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# **Alberta Building Code 2006**

**Volume 1**

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# Preface

## National Building Code of Canada 2005

The National Building Code of Canada 2005, together with the National Plumbing Code of Canada 2005 and the National Fire Code of Canada 2005, is an objective-based National Model Code that can be adopted by provincial and territorial governments.

In Canada, provincial and territorial governments have the authority to enact legislation that regulates building design and construction within their jurisdictions. This legislation may include the adoption of the National Building Code without change or with modifications to suit local needs, and the enactment of other laws and regulations regarding building design and construction, including the requirements for professional involvement.

The National Building Code is a model code that helps promote consistency among provincial and territorial building codes.

## Alberta Building Code 2006

By agreement with the National Research Council of Canada, Alberta is committed to using the National Building Code of Canada as its base document with changes and modifications to suit Alberta needs in regulating the design, construction, alteration, change of use and demolition of buildings.

The Alberta Building Code 2006 was established by the Building Technical Council, a technical council of the Safety Codes Council, after consultation with municipal authorities, provincial government departments, associations, other affected parties and Code users. The Code is published for Alberta by the National Research Council of Canada.

This edition of the Alberta Building Code succeeds the 1997 edition.

The Alberta Building Code sets out technical provisions for the design and construction of new buildings. It also applies to the alteration, change of use and demolition of existing buildings.

The Alberta Building Code establishes provisions to address the following five objectives, which are fully described in Division A of the Code:

- safety
- health
- accessibility for persons with disabilities
- fire and structural protection of buildings
- energy conservation

Code provisions do not necessarily address all the characteristics of buildings that might be considered to have a bearing on the Code's objectives. Through the extensive consensus process at the national and provincial levels, the code-user community has decided which characteristics should be regulated through the Alberta Building Code 2006.

The Alberta Building Code is not a textbook on building design or construction. The design of a technically sound building depends upon many factors beyond simple compliance with building regulations. Such factors include the availability of knowledgeable practitioners who have received appropriate education, training and experience and have some degree

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of familiarity with the principles of good building practice and experience using textbooks, reference manuals and technical guides.

The Alberta Building Code 2006 does not list acceptable proprietary building products. It establishes the criteria that building materials, products and assemblies must meet. Some of these criteria are explicitly stated in the Alberta Building Code while others are incorporated by reference to material or product standards published by standards development organizations. Only those portions of the standards related to the objectives of this Code are mandatory parts of the Alberta Building Code 2006.

## **Relationship between the Alberta Building Code and the Alberta Fire Code**

The Alberta Building Code 2006 and Alberta Fire Code 2006 each contain provisions that deal with the safety of persons in buildings in the event of a fire and the protection of buildings from the effects of fire.<sup>(1)</sup> These two Codes are developed as complementary and coordinated documents to minimize the possibility of their containing conflicting provisions. It is expected that buildings comply with both the Alberta Building Code and the Alberta Fire Code. The Alberta Building Code generally applies at the time of construction and reconstruction while the Alberta Fire Code applies to the operation and maintenance of the fire-related features of buildings in use.

The scope of each of these Codes with respect to fire safety and fire protection can be summarized as follows:

The Alberta Building Code covers the fire safety and fire protection features that are required to be incorporated in a building or facility at the time of its original construction. Building codes typically no longer apply once a building is occupied, unless the building is undergoing alteration or change of use, or being demolished.

The Alberta Fire Code includes provisions for:

- the on-going maintenance and use of the fire safety and fire protection features incorporated in buildings
- the conduct of activities that might cause fire hazards in and around buildings
- limitations on hazardous contents in and around buildings
- the establishment of fire safety plans
- fire safety at construction and demolition sites

In addition, the Alberta Fire Code contains provisions regarding fire safety and fire protection features that must be added to existing buildings when certain hazardous activities or processes are introduced in these buildings.

Some of the Alberta Fire Code's provisions are not duplicated directly in the Alberta Building Code but are in fact adopted through cross-references to the Alberta Fire Code. Thus, some Alberta Fire Code provisions may apply to original construction, alterations, or changes in use.

## **Code Development**

### **Development of the National Model Codes**

The Canadian Commission on Building and Fire Codes (CCBFC) is responsible for the content of the National Model Codes. The CCBFC is an independent body made up of volunteers from across the country and from all facets of the code-user community. Members of the CCBFC and its standing committees include builders, engineers, architects, building owners, building operators, fire and building officials, manufacturers and representatives of general interests.

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(1) The Alberta Fire Code also applies to other types of facilities besides buildings (e.g. tank farms and storage yards). Those applications are not discussed here.

The CCBFC is advised on scope, policy and technical issues pertaining to the Codes by the Provincial/Territorial Policy Advisory Committee on Codes (PTPACC), which is a committee of senior representatives from provincial/territorial ministries responsible for the regulation of buildings, fire safety and plumbing in their jurisdictions. The PTPACC was created by the provinces and territories, with provision of guidance to the CCBFC as one of its main functions. Through the PTPACC and its subcommittees on building, fire and plumbing regulation, the provinces and territories are engaged in every phase of the model code development process.

The Canadian Codes Centre of the National Research Council's Institute for Research in Construction provides technical and administrative support to the CCBFC and its standing committees. The National Research Council publishes the National Model Codes and periodic revisions to the Codes to address pressing issues.

The broader code-user community also makes a significant contribution to the model code development process by submitting requests for changes or additions to the Codes and by commenting on the collected proposed changes during the public consultations that precede each new edition.

The CCBFC takes into consideration the advice received from the provinces and territories as well as code users' comments at each stage of code development. The scope and content of the Model Codes are determined on a consensus basis, which involves the review of technical, policy and practical concerns and debate on the implications of these concerns.

More information on the code development process and guidelines for requesting changes to the National Building Code are available on the Internet at [www.nationalcodes.ca](http://www.nationalcodes.ca). Printed copies of this information and guidelines may also be requested from the Secretary of the CCBFC, at the address provided at the end of this Preface.

## **Development of the Alberta Safety Codes**

The Safety Codes Act is the legislation under which the Alberta Building Code is adopted. The Act also provides for the accreditation of organizations, certification and powers of the authority having jurisdiction, enforcement, appeals and penalties. Printed copies of the Safety Codes Act can be obtained from Alberta Queen's Printer on the Internet at [www.qp.gov.ab.ca](http://www.qp.gov.ab.ca) or at the address at the end of this Preface.

Under the authority of the Safety Codes Act, the Safety Codes Council is a statutory corporation that formulates and oversees the development and administration of safety codes and standards in Alberta. The Building Technical Council is one of ten councils forming the Safety Codes Council and deals with all matters related to buildings generally, excluding service and equipment installation.

Based on public review of a proposed new edition of the Alberta Building Code, the Building Technical Council established the content of the Code and proposed its adoption to the Minister of Municipal Affairs and Housing as an Alberta Regulation, the Alberta Building Code 2006.

Under the Safety Codes Act, Alberta adopts the latest edition of the National Building Code of Canada and makes changes so the resulting document fits the Alberta legislative framework and meets the needs of Albertans.

Guidelines for requesting changes to the Alberta Building Code are available on the Internet at [www.municipalaffairs.gov.ab.ca/ss\\_index.htm](http://www.municipalaffairs.gov.ab.ca/ss_index.htm). Printed copies of the guidelines may also be requested from Alberta Municipal Affairs and Housing at the address provided at the end of this Preface.

## **Code Provisions**

Every Alberta Building Code provision must address at least one of the Code's five stated objectives, namely:

- safety
- health
- accessibility for persons with disabilities
- fire and structural protection of buildings
- energy conservation

In dealing with proposed changes or additions to any of the Alberta Safety Codes, the Safety Codes Council considers many issues such as the following:

- Does the proposed provision provide the minimum level of performance—and no more than the minimum—needed to achieve the Code’s objectives?
- Will persons responsible for code compliance be able to act on or implement the provision using commonly accepted practices?
- Will enforcement agencies be able to enforce the provision?
- Are the costs of implementing the provision justifiable?
- Have the potential policy implications of the provision been identified and addressed?
- Is there broad consensus on this provision among code users representing all facets of the design and construction industries as well as among provincial and municipal authorities?

## Objective-Based Code Format

The Alberta Building Code is published in an objective-based code format for the first time in the 2006 edition. This is the result of ten years of work on an initiative that arose out of the strategic plan adopted by the Canadian Commission on Building and Fire Codes (CCBFC) in 1995.

The objective-based code format organizes the Alberta Building Code into three Divisions:

- Division A, which defines the scope of the Code and contains the objectives, the functional statements, the lists of objectives and functional statements attributed to the various Code provisions and the conditions necessary to achieve compliance;
- Division B, which contains acceptable solutions (formerly referred to as “technical requirements”) deemed to satisfy the objectives and functional statements listed in Division A; and
- Division C, which contains administrative provisions.

A more complete description of this division-based structure is included in the section entitled Structure of Objective-Based Codes.

Apart from the inclusion of changes resulting from the normal code development process, the provisions in Division B are essentially the same as the technical provisions found in the 1997 edition of the Alberta Building Code. However, in the Alberta Building Code 2006, most provisions in Division B are linked to:

- one or more objectives (such as safety or health) that individual provisions help to address, and
- one or more functional statements (statements on the functions of the building that a particular provision helps to achieve).

In addition, each Code provision is linked to two new types of explanatory material:

- intent statements (detailed statements on the specific intent of the provision), and
- application statements (detailed statements on what the provision applies to).

## Objectives

The Alberta Building Code’s objectives are fully defined in Section 2.2. of Division A. Most of the top-level objectives have two levels of sub-objectives.

The objectives describe, in very broad terms, the overall goals that the Alberta Building Code’s provisions are intended to achieve. They serve to define the boundaries of the subject areas the Code addresses. However, the Code does not deal with all the issues that might be considered to fall within those boundaries.

The objectives describe undesirable situations and their consequences, which the Code aims to avoid occurring in buildings. The wording of the definitions of the objectives includes two key phrases: “limit the probability” and “unacceptable risk.” The phrase “limit the probability” is used to acknowledge that the Alberta Building Code cannot entirely prevent those undesirable situations from happening. The phrase “unacceptable risk” acknowledges that the Alberta Building Code cannot eliminate all risk: the “acceptable risk” is the risk remaining once compliance with the Code has been achieved.

The objectives are entirely qualitative and are not intended to be used on their own in the design and approval processes.

## Functional Statements

The Alberta Building Code’s functional statements are listed in Section 3.2. of Division A.

The functional statements are more detailed than the objectives: they describe conditions in the building that help satisfy the objectives. The functional statements and the objectives are interconnected: there may be several functional statements related to any one objective and a given functional statement may describe a function of the building that serves to achieve more than one objective. There are tables located in Part 4 of Division A listing the sets of functional statements and objectives that have been attributed to provisions or portions of provisions for each Part of Division B.

Like objectives, functional statements are entirely qualitative and are not intended to be used on their own in the design and approval processes.

## Intent Statements

Intent statements explain, in plain language, the basic thinking behind each Code provision contained in Division B. Each intent statement, which is unique to the provision with which it is associated, explains how that provision helps to achieve its attributed objectives and functional statements. Like the objectives, the intent statements are expressed in terms of risk avoidance. They offer insight into the views of the responsible standing committees on what the Code provisions are intended to achieve.

The intent statements serve explanatory purposes only and do not form an integral part of the Code provisions: as such, they are similar in function to appendix notes. Due to the sheer volume of intent statements—thousands for the Alberta Building Code alone—they are only published in the electronic version of the Code.

## Application Statements

Application statements summarize what each Code provision does and does not apply to. They provide greater detail than the application information found in the body of the Code.

The application statements serve explanatory purposes only and do not form an integral part of the Code provisions: as such, they are similar in function to appendix notes. Due to the sheer volume of application statements—thousands for the Alberta Building Code alone—they are only published in the electronic version of the Code.

All this additional information—objectives and functional, intent and application statements—is intended to facilitate the implementation of the Code in three ways:

- **Clarity of intent:** The objectives, functional statements and intent statements linked to a Code provision clarify the reasoning behind that provision and facilitate understanding of what must be done to satisfy that provision. This added information may also help avoid disputes between practitioners and officials over these types of issues.
- **Clarity of application:** The application statement of a provision helps clarify whether the provision applies in a given situation.
- **Flexibility:** The additional information allows for flexibility in Code compliance. A person seeking to propose a new method or material not described or covered in the

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Code will be able to use the added information to understand the expected level of performance that their alternative solution must achieve to satisfy the Code.

## **Structure of Objective-Based Codes**

The Alberta Building Code 2006 is organized into three Divisions.

### **Division A: Compliance, Objectives, Functional Statements and Attribution Tables**

Division A defines the scope of the Alberta Building Code and presents the objectives that the Code addresses and the functions the building must perform to help to satisfy those objectives.

Division A cannot be used on its own as a basis for designing and constructing a building, or for evaluating a building's compliance with the Code.

### **Division B: Acceptable Solutions**

The term "requirements," which was used to describe the technical provisions contained in the Alberta Building Code 1997, has been replaced with the term "acceptable solutions" in the Alberta Building Code 2006. The change in terminology reflects the principle that building codes establish an acceptable level of risk and underlines the fact that a code cannot describe all possible valid design and construction options. The new term provokes the question "To whom are these solutions considered acceptable?" As indicated previously in this Preface, the acceptable solutions represent the minimum level of performance that will satisfy the Alberta Building Code's objectives and that is acceptable to an authority that adopts the Alberta Building Code into law or regulation.

Division B of the Alberta Building Code 2006 contains most of the provisions from the Alberta Building Code 1997, which code users are familiar with, together with the changes and additions resulting from the normal updating process. Compliance with the acceptable solutions is deemed to automatically satisfy the linked Division A objectives and functional statements.

Most provisions in Division B—now acceptable solutions—are linked to at least one objective and functional statement found in Division A. These linkages play an important role in allowing objective-based codes to accommodate innovation.

It is expected that the majority of Code users will primarily follow the acceptable solutions given in Division B and that they will consult Division A only in cases where it may serve to clarify the application of Division B's provisions to a particular situation or when they are considering an alternative solution.

### **Division C: Administrative Provisions**

Division C includes the administrative provisions formerly found in Parts 1 and 2 of the Alberta Building Code 1997 as well as some new administrative provisions.

### **Relationship between Division A and Division B**

Sentence 1.2.1.1.(1) of Division A is a very important new sentence: it is a precise statement of the relationship between Divisions A and B and is central to the concept of objective-based codes.

- 1)** Compliance with this Code shall be achieved by
- a) complying with the applicable acceptable solutions in Division B (see Appendix A), or
  - b) using alternative solutions that will achieve at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the applicable acceptable solutions (see Appendix A).

Clause (a) makes it clear that the acceptable solutions in Division B are automatically deemed to satisfy the linked objectives and functional statements of Division A.

Clause (b) introduces the new term “alternative solutions,” which echoes the concept of “equivalents” described in the Alberta Building Code 1997. This Clause makes it clear that alternative solutions can be used in lieu of compliance with the acceptable solutions. However, to do something different from the acceptable solutions described in Division B, a builder, designer or building owner must show that their proposed alternative solution will perform at least as well as the acceptable solution(s) it is replacing. The objectives and functional statements attributed to the acceptable solution(s) identify the areas of performance where this equivalence must be demonstrated.

In Alberta, the Safety Codes Act recognizes “alternative solutions” as variances. The Safety Codes Act has provisions to ensure that Variances are issued by appropriate individuals such as safety codes officers and administrators and registered with the Safety Codes Council. The Safety Codes Council can provide additional information on policy and procedures regarding the issuance of variances.

## Additional Information

### Numbering System

A consistent numbering system has been used throughout the Alberta Safety Codes. The first number indicates the Part of the Code; the second, the Section in the Part; the third, the Subsection; and the fourth, the Article in the Subsection. The detailed provisions are found at the Sentence level (indicated by numbers in brackets), and Sentences may be broken down into Clauses and Subclauses. This structure is illustrated as follows:

3	Part
3.5.	Section
3.5.2.	Subsection
3.5.2.1.	Article
3.5.2.1.(2)	Sentence
3.5.2.1.(2)(a)	Clause
3.5.2.1.(2)(a)(i)	Subclause

### Change Indication

Where a technical change or addition has been made relative to the 1995 edition of the National Building Code, a vertical line has been added in the margin next to the affected provision. A heavy vertical line in the margin indicates an addition or amendment to the National Building Code 2005 at the time it was adopted in Alberta as the Alberta Building Code 2006. No change indication has been provided in cases where provisions have been renumbered or deleted.

### Metric Conversion

All values in the Alberta Building Code are given in metric units. A conversion table of imperial equivalents for the most common units used in building design and construction is located at the end of the Code.

## Parts in Division B and Professional Disciplines

Division B is organized into Parts that are largely related to disciplines. However, this does not mean that persons of a certain discipline who are executing the design or construction of a particular building component can necessarily deal with only one Part of the Code in isolation since provisions related to that building component may be found in more than one Part.

### *Examples:*

Provisions that deal with fire safety issues related to heating, ventilating and air-conditioning systems are located in Part 3 of Division B, Fire Protection, Occupant Safety and Accessibility, and not in Part 6, Heating, Ventilating and Air-conditioning.

Structural requirements related to loads on handrails and grab bars are located in Part 3 of Division B, Fire Protection, Occupant Safety and Accessibility, while structural requirements related to loads on guards are located in Part 4, Structural Design.

For this reason, the part-based structure of Division B is not well suited for use as the basis for allocating responsibilities to different professions or as the basis for contractual arrangements.

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Manager  
Codes Production and Marketing  
Institute for Research in Construction  
National Research Council of Canada  
Ottawa, Ontario K1A 0R6

## Revisions, Errata and Bulletins

From time to time, Alberta Municipal Affairs and Housing and the Safety Codes Council issue revisions, errata or bulletins for the Alberta Building Code.

Errata are corrections that have been identified and are issued to facilitate correct use of the Code.

Revisions are changes to the Code that are implemented after publication. They are brought into force through a Building Code Amendment Regulation made pursuant to the Safety Codes Act.

Bulletins are known as STANDATA and come in three formats: Building Code Variances, Building Code Interpretations and Building Code Bulletins.

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Persons interested in receiving automatic e-mail notification of revisions, errata or bulletins can subscribe to a list server at [www.municipalaffairs.gov.ab.ca/ss\\_ss-standata.htm](http://www.municipalaffairs.gov.ab.ca/ss_ss-standata.htm).

## Contact Information

The CCBFC, Alberta Municipal Affairs and Housing, and the Safety Codes Council welcome comments and suggestions for improvements to the National and Alberta Building Codes.

Persons interested in requesting a change to a technical provision of the NBC should refer to the guidelines available on the Internet at [www.nationalcodes.ca](http://www.nationalcodes.ca), where additional information is also presented.

Persons interested in requesting a change to a technical provision of the Alberta Building Code should refer to the guidelines available on the Internet at [www.municipalaffairs.gov.ab.ca/ss\\_index.htm](http://www.municipalaffairs.gov.ab.ca/ss_index.htm).

Comments, suggestions and requests for printed copies of Code change guidelines referred to in this Preface should be sent to the CCBFC or Alberta Municipal Affairs and Housing at:

The Secretary  
Canadian Commission on Building and Fire Codes  
Institute for Research in Construction  
National Research Council of Canada  
Ottawa, Ontario K1A 0R6

or

Chief Building Administrator  
Alberta Municipal Affairs and Housing  
16th Floor, Commerce Place  
10155 - 102 Street  
Edmonton, Alberta T5J 4L4  
Phone: 1-866-421-6929 (within Canada)  
1-780-644-1010 (outside Canada)  
Fax: 1-780-427-8686  
E-mail: [safety.services@gov.ab.ca](mailto:safety.services@gov.ab.ca)  
Web: [www.municipalaffairs.gov.ab.ca/ss\\_index.htm](http://www.municipalaffairs.gov.ab.ca/ss_index.htm)

Requests to purchase printed copies of the Safety Codes Act and its regulations should be sent to the Alberta Queen's Printer at:

Alberta Queen's Printer  
Main Floor, Park Plaza  
10611 - 98 Avenue  
Edmonton, Alberta T5K 2P7  
Phone: 1-780-427-4952  
Fax: 1-780-452-0668  
Web: [www.qp.gov.ab.ca/index.cfm](http://www.qp.gov.ab.ca/index.cfm)



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# Relationship of the Alberta Building Code to Standards Development and Conformity Assessment

The development of many provisions in the Alberta Building Code 2006 and the assessment of conformity to those provisions are supported by several of the member organizations of Canada's National Standards System (NSS).

The NSS is a federation of accredited organizations concerned with standards development, certification, testing, inspection, personnel and management systems registration that is established under the auspices of the Standards Council of Canada Act. Activities of the NSS are coordinated by the Standards Council of Canada (SCC), which has accredited 4 standards development organizations, 27 certification organizations, 21 registration organizations, and almost 400 calibration and testing laboratories.

The SCC is a federal non-profit Crown corporation responsible for the coordination of voluntary standardization in Canada. It also has responsibilities for Canada's activities in voluntary international standardization.

## Canadian Standards

The Alberta Building Code 2006 contains many references to standards published by accredited standards development organizations in Canada. As part of the accreditation requirements, these organizations adhere to the principles of consensus. This generally means substantial majority agreement of a committee comprising a balance of producer, user and general interest members, and the consideration of all negative comments. The organizations also have formal procedures for the second-level review of the technical preparation and balloting of standards prepared under their auspices. (The Canadian Commission on Building and Fire Codes follows these same principles of consensus in the operation of its code development process.) The following organizations are accredited as standards development organizations in Canada:

- Bureau de normalisation du Québec (BNQ)
- Canadian General Standards Board (CGSB)
- Canadian Standards Association (CSA)
- Underwriters' Laboratories of Canada (ULC)

Table 1.3.1.2. of Division B lists the standards referenced in the Alberta Building Code. Standards proposed to be referenced in the Alberta Building Code are reviewed to ensure their contents are compatible with the Code. Thereafter, referenced standards are reviewed several times during each Code cycle. Standards development organizations are asked to provide information on any changes in the status of their standards referenced in the Alberta Building Code—withdrawals, amendments, new editions, etc. This information is passed on to the CCBFC, its standing committees, the Safety Codes Council, and interested stakeholders on particular issues, all of whom are given the opportunity to identify any problems associated with the changes. These bodies do not necessarily review in detail the revised standards; rather, the approach relies on the consensus process involved in the maintenance of the standards and on the extensive knowledge and backgrounds of committee members, provincial or territorial staff, NRC staff, and consulted stakeholders to identify changes in the standards that might create problems in the Code.

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## Non-Canadian Standards

A number of subject areas for which the Canadian standards development organizations have not developed standards are covered in the Alberta Building Code. In these cases, the Code often makes reference to standards developed by organizations in other countries, such as the American Society for Testing and Materials (ASTM) and the National Fire Protection Association (NFPA). These standards are developed using processes that may differ from those used by the Canadian standards development organizations; nevertheless, these standards have been reviewed by the relevant standing committees and found to be acceptable.

## Conformity Assessment

The Alberta Building Code 2006 establishes minimum measures, either within its own text or that of referenced standards. However, the Alberta Building Code does not deal with the question of who is responsible for assessing conformity to the measures or how those with this responsibility might carry it out. This responsibility is usually established by the governing legislation of the adopting provinces or territories. Provincial or territorial authorities should be consulted to determine who is responsible for conformity assessment within their jurisdiction.

Those persons responsible for ensuring that a material, appliance, system or equipment meets the performance requirements of this Code have several means available to assist them. These means vary from on-site inspection to the use of certification services provided by accredited third-party organizations. Test reports or mill certificates provided by manufacturers or suppliers can also assist in the acceptance of products. Engineering reports may be required for more complex products.

### Testing

The accreditation programs of the SCC include one for testing and calibration laboratories. Almost 400 organizations are accredited, with 68 accredited as capable of reliably testing building products to specified standards. The test results produced by these organizations can be used in the evaluation, qualification and certification of building products to Code provisions.

### Certification

Certification is the confirmation by an independent organization that a product or service meets a requirement. Certification of a product, process, or system entails physical examination, testing as specified in the appropriate standards, plant examination, and follow-up unannounced plant inspections. This procedure leads to the issuing of a formal assurance or declaration, by means of a certification mark or certificate, that the product, process or system is in full conformity with specified provisions.

In some cases, a product for which no standard exists can be certified using procedures and criteria developed by the accredited certifying organization and specifically designed to measure the performance of that product.

A complete list of accredited certification bodies can be found on SCC's Web site at [www.scc.ca](http://www.scc.ca). Certification bodies publish lists of certified products and companies.

### Registration

Quality Registration Organizations assess a company's conformance to quality assurance standards like the International Organization for Standardization ISO 9000.

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## **Evaluation**

An evaluation is a written opinion by an independent professional organization that a product will perform its intended function in a building. An evaluation is very often done to determine the ability of an innovative product, for which no standards exist, to satisfy the intent of a Code requirement. Follow-up plant inspections are not normally part of the evaluation process. Several organizations, including the Canadian Construction Materials Centre (CCMC), offer such evaluation services.

## **Qualification**

The qualification of building products also evaluates the ability of a product to perform its intended function by verifying that it meets the requirements of a standard. Qualification normally includes some follow-up plant inspection. Some organizations publish lists of qualified products that meet the specified requirements. Some organizations qualify manufacturing and/or testing facilities for building products for compliance with the Code and relevant standards.



# The Safety Codes Council

## Building Technical Council

George Sykora, Chair <sup>(1)</sup>	- Member-at-Large
Dave Monsen, Chair <sup>(2)</sup>	- Alberta Association of Architects
Larry Ochocki, Vice-Chair <sup>(3)</sup>	- City of Calgary/City of Edmonton
Bernie Williams, Vice-Chair <sup>(3)</sup>	- Alberta Fire Chiefs Association
Herman Bruin, Vice-Chair <sup>(4)</sup>	- Alberta Construction Association
Dick Walters, Vice-Chair <sup>(5)</sup>	- Association of Professional Engineers, Geologists and Geophysicists of Alberta
Avi Amir	- Alberta New Home Warranty Program
Bill Barnowich	- Alberta Building Officials Association
Jim Bassingthwaite	- Building Owners and Managers Association
Gord Bontje	- Urban Development Institute
Burgess Bredo	- Alberta Association of Architects
Doug Delmage	- Alberta Building Officials Association
Rick Ennis	- Alberta Alliance of Manufacturers & Exporters
Linden Holmen	- Alberta Home Builders' Association
Barry Laviolette	- Association of Professional Engineers, Geologists and Geophysicists of Alberta
Marty Lee	- Mechanical Contractors Association
Jim Marke	- Alberta Home Builders' Association
Ken McLaren	- Alberta Urban Municipalities Association

Mario Miglierina	- Alberta Construction Association
John Olson	- Urban Development Institute
Denis St. Onge	- Alberta Urban Municipalities Association
Martyn Piper	- Alberta Building Trades Council
Cal Ploof	- Alberta Building Trades Council
Ivan Villadsen	- Mechanical Contractors Association
Steve Walton	- Building Owners and Managers Association
Ed Wieclaw	- Alberta Association of Municipal Districts and Counties

## Technical Support

Chris Tye <sup>(6)</sup>	- Alberta Municipal Affairs and Housing
Chris Salvian <sup>(7)</sup>	- Alberta Municipal Affairs and Housing
Ata Khan <sup>(7)</sup>	- Alberta Municipal Affairs and Housing
Frank Cass <sup>(7)</sup>	- Alberta Municipal Affairs and Housing

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- (1) Term from November 2000 to present.
  - (2) Term from September 1994 to November 2000.
  - (3) Term from February 2006 to present.
  - (4) Term from March 1993 to January 2006.
  - (5) Term from September 1998 to January 2006.
  - (6) Administrator of the Alberta Building and Fire Codes.
  - (7) MA&H staff who provided assistance with the preparation of the 2006 Code.



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# **Division A**

## **Compliance, Objectives, Functional Statements and Attribution Tables**



# Part 1

## Compliance

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# Part 1 Compliance

## Section 1.1. General

### 1.1.1. Application of this Code

#### 1.1.1.1. Application of this Code

- 1)** This Code applies to any one or more of the following
  - a) the design of a *new building*,
  - b) the construction of a *new building*,
  - c) the *occupancy* of any *building*,
  - d) the change in *occupancy* of any *building*,
  - e) an *alteration* to any *building*,
  - f) an addition to any *building*,
  - g) the demolition of any *building*,
  - h) the reconstruction of any *building* that has been damaged by fire, earthquake or other cause,
    - i) the correction of an *unsafe condition* in or about any *building* or property,
    - j) all parts of any *building* affected by a change in *occupancy*,
  - k) the *work* necessary to ensure safety in parts of any *building* that
    - i) remain after demolition, or
    - ii) are affected by, but that are not directly involved in, additions or *alterations*,
  - l) the installation, replacement, or *alteration* of materials regulated by this Code,
  - m) the installation, replacement, or *alteration* of equipment regulated by this Code,
  - n) the *work* necessary to ensure safety in a relocated *building* during and after relocation, and
  - o) safety during construction of a *project*, including protection of the public and neighbouring properties.
- 2)** This Code applies both to site-assembled and factory-built *buildings*. (See Appendix A.)
- 3)** This Code shall take effect pursuant to the terms of the Building Code Regulation under the Safety Codes Act.
- 4)** This Code does not authorize the construction of a *building* for which a land use is not allowed pursuant to an Airport Vicinity Protection Area regulation under the Municipal Government Act.
- 5)** This Code does not apply
  - a) except for specific requirements in Part 7 of Division B, to a *building* of low human *occupancy* for the housing of livestock or the storage or maintenance of equipment or materials or produce associated with the operation of the farm or acreage on which it is located (see Appendix A),
  - b) to utility towers and poles, television and radio or other communications antennas or towers, except that loads resulting from those located on or attached to a *building* shall be included in the *building* design,
  - c) to water conveyance and control structures, except for a *building* provided for *occupancy*,
  - d) to highway and railway bridges,

- e) to mechanical process equipment and appliances in an *industrial occupancy* that are not required for *building* services and are not specifically regulated by this Code,
- f) to an accessory *building* not greater than 10 m<sup>2</sup> in *building area* that does not create a hazard, or
- g) except for ramps, stairs, platforms and associated *buildings*, to the category of elevating devices and amusement rides regulated under other regulations made pursuant to the Safety Codes Act.

### 1.1.1.2. Application to Existing Buildings

(See Appendix A.)

- 1) This Article applies to a *building* that has been legally built, occupied and used before 02 September 2007.
- 2) If a *building* is altered, rehabilitated, refurbished, renovated or repaired, the level of life safety and *building* performance shall not be decreased.
- 3) Except as specified in Part 10 of Division B, the *authority having jurisdiction* shall accept any construction or condition that lawfully existed in Alberta before 02 September 2007 if the construction or condition does not constitute an *unsafe condition*.
- 4) A change in *occupancy* or *alteration* of any *building* constructed before 02 September 2007 shall be permitted if the level of safety and *building* performance proposed are acceptable to the *authority having jurisdiction*.
- 5) For a *building* constructed before 02 September 2007, the *authority having jurisdiction* may accept an alternative or a proposal that achieves the appropriate level of safety for the specific activity for which the *building* is to be used.
- 6) The *authority having jurisdiction* may accept existing construction not in complete compliance with this Code, in which case it may be accepted subject to conditions.

### 1.1.1.3. Temporary Use

- 1) Except for *buildings* constructed under Part 10 of Division B, the *authority having jurisdiction* may allow, for a limited time only, the erection or relocation and existence of a *building* for an *occupancy* which may, because of its nature, exist for a short time, under circumstances which may warrant only selective compliance with this Code. (See Appendix A.)
- 2) The *building* allowed in Sentence (1) shall have posted
  - a) the time limitations imposed under Sentence (1),
  - b) any conditions of selective compliance imposed under Sentence (1), and
  - c) the permit.

## Section 1.2. Compliance

### 1.2.1. Compliance with this Code

#### 1.2.1.1. Compliance with this Code

- 1) Compliance with this Code shall be achieved by
  - a) complying with the applicable acceptable solutions in Division B (see Appendix A), or
  - b) using alternative solutions that will achieve at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the applicable acceptable solutions (see Appendix A).
- 2) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Division B shall be the objectives and functional statements referred to in Subsection 1.1.2. of Division B.

**1.2.2. Materials, Appliances, Systems and Equipment****1.2.2.1. Characteristics of Materials, Appliances, Systems and Equipment**

1) All materials, *appliances*, systems and equipment installed to meet the requirements of this Code shall possess the necessary characteristics to perform their intended functions when installed in a *building*.

2) Evaluation reports issued by the Canadian Construction Materials Centre, National Research Council of Canada, or an organization approved by the *Chief Building Administrator* may be used in determining compliance with the requirements of this Code.

3) The *Chief Building Administrator* may issue lists of materials or products that, in his opinion, satisfy the requirements of this Code and, after listing, may be used to fulfill the requirements of this Code.

**1.2.2.2. Storage on the Building Site**

1) All *building* materials, *appliances* and equipment on the *building* site shall be stored in such a way as to prevent the deterioration or impairment of their essential properties.

**1.2.2.3. Used Materials, Appliances and Equipment**

1) Unless otherwise specified, used materials, *appliances* and equipment are permitted to be reused when they meet the requirements of this Code for new materials, *appliances* and equipment and are satisfactory for the intended use.

**1.2.2.4. Asbestos**

1) Except as permitted by Sentence (2), no person shall install any product that has a potential for releasing asbestos fibres in a *building*.

2) Asbestos-cement board and asbestos-cement pipe may be used in a *building* but not in a supply or return air system.

**Section 1.3. Divisions A, B and C of this Code****1.3.1. General****1.3.1.1. Scope of Division A**

1) Division A contains the compliance and application provisions, objectives and functional statements of this Code.

**1.3.1.2. Scope of Division B**

1) Division B contains the acceptable solutions of this Code.

**1.3.1.3. Scope of Division C**

1) Division C contains the administrative provisions of this Code.

**1.3.1.4. Internal Cross-references**

1) Where the Division of a referenced provision is not specified in this Code, it shall mean that the referenced provision is in the same Division as the referencing provision.

**1.3.2. Application of Division A****1.3.2.1. Application of Parts 1, 2, 3 and 4**

1) Parts 1, 2, 3 and 4 of Division A apply to all *buildings* covered in this Code. (See Article 1.1.1.1.)

## 1.3.3.1.

## 1.3.3. Application of Division B

## 1.3.3.1. Application of Parts 1, 7 and 8

1) Parts 1, 7 and 8 of Division B apply to all *buildings* covered in this Code. (See Article 1.1.1.1.)

## 1.3.3.2. Application of Parts 3, 4, 5 and 6

1) Parts 3, 4, 5, and 6 of Division B apply to all *buildings* described in Article 1.1.1.1. and

- a) classified as *post-disaster buildings*,
- b) used for *major occupancies* classified as
  - i) Group A, *assembly occupancies*,
  - ii) Group B, *care or detention occupancies*, or
  - iii) Group F, Division 1, *high-hazard industrial occupancies*, or
- c) exceeding 600 m<sup>2</sup> in *building area* or exceeding 3 *storeys* in *building height* used for *major occupancies* classified as
  - i) Group C, *residential occupancies*,
  - ii) Group D, *business and personal services occupancies*,
  - iii) Group E, *mercantile occupancies*, or
  - iv) Group F, Divisions 2 and 3, *medium- and low-hazard industrial occupancies*.

## 1.3.3.3. Application of Parts 9, 10 and 11

1) Part 9 of Division B applies to all *buildings* described in Article 1.1.1.1. of 3 *storeys* or less in *building height*, having a *building area* not exceeding 600 m<sup>2</sup>, and used for *major occupancies* classified as

- a) Group C, *residential occupancies* (see Appendix Note A-9.1.1.1.(1) of Division B),
- b) Group D, *business and personal services occupancies*,
- c) Group E, *mercantile occupancies*, or
- d) Group F, Divisions 2 and 3, *medium- and low-hazard industrial occupancies*.

2) Part 10 of Division B applies to a *building* conforming to Sentence (3) in which accommodation is provided for an industrial work force living and working in a temporary location.

3) Part 10 of Division B applies to a

- a) one *storey building*
  - i) without sleeping accommodation, that is not more than 1200 m<sup>2</sup> in *building area* and if *sprinklered*, that is not more than 2400 m<sup>2</sup> in *building area*, or
  - ii) with sleeping accommodation, that is not more than 600 m<sup>2</sup> in *building area* and if *sprinklered*, that is not more than 1200 m<sup>2</sup> in *building area*, and
- b) two *storey building*
  - i) without sleeping accommodation, that is not more than 600 m<sup>2</sup> in *building area* and if *sprinklered*, that is not more than 1200 m<sup>2</sup> in *building area*, or
  - ii) with sleeping accommodation, that is not more than 300 m<sup>2</sup> in *building area* and if *sprinklered*, that is not more than 600 m<sup>2</sup> in *building area*.

4) Part 10 of Division B applies to Group D and Group F, Division 3 *occupancies* for a work force working in a temporary location.

5) Except as permitted in Sentence (6), Part 11 of Division B applies to a *building* constructed within an airport vicinity protection area that has been established by an Airport Vicinity Protection Area regulation under the Municipal Government Act.

- 6) Part 11 of Division B does not apply
  - a) to a *building* for which a land use is allowed by an Airport Vicinity Protection Area regulation under the Municipal Government Act and the regulation does not place any conditions with respect to acoustic insulation,
  - b) to any part of a *building* that is not designed for winter use when the outside temperature is below 0°C, or
  - c) to a *building* that was completed before 30 November 1983 or for which a *building* permit was issued before 30 November 1983.

#### 1.3.3.4. Building Size Determination

1) Where a *firewall* divides a *building*, each portion of the *building* so divided shall be considered as a separate *building*, except when this requirement is specifically modified in other parts of this Code. (See Appendix A.)

2) Except as permitted in Sentence (3), where portions of a *building* are completely separated by a vertical *fire separation* that has a *fire-resistance rating* of not less than 1 h and extends through all *storeys* and *service spaces* of the separated portions, each separated portion is permitted to be considered as a separate *building* for the purpose of determining *building height*, provided

- a) each separated portion is not more than 3 *storeys* in *building height* and is used only for *residential occupancies*, and
- b) the unobstructed path of travel for a firefighter from the nearest *street* to one entrance of each separated portion is not more than 45 m.

(See Appendix A.)

3) The vertical *fire separation* referred to in Sentence (2) may terminate at the floor assembly immediately above a *basement* provided the *basement* conforms to Article 3.2.1.2. of Division B.

#### 1.3.4. Application of Division C

##### 1.3.4.1. Application of Parts 1 and 2

1) Parts 1 and 2 of Division C apply to all *buildings* covered in this Code. (See Article 1.1.1.1.)

## Section 1.4. Terms and Abbreviations

### 1.4.1. Definitions of Words and Phrases

#### 1.4.1.1. Non-defined Terms

1) Words and phrases used in this Code that are not included in the list of definitions in Article 1.4.1.2. shall have the meanings defined in the Safety Codes Act, Alberta Fire Code 2006, National Plumbing Code 2005, or that are commonly assigned to them in the context in which they are used, taking into account the specialized use of terms by the various trades and professions to which the terminology applies.

2) Where objectives and functional statements are referred to in this Code, they shall be the objectives and functional statements described in Parts 2, 3 and 4.

3) Where acceptable solutions are referred to in this Code, they shall be the provisions stated in Parts 3 to 11 of Division B.

4) Where alternative solutions are referred to in this Code, they shall be the alternative solutions mentioned in Clause 1.2.1.1.(1)(b).

5) For words not defined by Sentence (1), reference should be made to the Canadian Oxford Dictionary (Second Edition), published by Oxford University Press.

1.4.1.2. **Defined Terms**

**1)** The words and terms in italics in this Code have the following meanings:

- Abattoir* means premises where animals are slaughtered and meat is cut, wrapped, frozen, cured, smoked or aged.
- Access to exit* means that part of a *means of egress* within a *floor area* that provides access to an *exit* serving the *floor area*.
- Acoustic insulation factor* means a number that is used as a measure of the reduction in the level of aircraft noise provided by the assemblies forming the exterior envelope of a *building*.
- Adfreezing* means the adhesion of *soil* to a *foundation unit* resulting from the freezing of *soil water*. (Also referred to as “frost grip.”)
- Air barrier system* means the assembly installed to provide a continuous barrier to the movement of air.
- Air-supported structure* means a structure consisting of a pliable membrane which achieves and maintains its shape and support by internal air pressure.
- Alarm signal* means an audible signal transmitted throughout a zone or zones or throughout a *building* to advise occupants that a fire emergency exists.
- Alert signal* means an audible signal to advise designated persons of a fire emergency.
- Alteration* means a change or extension to any matter or thing or to any *occupancy* regulated by this Code.
- Appliance* means a device to convert electrical energy or fuel into thermal energy, and includes all components, controls, wiring and piping required to be part of the device by the applicable standard referred to in this Code.
- Architectural work* means the preparation of designs, graphic representations, plans, drawings, detail drawings or specifications for the erection, construction or *alteration* of, or addition to a *building* but does not include *engineering work*.
- Artesian groundwater* means a confined body of water under pressure in the ground.
- Assembly occupancy* means the *occupancy* or the use of a *building*, or part thereof, by a gathering of persons for civic, political, travel, religious, social, educational, recreational or like purposes, or for the consumption of food or drink.
- Attic or roof space* means the space between the roof and the ceiling of the top *storey* or between a dwarf wall and a sloping roof.
- Authority having jurisdiction* means a safety codes officer in the building discipline exercising authority pursuant to designation of powers and terms of employment in accordance with the Safety Codes Act.
- Barrier-free* means that a *building* and its facilities can be approached, entered, and used by persons with physical, mental or sensory disabilities.
- Basement* means a *storey* or *storeys* of a *building* located below the *first storey*.
- Bather* means a person actually in or on the water of a *swimming pool*.
- Bathing load* means the maximum number of *bathers* allowed for in the design.
- Bearing surface* means the contact surface between a *foundation unit* and the *soil* or *rock* upon which it bears.
- Boiler* means an *appliance* intended to supply hot water or steam for space heating, processing or power purposes.
- Breeching* means a *flue pipe* or chamber for receiving *flue* gases from one or more *flue* connections and for discharging these gases through a single *flue* connection.
- Building* means any structure used or intended for supporting or sheltering any use or *occupancy*.
- Building area* means the greatest horizontal area of a *building* above *grade* within the outside surface of exterior walls or within the outside surface of exterior walls and the centre line of *firewalls*.

*Building height (in storeys)* means the number of *storeys* contained between the roof and the floor of the *first storey*.

*Business and personal services occupancy* means the *occupancy* or use of a *building* or part thereof for the transaction of business or the rendering or receiving of professional or personal services.

*Caisson* (see *Pile*).

*Campground* means land on which a person is commonly permitted to erect tents or park recreational vehicles for the purpose of overnight camping, and includes any *building*, structure, tent, vehicle or enclosure that is located on the land and is used as part of the facility.

*Care or detention occupancy* means the *occupancy* or use of a *building* or part thereof by persons who require special care or treatment because of cognitive or physical limitations or by persons who are restrained from, or are incapable of, self-preservation because of security measures not under their control.

*Cavity wall* means a construction of masonry units laid with a cavity between the wythes. The wythes are tied together with metal ties or bonding units, and are relied on to act together in resisting lateral loads.

*Cemetery* means land that is set apart or land that is used for the burial of dead human bodies or other human remains or in which dead human bodies or other human remains are buried.

*Chief Building Administrator* means a person in the building discipline appointed as an Administrator under the Safety Codes Act.

*Chimney* means a primarily vertical shaft enclosing at least one *flue* for conducting *flue* gases to the outdoors.

*Chimney liner* means a conduit containing a *chimney flue* used as a lining of a *masonry or concrete chimney*.

*Closure* means a device or assembly for closing an opening through a *fire separation* or an exterior wall, such as a door, a shutter, wired glass or glass block, and includes all components such as hardware, closing devices, frames and anchors.

*Columbarium* means a *building* or part thereof designed for storing the ashes of dead human bodies or other human remains that have been cremated.

*Combustible* means that a material fails to meet the acceptance criteria of CAN/ULC-S114, "Test for Determination of Non-Combustibility in Building Materials."

*Combustible construction* means that type of construction that does not meet the requirements for *noncombustible construction*.

*Combustible liquid* means a liquid having a *flash point* at or above 37.8°C and below 93.3°C.

*Commercial beach* means any natural body of water used by persons for swimming or bathing, together with the shores, *building*, equipment and appurtenances thereto available to the public and for the use of which persons are either directly charged a fee, or indirectly charged a fee through the commercial exploitation of the area adjacent to or in proximity to the body of water.

*Conditioned space* means any space within a *building* the temperature of which is controlled to limit variation in response to the exterior ambient temperature by the provision, either directly or indirectly, of heating or cooling over substantial portions of the year.

*Constructor* means a person who contracts with an *owner* or their authorized agent to undertake a *project*, and includes an *owner* who contracts with more than one person for the *work* on a *project* or undertakes the *work* on a *project* or any part thereof.

*Constructed beach* means a basin of water that

- (a) is artificially created,
- (b) has a depth of more than 600 mm at any point, and

- (c) is for swimming or recreative bathing as its principal intended use, and includes the shore, grounds, *buildings* and equipment used in connection with the body of water, but does not include a *swimming pool* or *wading pool* as defined in this Code.

*Contained use area* means a supervised area containing one or more rooms in which occupant movement is restricted to a single room by security measures not under the control of the occupant.

*Coordinating registered professional* means a *registered professional* retained to coordinate all design work and field reviews of the *registered professionals of record* required for the project.

*Crematory* means a *building* or part thereof fitted with proper *appliances* for the purpose of incineration or cremation of dead human bodies, and includes everything incidental or ancillary thereto.

*Dairy manufacturing plant* means an establishment in which milk, cream, butter, cheese, ice cream, condensed milk, evaporated milk, milk powder, dry milk, malted milk, sherbet or any other product manufactured wholly or mainly from milk, is processed, manufactured, reprocessed, packed or repacked.

*Day care facility* means a day care centre, drop-in centre or nursery school for children under seven years who are not attending school on a full-time basis.

*Day use area* means a specifically designated parcel or tract of land where a camper may picnic or partake in day use activities but does not include playgrounds, sports grounds, rodeo grounds or exhibition grounds.

*Dead load* means the weight of all permanent structural and non-structural components of a *building*.

*Deep foundation* means a *foundation unit* that provides support for a *building* by transferring loads either by end-bearing to *soil* or *rock* at considerable depth below the *building*, or by adhesion or friction, or both, in the *soil* or *rock* in which it is placed. *Piles* are the most common type of *deep foundation*.

*Designer* means the person responsible for the design.

*Direct-vented* (as applying to a fuel-fired space- or water-heating *appliance*) means an *appliance* and its venting system in which all the combustion air is supplied directly from the outdoors and the products of combustion are vented directly to the outdoors via independent, totally enclosed passageways connected directly to the *appliance*.

*Dwelling unit* means a *suite* operated as a housekeeping unit, used or intended to be used by one or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities.

*Engineering work* means the preparation of designs, plans, drawings, detail drawings, specifications or graphic representations for electrical, mechanical and structural systems or components in *buildings*, and includes any applicable geotechnical *engineering work*.

*Excavation* means the space created by the removal of *soil*, *rock* or *fill* for the purposes of construction.

*Exhaust duct* means a duct through which air is conveyed from a room or space to the outdoors.

*Exit* means that part of a *means of egress*, including doorways, that leads from the *floor area* it serves to a separate *building*, an open public thoroughfare, or an exterior open space protected from fire exposure from the *building* and having access to an open public thoroughfare. (See Appendix A.)

*Exit level* means the level of an *exit* stairway at which an exterior *exit* door or *exit* passageway leads to the exterior.

*Exit storey* (as applying to Subsection 3.2.6. of Division B) means a *storey* having an exterior *exit* door.

- Exposing building face* means that part of the exterior wall of a *building* that faces one direction and is located between ground level and the ceiling of its top *storey* or, where a *building* is divided into *fire compartments*, the exterior wall of a *fire compartment* that faces one direction.
- Factory-built chimney* means a *chimney* consisting entirely of factory-made parts, each designed to be assembled with the other without requiring fabrication on site.
- Field review* means a review of the *work* to which a *project* relates at the *project* site, and at locations where *building* components are fabricated for use at the *project* site.
- Fill* means *soil*, *rock*, rubble, industrial waste such as slag, organic material or a combination of these that is transported and placed on the natural surface of *soil* or *rock* or organic terrain. It may or may not be compacted.
- Fire compartment* means space in a *building* that is enclosed by exterior walls or is separated from all other parts of the *building* by enclosing construction providing a *fire separation* having a required *fire-resistance rating*.
- Fire damper* means a *closure* consisting of a damper that is installed in an air distribution system or a wall or floor assembly and that is normally held open but designed to close automatically in the event of a fire in order to maintain the integrity of the *fire separation*.
- Fire detector* means a device that detects a fire condition and automatically initiates an electrical signal to actuate an *alert signal* or *alarm signal* and includes *heat detectors* and *smoke detectors*.
- Fire load* (as applying to an *occupancy*) means the *combustible* contents of a room or *floor area* expressed in terms of the average weight of *combustible* materials per unit area, from which the potential heat liberation may be calculated based on the calorific value of the materials, and includes the furnishings, finished floor, wall and ceiling finishes, trim and temporary and movable *partitions*.
- Fire-protection rating* means the time in minutes or hours that a *closure* will withstand the passage of flame when exposed to fire under specified conditions of test and performance criteria, or as otherwise prescribed in this Code.
- Fire-resistance rating* means the time in minutes or hours that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in this Code. (See Appendix Note D-1.2.1.(2) of Division B.)
- Fire-retardant-treated wood* means wood or a wood product that has had its surface-burning characteristics, such as flame spread, rate of fuel contribution and density of smoke developed, reduced by impregnation with fire-retardant chemicals.
- Fire separation* means a construction assembly that acts as a barrier against the spread of fire. (See Appendix A.)
- Fire stop flap* means a device intended for use in horizontal assemblies required to have a *fire-resistance rating* and incorporating protective ceiling membranes, which operates to close off a duct opening through the membrane in the event of a fire.
- Firewall* means a type of *fire separation* of *noncombustible construction* that subdivides a *building* or separates adjoining *buildings* to resist the spread of fire and that has a *fire-resistance rating* as prescribed in this Code and has structural stability to remain intact under fire conditions for the required fire-rated time.
- First storey* means the uppermost *storey* having its floor level not more than 2 m above *grade*.
- Flame-spread rating* means an index or classification indicating the extent of spread-of-flame on the surface of a material or an assembly of materials as determined in a standard fire test as prescribed in this Code.
- Flammable liquid* means a liquid having a *flash point* below 37.8°C and having a vapour pressure not more than 275.8 kPa (absolute) at 37.8°C as determined by ASTM D 323, "Vapor Pressure of Petroleum Products (Reid Method)."

- Flash point* means the minimum temperature at which a liquid within a container gives off vapour in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.
- Floor area* means the space on any *storey* of a *building* between exterior walls and required *firewalls*, including the space occupied by interior walls and *partitions*, but not including *exits*, *vertical service spaces*, and their enclosing assemblies.
- Flue* means an enclosed passageway for conveying *flue* gases.
- Flue collar* means the portion of a fuel-fired *appliance* designed for the attachment of the *flue pipe* or *breeching*.
- Flue pipe* means the pipe connecting the *flue collar* of an *appliance* to a *chimney*.
- Foamed plastic* means all materials that are homogeneous systems comprised of at least two phases, one is a continuous polymeric organic material, and the second is deliberately introduced for the purpose of distributing a gas in voids throughout the material, thereby achieving a reduction in density of the base material. Examples include but are not limited to polyisocyanurate foam, polystyrene foam, polyurethane foam and polyvinyl chloride foam.
- Food area* means any area in a *food establishment* where food is processed, handled, served or stored as part of the normal operation of the *food establishment*.
- Food establishment* means premises where food that is intended for consumption by the public is served, offered for sale, displayed, processed, packaged, stored or handled.
- Forced-air furnace* means a *furnace* equipped with a fan that provides the primary means for the circulation of air.
- Foundation* means a system or arrangement of *foundation units* through which the loads from a *building* are transferred to supporting *soil* or *rock*.
- Foundation unit* means one of the structural members of the *foundation* of a *building* such as a footing, raft or *pile*.
- Frost action* means the phenomenon that occurs when water in *soil* is subjected to freezing which, because of the water/ice phase change or ice lens growth, results in a total volume increase or the build-up of expansive forces under confined conditions or both, and the subsequent thawing that leads to loss of *soil* strength and increased compressibility.
- Furnace* means a *space-heating appliance* using warm air as the heating medium and usually having provision for the attachment of ducts.
- Gas vent* means that portion of a venting system designed to convey vent gases to the outdoors from the *vent connector* of a gas-fired *appliance* or directly from the *appliance* when a *vent connector* is not used.
- Grade* (as applying to the determination of *building height*) means the lowest of the average levels of finished ground adjoining each exterior wall of a *building*, except that localized depressions such as for vehicle or pedestrian entrances need not be considered in the determination of average levels of finished ground. (See *First storey*.)
- Groundwater* means a free standing body of water in the ground.
- Groundwater level* (groundwater table) means the top surface of a free standing body of water in the ground.
- Guard* means a protective barrier around openings in floors or at the open sides of stairs, landings, balconies, *mezzanines*, galleries, raised *walkways* or other locations to prevent accidental falls from one level to another. Such a barrier may or may not have openings through it.
- Heat detector* means a *fire detector* designed to operate at a predetermined temperature or rate of temperature rise.
- Heavy timber construction* means that type of *combustible construction* in which a degree of fire safety is attained by placing limitations on the sizes of wood structural members and on the thickness and composition of wood floors and roofs and by the avoidance of concealed spaces under floors and roofs.

*High-hazard industrial occupancy* (Group F, Division 1) means an *industrial occupancy* containing sufficient quantities of highly *combustible* and flammable or explosive materials which, because of their inherent characteristics, constitute a special fire hazard.

*Horizontal exit* means an *exit* from one *building* to another by means of a doorway, vestibule, *walkway*, bridge or balcony.

*Horizontal service space* means a space such as an attic, duct, ceiling, roof or crawl space oriented essentially in a horizontal plane, concealed and generally inaccessible, through which *building* service facilities such as pipes, ducts and wiring may pass.

*Impeded egress zone* means a supervised area in which occupants have free movement but require the release, by security personnel, of security doors at the boundary before they are able to leave the area, but does not include a *contained use area*.

*Indirect service water heater* means a *service water heater* that derives its heat from a heating medium such as warm air, steam or hot water.

*Industrial occupancy* means the *occupancy* or use of a *building* or part thereof for the assembling, fabricating, manufacturing, processing, repairing or storing of goods and materials.

*Interconnected floor space* means superimposed *floor areas* or parts of *floor areas* in which floor assemblies that are required to be *fire separations* are penetrated by openings that are not provided with *closures*.

*Interior design* means that portion of the practice of architecture that is limited to

- (a) giving advice or preparing designs, plans, drawings, detail drawings, specifications or graphic representations respecting
  - (i) interior finishes in a *building*,
  - (ii) fixed or loose furnishings, equipment or fixtures for use in a *building*, or
  - (iii) partitions in a *building* that are used to subdivide a *floor area*, and
- (b) the administering of construction contracts, inspection of *work* and assessment of the performance of *work*, and the quality of materials related to the *work* described in Clause (a),

but does not include services that

- (a) affect the structural integrity of a *building*, including removal of or *alterations* to floor and roof elements,
- (b) affect the electrical or mechanical systems of a *building*,
- (c) alter the construction or location of a *building* enclosure system,
- (d) add usable floor space through the addition of *mezzanines*, infill or similar elements, or
- (e) through organization or change in *occupancy*, affect the number, location or size of *exits* or stairways within or attached to a *building* or proposed *building*.

*Limiting distance* means the distance from an *exposing building face* to a property line, the centre line of a *street*, lane or public thoroughfare, or to an imaginary line between 2 *buildings* or *fire compartments* on the same property, measured at right angles to the *exposing building face*.

*Live load* means a variable load due to the intended use and *occupancy* that is to be assumed in the design of the structural members of a *building*. It includes loads due to cranes and the pressure of liquids in containers.

*Loadbearing* (as applying to a *building* element) means subjected to or designed to carry loads in addition to its own *dead load*, excepting a wall element subjected only to wind or earthquake loads in addition to its own *dead load*.

*Low-hazard industrial occupancy* (Group F, Division 3) means an *industrial occupancy* in which the *combustible* content is not more than 50 kg/m<sup>2</sup> or 1200 MJ/m<sup>2</sup> of *floor area*.

*Major occupancy* means the principal *occupancy* for which a *building* or part thereof is used or intended to be used, and shall be deemed to include the subsidiary *occupancies* that are an integral part of the principal *occupancy*. The *major occupancy* classifications used in this Code are as follows:

- A1 – *Assembly occupancies* intended for the production and viewing of the performing arts

- A2 – *Assembly occupancies* not elsewhere classified in Group A
- A3 – *Assembly occupancies* of the arena type
- A4 – *Assembly occupancies* in which the occupants are gathered in the open air
- B1 – *Care or detention occupancies* in which persons are under restraint or are incapable of self-preservation because of security measures not under their control
- B2 – *Care or detention occupancies* in which persons having cognitive or physical limitations require special care or treatment
- C – *Residential occupancies*
- D – *Business and personal services occupancies*
- E – *Mercantile occupancies*
- F1 – *High-hazard industrial occupancies*
- F2 – *Medium-hazard industrial occupancies*
- F3 – *Low-hazard industrial occupancies*

*Manufactured home* means a factory-constructed detached *dwelling unit* readily relocatable as a single unit or in modules.

*Masonry or concrete chimney* means a *chimney* of brick, stone, concrete or masonry units constructed on site.

*Mausoleum* means a structure wholly or partly above the level of the ground that is designed for the burial or storage of dead human bodies.

*Maximum design bathing load* means the maximum number of *bathers* in any 24 hour period based on the capacity of the filtration system of a *swimming pool*.

*Means of egress* means a continuous path of travel provided for the escape of persons from any point in a *building* or contained open space to a separate *building*, an open public thoroughfare, or an exterior open space protected from fire exposure from the *building* and having access to an open public thoroughfare. *Means of egress* includes *exits* and *access to exits*.

*Mechanically vented* (as applying to a fuel-fired space- or water-heating *appliance*) means an *appliance* and its venting system in which the products of combustion are entirely exhausted to the outdoors by a mechanical device, such as a fan, blower or aspirator, upstream or downstream from the combustion zone of the *appliance*, via independent, totally enclosed passageways connected directly to the *appliance*. (See Appendix A.)

*Medium-hazard industrial occupancy* (Group F, Division 2) means an *industrial occupancy* in which the *combustible* content is more than 50 kg/m<sup>2</sup> or 1200 MJ/m<sup>2</sup> of *floor area* and not classified as a *high-hazard industrial occupancy*.

*Mercantile occupancy* means the *occupancy* or use of a *building* or part thereof for the displaying or selling of retail goods, wares or merchandise.

*Mezzanine* means an intermediate floor assembly between the floor and ceiling of any room or *storey* and includes an interior balcony.

*New building* means a *building*

- (a) that was not substantially completed on or before 02 September 2007, or
- (b) for which an application for a *permit* was not submitted to the *authority having jurisdiction* on or before 02 September 2007.

*Noise contour* means the value of the noise exposure forecast or the noise exposure projection at a *building* site as determined from an Airport Vicinity Protection Area regulation under the Municipal Government Act.

*Noncombustible* means that a material meets the acceptance criteria of CAN/ULC-S114, "Test for Determination of Non-Combustibility in Building Materials."

*Noncombustible construction* means that type of construction in which a degree of fire safety is attained by the use of *noncombustible* materials for structural members and other *building* assemblies.

*Occupancy* means the use or intended use of a *building* or part thereof for the shelter or support of persons, animals or property.

*Occupant load* means the number of persons for which a *building* or part thereof is designed.

*Open air storey* means a *storey* in which at least 25% of the total area of its perimeter walls is open to the outdoors in a manner that will provide cross-ventilation to the entire *storey*.

*Owner* means a person who

- (a) controls the property under consideration,
- (b) holds themselves out as the person having the powers and authority of ownership or who for the time being exercises the powers and authority of ownership,
- (c) is registered under provincial legislation as the *owner* of a freehold estate in possession of land, or
- (d) has purchased or otherwise acquired land, whether they have purchased or otherwise acquired the land directly from a previous *owner* or from another purchaser, and have not yet registered their ownership.

*Partition* means an interior wall 1 *storey* or part-*storey* in height that is not *loadbearing*.

*Party wall* means a wall jointly owned and jointly used by 2 parties under easement agreement or by right in law, and erected at or upon a line separating 2 parcels of land each of which is, or is capable of being, a separate real-estate entity.

*Perched groundwater* means a free standing body of water in the ground extending to a limited depth.

*Permit* means, for the purposes of this Code, permission or authorization in writing to commence the use, *occupancy*, relocation, construction or demolition of any *building*.

*Personal service facilities* means those premises where there is skin to skin contact between the personal service worker and the client resulting in the possible transfer of viruses or bacteria.

*Pile* means a slender *deep foundation unit* made of materials such as wood, steel or concrete or a combination thereof, that is either premanufactured and placed by driving, jacking, jetting or screwing, or cast-in-place in a hole formed by driving, excavating or boring. (Cast-in-place bored *piles* are often referred to as *caissons* in Canada.)

*Plenum* means a chamber forming part of an air duct system.

*Plumbing system* means a drainage system, a venting system and a water system or parts thereof.

*Post-disaster building* means a *building* that is essential to the provision of services in the event of a disaster, and includes

- hospitals, emergency treatment facilities and blood banks,
- telephone exchanges,
- power generating stations and electrical substations,
- control centres for air, land and marine transportation,
- public water treatment and storage facilities, and pumping stations,
- sewage treatment facilities and *buildings* having critical national defence functions, and
- *buildings* of the following types, unless exempted from this designation by the *authority having jurisdiction*:
  - emergency response facilities,
  - fire, rescue and police stations and housing for vehicles, aircraft or boats used for such purposes, and
  - communications facilities, including radio and television stations.

(See Appendix A.)

*Private sewage disposal system* means a privately owned plant for the treatment and disposal of sewage (such as a septic tank with an absorption field).

*Private swimming pool* means a *swimming pool* that is constructed for the use of a single family *dwelling unit* by the *owners* and their guests.

*Professional engineer* means, for the purposes of this Code, an individual who holds a certificate of registration, licence or certificate of authorization to engage in the practice of engineering under the Engineering, Geological and Geophysical Professions Act.

*Project* means any construction, *alteration* or demolition operation.

*Protected floor space* means that part of a *floor area* protected from the effects of fire and used as part of a *means of egress* from an *interconnected floor space*.

*Public corridor* means a corridor that provides *access to exit* from more than one *suite*. (See Appendix A.)

*Public swimming pool* means a *swimming pool*

- (a) generally available for use by the public or any segment of the public, or
- (b) operated in conjunction with the program of an educational, instructional, physical fitness or athletic institution supported in whole or in part by public funds or public subscription.

*Public way* means a sidewalk, *street*, highway, square or other open space to which the public has access, as of right or by invitation, expressed or implied.

*Range* means a cooking *appliance* equipped with a cooking surface and one or more ovens.

*Receiving pool* means a *swimming pool* located to receive *sliders* at the base of one or more slides in a *water theme park*.

*Recreation camp* means a camp that contains accommodation facilities used wholly or partly for recreational purposes, and without limitation, includes the following

- (a) trail riding ranches and guest ranches,
- (b) rural experience camps,
- (c) nature experience camps,
- (d) survival training camps,
- (e) fishing, hunting, skiing, golf or fitness camps,
- (f) religious camps,
- (g) nudist camps,
- (h) camps for persons with disabilities, and
- (i) rehabilitation camps for mental illness, alcoholism or weight loss.

*Registered architect* means a person who holds a certificate of registration or a licence to engage in the practice of architecture under the Architects Act.

*Registered professional* means a person who is registered or licensed to practice as

- (a) an architect under the Architects Act, or
- (b) a professional engineer under the Engineering, Geological and Geophysical Professions Act.

*Registered professional of record* means a *registered professional* retained to be responsible for the integrity and completeness of the design and *field reviews* of one or more of the following elements of a *project*:

- (a) architectural,
- (b) structural,
- (c) mechanical,
- (d) electrical, and
- (e) geotechnical.

*Repair garage* means a *building* or part thereof where facilities are provided for the repair or servicing of motor vehicles.

*Residential occupancy* means the *occupancy* or use of a *building* or part thereof by persons for whom sleeping accommodation is provided but who are not harboured or detained to receive medical care or treatment or are not involuntarily detained.

*Restaurant* means a *food establishment* where food is sold or distributed in a state ready for immediate consumption and that has

- (a) seating or standing room designed for food consumption by patrons, or
- (b) parking space under the control of the *owner* provided so that a patron may consume food in a vehicle, and includes a canteen, cafeteria, dining room or similar facility provided for employees, staff or students.

*Return duct* means a duct for conveying air from a space being heated, ventilated or air-conditioned back to the heating, ventilating or air-conditioning *appliance*.

*Rock* means that portion of the earth's crust that is consolidated, coherent and relatively hard and is a naturally formed, solidly bonded, mass of mineral matter that cannot readily be broken by hand.

*Sanitary drainage system* means a drainage system that conducts sewage.

*Secondary meat processing plant* means a *food establishment* where carcasses or primal cuts are converted to saleable products for wholesale distribution.

*Secondary suite* means a second self-contained *dwelling unit* that is located within a primary *dwelling unit*, where both *dwelling units* are registered under the same land title. (See Appendix A.)

*Semi-public swimming pool* means a *swimming pool*

- (a) provided by a hotel, motel, apartment *building*, condominium, multiple housing unit, *manufactured home* park, trailer park, private educational institution or private club, the use of which is restricted entirely to the registered guests, owners, tenants, students or members, as the case may be, and their guests,
- (b) operated on the premises of a recreational camp for use by campers and their visitors and camp personnel, or
- (c) operated in conjunction with
  - (i) a day nursery,
  - (ii) a day camp,
  - (iii) an institution for the care or treatment of the ill, aged or infirm, or
  - (iv) an institution housing persons in custodial care, and includes a *private swimming pool* that is used by a charitable, religious, community or service organization for the purpose of providing swimming lessons.

*Service room* means a room provided in a *building* to contain equipment associated with *building* services. (See Appendix A.)

*Service space* means space provided in a *building* to facilitate or conceal the installation of *building* service facilities such as chutes, ducts, pipes, shafts or wires.

*Service water heater* means a device for heating water for plumbing services.

*Shallow foundation* means a *foundation unit* that derives its support from *soil* or *rock* located close to the lowest part of the *building* that it supports.

*Slider* means a *bather* who is using water slide flumes or similar facilities at a *water theme park*.

*Slow burning solid fuel fired appliance* means an *appliance* that has provision, including gasketed or machined areas on the loading doors, to control the rate of combustion to a point where the formation of creosote in the *chimney flue* is a distinct possibility. (These are also referred to as airtight stoves.)

*Smoke alarm* means a combined *smoke detector* and audible alarm device designed to sound an alarm within the room or *suite* in which it is located upon the detection of smoke within that room or *suite*.

*Smoke detector* means a *fire detector* designed to operate when the concentration of airborne combustion products exceeds a predetermined level.

*Soil* means that portion of the earth's crust that is fragmentary, or such that some individual particles of a dried sample may be readily separated by agitation in water; it includes boulders, cobbles, gravel, sand, silt, clay and organic matter.

*Space heater* means a *space-heating appliance* for heating the room or space within which it is located, without the use of ducts.

*Space-heating appliance* means an *appliance* intended for the supplying of heat to a room or space directly, such as a *space heater*, fireplace or *unit heater*, or to rooms or spaces of a *building* through a heating system such as a central *furnace* or *boiler*.

*Special purpose swimming pool* means a *swimming pool* that is used for cleaning the body, for the practice of healing or therapy, for the observance of religious rituals or other similar purposes.

- Sprinklered* (as applying to a *building* or part thereof) means that the *building* or part thereof is equipped with a system of automatic sprinklers.
- Stage* means a space that is designed primarily for theatrical performances with provision for quick change scenery and overhead lighting, including environmental control for a wide range of lighting and sound effects and that is traditionally, but not necessarily, separated from the audience by a proscenium wall and curtain opening.
- Storage garage* means a *building* or part thereof intended for the storage or parking of motor vehicles and containing no provision for the repair or servicing of such vehicles. (See Appendix A.)
- Storage-type service water heater* means a *service water heater* with an integral hot water storage tank.
- Storey* means that portion of a *building* that is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of such floor and the ceiling above it.
- Stove* means an *appliance* intended for cooking and space heating.
- Street* means any highway, road, boulevard, square or other improved thoroughfare 9 m or more in width, that has been dedicated or deeded for public use and is accessible to fire department vehicles and equipment.
- Subsurface investigation* means the appraisal of the general subsurface conditions at a *building* site by analysis of information gained by such methods as geological surveys, in situ testing, sampling, visual inspection, laboratory testing of samples of the subsurface materials and *groundwater* observations and measurements.
- Suite* means a single room or series of rooms of complementary use, operated under a single tenancy, and includes *dwelling units*, individual guest rooms in motels, hotels, boarding houses, rooming houses and dormitories as well as individual stores and individual or complementary rooms for *assembly occupancies*, *business and personal services occupancies*, *medium-hazard industrial occupancies* and *low-hazard industrial occupancies*. (See Appendix A.)
- Supply duct* means a duct for conveying air from a heating, ventilating or air-conditioning *appliance* to a space to be heated, ventilated or air-conditioned.
- Swimming pool* means a structure, basin or tank containing an artificially created pool of water that is greater than 600 mm in depth at any point and is used for swimming, recreation, bathing, diving, wading, healing or therapy, religious rituals or other purposes, and includes all buildings, equipment and facilities used in connection with it.
- Theatre* means a place of public assembly intended for the production and viewing of the performing arts or the screening and viewing of motion pictures, and consisting of an auditorium with permanently fixed seats intended solely for a viewing audience.
- Thermal barrier* means a membrane used to protect a *foamed plastic* or other *combustible* material from the effects of heat and flame for a specified period of time.
- Unit heater* means a suspended *space heater* with an integral air-circulating fan.
- Unprotected opening* (as applying to *exposing building face*) means a doorway, window or opening other than one equipped with a *closure* having the required *fire-protection rating*, or any part of a wall forming part of the *exposing building face* that has a *fire-resistance rating* less than that required for the *exposing building face*.
- Unsafe condition* means any condition that, in the opinion of the *authority having jurisdiction*, could endanger the life, limb or health of any person authorized or expected to be on or about the premises.
- Vapour barrier* means the elements installed to control the diffusion of water vapour.
- Vent connector* (as applying to heating or cooling systems) means the part of a venting system that conducts the *flue* gases or vent gases from the *flue collar* of a gas *appliance* to the *chimney* or *gas vent*, and may include a draft control device.

*Vertical service space* means a shaft oriented essentially vertically that is provided in a *building* to facilitate the installation of *building* services including mechanical, electrical and plumbing installations and facilities such as elevators, refuse chutes and linen chutes.

*Wading pool* means a structure, basin or tank containing an artificially created pool of water that is 600 mm or less in depth throughout and is used for swimming, bathing, wading or other similar purposes.

*Walkway* means a covered or roofed pedestrian thoroughfare used to connect 2 or more *buildings* in which the width of the thoroughfare does not exceed 9 m.

*Water theme park* means an aquatic recreation facility consisting of recreational water slide flumes and associated *receiving pools*.

*Wave pool* means a *swimming pool* in which waves or surf are mechanically generated.

*Whirlpool* means a *swimming pool* designed primarily for therapeutic or recreational use that

- (a) is not drained, cleaned or refilled before use by each individual, and
- (b) utilizes hydrojet circulation, air induction bubbles or hot water or any combination of them, and includes hot tubs.

*Work* means any activity, duty or function, regulated by this Code, carried out at a *project*.

**1.4.2. Symbols and Other Abbreviations**

**1.4.2.1. Symbols and Other Abbreviations**

**1)** The symbols and other abbreviations in this Code shall have the meanings assigned to them in this Article and Article 1.3.2.1. of Division B.

- 1 in 2 ..... slope of 1 vertical to 2 horizontal
- cm ..... centimetre(s)
- ° ..... degree(s)
- °C ..... degree(s) Celsius
- dB(A) ..... A-weighted sound level
- diam ..... diameter
- g ..... gram(s)
- ga ..... gauge
- h ..... hour(s)
- Hz ..... hertz
- Inc. .... Incorporated
- J ..... joule(s)
- kg ..... kilogram(s)
- kN ..... kilonewton(s)
- kPa ..... kilopascal(s)
- kW ..... kilowatt(s)
- L ..... litre(s)
- lx ..... lux
- m ..... metre(s)
- M ..... metric nomenclature for reinforcing bars
- max. .... maximum
- min. .... minimum
- min ..... minute(s)
- MJ ..... megajoule(s)

mm .....	millimetre(s)
MPa .....	megapascal(s)
N .....	newton
n/a .....	not applicable
ng .....	nanogram(s)
No. ....	number(s)
nom. ....	nominal
o.c. ....	on centre
OSB .....	oriented strandboard
s .....	second(s)
temp. ....	temperature
T&G .....	tongue and groove
W .....	watt(s)
wt .....	weight
% .....	percent

## Section 1.5. Referenced Documents and Organizations

### 1.5.1. Referenced Documents

#### 1.5.1.1. Application of Referenced Documents

- 1)** The provisions of documents referenced in this Code, and of any documents referenced within those documents, apply only to the extent that they relate to
- buildings*, and
  - the objectives and functional statements attributed to the applicable acceptable solutions in Division B where the documents are referenced.
- (See Appendix A.)

#### 1.5.1.2. Conflicting Requirements

- 1)** In case of conflict between the provisions of this Code and those of a referenced document, the provisions of this Code shall govern.

#### 1.5.1.3. Applicable Editions

- 1)** Where documents are referenced in this Code, they shall be the editions designated in Subsection 1.3.1. of Division B.

### 1.5.2. Organizations

#### 1.5.2.1. Abbreviations of Proper Names

- 1)** The abbreviations of proper names in this Code shall have the meanings assigned to them in Article 1.3.2.1. of Division B.

# **Part 2**

## **Objectives**

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# Part 2 Objectives

## Section 2.1. Application

### 2.1.1. Application

#### 2.1.1.1. Application

- 1) This Part applies to all *buildings* covered in this Code. (See Article 1.1.1.1.)

#### 2.1.1.2. Application of Objectives

- 1) Except as provided in Sentences (2) to (5), the objectives described in this Part apply
  - a) to all *buildings* covered in this Code (see Article 1.1.1.1.), and
  - b) only to the extent that they relate to compliance with this Code as required in Article 1.2.1.1.
- 2) Objective OS4, Resistance to Unwanted Entry, applies only to *dwelling units* in *buildings* covered in Part 9 of Division B. (See Article 1.3.3.3.)
- 3) Objective OH3, Noise Protection, applies only to *dwelling units*.
- 4) Objective OH5, Hazardous Substances Containment, applies only to the extent defined in
  - a) the plumbing and drainage regulations made pursuant to the Safety Codes Act, and
  - b) the Alberta Fire Code 2006.
- 5) Objective OA, Accessibility (including Objectives OA1, Barrier-Free Path of Travel, and OA2, Barrier-Free Facilities), does not apply to
  - a) houses, including semi-detached houses, duplexes, triplexes, townhouses, row houses and boarding houses,
  - b) *buildings* of Group F, Division 1 *major occupancy*, and
  - c) *buildings* that are not intended to be occupied on a daily or full-time basis, including automatic telephone exchanges, pumphouses and substations.

## Section 2.2. Objectives

### 2.2.1. Objectives

#### 2.2.1.1. Objectives

- 1) The objectives of this Code are as follows (see Appendix A):

#### **OS Safety**

An objective of this Code is to limit the probability that, as a result of

- (a) the design, construction or demolition of the *building* or facility, or
- (b) specific circumstances related to the *building* or facility,

a person in or adjacent to the *building* or facility will be exposed to an unacceptable risk of injury.

**OS1 Fire Safety**

An objective of this Code is to limit the probability that, as a result of

- (a) the design or construction of the *building* or facility,
- (b) activities related to the construction, use or demolition of the *building* or facility,
- (c) the condition of specific elements of the *building* or facility,
- (d) the design or construction of specific elements of the facility related to certain hazards, or
- (e) inadequate built-in protective measures for the current or intended use of the *building* or facility,

a person in or adjacent to the *building* or facility will be exposed to an unacceptable risk of injury due to fire. The risks of injury due to fire addressed in this Code are those caused by—

- OS1.1 – fire or explosion occurring
- OS1.2 – fire or explosion impacting areas beyond its point of origin
- OS1.3 – collapse of physical elements due to a fire or explosion
- OS1.4 – fire safety systems failing to function as expected
- OS1.5 – persons being delayed in or impeded from moving to a safe place during a fire emergency

**OS2 Structural Safety**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person in or adjacent to the *building* or facility will be exposed to an unacceptable risk of injury due to structural failure. The risks of injury due to structural failure addressed in this Code are those caused by—

- OS2.1 – loads bearing on the *building* or facility elements that exceed their *loadbearing* capacity
- OS2.2 – loads bearing on the *building* or facility that exceed the *loadbearing* properties of the supporting medium
- OS2.3 – damage to or deterioration of *building* or facility elements
- OS2.4 – vibration or deflection of *building* or facility elements
- OS2.5 – instability of the *building* or facility or part thereof
- OS2.6 – collapse of the *excavation*

**OS3 Safety in Use**

An objective of this Code is to limit the probability that, as a result of

- (a) the design or construction of the *building* or facility,
- (b) activities related to the construction, use or demolition of the *building* or facility,
- (c) the condition of specific elements of the *building* or facility,
- (d) the design or construction of specific elements of the facility related to certain hazards, or
- (e) inadequate built-in protective measures for the current or intended use of the *building* or facility,

a person in or adjacent to the *building* or facility will be exposed to an unacceptable risk of injury due to hazards. The risks of injury due to hazards addressed in this Code are those caused by—

- OS3.1 – tripping, slipping, falling, contact, drowning or collision
- OS3.2 – contact with hot surfaces or substances
- OS3.3 – contact with energized equipment
- OS3.4 – exposure to hazardous substances
- OS3.5 – exposure to high levels of sound from fire alarm systems
- OS3.6 – persons becoming trapped in confined spaces
- OS3.7 – persons being delayed in or impeded from moving to a safe place during an emergency (see Appendix A)

**OS4 Resistance to Unwanted Entry**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person in the *building* or facility will be exposed to an unacceptable risk of injury due to the *building* or facility's low level of resistance to unwanted entry (see Sentence 2.1.1.2.(2) for application limitation). The risks of injury due to unwanted entry addressed in this Code are those caused by—

- OS4.1 – intruders being able to force their way through locked doors or windows
- OS4.2 – occupants being unable to identify potential intruders as such

**OS5 Safety at Construction and Demolition Sites**

An objective of this Code is to limit the probability that, as a result of the construction or demolition of the *building* or facility, the public adjacent to a construction or demolition site will be exposed to an unacceptable risk of injury due to hazards. The risks of injury due to construction and demolition hazards addressed in this Code are those caused by—

- OS5.1 – objects projected onto *public ways*
- OS5.2 – vehicular accidents on *public ways*
- OS5.3 – damage to or obstruction of *public ways*
- OS5.4 – water accumulated in *excavations*
- OS5.5 – entry into the site
- OS5.6 – exposure to hazardous substances and activities
- OS5.7 – loads bearing on a covered way that exceed its *loadbearing* capacity
- OS5.8 – collapse of the *excavation*
- OS5.9 – persons being delayed in or impeded from moving to a safe place during an emergency (see Appendix A)

**OH Health**

An objective of this Code is to limit the probability that, as a result of

- (a) the design or construction of the *building* or facility, or
  - (b) specific circumstances related to the *building* or facility,
- a person will be exposed to an unacceptable risk of illness.

**OH1 Indoor Conditions**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person in the *building* or facility will be exposed to an unacceptable risk of illness due to indoor conditions. The risks of illness due to indoor conditions addressed in this Code are those caused by—

- OH1.1 – inadequate indoor air quality
- OH1.2 – inadequate thermal comfort
- OH1.3 – contact with moisture

**OH2 Sanitation**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person in the *building* or facility will be exposed to an unacceptable risk of illness due to unsanitary conditions. The risks of illness due to unsanitary conditions addressed in this Code are those caused by—

- OH2.1 – exposure to human or domestic waste
- OH2.2 – consumption of contaminated water
- OH2.3 – inadequate facilities for personal hygiene
- OH2.4 – contact with contaminated surfaces
- OH2.5 – contact with vermin and insects

**OH3 Noise Protection**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building*, a person in the *building* will be exposed to an unacceptable risk of illness due to high levels of sound originating in adjacent spaces in the *building* (see Sentence 2.1.1.2.(3) for application limitation). The risks of illness due to high levels of sound addressed in this Code are those caused by—

- OH3.1 – exposure to airborne sound transmitted through assemblies separating *dwelling units* from adjacent spaces in the *building*

**OH4 Vibration and Deflection Limitation**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building*, a person in the *building* will be exposed to an unacceptable risk of illness due to high levels of vibration or deflection of *building* elements.

**OH5 Hazardous Substances Containment**

An objective of this Code is to limit the probability that, as a result of

- (a) the design or construction of the *building* or facility,
- (b) activities related to the construction, use or demolition of the *building* or facility,
- (c) the condition of specific elements of the *building* or facility,
- (d) the design or construction of specific elements of the facility related to certain hazards, or
- (e) inadequate built-in protective measures for the current or intended use of the *building* or facility,

the public will be exposed to an unacceptable risk of illness due to the release of hazardous substances from the *building* or facility (see Sentence 2.1.1.2.(4) for application limitation).

**OH10 Protection from Exterior Noise**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building*, a person in the *building* will be exposed to an unacceptable risk of illness due to high levels of sound originating outside the *building*. The risks of illness due to high levels of sound addressed in the Code are those caused by

OH10.1 – exposure to airborne sound transmitted through assemblies separating internal spaces from space outside the *building*.

**OH11 Hygiene**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person will be exposed to an unacceptable risk of illness due to unhygienic conditions. The risks of illness due to unhygienic conditions addressed in this Code are those caused by

OH11.1 – exposure to pathogenic micro-organisms

OH11.2 – ingestion of pathogenic micro-organisms

OH11.3 – transmission of pathogenic micro-organisms

**OH12 Privacy**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person in the *building* or facility will be exposed to an unacceptable risk of surveillance by other persons. The risk of surveillance is caused by

OH12.1 – a lack of barriers to visual overview

OH12.2 – a lack of gender-specific space

**OH13 Sensory Deprivation**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person in the *building* or facility would be exposed to an unacceptable risk of sensory deprivation due to a lack of windows overlooking the exterior and admitting natural light.

**OE Energy Conservation**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building*, the *building* will experience an unacceptable loss or gain of energy.

**OE1 Conservation of Thermal Energy**

An objective of this Code is to limit the probability that, as a result of its design or construction, the *building* will be exposed to an unacceptable loss or gain of thermal energy caused by insufficient thermal insulation.

**OA Accessibility**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person with a physical or sensory limitation will be unacceptably impeded from accessing or using the *building* or its facilities (see Sentence 2.1.1.2.(5) for application limitations).

**OA1 Barrier-Free Path of Travel**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person with a physical or sensory limitation will be unacceptably impeded from accessing the *building* or facility or circulating within it (see Sentence 2.1.1.2.(5) for application limitations).

**OA2 Barrier-Free Facilities**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, a person with a physical or sensory limitation will be unacceptably impeded from using the *building's* facilities (see Sentence 2.1.1.2.(5) for application limitations).

**OP Fire and Structural Protection of Buildings**

An objective of this Code is to limit the probability that, as a result of

- (a) the design, construction or demolition of the *building* or facility, or
- (b) specific circumstances related to the *building* or facility,

the *building* or facility or adjacent *buildings* will be exposed to an unacceptable risk of damage due to fire or structural insufficiency, or the *building* or facility or part thereof will be exposed to an unacceptable risk of loss of use also due to structural insufficiency.

**OP1 Fire Protection of the Building**

An objective of this Code is to limit the probability that, as a result of

- (a) the design or construction of the *building* or facility,
- (b) activities related to the construction, use or demolition of the *building* or facility,
- (c) the condition of specific elements of the *building* or facility,
- (d) the design or construction of specific elements of the facility related to certain hazards, or
- (e) inadequate built-in protective measures for the current or intended use of the *building* or facility,

the *building* or facility will be exposed to an unacceptable risk of damage due to fire. The risks of damage due to fire addressed in this Code are those caused by—

- OP1.1 – fire or explosion occurring
- OP1.2 – fire or explosion impacting areas beyond its point of origin
- OP1.3 – collapse of physical elements due to a fire or explosion
- OP1.4 – fire safety systems failing to function as expected

**OP2 Structural Sufficiency of the Building**

An objective of this Code is to limit the probability that, as a result of its design or construction, the *building* or part thereof will be exposed to an unacceptable risk of damage or loss of use due to structural failure or lack of structural serviceability. The risks of damage and of loss of use due to structural failure or lack of structural serviceability addressed in this Code are those caused by—

- OP2.1 – loads bearing on the *building* elements that exceed their *loadbearing* capacity
- OP2.2 – loads bearing on the *building* that exceed the *loadbearing* properties of the supporting medium
- OP2.3 – damage to or deterioration of *building* elements
- OP2.4 – vibration or deflection of *building* elements
- OP2.5 – instability of the *building* or part thereof
- OP2.6 – instability or movement of the supporting medium

**OP3 Protection of Adjacent Buildings or Facilities from Fire**

An objective of this Code is to limit the probability that, as a result of the design or construction of the *building* or facility, adjacent *buildings* or facilities will be exposed to an unacceptable risk of damage due to fire. The risks of damage to adjacent *buildings* or facilities due to fire addressed in this Code are those caused by—

- OP3.1 – fire or explosion impacting areas beyond the *building* or facility of origin

**OP4 Protection of Adjacent Buildings or Facilities from Structural Damage**

An objective of this Code is to limit the probability that, as a result of the design, construction or demolition of the *building* or facility, adjacent *buildings* or facilities will be exposed to an unacceptable risk of structural damage. The risks of structural damage to adjacent *buildings* or facilities addressed in this Code are those caused by—

- OP4.1 – settlement of the medium supporting adjacent *buildings* or facilities
- OP4.2 – collapse of the *building* or facility or portion thereof onto adjacent *buildings* or facilities
- OP4.3 – impact of the *building* or facility on adjacent *buildings* or facilities
- OP4.4 – collapse of the *excavation*



# **Part 3**

## **Functional Statements**

<b>3.1.</b>	<b>Application</b>	
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<b>3.2.</b>	<b>Functional Statements</b>	
3.2.1.	Functional Statements .....	3-1



## **Part 3**

# **Functional Statements**

### **Section 3.1. Application**

#### **3.1.1. Application**

##### **3.1.1.1. Application**

- 1)** This Part applies to all *buildings* covered in this Code. (See Article 1.1.1.1.)

##### **3.1.1.2. Application of Functional Statements**

- 1)** Except as provided in Sentences (2) and (3), the functional statements described in this Part apply
  - a) to all *buildings* covered in this Code (see Article 1.1.1.1.), and
  - b) only to the extent that they relate to compliance with this Code as required in Article 1.2.1.1.
- 2)** Functional Statement F56 applies only to *dwelling units*.
- 3)** Functional Statements F73 and F74 do not apply to
  - a) houses, including semi-detached houses, duplexes, triplexes, townhouses, row houses and boarding houses,
  - b) *buildings* of Group F, Division 1 *major occupancy*, and
  - c) *buildings* that are not intended to be occupied on a daily or full-time basis, including automatic telephone exchanges, pumphouses and substations.

### **Section 3.2. Functional Statements**

#### **3.2.1. Functional Statements**

##### **3.2.1.1. Functional Statements**

- 1)** The objectives of this Code are achieved by measures, such as those described in the acceptable solutions in Division B, that are intended to allow the *building* or its elements to perform the following functions (see Appendix A):

- F01** To minimize the risk of accidental ignition.
- F02** To limit the severity and effects of fire or explosions.
- F03** To retard the effects of fire on areas beyond its point of origin.
- F04** To retard failure or collapse due to the effects of fire.
- F05** To retard the effects of fire on emergency egress facilities.
- F06** To retard the effects of fire on facilities for notification, suppression and emergency response.
  
- F10** To facilitate the timely movement of persons to a safe place in an emergency.
- F11** To notify persons, in a timely manner, of the need to take action in an emergency.
- F12** To facilitate emergency response.

- F13** To notify emergency responders, in a timely manner, of the need to take action in an emergency.
- F20** To support and withstand expected loads and forces.
- F21** To limit or accommodate dimensional change.
- F22** To limit movement under expected loads and forces.
- F23** To maintain equipment in place during structural movement.
- F30** To minimize the risk of injury to persons as a result of tripping, slipping, falling, contact, drowning or collision.
- F31** To minimize the risk of injury to persons as a result of contact with hot surfaces or substances.
- F32** To minimize the risk of injury to persons as a result of contact with energized equipment.
- F33** To limit the level of sound of a fire alarm system.
- F34** To resist or discourage unwanted access or entry.
- F35** To facilitate the identification of potential intruders.
- F36** To minimize the risk that persons will be trapped in confined spaces.
- F40** To limit the level of contaminants.
- F41** To minimize the risk of generation of contaminants.
- F42** To resist the entry of vermin and insects.
- F43** To minimize the risk of release of hazardous substances.
- F44** To limit the spread of hazardous substances beyond their point of release.
- F46** To minimize the risk of contamination of potable water.
- F50** To provide air suitable for breathing.
- F51** To maintain appropriate air and surface temperatures.
- F52** To maintain appropriate relative humidity.
- F53** To maintain appropriate indoor/outdoor air pressure differences.
- F54** To limit drafts.
- F55** To resist the transfer of air through environmental separators.
- F56** To limit the transmission of airborne sound into a *dwelling unit* from spaces elsewhere in the *building* (see Sentence 3.1.1.2.(2) for application limitation).
- F60** To control the accumulation and pressure of water on and in the ground.
- F61** To resist the ingress of precipitation, water or moisture from the exterior or from the ground.
- F62** To facilitate the dissipation of water and moisture from the *building*.
- F63** To limit moisture condensation.
- F70** To provide potable water.
- F71** To provide facilities for personal hygiene.
- F72** To provide facilities for the sanitary disposal of human and domestic wastes.
- F73** To facilitate access to and circulation in the *building* and its facilities by persons with physical or sensory limitations (see Sentence 3.1.1.2.(3) for application limitation).

- F74** To facilitate the use of the *building's* facilities by persons with physical or sensory limitations (see Sentence 3.1.1.2.(3) for application limitation).
- F80** To resist deterioration resulting from expected service conditions.
- F81** To minimize the risk of malfunction, interference, damage, tampering, lack of use or misuse.
- F82** To minimize the risk of inadequate performance due to improper maintenance or lack of maintenance.
  
- F101** To minimize the risk of contamination of food.
- F102** To minimize the risk of inhalation of pathogenic micro-organisms.
- F103** To minimize the risk of ingestion of pathogenic micro-organisms.
- F104** To minimize the risk of physical contact with pathogenic micro-organisms.
- F105** To minimize the growth of pathogenic micro-organisms.
- F106** To minimize the risk of space-to-space transfer of pathogenic micro-organisms.
- F107** To minimize the risk of injury to persons as a result of contact with toxic or injurious substances.
  
- F110** To limit the transmission of airborne sound, originating outside a *building*, through an assembly separating internal space from space outside the *building*.
  
- F120** To limit the transmission of thermal energy from the *building*.
- F121** To limit the transmission of thermal energy into the *building*.
  
- F130** To limit unwanted visual surveillance.
  
- F140** To provide visual overview of the outdoors.
- F141** To provide for the admission of daylight into rooms and interior spaces of a *building*.





# **Part 4**

## **Attribution To Acceptable Solutions**

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# Part 4 Attribution To Acceptable Solutions

## Section 4.1. Application

### 4.1.1. Application

#### 4.1.1.1. Application

1) This Part applies to all *buildings* covered in this Code. (See Article 1.1.1.1.)

### 4.1.2. Acceptable Solutions

#### 4.1.2.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Division B shall be the objectives and functional statements listed in Section 4.2. (See Appendix A.)

## Section 4.2. Objectives and Functional Statements

### 4.2.1. Part 3 of Division B

#### 4.2.1.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 3 of Division B shall be the objectives and functional statements listed in Table 4.2.1.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.1.1.**  
**Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 3 of Division B**  
Forming Part of Sentence 4.2.1.1.(1)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.1.3.1. Separation of Major Occupancies</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F03-OS1.2]
(3)	[F02,F03,F06-OP1.2] [F02,F03,F06-OS1.2] [F10,F05-OS1.5]
<b>3.1.3.2. Prohibition of Occupancy Combinations</b>	
(1)	[F02,F03-OS1.2] [F10-OS1.5]
(2)	[F02,F03-OS1.2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.1.4.1. Combustible Materials Permitted</b>	
(2)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.1.4.2. Protection of Foamed Plastics</b>	
(1)	[F01-OP1.1] [F02-OP1.2]
	[F01-OS1.1] [F02-OS1.2]
<b>3.1.4.3. Wires and Cables</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.1.4.4. Fire-Retardant-Treated Wood</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.1.5.1. Noncombustible Materials</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.1.6.2. Restrictions</b>	
(1)	[F10,F12,F36-OS3.7]
	[F20-OS2.2]
(2)	[F01,F02,F36-OS1.5] Applies to portion of Code text: "An <i>air-supported structure</i> shall not be used for ... Group F, Division 1 <i>major occupancies</i> ..."
	[F10,F36-OS3.7] Applies to portion of Code text: "An <i>air-supported structure</i> shall not be used for Groups B, C, ... <i>major occupancies</i> or for classrooms."
(3)	[F10-OS3.7]
<b>3.1.6.3. Clearance to Other Structures</b>	
(2)	(a) [F03-OP3.1]
	(a) [F03-OS1.2]
	(b) [F10-OS3.7]
<b>3.1.6.4. Clearance to Flammable Material</b>	
(1)	[F01-OP1.1] [F03-OP1.2]
	[F01-OS1.1] [F03-OS1.2]
<b>3.1.6.5. Flame Resistance</b>	
(1)	[F02-OS1.2]
<b>3.1.6.6. Emergency Air Supply</b>	
(1)	[F20-OS3.7]
<b>3.1.7.1. Determination of Ratings</b>	
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
<b>3.1.7.5. Rating of Supporting Construction</b>	
(1)	[F04-OP1.3]
	[F04-OS1.3]
(3)	[F04-OP1.3]
	[F04-OS1.3]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.1.8.1. General Requirements</b>	
(1)	(a) [F03-OP1.2]
	(a) [F03-OS1.2]
(2)	[F03-OP1.2] Applies to the requirement that openings in <i>fire separations</i> be protected with <i>closures</i> , shafts or other means.
	[F03-OS1.2] Applies to the requirement that openings in <i>fire separations</i> be protected with <i>closures</i> , shafts or other means.
<b>3.1.8.2. Combustible Construction Support</b>	
(1)	[F04-OP1.2]
	[F04-OS1.2]
<b>3.1.8.3. Continuity of Fire Separations</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	(a) [F03-OP1.2]
	(a) [F03-OS1.2]
	(b) [F03-OP1.2]
	(b) [F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.4. Determination of Ratings</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.5. Installation of Closures</b>	
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F81-OP1.2]
	[F81-OS1.2]
<b>3.1.8.6. Maximum Openings</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.7. Fire Dampers</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.9. Installation of Fire Dampers</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F04-OP1.2]
	[F04-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F82-OH1.2] Applies to portion of Code text: "A tightly fitted access door shall be installed for each <i>fire damper</i> to provide access for ... the resetting of the release device."
	[F82-OP1.2] Applies to portion of Code text: "A tightly fitted access door shall be installed for each <i>fire damper</i> to provide access for the inspection of the damper ..."
	[F82-OS1.2] Applies to portion of Code text: "A tightly fitted access door shall be installed for each <i>fire damper</i> to provide access for the inspection of the damper ..."
<b>3.1.8.10. Twenty-Minute Closures</b>	
(3)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.11. Self-Closing Devices</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.12. Hold-Open Devices</b>	
(1)	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.13. Door Latches</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.8.14. Wired Glass and Glass Block</b>	
(3)	[F04-OP1.2] Applies to portion of Code text: "Glass blocks permitted by Sentence (1) shall be ... reinforced with steel reinforcement in each horizontal joint."
	[F04-OS1.2] Applies to portion of Code text: "Glass blocks permitted by Sentence (1) shall be ... reinforced with steel reinforcement in each horizontal joint."
<b>3.1.8.15. Temperature Rise Limit for Doors</b>	
(1)	[F03-OP1.2]
	[F03,F31-OS1.2] [F05-OS1.5]
<b>3.1.8.16. Area Limits for Wired Glass and Glass Block</b>	
(1)	[F05-OS1.5] [F31-OS1.2]
	[F30-OS3.1]
(2)	[F05-OS1.5] [F31-OS1.2]
<b>3.1.9.1. Fire Stopping of Service Penetrations</b>	
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
<b>3.1.9.2. Combustibility of Service Penetrations</b>	
(1)	[F03-OP1.2] [F02,F04-OP1.3] Applies to portion of Code text: "Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a <i>fire-resistance rating</i> shall be <i>noncombustible</i> ..."
	[F03-OS1.2] [F02,F04-OS1.3] Applies to portion of Code text: "Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a <i>fire-resistance rating</i> shall be <i>noncombustible</i> ..."
<b>3.1.9.3. Penetration by Wires, Cables and Outlet Boxes</b>	
(6)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.9.4. Combustible Piping Penetrations</b>	
(3)	[F03-OP1.2] [F02,F04-OP1.3]
	[F03-OS1.2] [F02,F04-OS1.3]
<b>3.1.9.5. Openings through a Membrane Ceiling</b>	
(1)	[F04-OP1.3]
	[F04-OS1.3]
<b>3.1.10.1. Prevention of Firewall Collapse</b>	
(1)	[F04-OP1.2]
	[F04-OP3.1]
	[F04-OS1.2]
(2)	[F03,F04-OP1.2]
	[F03,F04-OP3.1]
	[F03,F04-OS1.2]
(4)	[F04-OP1.2]
	[F04-OP3.1]
	[F04-OS1.2]
<b>3.1.10.2. Rating of Firewalls</b>	
(1)	[F03-OP1.2] Applies to portion of Code text: "A <i>firewall</i> which separates a <i>building</i> or <i>buildings</i> with <i>floor areas</i> containing a Group E or a Group F, Division 1 or 2 <i>major occupancy</i> shall be constructed as a <i>fire separation of noncombustible construction</i> having a <i>fire-resistance rating</i> not less than 4 h ..."
	[F03-OP3.1] Applies to portion of Code text: "A <i>firewall</i> which separates a <i>building</i> or <i>buildings</i> with <i>floor areas</i> containing a Group E or a Group F, Division 1 or 2 <i>major occupancy</i> shall be constructed as a <i>fire separation of noncombustible construction</i> having a <i>fire-resistance rating</i> not less than 4 h ..."
	[F03-OS1.2] Applies to portion of Code text: "A <i>firewall</i> which separates a <i>building</i> or <i>buildings</i> with <i>floor areas</i> containing a Group E or a Group F, Division 1 or 2 <i>major occupancy</i> shall be constructed as a <i>fire separation of noncombustible construction</i> having a <i>fire-resistance rating</i> not less than 4 h ..."
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
(3)	[F80,F04-OP1.2]
	[F80,F04-OP1.3]
	[F80,F04-OS1.2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F80,F04-OP1.2]
	[F80,F04-OP3.1]
	[F80,F04-OS1.2]
<b>3.1.10.3. Continuity of Firewalls</b>	
(1)	[F03-OP1.2] Applies to portion of Code text: "A <i>firewall</i> shall extend from the ground continuously through, or adjacent to, all <i>storeys</i> of a <i>building</i> or <i>buildings</i> so separated ..."
	[F03-OP3.1] Applies to portion of Code text: "A <i>firewall</i> shall extend from the ground continuously through, or adjacent to, all <i>storeys</i> of a <i>building</i> or <i>buildings</i> so separated ..."
	[F03-OS1.2] Applies to portion of Code text: "A <i>firewall</i> shall extend from the ground continuously through, or adjacent to, all <i>storeys</i> of a <i>building</i> or <i>buildings</i> so separated ..."
<b>3.1.10.4. Parapets</b>	
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
<b>3.1.10.5. Maximum Openings</b>	
(1)	[F03-OP1.2] Applies to portion of Code text: "... the aggregate width of openings shall be not more than 25% of the entire length of the <i>firewall</i> ."
	[F03-OP3.1] Applies to portion of Code text: "... the aggregate width of openings shall be not more than 25% of the entire length of the <i>firewall</i> ."
	[F03-OS1.2] Applies to portion of Code text: "... the aggregate width of openings shall be not more than 25% of the entire length of the <i>firewall</i> ."
<b>3.1.10.7. Combustible Projections</b>	
(1)	[F03-OP1.2] Applies to portion of Code text: " <i>Combustible</i> material shall not extend across the end of a <i>firewall</i> ..."
	[F03-OP3.1] Applies to portion of Code text: " <i>Combustible</i> material shall not extend across the end of a <i>firewall</i> ..."
	[F03-OS1.2] Applies to portion of Code text: " <i>Combustible</i> material shall not extend across the end of a <i>firewall</i> ..."
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
<b>3.1.11.1. Separation of Concealed Spaces</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.11.2. Fire Stopping in Wall Assemblies</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.11.3. Fire Stopping between Nailing and Supporting Elements</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.1.11.4. Fire Stopping between Vertical and Horizontal Spaces</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.1.11.5. Fire Stopping of Horizontal Concealed Spaces</b>	
(1)	[F03,F04–OP1.2]
	[F03,F04–OS1.2]
(2)	[F03,F04–OP1.2]
	[F03,F04–OS1.2]
<b>3.1.11.6. Fire Stopping of Crawl Spaces</b>	
(1)	[F03,F04–OP1.2]
	[F03,F04–OS1.2]
<b>3.1.11.7. Fire Stop Materials</b>	
(1)	[F04–OP1.2]
	[F04–OS1.2]
(5)	[F04–OP1.2]
	[F04–OS1.2]
(6)	[F03–OP1.2]
	[F03–OS1.2]
<b>3.1.12.1. Determination of Ratings</b>	
(1)	[F02–OP1.2]
	[F02–OS1.2]
(2)	[F02–OP1.2]
	[F02–OS1.2]
<b>3.1.13.2. Flame-Spread Rating</b>	
(1)	[F02–OP1.2]
	[F02–OS1.2]
<b>3.1.13.5. Skylights</b>	
(1)	[F02–OS1.5]
<b>3.1.13.6. Corridors</b>	
(1)	[F02–OS1.2,OS1.5]
(5)	[F02–OS1.2,OS1.5]
<b>3.1.13.7. High Buildings</b>	
(1)	[F02–OP1.2]
	[F02–OS1.2]
<b>3.1.13.9. Underground Walkways</b>	
(1)	[F02–OP3.1]
	[F02–OS1.2]
<b>3.1.13.10. Exterior Exit Passageway</b>	
(1)	[F02–OS1.5]
<b>3.1.14.1. Fire-Retardant-Treated Wood Roof Systems</b>	
(1)	[F02–OP1.2]
	[F02–OS1.2]
(2)	[F02–OP1.3]
	[F02–OS1.3,OS1.2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.1.14.2. Metal Roof Deck Assemblies</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.1.15.1. Roof Covering Classification</b>	
(1)	[F02-OP1.2]
	[F02-OP3.1]
	[F02-OS1.2]
<b>3.1.15.2. Roof Coverings</b>	
(1)	[F02-OP1.2]
	[F02-OP3.1]
	[F02-OS1.2]
<b>3.1.16.1. Fabric Canopies and Marquees</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2, OS1.5]
<b>3.1.17.1. Occupant Load Determination</b>	
(1)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
(2)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
(4)	[F10-OS3.7]
	[F72-OH2.1] [F71-OH2.3]
<b>3.2.1.2. Storage Garage Considered as a Separate Building</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.2.1.4. Floor Assembly over Basement</b>	
(1)	[F03-OP1.2] [F04-OP1.3]
	[F03-OS1.2] [F04-OS1.3]
(2)	[F04-OP1.2, OP1.3]
	[F04-OS1.2, OS1.3]
<b>3.2.1.5. Fire Containment in Basements</b>	
(1)	[F02-OP1.2, OP1.3]
	[F02-OS1.2, OS1.3]
<b>3.2.1.7. Automatic Fire Suppression Systems</b>	
(1)	[F02, F04-OS1.2, OS1.3]
	[F02, F04-OP1.2, OP1.3]
(2)	[F03-OS1.2]
	[F03-OP1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F02,F04–OS1.2,OS1.3]
	[F02,F04–OP1.2,OP1.3]
(4)	[F02,F04–OS1.2,OS1.3]
	[F02,F04–OP1.2,OP1.3]
<b>3.2.1.8. Height of Combustible Residential Buildings</b>	
(1)	[F02,F12–OS1.2]
	[F02,F12–OP1.2]
<b>3.2.2.2. Special and Unusual Structures</b>	
(1)	[F02,F03,F04–OP1.2,OP1.3]
	[F02,F03,F04–OS1.2,OS1.3]
<b>3.2.2.6. Multiple Major Occupancies</b>	
(1)	[F02,F03,F04–OP1.2,OP1.3]
	[F02,F03,F04–OS1.2,OS1.3]
<b>3.2.2.10. Streets</b>	
(1)	[F12–OP1.2]
	[F12–OS1.2,OS1.5]
<b>3.2.2.15. Storeys below Ground</b>	
(2)	(a) [F02,F04–OP1.2,OP1.3]
	(a) [F02,F04–OS1.2,OS1.3]
	(b),(c) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(b),(c) [F03–OS1.2] [F04–OS1.2,OS1.3]
<b>3.2.2.18. Automatic Sprinkler System Required</b>	
(2)	[F02,F04–OP1.2,OP1.3]
	[F02,F04–OS1.2,OS1.3]
<b>3.2.2.20. Group A, Division 1, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(b),(d) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(c),(d) [F04–OP1.3]
	(c),(d) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.21. Group A, Division 1, One Storey, Limited Area, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."



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Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F02-OP1.2] Applies to portion of Code text: "The <i>building</i> referred to in Sentence (1) is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..."
	[F02-OS1.2] Applies to portion of Code text: "The <i>building</i> referred to in Sentence (1) is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..."
	[F03-OP1.2] [F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) floor assemblies shall be <i>fire separations</i> i) with a <i>fire-resistance rating</i> not less than 45 min ..." and to Clause (b).
	[F03-OS1.2] [F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) floor assemblies shall be <i>fire separations</i> i) with a <i>fire-resistance rating</i> not less than 45 min ..." and to Clause (b).
<b>3.2.2.22. Group A, Division 1, One Storey, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
	[F03-OP1.2] [F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
	[F03-OS1.2] [F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
<b>3.2.2.23. Group A, Division 2, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(b),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.24. Group A, Division 2, up to 6 Storeys, Any Area, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.2.25. Group A, Division 2, up to 3 Storeys</b>	
(2)	(a),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(b),(d) [F04-OP1.3]
	(b),(d) [F04-OS1.3]
	[F04-OP1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
	[F04-OS1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
<b>3.2.2.26. Group A, Division 2, up to 3 Storeys, Increased Area, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
<b>3.2.2.27. Group A, Division 2, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
<b>3.2.2.28. Group A, Division 2, One Storey</b>	
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.2.2.29. Group A, Division 3, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(b),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.2.30. Group A, Division 3, up to 2 Storeys</b>	
(2)	(a),(d) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(d) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(d) [F04–OP1.3]
	(b),(d) [F04–OS1.3]
	[F02–OP1.2] Applies to portion of Code text: “Except as permitted by Clauses (c) and (d), the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ...”
	[F02–OS1.2] Applies to portion of Code text: “Except as permitted by Clauses (c) and (d), the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ...”
	[F04–OP1.3] Applies to portion of Code text: “... c) roof assemblies shall i) have a <i>fire-resistance rating</i> not less than 45 min, ...” and to Clause (d).
	[F04–OS1.3] Applies to portion of Code text: “... c) roof assemblies shall i) have a <i>fire-resistance rating</i> not less than 45 min, ...” and to Clause (d).
(3)	[F02–OP1.2] [F04–OP1.3]
	[F02–OS1.2] [F04–OS1.3]
<b>3.2.2.31. Group A, Division 3, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04–OP1.2,OP1.3] Applies to portion of Code text: “... a) ... the <i>building</i> is <i>sprinklered</i> throughout ...”
	[F02,F04–OS1.2,OS1.3] Applies to portion of Code text: “... a) ... the <i>building</i> is <i>sprinklered</i> throughout ...”
(2)	(a),(c) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(c) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(c) [F04–OP1.3]
	(b),(c) [F04–OS1.3]
	[F02–OP1.2] Applies to portion of Code text: “Except as permitted by Clause (c) ... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ...”
	[F02–OS1.2] Applies to portion of Code text: “Except as permitted by Clause (c) ... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ...”
<b>3.2.2.32. Group A, Division 3, One Storey, Increased Area</b>	
(2)	(a),(c) [F04–OP1.3]
	(a),(c) [F04–OS1.3]
	[F04–OP1.3] Applies to portion of Code text: “... b) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ...” and to Clause (c).
	[F04–OS1.3] Applies to portion of Code text: “... b) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ...” and to Clause (c).
(3)	[F02–OP1.2] [F04–OP1.3]
	[F02–OS1.2] [F04–OS1.3]
<b>3.2.2.33. Group A, Division 3, One Storey, Sprinklered</b>	
(1)	[F02,F04–OP1.2,OP1.3] Applies to portion of Code text: “... a) ... the <i>building</i> is <i>sprinklered</i> throughout ...”
	[F02,F04–OS1.2,OS1.3] Applies to portion of Code text: “... a) ... the <i>building</i> is <i>sprinklered</i> throughout ...”
<b>3.2.2.35. Group A, Division 4</b>	
(1)	[F02–OP1.2] Applies to portion of Code text: “... a <i>building</i> classified as Group A, Division 4 shall be of <i>noncombustible construction</i> .”
	[F02–OS1.2] Applies to portion of Code text: “... a <i>building</i> classified as Group A, Division 4 shall be of <i>noncombustible construction</i> .”
(4)	[F02,F04–OP1.2,OP1.3]
	[F02,F04–OS1.2,OS1.3]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.2.36. Group B, Division 1, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(b),(d) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(c),(d) [F04–OP1.3]
	(c),(d) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.37. Group B, Division 1, up to 3 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(c) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(c) [F04–OP1.3]
	(b),(c) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
<b>3.2.2.38. Group B, Division 2, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(b),(d) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(c),(d) [F04–OP1.3]
	(c),(d) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.39. Group B, Division 2, up to 3 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(c) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(c) [F04–OP1.3]
	(b),(c) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.2.40. Group B, Division 2, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
<b>3.2.2.41. Group B, Division 2, One Storey, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
<b>3.2.2.42. Group C, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(b),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.43. Group C, up to 6 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
<b>3.2.2.44. Group C, up to 3 Storeys, Noncombustible Construction, Sprinklered</b>	
(2)	(b),(d) [F04-OP1.3]
	(b),(d) [F04-OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "The <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "The <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F03-OP1.2] [F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 1 h, ..." and to Clause (d).
	[F03-OS1.2] [F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 1 h, ..." and to Clause (d).

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.2.45. Group C, up to 4 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
	[F03-OP1.2] [F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 1 h, ..." and to Clause (c).
	[F03-OS1.2] [F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 1 h, ..." and to Clause (c).
<b>3.2.2.46. Group C, up to 3 Storeys, Increased Area, Sprinklered</b>	
(2)	(b),(d) [F04-OP1.3]
	(b),(d) [F04-OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
	[F03-OP1.2] [F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 1 h, ..." and to Clause (d).
	[F03-OS1.2] [F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 1 h, ..." and to Clause (d).
<b>3.2.2.48. Group C, up to 3 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
	[F03-OP1.2] [F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (c).
	[F03-OS1.2] [F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... floor assemblies shall be <i>fire separations</i> with a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (c).
<b>3.2.2.49. Group D, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(b),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.51. Group D, up to 6 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
<b>3.2.2.52. Group D, up to 4 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
<b>3.2.2.53. Group D, up to 3 Storeys</b>	
(2)	(a),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(b),(d) [F04-OP1.3]
	(b),(d) [F04-OS1.3]
	[F04-OP1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
	[F04-OS1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
<b>3.2.2.54. Group D, up to 3 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
<b>3.2.2.55. Group D, up to 2 Storeys</b>	
(2)	[F03-OP1.2] [F04-OP1.2,OP1.3]
	[F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
<b>3.2.2.56. Group D, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F03-OP1.2] [F04-OP1.2,OP1.3]
	[F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
<b>3.2.2.57. Group E, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(b),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.58. Group E, up to 4 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(c) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
<b>3.2.2.59. Group E, up to 3 Storeys</b>	
(2)	(a),(e) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(e) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(d) [F04-OP1.3]
	(b),(d) [F04-OS1.3]
	(c),(d) [F04-OP1.3]
	(c),(d) [F04-OS1.3]
<b>3.2.2.60. Group E, up to 3 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(d) [F03-OP1.2] [F04-OP1.2,OP1.3]
	(a),(d) [F03-OS1.2] [F04-OS1.2,OS1.3]
	(b),(c) [F04-OP1.3]
	(b),(c) [F04-OS1.3]
<b>3.2.2.61. Group E, up to 2 Storeys</b>	
(2)	[F03-OS1.2] [F04-OS1.2,OS1.3]
	(a),(b) [F03-OP1.2] [F04-OP1.2,OP1.3]
<b>3.2.2.62. Group E, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F03-OS1.2] [F04-OS1.2,OS1.3] (a),(b) [F03-OP1.2] [F04-OP1.2,OP1.3]
<b>3.2.2.63. Group F, Division 1, up to 4 Storeys, Sprinklered</b>	
(2)	(b),(d) [F03-OP1.2] [F04-OP1.2,OP1.3] (b),(d) [F03-OS1.2] [F04-OS1.2,OS1.3] (c),(d) [F04-OP1.3] (c),(d) [F04-OS1.3] [F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..." [F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..." [F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..." [F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.64. Group F, Division 1, up to 3 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..." [F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	[F03-OP1.2] [F04-OP1.2,OP1.3] [F03-OS1.2] [F04-OS1.2,OS1.3] [F02-OP1.2] Applies to portion of Code text: "The <i>building</i> referred to in Sentence (1) is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..." [F02-OS1.2] Applies to portion of Code text: "The <i>building</i> referred to in Sentence (1) is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..."
<b>3.2.2.65. Group F, Division 1, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..." [F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	[F03-OP1.2] [F04-OP1.2,OP1.3] [F03-OS1.2] [F04-OS1.2,OS1.3] [F03-OP1.2] Applies to portion of Code text: "... a) [ <i>noncombustible</i> ] floor assemblies shall be <i>fire separations</i> ..." [F03-OS1.2] Applies to portion of Code text: "... a) [ <i>noncombustible</i> ] floor assemblies shall be <i>fire separations</i> ..."
<b>3.2.2.67. Group F, Division 2, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03-OP1.2] [F04-OP1.2,OP1.3] (b),(d) [F03-OS1.2] [F04-OS1.2,OS1.3] (c),(d) [F04-OP1.3] (c),(d) [F04-OS1.3] [F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..." [F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..." [F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..." [F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.68. Group F, Division 2, up to 4 Storeys, Increased Area, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..." [F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	(a),(c) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(c) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(c) [F04–OP1.3]
	(b),(c) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
<b>3.2.2.69. Group F, Division 2, up to 3 Storeys</b>	
(2)	(a),(e) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(e) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(d) [F04–OP1.3]
	(b),(d) [F04–OS1.3]
	[F04-OP1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
	[F04-OS1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min ..." and to Clause (d).
<b>3.2.2.70. Group F, Division 2, up to 4 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(d) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(d) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(c) [F04–OP1.3]
	(b),(c) [F04–OS1.3]
<b>3.2.2.71. Group F, Division 2, up to 2 Storeys</b>	
(2)	[F03–OP1.2] [F04–OP1.2,OP1.3]
	[F03–OS1.2] [F04–OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
<b>3.2.2.72. Group F, Division 2, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	[F03–OP1.2] [F04–OP1.2,OP1.3]
	[F03–OS1.2] [F04–OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.2.73. Group F, Division 3, Any Height, Any Area, Sprinklered</b>	
(2)	(b),(d) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(b),(d) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(c),(d) [F04–OP1.3]
	(c),(d) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> shall be <i>sprinklered</i> throughout ..."
<b>3.2.2.75. Group F, Division 3, up to 6 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(c) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(b),(c) [F04–OP1.3]
	(b),(c) [F04–OS1.3]
	[F02-OP1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "... the <i>building</i> referred to in Sentence (1) shall be of <i>noncombustible construction</i> ..."
<b>3.2.2.76. Group F, Division 3, up to 3 Storeys</b>	
(2)	(a),(d) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(d) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(b),(d) [F04–OP1.3]
	(b),(d) [F04–OS1.3]
	[F04-OP1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min, ..." and to Clause (d).
	[F04-OS1.3] Applies to portion of Code text: "... c) roof assemblies shall have, if of <i>combustible construction</i> , a <i>fire-resistance rating</i> not less than 45 min ..." and to Clause (d).
<b>3.2.2.77. Group F, Division 3, up to 4 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	(a),(c) [F03–OP1.2] [F04–OP1.2,OP1.3]
	(a),(c) [F03–OS1.2] [F04–OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(b),(c) [F04–OP1.3]
	(b),(c) [F04–OS1.3]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.2.78. Group F, Division 3, up to 2 Storeys</b>	
(2)	[F03-OP1.2] [F04-OP1.2,OP1.3]
	[F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
<b>3.2.2.79. Group F, Division 3, up to 2 Storeys, Sprinklered</b>	
(1)	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
(2)	[F03-OP1.2] [F04-OP1.2,OP1.3]
	[F03-OS1.2] [F04-OS1.2,OS1.3]
	(a) [F03-OP1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
	(a) [F03-OS1.2] Applies to the requirement that <i>noncombustible</i> floor assemblies be <i>fire separations</i> .
<b>3.2.2.80. Group F, Division 3, One Storey</b>	
(1)	[F02-OP1.2] Applies to portion of Code text: "A <i>building</i> classified as Group F, Division 3 is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..."
	[F02-OS1.2] Applies to portion of Code text: "A <i>building</i> classified as Group F, Division 3 is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..."
<b>3.2.2.81. Group F, Division 3, One Storey, Sprinklered</b>	
(1)	[F02-OP1.2] Applies to portion of Code text: "A <i>building</i> classified as Group F, Division 3 is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..."
	[F02-OS1.2] Applies to portion of Code text: "A <i>building</i> classified as Group F, Division 3 is permitted to be of <i>heavy timber construction</i> or <i>noncombustible construction</i> used singly or in combination ..."
	[F02,F04-OP1.2,OP1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
	[F02,F04-OS1.2,OS1.3] Applies to portion of Code text: "... a) ... the <i>building</i> is <i>sprinklered</i> throughout ..."
<b>3.2.2.82. Group F, Division 3, One Storey, Any Area, Low Fire Load Occupancy</b>	
(2)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.2.2.83. Group F, Division 3, Storage Garages up to 22 m High</b>	
(1)	[F02-OP1.2] Applies to portion of Code text: "A <i>building</i> used as a <i>storage garage</i> with all <i>storeys</i> constructed as <i>open-air storeys</i> and having no other <i>occupancy</i> above it is permitted to have its floor, wall, ceiling and roof assemblies constructed without a <i>fire-resistance rating</i> provided it is a) of <i>noncombustible construction</i> ..."
	[F02-OS1.2] Applies to portion of Code text: "A <i>building</i> used as a <i>storage garage</i> with all <i>storeys</i> constructed as <i>open-air storeys</i> and having no other <i>occupancy</i> above it is permitted to have its floor, wall, ceiling and roof assemblies constructed without a <i>fire-resistance rating</i> provided it is a) of <i>noncombustible construction</i> ..."
<b>3.2.3.1. Limiting Distance and Area of Unprotected Openings</b>	
(1)	[F03-OP3.1]
(5)	[F03-OP3.1]
(6)	[F03-OP3.1]
(8)	[F03-OP3.1]
(9)	[F03-OP3.1]
(10)	[F03-OP3.1]
<b>3.2.3.2. Area of Exposing Building Face</b>	
(2)	[F03-OP3.1]
(3)	[F03-OP3.1]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.3.4. Party Wall</b>	
(1)	[F03-OP3.1]
<b>3.2.3.5. Wall with Limiting Distance Less Than 1.2 m</b>	
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
<b>3.2.3.6. Combustible Projections</b>	
(1)	[F03-OP3.1]
(3)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
<b>3.2.3.7. Construction of Exposing Building Face</b>	
(1)	[F03,F02-OP3.1]
(2)	[F03,F02-OP3.1]
(3)	[F03,F02-OP3.1]
<b>3.2.3.8. Protection of Exterior Building Face</b>	
(1)	[F01,F02-OP1.2]
	[F01,F02,F04-OS1.2]
	[F02-OP3.1]
<b>3.2.3.9. Protection of Structural Members</b>	
(1)	[F04-OP1.3]
	[F04-OS1.3]
<b>3.2.3.10. Unlimited Unprotected Openings</b>	
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
<b>3.2.3.11. Low Fire Load, One Storey Building</b>	
(1)	(a) [F04-OP3.1]
	(b) [F03-OP3.1]
<b>3.2.3.12. Area Increase for Unprotected Openings</b>	
(1)	[F03-OP3.1]
<b>3.2.3.13. Protection of Exit Facilities</b>	
(4)	[F06-OP1.2]
	[F06-OS1.2] [F05-OS1.5]
<b>3.2.3.14. Wall Exposed to Another Wall</b>	
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
<b>3.2.3.15. Wall Exposed to Adjoining Roof</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.2.3.16. Protection of Soffits</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.2.3.17. Canopy Protection for Vertically Separated Openings</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.2.3.18. Covered Vehicular Passageway</b>	
(1)	[F03-OP3.1]
(2)	[F02-OP3.1]
<b>3.2.3.19. Walkway between Buildings</b>	
(1)	[F03-OP3.1]
(2)	[F02-OP3.1]
(3)	[F02,F12-OP3.1]
<b>3.2.3.20. Underground Walkway</b>	
(1)	[F01,F02-OP3.1]
(2)	[F03-OP3.1]
(3)	[F02-OP3.1] Applies to portion of Code text: "An underground <i>walkway</i> shall be of <i>noncombustible construction</i> ..."
	[F80-OP2.3] Applies to portion of Code text: "An underground <i>walkway</i> shall be ... suitable for an underground location."
(4)	(a) [F05-OS1.5] [F06-OS1.2]
	(b) [F10-OS1.5] [F12-OS1.2]
<b>3.2.4.1. Determination of Requirement for a Fire Alarm System</b>	
(1)	[F11-OS1.5] [F13-OS1.5,OS1.2]
	[F13-OP1.2]
(2)	[F11-OS1.5]

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Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.4.2. Continuity of Fire Alarm System</b>	
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F10-OS1.5] [F03-OS1.2]
(5)	[F11,F13-OS1.2]
<b>3.2.4.3. Types of Fire Alarm Systems</b>	
(1)	(a) [F11-OS1.5]
	(b) [F11-OS1.4] [F13-OS1.5]
	(c),(d) [F11-OS1.5]
<b>3.2.4.4. Description of Fire Alarm Systems</b>	
(1)	[F11-OS1.5]
(2)	(a) [F11-OS1.4] [F13-OS1.5]
	(b),(c) [F11-OS1.5]
(3)	[F13-OS1.5]
(4)	[F13-OS1.5]
<b>3.2.4.5. Installation and Verification of Fire Alarm Systems</b>	
(1)	[F11,F81-OS1.5] [F13,F12,F81-OS1.5,OS1.2]
	[F12,F11-OS3.7] Applies to voice communication systems.
(2)	[F82-OS1.5]
<b>3.2.4.6. Silencing of Alarm Signals</b>	
(1)	[F11-OS1.5]
(2)	[F81,F34-OS1.5]
<b>3.2.4.7. Signals to Fire Department</b>	
(1)	[F13-OP1.2]
	[F13-OS1.5,OS1.2]
(2)	[F13-OP1.2]
	[F13-OS1.5,OS1.2]
(3)	[F13-OP1.2]
	[F13-OS1.5,OS1.2]
(4)	[F81,F13-OP1.2]
	[F81,F13-OS1.5,OS1.2]
(5)	[F13-OP1.2]
	[F13-OS1.5,OS1.2]
<b>3.2.4.8. Annunciator and Zone Indication</b>	
(1)	[F12-OS1.5,OS1.2]
(2)	[F12-OS1.5,OS1,2]
(4)	[F12-OS1.2,OS1.5]
(7)	[F12-OS1.5,OS1.2]
<b>3.2.4.9. Electrical Supervision</b>	
(1)	[F82-OS1.5,OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	(a),(d),(e),(f),(g) [F82-OP1.2]
	(a),(d),(e),(f),(g) [F82-OS1.2]
	(b),(c) [F82-OS1.5]
(3)	[F82-OP1.2]
	[F82-OS1.2]
<b>3.2.4.10. Fire Detectors</b>	
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F02-OS1.2] [F11-OS1.5]
<b>3.2.4.11. Smoke Detectors</b>	
(1)	[F11-OS1.5]
(2)	[F12-OS1.5]
<b>3.2.4.12. Prevention of Smoke Circulation</b>	
(1)	[F03-OS1.2]
<b>3.2.4.13. Vacuum Cleaning System Shutdown</b>	
(1)	[F03-OS1.2]
<b>3.2.4.14. Elevator Emergency Return</b>	
(1)	[F10-OS1.5]
(2)	[F11-OS1.5]
(3)	[F02-OS1.2]
<b>3.2.4.15. System Monitoring</b>	
(1)	[F11-OS1.5] [F12-OS1.5,OS1.2]
	[F12-OP1.2]
(2)	[F11-OS1.5] [F13-OS1.5,OS1.2]
	[F13-OP1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
<b>3.2.4.16. Manual Stations</b>	
(1)	[F11-OS1.5]
(2)	[F02-OS1.2] [F12-OS1.2,OS1.5] [F10-OS1.5]
(3)	[F02-OS1.2] [F12-OS1.2,OS1.5] [F10-OS1.5]
(4)	[F11-OS1.5]
<b>3.2.4.17. Alert and Alarm Signals</b>	
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F11-OS1.5]
<b>3.2.4.18. Audibility of Alarm Systems</b>	
(1)	[F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F33-OS3.5]
(5)	[F11-OS1.5]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(6)	[F11-OS1.5]
(7)	[F11-OS1.5]
(9)	[F11,F81-OS1.5]
(10)	[F11,F81-OS1.5]
(11)	[F11,F81-OS1.5]
(12)	[F11-OS1.5]
(14)	[F11-OS1.5]
<b>3.2.4.19. Visual Signals</b>	
(1)	[F11-OS1.5]
(2)	[F81-OS1.5]
(3)	[F11-OS1.5]
<b>3.2.4.20. Smoke Alarms</b>	
(1)	[F81,F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5]
(4)	[F11-OS1.5]
(5)	[F11,F81-OS1.5]
(6)	[F11-OS1.5]
(7)	[F81,F11-OS1.5]
(8)	[F11,F81-OS1.5]
(9)	[F11-OS1.5]
<b>3.2.4.21. Voice Communication Systems</b>	
(1)	[F12,F11-OS3.7]
(2)	[F11-OS1.5]
(3)	[F11-OS1.5] [F13-OS1.4,OS1.5]
(4)	[F11-OS1.5]
(5)	[F12-OS3.7]
<b>3.2.5.1. Access to Above-grade Storeys</b>	
(1)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
(3)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
<b>3.2.5.2. Access to Basements</b>	
(1)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
<b>3.2.5.3. Roof Access</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.5.4. Access Routes</b>	
(1)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
<b>3.2.5.5. Location of Access Routes</b>	
(1)	[F12-OP1.2]
	[F12-OS1.5,OS1.2] [F06-OS1.1]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(4)	[F12-OP1.2]
	[F12-OS1.2]
<b>3.2.5.6. Access Route Design</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2]
<b>3.2.5.7. Water Supply</b>	
(1)	[F02,F03,F12-OP1.2]
	[F02,F03,F12-OP3.1]
	[F02,F03,F12-OS1.2,OS1.3]
(2)	[F02,F03,F12-OS1.2,OS1.3]
	[F02,F03,F12-OP1.2]
	[F02,F03,F12-OP3.1]
(3)	[F02,F12,F81-OS1.2]
	[F02,F12,F81-OP1.2]
(4)	[F02,F12,F81-OS1.2]
	[F02,F12,F81-OP1.2]
<b>3.2.5.8. Standpipe Systems</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.2.5.9. Standpipe System Design</b>	
(1)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(5)	[F02-OP1.2]
	[F02-OS1.2]
(6)	[F12-OP1.2]
	[F12-OS1.2]
<b>3.2.5.10. Hose Connections</b>	
(1)	[F03-OS1.2] [F05,F06-OS1.5,OS1.2]
	[F03,F06-OP1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2]



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Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.2.5.11. Hose Stations and Cabinets</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	[F02,F12-OP1.2]
	[F02,F12-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F10-OS1.5]
(6)	[F12,F81-OS1.4]
	[F12,F81-OP1.4]
(8)	[F12-OS1.2]
	[F12-OP1.2]
(9)	[F12-OS1.2] [F81-OS1.4]
	[F12-OP1.2] [F81-OP1.4]
<b>3.2.5.12. Trouble Signal Annunciation for Valves</b>	
(1)	[F82-OP1.2]
	[F82-OS1.2]
<b>3.2.5.13. Automatic Sprinkler Systems</b>	
(1)	[F02,F81,F82-OP1.2]
	[F02,F81,F82-OS1.2]
(2)	[F02,F81,F82-OP1.2]
	[F02,F81,F82-OS1.2]
(3)	[F02,F81,F82-OP1.2]
	[F02,F81,F82-OS1.2]
(4)	[F02-OP1.2]
	[F02-OS1.2]
(5)	[F81-OP1.2]
	[F81-OS1.2]
(6)	[F02-OP1.2]
	[F02-OS1.2]
(7)	[F02-OS1.2]
(8)	[F81-OS3.3,OS3.6]
(9)	[F12-OS1.2]
	[F12-OP1.2]
<b>3.2.5.14. Combustible Sprinkler Piping</b>	
(1)	[F06-OP1.2]
	[F06-OS1.2]

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**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
(3)	[F06-OP1.2]
	[F06-OS1.2]
(4)	[F06-OP1.2]
	[F06-OS1.2]
<b>3.2.5.15. Sprinklered Service Space</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F11-OS1.5] [F12-OS1.5,OS1.2]
	[F12-OP1.2]
<b>3.2.5.16. Fire Department Connections</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OS1.2]
	[F12-OP1.2]
<b>3.2.5.17. Portable Fire Extinguishers</b>	
(1)	[F02,F12,F81-OP1.2]
	[F02,F12,F81-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OS1.2] [F81-OS1.4]
	[F12-OP1.2] [F81-OP1.4]
<b>3.2.5.18. Protection from Freezing</b>	
(1)	[F81-OP1.2]
	[F81-OS1.2]
<b>3.2.5.19. Fire Pumps</b>	
(1)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
<b>3.2.6.2. Limits to Smoke Movement</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2,OS1.5]
(2)	[F06-OP1.2]
	[F06-OS1.2,OS1.5] [F05-OS1.5]
(3)	[F06-OP1.2]
	[F06-OS1.5,OS1.2] [F05-OS1.5]
(4)	[F03-OP1.2]
	[F03-OS1.2,OS1.5]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F03-OP1.2]
	[F03-OS1.2,OS1.5]
<b>3.2.6.3. Connected Buildings</b>	
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2,OS1.5]
<b>3.2.6.4. Emergency Operation of Elevators</b>	
(3)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(4)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(5)	[F12-OP1.2]
	[F12-OS1.2,OS1.5.]
(6)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
<b>3.2.6.5. Elevator for Use by Firefighters</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(3)	[F06-OP1.2]
	[F06-OS1.2,OS1.5]
(4)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(5)	[F06-OP1.2]
	[F06-OS1.2,OS1.5]
(6)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(7)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(8)	[F06-OP1.2]
	[F06-OS1.2,OS1.5]
<b>3.2.6.6. Venting to Aid Firefighting</b>	
(1)	[F06-OP1.2]
	[F06-OS1.2,OS1.5]
(2)	[F30-OS3.1]
(3)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(4)	[F03-OS1.2] [F12-OS1.2,OS1.5]
<b>3.2.6.7. Central Alarm and Control Facility</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]

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**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F12-OP1.2] [F12-OS1.2,OS1.5] [F11-OS1.5]
<b>3.2.6.8. Voice Communication System</b>	
(1)	[F12,F11-OS3.7]
<b>3.2.6.9. Protection of Electrical Conductors</b>	
(1)	[F06-OP1.2] [F06-OS1.2,OS1.5]
(2)	[F06-OP1.2] [F06-OS1.2,OS1.5]
<b>3.2.6.10. Testing</b>	
(1)	[F82-OP1.2] [F82-OS1.2,OS1.5]
<b>3.2.7.1. Minimum Lighting Requirements</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>3.2.7.2. Recessed Lighting Fixtures</b>	
(1)	[F01-OP1.1,OP1.2] [F01-OS1.1,OS1.2]
<b>3.2.7.3. Emergency Lighting</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1] [F10-OS3.7]
<b>3.2.7.4. Emergency Power for Lighting</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30,F81-OS3.1] [F10,F81-OS3.7]
<b>3.2.7.5. Emergency Power Supply Installation</b>	
(1)	[F81,F06,F02-OP3.1] [F81,F06,F02,F03-OP1.2] [F81,F06,F11,F02,F03,F10,F12-OS1.2,OS1.5] [F81,F30-OS3.1] [F81,F11,F10,F12-OS3.7]
<b>3.2.7.6. Emergency Power for Health Care Facilities</b>	
(1)	[F81,F06,F02-OP3.1] [F81,F06,F02,F03-OP1.2] [F81,F06,F11,F02,F03,F10,F12-OS1.2,OS1.5] [F81,F30-OS3.1] [F81,F11,F10,F12-OS3.7]
<b>3.2.7.7. Fuel Supply Shut-off Valves</b>	
(1)	[F12-OH5] Applies to the requirement for a suitably identified shut-off valve outside the <i>building</i> . [F12-OP1.2] Applies to the requirement for a suitably identified shut-off valve outside the <i>building</i> . [F12-OS1.1,OS1.2] Applies to the requirement for a suitably identified shut-off valve outside the <i>building</i> . [F81-OS1.2,OS1.5] Applies to the requirement for a suitably identified separate shut-off valve. [F81-OS3.1,OS3.7] Applies to the requirement for a suitably identified separate shut-off valve.

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.2.7.8. Emergency Power for Fire Alarm Systems</b>	
(1)	[F11-OS1.5] [F13-OS1.5,OS1.2]
	[F13-OP1.2] Applies to the requirement for fire alarm systems, including those with a voice communication system, to be provided with an emergency power supply.
(2)	[F11-OS1.5] [F13-OS1.2,OS1.5]
	[F13-OP1.2]
(3)	[F11-OS1.5] [F13-OS1.5,OS1.2]
	[F13-OP1.2]
(4)	[F11-OS1.5] [F13-OS1.2,OS1.5]
	[F13-OP1.2]
<b>3.2.7.9. Emergency Power for Building Services</b>	
(1)	[F12,F02,F03-OP1.2]
	[F12,F02,F03-OS1.5,OS1.2]
	(a) [F36-OS3.6] [F12,F10-OS3.7]
	(b) [F02-OP3.1]
(2)	[F81-OS1.4]
	[F81-OP1.4]
<b>3.2.8.1. Application</b>	
(1)	[F03,F06-OP1.2]
	[F03,F06-OS1.2] [F05-OS1.5]
<b>3.2.8.2. Exceptions to Special Protection</b>	
(3)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F02,F03-OP1.2]
	[F02,F03-OS1.2]
<b>3.2.8.3. Construction Requirements</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.2.8.4. Sprinklers</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.2.8.5. Vestibules</b>	
(1)	[F06-OS1.2] [F05-OS1.5]
	[F06,F03-OP1.2]
<b>3.2.8.6. Protected Floor Space</b>	
(1)	[F05-OS1.2] [F06-OS1.5]
<b>3.2.8.7. Draft Stops</b>	
(1)	[F02-OS1.2] [F11-OS1.5] [F13-OS1.5,OS1.2]
	[F02,F13-OP1.2]
<b>3.2.8.8. Mechanical Exhaust System</b>	
(1)	[F03-OP1.2]
	[F03-OS1.5,OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F12-OP1.2] [F12-OS1.5,OS1.2]
<b>3.2.8.9. Combustible Content Limits</b>	
(1)	[F02-OP1.2] [F02-OS1.2]
<b>3.3.1.1. Separation of Suites</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(3)	[F02-OP1.2] [F02-OS1.2]
<b>3.3.1.2. Hazardous Substances, Equipment and Processes</b>	
(3)	[F05-OS1.5] [F43-OS3.7]
<b>3.3.1.3. Means of Egress</b>	
(3)	[F10-OS3.7]
(4)	[F10,F12,F05,F06-OS3.7]
(5)	[F10,F12-OS3.7]
(6)	[F10,F12,F05,F06-OS3.7]
(7)	[F10,F12,F05,F06-OS3.7]
(8)	[F05-OS1.5]
(9)	[F10,F12,F05,F06-OS3.7]
(10)	[F10,F12,F30,F36-OS3.7] [F31-OS3.2] [F30-OS3.1] [F36-OS3.6]
<b>3.3.1.4. Public Corridor Separations</b>	
(1)	[F03,F05-OS1.5] [F06-OS1.5,OS1.2] [F03,F06-OP1.2]
(2)	[F03,F05-OS1.5] [F06-OS1.5,OS1.2] [F03,F06-OP1.2]
(3)	[F03,F05-OS1.5] [F06-OS1.2,OS1.5] [F03,F06-OP1.2]
(4)	(a),(b) [F03,F05,F10-OS1.5] [F06,F12-OS1.2,OS1.5] (c) [F03,F05-OS1.5] [F03,F06-OS1.5,OS1.2] (a),(b) [F03,F06,F12-OP1.2] (c) [F03,F06-OP1.2]
<b>3.3.1.5. Egress Doorways</b>	
(1)	[F10,F05-OS1.5]
<b>3.3.1.6. Travel Distance</b>	
(1)	[F10-OS1.5]
<b>3.3.1.7. Protection on Floor Areas with a Barrier-Free Path of Travel</b>	
(1)	[F10,F05-OS1.5] (a) [F06-OS1.5]
(2)	[F03-OS1.2] [F06-OS1.5]
(3)	[F03-OS1.2] [F06-OS1.5]
(4)	[F30-OS3.1]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.3.1.9. Corridors</b>	
(1)	[F10,F12-OS3.7]
(2)	[F10,F12-OS3.7]
(3)	[F30,F73-OS3.1]
(5)	[F10,F12-OS3.7]
(6)	(a) [F10,F12-OS3.7]
	(b) [F05-OS1.5] [F06-OS1.5,OS1.2]
(7)	[F10-OS3.7]
<b>3.3.1.11. Door Swing</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
<b>3.3.1.12. Sliding Doors</b>	
(1)	(b) [F10-OS3.7]
<b>3.3.1.13. Doors and Door Hardware</b>	
(1)	(a),(b) [F10,F12-OS3.7]
	(c) [F10-OS3.7] [F30-OS3.1]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
(5)	[F10-OS3.7]
	[F73-OA1]
(7)	[F12-OS3.7]
(8)	[F12-OS3.7]
(9)	[F12-OS3.7]
(10)	[F10,F81-OS3.7]
<b>3.3.1.17. Capacity of Access to Exits</b>	
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
<b>3.3.1.18. Guards</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
<b>3.3.1.19. Transparent Doors and Panels</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F20-OS3.1]
(3)	[F30-OS3.1] [F10-OS3.7]
(6)	[F30-OS3.1]
<b>3.3.1.20. Exhaust Ventilation and Explosion Venting</b>	
(1)	[F01-OS1.1]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F02-OP1.3] Applies to the requirement for explosion-relief devices and vents.
	[F02-OS1.3] Applies to the requirement for explosion-relief devices and vents.
<b>3.3.1.21. Janitors' Rooms</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.3.1.22. Common Laundry Rooms</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.3.1.23. Obstructions</b>	
(1)	[F10-OS3.7]
<b>3.3.1.24. Signs in Service Spaces</b>	
(1)	[F10-OS3.7]
<b>3.3.1.25. Welding and Cutting</b>	
(1)	[F03,F02-OP1.2]
	[F03,F02-OS1.2]
(3)	[F01-OS1.1]
	[F01-OP1.1]
<b>3.3.1.26. Storage Rooms</b>	
(1)	[F03-OS1.2]
	[F03-OP1.2]
<b>3.3.2.2. Fire Separations</b>	
(1)	[F03-OS1.2]
(3)	[F03-OS1.2] Applies where space under tiers of seats is <i>sprinklered</i> .
	[F03-OS1.2] Applies where space under tiers of seats is not <i>sprinklered</i> .
<b>3.3.2.4. Fixed Seats</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(3)	[F10-OS3.7]
<b>3.3.2.5. Aisles</b>	
(2)	[F10-OS3.7]
(4)	[F10-OS3.7]
(5)	[F10-OS3.7]
(6)	[F10-OS3.7]
(7)	[F10-OS3.7]
(8)	[F10-OS3.7] [F30-OS3.1]
(9)	[F10-OS3.7] [F30-OS3.1]
(10)	[F10-OS3.7] [F30-OS3.1]
(11)	[F10-OS3.7] [F30-OS3.1]
(12)	[F10-OS3.7] [F30-OS3.1]



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Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(13)	[F10-OS3.7] [F30-OS3.1]
(14)	[F10-OS3.7] [F30-OS3.1]
(15)	[F10-OS3.7] [F30-OS3.1]
(16)	[F10-OS3.7] [F30-OS3.1]
<b>3.3.2.6. Corridors</b>	
(1)	[F03,F05-OS1.5] [F06-OS1.5,OS1.2]
	[F03,F06-OP1.2]
(3)	[F03,F05-OS1.5] [F06-OS1.5,OS1.2]
	[F03,F06-OP1.2]
(4)	[F10-OS3.7]
<b>3.3.2.7. Doors</b>	
(1)	[F10-OS3.7]
<b>3.3.2.8. Fixed Bench-Type Seats without Arms</b>	
(1)	[F10-OS3.7]
	[F10-OS3.7]
<b>3.3.2.10. Outdoor Places of Assembly</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(5)	[F10-OS3.7]
<b>3.3.2.11. Bleachers</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
(2)	[F10-OS3.7] [F30-OS3.1]
(4)	[F10-OS3.7] [F30-OS3.1]
(5)	[F30-OS3.1]
<b>3.3.2.12. Libraries</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.3.2.13. Stages for Theatrical Performances</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F02-OS1.2] [F06-OS1.2,OS1.5]
	[F02,F06-OP1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(6)	[F03-OP1.2] [F03-OS1.2,OS1.5]
<b>3.3.2.14. Risers for Stairs</b>	
(1)	[F30-OS3.1]
<b>3.3.3.2. Separations between Care or Detention Occupancies and Repair Garages</b>	
(1)	[F03-OS1.2] [F44-OS3.4]
<b>3.3.3.3. Corridors</b>	
(1)	[F10-OS3.7]
(2)	[F10,F12-OS3.7]
(3)	(a) [F10-OS3.7] (b) [F10,F12-OS3.7]
<b>3.3.3.4. Doorway Width</b>	
(1)	[F10,F12-OS3.7]
<b>3.3.3.5. Hospitals and Nursing Homes</b>	
(2)	[F05-OS1.5] [F06-OS1.5,OS1.2] [F06-OP1.2]
(4)	[F03,F06-OP1.2] [F05-OS1.2] [F06-OS1.2,OS1.5]
(6)	[F05-OS1.2] [F06-OS1.5]
(7)	[F10-OS1.5]
(8)	[F10-OS1.5]
(9)	[F03,F05-OS1.2] [F06-OS1.5]
(12)	[F03,F05-OS1.2] [F06-OS1.5]
<b>3.3.3.6. Areas of Refuge</b>	
(1)	[F03-OS1.2]
<b>3.3.3.7. Contained Use Areas</b>	
(2)	[F03-OS1.2] [F06-OS1.5,OS1.2] [F03,F06-OP1.2]
(3)	[F02-OS1.2] [F06-OS1.5,OS1.2] [F02,F06-OP1.2]
(4)	[F02-OS1.2] [F06-OS1.5,OS1.2] [F02,F06-OP1.2]
(5)	[F10-OS3.7]
<b>3.3.3.8. Windows</b>	
(1)	[F141-OH13]
<b>3.3.4.2. Fire Separations</b>	
(1)	[F03-OS1.2] [F05-OS1.5] [F06-OS1.5,OS1.2] [F03,F06-OP1.2]
(4)	[F02,F03-OS1.2] [F44-OS1.1] (a),(b) [F02,F03-OP1.2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F03-OS1.2] [F01-OS1.1]
	[F44-OS3.4]
	(a) [F03-OP1.2]
<b>3.3.4.3. Storage Rooms</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.3.4.4. Egress from Dwelling Units</b>	
(2)	[F10,F05-OS3.7]
(3)	[F10-OS3.7]
(4)	[F05-OS1.2,OS1.5]
(5)	[F10,F05-OS3.7]
(6)	[F10,F05-OS3.7]
<b>3.3.4.5. Automatic Locking Prohibition</b>	
(1)	[F10-OS3.7]
<b>3.3.5.2. Fire Extinguishing Systems</b>	
(1)	[F02-OS1.2] [F04-OS1.4]
	[F02-OP1.2] [F04-OP1.4]
(2)	[F02-OS1.2] [F04-OS1.4]
	[F02-OP1.2] [F04-OP1.4]
<b>3.3.5.3. Basements</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5] [F01-OS1.1]
(2)	[F05-OS1.5] [F06-OS1.2,OS1.5] Applies to the separation of <i>exits</i> from the remainder of the <i>building</i> .
	[F06-OP1.2] Applies to the separation of <i>exits</i> from the remainder of the <i>building</i> .
	[F06-OP1.2] Applies to the separation of entrances from the remainder of the <i>building</i> .
	[F06-OS1.5,OS1.2] Applies to the separation of entrances to <i>basements</i> and to rooms containing <i>building services</i> from the remainder of the <i>building</i> .
(3)	[F44-OS1.1]
<b>3.3.5.4. Repair and Storage Garages</b>	
(2)	[F30-OS3.1] [F10,F12-OS3.7]
(5)	[F30-OS3.1]
(6)	[F30-OS3.1]
(7)	[F02-OP1.2]
	[F02-OS1.2]
<b>3.3.5.5. Repair Garage Separation</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.3.5.6. Storage Garage Separation</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.3.5.7. Vestibules</b>	
(3)	[F44-OS1.1]
	[F44-OS3.4]
<b>3.3.5.8. Dispensing of Fuel</b>	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
<b>3.3.5.9. Multiple Tenant Self Storage Warehouses</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.3.5.11. Tire Storage</b>	
(2)	[F03-OS1.2]
	[F03-OP1.2]
(3)	[F02,F04-OS1.2,OS1.3] [F81-OS1.4]
	[F02,F04-OP1.2,OP1.3] [F81-OP1.4]
(4)	[F02-OS1.2]
	[F02-OP1.2]
(5)	[F02,F12,F81-OS1.2]
	[F02,F12,F81-OP1.2]
(6)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
<b>3.3.5.13. Compressed Gas Cylinders</b>	
(2)	[F81-OS1.1] Applies to portion of Code text: "...to prevent dislodgement..."
	[F81-OS3.4] Applies to portion of Code text: "...to prevent dislodgement..."
	[F02,F80,F81-OS1.1] Applies to portion of Code text: "...shall be supported on raised concrete or other <i>noncombustible</i> platforms..."
	[F34-OS1.1] Applies to portion of Code text: "...in a fenced enclosure..."
	[F34-OS3.4] Applies to portion of Code text: "...in a fenced enclosure..."
	[F34-OH5] Applies to portion of Code text: "...in a fenced enclosure..."
(3)	[F34-OH5]
	[F34-OS3.4]
	[F34-OS1.1]



Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	(a) [F03-OS1.2] [F44-OS1.1]
	(a) [F03-OP1.2] [F44-OP1.1]
	(b) [F02-OP1.3]
	(b) [F02-OS1.3]
	(c) [F12-OS1.2] Applies to portion of Code text: "...to be entered from the exterior..."
	(c) [F12-OP1.2] Applies to portion of Code text: "...to be entered from the exterior..."
	(c) [F44-OS1.1] Applies to the requirement for closures leading to the interior of the <i>building</i> .
	(c) [F44-OP1.1] Applies to the requirement for closures leading to the interior of the <i>building</i> .
	(d) [F02-OS1.3]
	(d) [F02-OP1.3]
	(e) [F01-OS1.1]
	(e) [F01-OP1.1]
	(f) [F01-OS1.1]
	(f) [F01-OP1.1]
	(g) [F01,F02-OS1.1]
(g) [F01,F02-OP1.1]	
(6)	[F03-OS1.2]
	[F03-OP1.2]
	(a) [F44-OS3.4]
	(b) [F44-OS3.4]
	(c) [F12-OS3.4] Applies to portion of Code text: "...to be entered from the exterior..."
	(d) [F44-OS3.4] Applies to the requirement for closures leading to the interior of the <i>building</i> .
<b>3.3.5.14. Dust Explosions</b>	
(1)	[F02-OS1.2,OS1.3]
	[F02-OP1.2,OP1.3]
<b>3.3.5.15. Oxidizing Materials</b>	
(1)	[F03-OS1.2]
	[F03-OP1.2]
	[F51,F52-OS1.1]
	[F51,F52-OS3.4]
<b>3.3.5.16. Corrosive Liquids</b>	
(1)	[F03-OS1.2]
	[F03-OP1.2]
<b>3.3.5.17. Reactive Substances</b>	
(1)	[F03-OS1.2]
	[F03-OP1.2]
(2)	[F12-OS3.4]
<b>3.3.5.18. Flammable and Combustible Liquid Storage Tanks</b>	
(2)	[F01-OP1.1] [F02-OP1.2]
	[F01-OS1.1] [F02-OS1.2]

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**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F01-OS1.1]
	[F01-OP1.1]
	[F44-OH5]
	[F44-OP1.1]
	[F44-OS1.1]
(6)	(a) [F03-OP1.2]
	(a) [F03-OS1.2]
	(b) [F44-OH5] Applies to portion of Code text "...designed to contain 100% of the volume of the largest storage tank..."
	(b) [F44-OP1.1] Applies to portion of Code text "...designed to contain 100% of the volume of the largest storage tank..."
	(b) [F44-OS1.1] Applies to portion of Code text "...designed to contain 100% of the volume of the largest storage tank..."
	(c) [F44-OH5]
	(c) [F44-OP1.1,OP1.2]
	(c) [F44-OS1.1,OS1.2]
	(d) and (e) [F01-OS1.1]
(d) and (e) [F01-OP1.1]	
(7)	[F03-OS1.2]
	[F03-OP1.2]
<b>3.3.5.19. Dust Collectors</b>	
(1)	[F01,F02-OS1.1,OS1.2]
	[F01,F02-OP1.1,OP1.2]
(2)	[F81-OS1.1]
	[F81-OP1.1]
<b>3.3.5.20. Structure</b>	
(1)	[F02-OS1.3]
	[F02-OP1.3]
<b>3.3.5.22. Spray Applications</b>	
(1)	[F01,F81-OS1.1]
	[F01,F81-OP1.1]
<b>3.4.1.2. Separation of Exits</b>	
(1)	[F10,F12,F05,F06-OS3.7]
	[F12,F06-OP1.2]
	[F12,F06-OS1.5,OS1.2]
(2)	[F10-OS3.7]
<b>3.4.1.5. Exterior Exit Passageways</b>	
(1)	[F10-OS3.7]
<b>3.4.1.6. Restricted Use of Horizontal Exits</b>	
(1)	[F10-OS3.7]
(2)	[F10,F05-OS3.7]
<b>3.4.1.7. Slide Escapes</b>	
(1)	[F10-OS3.7]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.4.1.9. Mirrors near Exits</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
<b>3.4.1.10. Combustible Glazing in Exits</b>	
(1)	[F03,F06-OP1.2]
	[F05-OS1.2] [F06-OS1.2,OS1.5]
<b>3.4.2.1. Minimum Number of Exits</b>	
(1)	[F10,F12,F05,F06-OS3.7]
	[F12,F06-OP1.2]
	[F12,F06-OS1.2]
(3)	[F10-OS3.7]
<b>3.4.2.2. Means of Egress from Mezzanines</b>	
(1)	[F05-OS1.5]
<b>3.4.2.3. Distance between Exits</b>	
(1)	[F10,F05-OS1.5]
<b>3.4.2.4. Travel Distance</b>	
(3)	[F10-OS3.7]
<b>3.4.2.5. Location of Exits</b>	
(1)	[F10-OS3.7]
(3)	[F10-OS3.7]
<b>3.4.2.6. Principal Entrances</b>	
(1)	[F10-OS3.7]
<b>3.4.3.1. Exit Width Based on Occupant Load</b>	
(2)	[F10-OS3.7]
<b>3.4.3.2. Exit Width</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(6)	[F10-OS3.7]
(7)	[F10-OS3.7]
(8)	[F12-OP1.2]
	[F12-OS1.2]
	[F12,F10-OS3.7] [F30-OS3.1]
<b>3.4.3.3. Exit Width Reduction</b>	
(1)	[F10,F12-OS3.7] [F30-OS3.1]
	[F12-OP1.2]
	[F12-OS1.2]
(2)	[F10,F12-OS3.7]
	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F10,F12-OS3.7]
	[F12-OP1.2]
	[F12-OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F10,F12-OS3.7]
	[F12-OP1.2]
	[F12-OS1.2]
<b>3.4.3.4. Headroom Clearance</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2]
	[F30-OS3.1] [F10,F12-OS3.7]
(3)	[F12-OP1.2]
	[F12-OS1.2]
	[F30-OS3.1] [F10,F12-OS3.7]
(4)	[F12-OP1.2]
	[F12-OS1.2]
	[F30-OS3.1] [F10,F12-OS3.7]
<b>3.4.4.1. Fire-Resistance Rating of Exit Separations</b>	
(1)	[F05-OS1.5] [F06-OS1.5,OS1.2] [F03-OS1.2]
	[F06,F03-OP1.2]
<b>3.4.4.2. Exits through Lobbies</b>	
(1)	[F05,F06-OS1.5]
(2)	[F12,F10,F05,F06-OS1.5]
<b>3.4.4.3. Exterior Passageway Exceptions</b>	
(1)	[F05,F06,F10-OS1.5]
<b>3.4.4.4. Integrity of Exits</b>	
(1)	[F05-OS1.5] [F06-OS1.5,OS1.2] [F03-OS1.2]
	[F06,F03-OP1.2]
(2)	[F05-OS1.5] [F06-OS1.5,OS1.2]
	[F06-OP1.2]
(3)	[F05-OS1.5] [F06-OS1.5,OS1.2]
	[F06-OP1.2]
(4)	[F05-OS1.5] [F06-OS1.5,OS1.2]
	[F06-OP1.2]
	[F43-OS3.7]
(5)	[F03,F06-OP1.2]
	[F05-OS1.5] [F06-OS1.5,OS1.2] [F03-OS1.2]
(6)	[F10,F05-OS1.5] [F12-OS1.5,OS1.2]
	[F10,F12-OS3.7] [F30-OS3.1] [F31-OS3.2] [F32-OS3.3] [F43-OS3.4]
	[F12-OP1.2]
(7)	[F05-OS1.5] [F06-OS1.5,OS1.2]
	[F06-OP1.2]
	[F43-OS3.7]
(8)	[F05-OS1.5] [F06-OS1.5,OS1.2]
	[F06-OP1.2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(9)	[F05-OS1.5] [F06-OS1.5,OS1.2] [F06-OP1.2]
<b>3.4.5.1. Exit Signs</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10,F81-OS3.7]
(5)	[F10-OS3.7]
(6)	[F10-OS3.7]
<b>3.4.5.2. Signs for Stairs and Ramps at Exit Level</b>	
(1)	[F10-OS3.7]
<b>3.4.6.1. Slip Resistance of Ramps and Stairs</b>	
(1)	(a) [F10-OS3.7] [F30-OS3.1]
	(b) [F10-OS3.7] [F30-OS3.1]
(2)	[F10,F12-OS3.7] [F30-OS3.1]
	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
<b>3.4.6.2. Minimum Number of Risers</b>	
(1)	[F30-OS3.1]
<b>3.4.6.3. Landings and Maximum Vertical Rise of Stair Flights</b>	
(1)	[F10-OS3.7]
(2)	[F10,F12-OS3.7] [F30-OS3.1]
	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(3)	[F10,F12-OS3.7] [F30-OS3.1]
(4)	[F10,F12-OS3.7] [F30-OS3.1]
(5)	[F10,F12-OS3.7] [F30-OS3.1]
<b>3.4.6.4. Handrails</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1] [F10-OS3.7]
(6)	[F30-OS3.1] [F10-OS3.7]
	[F73-OA1]
(8)	[F30-OS3.1] [F10-OS3.7]
(9)	[F20-OS3.1,OS3.7]
(10)	[F30-OS3.1] [F10-OS3.7]
<b>3.4.6.5. Guards</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1]
(6)	[F30-OS3.1]
(7)	[F30-OS3.1]
<b>3.4.6.6. Ramp Slope</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
<b>3.4.6.7. Treads and Risers</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
(2)	[F10-OS3.7] [F30-OS3.1]
(3)	[F10-OS3.7] [F30-OS3.1]
(4)	[F30-OS3.1]
(5)	[F10-OS3.7] [F30-OS3.1]
(6)	[F30-OS3.1]
<b>3.4.6.8. Curved Stairs</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
(2)	[F10-OS3.7] [F30-OS3.1]
<b>3.4.6.9. Horizontal Exits</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(4)	[F10,F73-OS3.7]
(5)	[F10-OS3.7]
<b>3.4.6.10. Doors</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7] Applies to portion of Code text: "No exit door shall open directly onto a step ..." [F81,F10-OS3.7] Applies where there is a danger of blockage from ice or snow.
(3)	[F10-OS3.7]
(4)	[F10,F12-OS3.7]
<b>3.4.6.11. Direction of Door Swing</b>	
(1)	[F10-OS3.7]
<b>3.4.6.12. Self-closing Devices</b>	
(1)	[F05-OS1.5] [F06-OS1.5,OS1.2] [F06,F03-OP1.2]
<b>3.4.6.13. Sliding Doors</b>	
(2)	[F12-OS3.7]
<b>3.4.6.14. Revolving Doors</b>	
(1)	(a) [F30-OS3.1] [F10-OS3.7] (b) [F10,F12-OS3.7] (c) [F10-OS3.7] (d) [F30-OS3.1] [F10-OS3.7] (e) [F20-OS3.1]
(2)	[F10-OS3.7]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	(a),(b),(d),(e) [F10,F81-OS3.7] [F20,F30-OS3.1]
<b>3.4.6.15. Door Release Hardware</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10,F81-OS3.7]
(5)	[F10-OS3.7]
	[F73-OA1]
<b>3.4.6.16. Security for Banks and Mercantile Floor Areas</b>	
(1)	[F02-OS1.2] Applies to <i>sprinklered buildings</i> .
	[F10,F81-OS3.7] Applies to <i>exit</i> and egress doors complying with the stated Sentences.
(2)	[F10-OS3.7]
(3)	[F81-OS3.7]
(5)	[F10-OS1.5]
(6)	[F10-OS3.7]
(9)	[F10,F81-OS3.7]
<b>3.4.6.17. Emergency Access to Floor Areas</b>	
(1)	(a),(b) [F10-OS3.7]
	(c) [F12-OP1.2]
	(c) [F12-OS1.2,OS1.5]
	(c) [F12-OS3.7]
(2)	[F10-OS3.7]
<b>3.4.6.18. Floor Numbering</b>	
(1)	[F10,F12,F73-OS3.7]
	[F12-OP1.2]
	[F12-OS1.2]
	[F73-OA1]
<b>3.4.7.1. Scope</b>	
(1)	[F10,F12-OS3.7]
(2)	[F10-OS1.5] [F12-OS1.2]
	[F10-OS3.7] [F30-OS3.1]
<b>3.4.7.2. Fire Escape Construction</b>	
(1)	[F05-OS1.5] [F06-OS1.2] Applies to the combustibility of materials used in the construction of fire escapes.
	[F10,F12-OS3.7] [F20-OS3.1] Applies to the type and construction of fire escapes.
	[F20-OS2.1] Applies to the type and construction of fire escapes.
<b>3.4.7.3. Access to Fire Escapes</b>	
(1)	[F10-OS3.7] Applies to portion of Code text: "Access to fire escapes shall be from corridors through doors at floor level ..."
(2)	[F30-OS3.1] [F10-OS3.7]
<b>3.4.7.4. Protection of Fire Escapes</b>	
(1)	[F05,F06-OS1.5]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.4.7.5. Stairs</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7] Applies to the reduction in width permitted under certain conditions.
(4)	[F10-OS3.7] [F30-OS3.1]
<b>3.4.7.6. Guards and Railings</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
(2)	[F10-OS3.7] [F30-OS3.1]
(3)	[F10-OS3.7] [F30-OS3.1]
(4)	[F30-OS3.1]
(5)	[F30-OS3.1]
<b>3.5.2.1. Elevators, Escalators and Dumbwaiters</b>	
(3)	[F73-OA1]
<b>3.5.3.1. Fire Separations for Elevator Hoistways</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.5.3.2. Vertical Service Spaces for Dumbwaiters</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.5.3.3. Fire Separations for Elevator Machine Rooms</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.5.4.1. Elevator Car Dimensions</b>	
(1)	[F12-OS3.7]
(2)	[F12-OS3.7]
<b>3.5.4.2. Floor Numbering</b>	
(1)	[F73-OA1]
<b>3.6.1.3. Storage Use Prohibition</b>	
(1)	[F01-OS1.1] [F02-OS1.2]
<b>3.6.1.4. Appliances Installed outside a Building</b>	
(1)	[F03-OS1.2]
	(a) [F03-OP3.1]
	(b) [F03-OP1.2]
<b>3.6.2.1. Fire Separations around Service Rooms</b>	
(1)	[F03-OP1.2,OP1.4]
	[F03-OS1.2,OS1.4]
(3)	[F01-OP1.1] [F03-OP1.2]
	[F01-OS1.1] [F03-OS1.2]
(4)	[F03-OP1.2,OP1.4]
	[F03-OS1.2,OS1.4]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F03-OP1.2,OP1.4]
	[F03-OS1.2,OS1.4]
(6)	[F03-OP1.2,OP1.4]
	[F03-OS1.2,OS1.4]
(7)	[F03-OP1.2,OP1.4]
	[F03-OS1.2,OS1.4]
<b>3.6.2.2. Service Rooms under Exits</b>	
(1)	[F02-OS1.2]
	[F06,F05-OS3.7]
<b>3.6.2.4. Incinerator Rooms</b>	
(1)	[F02-OS1.2]
<b>3.6.2.5. Combustible Refuse Storage</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.6.2.6. Door Swing for Service Rooms</b>	
(1)	[F10-OS1.5] Applies to portion of Code text: "A swing-type door from a <i>service room</i> containing a <i>boiler</i> or <i>incinerator</i> shall swing outward from the room ..."
	[F30-OS3.1] Applies to portion of Code text: "A swing-type door from a <i>service room</i> containing a <i>boiler</i> or <i>incinerator</i> shall swing ... inward if the door opens onto a corridor or any room used for an <i>assembly occupancy</i> ."
<b>3.6.2.7. Electrical Equipment Vaults</b>	
(2)	[F03-OP1.2,OP1.4]
	[F03-OS1.2,OS1.4]
(3)	[F02-OP1.2] [F03-OP1.4]
	[F02-OS1.2] [F11-OS1.5] [F03-OS1.4]
(4)	[F03-OP1.2,OP1.4]
	[F03-OS1.2,OS1.4]
(6)	[F81-OS1.1]
(7)	[F03-OS1.2]
(8)	[F44-OS1.1] [F03-OS1.2]
(9)	[F44-OH5]
<b>3.6.2.8. Emergency Power Installations</b>	
(1)	[F03-OP1.2,OP1.4] [F06-OP1.2]
	[F03-OS1.2,OS1.4] [F06-OS1.2,OS1.5]
<b>3.6.3.1. Fire Separations for Vertical Service Spaces</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F03-OP1.2] [F03-OS1.2]
<b>3.6.3.2. Foamed Plastic Protection</b>	
(1)	[F02-OS1.2]
<b>3.6.3.3. Linen and Refuse Chutes</b>	
(1)	(a),(b),(c) [F41-OH2.4,OH2.5] (d),(e) [F02-OS1.2]
(2)	[F03-OP1.2] [F03-OS1.2]
(3)	[F03-OS1.2]
(4)	(a) [F41-OH2.4,OH2.5] (b) [F03-OS1.2]
(5)	(a) [F81,F03-OP1.2] (a) [F81,F03-OS1.2] (a) [F81,F41-OH2.4,OH2.5] (b) [F03-OP1.2] (b) [F03-OS1.2] (c) [F01,F02-OP1.2] (c) [F01,F02-OS1.2] (d) [F05-OS1.5] [F06-OS1.5,OS1.2] (d) [F06-OP1.2]
(6)	[F02-OP1.2] [F02-OS1.2]
(7)	[F03-OP1.2] [F03-OS1.2]
(8)	[F02-OS1.2] [F41-OH2.4,OH2.5]
(9)	[F03-OP1.2] [F03-OS1.2]
(10)	[F41-OH2.4,OH2.5] Applies to portion of Code text: "The room or bin into which a refuse chute discharges shall be ... impervious to moisture and be equipped with a water connection and floor drain for washing-down purposes." [F81,F03-OS1.2] Applies to portion of Code text: "The room or bin into which a refuse chute discharges shall be of sufficient size to contain the refuse between normal intervals of emptying ..." [F81,F41-OH2.4,OH2.5] Applies to portion of Code text: "The room or bin into which a refuse chute discharges shall be of sufficient size to contain the refuse between normal intervals of emptying ..."
(11)	[F01,F02-OS1.2]
<b>3.6.3.4. Exhaust Duct Negative Pressure</b>	
(1)	[F03-OS1.2]
<b>3.6.4.2. Fire Separations for Horizontal Service Spaces</b>	
(2)	[F03-OP1.2] [F03-OS1.2]
<b>3.6.4.3. Plenum Requirements</b>	
(1)	[F02-OS1.2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>3.6.4.4. Attic or Roof Space Access</b>	
(1)	[F01,F02,F12-OP1.2]
	[F01,F02,F12-OS1.2]
<b>3.6.4.5. Horizontal Service Space Access</b>	
(1)	[F01,F02,F12-OP1.2]
	[F01,F02,F12-OS1.2]
<b>3.6.4.6. Crawl Space Access</b>	
(1)	[F01,F02,F12-OP1.2]
	[F01,F02,F12-OS1.2]
<b>3.6.4.7. Roof Access</b>	
(1)	[F30-OS3.1]
(2)	[F10-OS3.7]
	[F30-OS3.1]
(3)	[F30-OS3.1]
<b>3.6.5.1. Duct Materials</b>	
(1)	[F01,F02-OS1.2]
(2)	[F02-OS1.2]
(4)	[F02-OS1.2]
(5)	[F02-OS1.2]
<b>3.6.5.2. Vibration Isolation Connectors</b>	
(1)	[F01,F02-OS1.2]
(2)	[F02-OS1.2]
<b>3.6.5.3. Tape</b>	
(1)	[F02-OS1.2]
<b>3.6.5.4. Coverings, Linings, Adhesives and Insulation</b>	
(1)	[F02-OS1.2]
(2)	[F02-OS1.2]
(3)	[F02-OS1.2]
(4)	[F02-OS1.2]
(5)	[F02-OS1.2]
(6)	[F02-OS1.2]
(7)	[F01,F02-OS1.2]
<b>3.6.5.5. Insulation and Coverings</b>	
(1)	[F01,F02-OS1.2]
(2)	[F02-OS1.2]
(3)	[F02-OS1.2]
(4)	[F02-OS1.2]
<b>3.6.5.6. Clearance of Ducts and Plenums</b>	
(2)	[F01-OS1.2]
(3)	[F01-OS1.2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F01-OS1.2]
(5)	[F01-OS1.2]
<b>3.6.5.7. Supply, Return, Intake and Exhaust-Air Openings</b>	
(1)	[F02-OS1.2]
<b>3.6.5.8. Return-Air System</b>	
(1)	[F02-OS1.2]
(2)	[F01,F02-OS1.2]
(3)	[F01,F02-OS1.2]
(4)	[F01,F02-OS1.2]
<b>3.8.1.1. Application</b>	
(4)	[F73-OA1]
<b>3.8.1.2. Entrances</b>	
(1)	[F73-OA1]
(5)	[F73-OA1]
(6)	[F73-OA1]
<b>3.8.1.3. Barrier-Free Path of Travel</b>	
(1)	[F73-OA1]
(2)	(a),(b) [F30-OS3.1]
	(a),(b) [F73-OA1]
	(c) [F30-OS3.1]
	(c) [F73-OA1]
	(d),(e) [F30-OS3.1]
	(d),(e) [F73-OA1]
(4)	[F73-OA1]
<b>3.8.1.4. Access to Storeys Served by Escalators and Moving Walks</b>	
(1)	[F73-OA1]
(2)	[F73-OA1]
<b>3.8.1.5. Controls</b>	
(1)	[F10-OS3.7]
	[F74-OA2]
<b>3.8.2.1. Areas Requiring a Barrier-Free Path of Travel</b>	
(1)	[F73-OA1]
(3)	[F74-OA2]
<b>3.8.2.2. Access to Parking Areas</b>	
(1)	[F73-OA1]
(2)	[F73-OA1]
(3)	(a) [F74-OA2]
	(b) [F73-OA1]
	(c) [F74-OA2]
<b>3.8.2.3. Washrooms Required to be Barrier-Free</b>	
(1)	[F72-OH2.1] [F71-OH2.3]
	[F74-OA2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F72-OH2.1] [F73-OA1]
(5)	[F72-OH2.1] [F71-OH2.3] [F74-OA2]
(6)	[F74-OA2]
(7)	[F74-OA2]
<b>3.8.3.1. Accessibility Signs</b>	
(1)	[F73-OA1]
(2)	[F74-OA2]
(3)	[F74-OA2]
(4)	[F74-OA2]
(5)	[F73-OA1]
<b>3.8.3.2. Exterior Walks</b>	
(1)	(a),(b),(c),(e) and (g) [F73-OA1] (d) and (f) [F30-OS3.1]
<b>3.8.3.3. Doorways and Doors</b>	
(1)	[F73-OA1]
(2)	[F73-OA1]
(3)	[F10-OS3.7] [F74-OA2]
(4)	[F10-OS3.7] [F74-OA2]
(5)	[F73-OA1]
(7)	[F73-OA1]
(9)	[F30-OS3.1] [F73-OA1]
(10)	[F73-OA1]
(11)	[F30-OS3.1] [F73-OA1]
(13)	[F73-OA1]
<b>3.8.3.4. Ramps</b>	
(1)	(a),(b),(c),(d),(f) and (g) [F73-OA1] (b),(c),(d),(e),(f) and (g) [F30-OS3.1]
<b>3.8.3.6. Spaces in Seating Area</b>	
(1)	(d) [F10-OS3.7] [F30-OS3.1] Applies to portion of Code text: "... level, or level with removable seats ..." [F74-OA2] Applies to entire Sentence except for portion of Code text: "... without infringing on egress from any row of seating or any aisle requirements ..."
<b>3.8.3.7. Assistive Listening Devices</b>	
(1)	[F11-OS3.7] [F74-OA2]

**Table 4.2.1.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.8.3.8. Water Closet Stalls</b>	
(1)	[F72-OH2.1]
	[F74-OA2]
	(b)(i) [F74-OA2]
	(e) [F30-OS3.1] Applies to portion of Code text: "... be equipped with a coat hook ... projecting not more than 50 mm from the wall ..."
(2)	[F20,F30-OS3.1]
	[F74-OA2]
<b>3.8.3.9. Water Closets</b>	
(1)	[F72-OH2.1]
	[F74-OA2]
<b>3.8.3.10. Urinals</b>	
(1)	[F74-OA2]
	(a),(b) [F72-OH2.1]
(2)	[F74-OA2]
	(c) [F30-OS3.1]
<b>3.8.3.11. Lavatories</b>	
(1)	[F71-OH2.3]
	[F74-OA2]
	(d) [F31-OS3.2]
(2)	[F74-OA2]
<b>3.8.3.12. Universal Toilet Rooms</b>	
(1)	[F72-OH2.1] [F71-OH2.3]
	[F74-OA2]
	(b) [F74-OA2] Applies to portion of Code text: "... b) ... a door capable of being locked from the inside ..."
	(b) [F10-OS3.7]
	(g) [F30-OS3.1] Applies to the requirement for a coat hook.
(g) [F74-OA2] Applies to the requirement for a shelf.	
<b>3.8.3.13. Showers</b>	
(1)	[F74-OA2]
	(c),(d) [F30-OS3.1]
	(f) [F30-OS3.1]
	(g) [F31-OS3.2]
(2)	[F74-OA2]
<b>3.8.3.14. Counters</b>	
(1)	[F74-OA2]
(2)	[F74-OA2]
(3)	[F74-OA2]
<b>3.8.3.15. Shelves or Counters for Telephones</b>	
(1)	[F74-OA2]
(2)	[F74-OA2]
(3)	[F74-OA2]

Table 4.2.1.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>3.8.3.16. Drinking Fountains</b>	
(1)	(a),(b) [F74–OA2]
<b>3.8.3.17. Bathtubs</b>	
(1)	[F74–OA2]
	(d) [F20,F30–OS3.1]

**Notes to Table 4.2.1.1.:**

(1) See Parts 2 and 3.

**4.2.2. Part 4 of Division B****4.2.2.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 4 of Division B shall be the objectives and functional statements listed in Table 4.2.2.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.2.1.**  
**Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 4 of Division B**  
 Forming Part of Sentence 4.2.2.1.(1)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.1.1.3. Design Requirements</b>	
(1)	[F20–OS2.1]
(2)	[F22–OH4]
	[F22–OP2.4]
(3)	[F20–OS2.1] Applies to structural members where temporary overloading during construction may result in impairment of that or any other member.
(4)	[F20,F80,F82–OS2.1]
(5)	[F20–OS2.3,OS2.4]
	[F20–OP2.1] [F22–OP2.4]
<b>4.1.1.5. Design Basics</b>	
(2)	[F20–OP2.1] [F22–OP2.4,OP2.5]
	[F20–OS2.1] [F22–OS2.4,OS2.5]
	[F22–OH4]
<b>4.1.2.1. Loads and Effects</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F22–OP2.4]
	[F22–OH4]
(2)	[F20–OS2.1]
(3)	[F20–OS2.1]
<b>4.1.2.2. Loads Not Listed</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F22–OP2.4]
	[F22–OH4]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.1.3.2. Strength and Stability</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4,OP2.5]
	[F20-OS2.1] [F22-OS2.4,OS2.5]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OP2.1] [F22-OP2.4,OP2.5]
	[F20-OS2.1] [F22-OS2.4,OS2.5]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(9)	[F20-OS2.1] [F22-OS2.4,OS2.5]
(10)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.3.3. Fatigue</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1,OP2.4] [F22-OP2.4]
	[F22-OH4]
<b>4.1.3.4. Serviceability</b>	
(1)	[F22-OH4]
	[F22-OP2.4]
<b>4.1.3.5. Deflection</b>	
(1)	[F22-OH4]
	[F22-OP2.4]
	(b),(c),(d) [F22-OP2.4]
(2)	[F22-OP2.4]
	[F22-OS2.3,OS2.4]
(3)	[F22-OP2.4]
(5)	[F22-OP2.3,OP2.4]
	[F22-OS2.3,OS2.4]
<b>4.1.3.6. Vibration</b>	
(1)	[F22-OH4]
	[F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1,OP2.4] [F22-OP2.4]
	[F22-OH4]
<b>4.1.4.1. Dead Loads</b>	
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]

Table 4.2.2.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1] [F22-OS2.4,OS2.5]
<b>4.1.5.1. Loads Due to Use of Floors and Roofs</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.5.2. Uses Not Stipulated</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.5.3. Full and Partial Loading</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.5.4. Loads for Occupancy Served</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.5.5. Loads on Exterior Areas</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.5.7. Floor Loads Due to Intended Use</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.5.8. More Than One Occupancy</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.1.5.9. Variation with Tributary Area</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.5.10. Concentrated Loads</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.5.11. Sway Forces in Assembly Occupancies</b>	
(1)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
<b>4.1.5.12. Crane-Supporting Structures and Impact of Machinery and Equipment</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1,OP2.4] [F22-OP2.4]
(2)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
(3)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
(4)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
<b>4.1.5.13. Bleacher Seats</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.4]
<b>4.1.5.14. Helicopter Landing Areas</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.5.15. Loads on Guards</b>	
(1)	[F20-OS2.1]
(2)	[F20-OS2.1,OS2.4]
(4)	[F20-OS2.1]
<b>4.1.5.16. Loads on Vehicle Guardrails</b>	
(1)	[F20-OS2.1]
<b>4.1.5.17. Loads on Walls Acting As Guards</b>	
(1)	[F20-OS2.1]
<b>4.1.5.18. Firewalls</b>	
(1)	[F20-OP1.2]
	[F20-OP3.1]
	[F20-OS1.2]
(2)	[F04-OP1.2]
	[F04-OP3.1]
	[F04-OS1.2]

Table 4.2.2.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.1.5.19. Roof Suspended Platforms</b>	
(2)	[F20-OS2.1]
	[F30-OS3.1]
<b>4.1.6.2. Specified Snow Loading</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	(a) to (e) [F20-OP2.1] [F22-OP2.4] Applies to roof shapes and configurations that call for a higher shape factor.
	(a) to (e) [F20-OS2.1] Applies to roof shapes and configurations that call for a higher shape factor.
	[F20-OP2.1] [F22-OP2.4] Applies to portion of Code text: "The shape factor, $C_a$ , shall be 1.0, ..."
	[F20-OS2.1] Applies to portion of Code text: "The shape factor, $C_a$ , shall be 1.0, ..."
<b>4.1.6.3. Full and Partial Loading</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.6.4. Specified Rain Load</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.7.1. Specified Wind Load</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
(6)	(a),(b),(c) [F20-OP2.1] [F22-OP2.4]
	(a),(b),(c) [F20-OS2.1]
	(a),(b),(c) [F22-OH4]
	(d) [F20-OP2.1] [F22-OP2.4]
	(d) [F20-OS2.1]
	(d) [F22-OH4]
<b>4.1.7.2. Dynamic Effects of Wind</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.7.3. Full and Partial Loading</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
	[F22-OH4]
<b>4.1.7.4. Interior Walls and Partitions</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.3. General Requirements</b>	
(2)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.4. Site Properties</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]

Table 4.2.2.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.5. Importance Factor</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1,OP2.3] [F22-OP2.4]
<b>4.1.8.6. Structural Configuration</b>	
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.7. Methods of Analysis</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.8. Direction of Loading</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.9. SFRS Force Reduction Factors, System Overstrength Factors, and General Restrictions</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.10. Additional System Restrictions</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	(a) [F20-OP2.3] [F22-OP2.4]
	(b) [F20-OP2.3] [F22-OP2.4]
	(c) [F20-OP2.3] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.11. Equivalent Static Force Procedure for Structures Satisfying the Conditions of Article 4.1.8.7.</b>	
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	(a) [F20-OP2.1] [F22-OP2.4]
	(a) [F20-OS2.1]
	(b) [F20-OP2.1] [F22-OP2.4]
	(b) [F20-OS2.1]
(9)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(10)	(a) [F20-OP2.1] [F22-OP2.4]
	(a) [F20-OS2.1]
	(b) [F20-OP2.1] [F22-OP2.4]
	(b) [F20-OS2.1]
<b>4.1.8.12. Dynamic Analysis Procedure</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	(a) [F20-OP2.1] [F22-OP2.4]
	(a) [F20-OS2.1]
(5)	[F20-OS2.1]
	[F20-OP2.1,OP2.3] [F22-OP2.4]
(6)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(8)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.13. Deflections and Drift Limits</b>	
(1)	[F22-OP2.3,OP2.4]
	[F22-OS2.3,OS2.4]
(2)	[F22-OP2.3,OP2.4]
	[F22-OS2.3,OS2.4]
(3)	[F22-OP2.3,OP2.4]
	[F22-OS2.3,OS2.4]

Table 4.2.2.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.1.8.14. Structural Separation</b>	
(1)	[F22-OP2.3,OP2.4]
	[F22-OP4.3]
	[F22-OS2.3,OS2.4]
(2)	[F20-OP2.1,OP2.3,OP2.4]
	[F20-OP4.3]
	[F20-OS2.1,OS2.3,OS2.4]
(3)	[F20-OP2.1,OP2.3,OP2.4]
	[F20-OP4.3]
	[F20-OS2.1,OS2.3,OS2.4]
(4)	[F20-OP2.1,OP2.3,OP2.4]
	[F20-OP4.3]
	[F20-OS2.1,OS2.3,OS2.4]
<b>4.1.8.15. Design Provisions</b>	
(1)	[F20-OP2.1,OP2.3,OP2.4]
	[F20-OS2.1]
(2)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
(3)	[F20-OP2.1,OP2.4]
	[F20-OS2.1,OS2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.1.8.16. Foundation Provisions</b>	
(1)	[F20-OP2.1] Applies to portion of Code text: " <i>Foundations</i> shall be designed to resist the lateral load capacity of the SFRS ..."
	[F20-OS2.1] Applies to portion of Code text: " <i>Foundations</i> shall be designed to resist the lateral load capacity of the SFRS ..."
(2)	[F20-OP2.2,OP2.4]
	[F20-OS2.2,OS2.4]
(3)	(a) [F22-OP2.4]
	(a) [F22-OS2.4]
	(b) [F22-OP2.4]
	(b) [F22-OS2.4]
	(c) [F20-OP2.4]
	(c) [F20-OS2.4]
(4)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
(5)	(a) [F20-OP2.1]
	(a) [F20-OS2.1]
	(b) [F22-OP2.4]
	(b) [F22-OS2.4]
(6)	[F20-OP2.4]
	[F20-OS2.4]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(7)	[F20-OP2.2] [F22-OP2.4] [F20-OS2.2] [F22-OS2.4]
<b>4.1.8.17. Elements of Structures, Non-structural Components and Equipment</b>	
(1)	[F20-OP2.3] [F22-OP2.3,OP2.4] [F20,F22-OS2.4]
(3)	[F20,F22-OP2.3,OP2.4] [F20,F22-OS2.4]
(5)	[F20,F22-OP2.3,OP2.4] [F20,F22-OS2.4]
(6)	[F20,F22-OP2.1,OP2.4] [F20,F22-OS2.1]
(7)	[F20,F22-OP2.3,OP2.4] [F20,F22-OS2.4]
(8)	(a) [F20,F22-OP2.3,OP2.4] (a) [F20,F22-OS2.4] (b),(c) [F20,F22-OP2.3,OP2.4] (b),(c) [F20,F22-OS2.4] (d) [F20,F22-OP2.3,OP2.4] (d) [F20,F22-OS2.4] (e) [F20,F22-OP2.3,OP2.4] (e) [F20,F22-OS2.4] [F20,F22-OP2.3,OP2.4] Applies to portion of Code text: "Connections to the structure of elements and components listed in Table 4.1.8.17. shall be designed to support the component or element for gravity loads, shall conform to the requirements of Sentence (1) ..." [F20,F22-OS2.4] Applies to portion of Code text: "Connections to the structure of elements and components listed in Table 4.1.8.17. shall be designed to support the component or element for gravity loads, shall conform to the requirements of Sentence (1) ..."
(10)	[F22-OP2.3,OP2.4] [F22-OS2.3,OS2.4]
(11)	[F22-OP2.1,OP2.3,OP2.4] [F22-OS2.1,OS2.3,OS2.4]
(12)	[F20-OS2.1] [F22-OS2.4] [F20,F22-OP2.3,OP2.4]
(13)	[F20-OP2.1] [F22-OP2.3] [F20-OS2.1] [F22-OS2.3]
<b>4.2.2.1. Subsurface Investigation</b>	
(1)	[F20-OP2.2] [F21-OP2.6] [F20-OS2.2,OS2.6] [F21-OS2.6] [F21-OP4.1,OP4.4]
<b>4.2.2.3. Field Review</b>	
(1)	[F20-OP2.2] [F21-OP2.5] [F20-OS2.2,OS2.6] [F21-OS2.6] [F21-OP4.1,OP4.4]

Table 4.2.2.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.2.2.4. Altered Subsurface Condition</b>	
(1)	[F20-OP2.2] [F21-OP2.6]
	[F20-OS2.2,OS2.6] [F21-OS2.6]
	[F21-OP4.1,OP4.4]
(2)	[F20-OP2.2] [F21-OP2.6]
	[F20-OS2.2,OS2.6] [F21-OS2.6]
	[F21-OP4.1,OP4.4]
<b>4.2.3.2. Preservation Treatment of Wood</b>	
(1)	[F80-OP2.3]
	[F80-OS2.3]
(2)	[F82-OP2.3]
	[F82-OS2.3]
<b>4.2.3.4. Prevention of Deterioration of Masonry</b>	
(1)	[F80-OP2.3]
	[F80-OS2.3]
<b>4.2.3.6. Protection Against Chemical Attack</b>	
(1)	[F80-OP2.3]
	[F80-OS2.3]
<b>4.2.3.8. Steel Piles</b>	
(1)	[F20-OP2.3]
	[F20-OS2.3]
<b>4.2.3.9. High Strength Steel Tendons</b>	
(1)	[F20,F80-OP2.6,OP2.5]
	[F20,F80-OP4.1,OP4.4]
	[F20,F80-OS2.5,OS2.6]
<b>4.2.3.10. Corrosion of Steel</b>	
(1)	[F80-OP2.3]
	[F80-OP4.1]
	[F80-OS2.3]
<b>4.2.4.1. Design Basis</b>	
(1)	[F20-OP2.2] [F21-OP2.5]
	[F20-OS2.2,OS2.6] [F21-OS2.6]
	[F21-OP4.1,OP4.4]
(5)	[F21-OP2.4,OP2.5]
	[F21-OS2.5]
<b>4.2.4.2. Subsurface Investigation</b>	
(1)	[F20-OP2.2] [F21-OP2.6]
	[F20-OS2.2,OS2.6] [F21-OS2.6]
	[F21-OP4.1,OP4.4]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.2.4.3. Identification</b>	
(1)	[F20–OP2.2] [F21–OP2.6]
	[F20–OS2.2,OS2.6] [F21–OS2.6]
	[F21–OP4.1,OP4.4]
<b>4.2.4.4. Depth of Foundations</b>	
(1)	[F21–OP2.4] Applies to portion of Code text: "... the <i>bearing surface</i> of a <i>foundation</i> shall be below the level of potential damage, including damage resulting from <i>frost action</i> ..."
	[F21–OP2.4] Applies to portion of Code text: "... the <i>foundation</i> shall be designed to prevent damage resulting from <i>adfreezing</i> and <i>frost jacking</i> ."
(2)	[F21–OP2.4]
<b>4.2.4.5. Sloping Ground</b>	
(1)	[F21–OP2.2,OP2.6,OP2.4]
	[F21–OS2.2]
<b>4.2.4.6. Eccentric and Inclined Loads</b>	
(1)	[F20–OP2.1,OP2.2,OP2.4]
	[F20–OS2.1,OS2.2]
<b>4.2.4.7. Dynamic Loading</b>	
(1)	[F20–OH4]
	[F20–OP2.2,OP2.6,OP2.4]
	[F20–OS2.2]
<b>4.2.4.8. Hydrostatic Uplift</b>	
(1)	[F22–OP2.1,OP2.4]
<b>4.2.4.9. Groundwater Level Change</b>	
(1)	[F21–OP4.1]
<b>4.2.4.10. Permafrost</b>	
(1)	[F20–OP2.2,OP2.4] [F21–OP2.6,OP2.4]
	[F20–OS2.2] [F21–OS2.5]
<b>4.2.4.11. Swelling and Shrinking Soils</b>	
(1)	[F21–OP2.6,OP2.4]
<b>4.2.4.12. Expanding and Deteriorating Rock</b>	
(1)	[F21–OP2.6,OP2.4]
<b>4.2.4.13. Construction on Fill</b>	
(1)	(a) [F20–OS2.2] [F21–OS2.5]
	(b) [F20–OP2.2,OP2.4] [F21–OP2.6,OP2.4]
	(c) [F01–OS1.1]
<b>4.2.5.2. Excavation Construction</b>	
(1)	[F21–OP4.1]
(2)	[F20–OP2.3]
	[F20–OS2.6]
	[F20,F21–OP4.1]
<b>4.2.5.3. Supported Excavations</b>	
(1)	[F20–OS2.6]
	[F21–OP4.1]

Table 4.2.2.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.2.5.4. Unsupported Excavations</b>	
(1)	[F20-OS2.6]
	[F21-OP4.1]
<b>4.2.5.5. Control of Water around Excavations</b>	
(1)	[F60-OP4.1,OP4.4]
	[F60-OS2.6]
<b>4.2.5.6. Loss of Ground</b>	
(1)	[F21-OP4.1]
<b>4.2.5.7. Protection and Maintenance at Excavations</b>	
(1)	[F80-OP4.1]
	[F80-OS2.6]
<b>4.2.5.8. Backfilling</b>	
(1)	[F21-OP4.1]
	(a) [F21-OP2.1,OP2.4]
	(a) [F21-OS2.1]
(2)	[F21-OP2.4]
<b>4.2.6.2. Support of Shallow Foundations</b>	
(1)	[F20-OS2.2]
	[F20-OP2.2,OP2.4] [F21-OP2.4]
<b>4.2.6.3. Incorrect Placement of Shallow Foundations</b>	
(1)	[F20-OS2.2]
	[F20-OP2.2,OP2.4] [F21-OP2.4]
<b>4.2.6.4. Damaged Shallow Foundations</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1,OP2.4] [F22-OP2.4]
<b>4.2.7.2. Design of Deep Foundations</b>	
(3)	[F20-OS2.1,OS2.2] [F21-OS2.5]
	[F20-OP2.1,OP2.2] [F21,F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1,OP2.4] [F22-OP2.4]
(6)	[F20-OP2.1,OP2.4]
<b>4.2.7.3. Tolerance in Alignment and Location</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1,OP2.4] [F22-OP2.4]
<b>4.2.7.4. Incorrect Alignment and Location</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1,OP2.4] [F22-OP2.4]
<b>4.2.7.5. Installation of Deep Foundations</b>	
(1)	[F81-OS2.1] [F21-OS2.2,OS2.6]
	(a),(b) [F81-OP2.1,OP2.4] [F21-OP2.2,OP2.4]
	(c) [F21-OP4.1]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.2.7.6. Damaged Deep Foundation Units</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
<b>4.2.8.2. Use of Existing Foundations</b>	
(1)	[F20-OS2.1,OS2.2]
	[F20-OP2.1,OP2.2] [F22-OP2.4]
<b>4.3.1.1. Design Basis for Wood</b>	
(1)	[F20-OP2.1] [F21,F22-OP2.4] [F80-OP2.3,OP2.4]
	[F20-OS2.1] [F80-OS2.3]
	[F22,F21,F80-OH4]
<b>4.3.1.2. Glued-Laminated Members</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F21,F22-OP2.4]
	[F21,F22-OH4]
<b>4.3.2.1. Design Basis for Plain and Reinforced Masonry</b>	
(1)	[F20-OP2.1] [F22,F21-OP2.4] [F80-OP2.3,OP2.4]
	[F20-OS2.1] [F80-OS2.3]
	[F21,F22,F80-OH4]
<b>4.3.3.1. Design Basis for Plain, Reinforced and Prestressed Concrete</b>	
(1)	[F20-OP2.1] [F21,F22-OP2.4] [F80,F81-OP2.3,OP2.4]
	[F20-OS2.1] [F80,F81-OS2.3]
	[F21,F22,F80,F81-OH4]
<b>4.3.4.1. Design Basis for Structural Steel</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F80-OP2.3,OP2.4]
	[F20-OS2.1] [F80-OS2.3]
	[F22,F80-OH4]
<b>4.3.4.2. Design Basis for Cold Formed Steel</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F80-OP2.3,OP2.4]
	[F20-OS2.1] [F80-OS2.3]
	[F22,F80-OH4]
<b>4.3.5.1. Design Basis for Aluminum</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F80-OP2.3,OP2.4]
	[F20-OS2.1] [F80-OS2.3]
	[F22,F80-OH4]
<b>4.3.6.1. Design Basis for Glass</b>	
(1)	[F20-OP2.1]
	[F20-OS2.1]
<b>4.4.1.1. Design Basis for Air-Supported Structures</b>	
(1)	[F20-OP2.1] [F22-OP2.4] [F80-OP2.3]
	[F20-OS2.1] [F80-OS2.3]
	[F22-OH4]

**Table 4.2.2.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>4.4.2.1. Design Basis for Parking Structures</b>	
(1)	[F21,F61,F80-OH4]
	[F21,F61,F80-OP2.3,OP2.4]
	[F21,F61,F80-OS2.3]

**Notes to Table 4.2.2.1.:**

(1) See Parts 2 and 3.

**4.2.3. Part 5 of Division B**

**4.2.3.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 5 of Division B shall be the objectives and functional statements listed in Table 4.2.3.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.3.1.**  
**Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 5 of Division B**  
Forming Part of Sentence 4.2.3.1.(1)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>5.1.4.1. Structural and Environmental Loads</b>	
(1)	[F61-OH4]
	(a) [F20,F51,F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	(a) [F55,F61,F63-OH1.1,OH1.2,OH1.3]
	(a) [F60,F61,F63-OS2.2,OS2.3]
	(b) [F20,F21,F22-OH1.1,OH1.2,OH1.3]
	(b) [F20-OH4]
	(b) [F20-OS2.1] [F21,F22-OS2.3,OS2.4]
	[F20-OS3.1] Applies to snow fences and sloped glazing.
(3)	[F20-OS2.1] [F21,F22-OS2.3,OS2.4]
	[F20,F21,F22-OH1.1,OH1.2,OH1.3]
(4)	(a) [F20,F21,F22-OH1.1,OH1.2,OH1.3]
	(a) [F20-OS2.1] [F21,F22-OS2.3,OS2.4]
	(b) [F20,F21,F22-OH1.1,OH1.2,OH1.3]
	(b) [F20-OS2.1] [F21,F22-OS2.3,OS2.4]
(5)	[F20,F21,F22-OH1.1,OH1.2,OH1.3]
	(b) and (c) [F22-OH4]
	(a) [F20-OS2.1,OS2.3]
	(b) and (c) [F21,F22-OS2.3]
<b>5.1.4.2. Resistance to Deterioration</b>	
(1)	[F80,F81-OH1.1,OH1.2,OH1.3]
	[F80,F81-OS2.3]
	[F80,F81-OH4] Applies to floor assemblies.
	[F80,F81-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F80,F81-OS3.1] Applies to floor assemblies.
<b>5.2.1.1. Exterior Environmental Loads</b>	
(2)	[F20-OS2.1]
	[F40,F20-OH1.1] [F20-OH1.2,OH1.3]
<b>5.2.1.2. Interior Environmental Loads</b>	
(1)	[F51,F55,F61,F63-OH1.1,OH1.2]
	[F55,F61,F63-OS2.3]
	[F51,F61,F63,F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators.

Table 4.2.3.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>5.2.1.3. Environmental Load and Transfer Calculations</b>	
(1)	[F56-OH3.1] Applies to sound transmission calculations.
	[F61,F51,F63-OS2.3] Applies to heat, air and moisture transfer calculations.
	[F61,F51,F63,F55-OH1.1,OH1.2] [F55,F61-OH1.3] Applies to heat, air and moisture transfer calculations.
(3)	[F20-OS2.1]
	[F61,F63,F55-OH1.1,OH1.2] [F61,F55-OH1.3]
	[F20-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
<b>5.2.2.1. Determination of Structural Loads</b>	
(1)	[F20-OS2.1] [F21,F22-OS2.3,OS2.4]
	[F20,F21,F22-OH1.1,OH1.2,OH1.3]
	[F20,F21,F22-OH4]
(3)	[F20-OS2.1] [F21,F22-OS2.3,OS2.4]
	[F20,F21,F22-OH1.1,OH1.2,OH1.3]
	[F20,F21,F22-OH4]
<b>5.2.2.2. Wind Load and Other Air Pressure Loads</b>	
(2)	[F20-OS2.1] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4]
(3)	[F20-OS2.1] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4]
<b>5.2.2.3. Design Procedures</b>	
(1)	[F20-OS2.1] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4]
<b>5.3.1.1. Required Resistance to Heat Transfer</b>	
(1)	[F63-OS2.3]
	[F63-OH1.1] [F51,F63-OH1.2]
	[F51,F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
<b>5.3.1.2. Properties to Resist Heat Transfer or Dissipate Heat</b>	
(1)	(b) and (d) [F51,F63-OS2.3]
	(a),(b) [F51,F63-OH1.1]
	(c) [F51-OH1.2]
	(b) [F51,F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
(2)	(d) [F30-OS3.1]
	[F63-OH1.1]
	[F63-OS2.3]
<b>5.3.1.3. Location and Installation of Materials Providing Thermal Resistance</b>	
(1)	[F51,F63-OH1.1]
	[F63-OS2.3]

**Table 4.2.3.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F51,F63-OH1.1,OH1.2]
	[F63-OS2.3]
	[F51,F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
(3)	[F51,F63-OH1.1,OH1.2] [F41-OH1.1]
	[F63-OS2.3]
	[F51,F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
<b>5.4.1.1. Required Resistance to Air Leakage</b>	
(1)	(c) and (d) [F61,F62,F63,F55-OS2.3]
	(a),(b),(e) [F51,F52,F54,F55-OH1.2]
	(a),(b),(c) [F40,F55-OH1.1]
	(c) [F55,F61,F63-OH1.3]
	(d) [F55,F62-OS3.1]
(e) [F55,F62-OS1.4] Applies where required life safety systems are incorporated in environmental separators.	
(2)	[F40-OH1.1] [F52,F54-OH1.2] [F51,F55,F61,F63-OH1.1,OH1.2,OH1.3]
	[F61,F63-OS2.3]
	[F51,F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
<b>5.4.1.2. Air Barrier System Properties</b>	
(1)	[F55-OH1.1,OH1.2,OH1.3]
	[F55-OS2.3]
	[F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
(3)	[F61,F51,F63,F55-OH1.1,OH1.2] [F55,F61-OH1.3]
	[F61,F63-OS2.3]
	[F61,F51,F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
<b>5.5.1.1. Required Resistance to Vapour Diffusion</b>	
(1)	[F63-OH1.1,OH1.2]
	[F63-OS2.3]
(2)	[F63-OH1.1,OH1.2]
	[F63-OS2.3]
<b>5.5.1.2. Vapour Barrier Properties and Installation</b>	
(1)	[F63-OH1.1,OH1.2]
	[F63-OS2.3]
(2)	[F63-OH1.1,OH1.2]
	[F63-OS2.3]
(3)	[F63-OH1.1,OH1.2]
	[F63-OS2.3]
<b>5.6.1.1. Required Protection from Precipitation</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>5.6.1.2. Protective Material and Component Properties</b>	
(1)	[F20,F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3]
(2)	[F20,F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3]

Table 4.2.3.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20,F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3]
(4)	[F20,F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3]
<b>5.6.1.3. Installation of Protective Materials</b>	
(1)	[F20-OS2.1] [F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.1,OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>5.6.2.1. Sealing and Drainage</b>	
(1)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OS2.3]
<b>5.6.2.2. Accumulation and Disposal</b>	
(1)	[F30-OS3.1]
(3)	[F60-OS2.3] [F21-OS2.2]
	[F61-OH1.1,OH1.2,OH1.3]
	(b) [F21-OP2.6]
(4)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>5.7.1.1. Prevention of Accumulation and Ingress</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OS2.3]
(2)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
(3)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OS2.3]
<b>5.8.1.1. Required Drainage</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3] Applies to portion of Code text: "... the bottom of every exterior <i>foundation</i> wall and every floor-on-ground shall be provided with drainage."
	[F60-OS2.3,OS2.2] Applies to portion of Code text: "... the bottom of every exterior <i>foundation</i> wall and every floor-on-ground shall be provided with drainage."
<b>5.8.1.2. Drainage Materials and Installation</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OS2.3] [F21-OS2.2]
<b>5.8.2.1. Required Moisture Protection</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>5.8.2.2. Protective Material and Component Properties</b>	
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]

**Table 4.2.3.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(5)	[F61-OS2.3]
	[F61-OH1.1] [F20,F61-OH1.2,OH1.3]
(6)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(7)	(b) [F61-OH1.1,OH1.2,OH1.3]
	(b) [F61-OS2.3]
<b>5.8.2.3. Installation of Moisture Protection</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>5.9.1.1. Sound Transmission Class</b>	
(1)	[F56-OH3.1]
<b>5.9.1.2. Required Protection from Noise</b>	
(1)	[F56-OH3.1]
(2)	[F56-OH3.1]
<b>5.10.1.1. Compliance with Applicable Standards</b>	
(1)	[F20-OS2.1] [F51,F61,F63,F80-OS2.3] [F51-OS2.5]
	[F51,F54,F55,F61,F63,F80-OH1.1,OH1.2] [F41,F55-OH1.1] [F55,F61,F80-OH1.3]
	[F80,F61,F63-OS3.1]
	(a) [F61,F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators.
	[F80,F61,F63-OH4] Applies to floor assemblies.
(4)	[F20-OS2.1] [F61,F63-OS2.3]
	[F20,F61,F63-OH1.1,OH1.2] [F61-OH1.3]
	[F61-OS3.1]

**Notes to Table 4.2.3.1.:**

<sup>(1)</sup> See Parts 2 and 3.

## 4.2.4. Part 6 of Division B

## 4.2.4.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 6 of Division B shall be the objectives and functional statements listed in Table 4.2.4.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.4.1.**  
**Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 6 of Division B**  
 Forming Part of Sentence 4.2.4.1.(1)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>6.2.1.1. Good Engineering Practice</b>	
(1)	[F50,F31,F63,F51,F54,F52-OS3.2,OS3.4]
	(a) (b) (c) (e) (f) (g) (h) [F50,F51,F52,F54,F63-OH1.2,OH1.3]
	(a) to (c) and (e) to (h) [F50,F51,F52,F54,F63-OH1.1]
	(a) to (e) [F31,F51-OP1.1]
	(d) [F01-OS1.1]
<b>6.2.1.3. Structural Movement</b>	
(1)	[F23-OS3.1]
	[F51,F63,F50-OH1.1,OH1.2,OH1.3]
<b>6.2.1.4. Installation Standards</b>	
(1)	[F81-OP1.1]
	[F81-OS1.1]
	[F81-OS3.4]
<b>6.2.1.5. Fireplaces and Solid-Fuel Burning Appliances</b>	
(2)	[F01-OS1.1]
	[F01-OP1.1]
	[F43-OS3.4]
	[F43-OH1.1]
	[F43-OH5]
<b>6.2.1.8. Installation – General</b>	
(1)	[F82-OP1.1]
	[F82-OS1.1]
	[F82-OS3.4]
(2)	[F31-OS3.1]
(3)	[F81-OS1.1]
	[F81-OS3.2,OS3.3,OS3.4]
<b>6.2.1.9. Expansion, Contraction and System Pressure</b>	
(1)	[F20-OS3.2]
<b>6.2.1.10. Heat Exchanger Material</b>	
(1)	[F43,F80-OS3.4]
	[F43,F80-OH1.1]
	[F43,F80-OH5]
<b>6.2.1.11. Access Openings</b>	
(1)	[F36-OS3.6]

**Table 4.2.4.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>6.2.1.12. Exit Stairway HVAC</b>	
(1)	[F05,F10,F12,F44-OS1.2,OS1.5]
<b>6.2.1.13. Indoor Design Parameters</b>	
(1)	[F51-OH1.2]
(2)	[F51-OH1.2]
(3)	[F51-OH1.2]
(4)	[F51-OH1.2]
(5)	[F51-OH1.2]
<b>6.2.2.1. Required Ventilation</b>	
(1)	[F50,F31,F63,F51,F54,F52-OP1.1]
	[F50,F31,F63,F51,F54,F52-OS1.1]
(2)	[F50-OH1.1]
<b>6.2.2.2. Natural Ventilation</b>	
(1)	[F50-OH1.1]
<b>6.2.2.3. Ventilation of Storage Garages</b>	
(1)	[F50,F44-OS3.4]
(2)	[F44-OS3.4]
(3)	[F44-OS3.4]
(4)	[F50,F44-OS3.4]
(5)	[F50,F44-OH1.1]
	[F50,F44-OS3.4]
<b>6.2.2.4. Air Contaminants</b>	
(1)	[F44-OH1.1]
	[F44-OS3.4]
(2)	[F44-OH1.1]
(3)	[F52-OH1.1]
<b>6.2.2.5. Hazardous Gases, Dusts or Liquids</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01,F02-OS1.1]
	[F01,F02-OP1.1]
(3)	[F01,F02-OS1.1]
	[F01,F02-OP1.1]
(4)	(a) [F03-OS1.2]
	(a) [F03-OP1.2]
	(b) [F44-OH1.1]
(5)	[F44-OS1.1,OS1.2]
	[F44-OP1.1,OP1.2]
	[F44-OH5]
(6)	[F01,F44-OH5]
	[F01,F44-OS1.1]
	[F01,F44-OP1.1]

Table 4.2.4.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>6.2.2.6. Commercial Cooking Equipment</b>	
(1)	[F01,F44-OP1.1]
	[F01,F44-OS1.1]
(2)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
(3)	[F101-OH11.2]
(4)	[F42,F101-OH11.2]
(5)	[F80,F101-OH11.2]
(6)	[F40,F50,F52-OH1.1,OH1.2,OH1.3]
<b>6.2.2.7. Crawl Spaces and Attic or Roof Spaces</b>	
(1)	[F61,F63,F41-OH1.1,OH1.3]
<b>6.2.2.8. Projection Rooms</b>	
(2)	[F51-OH1.2]
(3)	[F40,F44,F50-OS3.4]
	[F40,F44,F50-OH1.1]
	[F40,F44,F50-OH5]
<b>6.2.3.2. Materials in Air Duct Systems</b>	
(2)	[F20,F80-OH1.1,OH1.2]
(3)	[F81-OH1.1]
	[F81,F44-OS3.4]
(4)	[F20,F80-OH1.1,OH1.2]
(5)	[F44,F50,F51,F52-OH1.1,OH1.2]
<b>6.2.3.3. Connections and Openings in Air Duct Systems</b>	
(1)	[F81-OH1.1,OH1.2]
	[F81,F44-OS3.4]
(2)	[F82-OS1.1]
(3)	[F50,F51-OH1.1,OH1.2]
<b>6.2.3.4. Duct Coverings and Linings</b>	
(3)	[F81-OH1.1,OH1.2]
	[F81-OP1.1]
	[F81-OS1.1]
<b>6.2.3.5. Underground Ducts</b>	
(1)	(b) [F44,F81-OH1.1]
	(c) [F44,F81-OH1.1]
	(a) [F44,F81-OH1.2,OH1.3]
	(d) [F80-OH1.1]
(2)	[F81-OH1.1,OH1.2,OH1.3]
(3)	[F120-OE1]
	[F63-OH1.3]
	[F51,F52,F80-OH1.2]
<b>6.2.3.8. Exhaust Ducts and Outlets</b>	
(1)	[F44-OH1.1]

**Table 4.2.4.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F44-OH1.1]
(3)	[F81-OH1.1]
	[F81-OH1.2]
(4)	[F81-OH1.1]
	[F81-OH1.2]
(5)	[F81-OH1.1]
(6)	[F81-OH1.1]
(7)	[F01,F81,F82-OS1.1]
	[F01,F81,F82-OP1.1]
	[F62,F80-OH1.3]
(8)	[F81-OH1.1]
(9)	[F81,F44-OH1.1]
	[F81,F44-OS1.1]
(10)	[F81,F44-OH1.1]
(11)	[F81-OH1.2]
	[F81,F44-OH1.1]
<b>6.2.3.9. Interconnection of Systems</b>	
(1)	[F40-OH1.1]
	[F44-OS1.1]
(2)	[F81,F44-OH1.1]
	[F81,F44-OP1.1]
	[F81,F44-OS1.1]
(3)	[F81,F44-OH1.1]
<b>6.2.3.11. Make-up Air</b>	
(1)	[F44,F81-OS3.4]
	[F50,F81-OH1.1]
(2)	[F81-OH1.1]
	[F81,F44-OS3.4]
(3)	[F81-OH1.2]
<b>6.2.3.12. Supply, Return, Intake and Exhaust Air Openings</b>	
(1)	[F30-OS3.1]
	[F81-OH1.2]
(2)	[F81-OH1.1]
	[F81,F44-OS3.4]
(3)	[F81-OH1.1]
(4)	[F82-OS3.4]
	[F82,F81-OH1.1]
<b>6.2.3.13. Filters and Odour Removal Equipment</b>	
(1)	[F80-OP1.1]
	[F80-OS1.1]
(2)	[F30-OS3.3]
	[F81,F43-OH1.1]

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Table 4.2.4.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F82-OH1.1]
(4)	[F82-OH1.1]
<b>6.2.3.14. Air Washers and Evaporative Cooling Sections or Towers</b>	
(1)	[F80,F81-OP1.1]
	[F80,F81-OS1.1]
(2)	[F82-OH1.1]
(3)	[F01,F81-OS1.1]
<b>6.2.3.15. Fans and Associated Air Handling Equipment</b>	
(1)	[F81,F44-OH1.1]
	[F81,F44-OS3.4]
(2)	[F81-OH1.1]
<b>6.2.3.20. Return-Air System</b>	
(3)	[F10-OS1.5]
<b>6.2.4.1. Carbon Monoxide Alarms</b>	
(2)	(a),(b),(d) [F44-OS3.4]
	(c) [F81-OS3.4]
(3)	[F44-OS3.4]
(4)	[F44-OS3.4]
(5)	[F44-OS3.4]
<b>6.2.5.2. Appliances Installed Outside the Building</b>	
(1)	[F81-OH1.1]
	[F81-OP1.1]
	[F81-OS1.1]
<b>6.2.6.1. Applicable Standard</b>	
(1)	[F81-OS1.1]
<b>6.2.7.1. Clearances</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>6.2.8.1. Lining or Backing</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OS1.1]
<b>6.2.9.1. Piping Materials and Installation</b>	
(1)	[F20-OS3.2,OS3.4]
(2)	[F21-OH1.1]
(3)	[F20-OS2.2]
<b>6.2.9.2. Insulation and Coverings</b>	
(1)	[F20,F30-OS3.2,OS3.4]
(2)	[F31-OS3.2]
<b>6.2.9.3. Clearances</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]

**Table 4.2.4.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>6.2.9.4. Surface Temperature</b>	
(1)	[F31-OS3.2]
<b>6.2.9.5. Protection</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>6.2.10.1. Cooling Units</b>	
(1)	[F43,F81-OS3.4]
<b>6.2.11.1. Storage Bins</b>	
(1)	[F30,F31,F43-OS3.2,OS3.4]
(2)	[F01-OP1.1]
	[F01-OS1.1]
(3)	[F30-OH2.1]
(4)	[F01-OP1.1]
	[F01-OS1.1]
<b>6.2.11.2. Ash Storage Bins</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
<b>6.3.1.2. Masonry or Concrete Chimneys</b>	
(2)	[F01-OP1.1]
	[F01-OS1.1]
<b>6.3.1.3. Metal Smoke Stacks</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>6.3.1.4. Common Flue</b>	
(1)	[F43-OS3.4]
<b>6.3.1.5. Access Ladders</b>	
(1)	[F20,F80-OS3.1]
(2)	[F30-OS3.1]

**Notes to Table 4.2.4.1.:**

(1) See Parts 2 and 3.

## 4.2.5. Part 7 of Division B

## 4.2.5.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 7 of Division B shall be the objectives and functional statements listed in Table 4.2.5.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.5.1.**  
**Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 7 of Division B**  
 Forming Part of Sentence 4.2.5.1.(1)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.1.4.1. Room and Space Height</b>	
(1)	[F30-OS3.1]
<b>7.1.5.2. Insect Screens</b>	
(1)	[F42-OH2.5]
<b>7.1.6.1. General</b>	
(1)	[F41,F43-OH11.1]
<b>7.2.1.2. Plumbing Systems and Fixtures</b>	
(1)	[F70-OH2.2]
	[F72-OH2.1]
	[F71-OH2.3]
(2)	[F72-OH2.1]
(3)	[F72-OH2.1]
(4)	[F71-OH2.3]
(5)	[F72-OH2.1] [F71-OH2.3]
(7)	[F72-OH2.1]
(8)	[F103-OH11.2]
(9)	[F71-OH2.3]
	[F72-OH2.1]
<b>7.2.1.3. Sewer Hook-up</b>	
(1)	[F72-OH2.1]
(2)	[F72-OH2.1]
<b>7.2.1.4. Floor Drains</b>	
(1)	[F40-OH2.4]
	[F30-OS3.1]
(2)	[F62-OH1.3]
(3)	[F62-OH1.3]
	[F72-OH2.1]
<b>7.2.1.5. Corrosion Protection</b>	
(1)	[F80-OH11.1]
<b>7.2.1.6. Safety Glass</b>	
(1)	[F20,F30-OS3.1]
<b>7.2.1.7. Grab Bar Installation</b>	
(1)	[F20-OS3.1]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.2.1.8. Bathtubs in Hotels and Motels</b>	
(1)	[F74-OA2]
	(a) [F31-OS3.2]
	(b) [F30-OS3.1]
<b>7.2.1.9. Common Bathrooms and Water Closets</b>	
(1)	[F34-OS4.2]
<b>7.2.1.11. Laundry Facilities</b>	
(1)	[F71-OH2.3]
(2)	[F72-OH2.1]
<b>7.2.2.1. General</b>	
(2)	[F130-OH12.2]
(5)	[F72-OH2.1]
(6)	(a) [F106-OH2.1]
	(a) [F130-OH12.2]
	(b) [F30-OS3.1]
	(b) [F50-OH1.1]
	(c) and (d) [F101-OH11.2]
<b>7.2.2.2. Privacy</b>	
(1)	[F130-OH12.2]
(2)	[F130-OH12.1]
<b>7.2.2.3. Water Closet Room or Cubicle</b>	
(1)	[F71-OH2.3]
(2)	[F105,F106-OH11.3]
(3)	[F71-OH2.3]
(4)	[F50-OH1.1]
	[F130-OH12.1]
<b>7.2.2.4. Surface Protection</b>	
(1)	[F40,F80-OH2.1]
	[F80,F82-OH11.1]
	[F40,F80-OH2.4]
(2)	[F40,F80-OH2.1]
	[F80,F82-OH11.1]
	[F40,F80-OH2.4]
<b>7.2.2.5. Fixtures for Eating Areas and Establishments Serving Alcoholic Beverages</b>	
(1)	[F72-OH2.1]
(2)	[F72-OH2.1]
<b>7.2.2.6. Water Closets for Assembly Occupancies</b>	
(1)	[F72-OH2.1]
(4)	[F72-OH2.1]
(5)	[F72-OH2.1]
(6)	[F72-OH2.1]

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Table 4.2.5.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.2.2.7. Water Closets for Care or Detention Occupancies</b>	
(1)	[F72-OH2.1]
<b>7.2.2.8. Water Closets for Mercantile Occupancies</b>	
(1)	[F72-OH2.1]
<b>7.2.2.9. Water Closets for Residential, Business and Personal Services and Industrial Occupancies</b>	
(1)	[F72-OH2.1]
<b>7.2.2.10. Sanitary Facilities for Recreation Camps</b>	
(1)	(a) [F72-OH2.1]
	(b) [F71-OH2.3]
	(c) [F71-OH2.3]
<b>7.2.3.1. General</b>	
(1)	(a) [F130-OH12.1]
	(b) [F30-OS3.1]
	(c) [F105,F106-OH11.3]
	(d) [F50,F44-OH2.1]
	(e) [F42-OH2.5]
	(f) [F71-OH2.3]
<b>7.2.3.2. Location</b>	
(1)	(a) [F106-OH11.1,OH11.3]
	(b) [F101-OH11.2]
	(c) [F46-OH2.2]
<b>7.2.3.3. Substitution of Privies</b>	
(2)	[F72-OH2.1]
<b>7.2.4.1. General</b>	
(1)	[F71-OH2.3]
(3)	[F30-OS3.1]
	[F74-OA2]
(4)	[F31-OS3.2]
	[F71-OH2.3]
	[F74-OA2]
(5)	[F71-OH2.3]
(6)	[F71-OH2.3]
<b>7.2.4.2. Day Care Facilities</b>	
(1)	[F71-OH2.3]
	[F104,F106-OH11.3]
<b>7.2.4.3. Food Establishments</b>	
(1)	[F71-OH2.3]
	[F101-OH11.2]
<b>7.2.5.1. General</b>	
(1)	[F72-OH2.1] [F71-OH2.3]
(2)	[F72-OH2.1] [F71-OH2.3]
(3)	[F72-OH2.1]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F71-OH2.3]
<b>7.2.6.1. Hot Water Temperature</b>	
(1)	[F31-OS3.2]
	[F41-OH2.2]
<b>7.2.6.3. Equipment and Installation</b>	
(2)	[F31-OS3.2]
	[F23-OS2.4]
	[F01-OS1.1]
	[F01-OP1.1]
<b>7.2.6.4. Corrosion-Resistant Coating</b>	
(1)	[F46,F80,F81-OH2.2]
	[F80,F81-OH2.3]
<b>7.2.6.5. Fuel-Burning Heaters</b>	
(1)	[F43-OS3.4]
<b>7.2.6.6. Heating Coils</b>	
(1)	[F31-OS3.2]
	[F81-OS2.3]
<b>7.2.6.7. Burn Prevention</b>	
(1)	[F31-OS3.2]
<b>7.3.2.2. Showers</b>	
(1)	[F103,F104-OH11.1]
<b>7.3.2.3. Fence and Gate Design and Construction</b>	
(1)	[F30,F34-OS3.1]
(2)	[F30,F34-OS3.1]
(3)	[F30,F34-OS3.1]
(4)	[F30-OS3.1]
(5)	[F32-OS3.3]
<b>7.3.2.5. Spectator Areas</b>	
(1)	[F104-OH11.1]
	[F106-OH11.3]
(2)	[F62-OH2.4]
	[F106-OH11.3]
(3)	[F104-OH11.1]
	[F106-OH11.3]
<b>7.3.2.6. Food and Beverage Areas</b>	
(1)	[F106-OH11.3]
(2)	[F30-OS3.1]
<b>7.3.2.7. Waste Water Discharge</b>	
(1)	[F106-OH11.3]

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Table 4.2.5.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.3.3.2. Materials</b>	
(1)	[F20-OS2.1]
	[F43-OS3.4]
	[F80,F82-OH11.1]
	[F106-OH2.3]
<b>7.3.3.3. Entrapments</b>	
(1)	[F30-OS3.1]
<b>7.3.3.4. Colour</b>	
(1)	[F11,F30-OS3.1]
<b>7.3.3.5. Skimmers and Glazed Surfaces</b>	
(1)	[F82,F104,F105-OH11.1]
<b>7.3.3.6. Wall and Floor Intersections</b>	
(1)	[F30-OS3.1]
<b>7.3.3.7. Slopes to Drain</b>	
(1)	[F82,F105-OH11.1]
<b>7.3.3.8. Vertical Wall Slopes</b>	
(1)	[F30-OS3.1]
<b>7.3.3.9. Bottom Slopes</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>7.3.3.10. Wave Shutdown</b>	
(1)	[F30-OS3.1]
	[F10,F12-OS3.7]
<b>7.3.3.11. Ledges</b>	
(1)	[F30-OS3.1]
<b>7.3.3.12. Pool Access</b>	
(1)	[F30-OS3.1]
(3)	[F30-OS3.1]
(4)	[F30-OS3.1]
(6)	[F30-OS3.1]
	[F82,F104,F105-OH11.1]
(7)	[F30-OS3.1]
(8)	[F30-OS3.1]
(9)	[F30-OS3.1]
	[F80-OH11.1]
(10)	[F30-OS3.1]
<b>7.3.3.13. Diving Boards or Platforms</b>	
(1)	[F80-OH11.1]
	[F20-OS2.1]
(3)	[F30-OS3.1]
(5)	[F30-OS3.1]
(6)	[F81-OS3.1]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(7)	[F81-OS3.1]
(8)	[F81-OS3.1]
<b>7.3.3.14. Anchorage Fittings and Hardware</b>	
(1)	[F80-OH11.1]
<b>7.3.3.15. Decks</b>	
(1)	[F30-OS3.1]
	[F82,F104,F105-OH11.1]
(2)	[F30-OS3.1]
	[F104,F105-OH11.1]
(3)	[F104,F105-OH11.1]
(4)	[F30-OS3.1]
	[F104,F105-OH11.1]
(5)	[F30-OS3.1]
	[F104,F105-OH11.1]
(6)	[F30-OS3.1]
	[F104,F105-OH11.1]
(7)	[F104,F105-OH11.1]
(8)	[F106-OH11.3]
<b>7.3.3.16. Drainage System</b>	
(1)	[F82-OH11.1]
<b>7.3.3.17. Hose Bibcocks</b>	
(1)	[F82,F105-OH11.1]
(2)	[F82,F105-OH11.1]
<b>7.3.3.18. Pool Markings</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
(4)	[F30-OS3.1]
(5)	[F30-OS3.1]
(6)	[F30-OS3.1]
(7)	[F30-OS3.1]
(8)	[F30-OS3.1]
<b>7.3.3.19. Underwater Lighting</b>	
(1)	[F12,F30-OS3.1]
(2)	[F12,F30-OS3.1]
(3)	[F12,F30-OS3.1]
(4)	[F82-OS3.1]
<b>7.3.3.20. Emergency Lighting</b>	
(1)	[F12,F30-OS3.1]
(2)	[F10-OS3.7]
	[F30-OS3.1]

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Table 4.2.5.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.3.3.21. General Lighting</b>	
(1)	[F12,F30-OS3.1]
(2)	[F30-OS3.1]
<b>7.3.3.22. Electrical Installations</b>	
(2)	[F32-OS3.3]
<b>7.3.3.23. Dressing Rooms</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
<b>7.3.3.24. Partitions and Walls</b>	
(1)	[F80,F82,F104,F105-OH11.1]
(2)	[F80,F82,F104,F105-OH11.1]
<b>7.3.3.25. Dressing Room Floors</b>	
(1)	(a),(c) and (d) [F30-OS3.1]
	(b),(c),(d) and (e) [F104,F105-OH11.1]
	(b) and (e) [F82-OH11.1]
<b>7.3.3.26. Dressing Room Hose Bibcock</b>	
(1)	[F82,F105-OH11.1]
(2)	[F82,F105-OH11.1]
<b>7.3.3.27. Showers</b>	
(1)	[F31-OS3.2]
	[F104-OH11.1]
(2)	[F71-OH2.3]
	[F104-OH11.1]
(3)	[F104-OH11.1]
(4)	[F82,F104,F105-OH11.1]
<b>7.3.3.29. Accessories</b>	
(1)	[F30-OS3.1]
(2)	[F71-OH2.3]
<b>7.3.3.30. Non-Bather Washroom Facilities</b>	
(1)	[F104-OH11.1]
<b>7.3.3.31. Swimming Pool Inlets and Outlets</b>	
(1)	[F80,F81,F104-OH11.1]
(2)	[F81,F104-OH11.1]
(3)	[F81,F104-OH11.1]
(5)	[F81,F104-OH11.1]
(6)	[F81,F104-OH11.1]
(7)	[F81,F104-OH11.1]
<b>7.3.3.33. Pool Drains</b>	
(1)	[F30-OS3.1]
	[F81,F104-OH11.1]
(2)	[F81,F104-OH11.1]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F30-OS3.1]
(4)	[F30-OS3.1]
(5)	[F104-OH11.1]
(9)	[F30-OS3.1]
<b>7.3.3.34. Overflow</b>	
(2)	[F104-OH11.1]
(3)	[F30-OS3.1]
	[F104-OH11.1]
(4)	[F104-OH11.1]
(5)	[F81,F104-OH11.1]
<b>7.3.3.36. Surge Capacity</b>	
(1)	[F81,F104-OH11.1]
<b>7.3.3.37. Skimming Devices</b>	
(2)	[F81,F104-OH11.1]
(3)	[F81,F104-OH11.1]
(4)	(a) [F80-OH11.1]
	(b) and (h) [F30-OS3.1]
	(c) [F82-OH11.1]
	(d),(e),(f) and (g) [F81,F104-OH11.1]
<b>7.3.3.38. Circulation System</b>	
(2)	[F81-OH11.1]
(3)	[F81-OH11.1]
<b>7.3.3.39. Turnover Period</b>	
(1)	[F81,F104-OH11.1]
(2)	[F81,F104-OH11.1]
<b>7.3.3.40. Operation and Maintenance</b>	
(1)	[F81,F82,F104-OH11.1]
(2)	[F81,F82,F104-OH11.1]
(3)	[F81,F82-OS2.3]
(4)	[F81,F82,F104-OH11.1]
<b>7.3.3.41. Velocities</b>	
(1)	[F81,F104-OH11.1]
(2)	[F81,F104-OH11.1]
<b>7.3.3.42. Materials</b>	
(1)	[F20-OS2.1]
	[F43-OS3.4]
	[F80-OH11.1]
<b>7.3.3.43. Flanges and Unions</b>	
(1)	[F81,F82,F104-OH11.1]
<b>7.3.3.44. Sump or Blow Off Device</b>	
(1)	[F81,F82,F104-OH11.1]

Table 4.2.5.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.3.3.45. Flow Indicators and Gauges</b>	
(1)	[F81,F82,F104-OH11.1]
(2)	[F81,F82,F104-OH11.1]
(3)	[F81,F82,F104-OH11.1]
(4)	[F81,F82,F104-OH11.1]
<b>7.3.3.46. Heating</b>	
(1)	[F31-OS3.2]
(2)	[F31-OS3.2]
(3)	[F81-OS3.2]
(4)	[F81-OS3.2]
<b>7.3.3.47. Equipment and Mechanical Room</b>	
(1)	[F12-OS3.1]
	[F34-OS4.1]
(2)	[F30-OS3.1]
	[F62-OH1.3]
(3)	[F81,F82,F104-OH11.1]
<b>7.3.3.48. Storage Room</b>	
(1)	[F34-OS3.4]
	[F80,F81-OH11.1]
(2)	[F107-OS3.4]
<b>7.3.3.49. Disinfection Equipment</b>	
(1)	[F81,F104-OH11.1]
(2)	[F81,F104-OH11.1]
<b>7.3.3.51. Chemical Feed Equipment</b>	
(1)	(c) [F46-OH2.2]
	(c) [F81,F104-OH11.1]
<b>7.3.3.52. Water Operated Gas Chlorinator</b>	
(1)	[F43-OS3.4]
(2)	[F43,F44-OS3.4]
<b>7.3.3.53. Disinfection Injection Equipment</b>	
(1)	[F81,F104-OH11.1]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.3.3.54. Gaseous Chlorine Equipment</b>	
(1)	(a) [F50–OH1.1] (a) [F03–OS1.2] (a) [F44,F80–OS3.4] (a) [F03–OP1.2] (b) [F43–OS3.4] (c) [F12–OS3.4] [F10–OS3.7] (d) [F50–OS3.4] (d) [F50–OH1.1] (e) and (f) [F12,F107–OS3.4] (g) [F44,F107–OS3.4] (g) [F44–OH5] (g) [F107–OH1.1] (h) [F50–OH1.1] (i) [F44–OH5] (i) [F43–OS3.4] (j) [F42,F80–OH2.5] (j) [F80–OH11.1] (k) [F30–OS3.1] (l) [F43,F51–OS3.4] (m) [F13–OS3.4] (n) [F13–OS3.4] (o) [F81–OS3.1] [F12,F81,F82–OS3.4] (p) [F43–OS3.4] (q) [F12,F50,F107–OS3.4] (r) [F44–OS3.4]
<b>7.3.3.55. pH Control</b>	
(1)	[F81,F82,F105–OH11.1]
<b>7.3.3.56. Diatomaceous Earth Filter</b>	
(1)	[F81,F82,F104–OH11.1]
<b>7.3.3.57. ORP</b>	
(1)	[F81,F82,F105–OH11.1]
<b>7.3.4.1. General</b>	
(4)	[F30–OS3.1]
(6)	[F60–OP2.6]
<b>7.3.4.2. Platforms</b>	
(2)	[F30–OS3.1]
(3)	[F30–OS3.1]
	[F20–OS2.1]
(5)	[F30–OS3.1]
<b>7.3.4.3. Drainage</b>	
(1)	[F60–OP2.6]

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Table 4.2.5.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F60-OP2.6]
<b>7.3.4.4. Stairs</b>	
(1)	[F30-OS3.1]
<b>7.3.5.2. Pool Egress</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>7.3.5.3. Inlets</b>	
(1)	[F82,F104-OH11.1]
<b>7.3.5.4. Deck Space and Clearances</b>	
(1)	[F30-OS3.1]
	[F104,F105-OH11.1]
<b>7.3.5.6. Diving Tank</b>	
(1)	[F81-OS3.1]
<b>7.3.6.2. Whirlpools</b>	
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
(4)	[F30-OS3.1]
(7)	[F81,F104,F105-OH11.1]
(8)	[F81,F104,F105-OH11.1]
(9)	[F30-OS3.1]
<b>7.3.6.3. Wading Pools</b>	
(2)	[F30-OS3.1]
	(a) [F80-OS2.3]
	(a) [F82-OH1.1]
(6)	[F81,F104,F105-OH11.1]
<b>7.3.7.2. Materials</b>	
(1)	[F20,F80-OS2.3]
(2)	[F30-OS3.1]
<b>7.3.7.3. Flume and Receiving Pool Design and Construction</b>	
(2)	[F43-OS3.4]
	[F82-OH11.1] [F106-OH11.3]
(3)	[F40,F50,F107-OS3.4]
(4)	[F30-OS3.1]
(5)	[F30-OS3.1]
(6)	[F30-OS3.1]
(7)	[F30-OS3.1]
(8)	[F30-OS3.1]
(9)	[F20,F80-OS2.3]
(10)	[F30-OS3.1]
(11)	[F30-OS3.1]
(13)	[F30-OS3.1]
(14)	[F30-OS3.1]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(16)	[F30-OS3.1]
(18)	[F30-OS3.1]
(19)	[F12,F30-OS3.1]
(22)	[F30-OS3.1]
(23)	[F30,F81-OS3.1]
(24)	[F81,F104-OH11.1]
<b>7.3.7.4. Walkways, Steps and Stairs</b>	
(1)	[F30-OS3.1]
	[F10,F12-OS3.7]
(2)	[F30-OS3.1]
<b>7.3.7.5. First Aid</b>	
(1)	[F12-OS3.1]
(2)	[F51-OH1.2]
<b>7.3.7.6. Dispatch Area</b>	
(1)	[F12,F30-OS3.1]
(2)	[F12,F13-OS3.1]
<b>7.3.8.1. Finishes</b>	
(1)	[F30-OS3.1]
(2)	[F82,F104-OH11.1]
<b>7.3.8.2. Doors</b>	
(1)	[F36-OS3.6,OS3.7]
<b>7.3.9.1. Underwater Hazards</b>	
(1)	[F30-OS3.1]
<b>7.3.9.2. Changing Facilities</b>	
(1)	(a) [F30-OS3.1]
	(b) [F130-OH12.2]
	(c) [F82,F104-OH11.1]
(2)	[F82-OH11.1]
<b>7.3.9.3. Storm Water Retaining Ponds and Constructed Lakes</b>	
(1)	[F30-OS3.1]
<b>7.4.1.1. Standard</b>	
(1)	[F81-OS3.4]
<b>7.4.1.3. Alterations to Systems</b>	
(1)	[F81,F82-OS3.4]
<b>7.5.1.1. Plumbing Facilities</b>	
(1)	[F101,F103,F105-OH11.2]
(2)	[F101-OH11.2]
(3)	[F101,F103-OH11.2]
<b>7.5.1.2. Separation of Functions</b>	
(1)	[F101,F103-OH11.2]
(2)	[F50-OH11.1]
	[F101,F103-OH11.2]

Table 4.2.5.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.5.1.3. Insect Screens</b>	
(1)	[F42,F101-OH11.2]
<b>7.5.1.4. Provision of Storage Space</b>	
(1)	[F101-OH11.2]
(2)	[F101-OH11.2]
<b>7.5.1.5. Cleaning and Storage of Mobile Units</b>	
(1)	(a) [F82-OH11.1]
	(b) [F70,F71-OH2.1,OH2.3]
	(b) [F101-OH11.2]
	(c) [F72-OH2.1]
	(d) [F101-OH11.2]
<b>7.5.1.6. Interior Finishes</b>	
(2)	[F30-OS3.1]
	[F80,F82-OH11.1]
	[F101-OH11.2]
(3)	[F80,F82-OH11.1]
	[F101-OH11.2]
(4)	[F80,F82-OH11.1]
	[F101-OH11.2]
<b>7.5.1.7. Lighting</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F101-OS3.4]
<b>7.5.2.1. Separation of Functions</b>	
(1)	(a) [F102,F104-OH11.1]
	(a) [F106-OH11.3]
	(b) and (c) [F101-OH11.2]
<b>7.5.2.2. Interior Finishes</b>	
(1)	[F82-OH11.1]
<b>7.5.2.3. Lighting</b>	
(1)	[F30-OS3.1]
<b>7.6.1.1. Room and Window Area</b>	
(1)	[F10-OS1.5]
(2)	[F141-OH13]
<b>7.6.1.2. Washrooms</b>	
(1)	[F71-OH2.3]
	[F72-OH2.1]
<b>7.6.1.3. Location Restriction</b>	
(1)	[F10-OS1.5]
<b>7.6.1.4. Interior Finishes</b>	
(1)	[F82-OH11.1]
(2)	[F107-OS3.4]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.6.1.5. Lighting</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>7.7.1.1. General</b>	
(1)	[F101,F106-OH11.3]
(2)	[F101,F106-OH11.3]
(3)	[F101,F105-OH11.2]
(4)	[F101-OH11.2]
(5)	[F101-OH11.2]
<b>7.7.1.2. Room Finishes</b>	
(1)	[F82-OH11.1]
<b>7.7.1.3. Floors</b>	
(1)	[F06-OH11.3]
	[F82-OH11.1]
	[F72-OH2.1]
<b>7.7.1.4. Utility Lines</b>	
(1)	[F82-OH11.1]
<b>7.7.1.5. Ventilation</b>	
(1)	[F42-OH2.5]
<b>7.7.1.6. Light Fixtures</b>	
(1)	[F101-OS3.4]
<b>7.8.1.2. Lighting</b>	
(1)	[F30-OS3.1]
(2)	[F101-OS3.4]
<b>7.8.1.3. Ventilation</b>	
(1)	[F42-OH2.5]
<b>7.8.1.4. Floor, Wall and Ceiling Finishes</b>	
(1)	[F30-OS3.1]
	[F72-OH2.1]
(2)	[F82-OH11.1]
(3)	[F82-OH11.1]
(4)	[F82-OH11.1]
<b>7.8.1.5. Staff Facilities</b>	
(1)	[F71-OH2.3]
	[F72-OH2.1]
<b>7.8.1.6. Refrigeration</b>	
(1)	[F101,F105-OH11.2]
(2)	[F81-OH11.2]
<b>7.8.1.7. Water Supply and Pressure</b>	
(1)	[F70-OH2.2]
	[F71-OH2.3]

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Table 4.2.5.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>7.8.1.8. Sterilizers</b>	
(1)	[F101–OH11.1]
<b>7.8.1.9. Storage of Hoses</b>	
(1)	[F30–OS3.1]
<b>7.8.1.10. Sewage Lines and Floor Drains</b>	
(1)	[F72–OH2.1]
(2)	[F72–OH2.1]
<b>7.8.1.11. Prohibition of Catch Basins</b>	
(1)	[F101–OH11.2]
<b>7.8.1.12. Rails, Racks and Hooks</b>	
(1)	[F101–OH11.2]
	[F101,F105,F106–OH11.2,OH11.3]
<b>7.8.2.1. Facilities</b>	
(1)	[F82–OH11.1]
	[F101–OH11.2]
(2)	[F82–OH11.1]
	[F101–OH11.2]
<b>7.8.2.2. Construction Materials</b>	
(1)	[F80,F105–OH11.1]
<b>7.8.2.3. Ramps</b>	
(1)	[F30–OS3.1]
<b>7.8.2.4. Ventilation</b>	
(1)	[F50–OH1.1]
	[F52–OH1.3]
(2)	[F50–OH1.1]
	[F52–OH1.3]
<b>7.8.2.5. Lighting</b>	
(1)	[F30–OS3.1]
	[F101–OH11.2]
<b>7.8.3.1. Ventilation</b>	
(1)	[F50–OH1.1]
	[F52–OH1.3]
<b>7.8.3.2. Heating System</b>	
(1)	[F51,F101–OH11.2]
<b>7.8.3.3. Floor, Wall and Ceiling Finishes</b>	
(1)	[F80,F105–OH11.1]
<b>7.8.3.4. Windows</b>	
(1)	[F80,F105–OH11.1]
<b>7.10.1.4. Fencing</b>	
(1)	[F30,F34–OS3.1]
<b>7.10.2.1. Materials and Construction</b>	
(1)	[F80–OS2.3]

**Table 4.2.5.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	(a) [F80-OS2.3]
	(b) and (c) [F34-OS3.4]
<b>7.10.2.2. Design</b>	
(1)	[F34-OS4.1]

**Notes to Table 4.2.5.1.:**

(1) See Parts 2 and 3.

**4.2.6. Part 8 of Division B**

**4.2.6.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 8 of Division B shall be the objectives and functional statements listed in Table 4.2.6.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.6.1.  
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 8 of Division B  
Forming Part of Sentence 4.2.6.1.(1)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>8.1.1.3. Demolition Procedures</b>	
(1)	[F01-OS1.1]
	[F30-OS5.1,OS5.3,OS5.8] [F34-OS5.5] [F31,F32,F43,F44-OS5.6]
<b>8.1.2.2. Protection from Risk</b>	
(1)	[F01-OS1.1]
	[F30-OS5.1,OS5.3,OS5.8] [F34-OS5.5] [F31,F32,F43,F44-OS5.6]
<b>8.2.1.2. Covered Way Construction</b>	
(1)	(a),(b),(d),(e),(f),(g) [F30-OS5.1,OS5.2] [F34-OS5.5]
	(c) [F20-OS5.7]
<b>8.2.1.3. Fencing, Boarding or Barricades</b>	
(1)	[F30-OS5.1,OS5.3,OS5.6] [F34-OS5.5]
(2)	[F34-OS5.5] [F30-OS5.3]
(3)	[F34-OS5.5]
<b>8.2.1.4. Special Hazards</b>	
(1)	[F34-OS5.5]
<b>8.2.1.5. Work Shutdown</b>	
(1)	[F34-OS5.5]
<b>8.2.2.1. Water Removal</b>	
(1)	[F60-OS5.4]
	[F60-OS5.8]
<b>8.2.2.2. Protection of Adjoining Property</b>	
(1)	(a) [F21-OP4.1]
	(b) [F21-OS5.8]

Table 4.2.6.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>8.2.3.1. Safe Passage Past Site</b>	
(1)	[F30–OS5.1, OS5.3, OS5.2]
(2)	[F30–OS5.3, OS5.2]
(3)	[F30–OS5.3, OS5.2]
(4)	[F30–OS5.3, OS5.2]
<b>8.2.3.2. Protection from Dangerous Activities</b>	
(1)	[F30–OS5.1]
(2)	[F30, F34–OS3.1, OS5.1, OS5.5]
<b>8.2.3.3. Barricades</b>	
(1)	[F30–OS5.1, OS5.3, OS5.2] [F34–OS5.5]
(2)	[F30–OS5.1] [F34–OS5.5]
<b>8.2.3.4. Restoration and Repair</b>	
(1)	[F30–OS5.3]
(2)	[F30–OS5.3, OS5.2]
<b>8.2.3.5. Warning Lights</b>	
(1)	[F30–OS5.3, OS5.2]
<b>8.2.4.1. Hazards to Vehicular Traffic</b>	
(1)	[F30–OS5.2]
<b>8.2.4.2. Flags Used for Directing Traffic</b>	
(1)	[F30–OS5.2]
<b>8.2.4.3. Signs Used for Directing Traffic</b>	
(1)	[F30–OS5.2]
<b>8.2.4.4. Worker Directing Traffic</b>	
(1)	[F30–OS5.2]
<b>8.2.4.5. Clothing While Directing Traffic</b>	
(1)	[F30–OS5.2]
<b>8.2.5.1. Control of Waste Material</b>	
(1)	[F30–OS5.1]
<b>8.2.5.2. Removal of Waste Material</b>	
(1)	[F30–OS5.1, OS5.3]
<b>8.2.5.3. Enclosures for Waste Material</b>	
(1)	[F30–OS5.1, OS5.3] [F34–OS5.6]
<b>8.2.5.4. Chutes for Waste Material</b>	
(1)	[F30–OS5.1]

**Notes to Table 4.2.6.1.:**<sup>(1)</sup> See Parts 2 and 3.

**4.2.7. Part 9 of Division B**

**4.2.7.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 9 of Division B shall be the objectives and functional statements listed in Table 4.2.7.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.7.1.**  
**Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 9 of Division B**  
 Forming Part of Sentence 4.2.7.1.(1)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.3.1.1. General</b>	
(1)	<p>[F20-OP2.1,OP2.4]                      [F21-OP2.3,OP2.4]                      [F80-OP2.3]                      [F20-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1]                      [F21,F80-OS2.3]                      [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F21,F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces.                      [F20,F21,F80,F61,F55-OH1.1,OH1.2] [F20,F21,F80,F61-OH1.3] Applies where concrete supports or is used in an environmental separator.</p> <p>[F20,F21,F80-OH4] Applies where concrete elements support wood-frame floors.</p> <p>[F20,F21,F80-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>[F20,F21,F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails.                      [F20,F21,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p>
(4)	<p>[F20-OP2.1,OP2.4]                      [F21,F80-OP2.3,OP2.4]                      [F20-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1]                      [F80-OS2.3]                      [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F21,F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces.                      [F20,F21,F80,F61,F55-OH1.1,OH1.2] [F20,F21,F80,F61-OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F21,F80-OH4] Applies to elements that support floors.</p> <p>[F20,F80-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>[F20,F80-OS3.1] Applies to concrete that supports wood-frame floors or steps.                      [F20,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p>

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.3.1.2. Cement</b>	
(1)	[F20-OP2.1,OP2.4] [F80-OP2.3,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces. [F20,F80,F61,F55-OH1.1,OH1.2] [F20,F80,F61-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20,F80-OH4] Applies where concrete elements support wood-frame floors.
	[F20,F80-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.
	[F20,F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails. [F20,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.
<b>9.3.1.3. Concrete in Contact with Sulphate Soil</b>	
(1)	[F20-OP2.1,OP2.4] [F80-OP2.3,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces. [F80-OH1.1,OH1.2,OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F80-OH4] Applies where concrete elements support wood-frame floors.
	[F80-OS1.1] Applies where concrete is used in footings for <i>chimneys</i> or fireplaces.
	[F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails. [F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.
<b>9.3.1.4. Aggregates</b>	
(1)	[F20-OP2.1,OP2.4] [F80-OP2.3,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OS1.1] Applies to concrete used in <i>chimneys</i> or fireplaces.
	[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.4] Applies to concrete used in <i>chimneys</i> or fireplaces.
	[F20,F80,F61,F55-OH1.1,OH1.2] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces. [F20,F80,F61-OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.3.1.5. Water</b>	
(1)	<p>[F20-OP2.1,OP2.4] [F80-OP2.3,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1] [F80-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F80-OH4] Applies where concrete elements support wood-frame floors.</p> <p>[F20,F80-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>[F20,F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails. [F20,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>[F20,F80,F61,F55-OH1.1,OH1.2] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces. [F20,F80,F61-OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.</p>
<b>9.3.1.6. Compressive Strength</b>	
(1)	<p>(a) [F20-OP2.1,OP2.4] (a) [F21-OP2.3,OP2.4] (a) [F80-OP2.3] (a) [F20-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(a) [F20-OS2.1] (a) [F21,F80-OS2.3] (a) [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(a) [F20,F21,F80-OH4] Applies to elements that support floors.</p> <p>(a) [F20,F21,F80-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>(a) [F20,F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces. (a) [F20,F80,F61,F55-OH1.1,OH1.2] [F20,F80,F61-OH1.3] Applies where concrete supports or is used in an environmental separator.</p> <p>(a) [F20,F80-OS3.1] Applies to elements that support floors or steps. (a) [F20,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>(b) [F20-OP2.1,OP2.4] (b) [F21-OP2.3,OP2.4] (b) [F80-OP2.3] (b) [F20-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(b) [F20-OS2.1] (b) [F21,F80-OS2.3] (b) [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(b) [F20,F21,F80,F61,F55-OH1.1,OH1.2] [F20,F21,F80,F61-OH1.3]</p> <p>(b) [F20,F21,F80-OS3.1]</p> <p>(c) [F20,F21,F80-OS3.1]</p> <p>(c) [F20-OP2.1] [F20,F21,F80-OP2.3,OP2.4]</p> <p>(c) [F20-OS2.1] [F20,F21,F80-OS2.3]</p>
(2)	[F80-OS3.1]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.3.1.7. Concrete Mixes</b>	
(1)	<p>(a) [F20-OP2.1,OP2.4]                      (a) [F21-OP2.3,OP2.4]                      (a) [F20,F55,F61-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(a) [F20-OS2.1]                      (a) [F21-OS2.3]                      (a) [F20,F61,F55-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(a) [F20,F21,F61-OH4] Applies to elements that support floors.</p> <p>(a) [F20,F21,F61-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>(a) [F20,F21,F61-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails.                      (a) [F20,F21,F61-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>(a) [F20,F21,F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces.                      (a) [F20,F21,F80,F61,F55-OH1.1,OH1.2] [F20,F21,F80,F61-OH1.3] Applies where concrete supports or is used in an environmental separator.</p> <p>(b) [F20-OP2.1,OP2.4]                      (b) [F21-OP2.3,OP2.4]                      (b) [F80-OP2.3]                      (b) [F20-OP2.3] Applies where concrete is used in an environmental separator.</p> <p>(b) [F20-OS2.1]                      (b) [F21,F80-OS2.3]                      (b) [F20-OS2.3] Applies where concrete is used in an environmental separator.</p> <p>(b) [F20,F21,F80,F61,F55-OH1.1,OH1.2] [F20,F21,F80,F61-OH1.3]</p> <p>(b) [F20,F21,F80-OS3.1]</p> <p>(c) [F20,F21,F80-OP2.3,OP2.4]</p> <p>(c) [F20,F21,F80-OS3.1]</p> <p>(c) [F20,F21-OS2.1] [F20,F21,F80-OS2.3]</p>
(2)	<p>[F20-OP2.1,OP2.4]                      [F21-OP2.3,OP2.4]                      [F20,F61,F55-OP2.3] Applies where concrete supports or is used in an environmental separator.</p> <p>[F20-OS2.1]                      [F21-OS2.3]                      [F20,F61,F55-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F21-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p> <p>[F20,F21,F61,F55-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces.                      [F20,F21-OH1.2,OH1.3] Applies where concrete supports or is used in an environmental separator.</p> <p>[F20,F21,F61,F55-OH4] Applies where concrete elements support wood-frame floors.</p> <p>[F20,F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails.                      [F20,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.</p>

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.3.1.8. Admixtures</b>	
(1)	[F20-OP2.1,OP2.4] [F21-OP2.3,OP2.4] [F80-OP2.3,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F21-OS2.3] [F20,F61,F55-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F80-OH4] Applies where concrete elements support wood-frame floors.
	[F20,F21,F80-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.
	[F20,F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces. [F20,F80,F61,F55-OH1.1,OH1.2] [F20,F80,F61-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20,F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails. [F20,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.
<b>9.3.1.9. Cold Weather Requirements</b>	
(1)	[F20-OP2.1,OP2.4] [F21,F80-OP2.3,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F21-OS2.3] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F80-OH4] Applies where concrete elements support wood-frame floors.
	[F20,F21,F80-OS1.1] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.
	[F20,F80-OH1.1] Applies where concrete supports or is used in the walls of <i>chimneys</i> or fireplaces. [F20,F80,F61,F55-OH1.1,OH1.2] [F20,F80,F61-OH1.3] Applies where concrete supports or is used in an environmental separator.
	[F20,F80-OS3.1] Applies to concrete floors or steps, concrete that supports wood-frame floors or steps, and concrete steps that support <i>guards</i> or handrails. [F20,F80-OS3.4,OS3.7] Applies where concrete supports or is used in <i>chimneys</i> or fireplaces.
(2)	[F22-OS2.3,OS2.4,OS2.5]
	[F22-OP2.3,OP2.4,OP2.5,OP2.6]
<b>9.3.2.2. Lumber Grades</b>	
(1)	[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, or elements that support walls, that contain doors or windows required for emergency egress.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.3.2.5. Moisture Content</b>	
(1)	[F21,F80-OP2.3,OP2.4]
	[F21,F80-OS2.3]
	[F21,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21,F80-OH4] Applies to floors and elements that support floors.
	[F21,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F21,F80-OS3.1] Applies to floors and elements that support floors.
<b>9.3.2.8. Undersized Lumber</b>	
(1)	[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.3.2.9. Termite and Decay Protection</b>	
(1)	[F82,F80-OP2.3,OP2.4]
	[F82,F80-OS2.3]
	[F82,F80-OH4] Applies where structural wood elements support or are used in floors.
	[F82,F80-OS1.2] Applies where wood elements support or are used in assemblies that are required to provide fire resistance.
	[F82,F80-OS3.1] Applies where structural wood elements support or are used in floors.
	[F82,F80,F61,F55-OH1.1,OH1.2] [F82,F80,F61-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
(2)	[F80,F82-OP2.3,OP2.4]
	[F80,F82-OS2.3]
	[F82,F80-OH4] Applies where structural wood elements support or are used in floors.
	[F82,F80-OS1.2] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
	[F82,F80-OS3.1] Applies where structural wood elements support or are used in floors.
	[F82,F80,F61,F55-OH1.1,OH1.2] [F82,F80,F61-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
(3)	[F80-OP2.3,OP2.4]
	[F80-OS2.3]
	[F80-OH4] Applies where structural wood elements support or are used floors.
	[F80-OS1.2] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
	[F80-OS3.1] Applies where structural wood elements support or are used in floors.
	[F82,F80,F61,F55-OH1.1,OH1.2] [F82,F80,F61-OH1.3] Applies where structural wood elements support or are used in an environmental separator.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F80-OP2.3,OP2.4,OP2.5]
	[F80-OS2.3,OS2.5]
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OS1.2] Applies where cribbing or retaining walls support assemblies that are required to provide fire resistance.
	[F80-OS3.1] Applies where cribbing or retaining walls support floors.
	[F80,F61,F55-OH1.1,OH1.2] [F80,F61-OH1.3] Applies where cribbing or retaining walls support an environmental separator.
(5)	[F80,F81-OP2.3,OP2.4]
	[F80,F81-OS2.3]
	[F80,F81-OH4] Applies where structural wood elements support wood-frame floors.
	[F80,F81-OS1.2] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
	[F81,F80-OS3.1] Applies where structural wood elements support or are used in floors.
	[F81,F80,F61,F55-OH1.1,OH1.2] [F81,F80,F61-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
(6)	[F20,F60-OS2.3]
	[F20,F61-OP2.3,OP2.4]
	[F20,F61-OS3.1] Applies where structural wood elements support or are used in floors.
	[F20,F61,F55-OH1.1,OH1.2] [F20,F61-OH1.3] Applies where structural wood elements support or are used in an environmental separator.
	[F80,F61-OH4] Applies to floors and elements that support floors.
	[F80,F81-OS1.2] Applies where structural wood elements support or are used in assemblies that are required to provide fire resistance.
<b>9.3.3.2. Galvanized Sheet Metal</b>	
(1)	[F80-OP2.3,OP2.4]
	[F80-OS2.3]
	[F80-OH1.1,OH1.2,OH1.3] Applies where sheet metal is used in an environmental separator.
	[F80-OH4] Applies where sheet metal is used in assemblies that support floors.
	[F80-OS3.1] Applies where sheet metal is used in assemblies that support floors.
(2)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OP2.3]
	[F80-OS2.3]
<b>9.4.2.2. Specified Snow Loads</b>	
(1)	[F20-OP2.1,OP2.3] [F22-OP2.3]
	[F20-OS2.1,OS2.3] [F22-OS2.3]
	[F22-OH1.1,OH1.2,OH1.3]
(2)	[F20-OP2.1]
	[F20-OS2.1]
<b>9.4.2.3. Platforms Subject to Snow and Occupancy Loads</b>	
(1)	[F20-OP2.1]
	[F20-OS2.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.4.2.4. Attics and Roof Spaces</b>	
(1)	[F20-OP2.1]
	[F20-OS2.1]
<b>9.4.3.1. Deflections</b>	
(1)	[F22-OH4]
	[F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OP2.1,OP2.4] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.4.4.1. Allowable Bearing Pressures</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to footings that support an environmental separator.
	[F20-OH4] Applies to footings that support floors and other elements that support floors.
	[F20-OP2.2,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to footings that support floors and other elements that support floors. [F20-OS3.7] Applies to footings that support walls that contain doors or windows required for emergency egress.
<b>9.4.4.2. Foundation Capacity in Weaker Soil and Rock</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.2,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.2,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.4.4.3. High Water Table</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.2,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.4.4.4. Soil Movement</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3] Applies to walls that support or are part of an environmental separator.
	[F21-OH4] Applies to <i>foundations</i> that support floors and other elements that support floors.
	[F21-OP2.1,OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F21-OS3.1] Applies to footings that support floors and other elements that support floors. [F21-OS3.7] Applies to footings that support walls that contain doors or windows required for emergency egress.
<b>9.4.4.5. Retaining Walls</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3,OP2.4]
	[F20-OS2.1,OS2.3]
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.4.4.6. Walls Supporting Drained Earth</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3,OP2.4]
	[F20-OS2.1,OS2.3]
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OS3.1] Applies to floors and elements that support floors. [F20-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3,OP2.4]
	[F20-OS2.1,OS2.3]
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OS3.1] Applies to floors and elements that support floors. [F20-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.5.1.2. Combination Rooms</b>	
(2)	[F10-OS3.7]
<b>9.5.2.2. Protection on Floor Areas with a Barrier-Free Path of Travel</b>	
(2)	[F10-OS1.5]
(3)	(a) [F10,F73-OS1.5]
	(b) and (c) [F10-OS1.5]
<b>9.5.3.1. Ceilling Heights of Rooms or Spaces</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.5.3.2. Mezzanines</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.5.3.3. Storage Garages</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.5.4.1. Hallway Width</b>	
(1)	[F10-OS3.7]



Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.6.2.1. Doors for Dwelling Units</b>	
(1)	[F42-OH2.5] Applies to entrance door to <i>dwelling unit</i> .
	[F51,F54-OH1.2] [F40,F61,F42-OH1.1] Applies to entrance door to <i>dwelling unit</i> .
	[F61,F42-OS2.3] Applies to entrance door to <i>dwelling unit</i> .
	[F01-OS1.1] [F03-OS1.2] Applies to door to <i>boiler or furnace room</i> .
	[F01-OP1.1] [F03-OP1.2] Applies to door to <i>boiler or furnace room</i> .
(2)	[F42-OH2.5] Applies to entrance door to <i>building</i> .
	[F40,F42,F61-OH1.1] [F51,F54-OH1.2] Applies to entrance door to <i>building</i> .
	[F42,F61-OS2.3] Applies to entrance door to <i>building</i> .
	[F03-OS1.2] Applies to door to common laundry and drying rooms and garbage rooms.
	[F03-OP1.2] Applies to door to common laundry and drying rooms and garbage rooms.
	[F40-OH1.1] Applies to door to garbage rooms.
	[F51,F52-OH1.1] Applies to door to public water closet room.
	[F130-OH12.1] Applies to door to public water closet room.
<b>9.6.3.1. Doorway Opening Sizes</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.6.3.2. Doors to Public Water-Closet Rooms</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.6.3.3. Doors to Bathrooms</b>	
(1)	[F74-OA2]
<b>9.6.4.1. Height of Door Sills above Floors or Ground</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.6.5.1. Exterior Wood Doors</b>	
(1)	[F40,F61,F42-OH1.1] [F51,F54-OH1.2]
	[F42-OH2.5]
	[F61,F42-OS2.3]
	[F80-OS3.7]
	[F80-OS4.1]
<b>9.6.5.2. Sliding Doors</b>	
(1)	[F40,F61,F42-OH1.1] [F51,F54-OH1.2]
	[F42-OH2.5]
	[F61,F42-OS2.3]
	[F80-OS3.1]
	[F80-OS4.1]
<b>9.6.5.3. Insulated Steel Doors</b>	
(1)	[F40,F61,F42-OH1.1] [F51,F54-OH1.2]
	[F42-OH2.5]
	[F61,F42-OS2.3]
	[F80-OS3.7]
	[F80-OS4.1]
<b>9.6.6.1. Maximum Area of Glass</b>	
(1)	[F30-OS3.1] [F10-OS3.7]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.6.6.2. Glass in Doors and Sidelights</b>	
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.6.6.3. Mirrored Glass Doors</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.6.6.4. Visibility of Glass or Transparent Doors</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.6.6.5. Glass for Shower or Bathtub Enclosures</b>	
(1)	[F30-OS3.1]
<b>9.6.6.6. Double Glazing</b>	
(1)	[F63-OS2.3]
	[F63-OH1.1] [F51,F63-OH1.2]
<b>9.6.7.2. Required Thermal Breaks</b>	
(1)	[F63-OH1.1,OH1.2]
	[F63-OS2.3]
<b>9.6.8.2. Wood Doors</b>	
(1)	[F20-OS4.1]
<b>9.6.8.3. Deadbolt Lock</b>	
(1)	[F34-OS4.1]
<b>9.6.8.4. Double Doors</b>	
(1)	[F34-OS4.1]
<b>9.6.8.5. Fastening of Hinges</b>	
(1)	[F20-OS4.1]
(2)	[F20-OS4.1]
<b>9.6.8.6. Fastening of Strikeplates</b>	
(1)	[F20-OS4.1]
(2)	[F20-OS4.1]
<b>9.6.8.7. Outward Swinging Doors</b>	
(1)	[F34-OS4.1]
<b>9.6.8.8. Door Viewer</b>	
(1)	[F35-OS4.2]
<b>9.6.8.9. Solid Blocking</b>	
(1)	[F20-OS4.1]
<b>9.6.8.10. Alternate Test Procedure</b>	
(1)	[F34-OS4.1]
<b>9.7.1.2. Bedroom Windows</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10,F12,F36-OS1.5]
	[F10,F12,F36-OS3.6]
<b>9.7.1.3. Window Opening into a Window-Well</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F10-OS3.7]
<b>9.7.1.4. Double Glazing or Storm Sash</b>	
(1)	[F63-OS2.3]
	[F63-OH1.1] [F51,F63-OH1.2]
<b>9.7.1.5. Height of Window Sills above Floors or Ground</b>	
(1)	[F30-OS3.1]
<b>9.7.1.6. Openable Windows into a Garage or Carport</b>	
(1)	[F44-OS3.4]
	[F03-OS1.2]
	[F03-OP1.2]
<b>9.7.1.7. Non-Openable Windows into a Garage or Carport</b>	
(1)	[F44-OS3.4]
<b>9.7.2.1. Window Standard</b>	
(1)	[F20,F21,F61,F63-OS2.3]
	[F10-OS1.5] Applies where windows serve bedrooms, except bedrooms that have direct access to the exterior through an <i>exit</i> door or bedrooms that are in <i>sprinklered suites</i> .
	[F55,F61,F62,F63-OH1.1] [F81-OH1.1] Applies to windows that provide required non-heating-season ventilation. [F54,F55,F61,F62,F63-OH1.2] [F63,F61,F62-OH1.3]
<b>9.7.3.1. Glass Standards</b>	
(1)	[F20-OS2.1] [F63-OS2.3]
	(e) [F63-OH1.1] [F51,F63-OH1.2]
	(g) [F03-OS1.2]
<b>9.7.3.2. Structural Design of Glass</b>	
(1)	[F20-OS2.1]
<b>9.7.4.1. Sealing Compound</b>	
(1)	[F61,F63-OS2.3]
	[F61,F63-OH1.1,OH1.3] [F61,F51,F54,F63-OH1.2]
<b>9.7.5.1. Transparent Panels</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.7.5.2. Sliding Glass Partitions</b>	
(1)	[F30-OS3.1] [F10-OS3.7] Applies to portion of Code text: "... except that such <i>partitions</i> shall be suitably marked to indicate their existence and position."
<b>9.7.5.3. Windows over Stairs, Ramps and Landings</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.7.5.4. Windows above the Second Storey</b>	
(1)	[F30-OS3.1]
<b>9.7.6.1. Forced Entry through Windows</b>	
(1)	[F34-OS4.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.7.7.1. Plastic Skylights</b>	
(1)	[F20-OS2.1] [F61,F63-OS2.3]
	[F30-OS3.1]
	[F61,F63-OH1.1] [F61-OH1.3]
<b>9.7.7.2. Glass Skylights</b>	
(1)	[F20-OS2.1] [F61,F63-OS2.3]
	[F30-OS3.1]
	[F61,F63-OH1.1] [F61-OH1.2,OH1.3]
<b>9.8.2.1. Stair Width</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.2.2. Height over Stairs</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.3.1. Straight and Curved Runs in Stairs</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.3.2. Minimum Number of Treads or Risers</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.3.3. Maximum Height of Stairs</b>	
(1)	[F30-OS3.1]
<b>9.8.4.1. Uniformity and Tolerances for Risers and Treads</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(5)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.4.2. Dimensions for Risers</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.4.3. Dimensions for Rectangular Treads</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.4.4. Dimensions for Angled Treads</b>	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.4.5. Winders</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.4.6. Leading Edges of Treads</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.5.2. Ramp Width</b>	
(1)	[F30-OS3.1] [F10-OS3.7]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.5.3. Height over Ramps</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.5.4. Slope</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.5.5. Maximum Rise</b>	
(1)	[F30-OS3.1]
<b>9.8.6.2. Required Landings</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.6.3. Dimensions of Landings</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.6.4. Height over Landings</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.7.1. Required Handrails</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.7.2. Continuity of Handrails</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.7.3. Termination of Handrails</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.7.4. Height of Handrails</b>	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.7.5. Ergonomic Design</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.7.6. Projections into Stairway and Ramps</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.7.7. Design and Attachment of Handrails</b>	
(1)	[F20-OS2.1]
	[F20-OS3.1,OS3.7]
(2)	[F20-OS2.1]
	[F20-OS3.1,OS3.7]
<b>9.8.8.1. Required Guards</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.8.2. Loads on Guards</b>	
(1)	[F20-OS2.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.8.8.3. Height of Guards</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.6]
(4)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.8.4. Guards for Floors and Ramps in Garages</b>	
(1)	[F10-OS3.1]
<b>9.8.8.5. Openings in Guards</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
<b>9.8.8.6. Design to Prevent Climbing</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>9.8.8.7. Glass in Guards</b>	
(1)	[F20-OS2.1]
	[F20-OS3.1,OS3.7]
<b>9.8.9.1. Loads on Stairs and Ramps</b>	
(1)	[F20-OS2.1]
	[F22-OH4]
<b>9.8.9.2. Exterior Concrete Stairs</b>	
(1)	[F22-OS3.1,OS3.7]
<b>9.8.9.3. Exterior Wood Steps</b>	
(1)	[F80-OS2.3]
	[F80-OS3.1,OS3.7]
<b>9.8.9.4. Wooden Stair Stringers</b>	
(1)	[F20-OS2.1]
	[F22-OH4]
(2)	[F20-OS2.1]
	[F22-OH4]
<b>9.8.9.5. Treads</b>	
(1)	[F20-OS2.1]
	[F22-OH4]
(2)	[F20-OS2.1]
	[F22-OH4]
<b>9.8.9.6. Finish for Treads and Landings</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.8.10.1. Design</b>	
(1)	[F20-OS2.1]
	[F22-OS3.1,OS3.7]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.8.10.2. Anchorage</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1]
	[F22-OS3.1,OS3.7]
<b>9.8.10.3. Prevention of Damage Due to Frost</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OS2.1]
	[F21-OS3.1]
<b>9.9.1.3. Occupant Load</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
<b>9.9.2.2. Purpose of Exits</b>	
(1)	[F10-OS3.7] Applies to "An <i>exit</i> shall be designed for no purpose other than for exiting ..."
<b>9.9.2.3. Elevators, Slide Escapes and Windows as Means of Egress</b>	
(1)	[F10-OS3.7]
<b>9.9.2.4. Principal Entrances</b>	
(1)	[F10-OS3.7]
<b>9.9.3.2. Exit Width</b>	
(1)	[F10-OS3.7]
<b>9.9.3.3. Width of Corridors</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.9.3.4. Clear Height</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.9.4.2. Fire Separations for Exits</b>	
(1)	[F03-OP1.2]
	[F05-OS1.5] [F03-OS1.2]
(2)	[F03-OP1.2]
	[F05-OS1.5] [F03-OS1.2]
(3)	[F05-OS1.5]
(4)	[F03-OP1.2]
	[F05-OS1.5] [F03-OS1.2]
<b>9.9.4.3. Wired Glass or Glass Block</b>	
(2)	[F05-OS1.5]
<b>9.9.4.4. Openings Near Unenclosed Exit Stairs and Ramps</b>	
(1)	[F05-OS1.5]
<b>9.9.4.5. Openings in Exterior Walls of Exits</b>	
(1)	[F05-OS1.5]
<b>9.9.4.6. Openings Near Exit Doors</b>	
(1)	[F05-OS1.5]
<b>9.9.4.7. Stairways in 2 Storey, Group D or E Buildings</b>	
(1)	[F05-OS1.5]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.9.5.2. Occupancies in Corridors</b>	
(1)	[F10-OS3.7]
<b>9.9.5.3. Obstructions in Public Corridors</b>	
(1)	[F30-OS3.1]
<b>9.9.5.4. Obstructions in Exits</b>	
(1)	[F10-OS3.7]
<b>9.9.5.5. Obstructions in Means of Egress</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
<b>9.9.5.6. Mirrors or Draperies</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
<b>9.9.5.7. Fuel-Fired Appliances</b>	
(1)	[F10-OS1.5] [F10-OS3.7]
<b>9.9.5.8. Service Rooms</b>	
(1)	[F10-OS3.7] [F30-OS3.1]
<b>9.9.5.9. Ancillary Rooms</b>	
(1)	[F05,F06-OS1.5] [F10-OS3.7]
<b>9.9.6.1. Obstructions by Doors</b>	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
<b>9.9.6.2. Clear Opening Height at Doorways</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
<b>9.9.6.3. Clear Opening Width at Doorways</b>	
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
<b>9.9.6.4. Door Action</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
<b>9.9.6.5. Direction of Door Swing</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
<b>9.9.6.6. Nearness of Doors to Stairs</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F10-OS3.7]
<b>9.9.6.7. Door Latching, Locking and Opening Mechanisms</b>	
(1)	(a) [F10-OS3.7] (b) [F10,F81-OS3.7]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
	[F73-OA1]
(4)	[F10-OS3.7]
<b>9.9.6.8. Effort Required to Open</b>	
(1)	[F10-OS3.7]
<b>9.9.7.1. Egress from Roof Area, Podiums, Terraces, Platforms and Contained Open Spaces</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
<b>9.9.7.2. Means of Egress from Suites</b>	
(1)	[F10-OS1.5]
(2)	[F10-OS3.7]
<b>9.9.7.3. Dead-End Corridors</b>	
(1)	[F10-OS3.7]
<b>9.9.7.4. Number and Spacing of Egress Doors</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS1.5]
<b>9.9.7.5. Independent Access to Exit</b>	
(1)	[F10-OS3.7]
<b>9.9.8.2. Number of Required Exits</b>	
(1)	[F10-OS3.7]
<b>9.9.8.3. Contribution of Each Exit</b>	
(1)	[F10-OS3.7]
<b>9.9.8.4. Location of Exits</b>	
(1)	[F10-OS1.5]
<b>9.9.8.5. Exiting through a Lobby</b>	
(1)	[F10-OS1.5]
(2)	[F10-OS1.5]
(3)	[F10-OS1.5]
(4)	[F10-OS1.5]
(5)	[F05-OS1.5]
<b>9.9.8.6. Mezzanine Means of Egress</b>	
(1)	[F05-OS1.5]
(4)	[F05-OS1.5]
<b>9.9.9.1. Travel Limit to Exits or Egress Doors</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
<b>9.9.9.2. Two Separate Exits</b>	
(1)	[F10-OS3.7]
<b>9.9.9.3. Shared Egress Facilities</b>	
(1)	[F10-OS3.7]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.9.9.4. Egress from Manufactured Homes</b>	
(1)	[F10,F12-OS1.5]
<b>9.9.10.2. Visibility of Exits</b>	
(1)	[F10-OS3.7]
<b>9.9.10.3. Required Exit Signs</b>	
(1)	[F10-OS3.7]
<b>9.9.10.4. Exit Direction Signs</b>	
(1)	[F10-OS3.7]
<b>9.9.10.5. Visibility of Exit Signs</b>	
(1)	[F10-OS3.7]
<b>9.9.10.6. Lettering</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
<b>9.9.10.7. Illumination</b>	
(2)	[F10-OS3.7]
<b>9.9.10.8. Signs for Stairs and Ramps at Exit Level</b>	
(1)	[F10-OS3.7]
<b>9.9.11.2. Required Lighting in Egress Facilities</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
<b>9.9.11.3. Emergency Lighting</b>	
(1)	[F30-OS3.1] [F10-OS3.7]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F30-OS3.1] [F10-OS3.7]
(4)	[F30-OS3.1] [F10-OS3.7]
(6)	[F30-OS3.1] [F10-OS3.7]
<b>9.10.1.2. Items under Part 3 Jurisdiction</b>	
(5)	[F01-OS1.1] Applies to portion of Code text: " ... facilities for the dispensing of fuel shall not be installed in any <i>building</i> ."
<b>9.10.3.4. Suspended Membrane Ceilings</b>	
(1)	[F04-OP1.3] [F04-OS1.3]
<b>9.10.4.3. Basement Storage Garages</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.5.1. Permitted Openings in Wall and Ceiling Membranes</b>	
(1)	[F03-OP1.2] [F04-OP1.3] [F03-OS1.2] [F04-OS1.3]
(2)	[F04-OP1.3] [F04-OS1.3]
(3)	[F03-OP1.2] [F03-OS1.2]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F04-OP1.3] [F04-OS1.2,OS1.3]
<b>9.10.7.1. Protection of Steel Members</b>	
(1)	[F03-OP1.2] [F04-OP1.3] [F03-OS1.2] [F04-OS1.3]
<b>9.10.8.1. Fire-Resistance Ratings for Floors and Roofs</b>	
(1)	[F03-OP1.2] [F04-OP1.2,OP1.3] Applies to portion of Code text: " Except as otherwise provided in this Subsection, the <i>fire-resistance ratings</i> of floors and roofs shall conform to Table 9.10.8.1." [F03-OS1.2] [F04-OS1.2,OS1.3] Applies to portion of Code text: " Except as otherwise provided in this Subsection, the <i>fire-resistance ratings</i> of floors and roofs shall conform to Table 9.10.8.1."
<b>9.10.8.2. Fire-Resistance Ratings in Sprinklered Buildings</b>	
(1)	(a),(b) [F02,F82-OP1.3] [F13-OP1.2] (a),(b) [F02,F82-OS1.3] [F13-OS1.5,OS1.2]
<b>9.10.8.3. Fire-Resistance Ratings for Walls, Columns and Arches</b>	
(1)	[F04-OP1.2,OP1.3] [F04-OS1.2,OS1.3]
<b>9.10.8.4. Support of Noncombustible Construction</b>	
(1)	[F04-OP1.3] [F04-OS1.3]
<b>9.10.8.7. Roofs Supporting an Occupancy</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.8.8. Floors of Exterior Passageways</b>	
(1)	[F04-OP1.3] [F06-OP1.2] [F05-OS1.5] [F06-OS1.5,OS1.2]
<b>9.10.9.2. Continuous Barrier</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.9.3. Openings to be Protected with Closures</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.9.4. Floor Assemblies</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.9.6. Service Equipment Penetrating a Fire Separation</b>	
(1)	[F03-OP1.2] [F03-OS1.2]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F03-OP1.2] [F04-OP1.3] Applies to portion of Code text: " Except as provided in Sentences (3) to (9) and Article 9.10.9.7., pipes, ducts, electrical boxes, totally enclosed raceways or other similar service equipment that partly or wholly penetrate an assembly required to have a <i>fire-resistance rating</i> shall be <i>noncombustible</i> ..." [F03-OS1.2] [F04-OS1.3] Applies to portion of Code text: " Except as provided in Sentences (3) to (9) and Article 9.10.9.7., pipes, ducts, electrical boxes, totally enclosed raceways or other similar service equipment that partly or wholly penetrate an assembly required to have a <i>fire-resistance rating</i> shall be <i>noncombustible</i> ..."
<b>9.10.9.7. Combustible Drain, Waste and Vent Piping</b>	
(1)	[F03-OP1.2] [F04-OP1.3] [F03-OS1.2] [F04-OS1.3]
<b>9.10.9.8. Collapse of Combustible Construction</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.9.9. Reduction in Thickness of Fire Separation by Beams and Joists</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.9.10. Concealed Spaces above Fire Separations</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.9.11. Separation of Residential Occupancies</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F03-OP1.2] [F03-OS1.2]
(3)	[F03-OP1.2] [F03-OS1.2]
<b>9.10.9.12. Residential Suites in Industrial Buildings</b>	
(1)	[F02-OS1.2]
<b>9.10.9.13. Separation of Suites</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F02-OP1.2] [F02-OS1.2]
<b>9.10.9.14. Separation of Residential Suites</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(3)	[F03-OS1.2]
<b>9.10.9.15. Separation of Public Corridors</b>	
(1)	[F03-OP1.2] [F06-OP1.2] [F05,F03-OS1.5] [F06-OS1.5,OS1.2]
(2)	[F03-OS1.2] [F06,F05-OS1.5] [F03,F06-OP1.2]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F03-OS1.2] [F06,F05-OS1.5] [F03,F06-OP1.2]
<b>9.10.9.16. Separation of Storage Garages</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	[F03-OP1.2] [F03-OS1.2]
(4)	[F01-OS1.1] [F44-OS3.4]
(5)	[F01-OS1.1] [F44-OS3.4]
<b>9.10.9.17. Separation of Repair Garages</b>	
(1)	[F03-OP1.2] [F03-OS1.2]
(3)	[F03-OP1.2] [F03-OS1.2]
(4)	[F44-OH1.1] [F44-OS1.1] [F44-OS3.4]
(5)	[F44-OH1.1] [F44-OS1.1] [F44-OS3.4]
<b>9.10.9.18. Exhaust Ducts Serving More Than One Fire Compartment</b>	
(1)	[F03-OS1.2]
(2)	[F03-OS1.2]
<b>9.10.9.19. Central Vacuum Systems</b>	
(1)	[F03-OS1.2]
<b>9.10.9.20. Janitorial Storage Rooms</b>	
(1)	[F03-OS1.2] [F03-OP1.2]
(2)	[F02-OS1.2] [F02-OP1.2]
<b>9.10.10.3. Separation of Service Rooms</b>	
(1)	[F03-OP1.2] [F03,F81-OP1.4] [F03-OS1.2] [F03,F81-OS1.4]
<b>9.10.10.4. Appliances and Equipment to be Located in a Service Room</b>	
(1)	[F03-OP1.2] [F03,F81-OP1.4] [F03-OS1.2] [F03,F81-OS1.4]
<b>9.10.10.5. Incinerators</b>	
(1)	[F03-OP1.2] [F03,F81-OP1.4] [F03-OS1.2] [F03,F81-OS1.4]
(2)	[F01-OS1.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OP2.1] [F80-OP2.3]
	[F20-OS2.1] [F80-OS2.3]
	[F40,F61-OH1.1,OH1.3]
(4)	[F01,F02-OS1.2]
<b>9.10.10.6. Storage Rooms</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.11.1. Required Firewalls</b>	
(1)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
<b>9.10.11.2. Firewalls Not Required</b>	
(1)	[F03-OP3.1]
	[F03-OS1.2]
(2)	[F03-OP3.1]
	[F03-OS1.2]
(3)	[F03-OP3.1]
	[F03-OS1.2]
<b>9.10.12.1. Termination of Floors or Mezzanines</b>	
(1)	[F03-OP1.2,OP1.4]
	[F03-OS1.5]
<b>9.10.12.2. Location of Skylights</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.12.3. Exterior Walls Meeting at an Angle</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.12.4. Protection of Soffits</b>	
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(6)	[F03-OP1.2]
	[F03-OP3.1]
	[F03-OS1.2]
<b>9.10.12.5. Protection of Balconies</b>	
(2)	[F03-OP1.2]
	[F03-OS1.2]



Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.1. Closures</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.2. Solid Core Wood Door as a Closure</b>	
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.5. Wired Glass as a Closure</b>	
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.6. Steel Door Frames</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.8. Maximum Size of Opening</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.9. Door Latch</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.10. Self-closing Device</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.13.11. Hold-Open Devices</b>	
(2)	[F03,F05-OS1.2,OS1.5]
	[F03-OP1.2]
	[F03-OP3.1]
<b>9.10.13.12. Service Room Doors</b>	
(1)	[F10-OS1.5] Applies to portion of Code text: "... but shall swing outward from such rooms in all other cases."
	[F30-OS3.1] Applies to portion of Code text: " Swing-type doors shall open into <i>service rooms</i> containing fuel-fired equipment where such doors lead to <i>public corridors</i> or rooms used for assembly ..."
<b>9.10.13.13. Fire Dampers</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.10.13.14. Fire Stop Flaps</b>	
(1)	[F03-OP1.3]
	[F03-OS1.3]
<b>9.10.13.15. Doors between Garages and Dwelling Units</b>	
(1)	[F01-OS1.1]
	[F44-OS3.4]
(2)	[F01-OS1.1]
	[F44-OS3.4]
<b>9.10.13.16. Door Stops</b>	
(1)	[F81-OP1.4]
	[F81-OS1.4]
<b>9.10.14.3. Limiting Distance where Firefighting Facilities are Inadequate</b>	
(1)	[F03-OP3.1]
<b>9.10.14.4. Openings in Exposing Building Face</b>	
(1)	[F03-OP3.1]
(2)	[F03-OP3.1]
(3)	[F03-OP3.1]
(4)	[F03-OP3.1]
(6)	[F03-OP3.1]
(7)	[F03-OP3.1]
<b>9.10.14.5. Construction of Exposing Building Face and Walls above Exposing Building Face</b>	
(1)	[F02,F03-OP3.1]
(2)	[F02,F03-OP3.1]
(3)	[F02,F03-OP3.1]
(4)	[F03-OP3.1]
(5)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
(6)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
(7)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.15.3. Limiting Distance where Firefighting Facilities are Inadequate</b>	
(1)	[F03-OP3.1]
<b>9.10.15.4. Glazed Openings in Exposing Building Face</b>	
(1)	[F03-OP3.1]
(3)	[F03-OP3.1]
(4)	[F03-OP3.1]
<b>9.10.15.5. Construction of Exposing Building Face of Houses</b>	
(1)	[F02,F03-OP3.1]



Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F02,F03-OP3.1]
(3)	[F03-OP3.1]
(5)	[F03-OP3.1]
(7)	[F02,F03-OP3.1]
(8)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
(9)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
(10)	[F03-OP3.1]
	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.16.1. Required Fire Stops in Concealed Spaces</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F03-OP1.2]
	[F03-OS1.2]
(4)	[F03-OP1.2]
	[F03-OS1.2]
(5)	[F03-OP1.2]
	[F03-OS1.2]
(6)	[F02,F03-OP1.2]
	[F02,F03-OS1.2]
(7)	[F02,F03-OP1.2]
	[F02,F03-OS1.2]
<b>9.10.16.2. Required Fire Stops in Wall Assemblies</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.16.3. Fire Stop Materials</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F04-OP1.2]
	[F04-OS1.2]
<b>9.10.16.4. Penetration of Fire Stops</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>9.10.17.1. Flame Spread Rating of Interior Surfaces</b>	
(1)	[F02-OS1.2]

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**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.10.17.2. Ceilings in Exits or Public Corridors</b>	
(1)	[F05–OS1.5]
<b>9.10.17.3. Walls in Exits</b>	
(1)	[F05–OS1.5]
(2)	[F05–OS1.5]
<b>9.10.17.4. Exterior Exit Passageways</b>	
(1)	[F05–OS1.5]
<b>9.10.17.5. Walls in Public Corridors</b>	
(1)	[F05–OS1.5]
<b>9.10.17.9. Combustible Skylights</b>	
(1)	[F02,F05–OS1.5]
<b>9.10.17.10. Protection of Foamed Plastics</b>	
(1)	(a),(b),(c) [F01,F02,F05–OS1.5]
(2)	[F01,F02–OS1.2]
<b>9.10.18.1. Access Provided through a Firewall</b>	
(1)	[F11–OS1.5]
<b>9.10.18.2. Fire Alarm System Required</b>	
(1)	[F11–OS1.5]
<b>9.10.18.3. Rooms and Spaces Requiring Heat Detectors or Smoke Detectors</b>	
(1)	[F11–OS1.5]
(2)	[F11–OS1.5]
(3)	[F02-OS1.2] Applies to the <i>sprinklered building</i> [F11-OS1.5] Applies to the supervision of the system and the flow alarm
<b>9.10.18.4. Smoke Detectors in Recirculating Air-Handling Systems</b>	
(1)	[F03–OS1.2]
<b>9.10.18.5. Portions of Buildings Considered as Separate Buildings</b>	
(1)	[F03–OS1.2]
(2)	[F11–OS1.2]
<b>9.10.18.7. Central Vacuum Systems</b>	
(1)	[F03–OS1.2]
<b>9.10.19.1. Required Smoke Alarms</b>	
(1)	[F81,F11–OS1.5]
<b>9.10.19.2. Location of Smoke Alarms</b>	
(1)	[F11–OS1.5]
(2)	[F11–OS1.5]
<b>9.10.19.3. Power Supply</b>	
(1)	[F81–OS1.5]
<b>9.10.19.4. Interconnection of Smoke Alarms</b>	
(1)	[F11–OS1.5]
<b>9.10.19.5. Instructions for Maintenance and Care</b>	
(1)	[F82–OS1.5]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.10.20.1. Windows or Access Panels Required</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
<b>9.10.20.2. Access to Basements</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(2)	[F12-OP1.2] Applies to portion of Code text: " Access required in Sentence (1) ... provides an opening not less than 1 100 mm high and 550 mm wide, the sill height of which shall not be more than 900 mm above the floor."
	[F12-OS1.2,OS1.5] Applies to portion of Code text: " Access required in Sentence (1) ... provides an opening not less than 1 100 mm high and 550 mm wide, the sill height of which shall not be more than 900 mm above the floor."
<b>9.10.20.3. Fire Department Access to Buildings</b>	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(2)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
<b>9.10.20.4. Portable Extinguishers</b>	
(1)	[F81,F02,F12-OP1.2]
	[F81,F02,F12-OS1.2]
<b>9.10.20.5. Freeze Protection of Fire Protection Systems</b>	
(1)	[F81,F02-OP1.2]
	[F81,F02-OS1.2]
<b>9.10.22.2. Vertical Clearances above Ranges</b>	
(1)	[F01-OS1.2,OS1.1]
(2)	[F01-OS1.1,OS1.2]
<b>9.10.22.3. Protection around Ranges</b>	
(1)	[F01-OS1.1,OS1.2]
(3)	[F01-OS1.1,OS1.2]
<b>9.11.1.1. Determination of Sound Transmission Class Ratings</b>	
(1)	[F56-OH3.1]
<b>9.11.2.1. Minimum Sound Transmission Class Ratings</b>	
(1)	[F56-OH3.1]
(2)	[F56-OH3.1]
<b>9.12.1.1. Removal of Topsoil and Organic Matter</b>	
(1)	[F40,F41,F20-OH1.1]
(2)	[F81-OP2.3,OP2.4]
	[F81-OS2.3]
	[F81-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F81-OS1.2] Applies to assemblies required to provide fire resistance.
	[F81-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OP2.2] [F20,F21-OP2.3,OP2.4]
	[F20-OS2.2,OS2.3] [F21-OS2.3]
	[F20,F21-OH4] Applies to floors and elements that support floors.
	[F20,F21-OS3.1] Applies to floors and elements that support floors.
	[F20,F21,F40,F41-OH1.1] [F20,F21-OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
<b>9.12.1.2. Standing Water</b>	
(1)	[F60-OP2.2,OP2.3,OP2.4]
	[F60-OS2.2,OS2.3]
	[F60-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F60-OH4] Applies to floors and elements that support floors.
	[F60-OS3.1] Applies to floors and elements that support floors.
<b>9.12.1.3. Protection from Freezing</b>	
(1)	[F21-OP2.3,OP2.4]
	[F21-OS2.3]
	[F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OS3.1] Applies to floors and elements that support floors.
<b>9.12.2.1. Excavation to Undisturbed Soil</b>	
(1)	[F20-OP2.2,OP2.3,OP2.4]
	[F20-OS2.2,OS2.3]
	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.12.2.2. Minimum Depth of Foundations</b>	
(1)	[F21-OP2.3,OP2.4]
	[F21-OS2.3]
	[F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OS3.1] Applies to floors, elements that support floors, and concrete steps with more than 2 risers.
(8)	[F21-OH4]
	[F21-OP2.3,OP2.4]
	[F21-OS2.3]
	[F21-OS3.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.12.3.1. Placement of Backfill</b>	
(1)	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F81-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F81-OP2.1] [F22-OP2.4] [F81-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F81-OS2.1] [F81-OS2.3] Applies to elements that support or are part of an environmental separator.
<b>9.12.3.2. Grading of Backfill</b>	
(1)	[F60,F61-OH1.1,OH1.2,OH1.3]
	[F60,F61-OP2.3]
	[F60,F61-OS2.3]
<b>9.12.3.3. Deleterious Debris and Boulders</b>	
(1)	[F81-OH1.1,OH1.2,OH1.3]
	[F81-OP2.3]
	[F81-OS2.3]
	[F81-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3]
	[F20-OS2.1,OS2.3]
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3]
	[F20-OS2.1,OS2.3]
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.12.4.1. Support of Footings</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OH2.1] Applies to sewer-line locations beneath footings.
	[F21-OP2.2] [F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F21-OS3.1] Applies to floors and elements that support floors.
<b>9.13.2.1. Required Dampproofing</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.13.2.2. Material Standards</b>	
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to materials installed to control the ingress of soil gas. [F61-OH1.1,OH1.2,OH1.3] Applies to materials installed to control the ingress of moisture.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.13.2.3. Standards for Application</b>	
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to materials installed to control the ingress of soil gas. [F61-OH1.1,OH1.2,OH1.3] Applies to materials installed to control the ingress of moisture.
<b>9.13.2.4. Preparation of Surface</b>	
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to dampproofing installed to control the ingress of soil gas. [F61-OH1.1,OH1.2,OH1.3] Applies to dampproofing installed to control the ingress of moisture.
(2)	[F61-OS2.3]
	[F40-OH1.1] Applies to <i>foundation</i> walls where the dampproofing serves to control the ingress of <i>soil</i> gas. [F61-OH1.1,OH1.2,OH1.3] Applies where the dampproofing serves to control the ingress of moisture.
(3)	[F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3] [F40-OH1.1] Applies where dampproofing materials are installed to control the infiltration of soil gas.
<b>9.13.2.5. Application of Dampproofing Material</b>	
(1)	[F61-OS2.3]
	[F40-OH1.1] Applies to dampproofing installed to control the ingress of soil gas. [F61-OH1.1,OH1.2,OH1.3] Applies to dampproofing installed to control the ingress of moisture.
<b>9.13.2.6. Interior Dampproofing of Walls</b>	
(1)	[F61-OH1.1,OH1.2]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2]
	[F61-OS2.3]
<b>9.13.2.7. Dampproofing of Floors-on-Ground</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.13.3.1. Required Waterproofing</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.13.3.2. Material Standards</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.13.3.3. Standards for Application</b>	
(1)	[F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3] [F40-OH1.1] Applies where waterproofing materials are installed to control the infiltration of soil gas.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.13.3.4. Preparation of Surface</b>	
(1)	[F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3] [F40-OH1.1] Applies where waterproofing materials are installed to control the infiltration of soil gas.
(2)	[F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3] [F40-OH1.1] Applies where waterproofing materials are installed to control the infiltration of soil gas.
(3)	[F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3] [F40-OH1.1] Applies where waterproofing materials are installed to control the infiltration of soil gas.
<b>9.13.3.5. Application of Waterproofing Membranes</b>	
(1)	[F61-OS2.3]
	[F61-OH1.1,OH1.2,OH1.3] [F40-OH1.1] Applies where waterproofing materials are installed to control the infiltration of soil gas.
<b>9.13.3.6. Floor Waterproofing System</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.14.2.1. Foundation Wall Drainage</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
(2)	(a) [F60-OH1.1,OH1.2,OH1.3] Applies where <i>foundations</i> serve as or support an environmental separator.
	(a) [F60-OS2.1] (a) [F60-OS2.3] Applies where <i>foundations</i> serve as or support an environmental separator.
	(b) [F21-OH1.1,OH1.2,OH1.3] Applies where <i>foundations</i> serve as or support an environmental separator.
	(b) [F21-OH4.1] Applies where <i>foundations</i> support floors or elements supporting floors.
	(b) [F21-OP2.1] (b) [F21-OP2.3] Applies where <i>foundations</i> serve as or support an environmental separator. (b) [F21-OP2.4] Applies where <i>foundations</i> support walls or floors.
	(b) [F21-OS2.1] (b) [F21-OS2.3] Applies where <i>foundations</i> serve as or support an environmental separator.
	(b) [F21-OS3.1] Applies where <i>foundations</i> support floors or elements supporting floors. (b) [F21-OS3.7] Applies where <i>foundations</i> support walls that contain windows or doors required for emergency egress.
<b>9.14.3.1. Material Standards</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.3]
	[F60-OS2.1,OS2.3]
<b>9.14.3.2. Minimum Size</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.3.3. Installation</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
(3)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
(4)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.4.1. Type of Granular Material</b>	
(1)	(a) [F60-OH1.1,OH1.2,OH1.3]
	(a) [F60-OP2.3] [F21-OP2.6]
	(a) [F60-OS2.3] [F21-OS2.2]
	(b) [F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	(b) [F21-OH4] Applies to floors and elements that support floors.
	(b) [F21-OP2.1,OP2.4] (b) [F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	(b) [F21-OS2.1] (b) [F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	(b) [F21-OS3.1] Applies to floors and elements that support floors.
<b>9.14.4.2. Installation</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.4.3. Grading</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.4.4. Wet Site Conditions</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.5.1. Drainage Disposal</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.5.2. Sump Pits</b>	
(1)	(a),(b) [F60,F61-OH1.1,OH1.3] (c) [F40-OH1.1] [F52-OH1.2]
	(a),(b) [F60,F61-OP2.3,OP2.4] (c) [F52-OP2.3]
	(a),(b) [F60,F61-OS2.1,OS2.3] (c) [F52-OS2.3]
	(c) [F30-OS3.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F30-OS3.1]
(3)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.5.3. Dry Wells</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
(2)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.6.1. Surface Drainage</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.2,OP2.3]
	[F60-OS2.1,OS2.2,OS2.3]
<b>9.14.6.2. Drainage away from Wells or Septic Disposal Beds</b>	
(1)	[F46-OH2.2] Applies to directing drainage away from the location of a water supply. [F44-OH2.1] Applies to directing drainage away from a septic tank disposal system.
<b>9.14.6.3. Window Wells</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OP2.1,OP2.3]
	[F60-OS2.1,OS2.3]
<b>9.14.6.4. Catch Basin</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.3]
	[F61-OS2.3]
	[F61-OS3.1]
<b>9.15.1.3. Foundations for Deformation-Resistant Buildings</b>	
(1)	[F20-OP2.2] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.15.2.2. Unit Masonry Construction</b>	
(1)	<p>[F20-OP2.1] [F21,F61-OP2.4] [F20,F21,F61-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1] [F20,F21,F61-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F21,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F21,F61-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F21,F61-OS3.1] Applies to floors and elements that support floors.</p>
(3)	<p>(a) [F20-OP2.1] (a) [F80-OP2.4] (a) [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(a) [F20-OS2.1] (a) [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(a) [F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>(a) [F20,F80-OH4] Applies to floors and elements that support floors.</p> <p>(a) [F20,F80-OS3.1] Applies to floors and elements that support floors.</p> <p>(b) [F20-OP2.1] (b) [F80-OP2.4] (b) [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(b) [F20-OS2.1] (b) [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(b) [F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>(b) [F20,F80-OH4] Applies to floors and elements that support floors.</p> <p>(b) [F20,F80-OS3.1] Applies to floors and elements that support floors.</p> <p>(c) [F20-OP2.1] (c) [F61-OP2.4] (c) [F20,F61-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(c) [F20-OS2.1] (c) [F20,F61-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>(c) [F20,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>(c) [F20,F61-OH4] Applies to floors and elements that support floors.</p> <p>(c) [F20,F61-OS3.1] Applies to floors and elements that support floors.</p>
<b>9.15.2.3. Pier-Type Foundations</b>	
(1)	<p>[F20-OP2.1,OP2.2] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.2] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22-OS3.1] Applies to floors and elements that support floors.</p>

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1,OP2.2] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.2] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(4)	[F20-OP2.1,OP2.4] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.15.2.4. Wood-Frame Foundations</b>	
(1)	(a) [F20-OP2.1,OP2.2] (a) [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20-OS2.1,OS2.2] (a) [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	(a) [F20,F80-OH4] Applies to floors and elements that support floors.
	(a) [F20,F80-OS3.1] Applies to floors and elements that support floors.
<b>9.15.3.1. Footings Required</b>	
(1)	[F20-OP2.2] [F20,F21-OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OH4] Applies to floors and elements that support floors.
	[F20,F21-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.15.3.2. Support of Footings</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F21-OH4] Applies to floors and elements that support floors. [F21-OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator. [F21-OS2.4] [F21-OS2.3] Applies to elements that support or are part of an environmental separator. [F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F21-OH4] Applies to floors and elements that support floors. [F21-OP2.1,OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator. [F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator. [F21-OS3.1] Applies to floors and elements that support floors.
<b>9.15.3.4. Basic Footing Widths and Areas</b>	
(1)	[F20-OP2.1] [F21-OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.2] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator. [F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20,F21-OH4] Applies to floors and elements that support floors. [F20,F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.2] [F21-OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.2] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator. [F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20,F21-OH4] Applies to floors and elements that support floors. [F20,F21-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.2] [F21-OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.2] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator. [F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20,F21-OH4] Applies to floors and elements that support floors. [F20,F21-OS3.1] Applies to floors and elements that support floors.
<b>9.15.3.5. Adjustments to Footing Widths for Exterior Walls</b>	
(1)	[F20-OP2.2,OP2.3] [F21-OP2.3,OP2.4] [F20-OS2.2,OS2.3] [F21-OS2.3] [F20,F21-OH1.1,OH1.2,OH1.3] [F20,F21-OH4] Applies to floors and elements that support floors. [F20,F21-OS3.1] Applies to floors and elements that support floors.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.15.3.6. Adjustments to Footing Widths for Interior Walls</b>	
(1)	[F20-OP2.2] [F21-OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OH4] Applies to floors and elements that support floors.
	[F20,F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.2]
	[F20-OS2.2]
<b>9.15.3.7. Adjustments to Footing Area for Column</b>	
(1)	[F20-OP2.2] [F21-OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.2] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OH4] Applies to floors and elements that support floors.
	[F20,F21-OS3.1] Applies to floors and elements that support floors.
<b>9.15.3.8. Footing Thickness</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.15.3.9. Step Footings</b>	
(1)	[F20,F22-OP2.3,OP2.4]
	[F20,F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies where the <i>foundation</i> supports or is part of an environmental separator.
	[F20,F22-OH4] Applies to <i>foundations</i> that support floors.
[F20,F22-OS3.1] Applies to <i>foundations</i> that support floors.	
<b>9.15.4.1. Permanent Form Material</b>	
(1)	[F22,F63,F55-OH1.1,OH1.2,OH1.3]
<b>9.15.4.2. Foundation Wall Thickness and Required Lateral Support</b>	
(1)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(4)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(5)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(7)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(8)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(9)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(10)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.15.4.5. Reinforcement for Flat Insulating Concrete Form Foundation Walls</b>	
(1)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(4)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.15.4.6. Extension above Ground Level</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.3]
	[F61-OS2.3]
<b>9.15.4.7. Reduction in Thickness</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.15.4.9. Crack Control Joints</b>	
(1)	[F21-OP2.3]
	[F21-OS2.3]
	[F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20-OP2.1] [F20,F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
<b>9.15.5.1. Support of Floor Joists</b>	
(1)	[F20-OP2.1,OP2.4] [F20-OP2.3] [F40,F61-OP2.3,OP2.4] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F40,F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F40,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F40,F61-OH4] Applies to floors and elements that support floors.
	[F20,F40,F61-OS3.1] Applies to floors and elements that support floors.
<b>9.15.5.2. Support of Beams</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.3,OP2.4] Applies to elements that support or are part of an environmental separator.
	[F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS3.1] Applies to floors and elements that support floors.
<b>9.15.5.3. Pilasters</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.15.6.2. Foundation Walls above Ground</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.3]
	[F61-OS2.3]
<b>9.15.6.3. Form Ties</b>	
(1)	[F30-OS3.1]
	[F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F61-OS2.3] Applies to elements that support or are part of an environmental separator.
<b>9.16.1.3. Required Floors-on-Ground</b>	
(1)	(a),(b) [F30-OS3.1]
	(a),(b) [F40-OH2.4]
<b>9.16.2.1. Required Installation of Granular Material</b>	
(1)	[F61-OH1.1] [F61,F60-OH1.2,OH1.3]
	[F60-OS2.3]
<b>9.16.2.2. Support of Floors</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OP2.1,OP2.3,OP2.4]
	[F21-OS2.1,OS2.3]
	[F21-OS3.1]
(2)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OP2.1,OP2.3,OP2.4]
	[F21-OS2.1,OS2.3]
	[F21-OS3.1]
(3)	[F22-OS3.1]
<b>9.16.3.1. Control of Water Ingress</b>	
(1)	[F60-OH1.1,OH1.2,OH1.3]
	[F60-OS2.3]
	[F60-OS3.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.16.3.2. Hydrostatic Pressure</b>	
(1)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OS3.1]
	[F20–OP2.1] [F61–OP2.3]
	[F20–OS2.1] [F61–OS2.3]
<b>9.16.3.3. Floor Drains</b>	
(1)	[F62–OH1.1,OH1.2,OH1.3]
	[F62–OS2.3]
	[F62–OS3.1]
<b>9.16.4.1. Surface Finish</b>	
(1)	[F30,F80–OS3.1]
	[F40–OH2.4]
	[F62–OH1.1,OH1.2,OH1.3]
(2)	[F20,F80–OS3.1]
	[F41–OH1.1]
<b>9.16.4.2. Topping Course</b>	
(1)	[F20,F80–OS3.1]
(2)	[F20,F80–OS3.1]
<b>9.16.4.3. Thickness</b>	
(1)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OH4]
	[F20–OP2.1,OP2.3]
	[F20–OS2.1,OS2.3]
	[F20–OS3.1]
<b>9.16.4.4. Bond Break</b>	
(1)	[F21–OS3.1]
<b>9.16.5.1. Wood-Frame Floors</b>	
(1)	[F20–OH4]
	[F20–OS3.1]
	[F20–OH1.1,OH1.2,OH1.3] Applies where wood-frame floors-on-ground serve as an environmental separator.
	[F20–OP2.1] [F20–OP2.3] Applies where wood-frame floors-on-ground serve as an environmental separator.
	[F20–OS2.1] [F20–OS2.3] Applies where wood-frame floors-on-ground serve as an environmental separator.
<b>9.17.2.1. Location</b>	
(1)	[F20–OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20–OH4] Applies to floors and elements that support floors.
	[F20–OP2.2,OP2.4] [F20–OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20–OS2.2] [F20–OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20–OS3.1] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.17.2.2. Lateral Support</b>	
(1)	[F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4,OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4,OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4,OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4,OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.17.3.1. Size and Thickness</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1] [F20,F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.17.3.2. End Bearing Plates</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.17.3.3. Paint</b>	
(1)	[F80–OH1.1,OH1.2,OH1.3]
	[F80–OP2.3,OP2.4]
	[F80–OS2.3]
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OS3.1] Applies to floors and elements that support floors.
<b>9.17.3.4. Design of Steel Columns</b>	
(1)	[F20-OP2.1]
	[F22-OP2.4]
	[F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1]
	[F22-OS2.4]
	[F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OH4] Applies to floors and elements that support floors.	
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
	[F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.17.4.1. Column Sizes</b>	
(1)	[F20-OP2.1]
	[F20,F22-OP2.4]
	[F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1]
	[F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
[F20,F22-OH4] Applies to floors and elements that support floors.	
[F20,F22-OS3.1] Applies to floors and elements that support floors.	
(2)	[F20-OP2.1]
	[F20,F22-OP2.4]
	[F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1]
	[F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
[F20,F22-OH4] Applies to floors and elements that support floors.	
[F20,F22-OS3.1] Applies to floors and elements that support floors.	
<b>9.17.4.2. Materials</b>	
(1)	[F20-OP2.1]
	[F20,F22-OP2.4]
	[F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1]
	[F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
[F20,F22-OH4] Applies to floors and elements that support floors.	
[F20,F22-OS3.1] Applies to floors and elements that support floors.	

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1] [F20,F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.17.4.3. Columns in Contact with Concrete</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS3.1] Applies to floors and elements that support floors.
<b>9.17.5.1. Materials</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.17.5.2. Sizes</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.17.6.2. Sizes</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.18.2.1. Access Openings</b>	
(1)	[F82-OH1.1,OH1.2]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F42-OH2.4,OH2.5] Applies where crawl spaces are heated or unheated and access is from the exterior.
	[F51,F63-OS2.3] Applies where crawl spaces are unheated and access is from the interior.
	[F42,F61-OS2.3] Applies where crawl spaces are heated or unheated and access is from the exterior.
	[F63-OS2.3] Applies where crawl spaces are unheated and access is from the interior. [F42,F61-OS2.3] Applies where crawl spaces are heated or unheated and access is from the exterior.
<b>9.18.3.1. Ventilation of Unheated Crawl Spaces</b>	
(1)	[F62-OH1.1]
	[F62-OS2.3]
(2)	[F62-OH1.1]
	[F62-OS2.3]
(3)	(a),(b) [F61,F62,F42-OS2.3]
	(a) [F62-OH1.1,OH1.2]
	(b) [F61,F42-OH1.1,OH1.2]
	(b) [F42-OH2.3,OH2.5]
<b>9.18.4.1. Access Way to Services</b>	
(1)	[F82-OH1.1,OH1.2]
	[F82-OH2.1]
<b>9.18.5.1. Drainage</b>	
(1)	[F60-OH1.1,OH1.2]
	[F60-OS2.3]
<b>9.18.6.1. Ground Cover in Unheated Crawl Spaces</b>	
(1)	[F61-OH1.1,OH1.2]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2]
	[F61-OS2.3]
<b>9.18.6.2. Ground Cover in Heated Crawl Spaces</b>	
(1)	[F40,F61-OH1.1] [F61-OH1.2]
	[F61-OS2.3]
(2)	[F40,F61-OH1.1] [F61-OH1.2]
	[F61-OS2.3]
(3)	[F40-OH1.1]
<b>9.19.1.1. Required Venting</b>	
(1)	[F62,F51-OS2.3]
	[F51,F62-OH1.1,OH1.2]
	[F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
<b>9.19.1.2. Vent Requirements</b>	
(1)	[F62,F51-OS2.3]
	[F51,F62-OH1.1,OH1.2]
	[F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
(2)	[F62,F51-OS2.3]
	[F51,F62-OH1.1,OH1.2]
	[F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
(3)	[F62,F51-OS2.3]
	[F51,F62-OH1.1,OH1.2]
	[F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F62,F51-OS2.3]
	[F51,F62-OH1.1,OH1.2] [F51-OH1.3] Applies to sloped roof assemblies that may be subject to ice damming.
(5)	[F42,F51,F61,F62-OS2.3]
	[F42-OH1.1] Applies to resistance to the entry of insects. [F51,F61,F62-OH1.1,OH1.2,OH1.3]
	[F42-OH2.5] Applies to resistance to the entry of insects.
<b>9.19.1.3. Clearances</b>	
(1)	[F62,F51-OH1.1,OH1.2,OH1.3]
	[F62,F51-OS2.3]
(2)	[F62,F51-OH1.1,OH1.2,OH1.3]
	[F62,F51-OS2.3]
(3)	[F51,F62-OH1.1,OH1.2,OH1.3]
	[F51,F62-OS2.3]
<b>9.19.2.1. Access</b>	
(1)	[F82-OH1.1,OH1.2,OH1.3]
	[F82-OS2.3]
(2)	[F82-OH1.1,OH1.2]
	[F82-OS2.3]
(3)	[F42-OH1.1] [F61-OH1.1,OH1.2,OH1.3] Applies where access is from the exterior. [F42-OH1.1] Applies where access is from an unheated enclosed space. [F51-OH1.2] Applies where access is from an interior heated space.
	[F42-OH2.5] Applies where access is from the exterior or an unheated enclosed space.
	[F61,F42-OS2.3] Applies where access is from the exterior or an unheated enclosed space.
<b>9.20.2.1. Masonry Unit Standards</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OP1.2] Applies to assemblies required to provide fire resistance. [F01,F20,F80-OP1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance. [F01-OS1.1,OS1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.4] Applies to masonry used in <i>chimneys</i> and fireplaces.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.2.2. Used Brick</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OP1.2] Applies to assemblies required to provide fire resistance. [F01-OP1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance. [F01-OS1.1,OS1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.4] Applies to masonry used in <i>chimneys</i> and fireplaces.
<b>9.20.2.3. Glass Blocks</b>	
(1)	[F01,F20-OP1.1] [F20-OP1.2] Applies to assemblies required to provide fire resistance.
	[F01,F20-OS1.1] [F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors. [F01,F20-OS3.4] Applies to masonry used in <i>chimneys</i> and fireplaces.
<b>9.20.2.4. Cellular Concrete</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F80-OS1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F80-OP2.1,OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS3.1] Applies to floors and elements that support floors. [F80-OS3.4] Applies to masonry used in <i>chimneys</i> and fireplaces.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.2.5. Stone</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OP1.2] Applies to assemblies required to provide fire resistance. [F01,F20,F80-OP1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance. [F01-OS1.1,OS1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
<b>9.20.2.6. Concrete Blocks Exposed to the Weather</b>	
(1)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F80-OP2.1,OP2.3] [F61-OP2.3]
	[F80-OS2.1,OS2.3] [F61-OS2.3]
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP1.2] Applies to concrete blocks in <i>chimneys</i> and fireplaces.
	[F80-OS3.1] Applies to elements that support floors. [F80-OS3.4] Applies to masonry used in <i>chimneys</i> and fireplaces.
<b>9.20.2.7. Compressive Strength</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OP1.2] Applies to assemblies required to provide fire resistance. [F01,F20,F80-OP1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance. [F01-OS1.1,OS1.2] Applies to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.4] Applies to masonry used in <i>chimneys</i> and fireplaces.
<b>9.20.3.1. Mortar Materials</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OS3.1] Applies to floors and elements that support floors.
	[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OP2.1,OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS3.1] Applies to floors and elements that support floors.
(4)	[F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OP2.1,OP2.4] [F21-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F21-OS2.1] [F21-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F21-OS3.1] Applies to floors and elements that support floors.
<b>9.20.3.2. Mortar and Grout Mixes</b>	
(1)	[F20,F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F21,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F21,F61-OH4] Applies to floors and elements that support floors.
	[F20,F21,F61-OP2.1,OP2.4] [F20,F21,F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F61-OS2.1] [F20,F21,F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F61-OS3.1] Applies to floors and elements that support floors.
(2)	(a) [F21,F61,F55-OH1.1,OH1.2,OH1.3]
	(a) [F21,F61,F55-OP2.1,OP2.3]
	(a) [F21,F61,F55-OS2.1,OS2.3]
	(b) [F21,F44-OS1.2] Applies to assemblies required to provide fire resistance.
	(b) [F21-OP2.1]
	(b) [F21-OS2.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20,F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F21,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F21,F61-OH4] Applies to floors and elements that support floors.
	[F20,F21,F61-OP2.1,OP2.4] [F20,F21,F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F61-OS2.1] [F20,F21,F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F61-OS3.1] Applies to floors and elements that support floors.
(4)	[F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F21-OH4] Applies to floors and elements that support floors.
	[F20,F21-OP2.1,OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F21-OS2.1] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OS3.1] Applies to floors and elements that support floors.
(5)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(6)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(7)	[F20,F21,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20,F21,F61-OH4] Applies to floors and elements that support floors.
	[F20,F21,F61-OP2.1,OP2.4] [F20,F21,F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F21,F61-OS2.1] [F20,F21,F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21,F61-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.4.1. Thickness</b>	
(1)	[F20,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F61-OH4] Applies to floors and elements that support floors.
	[F20,F61-OP2.1,OP2.4] [F20,F61-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F61-OS2.1] [F20,F61-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F61-OS3.1] Applies to floors and elements that support floors.
(2)	[F20,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F61-OH4] Applies to floors and elements that support floors.
	[F20,F61-OP2.1,OP2.4] [F20,F61-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F61-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F61-OS2.1] [F20,F61-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F61-OS3.1] Applies to floors and elements that support floors.
<b>9.20.4.2. Solid Masonry Units</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.4.3. Laying of Masonry Units</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator and to masonry used in <i>chimneys</i> and fireplaces.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.5.1. Masonry Support</b>	
(1)	[F20,F21-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F21-OH4] Applies to floors and elements that support floors.
	[F20,F21-OP2.1,OP2.4] [F20,F21-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F21-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F21-OS2.1] [F20,F21-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.5.2. Lintels or Arches</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OP2.1,OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OP2.1,OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS2.1] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
(4)	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1,OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS3.1] Applies to floors and elements that support floors. [F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.20.6.1. Thickness of Exterior Walls</b>	
(1)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.6.2. Cavity Walls</b>	
(1)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22,F61-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22,F61-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
	[F20,F22,F61-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
(3)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.20.6.3. Thickness of Interior Walls</b>	
(2)	(b) [F20-OP2.1,OP2.3,OP2.5] [F22-OP2.5]
	(b) [F20-OS2.1,OS2.3,OS2.5] [F22-OS2.5]
<b>9.20.6.4. Masonry Veneer</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.5] [F20,F22-OP2.3] Applies to elements that are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.3]
	[F61-OS2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.6.5. Parapet Walls</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.3]
	[F61-OS1.2]
	[F61-OS2.3]
<b>9.20.7.1. Maximum Dimensions</b>	
(1)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.20.7.2. Minimum Wall Thickness</b>	
(1)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.7.3. Separation of Chases or Recesses</b>	
(1)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.20.7.4. Non-Conforming Chases or Recesses</b>	
(1)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.20.7.5. Chases or Recesses Cut into Walls</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.8.1. Capping of Hollow Masonry Walls</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.8.2. Cavity Walls Supporting Framing Members</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F80-OP2.3]
	[F80-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.8.3. Bearing of Beams and Joists</b>	
(1)	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	(2)
[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.	
(3)	
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.8.4. Support of Beams and Columns</b>	
(1)	<p>[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F22-OS3.1] Applies to floors and elements that support floors.</p>
(2)	<p>[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OH4] Applies to floors and elements that support floors.</p> <p>[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS3.1] Applies to floors and elements that support floors.</p>
(3)	<p>[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F22-OS3.1] Applies to floors and elements that support floors.</p>
(4)	<p>[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F22-OS3.1] Applies to floors and elements that support floors.</p>

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.20.8.5. Distance to Edge of Supporting Members</b>	
(1)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F20-OP2.1,OP2.4,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.9.1. Joints to be Offset or Reinforced</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.9.2. Bonding or Tying of Other than Masonry Veneer</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.20.9.3. Bonding</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.9.4. Tying</b>	
(2)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OH4] Applies to floors and elements that support floors. [F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OS1.2] Applies to assemblies required to provide fire resistance. [F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OH4] Applies to floors and elements that support floors. [F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OS1.2] Applies to assemblies required to provide fire resistance. [F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OH4] Applies to floors and elements that support floors. [F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OS1.2] Applies to assemblies required to provide fire resistance. [F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator. [F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20-OH4] Applies to floors and elements that support floors. [F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS1.2] Applies to assemblies required to provide fire resistance. [F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator. [F20-OS3.1] Applies to floors and elements that support floors.
(6)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator. [F20-OH4] Applies to floors and elements that support floors. [F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS1.2] Applies to assemblies required to provide fire resistance. [F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator. [F20-OS3.1] Applies to floors and elements that support floors.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(7)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(8)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(9)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.9.5. Ties for Masonry Veneer</b>	
(1)	[F20,F22,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F80-OP2.1] [F20,F22,F80-OP2.5] [F20,F22,F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OS2.1] [F20,F22,F80-OS2.5] [F20,F22,F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OP2.1] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.
<b>9.20.9.6. Reinforcing for Glass Block</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that are part of an environmental separator.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that are part of an environmental separator.
<b>9.20.10.1. Lateral Support Required</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
	(2)
(a) [F20,F22-OH4] Applies to floors and elements that support floors.	
(a) [F20,F22-OS3.1] Applies to floors and elements that support floors.	
[F20-OP2.1,OP2.4] [F20,F22-OP2.5] (a) [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.	
[F20-OS2.1] [F20,F22-OS2.5] (a) [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.	
(4)	
	[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.11.1. Anchorage to Floor or Roof Assemblies where Masonry Walls Require Lateral Support</b>	
(1)	<p>[F20-OP2.1] [F20,F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F22-OS3.1] Applies to floors and elements that support floors.</p>
(2)	<p>[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F80-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.</p> <p>[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(3)	<p>[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OH4] Applies to floors and elements that support floors.</p> <p>[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.</p> <p>[F20-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS3.1] Applies to floors and elements that support floors.</p>
(4)	<p>[F20-OP2.1] [F20,F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.</p> <p>[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F22-OS3.1] Applies to floors and elements that support floors.</p>

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.11.2. Bonding and Tying Intersecting Masonry Walls where Walls Require Lateral Support</b>	
(1)	<p>[F20-OP2.1] [F20,F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.</p> <p>[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F22-OS3.1] Applies to floors and elements that support floors.</p>
(2)	<p>[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OH4] Applies to floors and elements that support floors.</p> <p>[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS3.1] Applies to floors and elements that support floors.</p>
(3)	<p>[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F80-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
<b>9.20.11.3. Anchoring Intersecting Wood-Frame Walls to Masonry Walls</b>	
(1)	<p>[F20,F22,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22,F80-OH4] Applies to floors and elements that support floors.</p> <p>[F20,F22,F80-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F20,F22,F80-OS3.1] Applies to floors and elements that support floors. [F20,F22,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p> <p>[F20,F80-OP2.1] [F20,F22,F80-OP2.4,OP2.5] [F20,F22,F80-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F80-OS2.1] [F20,F22,F80-OS2.5] [F20,F22,F80-OS2.3] Applies to elements that support or are part of an environmental separator.</p>

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.11.4. Anchoring Wood-Frame Roof Systems to Masonry Walls</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3]
	[F20-OS2.1,OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3]
	[F20-OS2.1,OS2.3]
<b>9.20.11.5. Anchoring Masonry Cornices, Sills and Trim to Masonry Walls</b>	
(1)	[F20,F80-OS2.1,OS2.3,OS2.5] [F22-OS2.5]
<b>9.20.11.6. Anchoring to Masonry Piers</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.12.1. Corbelling</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.12.2. Corbelling for Cavity Walls</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.12.3. Corbelling for Masonry Veneer</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
<b>9.20.13.1. Materials for Flashing</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OP2.1,OP2.3]
	[F80-OS2.1,OS2.3]
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OP2.1,OP2.3]
	[F80-OS2.1,OS2.3]
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.13.2. Fastening of Flashing</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OP2.1,OP2.3]
	[F80-OS2.1,OS2.3]
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.13.3. Location of Flashing</b>	
(1)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OP2.1,OP2.3]
	[F61,F62-OS2.1,OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.13.4. Extension of Flashing</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.1,OP2.3]
	[F61-OS2.1,OS2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.13.5. Flashing for Weep Holes in Masonry/Masonry Walls</b>	
(1)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OP2.1,OP2.3]
	[F61,F62-OS2.1,OS2.3]
	[F61,F62-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.13.6. Flashing for Weep Holes in Masonry Veneer</b>	
(2)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OP2.1,OP2.3]
	[F61,F62-OS2.1,OS2.3]
	[F61,F62-OS1.2] Applies to assemblies required to provide fire resistance.
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.1,OP2.3]
	[F61-OS2.1,OS2.3]
	[F61-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.13.7. Flashing Joints</b>	
(1)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OP2.1,OP2.3]
	[F61,F62-OS2.1,OS2.3]
	[F61,F62-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.13.8. Required Weep Holes</b>	
(1)	[F62-OH1.1,OH1.2,OH1.3]
	[F62-OP2.1,OP2.3]
	[F62-OS2.1,OS2.3]
	[F62-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.13.9. Protection of Interior Finish</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP2.1,OP2.3]
	[F61-OS2.1,OS2.3]
(2)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OP2.1,OP2.3]
	[F61,F62-OS2.1,OS2.3]
<b>9.20.13.10. Mortar Droppings</b>	
(1)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OP2.1,OP2.3]
	[F61,F62-OS2.1,OS2.3]
	[F61,F62-OS1.2] Applies to assemblies required to provide fire resistance.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.13.12. Drips beneath Window Sills</b>	
(1)	[F61,F62-OH1.1,OH1.2,OH1.3]
	[F61,F62-OP2.1,OP2.3]
	[F61,F62-OS2.1,OS2.3]
	[F61,F62-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.20.14.1. Laying Temperature of Mortar and Masonry</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20,F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F80-OH4] Applies to floors and elements that support floors.
	[F20,F80-OP2.1,OP2.4] [F20,F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F80-OS2.1] [F20,F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F20,F80-OS3.1] Applies to floors and elements that support floors. [F20,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.20.14.2. Protection from Weather</b>	
(1)	[F80-OP2.1,OP2.3]
	[F80-OS2.1,OS2.3]
<b>9.20.15.1. Amount of Reinforcement</b>	
(1)	[F20-OP2.1,OP2.3]
	[F20-OS2.1,OS2.3]
<b>9.20.15.2. Installation Standard</b>	
(1)	[F20-OP2.1,OP2.3]
	[F20-OS2.1,OS2.3]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.20.16.1. Corrosion Resistance of Connectors</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1,OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator or are exposed to moisture.
	[F80-OS3.1] Applies to floors and elements that support floors. [F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.20.17.1. Thickness of Insulating Concrete Form Walls</b>	
(1)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	<b>9.20.17.2. Reinforcement for Flat Insulating Concrete Form Walls</b>
(1)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	(2)
[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OH4] Applies to floors and elements that support floors.	
[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.	

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.20.17.3. Openings in Flat Non-Loadbearing Insulating Concrete Form Walls</b>	
(1)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors. [F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(6)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.20.17.4. Lintels over Openings in Flat Loadbearing Insulating Concrete Form Walls</b>	
(1)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OH4] Applies to floors and elements that support floors.
	[F20-OP2.1] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
<b>9.20.17.5. Framing Supported on Flat Insulating Concrete Form Walls</b>	
(1)	[F20,F22-OH4]
	[F20,F22-OS3.1]
	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20,F22-OH4]
	[F20,F22-OS3.1]
	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
(3)	[F20,F22-OH4]
	[F20,F22-OS3.1]
	[F20-OP2.1] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
<b>9.20.17.6. Anchoring of Roof Framing to Top of Flat Insulating Concrete Form Walls</b>	
(1)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OP2.1,OP2.3] [F22–OP2.3,OP2.4]
	[F20–OS2.1,OS2.3] [F22–OS2.3,OS2.4]
<b>9.21.1.2. Chimney or Flue Pipe Walls</b>	
(1)	[F01–OP1.1] Applies to the walls of any <i>chimney</i> or <i>flue pipe</i> , which are required to be constructed to be flame-tight.
	[F01–OS1.1] Applies to the walls of any <i>chimney</i> or <i>flue pipe</i> , which are required to be constructed to be flame-tight.
	[F44–OH1.1] Applies to the walls of any <i>chimney</i> or <i>flue pipe</i> , which are required to be constructed to be smoke-tight.
<b>9.21.2.1. Chimney Flue Limitation</b>	
(1)	[F44–OH1.1]
	[F44–OS3.4]
(2)	[F44–OH1.1]
	[F44–OS3.4]
(3)	[F44–OH1.1]
	[F44–OS3.4]
<b>9.21.2.2. Connections of More Than One Appliance</b>	
(1)	[F44–OH1.1]
	[F44–OS3.4]
(2)	[F44–OS3.4]
(3)	[F44–OH1.1]
	[F44–OS3.4]
(4)	[F44–OH1.1]
	[F44–OS3.4]
<b>9.21.2.3. Inclined Chimney Flues</b>	
(1)	[F44–OH1.1]
	[F44–OS3.4]
<b>9.21.2.4. Size of Chimney Flues</b>	
(2)	[F44–OH1.1]
	[F44–OS3.4]
<b>9.21.2.5. Fireplace Chimneys</b>	
(1)	[F44–OH1.1]
	[F44–OS3.4]
<b>9.21.2.6. Oval Chimney Flues</b>	
(1)	[F44–OH1.1]
	[F44–OS3.4]
<b>9.21.3.1. Lining Materials</b>	
(1)	[F01–OS1.1]
	[F20–OH1.1]
	[F20–OS2.3]
	[F44–OS3.4]
	[F44,F01,F20–OP1.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.21.3.2. Joints in Chimney Liners</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F01-OS3.4]
	[F44-OH1.1]
	[F44,F20-OS2.3]
(2)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OH1.1]
	[F44-OS3.4]
<b>9.21.3.3. Clay Liners</b>	
(1)	[F01-OS1.1]
	[F20-OS2.2]
	[F20,F01-OP1.1]
	[F20,F44-OH1.1]
	[F20,F44-OS3.4]
(2)	[F01,F20-OP1.1]
	[F01,F20-OS1.1]
	[F44-OH1.1]
	[F44-OS3.4]
	[F20-OS2.3] Applies to the liners referred to in Sentence (1), which are required to be not less than 15.9 mm thick.
<b>9.21.3.4. Firebrick Liners</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20,F44-OS3.4]
	[F44-OH1.1]
(2)	[F01,F20-OP1.1]
	[F20-OH1.1]
	[F20-OS2.2]
	[F20,F01-OS1.1]
	[F20,F44-OS3.4]
<b>9.21.3.5. Concrete Liners</b>	
(1)	[F01-OP1.1]
	[F01,F20-OS1.1]
	[F20-OS2.3]
	[F20,F44-OS3.4]
	[F44-OH1.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.21.3.6. Metal Liners</b>	
(1)	[F01,F20-OP1.1]
	[F20-OS2.3]
	[F20,F01-OS1.1]
	[F20,F44-OH1.1]
	[F20,F44-OS3.4]
(2)	[F20-OP1.1]
	[F20-OS2.3]
	[F20,F01-OS1.1]
	[F20,F44-OS3.4]
	[F44-OH1.1]
<b>9.21.3.7. Installation of Chimney Liners</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OS2.3]
	[F44-OH1.1]
	[F44-OS3.4]
<b>9.21.3.8. Spaces between Liners and Surrounding Masonry</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OS2.3]
(2)	[F01-OP1.1]
	[F20-OS1.1]
	[F20-OS2.3]
	[F44-OH1.1]
	[F44-OS3.4]
<b>9.21.3.9. Mortar for Chimney Liners</b>	
(1)	[F20,F44-OH1.1]
	[F20,F44-OS3.4]
	(a),(b) [F01,F20-OP1.1]
	(a),(b) [F01,F20-OS1.1]
	(b) [F20-OS2.3]
(2)	[F20-OS2.3]
	[F20,F01-OP1.1]
	[F20,F01-OS1.1]
	[F20,F44-OH1.1]
	[F44-OS3.4]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.21.3.10. Extension of Chimney Liners</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OS2.3]
	[F44-OS3.4]
	[F44,F20-OH1.1]
<b>9.21.4.4. Height of Chimney Flues</b>	
(1)	(a),(b) [F44-OH1.1]
	(a),(b) [F44-OS3.4]
<b>9.21.4.6. Chimney Caps</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OS2.3]
	[F20,F44-OH1.1]
	[F44-OS3.4]
(2)	[F20-OS2.3]
(3)	[F20-OS2.3]
	[F20,F01-OP1.1]
	[F20,F01-OS1.1]
	[F20,F44-OS3.4]
(4)	[F20-OS2.3]
	[F20,F01-OP1.1]
	[F20,F01-OS1.1]
	[F20,F44-OH1.1]
	[F20,F44-OS3.4]
<b>9.21.4.7. Cleanout</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.21.4.8. Wall Thickness</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20,F22-OS2.1]
	[F22-OP2.1]
<b>9.21.4.9. Separation of Flue Liners</b>	
(1)	[F01-OS1.1]
	[F20,F01-OP1.1]
	[F20,F22-OS2.3]
	[F20,F44-OH1.1]
	[F44-OS3.4]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F01-OS1.1]
	[F20,F22-OS2.3]
	[F20,F44-OH1.1]
	[F20,F44-OS3.4]
<b>9.21.4.10. Flashing</b>	
(1)	[F20,F61-OS2.3]
<b>9.21.5.1. Clearance from Combustible Materials</b>	
(1)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
(3)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.21.5.2. Sealing of Spaces</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.21.5.3. Support of Joists or Beams</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.22.1.2. Masonry and Concrete</b>	
(2)	[F22,F20-OS2.3]
<b>9.22.1.4. Combustion Air</b>	
(1)	[F40,F44,F54-OS3.4]
	[F40,F44,F54-OH1.1]
<b>9.22.2.1. Brick or Steel Liners</b>	
(1)	[F20,F01-OP1.1]
	[F20,F01-OS1.1]
<b>9.22.2.2. Firebrick Liners</b>	
(1)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
(3)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.22.2.3. Steel Liners</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OH1.1]
	[F44-OS3.4]
<b>9.22.3.1. Thickness of Walls</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
<b>9.22.4.1. Fire Chamber Dimensions</b>	
(1)	[F44-OH1.1]
	[F44-OS3.4]
<b>9.22.5.1. Hearth Extension</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
<b>9.22.5.2. Support of Hearth</b>	
(1)	[F01-OS1.1]
	[F20-OS2.3]
	[F20,F01-OP1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.22.6.1. Required Damper and Size</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F54-OH1.2]
<b>9.22.7.1. Slope of Smoke Chamber</b>	
(1)	[F44-OH1.1]
	[F44-OS3.4]
<b>9.22.7.2. Wall Thickness</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.22.8.1. Conformance to Standard</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OH1.1]
	[F44-OS3.4]
(2)	[F01,F41,F81-OS1.1]
	[F01,F41,F81-OS3.4]
	[F01,F41,F81-OP1.1]
	[F40,F43,F81-OH1.1]
<b>9.22.9.1. Clearance to the Fireplace Opening</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.22.9.2. Metal Exposed to the Interior</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.22.9.3. Clearance to Combustible Framing</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.22.9.4. Heat Circulating Duct Openings</b>	
(1)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
<b>9.22.10.1. Appliance Standard</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OH1.1]
	[F44-OS3.4]
<b>9.22.10.2. Installation</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OH1.1]
	[F44-OS3.4]
<b>9.23.2.1. Strength and Rigidity</b>	
(1)	[F20-OP2.1] [F20,F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.2.2. Protection from Decay</b>	
(1)	[F80-OP2.3,OP2.4]
	[F80-OS2.3]
	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance. [F80-OS3.1] Applies to floors and elements that support floors. [F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F81-OP2.3]
	[F81-OS2.3]
	[F81-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F81-OH4] Applies to floors and elements that support floors.
	[F81-OS1.2] Applies to assemblies required to provide fire resistance.
	[F81-OS3.1] Applies to floors and elements that support floors.
<b>9.23.2.3. Protection from Dampness</b>	
(1)	[F80-OP2.1,OP2.3,OP2.4]
	[F80-OS2.1,OS2.3]
	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS3.1] Applies to floors and elements that support floors.
<b>9.23.3.1. Standards for Nails and Screws</b>	
(1)	[F20-OP2.1]
	[F20,F22-OP2.4,OP2.5]
	[F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1]
	[F20,F22-OS2.5]
	[F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20-OP2.1,OP2.5]
	[F22-OP2.4,OP2.5]
	[F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
(2)	[F20-OS2.1]
	[F20,F22-OS2.5]
	[F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors.
[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.	

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.3.2. Length of Nails</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.3.3. Prevention of Splitting</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1,OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS3.1] Applies to floors and elements that support floors.
<b>9.23.3.4. Nailing of Framing</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.3.5. Fasteners for Sheathing or Subflooring</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(3)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1] [F20,F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(4)	<p>[F20-OP2.1] [F22-OP2.4]</p> <p>[F20,F22-OS2.1]</p> <p>[F20-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors.</p>

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.4.2. Spans for Joists, Rafters and Beams</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1,OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5]
(4)	[F20-OP2.1,OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5]
(5)	[F81-OS2.3]
	[F81-OP2.3]
<b>9.23.4.3. Steel Beams</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.4.4. Concrete Topping</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to elements that support walls that contain doors or windows required for emergency egress.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.4.5. Heavy Roofing Materials</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.5.1. Holes Drilled in Framing Members</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.5.2. Notching of Framing Members</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.5.3. Wall Studs</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.5.4. Top Plates</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.5.5. Roof Trusses</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.6.1. Anchorage of Building Frames</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
	[F22-OH4] Applies to floors and elements that support floors.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS3.1] Applies to floors and elements that support floors.
	[F22-OH4] Applies to floors and elements that support floors.
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
	[F22-OH4] Applies to floors and elements that support floors.
<b>9.23.6.2. Anchorage of Columns and Posts</b>	
(1)	[F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4,OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4,OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OP2.4,OP2.5] [F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS2.4,OS2.5] [F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.1] Applies to floors and elements that support floors.
<b>9.23.6.3. Anchorage of Smaller Buildings</b>	
(1)	[F22-OS2.3,OS2.5]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.7.1. Size of Sill Plates</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.7.2. Levelling and Sealing of Sill Plates</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.4,OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
<b>9.23.8.1. Bearing for Beams</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.8.2. Priming of Steel Beams</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F80-OH4] Applies to floors and elements that support floors.
	[F80-OP2.1,OP2.4] [F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F80-OS2.1] [F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F80-OS3.1] Applies to floors and elements that support floors.
<b>9.23.8.3. Built-up Wood Beams</b>	
(1)	[F20-OP2.1]
	[F20-OS2.1]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1]
	[F20-OS2.1]
(3)	[F20-OP2.1]
	[F20-OS2.1]
(4)	[F20-OP2.1]
	[F20-OS2.1]
(5)	[F20-OP2.1]
	[F20-OS2.1]
(6)	[F20-OP2.1]
	[F20-OS2.1]
(7)	[F20-OP2.1]
	[F20-OS2.1]
(8)	[F20-OP2.1]
	[F20-OS2.1]
<b>9.23.9.1. End Bearing for Joists</b>	
(1)	[F22-OH4]
	[F22-OS3.1]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F22-OH4]
	[F22-OS3.1]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.9.2. Joists Supported by Beams</b>	
(1)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(3)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(4)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.9.3. Restraint of Joist Bottoms</b>	
(1)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.9.4. Strapping, Bridging, Furring and Ceilings in Tables A-1 and A-2</b>	
(1)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(6)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.9.5. Header Joists</b>	
(1)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.9.6. Trimmer Joists</b>	
(1)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.9.7. Support of Tail and Header Joists</b>	
(1)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.9.8. Support of Walls</b>	
(1)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(4)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(5)	<p>[F22-OH4]</p> <p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.9.9. Cantilevered Floor Joists</b>	
(1)	[F22-OH4]
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	(2)
[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.	
[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.	
[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.	
(3)	
	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	<b>9.23.10.1. Stud Size and Spacing</b>
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.10.2. Bracing and Lateral Support</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5] [F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.4,OS2.5] [F20,F22-OH1.1,OH1.2,OH1.3] [F20,F22-OH4] Applies to walls that support floors. [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance. [F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5] [F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.4,OS2.5] [F20,F22-OH1.1,OH1.2,OH1.3] [F20,F22-OH4] Applies to walls that support floors. [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance. [F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5] [F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.4,OS2.5] [F20,F22-OH1.1,OH1.2,OH1.3] [F20,F22-OH4] Applies to walls that support floors. [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance. [F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5] [F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.4,OS2.5] [F20,F22-OH1.1,OH1.2,OH1.3] [F20,F22-OH4] Applies to walls that support floors. [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance. [F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to walls that support or are part of an environmental separator. [F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to walls that support or are part of an environmental separator. [F20,F22-OH1.1,OH1.2,OH1.3] Applies to walls that support or are part of an environmental separator. [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance. [F22-OH4] Applies to walls that support floors. [F22-OS3.1] Applies to walls that support floors. [F22-OS3.7] Applies to walls that contain doors or windows required for emergency egress.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.10.3. Orientation of Studs</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(3)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
<b>9.23.10.4. Continuity of Studs</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
<b>9.23.10.5. Support for Cladding, Sheathing and Finishing Materials</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.10.6. Studs at Sides of Openings</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors. [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	(b) [F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	(b) [F20,F22-OH4] Applies to floors and elements that support floors.
	(b) [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	(b) [F20,F22-OS3.1] Applies to floors and elements that support floors.
	(b) [F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20-OP2.1] (b) [F20-OP2.5] (b) [F22-OP2.4,OP2.5] (b) [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1] (b) [F20,F22-OS2.5] (b) [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	(b) [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.11.1. Size of Wall Plates</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
<b>9.23.11.2. Bottom Wall Plates</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]</p> <p>[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3]</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.11.3. Top Plates</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(3)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(4)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.11.4. Joints in Top Plates</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(3)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(4)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>

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**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.12.1. Openings in Non-Loadbearing Walls</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	[F20,F22-OS1.2]
<b>9.23.12.2. Openings in Loadbearing Walls</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
(2)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>
<b>9.23.12.3. Lintel Spans and Sizes</b>	
(1)	<p>[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.</p> <p>[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.</p> <p>[F22-OH4] Applies to floors and elements that support floors.</p> <p>[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.</p>

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1,OP2.5] [F22-OP2.4,OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.13.1. Continuity of Rafters and Joists</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.13.2. Framing around Openings</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.13.3. End Bearing Length</b>	
(1)	[F20-OP2.1,OP2.5] [F22-OP2.5] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.5] [F22-OS2.5] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.13.4. Location and Attachment of Rafters</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(3)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.13.5. Shaping of Rafters</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.13.6. Hip and Valley Rafters</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
<b>9.23.13.7. Intermediate Support for Rafters and Joists</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
(4)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(6)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F22-OH4]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.13.8. Ridge Support</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(3)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(4)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(5)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(6)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(7)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.13.9. Restraint of Joist Bottoms</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.13.10. Ceiling Joists Supporting Roof Load</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.13.11. Roof Trusses</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	(b) [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	(b) [F20,F22-OH1.1,OH1.2,OH1.3]
(3)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
(4)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
(5)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(6)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.14.1. Subflooring Required</b>	
(1)	[F20-OS2.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.14.2. Material Standards</b>	
(1)	[F20-OS2.1]
	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(2)	[F80-OH4]
	[F80-OP2.4]
	[F80-OS2.1]
	[F80-OS3.1]
(3)	[F20-OS2.1]
	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(4)	[F80-OH1.1]
	[F80-OH4]
	[F80-OP2.4]
	[F80-OS3.1]
(5)	[F81-OS2.3]
	[F81-OP2.3]
<b>9.23.14.3. Edge Support</b>	
(1)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
<b>9.23.14.4. Direction of Installation</b>	
(1)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(2)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
<b>9.23.14.5. Subfloor Thickness or Rating</b>	
(1)	[F20-OS2.1]
	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(2)	[F20-OS2.1]
	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OS2.1]
	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
<b>9.23.14.6. Annular Grooved Nails</b>	
(1)	[F81-OH1.1]
	[F81-OP2.3]
	[F81-OS2.3]
<b>9.23.14.7. Lumber Subflooring</b>	
(1)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(2)	[F22-OH4]
	[F22-OP2.4]
	[F22-OS3.1]
(3)	[F22-OP2.4]
	[F22-OS3.1]
<b>9.23.15.1. Required Roof Sheathing</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.4,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
<b>9.23.15.2. Material Standards</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F81-OS2.3]
	[F81-OP2.3]
<b>9.23.15.3. Direction of Installation</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(2)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.15.4. Joints in Panel-Type Sheathing</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.15.5. Lumber Roof Sheathing</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.15.6. Edge Support</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.23.15.7. Thickness or Rating</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F22-OH4]
	[F22-OS3.1]
(2)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
(3)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
(4)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
<b>9.23.16.1. Required Sheathing</b>	
(1)	[F20-OP2.1,OP2.3,OP2.5] [F22-OP2.3,OP2.4,OP2.5]
	[F20-OS2.1,OS2.3,OS2.5] [F22-OS2.3,OS2.5]
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.23.16.2. Thickness, Rating and Material Standards</b>	
(1)	[F20–OP2.1,OP2.3,OP2.5] [F22–OP2.3,OP2.4,OP2.5]
	[F20–OS2.1,OS2.3,OS2.5] [F22–OS2.3,OS2.5]
	[F20,F22–OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F81–OS2.3]
	[F81–OP2.3]
<b>9.23.16.4. Lumber Sheathing</b>	
(1)	[F20–OP2.1,OP2.3,OP2.5] [F22–OP2.3,OP2.4,OP2.5]
	[F20–OS2.1,OS2.3,OS2.5] [F22–OS2.3,OS2.5]
	[F20,F22–OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS3.1] Applies to floors and elements that support floors.
(2)	[F20–OP2.1,OP2.3,OP2.5] [F22–OP2.3,OP2.4,OP2.5]
	[F20–OS2.1,OS2.3,OS2.5] [F22–OS2.3,OS2.5]
	[F20,F22–OH1.1,OH1.2,OH1.3]
	[F20,F22-OH4] Applies to floors and elements that support floors.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.1] Applies to floors and elements that support floors. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.23.16.5. Joints in Panel-Type Sheathing</b>	
(1)	[F80,F81–OH1.1,OH1.2,OH1.3]
	[F80,F81–OP2.3,OP2.4]
	[F80,F81–OS2.3]
	[F80,F81-OH4] Applies to floors and elements that support floors.
	[F80,F81-OS3.1] Applies to floors and elements that support floors.
<b>9.24.1.2. Material Standards</b>	
(1)	[F20,F22,F80–OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.4] [F22,F80-OP2.4] [F20,F22,F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22,F80-OS2.4] [F20,F22,F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.24.1.4. Screws</b>	
(1)	[F20,F22,F80-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.4] [F22,F80-OP2.4] [F20,F22,F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22,F80-OS2.1] [F20,F22,F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.24.1.5. Cladding, Sheathing and Interior Finish Required</b>	
(1)	[F20,F22,F80-OH1.1,OH1.2,OH1.3]
	[F20,F22,F80-OP2.1,OP2.4] [F20,F22,F80-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22,F80-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22,F80-OS2.1] [F20,F22,F80-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.24.2.1. Size and Spacing of Studs in Interior Walls</b>	
(1)	[F20-OP2.1,OP2.4] [F22-OP2.4]
	[F20-OS2.1,OS2.4] [F22-OS2.4]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.24.2.2. Thickness of Studs</b>	
(1)	[F20-OP2.1,OP2.4] [F22-OP2.4]
	[F20-OS2.1,OS2.4] [F22-OS2.4]
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.24.2.3. Runners</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
<b>9.24.2.4. Openings in Fire Separations</b>	
(1)	[F20-OS1.2]
(2)	[F20-OS1.2]
(3)	[F20-OS1.2]
(4)	[F20-OS1.2]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.24.2.5. Size and Spacing of Studs in Exterior Walls</b>	
(1)	[F20–OP2.1,OP2.3,OP2.4] [F22–OP2.3,OP2.4]
	[F20–OS2.1,OS2.3,OS2.4] [F22–OS2.3,OS2.4]
	[F20,F22–OH1.1,OH1.2,OH1.3]
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.24.3.1. Installation of Runners</b>	
(1)	[F20,F22–OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22,F80-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	(2)
[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.	
[F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.	
[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.	
(3)	
	[F20,F22-OP2.1,OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20,F22-OS2.1,OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	(4)
[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.	
[F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.	
[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.	
[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.	
<b>9.24.3.2. Fire-Rated Walls</b>	
(1)	[F21–OS1.2]
(2)	[F21–OS1.2]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OS1.2]
(4)	[F20-OS1.2]
(5)	[F03-OS1.2]
<b>9.24.3.3. Orientation of Studs</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.24.3.4. Support for Cladding Materials</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.4] [F20-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS1.2] Applies to assemblies required to provide fire resistance.
	[F20-OS2.1,OS2.4] [F20-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
<b>9.24.3.5. Framing around Openings</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
	[F20,F22-OH1.1,OH1.2,OH1.3]
(2)	[F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator.
	[F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator.
	[F20,F22-OS1.2] Applies to assemblies required to provide fire resistance.
	[F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.24.3.6. Attachment of Studs to Runners</b>	
(1)	[F20,F22–OH1.1,OH1.2,OH1.3] [F20-OP2.1,OP2.4] [F22-OP2.4] [F20,F22-OP2.3] Applies to elements that support or are part of an environmental separator. [F20-OS2.1,OS2.4] [F22-OS2.4] [F20,F22-OS2.3] Applies to elements that support or are part of an environmental separator. [F20,F22-OS1.2] Applies to assemblies required to provide fire resistance. [F22-OS3.7] Applies to walls, and elements that support walls, that contain doors or windows required for emergency egress.
(2)	[F21–OS1.2]
<b>9.24.3.7. Openings for Fire Dampers</b>	
(1)	[F20–OS1.2]
(2)	[F20–OS1.2]
(3)	[F03–OS1.2]
<b>9.25.1.2. General</b>	
(2)	[F62,F63–OH1.1,OH1.2]
	[F62,F63–OS2.3]
<b>9.25.2.1. Thermal Insulation Requirements</b>	
(1)	[F51–OH1.2]
	[F63–OH1.3]
	[F63–OS2.3]
	[F63–OP2.3]
	[F120,F121–OE1]
<b>9.25.2.2. Insulation Materials</b>	
(1)	[F51,F63,F80–OH1.1,OH1.2]
	[F63,F80–OS2.3]
(3)	[F51,F63–OH1.1,OH1.2]
	[F63–OS2.3]
<b>9.25.2.3. Installation of Thermal Insulation</b>	
(1)	[F51,F63–OH1.1,OH1.2]
	[F63–OS2.3]
(2)	[F51,F63–OH1.1,OH1.2]
	[F63–OS2.3]
(3)	[F55–OH1.1,OH1.2]
	[F55–OS2.3]
(4)	[F51,F63,F80–OH1.1,OH1.2]
	[F63,F80–OS2.3]
(5)	[F21–OH1.1,OH1.2,OH1.3]
	[F21–OS2.2,OS2.3]
(6)	[F80–OH1.1,OH1.2]
	[F80–OS2.3]



Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(7)	[F80-OH1.1,OH1.2]
	[F80-OS2.3]
(8)	[F21-OH1.1,OH1.2]
	[F21-OS2.3]
(9)	[F01-OS1.1]
	[F01-OP1.1]
(10)	[F01-OS1.1]
	[F01-OP1.1]
<b>9.25.2.4. Installation of Loose-Fill Insulation</b>	
(1)	[F51,F63-OH1.1,OH1.2]
	[F63-OS2.3]
(2)	[F51-OH1.1,OH1.2,OH1.3]
	[F51-OS2.3]
(4)	(a) [F21,F51-OH1.1,OH1.2]
	(a) [F21,F51-OS2.3]
	(c) [F81-OH1.1,OH1.2]
	(c) [F81-OH1.1,OH1.2,OH1.3] Applies where the interior finish provides the required bracing.
	(c) [F81-OH4] Applies where the interior finish provides the required bracing of walls that support floors.
	(c) [F81-OP2.1,OP2.3,OP2.4,OP2.5] Applies where the interior finish provides to the required bracing.
	(c) [F81-OP3.1] Applies where the interior finish contributes to the required fire resistance of the wall.
	(c) [F81-OS2.1,OS2.3]
	(c) [F81-OS2.1,OS2.3,OS2.4,OS2.5] Applies where the interior finish provides the required bracing.
	(c) [F81-OS3.7] Applies where the interior finish provides the required bracing. (c) [F81-OS3.1] Applies where the interior finish provides the required bracing of walls that support floors.
(5)	[F51,F63-OH1.1,OH1.2]
	[F63-OS2.3]
(6)	(a) [F51,F62-OH1.1,OH1.2,OH1.3] (b) [F51,F63-OH1.1,OH1.2]
	(a) [F62,F51-OS2.3] (b) [F51,F63-OS2.3]
<b>9.25.2.5. Installation of Spray-Applied Polyurethane</b>	
(1)	[F51,F41,F63-OH1.1] [F51,F63-OH1.2]
	[F63-OS2.3]
<b>9.25.3.1. Required Barrier to Air Leakage</b>	
(1)	[F55-OH1.1,OH1.2,OH1.3]
	[F55-OS2.3]
	[F44-OS1.1] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
	[F44-OS3.4] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
(2)	[F63-OH1.1,OH1.2]
	[F63-OS2.3]
	[F63-OP2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.25.3.2. Air Barrier System Properties</b>	
(1)	[F20,F55–OH1.1,OH1.2,OH1.3]
	[F20,F55–OS2.3]
	[F20,F44-OS1.1] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
	[F20,F44-OS3.4] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
(2)	[F20,F80,F55–OH1.1,OH1.2,OH1.3]
	[F20,F80,F55–OS2.3]
	[F20,F80,F44-OS1.1] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
	[F20,F80,F44-OS3.4] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
<b>9.25.3.3. Continuity of the Air Barrier System</b>	
(1)	[F55–OH1.1,OH1.2,OH1.3]
	[F55–OS2.3]
	[F44-OS1.1] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
	[F44-OS3.4] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
(2)	[F55–OH1.1,OH1.2,OH1.3]
	[F55–OS2.3]
	(a) [F44-OS1.1] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
	(a) [F44-OS3.4] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
(6)	[F55–OH1.1,OH1.2,OH1.3]
	[F55–OS2.3]
	[F44-OS1.1] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
	[F44-OS3.4] Applies where the <i>air barrier system</i> separates a garage, or <i>suite</i> containing a garage, from residential space.
(7)	[F55–OH1.1,OH1.2,OH1.3]
	[F55–OS2.3]
(8)	[F01–OS1.1]
<b>9.25.4.1. Required Barrier to Vapour Diffusion</b>	
(1)	[F63–OH1.1,OH1.2]
	[F63–OS2.3]
<b>9.25.4.2. Vapour Barrier Materials</b>	
(1)	[F63–OH1.1,OH1.2]
	[F63–OS2.3]
(4)	[F63,F80–OH1.1,OH1.2]
	[F63,F80–OS2.3]
(5)	[F63,F80–OH1.1,OH1.2]
	[F63,F80–OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(6)	[F63-OH1.1,OH1.2] [F63-OS2.3]
<b>9.25.4.3. Installation of Vapour Barriers</b>	
(1)	[F63-OH1.1,OH1.2] [F63-OS2.3]
(2)	[F63-OH1.1,OH1.2] [F63-OS2.3]
<b>9.26.1.1. Purpose of Roofing</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3] [F61-OS2.3]
<b>9.26.1.2. Alternate Installation Methods</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3] [F61-OS2.3]
<b>9.26.2.1. Material Standards</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3] [F61-OS2.3]
<b>9.26.2.2. Nails</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] [F20,F80-OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3] [F20-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3] [F20-OS2.3]
(4)	[F20,F80-OH1.1,OH1.2,OH1.3] [F20,F80-OS2.3]
<b>9.26.2.3. Staples</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3] [F20,F80-OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3] [F20-OS2.3]
(3)	[F20,F80-OH1.1,OH1.2,OH1.3] [F20,F80-OS2.3]
<b>9.26.3.1. Slope</b>	
(1)	[F20-OS2.1,OS2.3] [F61,F80-OS2.3] [F20,F61,F80-OH1.1,OH1.2,OH1.3]
(2)	[F20,F61,F80-OH1.1,OH1.2,OH1.3] [F20,F61,F80-OS2.3]
(3)	[F61,F80-OH1.1,OH1.2,OH1.3] [F61,F80-OS2.3]
(4)	[F61,F80-OH1.1,OH1.2,OH1.3] [F61,F80-OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OS2.3]
<b>9.26.4.1. Required Flashing at Intersections</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.4.2. Materials</b>	
(1)	[F61,F62,F80-OH1.1,OH1.2,OH1.3]
	[F61,F62,F80-OS2.3]
<b>9.26.4.3. Valley Flashing</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(4)	[F20,F61,F80-OH1.1,OH1.2,OH1.3]
	[F20,F61,F80-OS2.3]
(5)	[F20,F61,F80-OH1.1,OH1.2,OH1.3]
	[F20,F61,F80-OS2.3]
(6)	[F20,F61,F80-OH1.1,OH1.2,OH1.3]
	[F20,F61,F80-OS2.3]
<b>9.26.4.4. Intersection of Shingle Roofs and Masonry</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OP1.1] Applies where a shingle roof intersects with a masonry <i>chimney</i> .
	[F61-OS1.1] Applies where a shingle roof intersects with a masonry <i>chimney</i> .
	[F61-OS3.4] Applies where a shingle roof intersects with a masonry <i>chimney</i> .
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OP1.1] Applies where counter flashing is installed between a shingle roof and a masonry <i>chimney</i> .
	[F61-OS1.1] Applies where counter flashing is installed between a shingle roof and a masonry <i>chimney</i> .
	[F61-OS3.4] Applies where counter flashing is installed between a shingle roof and a masonry <i>chimney</i> .
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OP1.1] Applies where flashing is installed between a shingle roof and a masonry <i>chimney</i> .
	[F61-OS1.1] Applies where flashing is installed between a shingle roof and a masonry <i>chimney</i> .
	[F61-OS3.4] Applies where flashing is installed between a shingle roof and a masonry <i>chimney</i> .
(4)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OP1.1] Applies where a shingle roof slopes upward from a masonry <i>chimney</i> .
	[F61-OS1.1] Applies where a shingle roof slopes upward from a masonry <i>chimney</i> .
	[F61-OS3.4] Applies where a shingle roof slopes upward from a masonry <i>chimney</i> .

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.26.4.5. Intersection of Shingle Roofs and Walls other than Masonry</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.4.6. Intersection of Built-Up Roofs and Masonry</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OP1.1] Applies where a built-up roof intersects with a masonry <i>chimney</i> .
	[F61-OS1.1] Applies where a built-up roof intersects with a masonry <i>chimney</i> .
	[F61-OS3.4] Applies where a built-up roof intersects with a masonry <i>chimney</i> .
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OP1.1] Applies where counter flashing is installed between a built-up roof and a masonry <i>chimney</i> .
	[F61-OS1.1] Applies where counter flashing is installed between a built-up roof and a masonry <i>chimney</i> .
	[F61-OS3.4] Applies where counter flashing is installed between a built-up roof and a masonry <i>chimney</i> .
<b>9.26.4.7. Intersection of Built-Up Roofs and Walls other than Masonry</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.4.8. Chimney Saddles</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP1.1]
	[F61-OS1.1]
	[F61-OS2.3]
	[F61-OS3.4]
(2)	[F20,F81-OH1.1,OH1.2,OH1.3]
	[F20,F81-OP1.1]
	[F20,F81-OS1.1]
	[F20,F81-OS2.3]
	[F20,F81-OS3.4]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OP1.1]
	[F61-OS1.1]
	[F61-OS2.3]
	[F61-OS3.4]
<b>9.26.4.9. Roof Penetrations</b>	
(1)	[F61,F80-OS2.3]
	[F61,F80-OP2.3]
	[F61,F80-OH1.3]
	[F54-OH1.2]
(2)	[F61,F80-OS2.3]
	[F61,F80-OP2.3]
	[F61,F80-OH1.3]
	[F54-OH1.2]
(3)	[F61,F80-OS2.3]
	[F61,F80-OP2.3]
	[F61,F80-OH1.3]
	[F54-OH1.2]
(4)	[F61,F80-OS2.3]
	[F61,F80-OP2.3]
	[F61,F80-OH1.3]
<b>9.26.5.1. Required Eave Protection</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.5.2. Materials</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.6.1. Materials</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F62-OH1.1,OH1.2,OH1.3]
	[F62-OS2.3]
<b>9.26.6.2. Installation</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.7.1. Coverage</b>	
(1)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.1]



Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.26.7.2. Starter Strip</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.7.3. Head Lap</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.7.4. Fasteners</b>	
(1)	[F20,F61-OH1.1,OH1.2,OH1.3]
	[F20,F61-OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(5)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
<b>9.26.7.5. Securing of Tabs</b>	
(1)	[F20,F61-OH1.1,OH1.2,OH1.3]
	[F20,F61-OS2.3]
<b>9.26.7.6. Hips and Ridges</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
<b>9.26.8.1. Coverage</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.8.2. Starter Strip</b>	
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.8.3. Securing of Tabs</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.8.4. Securing of Shingle Courses</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3/R]
	[F61-OS2.3]
<b>9.26.8.5. Hips and Ridges</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
<b>9.26.9.2. Grade</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.9.3. Size</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.9.4. Spacing and Joints</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.9.5. Fastening</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]
<b>9.26.9.6. Exposure</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.10.1. Size and Thickness</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.10.2. Underlay</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.10.3. Spacing and Joints</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.10.4. Fastening</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.26.10.5. Exposure</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.10.8. Grade</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.11.1. Quantity of Materials</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.11.2. Coal-Tar and Asphalt Products</b>	
(1)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
<b>9.26.11.3. Roof Felts</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
<b>9.26.11.4. Aggregate Surfacing</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.11.6. Number of Layers</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]
<b>9.26.11.7. Installation of Layers</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(2)	[F61,F81-OH1.1,OH1.2,OH1.3]
	[F61,F81-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
<b>9.26.11.8. Roofing over Wood-Based Sheathing</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.11.9. Attachment to Decking</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.11.10. Cant Strips</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OS3.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
	[F61-OS3.1]
(5)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(6)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.12.1. Coverage</b>	
(1)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
<b>9.26.12.2. Joints</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.13.1. Thickness</b>	
(1)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
<b>9.26.13.2. Support</b>	
(1)	[F20-OP2.1,OP2.3] [F22-OP2.3,OP2.4]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
<b>9.26.14.1. Support</b>	
(1)	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4]
	[F20,F22-OH1.1,OH1.2,OH1.3]
<b>9.26.15.1. Installation</b>	
(1)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
<b>9.26.16.1. Installation</b>	
(1)	[F61,F80-OH1.1,OH1.2,OH1.3]
	[F61,F80-OS2.3]
<b>9.26.17.1. Installation</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.26.18.2. Downspouts</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.27.2.1. Minimizing and Preventing Ingress and Damage</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F80,F81–OH1.1,OH1.2,OH1.3] [F80,F81–OS2.3]
<b>9.27.2.2. Minimum Protection from Precipitation Ingress</b>	
(3)	[F62–OH1.1,OH1.2,OH1.3] [F62–OS2.3]
(4)	[F61,F62–OH1.1,OH1.2,OH1.3] [F61,F62–OS2.3]
(5)	[F61,F62–OH1.1,OH1.2,OH1.3] [F61,F62–OS2.3]
<b>9.27.2.3. First and Second Planes of Protection</b>	
(1)	[F61,F62–OH1.1,OH1.2,OH1.3] [F61,F62–OS2.3]
<b>9.27.2.4. Protection of Cladding from Moisture</b>	
(1)	[F61,F80–OH1.1,OH1.2,OH1.3] [F61,F80–OS2.3]
(2)	[F61–OH1.1,OH1.2,OH1.3] [F61,F80–OS2.3]
<b>9.27.3.1. Elements of the Second Plane of Protection</b>	
(1)	[F61,F62–OH1.1,OH1.2,OH1.3] [F61,F62–OS2.3]
(3)	[F61,F62–OH1.1,OH1.2,OH1.3] [F61,F62–OS2.3]
<b>9.27.3.2. Sheathing Membrane Material Standard</b>	
(1)	[F20,F61,F62,F55–OH1.1,OH1.2,OH1.3] [F20,F61,F62,F55–OS2.3]
<b>9.27.3.3. Required Sheathing Membrane and Installation</b>	
(1)	[F61,F55–OH1.1,OH1.2,OH1.3] [F61,F55–OS2.3]
(2)	[F61,F55–OH1.1,OH1.2,OH1.3] [F61,F55–OS2.3]
(3)	[F61–OH1.1,OH1.2,OH1.3] [F61–OS2.3]
<b>9.27.3.4. Insulating Sheathing in Lieu of Sheathing Membrane</b>	
(2)	[F61,F55–OH1.1,OH1.2,OH1.3] [F61,F55–OS2.3]
<b>9.27.3.5. Sheathing Membranes in Lieu of Sheathing</b>	
(1)	[F61,F55–OH1.1,OH1.2,OH1.3] [F61,F55–OS2.3]
(2)	[F61,F55–OH1.1,OH1.2,OH1.3] [F61,F55–OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.27.3.6. Face Sealed Cladding</b>	
(2)	[F20,F61,F55–OH1.1,OH1.2,OH1.3]
	[F20,F61,F55–OS2.3]
(3)	[F61,F55–OH1.1,OH1.2,OH1.3]
	[F61,F55–OS2.3]
<b>9.27.3.7. Flashing Materials</b>	
(1)	[F61,F62,F80–OH1.1,OH1.2,OH1.3]
	[F61,F62,F80–OS2.3]
<b>9.27.3.8. Flashing Installation</b>	
(1)	(a),(b),(c)(i) [F61–OH1.1,OH1.2,OH1.3]
	(a),(b),(c)(i) [F61–OS2.3]
	(c)(ii) [F61,F62–OH1.1,OH1.2,OH1.3]
	(c)(ii) [F61,F62–OS2.3]
(2)	(a),(b)(ii),(c)(i) [F61–OH1.1,OH1.2,OH1.3] Applies to detailing of horizontal joints.
	(a),(b)(ii),(c)(i) [F61–OS2.3] Applies to detailing of horizontal joints.
	(b)(i),(c)(ii) [F61,F62–OH1.1,OH1.2,OH1.3] Applies to cladding installed outboard of a drained and vented air space.
	(b)(i),(c)(ii) [F61,F62–OS2.3] Applies to cladding installed outboard of a drained and vented air space.
(3)	[F61,F62–OH1.1,OH1.2,OH1.3]
	[F61,F62–OS2.3]
(4)	[F61,F62–OH1.1,OH1.2,OH1.3]
	[F61,F62–OS2.3]
(5)	[F61,F62–OH1.1,OH1.2,OH1.3]
	[F61,F62–OS2.3]
(6)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
<b>9.27.4.1. Required Caulking</b>	
(1)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
(2)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
(3)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
<b>9.27.4.2. Materials</b>	
(1)	[F80–OH1.1,OH1.2,OH1.3]
	[F80–OS2.3]
(2)	[F80–OH1.1,OH1.2,OH1.3]
	[F80–OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.27.5.1. Attachment</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] [F20,F22-OH1.1,OH1.2,OH1.3] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22-OH4] Applies where panel-type cladding is installed to provide the required bracing of walls that support floors.
	[F20,F22-OS3.1] Applies where panel-type cladding is installed to provide the required bracing of walls that support floors. [F20,F22-OS3.7] Applies where panel-type cladding is installed to provide required bracing of walls that contain doors or windows required for emergency egress.
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3]
(5)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3]
(6)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3]
(7)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3]
<b>9.27.5.2. Blocking</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] [F20,F22-OH1.1,OH1.2,OH1.3] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.5.3. Furring</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
(2)	[F20-OH1.1,OH1.2,OH1.3] [F20,F22-OH1.1,OH1.2,OH1.3] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OH1.1,OH1.2,OH1.3] [F20,F22-OH1.1,OH1.2,OH1.3] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where furring is used for the attachment of panel-type cladding installed to provide the required bracing.
<b>9.27.5.4. Size and Spacing of Fasteners</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] [F20,F22-OH1.1,OH1.2,OH1.3] Applies to the attachment of panel-type cladding installed to provide the required bracing.
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.5.5. Fastener Materials</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OP2.1,OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F80-OS2.3] [F80-OS2.3,OS2.4] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.5.6. Expansion and Contraction</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OS2.3]
<b>9.27.5.7. Penetration of Fasteners</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3] [F20,F22-OH1.1,OH1.2,OH1.3] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.6.1. Materials</b>	
(1)	[F61,F20-OH1.1,OH1.2,OH1.3]
	[F62,F20-OS2.3]
<b>9.27.6.2. Thickness and Width</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
<b>9.27.6.3. Joints</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F21,F61-OH1.1,OH1.2,OH1.3]
	[F21,F61-OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.27.7.1. Materials</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61,F20-OH1.1,OH1.2,OH1.3]
	[F61,F20-OS2.3]
(3)	[F61,F20-OH1.1,OH1.2,OH1.3]
	[F61,F20-OS2.3]
<b>9.27.7.2. Width</b>	
(1)	[F61,F20-OH1.1,OH1.2,OH1.3]
	[F61,F20-OS2.3]
<b>9.27.7.3. Fasteners</b>	
(1)	[F61,F20-OH1.1,OH1.2,OH1.3]
	[F61,F20-OS2.3]
<b>9.27.7.4. Offsetting of Joints</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.27.7.5. Fastening to Lath</b>	
(1)	[F81-OH1.1,OH1.2,OH1.3]
	[F81-OS2.3]
(2)	[F62-OH1.1,OH1.2,OH1.3]
	[F62-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(5)	[F62-OH1.1,OH1.2,OH1.3]
	[F62-OS2.3]
<b>9.27.7.6. Exposure and Thickness</b>	
(1)	[F62,F20-OH1.1,OH1.2,OH1.3]
	[F62,F20-OS2.3]
<b>9.27.8.1. Material Standards</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.27.8.2. Weight and Thickness</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.27.8.3. Fastening of Shingles</b>	
(1)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OS2.3]
<b>9.27.8.4. Joints of Shingles</b>	
(1)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
(2)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
(3)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
<b>9.27.8.5. Joints in Panels</b>	
(1)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
(2)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OS2.3]
<b>9.27.9.1. Material Standards</b>	
(1)	[F20–OP2.1,OP2.3,OP2.4] [F22–OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20–OS2.1,OS2.3] [F20–OS2.1,OS2.3,OS2.4] [F22–OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22–OH1.1,OH1.2,OH1.3]
<b>9.27.9.2. Thickness</b>	
(1)	[F20,F22–OH1.1,OH1.2,OH1.3]
	[F20,F22–OS2.1,OS2.3] [F20–OS2.1,OS2.3,OS2.4] [F22–OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F20–OP2.1,OP2.3] [F22–OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20–OS2.1,OS2.3] [F20–OS2.1,OS2.3,OS2.4] [F22–OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22–OH1.1,OH1.2,OH1.3]
<b>9.27.9.3. Edge Treatment</b>	
(1)	[F61–OH1.1,OH1.2,OH1.3]
	[F61–OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F61–OS2.3] [F61–OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.9.4. Panel Cladding</b>	
(1)	[F20,F22–OH1.1,OH1.2,OH1.3]
	[F20–OP2.1,OP2.3,OP2.4] [F22–OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22–OS2.1,OS2.3] [F20–OS2.1,OS2.3,OS2.4] [F22–OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(4)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.27.9.5. Lapped Strip Siding</b>	
(1)	[F21,F61-OH1.1,OH1.2,OH1.3]
	[F21,F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.27.10.1. Material Standards</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.10.2. Thickness</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(3)	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.10.3. Panel Cladding</b>	
(1)	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F21,F22-OH1.1,OH1.2,OH1.3]
	[F20,F21,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.27.10.4. Lapped Strip Siding</b>	
(1)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
(2)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]
<b>9.27.10.5. Clearance</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OP2.1,OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F21-OS2.1,OS2.3] [F21-OS2.1,OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.11.1. Material Standard</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.11.2. Thickness</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22-OH1.1,OH1.2,OH1.3] [F20,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(3)	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(4)	[F20-OP2.1,OP2.3,OP2.4] [F22-OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing.
	[F20,F22-OH1.1,OH1.2,OH1.3]
	[F20,F22-OS2.1,OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.11.3. Panel Cladding</b>	
(1)	[F20,F22,F80-OH1.1,OH1.2,OH1.3]
	[F20,F22,F80-OS2.1,OS2.3] [F20,F80-OS2.1,OS2.3,OS2.4] [F22,F80-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(2)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OS2.3]
(3)	[F61-OH1.1,OH1.2,OH1.3]
	[F61-OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F61-OH1.1,OH1.2,OH1.3] [F61-OS2.3]
<b>9.27.11.4. Clearance</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3] [F21-OP2.1,OP2.3,OP2.4,OP2.5] Applies where panel-type cladding is installed to provide the required bracing. [F21-OS2.1,OS2.3] [F21-OS2.1,OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.12.1. Material Standards</b>	
(1)	[F20-OS2.1,OS2.3] [F22,F61,F62-OS2.3] [F20,F22,F61,F62-OH1.1,OH1.2,OH1.3]
(2)	[F20,F22,F61-OH1.1,OH1.2,OH1.3] [F20-OS2.1,OS2.3] [F22,F61-OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
(3)	[F20-OS2.1,OS2.3] [F22,F61-OS2.3] [F20,F22,F61-OH1.1,OH1.2,OH1.3]
(4)	[F20,F22,F61-OH1.1,OH1.2,OH1.3] [F20-OS2.1,OS2.3] [F22,F61-OS2.3] [F20-OS2.1,OS2.3,OS2.4] [F22-OS2.3,OS2.4,OS2.5] Applies where panel-type cladding is installed to provide the required bracing.
<b>9.27.13.1. Material Standard</b>	
(1)	[F62,F61,F20-OH1.1,OH1.2,OH1.3] [F62,F61,F20-OS2.3]
<b>9.28.1.1. Sheathing beneath Stucco</b>	
(1)	[F20,F22-OH1.1,OH1.2,OH1.3] [F20,F22-OS2.3]
<b>9.28.1.2. Lath and Reinforcing</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3] [F20-OS2.3]
(2)	[F20-OH1.1,OH1.2,OH1.3] [F20-OS2.3]
(3)	[F20,F21-OH1.1] [F20,F21-OP1.1] [F20,F21-OS1.1] [F20,F21-OS2.3] [F20,F21-OS3.4]
<b>9.28.1.3. Concrete Masonry Units</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3] [F80-OS2.3] [F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> . [F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> . [F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.28.1.4. Clearance over Ground Level</b>	
(1)	[F80–OH1.1,OH1.2,OH1.3]
	[F80–OS2.3]
<b>9.28.1.5. Flashing and Caulking</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3] Applies to the separation of aluminum flashing from stucco.
	[F80-OS2.3] Applies to the separation of aluminum flashing from stucco.
<b>9.28.2.1. Portland Cement</b>	
(1)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.2.2. Aggregate</b>	
(1)	[F80–OH1.1,OH1.2,OH1.3]
	[F80–OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F20,F80–OH1.1,OH1.2,OH1.3]
	[F20,F80–OS2.3]
	[F20,F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.2.3. Water</b>	
(1)	[F80–OH1.1,OH1.2,OH1.3]
	[F80–OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.3.1. Materials</b>	
(1)	[F80–OH1.1,OH1.2,OH1.3]
	[F80–OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.3.2. Nails and Staples</b>	
(1)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(4)	[F20-OS2.1]
<b>9.28.4.1. Materials</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.4.2. No Sheathing Required</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
<b>9.28.4.3. Stucco Lath Specifications</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.4.4. Self-Furring Devices</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]
	[F20,F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.4.5. Application of Stucco Lath</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
(4)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.4.6. Fastening</b>	
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(3)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(4)	[F20-OS2.1]
<b>9.28.5.1. Mixes</b>	
(1)	[F20,F61,F80-OH1.1,OH1.2,OH1.3]
	[F20,F61,F80-OS2.3]
	[F20,F61,F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F61,F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F61,F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.5.2. Pigments</b>	
(1)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]
	[F20,F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.28.5.3. Mixing</b>	
(1)	[F20,F80–OH1.1,OH1.2,OH1.3]
	[F20,F80–OS2.3]
	[F20,F80–OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F20,F80–OH1.1,OH1.2,OH1.3]
	[F20,F80–OS2.3]
	[F20,F80–OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.6.1. Low Temperature Conditions</b>	
(1)	[F20,F80–OH1.1,OH1.2,OH1.3]
	[F20,F80–OS2.3]
	[F20,F80–OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F20,F80–OH1.1,OH1.2,OH1.3]
	[F20,F80–OS2.3]
	[F20,F80–OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.6.2. Number of Coats and Total Thickness</b>	
(1)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OS2.3]
	[F20–OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20–OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20–OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.6.3. First Coat</b>	
(1)	[F20,F80–OH1.1,OH1.2,OH1.3]
	[F20,F80–OS2.3]
	[F20,F80–OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80–OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F20–OH1.1,OH1.2,OH1.3]
	[F20–OS2.3]
	[F20–OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20–OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20–OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.28.6.4. Second Coat</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.6.5. Finish Coat</b>	
(1)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(3)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.28.6.6. Alternative Method</b>	
(1)	[F20-OH1.1,OH1.2,OH1.3]
	[F20-OS2.3]
	[F20-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(2)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .



Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(4)	[F80-OH1.1,OH1.2,OH1.3]
	[F80-OS2.3]
	[F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(5)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]
	[F20,F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
(6)	[F20,F80-OH1.1,OH1.2,OH1.3]
	[F20,F80-OS2.3]
	[F20,F80-OP1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS1.1] Applies where stucco is applied to masonry <i>chimneys</i> .
	[F20,F80-OS3.4] Applies where stucco is applied to masonry <i>chimneys</i> .
<b>9.29.2.1. Where Required</b>	
(1)	[F80,F81-OP2.3,OP2.4]
	[F80,F81-OS2.3]
	[F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F80,F81-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.2.2. Materials</b>	
(1)	[F80-OP2.3,OP2.4]
	[F80-OS2.3]
	[F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
<b>9.29.3.1. Size and Spacing of Furring</b>	
(1)	[F20,F22-OP2.1,OP2.4]
	[F20,F22-OS2.1]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.29.3.2. Fastening</b>	
(1)	[F20–OP2.1,OP2.4]
	[F20–OS2.1]
	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.4.1. Application</b>	
(1)	[F20,F80–OS2.1,OS2.3]
	[F20,F80–OP2.1,OP2.3] [F22,F80–OP2.4]
	[F20,F22,F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.5.1. Application</b>	
(2)	[F20,F80–OS2.1,OS2.3]
	[F20,F80–OP2.1,OP2.3] [F22,F80–OP2.4]
	[F20,F22,F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20,F22,F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
<b>9.29.5.2. Materials</b>	
(1)	[F20,F80–OS2.1,OS2.3]
	[F20,F80–OP2.1,OP2.3] [F22,F80–OP2.4]
	[F20,F22,F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20,F22,F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
<b>9.29.5.3. Maximum Spacing of Supports</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.5.4. Support of Insulation</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.29.5.5. Length of Fasteners</b>	
(1)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.5.6. Nails</b>	
(1)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.5.7. Screws</b>	
(1)	[F20-OP2.1,OP2.4]
	[F20-OS2.1]
	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.5.8. Spacing of Nails</b>	
(1)	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(3)	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs, or where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
(5)	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1,OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
[F20,F22-OH1.1,OH1.2,OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs, or where interior finishes support or serve as required environmental separation elements.	

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(6)	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20,F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1,OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies where interior finishes support or serve as required environmental separation elements.
(7)	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20,F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1,OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs, or where interior finishes support or serve as required environmental separation elements.
<b>9.29.5.9. Spacing of Screws</b>	
(1)	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OH1.1,OH1.2,OH1.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where gypsum board is required to provide the fire resistance and the rating of the assembly is determined according to Table A-9.10.3.1.A. in Appendix A.
	[F20-OP2.1] [F20-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where gypsum board is required to provide the fire resistance and the rating of the assembly is determined according to Table A-9.10.3.1.A. in Appendix A.
	[F20-OS2.1] [F20-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
(4)	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs, or where interior finishes support or serve as required environmental separation elements.
(6)	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,OS3.1,OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements. [F20,F22-OH1.1,OH1.2,OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs, or where interior finishes support or serve as required environmental separation elements.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(7)	[F20-OH4] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20-OP1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OP3.1] Applies where interior finishes are installed to contribute to the required fire resistance of exterior walls.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs. [F20,F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS3.1,OS3.7] Applies where walls support floors and where interior finishes contribute to the required bracing or lateral support for studs or where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OH1.1,OH1.2,OH1.3] Applies where interior finishes contribute to the required bracing or lateral support for studs, or where interior finishes support or serve as required environmental separation elements.
<b>9.29.5.10. Low Temperature Conditions</b>	
(1)	[F81-OS1.2] Applies where the finishing of joints is required to maintain required <i>fire-resistance ratings</i> .
<b>9.29.6.1. Thickness</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20,F22-OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.6.2. Grooved Plywood</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20,F22-OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.6.3. Nails and Staples</b>	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F20,F22-OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.29.6.4. Edge Support</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.7.1. Material Standard</b>	
(1)	[F20,F80–OS2.1,OS2.3]
	[F20,F80–OP2.1,OP2.3] [F22,F80–OP2.4]
	[F20,F22,F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20,F22,F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
<b>9.29.7.2. Thickness</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.7.3. Nails</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.7.4. Edge Support</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.8.1. Material Standard</b>	
(1)	[F20,F80–OP2.1,OP2.3]
	[F20,F80–OS2.1,OS2.3]
	[F20,F22,F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20,F22,F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.29.8.2. Thickness</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
(2)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.8.3. Nails</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20–OP2.4]
	[F20-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
(2)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.8.4. Edge Support</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.9.1. Material Standard</b>	
(1)	[F20,F80–OS2.1,OS2.3]
	[F20,F80–OP2.1,OP2.3] [F22,F80–OP2.4]
	[F20,F22,F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20,F22,F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
(2)	[F20,F80–OS2.1,OS2.3]
	[F20,F80–OP2.1,OP2.3] [F22,F80–OP2.4]
	[F20,F22,F80-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20,F22,F80,F81-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.29.9.2. Minimum Thickness</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
(4)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
(5)	[F20-OP2.1]
	[F20-OP2.5] [F22-OP2.4,OP2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OP2.3] Applies where interior finishes support or serve as required environmental separation elements.
	[F20-OS2.1]
	[F20,F22-OS2.4,OS2.5] Applies where interior finishes contribute to the required bracing or lateral support for studs.
	[F20,F22-OS2.3] Applies where interior finishes support or serve as required environmental separation elements.
<b>9.29.9.3. Nails</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.9.4. Edge Support</b>	
(1)	[F20–OS2.1]
	[F20–OP2.1] [F20,F22–OP2.4]
	[F20,F22-OH1.1,OH1.2] Applies where interior finishes support or serve as required environmental separation elements.
	[F20,F22-OS1.2] Applies where interior finishes are required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.29.10.1. Tile Application</b>	
(1)	<p>[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.</p> <p>[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20,F81-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.</p>
(2)	<p>[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.</p> <p>[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20,F81-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.</p>
<b>9.29.10.2. Mortar Base</b>	
(1)	<p>[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20,F80-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20,F80-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.</p> <p>[F20,F80,F81-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.</p>
(2)	<p>[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20,F80-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.</p> <p>[F20,F80-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.</p> <p>[F20,F80,F81-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.</p>

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element.
	[F20,F81-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.
(4)	[F20-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.
	[F20-OP2.1] [F20-OP2.5] [F22-OP2.4,OP2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OP2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F20-OS2.1] [F20-OS2.5] [F22-OS2.4,OS2.5] Applies where the substrate for the tile contributes to the required bracing or lateral support for studs. [F20-OS2.3] Applies where the substrate for the tile serves as a required environmental separation element or where the tile is installed to provide the required waterproof wall finish.
<b>9.29.10.3. Adhesives</b>	
(1)	[F20-OP2.3,OP2.4]
	[F20-OS2.3]
	[F20-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.29.10.4. Moisture-Resistant Backing</b>	
(1)	[F20-OS2.3]
	[F81-OP2.3,OP2.4]
	[F20-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
	[F81-OH1.1,OH1.2] Applies where the substrate supports or serves as a required environmental separation element.
<b>9.29.10.5. Joints between Tiles and Bathtub</b>	
(1)	[F81-OP2.3,OP2.4]
	[F81-OS2.3]
	[F81-OH1.1,OH1.2] Applies where the substrate serves as a required environmental separation element.
	[F81-OS1.2] Applies where the substrate is required to act as fire protection for foamed plastics or to contribute to the required fire resistance of assemblies.
<b>9.30.1.1. Required Finished Flooring</b>	
(1)	[F30-OS3.1]
	[F40,F41-OH2.4]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.30.1.2. Water Resistance</b>	
(1)	[F41,F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F80-OS2.3] Applies where finished flooring is required to provide water resistance.
<b>9.30.1.3. Sleepers</b>	
(1)	[F20,F80-OS3.1]
	[F80-OH1.1] Applies to portion of Code text: "Wood sleepers supporting finished flooring over a concrete base supported on the ground ... shall be treated with a wood preservative."
<b>9.30.2.1. Required Underlay</b>	
(1)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
(2)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
(3)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
<b>9.30.2.2. Materials and Thickness</b>	
(1)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
(2)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
<b>9.30.2.3. Fastening</b>	
(1)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
(2)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
(3)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
<b>9.30.2.4. Joints Offset</b>	
(1)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
<b>9.30.2.5. Surface Defects</b>	
(1)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.30.3.1. Thickness</b>	
(1)	[F20-OS2.1]
	[F30-OS3.1]
<b>9.30.3.2. Strip Direction and End Joints</b>	
(1)	[F30-OS3.1]
(2)	[F20-OS2.1]
(3)	[F20-OS2.1]
<b>9.30.3.3. Nailing</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>9.30.3.4. Staples</b>	
(1)	[F30-OS3.1]
<b>9.30.4.1. Adhesive</b>	
(1)	[F81-OS3.1]
<b>9.30.5.1. Materials</b>	
(1)	[F41,F80-OH1.1]
	[F80-OS3.1]
(2)	[F41-OH1.1]
	[F81,F80-OS3.1]
<b>9.30.6.1. Substrate</b>	
(1)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
(2)	[F81-OS3.1]
	[F81-OH1.1] Applies where finished flooring is required to provide water resistance.
	[F81-OS2.3] Applies where finished flooring is required to provide water resistance.
<b>9.32.1.1. Application</b>	
(5)	[F40-OS3.4]
<b>9.32.1.2. Required Ventilation</b>	
(1)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2]
(2)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2]
<b>9.32.1.3. Roughed-in Plumbing</b>	
(1)	[F40,F50,F52,F81-OH1.1,OH1.3]
	[F40,F50,F81-OS3.4]
<b>9.32.2.1. Required Ventilation</b>	
(1)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2]
<b>9.32.2.2. Non-Heating-Season Natural Ventilation</b>	
(1)	[F51,F52-OH1.2] [F40,F52,F50-OH1.1]
(3)	[F42-OH2.5]
	[F61,F42-OH1.1]
	[F61,F42-OS2.3]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F80-OH2.5] [F80,F42-OH1.1,OH1.2]
<b>9.32.2.3. Non-Heating-Season Mechanical Ventilation</b>	
(1)	[F40,F50,F52-OH1.1]
(3)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2]
(4)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2]
<b>9.32.3.1. Required Ventilation</b>	
(1)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2] [F40,F50,F53-OS3.4]
(2)	(a),(b) [F40,F50,F52-OH1.1] (a),(b) [F51,F52-OH1.2] (c) [F53-OH1.1] (c) [F53-OS3.4]
<b>9.32.3.2. Design and Installation</b>	
(1)	[F40,F52,F50-OH1.1] [F52,F51-OH1.2] [F52-OS2.3]
(2)	[F81-OH1.1]
(3)	[F81-OH1.1] [F81-OS3.4]
(4)	[F40,F43,F50,F53-OH1.1] [F43,F53,F82-OS3.4]
(5)	[F82-OH1.1]
(6)	[F63,F81-OH1.1]
<b>9.32.3.3. Principal Ventilation System</b>	
(1)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2]
(2)	[F40,F50,F52-OH1.1] [F51,F52-OH1.2]
(4)	[F80,F81-OH1.1]
(5)	[F81-OH1.1]
(6)	[F81-OH1.1]
(7)	[F81-OH1.1]
(8)	[F81-OH1.1]
(9)	[F40,F50,F52-OH1.1]
(10)	[F40-OH1.1]
<b>9.32.3.4. Ventilation Systems Used in Conjunction with Forced Air Heating Systems</b>	
(2)	[F43,F50,F81-OS3.4] [F50,F51,F81-OH1.1] [F51,F81-OH1.2]
(5)	[F40,F43,F50,F52-OH1.1] (a) [F43,F50,F53-OS3.4] (b) [F43,F50,F81-OS3.4]
(6)	[F43,F50,F53-OS3.4] [F53-OH1.1] [F53,F63-OS2.3]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(7)	[F40,F50,F52,F53-OH1.1] [F43,F50,F53-OS3.4]
(8)	(a),(b) [F81-OH1.1] (c) [F53-OH1.1] (c) [F53,F63-OS2.3]
(9)	(a),(b) [F43,F50,F53-OS3.4] (a),(b) [F43,F53-OH1.1] (c) [F53,F63-OH1.1] (c) [F53,F63-OS2.3]
(10)	[F43,F50,F53-OS3.4] [F53-OH1.1] [F53,F63-OS2.3]
(11)	[F53-OH1.1]
(12)	[F81-OH1.2]
<b>9.32.3.5. Ventilation Systems Not Used in Conjunction with Forced Air Heating Systems</b>	
(2)	[F43,F50,F53-OS3.4] [F53-OH1.1]
(3)	(a) [F43,F50,F53-OS3.4] (a) [F43,F53-OH1.1] (b) [F53,F63-OH1.1] (b) [F53,F63-OS2.3]
(4)	[F40,F43,F50,F52-OH1.1] [F43,F50,F53-OS3.4]
(5)	[F43,F50,F53-OS3.4] [F53-OH1.1] [F53,F63-OS2.3]
(6)	[F43,F50,F53-OS3.4] [F53-OH1.1] [F53,F63-OS2.3]
(7)	[F53-OH1.1]
(8)	[F51,F54-OH1.2]
(9)	[F54-OH1.2]
(10)	[F40,F50,F52-OH1.1]
(12)	[F40,F50,F52-OH1.1]
(13)	[F51,F54-OH1.2]
(14)	[F40,F50,F52-OH1.1]
<b>9.32.3.7. Supplemental Exhaust</b>	
(1)	[F40,F52-OH1.1]
(3)	[F40,F52-OH1.1]
(4)	[F40,F52-OH1.1]
(5)	[F40,F52-OH1.1]
(6)	[F81-OH1.1]
(7)	[F81-OH1.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(8)	[F81-OH1.1]
<b>9.32.3.8. Protection Against Depressurization</b>	
(2)	[F53-OH1.1]
	(a) [F43,F50,F53-OS3.4]
	(b) [F53,F63-OS2.3]
(3)	[F43,F50,F53,F81-OS3.4]
	[F53,F81-OH1.1]
(4)	[F81-OH1.1,OH1.2]
	[F81-OS3.4]
(5)	[F53-OH1.1]
	[F80,F81-OS3.4]
	[F81-OS1.1]
(6)	[F44-OS3.4]
(7)	[F81-OS3.4]
(9)	[F43,F50,F53-OS3.4]
	[F53-OH1.1]
<b>9.32.3.9. Carbon Monoxide Alarms</b>	
(2)	(a),(b),(d) [F44-OS3.4]
	(c) [F81-OS3.4]
	[F44-OS3.4]
(3)	[F44-OS3.4]
(4)	[F44-OS3.4]
(5)	[F44-OS3.4]
<b>9.32.3.10. Fans</b>	
(1)	[F40,F50,F52,F53-OH1.1] [F51,F52-OH1.2]
	[F53,F63-OS2.3]
(2)	[F81-OH1.1,OH1.2]
(3)	[F53-OH1.1,OH1.2]
	[F53-OS3.4]
(4)	[F40,F50,F52,F53-OH1.1] [F51,F52-OH1.2]
(5)	[F81-OH1.1,OH1.2]
(6)	[F81-OH1.1,OH1.2]
	[F81-OS3.4]
(7)	[F40,F50,F52,F53-OH1.1] [F51,F52-OH1.2]
	[F81-OS3.4]
<b>9.32.3.11. Ducts</b>	
(1)	[F81-OH1.1]
(2)	[F40,F52,F63-OH1.1]
	[F52,F63-OS2.3]
(3)	[F63-OH1.1]
	[F63,F80-OS2.3]
(4)	[F63-OH1.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(5)	[F01,F82-OS1.1] [F41,F82-OH1.1]
(6)	(a),(b),(c) [F02,F03-OS1.1] (a) [F80-OS1.1] (c) [F82-OS1.1]
(7)	[F41,F53,F80-OH1.1]
(8)	[F40,F41-OH1.1] [F40,F63-OS2.3]
(9)	[F40,F50,F52,F53-OH1.1] [F53-OS3.4]
(12)	[F40,F50,F52,F53-OH1.1] [F53-OS3.4]
<b>9.32.3.12. Heat Recovery Ventilators</b>	
(2)	[F40,F50,F52-OH1.1]
(3)	[F40,F50,F52-OH1.1]
(4)	[F43,F53-OS3.4] [F53-OH1.1,OH1.2] [F53,F63-OS2.3]
(5)	[F62-OH1.1]
(6)	[F81-OH1.1]
<b>9.32.3.13. Outdoor Intake and Exhaust Openings</b>	
(1)	[F40,F44,F50-OS3.4] [F40,F50,F52-OH1.1]
(2)	[F40,F50,F52,F53-OH1.1] [F43,F53-OS3.4]
(3)	[F40,F50,F44-OS3.4] [F40,F50,F52-OH1.1]
(4)	[F40,F44,F50,F53-OS3.4] [F40,F50,F52-OH1.1]
(5)	[F40,F53-OH1.1]
(6)	[F61-OH1.1] [F61-OS2.3]
(7)	[F01,F42-OS1.1] [F42-OH1.1] [F42-OH2.5]
(8)	[F01,F42-OS1.1] [F42,F63-OH1.1]
(9)	[F01,F42-OS1.1] [F42-OH1.1]
(10)	[F43,F53,F82-OS3.4] [F53,F82-OH1.1]
(11)	[F43,F53-OS3.4] [F53,F81-OH1.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(12)	[F01,F42,F80-OS1.1] [F42,F80-OH2.5]
(13)	[F51,F52,F54-OH1.2]
(14)	[F51,F52,F54-OH1.2]
(15)	[F51,F52,F54-OH1.2]
(16)	[F41,F50,F52,F62,F80-OH1.1] [F43,F50-OS3.4] [F01,F03-OS1.1,OS1.2] [F01,F03-OP1.1,OP1.2]
<b>9.33.2.1. Required Heating Systems</b>	
(1)	[F51,F52-OH1.2] [F63-OH1.1] [F63-OS2.3]
<b>9.33.3.1. Indoor Design Temperatures</b>	
(1)	(a),(b),(c) [F51-OH1.2]
<b>9.33.4.1. Design of Heating and Air-conditioning Systems</b>	
(1)	[F41,F63-OH1.1] [F51,F52-OH1.2] [F44-OS3.4] Applies only to heating systems. [F63-OS2.3] Applies only to heating systems.
<b>9.33.4.2. Access</b>	
(1)	[F82-OH1.1,OH1.2] [F82-OP1.1] [F82-OS1.1] [F82-OS2.3] Applies only to heating systems.
<b>9.33.4.3. Protection from Freezing</b>	
(1)	[F81-OH1.1,OH1.2] [F81-OS2.3] Applies only to heating systems.
<b>9.33.4.4. Expansion, Contraction and System Pressure</b>	
(1)	[F20-OH1.1,OH1.2] [F20-OS3.2] [F20-OS2.3] Applies only to heating systems.
<b>9.33.4.5. Structural Movement</b>	
(1)	[F23-OH1.1,OH1.2] [F23-OP1.1] [F23-OS1.1] [F23-OS3.4]
(2)	[F20-OS1.1] [F20-OS3.3,OS3.4]
<b>9.33.4.7. Contaminant Transfer</b>	
(1)	[F44-OH1.1] [F44-OS3.4]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.33.5.1. Capacity of Heating Appliances</b>	
(1)	[F63-OS2.3]
	[F63-OH1.1] [F51-OH1.2]
<b>9.33.5.2. Appliance Installation Standards</b>	
(1)	[F41,F63,F50-OH1.1] [F51,F52-OH1.2]
	[F01-OP1.1] Applies to heating equipment.
	[F01-OS1.1] Applies to heating equipment.
	[F44-OS3.4] Applies to heating equipment.
	[F63-OS2.3] Applies to heating equipment.
<b>9.33.5.3. Design, Construction and Installation Standard for Solid-Fuel-Burning Appliances</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F41,F43-OH1.1] [F51-OH1.2]
	[F43-OS3.4]
	[F51-OS2.3]
(2)	[F01-OS1.1]
	[F01-OP1.1]
	[F43-OS3.4]
	[F43-OH1.1]
	[F43-OH5]
<b>9.33.6.2. Materials in Air Duct Systems</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	(a),(b),(c),(d) [F01-OP1.1]
	(a),(b),(c),(d) [F01-OS1.1]
(3)	[F01-OP1.1]
	[F01-OS1.1]
(4)	(a),(b),(c),(d) [F01-OP1.1]
	(a),(b),(c),(d) [F01-OS1.1]
(7)	(a),(b) [F41,F63-OH1.1] [F50,F51,F52-OH1.2]
	(a),(b) [F63-OS2.3]
<b>9.33.6.3. Tape</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.33.6.4. Coverings, Linings, Adhesives and Insulation</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
(3)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]



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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(4)	[F01-OP1.1]
	[F01-OS1.1]
(5)	[F01-OP1.1]
	[F01-OS1.1]
(6)	[F01-OP1.1]
	[F01-OS1.1]
(7)	(a),(b) [F01,F03-OP1.1]
	(a),(b) [F01,F03-OS1.1]
(8)	[F03-OP1.1] Applies to air duct distribution systems.
	[F03-OS1.1] Applies to air duct distribution systems.
	[F63-OH1.1] Applies to ventilation ducts and their fittings. [F51,F52-OH1.2] Applies to air duct distribution systems serving heating systems.
	[F63-OS2.3] Applies to air duct distribution systems.
<b>9.33.6.5. Galvanized Steel or Aluminum Supply Ducts</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F20-OH1.1,OH1.2]
(2)	[F20,F63-OS2.3]
	[F20,F63-OH1.1] [F20,F51,F52-OH1.2]
<b>9.33.6.6. Construction of Ducts and Plenums</b>	
(1)	[F03-OP1.1]
	[F03-OS1.1]
(2)	[F01-OS1.1]
	[F20-OS3.1]
	[F20,F63-OS2.3] [F63-OH1.1] [F51,F52-OH1.2]
(3)	[F01-OP1.1]
	[F01-OS1.1]
	[F43,F63-OH1.1] [F51,F52-OH1.2]
	[F63-OS2.3]
(4)	[F01-OP1.1]
	[F01-OS1.1]
	[F43,F63-OH1.1] [F51,F52-OH1.2]
	[F63-OS2.3]
(5)	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
	[F63-OH1.1] [F51,F52-OH1.2]
<b>9.33.6.7. Installation of Ducts and Plenums</b>	
(1)	[F40-OH1.1]
	[F40-OS3.4]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(2)	[F01-OP1.1]
	[F01-OS1.1]
	[F63-OS2.3]
	[F63-OH1.1] [F51,F52-OH1.2]
(3)	[F20-OS3.1]
	[F63-OS2.3]
	[F63-OH1.1] [F51,F52-OH1.2]
(4)	[F51,F52-OH1.2] [F63,F50-OH1.1]
	[F63,F80-OS2.3]
(5)	[F01-OP1.1]
	[F01-OS1.1]
(6)	[F80-OH1.1,OH1.2]
	[F80-OS2.3]
(7)	(a),(b) [F40,F62-OH1.1,OH1.2]
	(a),(b) [F40,F62-OS2.3]
	(b) [F44-OS3.4]
<b>9.33.6.8. Clearances of Ducts and Plenums</b>	
(2)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
(3)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
(4)	(a),(b),(c) [F01-OP1.1]
	(a),(b),(c) [F01-OS1.1]
(5)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.33.6.9. Ducting in or beneath Slabs-on-Ground</b>	
(1)	[F51-OH1.1,OH1.2,OH1.3]
	[F51-OS2.3]
<b>9.33.6.10. Adjustable Dampers and Balance Stops</b>	
(1)	[F40,F63-OH1.1] [F51,F52-OH1.2]
	[F63-OS2.3] Applies to branch <i>supply ducts</i> that are not fitted with diffusers with adjustable balance stops.
<b>9.33.6.11. Warm-Air Supply Outlets and Return Inlets — General</b>	
(1)	[F81-OH1.1,OH1.2]
	[F81-OS1.1]
	[F81-OS2.3]
(2)	(a),(b) [F01,F02-OP1.1]
	(a),(b) [F01,F02-OS1.1]
<b>9.33.6.12. Warm-Air Supply Outlets</b>	
(1)	[F40,F63-OH1.1] [F51,F52-OH1.2]
	[F63-OS2.3]
(2)	[F63-OS2.3]
	[F63-OH1.1] [F51-OH1.2]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	[F40,F63–OH1.1] [F51–OH1.2]
(4)	[F40,F63–OH1.1] [F51–OH1.2]
	[F63–OS2.3]
(5)	[F40,F63–OH1.1] [F51–OH1.2]
	[F63–OS2.3]
(6)	[F40,F63–OH1.1] [F51–OH1.2]
	[F63–OS2.3]
(8)	[F31–OS3.2]
(9)	[F40,F63–OH1.1] [F51–OH1.2]
	[F63–OS2.3] Applies to warm-air supply outlets located in finished areas.
(10)	[F40–OH1.1]
	[F40,F44–OS3.4]
	[F03–OS1.2]
	[F03–OP1.2]
<b>9.33.6.13. Return-Air Inlets</b>	
(1)	[F44,F40–OH1.1]
	[F44,F40–OS3.4]
(2)	[F63–OH1.1] [F51–OH1.2]
(3)	[F63–OS2.3]
	[F63–OH1.1] [F51–OH1.2]
<b>9.33.6.14. Return-Air System</b>	
(1)	[F63–OS2.3]
	[F63–OH1.1] [F51–OH1.2]
(2)	[F01–OP1.1]
	[F01–OS1.1]
(3)	[F01–OP1.1]
	[F01–OS1.1]
(4)	(a),(b),(c) [F01–OP1.1]
	(a),(b),(c) [F01–OS1.1]
(5)	[F51,F52–OH1.1,OH1.2]
	[F51,F52–OS2.3]
(6)	[F63–OS2.3]
	[F63–OH1.1] [F51–OH1.2]
(7)	(a),(b) [F44–OH1.1]
	(a),(b) [F44–OS3.4]
(8)	[F43,F44,F50,F51,F52,F81–OH1.1,OH1.2]
	[F43,F44,F81–OS3.4]
<b>9.33.6.15. Filters and Odour Removal Equipment</b>	
(1)	[F01–OP1.1]
	[F01–OS1.1]
(2)	[F32–OS3.3]
	[F41–OH1.1]

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
(3)	(a),(b) [F81-OH1.1]
<b>9.33.7.1. Recessed Radiators and Convector</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.33.7.2. Surface Temperature</b>	
(1)	[F31-OS3.2]
<b>9.33.8.1. Piping Materials and Installation</b>	
(1)	[F20-OH1.1,OH1.2]
	[F20-OS3.2]
(2)	[F21,F40-OH1.1] [F21,F51-OH1.2]
(3)	[F20-OS2.2]
<b>9.33.8.2. Insulation and Coverings</b>	
(1)	[F80-OH1.2]
	[F80-OS3.2]
(2)	(a),(b) [F01-OP1.1]
	(a),(b) [F01-OS1.1]
(3)	(a),(b) [F01,F02-OP1.1,OP1.2]
	(a),(b) [F01,F02-OS1.1,OS1.2]
(4)	[F01,F02-OP1.1]
	[F01,F02-OS1.1,OS1.2]
(5)	[F31-OS3.2]
<b>9.33.8.3. Clearances</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.33.8.4. Protection</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
(2)	[F01-OP1.1]
	[F01-OS1.1]
<b>9.33.9.1. Cooling Units</b>	
(1)	(a),(b),(c) [F43-OH1.1] [F51-OH1.2]
<b>9.33.10.2. Factory-Built Chimneys</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F44-OS3.4]
	[F44,F41-OH1.1]
<b>9.34.1.3. Location of Equipment in Public Areas</b>	
(1)	[F10-OS3.1] [F32-OS3.3]
<b>9.34.1.4. Recessed Lighting Fixtures</b>	
(1)	[F01-OS1.1]

Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.34.1.6. Public Corridors and Stairs</b>	
(1)	[F32-OS3.3]
	[F30-OS3.1]
	[F01-OS1.1]
	[F01-OP1.1]
<b>9.34.2.1. Lighting of Entrances</b>	
(1)	[F30-OS3.1]
	[F34-OS4.2]
<b>9.34.2.2. Outlets in Dwelling Units</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>9.34.2.3. Stairways</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>9.34.2.4. Basements</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
<b>9.34.2.5. Storage Rooms</b>	
(1)	[F30-OS3.1]
<b>9.34.2.6. Garages and Carports</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
<b>9.34.2.7. Public and Service Areas</b>	
(1)	[F30-OS3.1]
(2)	[F30-OS3.1]
(3)	[F30-OS3.1]
<b>9.35.2.2. Garage Floor</b>	
(1)	[F40-OS1.1]
<b>9.35.3.2. Protection from Damage due to Soil Movement</b>	
(1)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OP2.3,OP2.4]
	[F21-OS2.3]
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OS3.1] Applies to floors and elements that support floors.
(2)	[F21-OH1.1,OH1.2,OH1.3]
	[F21-OP2.3,OP2.4]
	[F21-OS2.3]
	[F21-OH4] Applies to floors and elements that support floors.
	[F21-OS3.1] Applies to floors and elements that support floors.

**Table 4.2.7.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.35.3.4. Column Piers</b>	
(1)	[F80–OP2.3]
	[F80–OS2.3]
(2)	[F20–OP2.1,OP2.2]
	[F20–OS2.1,OS2.2]
<b>9.35.4.2. Columns</b>	
(1)	[F20–OP2.1]
	[F20–OS2.1]
<b>9.35.4.3. Anchorage</b>	
(1)	[F22–OP2.4,OP2.5]
	[F22–OS2.4,OS2.5]
<b>9.36.1.1. Design Standards</b>	
(1)	[F20,F21,F22,F81–OS2.1,OS2.3,OS2.4,OS2.5]
	[F20,F21,F22,F81–OP2.1,OP2.3,OP2.4,OP2.5]
	[F61,F81–OH1.3]
	[F61,F81–OS2.3]
<b>9.36.1.2. Materials</b>	
(1)	[F20,F21,F22–OS2.1,OS2.4,OS2.5]
	[F20,F21,F22–OP2.1,OP2.3,OP2.5]
	[F80–OP2.3]
(2)	[F80–OS2.1,OS2.3]
	[F80–OP2.1,OP2.3]
(3)	[F21–OS2.1]
	[F21–OP2.1]
<b>9.36.2.1. Horizontal Log Walls</b>	
(1)	[F61,F80–OP2.3]
	[F61,F80–OS2.3]
(2)	[F42–OH2.5]
	[F61–OP2.3]
	[F61–OS2.3]
	[F51,F52,F54,F55,F61,F81–OH1.1,OH1.2,OH1.3]
<b>9.36.2.2. Fastening to Bearer</b>	
(1)	[F20,F21,F22,F80–OS2.1,OS2.3,OS2.4,OS2.5]
	[F20,F21,F22,F80–OP2.1,OP2.3,OP2.4,OP2.5]
	[F42,F80–OH2.5]
<b>9.36.2.3. Vertical Log Walls</b>	
(1)	[F20,F21,F22,F80–OS2.1,OS2.3,OS2.4,OS2.5]
	[F20,F21,F22,F80–OP2.1,OP2.3,OP2.4,OP2.5]
	[F42,F80–OH2.5]
<b>9.36.2.4. End Plates</b>	
(1)	[F20,F22–OS2.1,OS2.3,OS2.4,OS2.5]
	[F20,F22–OP2.1,OP2.3,OP2.4,OP2.5]

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Table 4.2.7.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>9.37.2.1. Height of Rooms and Spaces</b>	
(1)	[F10–OS3.7] [F30–OS3.1]
<b>9.37.2.3. Bedroom Windows</b>	
(1)	[F10–OS3.7]
<b>9.37.2.4. Exit Stairs</b>	
(1)	[F10–OS3.7] [F30–OS3.1]
<b>9.37.2.5. Landings</b>	
(1)	[F10–OS3.7] [F30–OS3.1]
<b>9.37.2.7. Public and Exit Corridor Width</b>	
(1)	[F10–OS3.7] [F30–OS3.1]
<b>9.37.2.8. Unenclosed Exterior Stair or Ramp</b>	
(1)	[F05–OS1.5]
<b>9.37.2.9. Exit Doors</b>	
(1)	[F10–OS3.7] [F30–OS3.1]
<b>9.37.2.11. Means of Egress</b>	
(1)	[F10–OS1.5]
<b>9.37.2.13. Protection of Exits</b>	
(1)	[F03–OS1.2] [F05–OS1.5]
	[F03–OP1.2]
<b>9.37.2.16. Dwelling Unit Separations</b>	
(1)	[F03–OS1.2]
	[F03–OP1.2]
<b>9.37.2.17. Protection of Public Corridors</b>	
(1)	[F03,F05–OS1.5]
	[F03–OP1.2]
<b>9.37.2.18. Furnace Room Separations</b>	
(1)	[F03–OS1.2]
	[F03–OP1.2]
(2)	[F03–OS1.2]
	[F03–OP1.2]
<b>9.37.2.19. Heating and Ventilation Systems</b>	
(1)	[F40–OH1.1]
	[F44–OS1.1]
<b>9.37.2.20. Smoke Alarms</b>	
(1)	[F11,F81–OS1.5]
(2)	[F11,F81–OS1.5]
(3)	[F11,F81–OS1.5]

**Notes to Table 4.2.7.1.:**

(1) See Parts 2 and 3.

**4.2.8. Part 10 of Division B**

**4.2.8.1. Attribution to Acceptable Solutions**

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 10 of Division B shall be the objectives and functional statements listed in Table 4.2.8.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.8.1.**  
**Objectives and Functional Statements**  
**Attributed to the Acceptable Solutions in Part 10 of Division B**  
 Forming Part of Sentence 4.2.8.1.(1)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>10.2.1.1. Structural Design</b>	
(1)	[F20,F21,F22,F23–OP2.1,OP2.3,OP2.4] [F20,F21,F22,F23–OS2.1,OS2.3,OS2.4]
<b>10.2.2.1. Snow Loads</b>	
(1)	[F20–OP2.1] [F22–OP2.3] [F20–OS2.1] [F22–OS2.3]
(2)	[F20–OP2.1] [F22–OP2.3] [F20–OS2.1] [F22–OS2.3]
<b>10.2.2.2. Wind Loads</b>	
(1)	[F20–OP2.1] [F22–OP2.3] [F20–OS2.1] [F22–OS2.3]
<b>10.2.2.3. Floor Loads</b>	
(1)	[F20–OP2.1] [F22–OP2.3] [F20–OS2.1] [F22–OS2.3]
<b>10.2.3.1. Design</b>	
(1)	[F22–OP2.5] [F22–OS2.5]
<b>10.3.1.1. Heights</b>	
(1)	[F10–OS3.7] [F30–OS3.1]
<b>10.4.1.3. Sleeping Rooms</b>	
(1)	[F03–OS1.2]
(2)	[F03,F05–OS1.2,OS1.5]
(3)	[F03,F05–OS1.2,OS1.5]
<b>10.4.1.4. Service Rooms</b>	
(1)	[F03–OS1.2]
(2)	[F03–OS1.2]
<b>10.4.1.5. Exterior Wall Requirements</b>	
(1)	[F03–OP1.2] [F03–OP3.1] [F03–OS1.2]

Table 4.2.8.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>10.4.1.6. Fire Separations</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
	(a),(c) [F04-OP1.3]
	(a),(c) [F04-OS1.3]
	(b) [F05-OS1.2,OS1.5]
<b>10.4.2.1. Service Room</b>	
(1)	[F01-OS1.1] [F03-OS1.2]
<b>10.4.2.2. Fire Dampers</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
<b>10.4.2.3. Fire Stopping</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2] [F01-OP1.1]
	[F03-OS1.2] [F01-OS1.1]
<b>10.4.3.1. Flame-Spread Rating</b>	
(1)	[F02-OS1.2]
(2)	[F02,F05-OS1.2,OS1.5]
(3)	[F02,F05-OS1.2,OS1.5]
<b>10.4.4.1. Windows</b>	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
<b>10.4.5.1. Fire-Protection Rating</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
	(b)(i) [F05-OS1.5]
(3)	[F03-OP1.2]
	[F03-OS1.2]
<b>10.4.5.2. Closers</b>	
(1)	(a) [F03-OP1.2]
	(a) [F03-OS1.2]
	(b) [F130-OH12.1]
<b>10.4.5.4. Smoke Doors</b>	
(1)	[F03,F05-OS1.2,OS1.5]
(2)	[F03-OS1.2,OS1.5]
<b>10.4.6.1. Number of Exits and Travel Distance</b>	
(1)	[F10-OS3.7]
<b>10.4.6.2. Travel Distance</b>	
(1)	[F10-OS3.7]

**Table 4.2.8.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>10.4.7.1. Standpipe and Hose System</b>	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02,F03,F12-OP1.2]
	[F02,F03,F12-OP3.1]
	[F02,F03,F12-OS1.2,OS1.3]
(3)	[F12-OP1.2]
	[F12-OS1.2]
(5)	[F12-OP1.2]
	[F12-OS1.2]
<b>10.4.7.2. Sprinkler System</b>	
(1)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
<b>10.4.8.1. Specific Electrical Requirements</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]
	[F30-OS3.1] [F32-OS3.3]
<b>10.4.9.1. Foamed Plastic</b>	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(3)	[F02-OP1.2]
	[F02-OS1.2]
(4)	[F03,F81-OP1.2]
	[F03,F81-OS1.2]
<b>10.5.1.1. Design</b>	
(1)	[F51-OH1.2]
<b>10.5.1.2. Insulation</b>	
(1)	[F63-OP2.3]
	[F63-OS2.3]
	[F51-OH1.2] [F63-OH1.3]
	[F120,F121-OE1]
(2)	[F63-OP2.3]
	[F63-OS2.3]
	[F51-OH1.2] [F63-OH1.3]
	[F120,F121-OE1]
<b>10.5.1.3. Ventilation</b>	
(1)	[F50-OH1.1]
<b>10.5.1.5. Forced Air System</b>	
(1)	[F50-OH1.1]
<b>10.5.1.6. Ducts</b>	
(1)	[F01-OP1.1]
	[F01-OS1.1]

Table 4.2.8.1. (Continued)

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>10.5.1.7. Vapour Barrier</b>	
(1)	[F63–OH1.1,OH1.2]
	[F63–OS2.3]
<b>10.5.1.8. Screens</b>	
(1)	[F42–OH2.5]
<b>10.5.2.1. Number of Fixtures</b>	
(1)	[F130–OH12.2]
(2)	[F71–OH2.3] [F72–OH2.1]
<b>10.5.2.2. Piping</b>	
(1)	[F03–OP1.2]
	[F03–OS1.2]
<b>10.5.2.3. Heat Tape</b>	
(1)	[F01,F81–OP1.1]
	[F01,F81–OS1.1]
<b>10.6.1.1. Spatial Separation</b>	
(1)	[F03–OP3.1]
<b>10.6.1.3. Proximity to Vegetation</b>	
(1)	[F03–OP3.1]
<b>10.6.2.1. Skirting</b>	
(1)	[F03–OP3.1]
(3)	[F03–OP1.2]
	[F03–OP3.1]
	[F03–OS1.2]
<b>10.6.3.1. Fire Alarm Systems</b>	
(1)	[F11–OS1.5] [F81–OS1.4]
(2)	[F82–OS1.5]
<b>10.6.3.2. Manual Stations</b>	
(1)	[F11,F81–OS1.5]
<b>10.6.3.3. Heat Detectors</b>	
(1)	[F11,F81–OS1.5]
<b>10.6.3.4. Smoke Detectors</b>	
(1)	[F11,F81–OS1.5]
<b>10.6.3.5. Smoke Alarms</b>	
(1)	[F11,F81–OS1.5]
<b>10.6.4.1. Cooking Equipment Ventilation System</b>	
(1)	[F01,F44–OP1.1]
	[F01,F44–OS1.1]
<b>10.6.4.2. Kitchen Hoods, Canopies and Exposed Exhaust Ducts</b>	
(1)	[F42,F101–OH11.2]
(7)	[F81–OH11.2]
<b>10.6.5.1. Emergency Lighting</b>	
(1)	[F10–OS1.5]

**Table 4.2.8.1. (Continued)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>10.6.5.2. Exit Signs</b>	
(1)	[F10-OS1.5]
<b>10.6.6.1. Exit Door Hardware</b>	
(1)	[F10-OS1.5]
	[F10-OS3.6]

**Notes to Table 4.2.8.1.:**

(1) See Parts 2 and 3.

**4.2.9. Part 11 of Division B**

**4.2.9.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Part 11 of Division B shall be the objectives and functional statements listed in Table 4.2.9.1. (See A-4.1.2.1.(1) in Appendix A.)

**Table 4.2.9.1.  
Objectives and Functional Statements  
Attributed to the Acceptable Solutions in Part 11 of Division B  
Forming Part of Sentence 4.2.9.1.(1)**

Acceptable Solutions	Objectives and Functional Statements <sup>(1)</sup>
<b>11.2.1.2. Acoustic Insulation Factor</b>	
(1)	[F110-OH10.1]
(2)	[F110-OH10.1]
(3)	[F110-OH10.1]
(4)	[F110-OH10.1]
<b>11.2.2.1. Mechanical Ventilation</b>	
(1)	[F50,F52-OH1.1]
	[F110-OH10.1]

**Notes to Table 4.2.9.1.:**

(1) See Parts 2 and 3.



# Appendix A

## Explanatory Material

**A-1.1.1.1.(2) Factory-Built Houses.** The Alberta Building Code applies the same requirements to site-built and manufactured homes (also known as factory-built houses). However, it can often be difficult to determine whether a manufactured home complies with these requirements once it has been delivered to its construction site, because many of the wall, roof and floor assemblies are closed in and their components cannot be inspected.

In Alberta, two certification and labelling programs are used for manufactured homes. One is based on CAN/CSA-A277, "Procedure for Certification of Factory-Built Houses"; the second is based on the CAN/CSA-Z240 MH series of standards. Both incorporate the use of a label issued by Alberta Municipal Affairs and Housing confirming compliance with the requirements of Part 9 of the Alberta Building Code.

The labelling programs for manufactured homes are a cooperative effort between Alberta Municipal Affairs and Housing and Canadian Standards Association (CSA). CSA conducts periodic audits of the manufacturing plants, reviews the building plans, informs the manufacturer of deficiencies and distributes labels.

All new manufactured homes carry two labels:

- (a) CSA label to verify that the home was built by a CSA certified manufacturer under a quality assurance program, and
- (b) provincial label to confirm the home was designed and built to Part 9 of the Alberta Building Code as a single-family dwelling.

The provincial labels are only applied to manufactured homes that are fully completed in the factory. Unfinished homes sold to owners to be completed on the site do not receive provincial labels. In this situation only, CAN/CSA-A277 labels are applied and owners must then obtain all necessary permits for the work remaining to be completed.

For each incomplete manufactured home, the manufacturer provides the purchaser with written confirmation of the work completed in the factory. This confirmation is then provided to the authority having jurisdiction to support the release of permit(s) for on-site construction necessary to complete the home.

**A-1.1.1.1.(5)(a) Farm and Acreage Buildings.** Farm and acreage buildings include but are not limited to produce storage facilities, livestock and poultry housing, milking centres (except as required by Section 7.4.), manure storage facilities, grain bins, silos, feed preparation centres, farm workshops, and horse riding, exercise and training facilities not used by the public. Farm buildings may be classed as low or high human occupancy, depending on the occupant load.

Examples of farm buildings likely to be classed as low human occupancy as defined in Article 1.2.1.2. of the National Farm Building Code of Canada are livestock and poultry housing, manure and machinery storage facilities, and horse exercise and training facilities where no bleachers or viewing area are provided.

Examples of buildings that would be classed as other than low human occupancy include farm retail centres for feeds, horticultural and livestock produce, auction barns and show areas where bleachers or other public facilities are provided. Farm work centres where the number of workers frequently exceeds the limit for low human occupancy are also in this category.

It is possible to have areas of both high and low human occupancy in the same building provided that the structural safety and fire separation requirements for high human occupancy are met in that part.

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This Appendix is included for explanatory purposes only and does not form part of the requirements. The numbers that introduce each Appendix Note correspond to the applicable requirements in this Division.

**A-1.1.1.2. Application to Existing Buildings.** This Code is most often applied to existing buildings when an owner wishes to rehabilitate a building, change its use, or build an addition, or when an enforcement authority decrees that a building or class of buildings be altered for reasons of public safety. It is not intended that the Alberta Building Code be used to enforce the retrospective application of new requirements to existing buildings or existing portions of relocated buildings. For example, although the Alberta Fire Code could be interpreted to require the installation of fire alarm, standpipe and hose, and automatic sprinkler systems in an existing building for which there were no requirements at the time of construction, it is the intent of the Safety Codes Council that the Alberta Fire Code not be applied in this manner to these buildings unless the authority having jurisdiction has determined that there is an inherent threat to occupant safety and has issued an order to eliminate the unsafe condition, or where substantial changes or additions are being made to an existing building or the occupancy has been changed. (See also Appendix Note A-1.1.1.1.(1) of Division A of the Alberta Fire Code.)

Relocated buildings that have been in use in another location for a number of years can be considered as existing buildings, in part, and the same analytical process can be applied as for existing buildings. It should be noted, however, that a change in occupancy may affect some requirements (e.g. loads and fire separations) and relocation to an area with different wind, snow or earthquake loads will require the application of current code requirements. Depending on the construction of the building and the changes in load, structural modifications may be required. Similarly, parts of a relocated or existing building that are reconstructed, such as foundations and basements, or parts being modified are required to be built to current codes.

Whatever the reason, Code application to existing or relocated buildings requires careful consideration of the level of safety needed for that building. This consideration involves an analytical process similar to that required to assess alternative design proposals for new construction. See Clause 1.2.1.1.(1)(b) and its Appendix Note for information on achieving compliance with the Code using alternative solutions.

In developing Code requirements for new buildings, consideration has been given to the cost they impose on a design in relation to the perceived benefits in terms of safety. The former is definable; the latter difficult to establish on a quantitative basis. In applying the Code requirements to an existing building, the benefits derived are the same as in new buildings. On the other hand, the increased cost of implementing in an existing building a design solution that would normally be intended for a new building may be prohibitive.

The successful application of Code requirements to existing construction becomes a matter of balancing the cost of implementing a requirement with the relative importance of that requirement to the overall Code objectives. The degree to which any particular requirement can be relaxed without affecting the intended level of safety of the Code requires considerable judgment on the part of both the designer and the authority having jurisdiction.

Further information on the application of Code requirements to existing or relocated buildings may be found in the following publications:

- User's Guide - NBC 1995, Fire Protection, Occupant Safety and Accessibility (Part 3)
- Guidelines for Application of Part 3 of the National Building Code of Canada to Existing Buildings
- "Commentary L, Application of NBC Part 4 of Division B for the Structural Evaluation and Upgrading of Existing Buildings" of the User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B)
- User's Guide - NBC 1995, Application of Part 9 to Existing Buildings
- Canadian Building Digest No. 230, "Applying Building Codes to Existing Buildings"

These publications can be ordered through Client Services, Institute for Research in Construction, National Research Council of Canada, Ottawa, Ontario K1A 0R6, or through the Web site at [www.nationalcodes.ca](http://www.nationalcodes.ca).

**A-1.1.1.3.(1) Temporary Use.** An authority having jurisdiction has the discretionary power to allow the temporary use or occupancy of a building even though the building may not comply entirely with all requirements of the Alberta Building Code. Exceptions to compliance with all requirements are permitted because these buildings are intended for use and/or occupancy for short periods of time. It is a reasonable approach which allows tents and air-supported structures to be erected and occupied at carnivals, circuses, sideshows, auctions, religious outdoor events, etc. It also allows for more permanent structures, although still temporary in nature, to be used as school rooms, trailers on car dealer lots, storage sheds, office accommodation at construction sites or shelters to house plants during the spring season at shopping centres.

"Temporary" is usually thought of as being under three years.

**A-1.2.1.1.(1)(a) Code Compliance via Acceptable Solutions.** If a building design (e.g. material, component, assembly or system) can be shown to meet all provisions of the applicable acceptable solutions in Division B (e.g. it complies with the applicable provisions of a referenced standard), it is deemed to have satisfied the objectives and functional statements linked to those provisions and thus to have complied with that part of the Code. In fact, if it can be determined that a design meets all the applicable acceptable solutions in Division B, there is no need to consult the objectives and functional statements in Division A to determine its compliance.

**A-1.2.1.1.(1)(b) Code Compliance via Alternative Solutions.** Where a design differs from the acceptable solutions in Division B, then it should be treated as an “alternative solution.” A proponent of an alternative solution must demonstrate that the alternative solution addresses the same issues as the applicable acceptable solutions in Division B and their attributed objectives and functional statements. However, because the objectives and functional statements are entirely qualitative, demonstrating compliance with them in isolation is not possible. Therefore, Clause 1.2.1.1.(1)(b) identifies the principle that Division B establishes the quantitative performance targets that alternative solutions must meet. In many cases, these targets are not defined very precisely by the acceptable solutions—certainly far less precisely than would be the case with a true performance code, which would have quantitative performance targets and prescribed methods of performance measurement for all aspects of building performance. Nevertheless, Clause 1.2.1.1.(1)(b) makes it clear that an effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B—not “well enough” but “as well as.”

In this sense, it is Division B that defines the boundaries between acceptable risks and the “unacceptable” risks referred to in the statements of the Code’s objectives, i.e. the risk remaining once the applicable acceptable solutions in Division B have been implemented represents the residual level of risk deemed to be acceptable by the broad base of Canadians who have taken part in the consensus process used to develop the Code.

#### **Level of Performance**

Where Division B offers a choice between several possible designs, it is likely that these designs may not all provide exactly the same level of performance. Among a number of possible designs satisfying acceptable solutions in Division B, the design providing the lowest level of performance should generally be considered to establish the minimum acceptable level of performance to be used in evaluating alternative solutions for compliance with the Code.

Sometimes a single design will be used as an alternative solution to several sets of acceptable solutions in Division B. In this case, the level of performance required of the alternative solution should be at least equivalent to the overall level of performance established by all the applicable sets of acceptable solutions taken as a whole.

Each provision in Division B has been analyzed to determine to what it applies and what it is intended to achieve. The resultant application and intent statements clarify what undesirable results each provision seeks to preclude. These statements are not a legal component of the Code, but are advisory in nature, and can help Code users establish performance targets for alternative solutions.

#### **Areas of Performance**

A subset of the acceptable solutions in Division B may establish criteria for particular types of designs (e.g. certain types of materials, components, assemblies, or systems). Often such subsets of acceptable solutions are all attributed to the same objective: Fire Safety for example. In some cases, the designs that are normally used to satisfy this subset of acceptable solutions might also provide some benefits that could be related to some other objective: Fire Protection of the Building for example. However, if none of the applicable acceptable solutions are linked to Objective OP1, Fire Protection of the Building, it is not necessary that alternative solutions proposed to replace these acceptable solutions provide a similar benefit related to Fire Protection of the Building. In other words, the acceptable solutions in Division B establish acceptable levels of performance for compliance with the Code only in those areas defined by the objectives and functional statements attributed to the acceptable solutions.

#### **Applicable Acceptable Solutions**

In demonstrating that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B, its evaluation should not be limited to comparison with the acceptable solutions to which an alternative is proposed. It is possible that acceptable solutions elsewhere in the Code also apply. The proposed alternative solution may be shown to perform as well as the most apparent acceptable solution which it is replacing but may not perform as well as other relevant acceptable

solutions. For example, an innovative sheathing material may perform adequately as sheathing in a wall system that is braced by other means but may not perform adequately as sheathing in a wall system where the sheathing must provide the structural bracing. All applicable acceptable solutions should be taken into consideration in demonstrating the compliance of an alternative solution.

**A-1.3.3.4.(1) Buildings Divided by Firewalls.** This concept relates to the provisions directly regulated by this Code and does not apply to electrical service entrance requirements, which are regulated by other documents.

**A-1.3.3.4.(2) Buildings on Sloping Sites.** Application of the definition of grade to stepped buildings on sloping sites often results in such buildings being designated as being greater than 3 storeys in building height even though there may be only 2 or 3 storeys at any one location. The diagrams below illustrate this application compared to a similar building on a flat site.

Under this Sentence, Building A can be considered as being 3 storeys in building height instead of 6 storeys in building height. Both Building A and B are comparable with regard to fire safety and egress.

This relaxation applies to the determination of building height only. All other requirements continue to apply as appropriate.

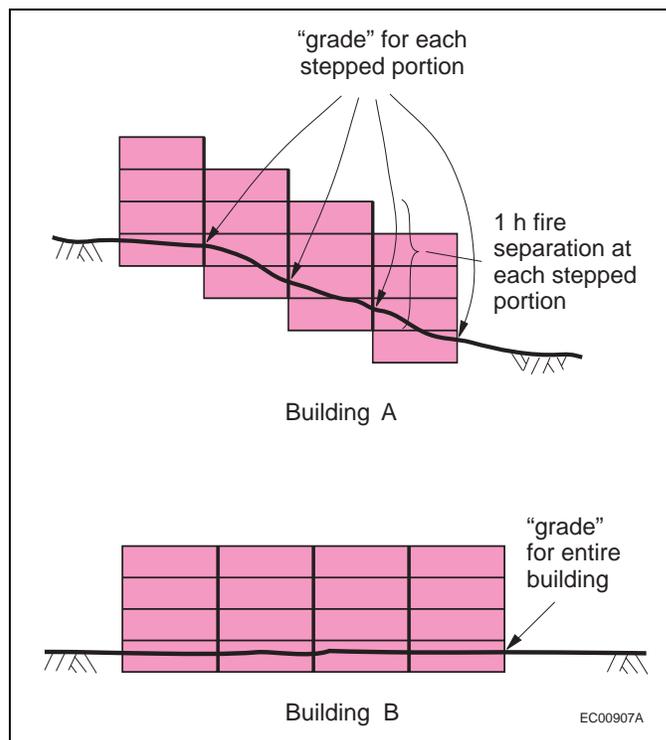


Figure A-1.3.3.4.(2)  
Application of the definition of grade

**A-1.4.1.2.(1) Defined Terms.**

**Exit**

Exits include doors or doorways leading directly into an exit stair or directly to the outside. In the case of an exit leading to a separate building, exits also include vestibules, walkways, bridges or balconies.

**Fire Separation**

A fire separation may or may not have a fire-resistance rating.

**Mechanically Vented**

The definition of this term is intended to include all types of appliances and venting systems that rely entirely on fans to evacuate the products of combustion. Systems variously referred to as “forced draft,” “power vented” and “induced draft” in standards and industry terminology may be covered by this definition. The key characteristic of such systems is that they are more resistant to depressurization-induced spillage of combustion products into the building in which they are housed because the combustion venting system downstream of the fan is “sealed,” i.e. includes no draft hood or draft control device.

**Post-disaster Building**

There may be circumstances where the authority having jurisdiction would choose to exempt certain types of buildings or parts thereof from being designated as post-disaster buildings in order to permit them to be governed by Part 9 rather than by the rest of the Code. Such is the case in the following examples: an ambulance that is stored at a volunteer’s residence or a police station that is housed in a small shopping mall. The circumstances where such exemptions are permitted are intentionally limited by the definition of post-disaster building.

**Public Corridor**

A covered mall is considered to be a public corridor and, as such, is subject to the same requirements as a public corridor.

**Secondary Suite**

A primary dwelling unit is a townhouse, row house, single- or semi-detached home, or duplex.

**Service Room**

Typical examples of service rooms include boiler rooms, furnace rooms, incinerator rooms, garbage handling rooms and rooms to accommodate air-conditioning or heating appliances, pumps, compressors and electrical equipment. Rooms such as elevator machine rooms and common laundry rooms are not considered to be service rooms.

**Storage Garage**

Entrances at which vehicles stop for a short time beneath an unenclosed canopy to pick up and drop off passengers are not considered as storage garages.

**Suite**

Tenancy in the context of the term “suite” applies to both rental and ownership tenure. In a condominium arrangement, for example, dwelling units are considered separate suites even though they are individually owned. In order to be of complementary use, a series of rooms that constitute a suite must be in reasonably close proximity to each other and have access to each other either directly by means of a common doorway or indirectly by a corridor, vestibule or other similar arrangement.

The term “suite” does not apply to rooms such as service rooms, common laundry rooms and common recreational rooms that are not leased or under a separate tenure in the context of the Code. Similarly, the term “suite” is not normally applied in the context of buildings such as schools and hospitals, since the entire building is under a single tenure. However, a room that is individually rented is considered a suite. A warehousing unit in a mini-warehouse is a suite. A rented room in a nursing home could be considered as a suite if the room was under a separate tenure. A hospital bedroom on the other hand is not considered to be under a separate tenure, since the patient has little control of that space, even though he pays the hospital a per diem rate for the privilege of using the hospital facilities, which include the sleeping areas.

For certain requirements in the Code, the expression “room or suite” is used (e.g., travel distance). This means that the requirement applies within the rooms of suites as well as to the suite itself and to rooms that may be located outside the suite. In other places the expression “suite, and rooms not located within a suite” is used (e.g., for the installation of smoke and heat detectors). This means that the requirement applies to individual suites as defined, but not to each room within the suite. The rooms “not within a suite” would include common laundry rooms, common recreational rooms and service rooms, which are not considered as tenant-occupied space.

**A-1.5.1.1.(1) Application of Referenced Documents.** Documents referenced in the Alberta Building Code may contain provisions covering a wide range of issues, including issues that are unrelated to the objectives and functional statements stated in Parts 2 and 3 of Division A respectively; e.g. aesthetic issues such as colour-fastness or uniformity. Sentence 1.5.1.1.(1) is intended to make it clear that, whereas referencing a document in the Alberta Building Code generally has the effect of making the provisions of that document part of the Code, provisions that are unrelated to buildings or to the objectives and functional statements attributed to the provisions in Division B where the document is referenced are excluded.

Furthermore, many documents referenced in the Alberta Building Code contain references to other documents, which may also, in turn, refer to other documents. These secondary and tertiary referenced documents may contain provisions that are unrelated to buildings and facilities or to the objectives and functional statements of the Alberta Building Code: such provisions—no matter how far down the chain of references they occur—are not included in the intent of Sentence 1.5.1.1.(1) of Division A.

### **A-2.2.1.1.(1) Objectives.**

#### **Listing of objectives**

Any gaps in the numbering sequence of the objectives are due to the fact that there is a master list of objectives covering the three principal Code Documents adopted in Alberta — the Alberta Building Code, the Alberta Fire Code and the National Plumbing Code—but not all objectives are pertinent to all Codes.

#### **The building**

Where the term “the building” is used in the wording of the objectives, it refers to the building for which compliance with the Alberta Building Code is being assessed.

#### **Emergency**

The term “emergency”—in the context of safety in buildings or facilities—is often equated to the term “fire emergency;” however, the wording of objectives OS3.7 and OS5.9 makes it clear that the Code addresses any type of emergency that would require the rapid evacuation of the building or facility, such as a bomb threat or the presence of intruders.

### **A-3.2.1.1.(1) Functional Statements.**

#### **Listing of functional statements**

The numbered functional statements are grouped according to functions that deal with closely related subjects. For example, the first group deals with fire risks, the second group deals with emergency egress and response, etc. There may be gaps in the numbering sequence for the following reasons:

- Each group has unused numbers which allows for the possible future creation of additional functional statements within any one group.
- There is a master list of functional statements covering the three principal Code Documents adopted in Alberta — the Alberta Building Code, the Alberta Fire Code and the National Plumbing Code—but not all functional statements are pertinent to all Codes.

**A-4.1.2.1.(1) Objectives and Functional Statements Attributed to Acceptable Solutions.** The objectives and functional statements attributed to each Code provision in Division B are shown in Tables in Part 4.

Many provisions in Division B serve as modifiers of or pointers to other provisions, or serve other clarification or explanatory purposes. In most cases, no objectives and functional statements have been attributed to such provisions, which therefore do not appear in the above-mentioned tables.

For provisions that serve as modifiers of or pointers to other referenced provisions and that do not have any objectives and functional statements attributed to them, the objectives and functional statements that should be used are those attributed to the provisions they reference.

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## **Division C**

# **Administrative Provisions**



# **Part 1**

## **General**

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<b>1.2.</b>	<b>Terms and Abbreviations</b>	
1.2.1.	Definitions of Words and Phrases ..	1-1
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# **Part 1 General**

## **Section 1.1. Application**

### **1.1.1. Application**

#### **1.1.1.1. Application**

**1)** This Part applies to all *buildings* covered in this Code. (See Article 1.1.1.1. of Division A.)

## **Section 1.2. Terms and Abbreviations**

### **1.2.1. Definitions of Words and Phrases**

#### **1.2.1.1. Non-defined Terms**

**1)** Words and phrases used in Division C that are not included in the list of definitions in Article 1.4.1.2. of Division A shall have the meanings defined in the Safety Codes Act, Alberta Fire Code 2006, National Plumbing Code 2005, or that are commonly assigned to them in the context in which they are used, taking into account the specialized use of terms by the various trades and professions to which the terminology applies.

**2)** Where objectives and functional statements are referred to in Division C, they shall be the objectives and functional statements described in Parts 2 and 3 of Division A.

**3)** Where acceptable solutions are referred to in Division C, they shall be the provisions stated in Parts 3 to 11 of Division B.

**4)** Where alternative solutions are referred to in Division C, they shall be the alternative solutions mentioned in Clause 1.2.1.1.(1)(b) of Division A.

**5)** For words not defined by Sentence (1), reference should be made to the Canadian Oxford Dictionary (Second Edition), published by Oxford University Press.

#### **1.2.1.2. Defined Terms**

**1)** The words and terms in italics in Division C shall have the meanings assigned to them in Article 1.4.1.2. of Division A.

### **1.2.2. Symbols and Other Abbreviations**

#### **1.2.2.1. Symbols and Other Abbreviations**

**1)** The symbols and other abbreviations in Division C shall have the meanings assigned to them in Article 1.4.2.1. of Division A.



# **Part 2**

## **Administrative Provisions**

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## **Part 2**

# **Administrative Provisions**

### **Section 2.1. Application**

#### **2.1.1. Application**

##### **2.1.1.1. Application**

**1)** This Part applies to all *buildings* covered in this Code. (See Article 1.1.1.1. of Division A.)

### **Section 2.2. Administration**

#### **2.2.1. Administration**

##### **2.2.1.1. Conformance with Administrative Requirements**

**1)** This Code shall be administered in conformance with the appropriate provincial regulations made pursuant to the Safety Codes Act and may be cited as the Alberta Building Code 2006.

##### **2.2.1.2. Building Code Variances**

(See Appendix A.)

**1)** A person may apply to the *Chief Building Administrator* in writing for a variance to this Code, and the request shall conform to the requirements stated in Section 2.3.

**2)** After a request submitted pursuant to Sentence (1) has been reviewed, the *Chief Building Administrator* may issue a written variance.

**3)** The *Chief Building Administrator* may include terms or conditions in the variance issued pursuant to Sentence (2).

**4)** A variance issued pursuant to Sentence (2) is applicable throughout Alberta.

##### **2.2.1.3. Building Code Interpretations**

(See Appendix A.)

**1)** A person may apply to the *Chief Building Administrator* in writing for an interpretation of this Code, and the request shall include

- a) specific Code references, and
- b) a statement identifying the ambiguity or lack of clarity resulting in the request for an interpretation.

**2)** After a request submitted pursuant to Sentence (1) has been reviewed, the *Chief Building Administrator* may issue a written interpretation.

**3)** An interpretation issued pursuant to Sentence (2) is applicable throughout Alberta.

**2.2.1.4.****2.2.1.4. Barrier-Free Relaxations**

- 1) The *Chief Building Administrator* may grant relaxation of one or more of the requirements of Section 3.8. of Division B if an *owner* can demonstrate to the satisfaction of the *Chief Building Administrator* that
  - a) the specific requirements are unnecessary, or
  - b) extraordinary circumstances prevent conformance.

**2.2.2. Information Required for Proposed Work****2.2.2.1. General Information Required**

- 1) Sufficient information shall be provided to show that the proposed work will conform to this Code and whether or not it may affect adjacent property.
- 2) Plans shall be drawn to scale and shall indicate the nature and extent of the work or proposed *occupancy* in sufficient detail to establish that, when completed, the work and the proposed *occupancy* will conform to this Code.
- 3) When proposed work is changed during construction, information on the changes shall comply with the requirements of this Section for proposed work.
- 4) Plans and specifications shall include, so far as is applicable,
  - a) floor plans on a scale of not less than 1:100,
  - b) dimensions of all rooms,
  - c) a description of the purpose of all rooms,
  - d) the location of all walls, *partitions*, doorways, windows and other openings,
  - e) the finish of all floors, walls and ceilings,
  - f) the location and description of all fixed equipment, and
  - g) *building* sections, elevations and details sufficient to determine if the proposed *work* meets the requirements of this Code.

**2.2.2.2. Site Plans**

- 1) If requested by the *authority having jurisdiction*, the *owner* shall submit an up-to-date plan of survey or real property report, prepared by a registered Alberta Land Surveyor, containing sufficient information regarding the site and the location of the *building*
  - a) to establish before construction starts that all requirements of this Code in relation to this information will be complied with, and
  - b) to verify upon completion of the *work* that all such requirements have been complied with.
- 2) Site plans shall show
  - a) by dimensions from property lines, the location of the proposed *building*,
  - b) the similarly dimensioned location of every adjacent existing *building* on the property,
  - c) existing and finished ground levels to an established datum at or adjacent to the site, and
  - d) the access routes for firefighting.

**2.2.2.3. Site Grading**

- 1) The *authority having jurisdiction* may require that an *owner* have a *building* site graded in conformance with a surface drainage plan, established by the council of the local authority, for the area in which the *building* is located.

**2.2.2.4. Dimensional Tolerances**

- 1) If life safety will not be reduced, the *authority having jurisdiction* may accept minor variation, not more than 2%, in a dimension given in this Code.

**2.2.2.5. Fabrication and Erection of Steel**

1) The *owner* shall submit evidence to the *authority having jurisdiction*, before construction begins, that all fabricators and erectors of welded construction for *buildings* constructed under Part 4 of Division B are certified by the Canadian Welding Bureau. (See Appendix A.)

**2.2.2.6. Swimming Pools**

1) Before a slide or other piece of play equipment is permanently installed or constructed in a *swimming pool*, the design and location shall be submitted for review and acceptance by the *authority having jurisdiction*.

2) The design of a water treatment system using ozone, ultraviolet light or any other supplemental disinfection system shall be submitted for review and acceptance by the *authority having jurisdiction*. (See Appendix A.)

**2.2.2.7. Water Theme Parks**

1) If a special discharge system that assures safe discharge from a water slide flume is proposed, background material shall be submitted for review and acceptance by the *authority having jurisdiction*.

**2.2.3. Fire Protection Components****2.2.3.1. Information Required for Fire Protection Components**

1) Information shall be submitted to show the major components of fire protection including

- a) the division of the *building* by *firewalls*,
- b) the *building area*,
- c) the degree of *fire separation* of *storeys*, shafts and special rooms or areas, including the location and rating of *closures* in *fire separations*,
- d) the source of information for *fire-resistance ratings* of elements of construction (to be indicated on large-scale sections),
- e) the location of *exits*, and
- f) fire detection, suppression and alarm systems.

**2.2.3.2. Plans of Fire Suppression Systems**

1) Before a fire suppression system is installed or altered, plans showing full details of the proposed fire suppression system and essential details of the *building* in which it is to be installed shall be drawn to scale and submitted with the application to build.

2) Unless deemed by the *authority having jurisdiction* to be a minor *alteration* to an existing system, all plans and specifications produced for an automatic fire suppression system referred to in Sentence 2.4.2.3.(1) shall be imprinted with the stamp or seal of a *professional engineer*.

**2.2.3.3. Plans of Fire Alarm Systems**

1) Before a fire alarm system is installed or altered, plans showing full details of the *building* in which it is to be installed shall be drawn to scale and submitted with the application to build.

2) Unless deemed by the *authority having jurisdiction* to be a minor *alteration* to an existing system, all plans and specifications produced for a fire alarm system referred to in Sentence 2.4.2.4.(1) shall be imprinted with the stamp or seal of a *professional engineer*.

**2.2.4. Structural and Foundation Drawings and Calculations****2.2.4.1. Application**

1) This Subsection applies only to a *building* for which a *professional engineer* or *registered architect* or both is required to be involved in accordance with Subsection 2.4.2.

**2.2.4.2.****2.2.4.2. Professional Seal and Signature of Designer**

1) Structural drawings and related documents submitted with the application to build shall be dated and shall bear the authorized professional seal and signature of the *designer* as defined in Sentence 2.4.2.2.(1).

**2.2.4.3. Information Required on Structural Drawings**

1) Structural drawings and related documents submitted with the application to build shall indicate, in addition to those items specified in Article 2.2.4.6. and in Part 4 of Division B applicable to the specific material,

- a) the name and address of the person responsible for the structural design,
- b) the date of issue of the Code and standards to which the design conforms,
- c) the dimensions, location and size of all structural members in sufficient detail to enable the design to be checked,
- d) sufficient detail to enable the *dead loads* to be determined, and
- e) all effects and loads, other than *dead loads*, used for the design of the structural members and exterior cladding.

**2.2.4.4. Drawings of Parts or Components**

1) Structural drawings of parts or components including *guards* designed by a person other than the *designer* of the *building* shall be dated and shall bear the authorized professional seal and signature of the *designer* of such parts or components.

**2.2.4.5. Design Calculations and Analysis**

1) The calculations and analysis made in the design of the structural members, including parts and components, of a *building* shall be available for inspection upon request.

**2.2.4.6. Information Required on Foundation Drawings**

1) *Foundation* drawings submitted with the application to build or excavate shall be provided to indicate

- a) the type and condition of the *soil* or *rock*, as well as the *groundwater* conditions, as determined by the *subsurface investigation*,
- b) the factored bearing pressures on the *soil* or *rock*, the factored loads when applicable and the design loads applied to *foundation units*, and
- c) the earth pressures and other loads applied to the supporting structures of supported *excavations*.

2) When required, evidence that justifies the information on the drawings shall be submitted with the application to excavate or build.

**2.2.4.7. Altered Conditions**

1) Where conditions as described under Sentences 4.2.2.4.(1) and (2) of Division B are encountered, or where *foundation units* or their locations are altered, this information shall be recorded on appropriate drawings or new “as constructed” drawings.

**2.2.5. Drawings and Specifications for Environmental Separators and Other Assemblies Exposed to the Exterior****2.2.5.1. Application**

1) This Subsection applies to *building* materials, components and assemblies to which Part 5 of Division B applies. (See Article 1.3.3.2. of Division A.)

**2.2.5.2. Information Required on Drawings and Specifications**

1) Information shown on drawings and in specifications shall be clear and legible, and shall contain sufficient details to demonstrate conformance with this Code. (See A-2.2.6.2.(1) in Appendix A.)

## 2.2.6. Heating, Ventilating and Air-conditioning Drawings and Specifications

### 2.2.6.1. Application

1) This Subsection applies only to *buildings* covered in Part 6 of Division B. (See Article 1.3.3.2. of Division A.)

### 2.2.6.2. Information Required on Drawings

1) The information shown on architectural drawings and on drawings for heating, ventilating and air-conditioning systems shall be clear and legible and shall contain all necessary details to demonstrate conformance with this Code. (See Appendix A.)

## 2.2.7. Electrical Drawings and Specifications

### 2.2.7.1. Application

1) Requirements of this Subsection apply to *appliances*, systems and equipment that are required to be installed in a *building* and are operated by either the regular or emergency electrical power supply.

### 2.2.7.2. Information Required on Drawings

1) The information shown on architectural plans and on plans for electrical systems shall be clear and legible and shall contain all the necessary details to demonstrate conformance with this Code. (See Appendix A.)

## 2.2.8. Drawings and Specifications for Plumbing and Health Services

### 2.2.8.1. Application

1) This Subsection applies to a *building* that contains a *food establishment* or a *swimming pool*.

### 2.2.8.2. Kitchen Equipment

1) Plans showing the layout of food preparation equipment shall be submitted by the *owner* to the Regional Health Authority for review.

### 2.2.8.3. Swimming Pools

1) In addition to the requirements in Sentences (2) to (4) and except as provided in Article 2.2.8.4., the plans and specifications for a *swimming pool* shall be prepared by and shall bear the stamp or seal of a *registered professional*.

- 2) The plans shall show complete construction details and shall include
- a) a site plan,
  - b) a floor plan,
  - c) structural plans,
  - d) mechanical plans, and
  - e) electrical plans.

(See Appendix A.)

- 3) The plans and specifications shall include
- a) the deck elevation relative to the surrounding area,
  - b) the location of outlets, drains, overflows, inlets, steps and ladders, diving boards, walk areas, lighting fixtures, equipment, dressing room areas and utility service lines,
  - c) the source of water supply and the method of waste water disposal,

- d) a statement of
  - i) *swimming pool* volume,
  - ii) unit filtration rate,
  - iii) *maximum design bathing load*,
  - iv) *bathing load*,
  - v) total water surface area,
  - vi) deck area,
  - vii) design circulation rate in litres per second,
  - viii) turnover period,
  - ix) chlorinator capacity,
  - x) filter area and type,
  - xi) number of inlets,
  - xii) number of skimmers or gutter drains, and
  - xiii) gutter capacity or surge tank capacity,
- e) complete detailed specifications and drawings for the construction of dressing room facilities, the water circulation system, filtration facilities, disinfection equipment and all appurtenances, and
- f) type of backflow prevention used on the make-up water to avoid cross connection with a public water supply, if applicable.

**4)** The plans and specifications shall be submitted by the *owner* to the Regional Health Authority.

#### 2.2.8.4. Private Swimming Pools

**1)** Except for a premanufactured *private swimming pool* that is entirely above ground, plans and specifications for a *private swimming pool* shall be submitted to the *authority having jurisdiction* and shall include

- a) a site plan,
- b) details of the *swimming pool* construction,
- c) schematics for the *swimming pool* mechanical system, including line sizes, location of inlets and outlets,
- d) source of water supply and waste water disposal, and
- e) *swimming pool* data giving
  - i) *swimming pool* size and surface area,
  - ii) *swimming pool* water volume complete with calculations,
  - iii) *swimming pool* circulation rate,
  - iv) *swimming pool* turnover rate,
  - v) filter type, size and model,
  - vi) circulation pump, type, size, model, and flow rate,
  - vii) number of inlets,
  - viii) number of skimmers, and
  - ix) number of main drains.

### 2.2.9. Permits

#### 2.2.9.1. General

**1)** A *permit* is required for the construction, *alteration*, installation, repair, relocation, demolition, or change in *occupancy* of any *work* to which this Code applies in accordance with regulations made pursuant to the Safety Codes Act.

**2)** In addition to a *permit* that is required by Sentence (1), other *permits* may be required for the installation of related *building* services.

**3)** An *owner* shall ensure that all *permits* required in connection with proposed *work* are obtained before starting the *work* to which they relate.

#### 2.2.9.2. Permit Fees

**1)** *Permit* fees and application procedures shall be as established by regulation or bylaw made pursuant to the Safety Codes Act.

2) The *authority having jurisdiction* may place a valuation on *work* for the purpose of determining fees.

### 2.2.9.3. Obtaining Permits

1) The *authority having jurisdiction* shall accept and process an application for a *permit*.

2) An *owner* may apply for an order of mandamus to obtain a *permit* if the proposed *project* meets the applicable requirements of the Safety Codes Act and this Code.

3) No person shall submit in support of an application or as an application for a *permit* any plans, drawings or specifications for the construction, erection or enlargement of any *building* that is a category or type of *building* described in Subsection 2.4.2., unless the plans or specifications comply with the seals and stamps requirements of that Subsection.

### 2.2.9.4. Required Information

- 1) Except as otherwise required by this Part every applicant for a *permit* shall
- identify and describe in detail the *project* or *occupancy* to be covered by the *permit* for which application is made,
  - describe the land on which the *project* is to be undertaken by a description that will readily identify and locate the *building* lot,
  - submit plans, specifications or other documents, showing the proposed *occupancy* of all parts of the *building*,
  - state the valuation of the proposed *project*, and
  - state, as applicable, the names, addresses and telephone numbers of the *owner* and the *designer*.

### 2.2.9.5. Records

1) The *authority having jurisdiction* may keep copies of all applications received, *permits* and orders issued, inspections and tests made, and of all papers and documents connected with the administration of regulations made under the Safety Codes Act.

### 2.2.9.6. Deviations

1) The *owner* shall not deviate, nor authorize a deviation, from the requirements of this Code, or the conditions of a *permit*, without first obtaining permission in writing to do so from the *authority having jurisdiction*.

### 2.2.9.7. Permit Revoked

- 1) The *authority having jurisdiction* may revoke a *permit* if
- there is a contravention of any condition under which the *permit* was issued,
  - the *permit* was issued in error, or
  - the *permit* was issued on the basis of incorrect information.

### 2.2.9.8. Refusal to Proceed

1) The *authority having jurisdiction* may refuse to allow any *building*, *project*, *work* or *occupancy* that would not be permitted by the Safety Codes Act, this Code or other legislation.

2) The *authority having jurisdiction* may refuse to allow any *building*, *project*, *work* or *occupancy* if

- incorrect information is submitted, or
- the information submitted is inadequate to determine compliance with the provisions of the Safety Codes Act, this Code or other legislation.

3) A person who is refused a *permit* may appeal the refusal in accordance with the Safety Codes Act and regulations made pursuant to the Act.

**2.2.9.9. Responsibility for Compliance**

**1)** Neither the issuance of a *permit*, nor inspections made by the *authority having jurisdiction*, shall in any way relieve the *owner* of a *building* from full responsibility for carrying out the construction or having the construction carried out in accordance with the requirements of the Safety Codes Act and regulations made pursuant to that Act, this Code, or the *permit*, including compliance with any special conditions required by the *authority having jurisdiction*.

**2)** The *owner* shall ensure that all activities that take place on the site meet the requirements of this Code.

**3)** The *constructor* shall ensure that

- a) precautions are taken to safeguard the public and protect adjacent properties,
- b) the methods used in demolition or erection are safe, and
- c) the material and equipment used on site meet the requirements of this Code.

**4)** Every vendor or supplier of materials and things used in the construction of a *building* shall ensure that the materials and equipment he advertises, displays, sells, leases or otherwise disposes of meet the requirements of this Code.

**5)** The *designer* shall ensure that the plans and specifications comply with the requirements of this Code.

**2.2.10. Occupancy****2.2.10.1. Occupancy Permit**

**1)** If required by the *authority having jurisdiction*, an *owner* shall obtain an *occupancy permit* or permission in writing to occupy from the *authority having jurisdiction*, before any

- a) *occupancy* of a *building* after
  - i) construction,
  - ii) relocation,
  - iii) partial demolition, or
  - iv) *alteration* of that *building*, and
- b) change in the *occupancy* of a *building*.

**2)** An *occupancy permit* or permission to use a *building* issued under the Safety Codes Act shall not be construed to be a licence to operate or engage in any business.

**2.2.10.2. Occupancy before Completion**

**1)** The *authority having jurisdiction* may issue an *occupancy permit*, subject to compliance with provisions to safeguard persons in or about the *project*, to allow the *occupancy* of a *building* before completion of the *project*.

**2)** The *owner* shall ensure that no *unsafe condition* exists or will exist because of construction or *work* being undertaken or not completed should *occupancy* occur before the completion of the construction or *work*.

**2.2.10.3. Tents and Air-Supported Structures**

**1)** Unless otherwise allowed by the *authority having jurisdiction*, a tent or air-supported structure shall not be erected unless an *occupancy permit*, or permission in writing, has been obtained from the *authority having jurisdiction*.

**2)** The *authority having jurisdiction* may issue an *occupancy permit* for, or permission in writing to occupy, a tent or an air-supported structure for a period of up to 12 months, if he is satisfied the tent or air-supported structure complies with the performance required by this Code.

**3)** Approval to occupy a tent or air-supported structure may be renewed, if the tent or air-supported structure complies with all requirements in effect at the time of request for renewal.

**2.2.10.4. Dairy Manufacturing Plants**

- 1) Upon completion of the construction or *alteration* of a *dairy manufacturing plant*, the *occupancy* and use of the plant shall not commence until
  - a) a final inspection by the *authority having jurisdiction* has taken place and permission has been given to occupy the *building*, and
  - b) permission to use the *building* has been granted by Alberta Agriculture, Food and Rural Development confirming the *building* has met all the requirements of the Dairy Industry Act and regulations made pursuant to that Act.

**2.2.10.5. Medical Gas Piping Systems**

- 1) Upon completion of the installation or *alteration* of a non-flammable medical gas piping system,
  - a) the non-flammable medical gas piping system shall be inspected and tested in conformance with CAN/CSA-Z305.1, "Nonflammable Medical Gas Piping Systems," and
  - b) a report shall be prepared by the testing organization indicating the results of the inspection made and testing performed in respect of the non-flammable medical gas piping system.
- 2) A non-flammable medical gas piping system shall not be used until the report required by Sentence (1) has been
  - a) certified by the person making the report that the non-flammable medical gas piping that is the subject of the report conforms to CAN/CSA-Z305.1, "Nonflammable Medical Gas Piping Systems," and
  - b) filed with and accepted by the *authority having jurisdiction*.

**2.2.11. Prohibitions****2.2.11.1. Prohibited Actions**

- 1) No person
  - a) shall fail to complete construction or demolition that is regulated by this Code and is shown on the plans, specifications and documents before occupying a *building* without first having obtained the permission of the *authority having jurisdiction* in accordance with this Section,
  - b) being responsible for the use, *occupancy*, relocation, construction, *alteration*, demolition of, or addition to a *building* shall cause, allow or maintain an *unsafe condition*,
  - c) shall undertake *work* on, over or under public property, or erect or place any construction or store any material thereon, without first having obtained permission from the appropriate authority,
  - d) shall allow the property boundaries, or grading of a *building* lot to be changed so as to place a *building* in contravention of this Code unless the *building* is altered, after obtaining any necessary *permits*, so that no contravention will occur as a result of the change of the property boundary, or grading, of the *building* lot,
  - e) shall knowingly submit false or misleading information,
  - f) shall change the size or scope of a *project* for which a *permit* has been issued, or permission to construct has been given, without first having obtained, in writing, the permission of the *authority having jurisdiction*, or
  - g) shall remove or deface any label or marking on a material or product that has been affixed to show compliance with this Code or a referenced document.

**2.2.12. Required Notification****2.2.12.1. Notification Before Starting**

- 1) Before *work* is started on a *project*, the *owner* shall give notice to the *authority having jurisdiction* of the date on which *work* will start.

- 2) The *owner* shall give notice in writing to the *authority having jurisdiction*
  - a) before starting *work*, listing the name, address and telephone number of
    - i) the *constructor* or other person responsible for the *work*,
    - ii) any *professional engineer, registered architect* or *registered professional of record* reviewing the *work*, and
    - iii) any inspection or testing agency engaged to monitor the *work*, and
  - b) of any change in or termination of employment of those persons listed in Clause (a) during the course of construction, immediately after the change or termination occurs.

3) The *owner* proposing to construct or alter a *dairy manufacturing plant* shall notify in writing the *authority having jurisdiction* that the plans describing the process and equipment layout have been submitted to Alberta Agriculture, Food and Rural Development for their review.

4) The *owner* proposing to construct or alter an *abattoir* or *secondary meat processing plant* shall notify the *authority having jurisdiction* that plans describing the process and the equipment layout have been submitted to Alberta Agriculture, Food and Rural Development for approval.

5) The *owner* proposing to construct or alter a *food establishment* shall notify in writing the *authority having jurisdiction* that the plans and specifications describing the process and the layout of food preparation equipment have been submitted to the local Regional Health Authority for review.

#### 2.2.12.2. Change in Professional Involvement

1) The *owner* and *coordinating registered professional* shall notify the *authority having jurisdiction* should the *coordinating registered professional* cease to be retained at any time during the construction of the *project*.

2) The *owner* and *registered professional of record* shall notify the *authority having jurisdiction* should the *registered professional of record* cease to be retained at any time during the construction of the *project*.

#### 2.2.12.3. Change of Ownership

1) The *owner* shall give notice in writing to the *authority having jurisdiction* of an impending change in ownership.

2) A new *owner* shall provide assurance that compliance with Subsection 2.2.8. and Sentence 2.4.3.1.(1) will continue under new ownership.

#### 2.2.12.4. Availability of Documents

1) The *owner* shall ensure that the plans and specifications, on which the issue of the *permit* was based, are available at the *project* site during working hours for inspection by the *authority having jurisdiction*.

#### 2.2.12.5. Inspection

- 1) The *owner* shall give notification to the *authority having jurisdiction*
  - a) of the intent to undertake construction that is required to be inspected,
  - b) of the intent to cover construction that is required to be inspected before covering, and
  - c) when construction has been completed.

2) If required by the *authority having jurisdiction*, an *owner* shall have uncovered and replaced at his own expense any construction that has been covered contrary to an order, or condition of a *permit*, issued by the *authority having jurisdiction*.

**2.2.12.6. Verification of Compliance**

1) Except as required in Article 2.4.3.2., when required by the *authority having jurisdiction*, an *owner* or a *constructor* shall provide written assurance from the person supervising construction that the construction was in compliance with the requirements of this Code and any *permits* issued.

**2.2.13. Safety During Construction****2.2.13.1. Safety During Construction**

1) Except as required by Sentence 2.4.4.2.(1), the *constructor* shall be responsible for ensuring compliance with Part 8 of Division B.

2) The *constructor* is responsible jointly and severally with the *owner* for any construction or *work* undertaken.

**2.2.13.2. Responsibility for Damage**

1) The *owner* is responsible for the repair of any damage to public property or works located thereon that may occur as a result of undertaking *work* regulated by this Code.

2) The *owner* shall ensure that *work* undertaken does not damage or create a hazard to adjacent properties.

**2.2.13.3. Cranes and Equipment**

1) The *authority having jurisdiction* may order the method of construction to stop and the equipment used in that method of construction to be removed if cranes or other equipment used in a particular method of construction

- a) interfere with public safety,
- b) create an *unsafe condition*, or
- c) interfere with or disrupt activities on or impede access to
  - i) adjacent properties, or
  - ii) public facilities within the municipality.

**2.2.14. Unsafe Condition****2.2.14.1. Correcting an Unsafe Condition**

1) If a *building* is in an *unsafe condition*, the *owner* shall forthwith take all necessary action to correct the condition.

2) The *authority having jurisdiction* may order the *owner* of any *building* to correct any *unsafe condition*.

3) If immediate measures must be taken to avoid an imminent danger of fire or risk of accident, the *authority having jurisdiction* may take any action deemed necessary to reduce the danger of fire or risk of accident, without notice, and at the expense of the *owner*.

**2.2.15. Building Failures****2.2.15.1. Reporting Failures**

1) Except as required by Sentence (2), if a failure occurs in a *building* regulated by this Code that causes, or has the potential to cause, injury or loss of life, the *owner* shall submit a report, if requested by the *Chief Building Administrator*, that includes

- a) the name and address of the *owner* of the *building*,
- b) the name and address of the *building* involved in the failure,
- c) the name and address of the *constructor* or the person who supervised the construction of the *building*,
- d) the nature of the failure, and
- e) a description of the remedial action that is being undertaken.

- 2)** If a structural collapse occurs in a *building* regulated by this Code, the *owner* shall submit a report to the *Chief Building Administrator* that includes
- a) the name and address of the *owner* of the *building*,
  - b) the name and address of the *building*,
  - c) if involved, the name and address of
    - i) the *registered architect* who designed the *building*,
    - ii) the *professional engineer* who designed the structure of the *building*,
    - iii) the *professional engineer* who reviewed the construction of the *building*, and
    - iv) the *constructor* who supervised the construction of the *building*,
  - d) the nature of the structural collapse, and
  - e) a description of the remedial action that is being undertaken.

## 2.2.16. Orders and Appeals

### 2.2.16.1. General

- 1)** If a person is issued an order pursuant to the Safety Codes Act by the *authority having jurisdiction* and objects to the contents of the order, that person may
- a) have the order reviewed by the *Chief Building Administrator*, and/or
  - b) appeal the order to the Safety Codes Council.
- 2)** A request to have the order reviewed by the *Chief Building Administrator* must be completed within 14 days of when the order was served. (See Appendix A.)
- 3)** The *Chief Building Administrator* may revoke or vary the original order if the order
- a) is improper, impractical, or unreasonable,
  - b) contains errors, or
  - c) does not correct or satisfy concerns about safety.
- 4)** An appeal must be commenced by serving notice to the Safety Codes Council within 35 days of the date the order was served.
- 5)** An appeal does not operate as a stay of the order unless a chair of the Safety Codes Council so directs.
- 6)** A request for a review, an appeal or a stay of an order shall be in writing.

## Section 2.3. Alternative Solutions

### 2.3.1. Documentation of Alternative Solutions

(See Appendix A.)

#### 2.3.1.1. Documentation

- 1)** Documentation conforming to this Subsection shall be provided by the person requesting the use of an alternative solution to demonstrate that the proposed alternative solution complies with this Code.
- 2)** The documentation referred to in Sentence (1) shall include
- a) a Code analysis outlining the analytical methods and rationales used to determine that a proposed alternative solution will achieve at least the level of performance required by Clause 1.2.1.1.(1)(b) of Division A, and
  - b) information concerning any special maintenance or operational requirements, including any *building* component commissioning requirements, that are necessary for the alternative solution to achieve compliance with the Code after the *building* is constructed.

**3)** The Code analysis referred to in Clause (2)(a) shall identify the applicable objectives, functional statements and acceptable solutions, and any assumptions, limiting or restricting factors, testing procedures, engineering studies or *building* performance parameters that will support a Code compliance assessment.

**4)** The Code analysis referred to in Clause (2)(a) shall include information about the qualifications, experience and background of the person or persons taking responsibility for the design.

**5)** The information provided under Sentence (3) shall be in sufficient detail to convey the design intent and to support the validity, accuracy, relevance and precision of the Code analysis.

**6)** Where the design of a *building* includes proposed alternative solutions that involve more than one person taking responsibility for different aspects of the design, the applicant for the permit shall identify a single person to co-ordinate the preparation of the design, Code analysis and documentation referred to in this Subsection.

**7)** The *authority having jurisdiction* shall forward a copy of what was accepted as an alternative solution to the *Chief Building Administrator* to be registered as a variance.

## Section 2.4. Professional Design and Review

### 2.4.1. Application

#### 2.4.1.1. Application

**1)** The requirements of Subsection 2.4.3. apply to an *owner* who applies for a *building permit* for a *building* that falls within the scope of Sentence 2.4.2.1.(3) or (4). (See Appendix A.)

### 2.4.2. Professional Involvement

#### 2.4.2.1. General

**1)** If drawings or specifications are required to be imprinted with the seals or stamps of a *registered architect* or a *professional engineer*, the seals or stamps must be signed and dated by the respective professionals in accordance with the enactments that govern their professions.

**2)** Except as required in Sentence (8), architect and engineer seals and stamps are not required on plans or specifications for a *building*

- a) 3 storeys or less in *building height*, for an *assembly occupancy* or *care or detention occupancy* that,
  - i) if 1 storey in *building height*, has a *building area* of 300 m<sup>2</sup> or less,
  - ii) if 2 storeys in *building height*, has a *building area* of 150 m<sup>2</sup> or less, or
  - iii) if 3 storeys in *building height*, has a *building area* of 100 m<sup>2</sup> or less,
- b) classified as a *residential occupancy* that is
  - i) a single family dwelling, or
  - ii) a multiple family dwelling that contains 4 *dwelling units* or less,
- c) classified as a *residential occupancy*, 3 storeys or less in *building height*, as a hotel, motel, or similar use that,
  - i) if 1 storey in *building height*, has a *building area* of 400 m<sup>2</sup> or less,
  - ii) if 2 storeys in *building height*, has a *building area* of 200 m<sup>2</sup> or less, or
  - iii) if 3 storeys in *building height*, has a *building area* of 130 m<sup>2</sup> or less,

- d) 3 storeys or less in *building height*, classified as a *business and personal services occupancy, mercantile occupancy or industrial occupancy* that,
  - i) if 1 storey in *building height*, has a *building area* of 500 m<sup>2</sup> or less,
  - ii) if 2 storeys in *building height*, has a *building area* of 250 m<sup>2</sup> or less, or
  - iii) if 3 storeys in *building height*, has a *building area* of 165 m<sup>2</sup> or less,
- e) that is a farm *building* not for public use, or
- f) classified as a relocatable industrial camp *building*.

**3)** Plans and specifications must be imprinted with the seals or stamps of either a *registered architect*, or one or more *professional engineers* qualified to engage in the appropriate combination of those branches of *professional engineering* that are applicable to *building design and construction for a building* that is

- a) 3 storeys or less in *building height* and classified as a *residential occupancy*, containing at least 5 but not more than 20 *dwelling units* in a single site,
- b) classified as an *industrial occupancy* and the *occupant load* is 28 m<sup>2</sup> per person or greater, or
- c) classified for more than one *occupancy group*, if
  - i) the *major occupancy* of the *building* is industrial,
  - ii) the *occupant load* is 28 m<sup>2</sup> per person or greater, and
  - iii) any *occupancy* other than the *major occupancy* does not exceed 400 m<sup>2</sup> in *building area*.

**4)** For *buildings* other than those described in Sentences (2) and (3), the *building plans and specifications* must be imprinted with seals and stamps of both

- a) a *registered architect* in the case of architectural design, and
- b) one or more *professional engineers* qualified to engage in the appropriate combination of those branches of *professional engineering* that are applicable to *building design and construction* in the case of engineering design.

**5)** Notwithstanding the requirements of Sentence (4), if a *project* is limited to either *architectural work* or *engineering work*, the plans and specifications for the cutting, patching, or modification necessary to properly incorporate the primary *work* require only a single seal or stamp.

**6)** Notwithstanding the requirements of Sentence (1), a *registered architect* or *professional engineer* who is authorized by the Council as defined in the Architects Act or the Engineering, Geological and Geophysical Professions Act to submit a design without the seal or stamp of the other profession may submit an application with plans and specifications that do not have the seal or stamp of the other profession if authorization is presented with the application.

**7)** Notwithstanding the requirements of Sentences (3) and (4), if the *project* is restricted to *interior design work*, the seal or stamp of an *interior designer* may be accepted instead of an architect seal or stamp for that *interior design work*.

**8)** If the size or complexity of a *project* may give rise to special safety concerns, the *authority having jurisdiction* may require

- a) that all or part of the plans and specifications of a *building* be imprinted with a stamp or seal affixed by a
  - i) *professional engineer* where *engineering work* is involved,
  - ii) *registered architect* where *architectural work* is involved, or
  - iii) both a *professional engineer* and *registered architect*, and
- b) that *field reviews* during construction of a *building* be performed by a
  - i) *professional engineer* where *engineering work* is involved,
  - ii) *registered architect* where *architectural work* is involved, or
  - iii) both a *professional engineer* and *registered architect*.

#### 2.4.2.2. Structural Design

**1)** For design carried out in accordance with Part 4 of Division B, the *designer* shall be a *professional engineer* or *registered architect* licensed to practice in Alberta and skilled in the *work* concerned. (See Appendix A.)

2) If a preserved wood *foundation* is to be installed in a *building* in accordance with Part 4 of Division B, the *owner* shall submit evidence to the *authority having jurisdiction*, before construction begins, that they have retained a *professional engineer* to perform *field reviews* of the *foundation* system during installation.

#### 2.4.2.3. Fire Suppression System Designs

1) If an automatic fire suppression system is to be installed in a *building* described in Sentence 2.4.2.1.(3) or (4), the *owner* shall submit evidence to the *authority having jurisdiction*, before construction begins, that they have retained a *professional engineer* to

- a) design the system,
- b) perform *field reviews* of the system during installation, and
- c) witness the testing of the system after installation.

#### 2.4.2.4. Fire Alarm System Designs

1) If a fire alarm system is to be installed in a *building* described in Sentence 2.4.2.1.(3) or (4), the *owner* shall submit evidence to the *authority having jurisdiction*, before construction begins, that they have retained a *professional engineer* to

- a) design the system,
- b) perform *field reviews* of the system during installation, and
- c) perform verification of the system after installation.

### 2.4.3. Schedules of Professional Involvement

(See Appendix B.)

#### 2.4.3.1. Owner

- 1) Before beginning construction, the *owner* shall
  - a) retain a *coordinating registered professional* to coordinate all design *work* and *field reviews* of the *registered professionals* required for the *project* in order to ascertain that
    - i) the design will comply with this Code and other regulations made pursuant to the Safety Codes Act, and
    - ii) the construction of the *project* will substantially comply with this Code and other regulations made pursuant to the Safety Codes Act,  
(see Appendix A),
  - b) retain *registered professionals of record* to complete design *work* and *field review* required for the *project*, and
  - c) provide the *authority having jurisdiction* letters in the forms set out in Schedules A-1, A-2, B-1 and B-2 (see Appendix A).

#### 2.4.3.2. Authority Having Jurisdiction

1) Before issuing an *occupancy permit* or giving permission to occupy, the *authority having jurisdiction* shall receive assurance in the form set out in Schedule C-1 from the *coordinating registered professional* that the *building* or portion of the *building* to be occupied substantially complies with the requirements of this Code. (See Appendix A.)

#### 2.4.3.3. Stoppage of Work

- 1) Where a *coordinating registered professional* ceases to be retained, *work* on the *project* will stop until a replacement is appointed.
- 2) Where a *registered professional of record* ceases to be retained, *work* on that portion of the *project* for which the *registered professional* was responsible shall stop until the *registered professional* is replaced.

**2.4.4.1.****2.4.4. Responsibilities****2.4.4.1. Registered Professional**

- 1)** The *coordinating registered professional* for the *project* shall ensure that
  - a) the design requirements are coordinated and comply with the requirements of this Code,
  - b) any corrective actions taken as a result of a *field review* are recorded and available to the *authority having jurisdiction* on their request, and
  - c) the *authority having jurisdiction* is provided with a letter in the form set out in Schedule C-1 stating that the *project* for which *registered professionals* were retained substantially complies with this Code.
  
- 2)** A *registered professional of record* shall
  - a) sign and seal the drawings required in support of the *building permit* application,
  - b) ensure that drawings comply with the requirements of this Code,
  - c) ensure that *field reviews* that are necessary to comply with Clause (b) are completed, and
  - d) provide a letter to the *coordinating registered professional* in the form set out in Schedule C-2 stating that components of the *project* for which the *registered professional* is responsible are constructed so as to substantially comply with
    - i) the plans and supporting documents, and
    - ii) the requirements of this Code.

**2.4.4.2. Constructor**

- 1)** The *constructor* shall be responsible for the construction safety aspects of the *project* and when required shall retain a *registered professional* to design temporary structural members such as formwork, falsework, hoarding and scaffolding. (See Article 4.1.1.3. of Division B and Appendix A.)

**2.4.5. Off-Site Review****2.4.5.1. Factory-Built Assemblies**

- 1)** Where a *building* or component of a *building* is assembled off the *building* site in such a manner that it cannot be reviewed on site, off-site reviews shall be carried out to determine compliance with this Code.
  
- 2)** Every *manufactured home* and off-site manufactured house that is constructed after 02 September 2007 shall be certified by the Canadian Standards Association or an organization approved for this purpose by the *Chief Building Administrator*, to confirm that the unit complies with the objectives and functional statements of this Code.
  
- 3)** Every relocatable industrial camp *building* that is constructed after 02 September 2007 shall be certified by an organization approved for this purpose by the *Chief Building Administrator*, to confirm that the *building* complies with the objectives and functional statements of this Code.

# Appendix A

## Explanatory Material

**A-2.2.1.2. Building Code Variances.** The Chief Building Administrator and safety codes officers both evaluate and issue variances using the procedures for alternative solutions described in Section 2.3. The difference is one of scope and application.

A variance issued by the Chief Building Administrator under Article 2.2.1.2. is applicable throughout the province and is published on the Alberta Municipal Affairs and Housing Web site. The application to the Chief Building Administrator must show that the issue is province-wide and is not applicable to only a single location or project. The Chief Building Administrator, in accordance with policy, does not issue project-specific variances.

A variance issued by a safety codes officer is project-specific and does not set a precedent: each request for a variance must be evaluated on its own merits and within its own particular circumstances.

In previous editions of the Alberta Building Code, Building Code Variances were known as Director's Rulings. The name change is for the purpose of consistency with the terms used in the Safety Codes Act.

**A-2.2.1.3. Building Code Interpretations.** In previous editions of the Alberta Building Code, Building Code Interpretations were known as Director's Interpretations. The name change is for the purpose of consistency with the terms used in the Safety Codes Act.

**A-2.2.2.5.(1) Fabrication and Erection of Steel.** The design of welded steel components must meet the requirements of the following standards:

- CAN/CSA-S16.1, "Limit States Design of Steel Structures," and
- CAN/CSA-S136, "Cold Formed Steel Structures."

Both standards require that the design, fabrication and erection of steel structures be undertaken by companies and personnel certified by the Canadian Welding Bureau. This certification provides the structural engineer with the confidence that the design, fabrication and erection of welded steel is performed by companies having appropriately qualified personnel, approved procedures and adequate facilities. On completion of the project, the structural engineer will be required to give assurance that the requirements of the Code have been met.

**A-2.2.2.6.(2) Ozone Systems.** Ozone systems require the incorporation of a number of safeguards. Designers and manufacturers of such systems for use in Alberta should contact the authority having jurisdiction in the planning stages of such systems.

**A-2.2.6.2.(1) Information Required on Drawings and Specifications.** Examples of information that should be shown on architectural drawings and drawings for heating, ventilating and air-conditioning systems are:

- (a) the name, type and location of the building,
- (b) the name of the owner,
- (c) the name of the architect,
- (d) the name of the engineer or designer,
- (e) the north point,
- (f) the dimensions and height of all rooms,
- (g) the intended use of all rooms,
- (h) the details or description of the wall, roof, ceiling and floor construction, including insulation,
- (i) the details or description of the windows and outside doors, including the size, weatherstripping, storm sashes, sills and storm doors,
- (j) the size and continuity of all pipes, ducts, shafts, flues and fire dampers,

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This Appendix is included for explanatory purposes only and does not form part of the requirements. The numbers that introduce each Appendix Note correspond to the applicable requirements in this Division.

**A-2.2.7.2.(1)**

- (k) the location, size, capacity and type of all principal units of equipment,
- (l) the size, shape and height of all chimneys and gas vents,
- (m) the size and location of all combustion air and ventilation openings, and
- (n) the location and fire-resistance rating of required fire separations.

**A-2.2.7.2.(1) Information Required on Drawings and Specifications.** The location of electrical controls and devices is often placed on the architectural drawings. Separate detail drawings are provided by the electrical engineer of record.

**A-2.2.8.3.(2) Air Quality at Swimming Pools.** The ventilation rates for pool and deck areas and spectator areas listed in ASHRAE 62 may not be adequate for wave pools, leisure pools or whirlpools, where more airborne contaminants can be expected. The length of stay in these facilities should also be considered.

**A-2.2.16.1.(2) General Information on Appeals.** A review of an order by the Chief Building Administrator is an independent administrative review which is not part of the formal appeal process. An appeal of an order must be directed to the Safety Codes Council.

**A-2.3.1. Documentation of Alternative Solutions.** Beyond the purposes of demonstrating compliance and acquiring a building permit, there are other important reasons for requiring that the proponent of an alternative solution submit project documentation (i.e. a compliance report) to the authority having jurisdiction and for the authority having jurisdiction to retain that documentation for a substantial period following the construction of a building:

- Most jurisdictions require that a building be maintained in compliance with the codes under which it was built. Alternative solutions made possible by objective-based codes may have special maintenance requirements, which would be described in the documentation.
- Documentation helps consultants perform code compliance assessments of existing buildings before they are sold and informs current owners or prospective buyers of existing buildings of any limitations pertaining to their future use or development.
- Documentation provides design professionals with the basic information necessary to design changes to an existing building.
- An alternative solution could be invalidated by a proposed alteration to a building. Designers and regulators must therefore know the details of the particular alternative solutions that were integral to the original design. Complete documentation should provide insight as to why one alternative solution was chosen over another.
- Documentation is the “paper trail” of the alternative solution negotiated between the designer and the regulator and should demonstrate that a rational process led to the acceptance of the alternative solution as an equivalency.
- It is possible that over time a particular alternative solution may be shown to be inadequate. It would be advantageous for a jurisdiction to know which buildings included that alternative solution as part of their design: documentation will facilitate this type of analysis.
- Project documentation provides important information to a forensic team that is called to investigate an accident or why a design failed to provide the level of performance expected.

This subject is discussed in further detail in “Recommended Documentation Requirements for Projects Using Alternative Solutions in the Context of Objective-Based Codes,” which was prepared for the CCBFC Task Group on Implementation of Objective-Based Codes and is available at [www.nationalcodes.ca](http://www.nationalcodes.ca).

**A-2.4.1.1.(1) Professional Design and Review.** This Section applies to buildings referred to in Sentence 2.4.2.1.(3) or (4) (for which the Acts governing the professions require registered professionals to be involved). Though not intended for use with other buildings (those not covered by Sentences 2.4.2.1.(3) and (4)), letters of similar wording to those used in the Schedules could be used to have various elements of the building verified.

**A-2.4.2.2.(1) Structural Design.** Part 4 of Division B was written on the assumption that structural design will be carried out by a professional who is qualified for such design. Sentence 2.4.2.2.(1) is not intended to imply that a professional may not also be required in the application of requirements in other Parts of the Alberta Building Code.

**A-2.4.3.1.(1)(a) Coordinating Registered Professional.** A registered professional of record may serve as the coordinating registered professional. The phrase “substantially comply with this Code” is used in field review because a registered professional does not supervise the construction. Review is based on periodic site visits, approval of shop drawings and approved deviation from the original design.

**A-2.4.3.1.(1)(c) Provision of Schedules.** Schedules A-1 and A-2 should be in place after the issuance of a development permit and before starting work on plans and specifications. Schedules B-1 and B-2 are affirmations by the professionals of record that they were involved in the design and will be involved in the field review. The “A” and “B” Schedules shall be submitted to the authority having jurisdiction before the issuance of a building permit.

**A-2.4.3.2.(1) Authority Having Jurisdiction.** The role of the coordinating registered professional is to ensure the building as a whole substantially meets the requirements of the Code. The coordinating registered professional is to obtain from all professionals of record assurance that their responsibilities have been met and verify that cross-disciplinary connections function to meet the requirements of the Code; for example, a fire alarm system designed and verified by the electrical engineer and required to close a damper designed by the mechanical engineer operates when a fire alarm is initiated.

**A-2.4.4.2.(1) Constructor.** The constructor shall be responsible for the construction safety aspects of the project, and when required, shall retain a registered professional to design temporary structural members such as formwork, falsework and scaffolding. Field review by registered professionals is not supervision. It is the responsibility of the constructor to ensure that the construction progresses according to plans and specifications.



# Appendix B

## Schedules of Professional Involvement

**B-2.4.3. Schedules of Professional Involvement.** The Schedules are intended to clearly define the relationship between the owner of the building and the required professionals. They are also needed to show how the various professional disciplines will be coordinated. The coordination relates to both the design and site review of all aspects of the building.

The following Schedules are provided on the following pages:

- **Schedule A-1** Letter of Commitment by the Owner and Coordinating Registered Professional<sup>(1)</sup>
- **Schedule A-2** Confirmation of Commitment by Owner and by Registered Professional of Record<sup>(1)</sup>
- **Schedule B-1** Letter of Commitment by the Registered Professional of Record<sup>(2)</sup>
- **Schedule B-2** Summary of Design and Field Review Requirements<sup>(2)</sup>
- **Schedule C-1** Assurance of Compliance Coordinating Registered Professional<sup>(3)</sup>
- **Schedule C-2** Assurance of Professional Field Review and Compliance<sup>(3)</sup>

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(1) Schedules A-1 and A-2 should be in place at the inception of the project before the issuance of a development or building permit. These help establish a dialogue early in the project.

(2) Schedules B-1 and B-2 should be attached to the drawings and specifications submitted for a building permit.

(3) Schedules C-1 and C-2 should be submitted at the conclusion of the project.



**SCHEDULE A-1**

**Letter of Commitment by the Owner and Coordinating Registered Professional**

See Subsection 2.4.3. of Division C of the Alberta Building Code

To: The *authority having jurisdiction*

Date: \_\_\_\_\_

\_\_\_\_\_  
Address

\_\_\_\_\_  
Postal Code

**Re: Design and Field Review of Construction for the following project**

\_\_\_\_\_  
Name of project

\_\_\_\_\_  
Address

\_\_\_\_\_  
Legal description

The *owner* has retained a *coordinating registered professional* to coordinate the *design work* and *field review* of the *registered professionals of record* required for this project.

The *coordinating registered professional* shall coordinate the *design work* and *field review* of the other *registered professionals* required for the project in order to ensure the design will comply with the Alberta Building Code (ABC) and that construction will substantially comply with the ABC.

The *owner* and the *coordinating registered professional* have read and understand Part 1 of Division A and Part 2 of Division C, especially Subsection 2.4.3. of Division C, of the ABC.

The *owner* and the *coordinating registered professional* acknowledge their responsibility to each notify the *authority having jurisdiction* should the coordinating professional cease to be retained by the *owner*.

The *owner* understands that should the *coordinating registered professional* cease to be retained at any time during construction, work on the project will cease until such time as a new *coordinating registered professional* is retained and a new letter in the form set out in Schedule A-1 is filed with the *authority having jurisdiction*.

The *coordinating registered professional* is a *registered professional* as defined in the ABC.

Schedule A-1 - Continued

Coordinating Registered Professional	Owner
<hr/> Signature	<hr/> Signature
<hr/> Date	<hr/> Date
Note: affix seals over signatures	
I, _____, have signed on behalf of	I, _____, have signed on behalf of
<hr/> Firm	<hr/> Firm
<hr/> Name	<hr/> Name
<hr/> Address	<hr/> Address
<hr/>	<hr/>
<hr/> <div style="text-align: right;">Postal Code</div>	<hr/> <div style="text-align: right;">Postal Code</div>

- Note:
1. This letter must be submitted before issuance of a *building* permit.
  2. In this letter the words in italics are defined in the Alberta Building Code .
  3. This letter must be signed by the *owner* and the *registered professional*. If signed by an agent, a letter of appointment must be attached. If the *owner* is a corporation, the letter must be signed by a signing officer of the corporation and the signing officer must set forth their position in the corporation.
  4. The term substantially comply is used in *field review* because a *registered professional* does not supervise the actual construction.
  5. The *constructor* is responsible for safety of the public and workers at the *project* site.

The Alberta Building Code defines a *registered professional* to mean

- a) a person who is registered or licensed to practice as an architect under the Architects Act, or
- b) a person who is registered or licensed to practice as a *professional engineer* under the Engineering, Geological and Geophysical Professions Act.

**SCHEDULE A-2**

**Confirmation of Commitment by Owner and by Registered Professional of Record**

See Subsection 2.4.3. of Division C of the Alberta Building Code

To: The *authority having jurisdiction*

Date: \_\_\_\_\_

Address

Postal Code

**Re: Design and Field Review of Construction for the following project**

Name of project

Address

Legal description

The *owner* has retained a *registered professional of record* to coordinate the *design work* and *field reviews* required for this *project* for:

- architecture
- structural engineering
- mechanical engineering
- electrical engineering
- geotechnical engineering

The *registered professional of record* shall coordinate the *design work* and *field review* for that component of the *project* for which the *professional of record* is responsible in order to ensure the design will comply with the Alberta Building Code (ABC).

The *owner* and the *registered professional of record* have read and understand Part 1 of Division A and Part 2 of Division C, especially Subsection 2.4.3. of Division C, of the ABC.

The *owner* and the *registered professional of record* acknowledge their responsibility to notify the *authority having jurisdiction* should the *registered professional* cease to be retained by the *owner*.

The *owner* understands that should the *registered professional of record* cease to be retained at any time during construction, work on the portion of the project for which the *registered professional* is responsible will cease until such time as a new *registered professional of record* is retained, and a new letter in the form set out in Schedule A-2 is filed with the *authority having jurisdiction*.

The *registered professional of record* is a *registered professional* as defined in the ABC.

Schedule A-2 - Continued

Registered Professional of Record	Owner
Signature	Signature
Date	Date
Note: affix seals over signatures	
I, _____, have signed on behalf of	I, _____, have signed on behalf of
Firm	Firm
Name	Name
Address	Address
Postal Code	Postal Code

- Note:
1. This letter must be submitted before issuance of a *building* permit.
  2. In this letter the words in italics are defined in the Alberta Building Code .
  3. This letter must be signed by the *owner* and the *registered professional*. If signed by an agent, a letter of appointment must be attached. If the *owner* is a corporation, the letter must be signed by a signing officer of the corporation and the signing officer must set forth their position in the corporation.
  4. The term substantially comply is used in *field review* because a *registered professional* does not supervise the actual construction.
  5. The *constructor* is responsible for safety of the public and workers at the *project* site.

The Alberta Building Code defines a *registered professional* to mean

- a) a person who is registered or licensed to practice as an architect under the Architects Act, or
- b) a person who is registered or licensed to practice as a *professional engineer* under the Engineering, Geological and Geophysical Professions Act.

**SCHEDULE B-1**

**Letter of Commitment by the Registered Professional of Record**

See Subsection 2.4.3. of Division C of the Alberta Building Code

To: The *authority having jurisdiction*

Date: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
Address

\_\_\_\_\_  
Postal Code

**Re: Design and Field Review of Construction for the following project**

\_\_\_\_\_  
Name of project

\_\_\_\_\_  
Address

\_\_\_\_\_  
Legal description

I hereby give assurance that the design of the

- architectural
- structural engineering
- mechanical engineering
- electrical engineering
- geotechnical engineering

components described on plans, specifications and other supporting documents, prepared by this *registered professional* in support of the application for a building permit, substantially comply with the Alberta Building Code (ABC).

I hereby undertake to be responsible for *field review* of the above referenced components during construction as indicated on the attached "Summary of Design and Field Review Requirements" (see Schedule B-2).

I also undertake to notify the *authority having jurisdiction* in writing if our contract for *field review* is terminated at any time during construction.

Schedule B-1 - Continued

**Registered Professional of Record**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Note: affix seals over signature

I, \_\_\_\_\_, have signed on behalf of

\_\_\_\_\_  
Firm

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Postal Code

- Note:
1. This letter must be submitted before issuance of a *building permit*.
  2. In this letter the words in italics are defined in the Alberta Building Code.
  3. This letter must be signed by the *registered professional*.
  4. The *constructor* is responsible for safety of the public and workers at the *project* site.

The Alberta Building Code defines a *registered professional* to mean

- a) a person who is registered or licensed to practice as an architect under the Architects Act, or
- b) a person who is registered or licensed to practice as a *professional engineer* under the Engineering, Geological and Geophysical Professions Act.

**SCHEDULE B-2**

**Summary of Design and Field Review Requirements**

See Subsection 2.4.3. of Division C of the Alberta Building Code

Submitted by: \_\_\_\_\_ Date: \_\_\_\_\_

(Initial applicable responsibilities and cross out and initial non-applicable items within the list of Code activities)

**ARCHITECTURAL** \_\_\_\_\_ initial to indicate overall responsibility

- 1.1 Development *permit* requirements and conditions.....
- 1.2 Requirements to prevent fire spread and collapse;  
*building height, building area, building classification, street access*.....
- 1.3 Spacial separation requirement;  
*limiting distance, unprotected openings, construction characteristics*.....
- 1.4 Exterior walls and roofs, including exterior glazing;  
dampproofing/waterproofing of walls or slabs below *grade*, wall cladding.....
- 1.5 Determining the need for fire detection, alarm notification and suppression; including emergency power and lighting.....
- 1.6 Provision for fire fighting.....
- 1.7 Requirements pertaining to *interconnected floor spaces* and high *buildings*.....
- 1.8 Safety within *floor areas*; including interim wall *partitions* and finishes, *access to exits, guards* and handrails, sound control, specific requirements related function.....
- 1.9 Egress systems, *occupant loads*, stairs and *exits*.....
- 1.10 *Barrier free* requirements.....
- 1.11 Vertical transportation.....
- 1.12 Service facilities; horizontal and vertical *service spaces*.....
- 1.13 Health requirements; including functional design i.e. washrooms, food preparation areas, *swimming pools*.....
- 1.14 Structural capacity of architectural components; including anchorage and seismic restraint.....
- 1.15 Site development and landscaping.....
- 1.16 Review of all applicable shop drawings.....

**STRUCTURAL** \_\_\_\_\_ initial to indicate overall responsibility

- 2.1 Structural capacity of structural components of *buildings*; including anchorage and seismic restraint.....
- 2.2 Structural aspects of *deep foundations*.....
- 2.3 Qualification of welded steel fabricators and erectors.....
- 2.4. Review of all applicable shop drawings.....

Schedule B-2 - Continued

<b>MECHANICAL</b> _____ initial to indicate overall responsibility	
3.1	HVAC Systems; including fire stopping of service penetrations and placement of <i>fire dampers</i> .....
3.2	<i>Plumbing systems</i> ; including potable water system, roof and storm drainage system, <i>sanitary drainage system</i> .....
3.3	Fire Protection Systems; including automatic sprinkler and other fire suppression systems; stand pipes and hose system, evaluation of necessary water supply demand.....
3.4	<i>Swimming pool</i> mechanical systems; including pool circulation and disinfection systems, ventilation in pool areas and chlorine rooms.....
3.5	Medical gas piping systems.....
3.6	Smoke control systems in high-rise and <i>care and detention occupancy</i> application.....
3.7	Review of all applicable shop drawings.....
<b>ELECTRICAL</b> _____ initial to indicate overall responsibility	
4.1	Electrical transformers vaults, switching devices and motors, including anchorage and seismic restraints.....
4.2	Electrical system and devices; including fire stopping of penetration through <i>fire separation</i> .....
4.3	Fire alarms; including voice communication system.....
4.4	Mechanical interface with controls and alarms.....
4.5	Emergency power and lighting systems.....
4.6	Fire protection of wiring for emergency systems.....
4.7	Review of all applicable shop drawings.....
<b>GEOTECHNICAL</b> _____	
5.1	<i>Excavation</i> .....
5.2	Shoring and underpinning.....
5.3	Geotechnical aspects of <i>deep foundations</i> .....
5.4	Control of ground and subsurface water.....
5.5	Structural considerations of <i>soil</i> ; including slope stability and seismic loading.....
5.6	Backfill and compaction of <i>fill</i> .....

- Note:
1. Schedule B-2 must be attached to B-1.
  2. In this letter the words in italics are defined in the Alberta Building Code.
  3. The *constructor* is responsible for safety to the public and workers at the *project* site.

**SCHEDULE C-1**

**Assurance of Compliance Coordinating Registered Professional**

See Subsection 2.4.3. of Division C of the Alberta Building Code

To: The *authority having jurisdiction*

Date: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
Address

\_\_\_\_\_  
Postal Code

\_\_\_\_\_  
Name of project

\_\_\_\_\_  
Address

\_\_\_\_\_  
Legal description

\_\_\_\_\_  
Permit number

I hereby give assurance that

- (a) I have fulfilled my obligations for coordinating the *field review* as outlined in Sentence 2.4.4.1.(1) of Division C of the Alberta Building Code (ABC) and as agreed to in the previously submitted Schedule A-1;
- (b) I have enclosed documents supporting all approved changes to the plans and specifications prepared by all of the *registered professionals of record* on which the *building permit* was issued for this *project*;
- (c) The *project* with the noted changes substantially complies with
  - (i) the applicable requirements of the Alberta Building Code, and
  - (ii) the plans, specifications and other documents submitted in support of the application for the *building permit*; and
- (d) I am a *registered professional* as defined in the Alberta Building Code.

Schedule C-1 - Continued

**Coordinating Registered Professional**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

Note: affix seals over signature

I, \_\_\_\_\_, have signed on behalf of

\_\_\_\_\_  
Firm

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Postal Code

- Note:
1. This letter shall be submitted by the *coordinating registered professional* after completion of the *project* and before permission to occupy is issued by the *authority having jurisdiction*. Separate similar letters (Schedule C-2) shall be submitted by each *registered professional of record* to the *coordinating registered professional*.
  2. In this letter the words in italics are defined in the Alberta Building Code.
  3. This letter must be signed by the *registered professional*.
  4. The term “substantially comply” is used in *field review* because a *registered professional* does not supervise the actual construction.
  5. The *constructor* is responsible for safety of the public and workers at the *project* site.

The Alberta Building Code defines a *registered professional* to mean

- a) a person who is registered or licensed to practice as an architect under the Architects Act, or
- b) a person who is registered or licensed to practice as a *professional engineer* under the Engineering, Geological and Geophysical Professions Act.

**SCHEDULE C-2**

**Assurance of Professional Field Review and Compliance**

See Subsection 2.4.3. of Division C of the Alberta Building Code

To: The *authority having jurisdiction*

Date: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
Address

\_\_\_\_\_  
Postal Code

\_\_\_\_\_  
Name of project

\_\_\_\_\_  
Address

\_\_\_\_\_  
Legal description

\_\_\_\_\_  
Permit number

I hereby give assurance that

- (a) I have fulfilled my obligations for *field review* as outlined in Sentence 2.4.4.1.(1) of Division C of the Alberta Building Code (ABC) and as outlined in the previously submitted Schedule B-1;
- (b) I have enclosed documents supporting all approved changes to the plans and specifications prepared by me on which the *building permit* was issued for this *project*;
- (c) Those components of the *project* opposite my initials in Schedule B-2 substantially comply with
  - (i) the applicable requirements of the Alberta Building Code, and
  - (ii) the plans, specifications and other documents submitted in support of the application for the *building permit*; and
- (d) I am a *registered professional* as defined in the Alberta Building Code.

Schedule C-2 - Continued

**Registered Professional of Record**

\_\_\_\_\_

Signature

\_\_\_\_\_

Date

Note: affix seals over signature

I, \_\_\_\_\_, have signed on behalf of

\_\_\_\_\_

Firm

\_\_\_\_\_

Name

\_\_\_\_\_

Address

\_\_\_\_\_

Postal Code

- Note:
1. This letter must be submitted by all of the *registered professionals of record* after completion of the *project* to the *coordinating registered professional*.
  2. In this letter the words in italics are defined in the Alberta Building Code.
  3. This letter must be signed by the *registered professional*.
  4. The term “substantially comply” is used in *field review* because a *registered professional* does not supervise the actual construction.
  5. The *constructor* is responsible for safety of the public and workers at the *project* site.

The Alberta Building Code defines a *registered professional* to mean

- a) a person who is registered or licensed to practice as an architect under the Architects Act, or
- b) a person who is registered or licensed to practice as a *professional engineer* under the Engineering, Geological and Geophysical Professions Act.

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# Part 1

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# Part 1 General

## Section 1.1. General

### 1.1.1. Application

#### 1.1.1.1. Application

**1)** This Part applies to all *buildings* covered in this Code. (See Article 1.1.1.1. of Division A.)

### 1.1.2. Objectives and Functional Statements

#### 1.1.2.1. Attribution to Acceptable Solutions

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in Division B shall be the objectives and functional statements identified in Part 4 of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)

### 1.1.3. Climatic and Seismic Data

#### 1.1.3.1. Climatic and Seismic Values

**1)** The climatic and seismic values required for the design of *buildings* under this Code shall be in conformance with the values established by the *authority having jurisdiction* or, in the absence of such data, with Sentence (2) and the climatic and seismic values in Appendix C. (See Appendix A.)

**2)** The outside winter design temperatures determined from Appendix C shall be those listed for the January 2.5% values. (See Appendix A.)

#### 1.1.3.2. Depth of Frost Penetration

**1)** Depth of frost penetration shall be established on the basis of local experience.

### 1.1.4. Fire Safety Plan

#### 1.1.4.1. Fire Safety Plan

**1)** Where a fire safety plan is required, it shall conform to Section 2.8. of Division B of the Alberta Fire Code 2006.

## Section 1.2. Terms and Abbreviations

### 1.2.1. Definitions of Words and Phrases

#### 1.2.1.1. Non-defined Terms

1) Words and phrases used in Division B that are not included in the list of definitions in Article 1.4.1.2. of Division A shall have the meanings defined in the Safety Codes Act, Alberta Fire Code 2006, National Plumbing Code 2005, or that are commonly assigned to them in the context in which they are used, taking into account the specialized use of terms by the various trades and professions to which the terminology applies.

2) Where acceptable solutions are referred to in Division B, they shall be the provisions stated in Parts 3 to 11.

3) For words not defined by Sentence (1), reference should be made to the Canadian Oxford Dictionary (Second Edition), published by Oxford University Press.

#### 1.2.1.2. Defined Terms

1) The words and terms in italics in Division B shall have the meanings assigned to them in Article 1.4.1.2. of Division A.

### 1.2.2. Symbols and Other Abbreviations

#### 1.2.2.1. Symbols and Other Abbreviations

1) The symbols and other abbreviations in Division B shall have the meanings assigned to them in Article 1.4.2.1. of Division A and Article 1.3.2.1.

## Section 1.3. Referenced Documents and Organizations

### 1.3.1. Referenced Documents

#### 1.3.1.1. Effective Date

1) Unless otherwise specified herein, the documents referenced in this Code shall include all amendments, revisions and supplements effective to 30 September 2005.

#### 1.3.1.2. Applicable Editions

1) Where documents are referenced in this Code, they shall be the editions designated in Table 1.3.1.2. (See Appendix A.)

**Table 1.3.1.2.**  
**Documents Referenced in the Alberta Building Code 2006**  
 Forming Part of Sentence 1.3.1.2.(1)

Issuing Agency	Document Number	Title of Document	Code Reference
ANSI	A208.1-1999	Particleboard, Mat-Formed Wood	Table 5.10.1.1. 9.23.14.2.(3) 9.29.9.1.(1) 9.30.2.2.(1)
ANSI/ ASHRAE	62-2001	Ventilation for Acceptable Indoor Air Quality	6.2.2.1.(2) 10.5.1.3.(1)
ANSI/ ASME	B18.6.1-1981 (R2002)	Wood Screws (Inch Series)	Table 5.10.1.1. 9.23.3.1.(2)
ANSI/ NSPI	1-2003	Public Swimming Pools	7.3.3.13.(7) 7.3.3.13.(8) 7.3.5.6.(1)
ASTM	A 123/A 123M-02	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products	Table 5.10.1.1. Table 9.20.16.1.
ASTM	A 153/A 153M-05	Zinc Coating (Hot-Dip) on Iron and Steel Hardware	Table 5.10.1.1. Table 9.20.16.1.
ASTM	A 252-98 (2002)	Welded and Seamless Steel Pipe Piles	4.2.3.8.(1)
ASTM	A 283/A 283M-03	Low and Intermediate Tensile Strength Carbon Steel Plates	4.2.3.8.(1)
ASTM	A 653/A 653M-05	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process	Table 5.10.1.1. 9.3.3.2.(1)
ASTM	A 792/A 792M-05	Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process	9.3.3.2.(1)
ASTM	A 1008/A 1008M-05a	Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability	4.2.3.8.(1)
ASTM	A 1011/A 1011M-05	Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability	4.2.3.8.(1)
ASTM	C 4-04e01	Clay Drain Tile and Perforated Clay Drain Tile	Table 5.10.1.1. 9.14.3.1.(1)
ASTM	C 27-98 (2002)	Classification of Fireclay and High-Alumina Refractory Brick	9.21.3.4.(1)
ASTM	C 36/C 36M-03	Gypsum Wallboard	3.1.5.12.(4) Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 37/C 37M-01	Gypsum Lath	Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 79-04a	Gypsum Sheathing Board	Table 5.10.1.1. Table 9.23.16.2.A.
ASTM	C 126-99 (2005)	Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units	Table 5.10.1.1. 9.20.2.1.(1)
ASTM	C 212-00	Structural Clay Facing Tile	Table 5.10.1.1. 9.20.2.1.(1)
ASTM	C 260-01	Air-Entraining Admixtures for Concrete	9.3.1.8.(1)
ASTM	C 411-04	Hot-Surface Performance of High-Temperature Thermal Insulation	3.6.5.4.(4) 3.6.5.5.(1) 9.33.6.4.(4) 9.33.8.2.(2)
ASTM	C 412M-04	Concrete Drain Tile (Metric)	Table 5.10.1.1. 9.14.3.1.(1)

Table 1.3.1.2. (Continued)

Issuing Agency	Document Number	Title of Document	Code Reference
ASTM	C 442/C 442M-04	Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board	3.1.5.12.(4) Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 444M-03	Perforated Concrete Pipe (Metric)	Table 5.10.1.1. 9.14.3.1.(1)
ASTM	C 494/C 494M-05	Chemical Admixtures for Concrete	9.3.1.8.(1)
ASTM	C 588/C 588M-03	Gypsum Base for Veneer Plasters	3.1.5.12.(4) Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 630/C 630M-03	Water-Resistant Gypsum Backing Board	3.1.5.12.(4) Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 700-02	Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated	Table 5.10.1.1. 9.14.3.1.(1)
ASTM	C 840-04	Application and Finishing of Gypsum Board	9.10.12.4.(3) 9.29.5.1.(2)
ASTM	C 931/C 931M-04	Exterior Gypsum Soffit Board	3.1.5.12.(4) Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 960/C 960M-04	Predecorated Gypsum Board	3.1.5.12.(4) Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 1002-04	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs	Table 5.10.1.1. 9.24.1.4.(1) 9.29.5.7.(1)
ASTM	C 1177/C 1177M-04e01	Glass Mat Gypsum Substrate for Use as Sheathing	Table 5.10.1.1. Table 9.23.16.2.A.
ASTM	C 1178/C 1178M-04e01	Glass Mat Water-Resistant Gypsum Backing Panel	Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 1395/C 1395M-04	Gypsum Ceiling Board	Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C 1396/C 1396M-04	Gypsum Board	Table 5.10.1.1. Table 9.23.16.2.A. 9.29.5.2.(1)
ASTM	D 323-99a	Vapor Pressure of Petroleum Products (Reid Method)	1.4.1.2.(1) <sup>(1)</sup>
ASTM	D 2178-04	Asphalt Glass Felt Used in Roofing and Waterproofing	Table 5.10.1.1.
ASTM	D 2898-94 (2004)	Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing	3.1.5.5.(4) 3.1.5.21.(1) 3.2.3.7.(3)
ASTM	E 90-04	Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements	5.9.1.1.(1) 9.11.1.1.(1)
ASTM	E 96-05	Water Vapor Transmission of Materials	5.5.1.2.(3) 9.25.1.2.(1) 9.25.4.2.(1) 9.30.1.2.(1)
ASTM	E 336-05	Measurement of Airborne Sound Insulation in Buildings	5.9.1.1.(1) 9.11.1.1.(1)
ASTM	E 413-04	Classification for Rating Sound Insulation	5.9.1.1.(1) 9.11.1.1.(1)
ASTM	F 476-84 (2002)	Security of Swinging Door Assemblies	9.6.8.10.(1)

**Table 1.3.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
AWPA	M4-02	Care of Preservative-Treated Wood Products	4.2.3.2.(2) Table 5.10.1.1.
BNQ	NQ 3624-115-2000	Polyethylene (PE) Pipe and Fittings – Flexible Corrugated Pipes for Drainage – Characteristics and Test Methods	Table 5.10.1.1. 9.14.3.1.(1)
CCBFC	NRCC 48674	Alberta Fire Code 2006	1.1.4.1.(1) 1.2.1.1.(1) 1.2.1.1.(1) <sup>(2)</sup> 1.4.1.1.(1) <sup>(1)</sup> 2.1.1.2.(4) <sup>(1)</sup> 3.1.13.1.(1) 3.2.3.21.(1) 3.2.5.11.(10) 3.2.5.17.(1) 3.3.1.2.(1) 3.3.1.2.(4) 3.3.1.10.(1) 3.3.1.27.(1) 3.3.2.3.(1) 3.3.5.8.(2) 3.3.5.10.(1) 3.3.5.12.(1) 3.3.5.15.(1) 3.3.5.18.(4) 3.3.5.21.(1) 6.2.2.5.(1) 8.1.1.1.(3) 8.1.1.3.(1) 9.10.20.4.(1) 10.4.7.3.(1)
CCBFC	NRCC 47668	National Plumbing Code of Canada 2005	1.2.1.1.(1) 1.2.1.1.(1) <sup>(2)</sup> 1.4.1.1.(1) <sup>(1)</sup>
CGSB	CAN/CGSB-1.501-M89	Method for Permeance of Coated Wallboard	5.5.1.2.(2) 9.25.4.2.(6)
CGSB	CAN/CGSB-7.1-98	Lightweight Steel Wall Framing Components	9.24.1.2.(1)
CGSB	CAN/CGSB-7.2-94	Adjustable Steel Columns	9.17.3.4.(1)
CGSB	CAN/CGSB-10.3-92	Air Setting Refractory Mortar	9.21.3.4.(2) 9.21.3.9.(1) 9.22.2.2.(2)
CGSB	CAN/CGSB-11.3-M87	Hardboard	Table 5.10.1.1. 9.27.10.1.(2) 9.29.7.1.(1) 9.30.2.2.(1)
CGSB	CAN/CGSB-11.5-M87	Hardboard, Precoated, Factory Finished, for Exterior Cladding	Table 5.10.1.1. 9.27.10.1.(1)
CGSB	CAN/CGSB-12.1-M90	Tempered or Laminated Safety Glass	3.3.1.19.(2) 3.4.6.14.(1) 3.4.6.14.(3) Table 5.10.1.1. 7.2.1.6.(1) 9.6.6.2.(2) 9.7.3.1.(1) 9.8.8.7.(1)
CGSB	CAN/CGSB-12.2-M91	Flat, Clear Sheet Glass	Table 5.10.1.1. 9.7.3.1.(1)

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Issuing Agency	Document Number	Title of Document	Code Reference
CGSB	CAN/CGSB-12.3-M91	Flat, Clear Float Glass	Table 5.10.1.1. 9.7.3.1.(1)
CGSB	CAN/CGSB-12.4-M91	Heat Absorbing Glass	Table 5.10.1.1. 9.7.3.1.(1)
CGSB	CAN/CGSB-12.8-97	Insulating Glass Units	Table 5.10.1.1. 9.7.3.1.(1)
CGSB	CAN/CGSB-12.10-M76	Glass, Light and Heat Reflecting	Table 5.10.1.1. 9.7.3.1.(1)
CGSB	CAN/CGSB-12.11-M90	Wired Safety Glass	3.3.1.19.(2) 3.4.6.14.(1) 3.4.6.14.(3) Table 5.10.1.1. 9.6.6.2.(2) 9.7.3.1.(1) 9.8.8.7.(1)
CGSB	CAN/CGSB-12.20-M89	Structural Design of Glass for Buildings	4.3.6.1.(1) 9.7.3.2.(1)
CGSB	19-GP-5M-1984	Sealing Compound, One Component, Acrylic Base, Solvent Curing	Table 5.10.1.1. 9.27.4.2.(2)
CGSB	CAN/CGSB-19.13-M87	Sealing Compound, One-Component, Elastomeric, Chemical Curing	Table 5.10.1.1. 9.27.4.2.(2)
CGSB	19-GP-14M-1984	Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing	Table 5.10.1.1. 9.27.4.2.(2)
CGSB	CAN/CGSB-19.22-M89	Mildew-Resistant Sealing Compound for Tubs and Tiles	9.29.10.5.(1)
CGSB	CAN/CGSB-19.24-M90	Multicomponent, Chemical-Curing Sealing Compound	Table 5.10.1.1. 9.27.4.2.(2)
CGSB	CAN/CGSB-34.4-M89	Siding, Asbestos-Cement, Shingles and Clapboards	Table 5.10.1.1. 9.27.8.1.(1)
CGSB	CAN/CGSB-34.5-M89	Sheets, Asbestos-Cement, Corrugated	Table 5.10.1.1. 9.27.8.1.(1)
CGSB	CAN/CGSB-34.14-M89	Sheets, Asbestos-Cement, Decorative	Table 5.10.1.1. 9.27.8.1.(1)
CGSB	CAN/CGSB-34.16-M89	Sheets, Asbestos-Cement, Flat, Fully Compressed	Table 5.10.1.1. 9.27.8.1.(1)
CGSB	CAN/CGSB-34.17-M89	Sheets, Asbestos-Cement, Flat, Semicompressed	Table 5.10.1.1. 9.27.8.1.(1)
CGSB	CAN/CGSB-34.21-M89	Panels, Sandwich, Asbestos-Cement with Insulating Cores	Table 5.10.1.1. 9.27.8.1.(1)
CGSB	CAN/CGSB-34.22-94	Asbestos-Cement Drain Pipe	Table 5.10.1.1. 9.14.3.1.(1)
CGSB	CAN/CGSB-37.1-M89	Chemical Emulsifier Type, Emulsified Asphalt for Dampproofing	Table 5.10.1.1. 9.13.2.2.(1)
CGSB	CAN/CGSB-37.2-M88	Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings	Table 5.10.1.1. 9.13.2.2.(1) 9.13.3.2.(1)
CGSB	CAN/CGSB-37.3-M89	Application of Emulsified Asphalts for Dampproofing or Waterproofing	5.8.2.3.(1) Table 5.10.1.1. 9.13.2.3.(1) 9.13.3.3.(1)

**Table 1.3.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
CGSB	CAN/CGSB-37.4-M89	Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	CAN/CGSB-37.5-M89	Cutback Asphalt Plastic, Cement	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	37-GP-6Ma-1983	Asphalt, Cutback, Unfilled, for Dampproofing	5.8.2.2.(6) 5.8.2.2.(7) Table 5.10.1.1. 9.13.2.2.(1)
CGSB	CAN/CGSB-37.8-M88	Asphalt, Cutback, Filled, for Roof Coating	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	37-GP-9Ma-1983	Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	37-GP-12Ma-1984	Application of Unfilled Cutback Asphalt for Dampproofing	5.8.2.3.(2) Table 5.10.1.1. 9.13.2.3.(1)
CGSB	CAN/CGSB-37.16-M89	Filled, Cutback Asphalt for Dampproofing and Waterproofing	Table 5.10.1.1. 9.13.2.2.(1) 9.13.3.2.(1)
CGSB	37-GP-18Ma-1985	Tar, Cutback, Unfilled, for Dampproofing	5.8.2.2.(6) 5.8.2.2.(7) Table 5.10.1.1. 9.13.2.2.(1)
CGSB	37-GP-21M-1985	Tar, Cutback, Fibrated, for Roof Coating	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	CAN/CGSB-37.22-M89	Application of Unfilled, Cutback Tar Foundation Coating for Dampproofing	5.8.2.3.(2) Table 5.10.1.1. 9.13.2.3.(1)
CGSB	37-GP-36M-1976	Application of Filled Cutback Asphalts for Dampproofing and Waterproofing	5.8.2.3.(1) Table 5.10.1.1.
CGSB	37-GP-37M-1977	Application of Hot Asphalt for Dampproofing or Waterproofing	5.8.2.3.(1) Table 5.10.1.1.
CGSB	CAN/CGSB-37.50-M89	Hot-Applied, Rubberized Asphalt for Roofing and Waterproofing	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	CAN/CGSB-37.51-M90	Application for Hot-Applied Rubberized Asphalt for Roofing and Waterproofing	5.6.1.3.(1) 5.8.2.3.(1) Table 5.10.1.1. 9.26.15.1.(1)
CGSB	37-GP-52M-1984	Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	CAN/CGSB-37.54-95	Polyvinyl Chloride Roofing and Waterproofing Membrane	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	37-GP-55M-1979	Application of Sheet Applied Flexible Polyvinyl Chloride Roofing Membrane	5.6.1.3.(1) Table 5.10.1.1. 9.26.16.1.(1)
CGSB	37-GP-56M-1985	Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing	Table 5.10.1.1. 9.26.2.1.(1)
CGSB	37-GP-64M-1977	Mat Reinforcing, Fibrous Glass, for Membrane Waterproofing Systems and Built-Up Roofing	Table 5.10.1.1.
CGSB	41-GP-6M-1983	Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced	Table 5.10.1.1. 9.26.2.1.(1)

Table 1.3.1.2. (Continued)

Issuing Agency	Document Number	Title of Document	Code Reference
CGSB	CAN/CGSB-41.24-95	Rigid Vinyl Siding, Soffits and Fascia	Table 5.10.1.1. 9.27.13.1.(1)
CGSB	CAN/CGSB-51.25-M87	Thermal Insulation, Phenolic, Faced	Table 5.10.1.1. Table 9.23.16.2.A. 9.25.2.2.(1)
CGSB	51-GP-27M-1979	Thermal Insulation, Polystyrene, Loose Fill	Table 5.10.1.1. 9.25.2.2.(1)
CGSB	CAN/CGSB-51.32-M77	Sheathing, Membrane, Breather Type	Table 5.10.1.1. 9.20.13.9.(1) 9.26.2.1.(1) 9.27.3.2.(1)
CGSB	CAN/CGSB-51.33-M89	Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction	Table 5.10.1.1. 9.25.4.2.(5)
CGSB	CAN/CGSB-51.34-M86 (Amended 1988)	Vapour Barrier, Polyethylene Sheet for Use in Building Construction	Table 5.10.1.1. 9.13.2.2.(1) 9.18.6.2.(1) 9.25.3.2.(2) 9.25.4.2.(4)
CGSB	CAN/CGSB-51.71-05	The Spillage Test: Method to Determine the Potential for Pressure-Induced Spillage from Vented, Fuel-Fired, Space Heating Appliances, Water Heaters and Fireplaces	9.32.3.8.(9)
CGSB	CAN/CGSB-63.14-M89	Plastic Skylights	5.10.1.1.(4) Table 5.10.1.1. 9.7.7.1.(1) 9.7.7.2.(1)
CGSB	CAN/CGSB-82.1-M89	Sliding Doors	Table 5.10.1.1. 9.6.5.2.(1)
CGSB	CAN/CGSB-82.5-M88	Insulated Steel Doors	Table 5.10.1.1. 9.6.5.3.(1)
CGSB	CAN/CGSB-82.6-M86	Doors, Mirrored Glass, Sliding or Folding, Wardrobe	9.6.6.3.(1)
CGSB	CAN/CGSB-93.1-M85	Sheet, Aluminum Alloy, Prefinished, Residential	Table 5.10.1.1. 9.27.12.1.(4)
CGSB	CAN/CGSB-93.2-M91	Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use	Table 5.10.1.1. 3.2.3.6.(5) 9.27.12.1.(3)
CGSB	CAN/CGSB-93.3-M91	Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use	Table 5.10.1.1. 9.27.12.1.(2)
CGSB	CAN/CGSB-93.4-92	Galvanized Steel and Aluminum-Zinc Alloy Coated Steel Siding, Soffits and Fascia, Prefinished, Residential	Table 5.10.1.1. 3.2.3.6.(5) 9.27.12.1.(1)
CSA	CAN/CSA-6.19-01	Residential Carbon Monoxide Alarming Devices	6.2.4.1.(2) 9.32.3.8.(6) 9.32.3.9.(2)
CSA	CAN/CSA-A23.1-04	Concrete Materials and Methods of Concrete Construction	4.2.3.6.(1) 4.2.3.9.(1) Table 5.10.1.1. 9.3.1.1.(4) 9.3.1.3.(1) 9.3.1.4.(1)
CSA	A23.3-04	Design of Concrete Structures	Table 4.1.8.9. 4.3.3.1.(1)

**Table 1.3.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
CSA	CAN/CSA-A82.1-M87 (R2003)	Burned Clay Brick (Solid Masonry Units Made from Clay or Shale)	Table 5.10.1.1. 9.20.2.1.(1)
CSA	A82.3-M1978 (R1998)	Calcium Silicate (Sand-Lime) Building Brick	Table 5.10.1.1. 9.20.2.1.(1)
CSA	A82.4-M1978 (R1998)	Structural Clay Load-Bearing Wall Tile	Table 5.10.1.1. 9.20.2.1.(1)
CSA	A82.5-M1978 (R1998)	Structural Clay Non-Load-Bearing Tile	Table 5.10.1.1. 9.20.2.1.(1)
CSA	CAN3-A82.8-M78 (R2003)	Hollow Clay Brick	Table 5.10.1.1. 9.20.2.1.(1)
CSA	CAN/CSA-A82.27-M91	Gypsum Board	3.1.5.12.(4) Table 5.10.1.1. Table 9.23.16.2.A.
CSA	A82.30-M1980	Interior Furring, Lathing and Gypsum Plastering	Table 5.10.1.1. 9.29.4.1.(1)
CSA	A82.31-M1980	Gypsum Board Application	Table 5.10.1.1.
CSA	CAN3-A93-M82 (R2003)	Natural Airflow Ventilators for Buildings	Table 5.10.1.1. 9.19.1.2.(5)
CSA	CAN/CSA-A123.1-05	Asphalt Shingles Made From Organic Felt and Surfaced with Mineral Granules	Table 5.10.1.1. 9.26.2.1.(1)
CSA	A123.2-03	Asphalt-Coated Roofing Sheets	Table 5.10.1.1. 9.26.2.1.(1)
CSA	CAN/CSA-A123.3-05	Asphalt Saturated Organic Roofing Felt	Table 5.10.1.1. 9.26.2.1.(1)
CSA	CAN/CSA-A123.4-04	Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems	Table 5.10.1.1. 9.13.2.2.(1) 9.13.3.2.(1) 9.26.2.1.(1)
CSA	CAN/CSA-A123.5-05	Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules	Table 5.10.1.1. 9.26.2.1.(1)
CSA	A123.17-05	Asphalt Glass Felt Used in Roofing and Waterproofing	Table 5.10.1.1. 9.26.2.1.(1)
CSA	CAN3-A123.51-M85 (R2001)	Asphalt Shingle Application on Roof Slopes 1:3 and Steeper	5.6.1.3.(1) Table 5.10.1.1. 9.26.1.2.(1)
CSA	CAN3-A123.52-M85 (R2001)	Asphalt Shingle Application on Roof Slopes 1:6 to Less Than 1:3	5.6.1.3.(1) Table 5.10.1.1. 9.26.1.2.(1)
CSA	A165.1-04	Concrete Block Masonry Units	Table 5.10.1.1. 9.15.2.2.(1) 9.17.5.1.(1) 9.20.2.1.(1) 9.20.2.6.(1)
CSA	A165.2-04	Concrete Brick Masonry Units	Table 5.10.1.1. 9.20.2.1.(1)
CSA	A165.3-04	Prefaced Concrete Masonry Units	Table 5.10.1.1. 9.20.2.1.(1)
CSA	CAN3-A165.4-04	Autoclaved Cellular Units	Table 5.10.1.1. 9.20.2.1.(1)

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Issuing Agency	Document Number	Title of Document	Code Reference
CSA	A179-04	Mortar and Grout for Unit Masonry	Table 5.10.1.1. 9.15.2.2.(3) 9.20.3.1.(1)
CSA	CAN/CSA-A220 Series-M91 (R2004)	Concrete Roof Tiles	Table 5.10.1.1. 9.26.2.1.(1) 9.26.17.1.(1)
CSA	CAN/CSA-A324-M88 (R2001)	Clay Flue Liners	9.21.3.3.(1)
CSA	A371-04	Masonry Construction for Buildings	5.6.1.3.(2) Table 5.10.1.1. 9.15.2.2.(3) 9.20.3.2.(7) 9.20.15.2.(1)
CSA	CAN/CSA-A405-M87 (R2000)	Design and Construction of Masonry Chimneys and Fireplaces	9.21.3.5.(1) 9.22.5.2.(2)
CSA	CAN/CSA-A438-00 (R2004)	Concrete Construction for Housing and Small Buildings	9.3.1.1.(1)
CSA	CAN/CSA-A440-00	Windows	5.10.1.1.(3) Table 5.10.1.1. 9.7.2.1.(1) 9.7.2.1.(2) 9.7.6.1.(1)
CSA	CAN/CSA-A440.1-00	User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows	5.10.1.1.(3) Table 5.10.1.1. 9.7.2.1.(1)
CSA	A660-04	Certification of Manufacturers of Steel Building Systems	4.3.4.3.(1)
CSA	CAN/CSA-A3001-03	Cementitious Materials for Use in Concrete	Table 5.10.1.1. 9.3.1.2.(1) 9.28.2.1.(1)
CSA	B44-04	Safety Code for Elevators	3.5.2.1.(3) 3.5.4.2.(1) 3.8.3.5.(1) Table 4.1.5.12.
CSA	B52-05	Mechanical Refrigeration Code	6.2.1.4.(1) 9.33.5.2.(1)
CSA	B111-1974 (R2003)	Wire Nails, Spikes and Staples	9.23.3.1.(1) 9.26.2.2.(1) 9.29.5.6.(1)
CSA	CAN/CSA-B139-04	Installation Code for Oil-Burning Equipment	6.2.1.4.(1) 9.33.5.2.(1)
CSA	CAN/CSA-B182.1-02	Plastic Drain and Sewer Pipe and Pipe Fittings	Table 5.10.1.1. 9.14.3.1.(1)
CSA	CAN/CSA-B214-01	Installation Code for Hydronic Heating Systems	6.2.1.1.(1)
CSA	CAN/CSA-B365-01	Installation Code for Solid-Fuel-Burning Appliances and Equipment	6.2.1.4.(1) 9.22.10.2.(1) 9.33.5.3.(1)
CSA	C22.2 No. 0.3-01 (R2005)	Test Methods for Electrical Wires and Cables	3.1.4.3.(1) 3.1.5.18.(1) 3.6.4.3.(1)
CSA	C22.2 No. 113-M1984 (R2004)	Fans and Ventilators	9.32.3.10.(7)
CSA	C22.2 No. 141-02	Unit Equipment for Emergency Lighting	3.2.7.4.(2) 9.9.11.3.(6)

**Table 1.3.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
CSA	C22.2 No. 211.0-03	General Requirements and Methods of Testing for Non-metallic Conduit	3.1.5.20.(1)
CSA	CAN/CSA-C260-M90 (R2002)	Rating the Performance of Residential Mechanical Ventilating Equipment	9.32.3.10.(1) 9.32.3.10.(2) Table 9.32.3.10.B.
CSA	CAN/CSA-C282-05	Emergency Electrical Power Supply for Buildings	3.2.7.5.(1)
CSA	CAN/CSA-C439-00 (R2005)	Rating the Performance of Heat/Energy-Recovery Ventilators	9.32.3.10.(4) 9.32.3.10.(5)
CSA	CAN/CSA-C448 Series-02	Design and Installation of Earth Energy Systems	9.33.5.2.(1)
CSA	CAN/CSA-F280-M90 (R2004)	Determining the Required Capacity of Residential Space Heating and Cooling Appliances	9.33.5.1.(1)
CSA	CAN/CSA-F326-M91 (R2005)	Residential Mechanical Ventilation Systems	9.32.3.1.(1)
CSA	CAN/CSA-G30.18-M92 (R2002)	Billet-Steel Bars for Concrete Reinforcement	9.3.1.1.(4)
CSA	CAN/CSA-G40.21-04	Structural Quality Steel	4.2.3.8.(1) Table 5.10.1.1. 9.23.4.3.(2)
CSA	G401-01	Corrugated Steel Pipe Products	Table 5.10.1.1. 9.14.3.1.(1)
CSA	O80 Series-97	Wood Preservation	3.1.4.4.(1) 4.2.3.2.(1) 4.2.3.2.(2) Table 5.10.1.1.
CSA	O80.1-97	Preservative Treatment of All Timber Products by Pressure Processes	Table 5.10.1.1. 9.3.2.9.(5)
CSA	O80.2-97	Preservative Treatment of Lumber, Timber, Bridge Ties, and Mine Ties by Pressure Processes	4.2.3.2.(1) Table 5.10.1.1. 9.3.2.9.(5)
CSA	O80.3-97	Preservative Treatment of Piles by Pressure Processes	4.2.3.2.(1)
CSA	O80.9-97	Preservative Treatment of Plywood by Pressure Processes	Table 5.10.1.1. 9.3.2.9.(5)
CSA	O80.15-97	Preservative Treatment of Wood for Building Foundation Systems, Basements, and Crawl Spaces by Pressure Processes	4.2.3.2.(1) Table 5.10.1.1. 9.3.2.9.(5)
CSA	O80.34-97	Pressure Preservative Treatment of Lumber and Timbers with Borates for Use Out of Ground Contact and Continuously Protected from Liquid Water	Table 5.10.1.1. 9.3.2.9.(5) 9.3.2.9.(6)
CSA	CAN/CSA-O86-01 (Including Supplement CAN/CSA-O86S1-05)	Engineering Design in Wood	Table 4.1.8.9. 4.3.1.1.(1)
CSA	O115-M1982 (R2001)	Hardwood and Decorative Plywood	Table 5.10.1.1. 9.27.9.1.(1) 9.30.2.2.(1)
CSA	O118.1-97 (R2002)	Western Cedars Shakes and Shingles	Table 5.10.1.1. 9.26.2.1.(1) 9.27.7.1.(1)
CSA	O118.2-M1981 (R2002)	Eastern White Cedar Shingles	Table 5.10.1.1. 9.26.2.1.(1) 9.27.7.1.(1)

Table 1.3.1.2. (Continued)

Issuing Agency	Document Number	Title of Document	Code Reference
CSA	O118.3-93 (R2003)	Northern Pine Tapersawn Shakes	9.26.2.1.(1) 9.27.7.1.(1)
CSA	O121-M1978 (R2003)	Douglas Fir Plywood	Table 5.10.1.1. 9.23.14.2.(1) 9.23.15.2.(1) Table 9.23.16.2.A. 9.27.9.1.(1) 9.30.2.2.(1) Table A-13 Table A-14 Table A-15
CSA	CAN/CSA-O122-M89	Structural Glued-Laminated Timber	Table A-11 Table A-16
CSA	CAN/CSA-O132.2 Series-90 (R1998)	Wood Flush Doors	Table 5.10.1.1. 9.6.5.1.(1)
CSA	CAN/CSA-O141-05	Softwood Lumber	Table 5.10.1.1. 9.3.2.6.(1)
CSA	O151-04	Canadian Softwood Plywood	Table 5.10.1.1. 9.23.14.2.(1) 9.23.15.2.(1) Table 9.23.16.2.A. 9.27.9.1.(1) 9.30.2.2.(1) Table A-13 Table A-14 Table A-15
CSA	O153-M1980	Poplar Plywood	Table 5.10.1.1. 9.23.14.2.(1) 9.23.15.2.(1) Table 9.23.16.2.A. 9.27.9.1.(1) 9.30.2.2.(1)
CSA	CAN/CSA-O177-M89 (R1998)	Qualification Code for Manufacturers of Structural Glued-Laminated Timber	4.3.1.2.(1) 9.23.4.2.(5) Table A-11 Table A-16
CSA	CAN/CSA-O325.0-92 (R2003)	Construction Sheathing	Table 5.10.1.1. 9.23.14.2.(1) 9.23.14.4.(2) Table 9.23.14.5.B. 9.23.15.2.(1) 9.23.15.3.(2) Table 9.23.15.7.B. Table 9.23.16.2.B. 9.29.9.1.(2) 9.29.9.2.(5) Table A-13 Table A-14 Table A-15
CSA	O325.2-M1990	Quality Assurance for Construction Sheathing	9.23.14.2.(5) 9.23.15.2.(2) 9.23.16.2.(2)

**Table 1.3.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
CSA	O437.0-93	OSB and Waferboard	Table 5.10.1.1. 9.23.14.2.(1) 9.23.14.4.(2) 9.23.15.2.(1) 9.23.15.3.(2) Table 9.23.16.2.A. 9.27.11.1.(1) 9.29.9.1.(2) 9.30.2.2.(1) Table A-13 Table A-14 Table A-15
CSA	CAN/CSA-S16-01 (Including Supplement CAN/CSA-S16S1-05)	Limit States Design of Steel Structures	Table 4.1.8.9. 4.3.4.1.(1)
CSA	CAN/CSA-S136-01 (Including Supplement CAN/CSA-S136S1-05)	North American Specification for the Design of Cold-Formed Steel Structural Members (using the Appendix B provisions applicable to Canada)	4.3.4.2.(1)
CSA	CAN3-S157-05	Strength Design in Aluminum	4.3.5.1.(1)
CSA	S269.1-1975 (R2003)	Falsework for Construction Purposes	4.1.1.3.(4)
CSA	CAN/CSA-S269.2-M87 (R2003)	Access Scaffolding for Construction Purposes	4.1.1.3.(4)
CSA	CAN/CSA-S269.3-M92 (R2003)	Concrete Formwork	4.1.1.3.(4)
CSA	S304.1-04	Design of Masonry Structures	Table 4.1.8.9. 4.3.2.1.(1)
CSA	S307-M1980 (R2005)	Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings	9.23.13.11.(5)
CSA	S350-M1980 (R2003)	Code of Practice for Safety in Demolition of Structures	8.1.1.3.(1)
CSA	CAN3-S367-M81 (R2003)	Air-Supported Structures	4.4.1.1.(1)
CSA	CAN/CSA-S406-92 (R2003)	Construction of Preserved Wood Foundations	9.15.2.4.(1) 9.16.5.1.(1)
CSA	S413-94 (R2000)	Parking Structures	4.4.2.1.(1)
CSA	CAN/CSA-Z32-04	Electrical Safety and Essential Electrical Systems in Health Care Facilities	3.2.7.3.(4) 3.2.7.6.(1)
CSA	CAN/CSA-Z91-02	Health and Safety Code for Suspended Equipment Operations	4.1.5.19.(2)
CSA	CAN/CSA-Z240.2.1-92 (R2005)	Structural Requirements for Mobile Homes	9.12.2.2.(6) 9.15.1.3.(1)
CSA	Z240.10.1-94 (R2001)	Site Preparation, Foundation, and Anchorage of Mobile Homes	9.15.1.3.(1) 9.23.6.3.(1)
CSA	Z240.5-92 (R2005)	Oil Requirements for Mobile Housing and Recreational Vehicles	9.33.5.2.(1)
CSA	CAN/CSA-Z271-98 (R2003)	Safety Code for Suspended Elevating Platforms	4.1.5.19.(2)
CSA	CAN/CSA-Z305.1-92 (R2001)	Nonflammable Medical Gas Piping Systems	2.2.10.5.(1) <sup>(2)</sup> 2.2.10.5.(2) <sup>(2)</sup> 7.4.1.1.(1) 7.4.1.1.(2) 7.4.1.3.(1)
CSA	CAN/CSA-Z317.2-01	Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities	6.2.1.1.(1)

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Issuing Agency	Document Number	Title of Document	Code Reference
CWC	2004	Engineering Guide for Wood Frame Construction	9.4.1.1.(1)
FINA	2005-2009	FINA Handbook	7.3.3.13.(6)
HVI	HVI 915-1995	Procedure for Loudness Rating of Residential Fan Products	9.32.3.10.(2)
HVI	HVI 916-2005	Airflow Test Standard	9.32.3.10.(1)
IAPMO	2000	Uniform Swimming Pool, Spa and Hot Tub Code	7.3.3.38.(2)
ILBA	2000	Log Building Standards for Residential, Handcrafted Interlocking, Scribe-fit Construction	9.36.1.1.(1)
ILBA	2005	Log Span Tables for Floor Joists, Beams, and Roof Support Systems	9.36.1.1.(1)
ISO	8201:1987(E)	Acoustics – Audible emergency evacuation signal	3.2.4.18.(2)
NFPA	10-2002	Portable Fire Extinguishers	3.2.5.17.(1) 3.3.5.11.(5) 9.10.20.4.(1) 10.4.7.3.(1)
NFPA	13-2002	Installation of Sprinkler Systems	3.2.4.8.(2) 3.2.4.15.(1) 3.2.5.7.(4) 3.2.5.11.(8) 3.2.5.13.(1) 3.2.5.13.(11) 3.3.2.13.(3) 3.3.5.11.(3) 10.4.7.2.(1)
NFPA	13D-2002	Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes	3.2.5.13.(3)
NFPA	13R-2002	Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height	3.2.5.7.(4) 3.2.5.13.(2) 10.4.7.2.(1)
NFPA	14-2003	Installation of Standpipe and Hose Systems	3.2.5.7.(3) 3.2.5.9.(1) 3.2.5.10.(1)
NFPA	20-2003	Installation of Stationary Pumps for Fire Protection	3.2.5.19.(1)
NFPA	33-2003	Spray Application Using Flammable or Combustible Materials	3.3.5.22.(1)
NFPA	68-2002	Venting of Deflagrations	3.3.5.13.(4)
NFPA	80-1999	Fire Doors and Fire Windows	3.1.8.5.(2) 3.1.8.10.(2) 3.1.8.12.(2) 3.1.8.12.(3) 3.1.8.14.(1) 9.10.13.1.(1)
NFPA	82-2004	Incinerators and Waste and Linen Handling Systems and Equipment	6.2.6.1.(1) 9.10.10.5.(2)
NFPA	86-2003	Ovens and Furnaces	6.2.2.5.(6)
NFPA	96-2004	Ventilation Control and Fire Protection of Commercial Cooking Operations	6.2.2.6.(1) 10.6.4.1.(1)
NFPA	211-2003	Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances	6.3.1.2.(2) 6.3.1.3.(1)
NFPA	214-2005	Water-Cooling Towers	6.2.3.14.(3)
NLGA	2004	Standard Grading Rules for Canadian Lumber (Interpretation Included)	9.3.2.1.(1)

**Table 1.3.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
NSF/ANSI	50-2004	Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs	7.3.3.38.(3) 7.3.3.51.(1)
Oxford University Press	2nd Edition, June 2004	Canadian Oxford Dictionary	1.4.1.1.(5) <sup>(1)</sup> 1.2.1.1.(3) 1.2.1.1.(5) <sup>(2)</sup>
SMACNA	1995	HVAC Duct Construction Standards – Metal and Flexible 2nd Edition	9.33.6.5.(2)
TC		Canadian Aviation Regulations – Part III	4.1.5.14.(1)
TPIC	1996	Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses	9.23.13.11.(6)
UL	UL-300-05	Fire Extinguishing Systems for Protection of Commercial Cooking Equipment	6.2.2.6.(2)
ULC	CAN/ULC-S101-04	Fire Endurance Tests of Building Construction and Materials	3.1.5.12.(3) 3.1.5.12.(4) 3.1.5.12.(6) 3.1.7.1.(1) 3.1.11.7.(1) 3.2.3.8.(1) 3.2.6.5.(8) 9.35.4.1.(2) 10.4.1.1.(1)
ULC	CAN/ULC-S102-03	Test for Surface Burning Characteristics of Building Materials and Assemblies	3.1.5.21.(1) 3.1.12.1.(1)
ULC	CAN/ULC-S102.2-03	Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies	3.1.12.1.(2) 3.1.13.4.(1)
ULC	ULC-S102.3-M82 (R2000)	Fire Test of Light Diffusers and Lenses	3.1.13.4.(1)
ULC	CAN4-S104-M80 (R1985)	Fire Tests of Door Assemblies	3.1.8.4.(1) 3.2.6.5.(5)
ULC	CAN4-S105-M85 (R1992)	Fire Door Frames Meeting the Performance Required by CAN4-S104	9.10.13.6.(1)
ULC	CAN4-S106-M80 (R1985)	Fire Tests of Window and Glass Block Assemblies	3.1.8.4.(1)
ULC	CAN/ULC-S107-03	Fire Tests of Roof Coverings	3.1.15.1.(1)
ULC	CAN/ULC-S109-03	Flame Tests of Flame-Resistant Fabrics and Films	3.1.6.5.(1) 3.1.16.1.(1) 3.6.5.2.(2) 3.6.5.3.(1) 9.33.6.3.(1)
ULC	CAN/ULC-S110-M86 (R2001)	Test for Air Ducts	3.6.5.1.(2) 3.6.5.1.(5) 9.33.6.2.(2) 9.33.6.2.(4)
ULC	ULC-S111-1995 (R2001)	Fire Tests for Air Filter Units	6.2.3.13.(1) 9.33.6.15.(1)
ULC	CAN/ULC-S112-M90 (R2001)	Fire Test of Fire-Damper Assemblies	3.1.8.4.(1)
ULC	CAN/ULC-S112.1-M90 (R2001)	Leakage Rated Dampers for Use in Smoke Control Systems	6.2.3.9.(3)
ULC	CAN4-S113-79 (R2000)	Wood Core Doors Meeting the Performance Required by CAN4-S104-77 for Twenty Minute Fire Rated Closure Assemblies	9.10.13.2.(1) 10.4.5.1.(1)
ULC	CAN/ULC-S114-05	Test for Determination of Non-Combustibility in Building Materials	1.4.1.2.(1) <sup>(1)</sup>

Table 1.3.1.2. (Continued)

Issuing Agency	Document Number	Title of Document	Code Reference
ULC	CAN/ULC-S115-05	Fire Tests of Firestop Systems	3.1.5.16.(3) 3.1.9.1.(1) 3.1.9.1.(2) 3.1.9.4.(4) 9.10.9.7.(3)
ULC	CAN4-S124-M85 (R2000)	Test for the Evaluation of Protective Coverings for Foamed Plastic	3.1.5.12.(2) 10.4.9.1.(4)
ULC	CAN/ULC-S126-M86 (R2000)	Test for Fire Spread Under Roof-Deck Assemblies	3.1.14.1.(1) 3.1.14.2.(1)
ULC	CAN/ULC-S134-92 (R1998)	Fire Test of Exterior Wall Assemblies	3.1.5.5.(1) 3.2.3.7.(2) 9.10.14.5.(2) 9.10.15.5.(2)
ULC	ULC-S135-04	Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)	3.1.5.1.(2)
ULC	ULC-S505-1974	Fusible Links for Fire Protection Service	3.1.8.9.(1)
ULC	CAN/ULC-S524-01	Installation of Fire Alarm Systems	3.2.4.5.(1) 10.6.3.1.(1)
ULC	ULC-S526-02	Visible Signal Devices for Fire Alarm Systems	3.2.4.19.(2)
ULC	CAN/ULC-S528-M91 (R1999)	Manual Pull Stations for Fire Alarm Systems	10.6.3.2.(1)
ULC	CAN/ULC-S529-02	Smoke Detectors for Fire Alarm Systems	10.6.3.4.(1)
ULC	CAN/ULC-S530-91	Heat Actuated Fire Detectors	10.6.3.3.(1)
ULC	CAN/ULC-S531-02	Smoke Alarms	3.2.4.20.(1) 9.10.19.1.(1) 9.37.2.20.(1) 10.6.3.5.(1)
ULC	CAN/ULC-S537-04	Verification of Fire Alarm Systems	3.2.4.5.(2) 10.6.3.1.(2)
ULC	CAN/ULC-S553-02	Installation of Smoke Alarms	3.2.4.20.(7)
ULC	CAN/ULC-S561-03	Installation and Services for Fire Signal Receiving Centres and Systems	3.2.4.7.(4)
ULC	CAN/ULC-S610-M87	Factory-Built Fireplaces	9.22.8.1.(1)
ULC	ULC-S628-93	Fireplace Inserts	9.22.10.1.(1)
ULC	CAN/ULC-S629-M87	650°C Factory-Built Chimneys	9.33.10.2.(1)
ULC	CAN/ULC-S639-M87 (R2000)	Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplaces	9.22.2.3.(1)
ULC	CAN/ULC-S701-05	Thermal Insulation, Polystyrene, Boards and Pipe Covering	Table 5.10.1.1. 9.15.4.1.(1) Table 9.23.16.2.A. 9.25.2.2.(1)
ULC	CAN/ULC-S702-97	Mineral Fibre Thermal Insulation for Buildings	Table 5.10.1.1. Table 9.23.16.2.A. 9.25.2.2.(1)
ULC	CAN/ULC-S703-01	Cellulose Fibre Insulation (CFI) for Buildings	Table 5.10.1.1. 9.25.2.2.(1)
ULC	CAN/ULC-S704-03	Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced	Table 5.10.1.1. Table 9.23.16.2.A. 9.25.2.2.(1)

**Table 1.3.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
ULC	CAN/ULC-S705.1-01	Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density, Material – Specification	Table 5.10.1.1. 9.25.2.2.(1)
ULC	CAN/ULC-S705.2-05	Thermal Insulation – Spray-Applied Rigid Polyurethane Foam, Medium Density – Application	5.3.1.3.(3) Table 5.10.1.1. 9.25.2.5.(1)
ULC	CAN/ULC-S706-02	Wood Fibre Thermal Insulation for Buildings	Table 5.10.1.1. 9.23.15.7.(3) Table 9.23.16.2.A. 9.25.2.2.(1) 9.29.8.1.(1)
ULC	ULC/ORD-C199P-02	Combustible Piping for Sprinkler Systems	3.2.5.14.(2) 3.2.5.14.(5)
ULC	ULC/ORD-C376-1995	Fire Growth of Foamed Plastic Insulated Building Panels in a Full-Scale Room Configuration	3.1.5.12.(7)
ULC	ULC/ORD-C1254.6-1995	Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units	6.2.2.6.(2)

**Notes to Table 1.3.1.2.:**

- (1) Code reference is in Division A.
- (2) Code reference is in Division C.

**1.3.2. Organizations**

**1.3.2.1. Abbreviations of Proper Names**

**1)** The abbreviations of proper names in this Code shall have the meanings assigned to them in this Article (the appropriate addresses of the organizations are shown in brackets).

- ACGIH ..... American Conference of Governmental Industrial Hygienists (1330 Kemper Meadow Drive, Cincinnati, Ohio 45240-1634 U.S.A.; www.acgih.org)
- ANSI ..... American National Standards Institute (25 West 43rd Street, 4th Floor, New York, New York 10036 U.S.A.; www.ansi.org)
- APSP ..... The Association of Pool & Spa Professionals (2111 Eisenhower Avenue, Alexandria, Virginia 22314 U.S.A.; www.nspi.org)
- ASCE ..... American Society of Civil Engineers (1801 Alexander Bell Drive, Reston, Virginia 20191-4400 U.S.A.; www.asce.org)
- ASHRAE ..... American Society of Heating, Refrigerating and Air-Conditioning Engineers (1791 Tullie Circle, N.E., Atlanta, Georgia 30329-2305 U.S.A.; www.ashrae.org)
- ASME ..... American Society of Mechanical Engineers (22 Law Drive, P.O. Box 2900, Fairfield, New Jersey 07007-2900 U.S.A.; www.asme.org)
- ASTM ..... American Society for Testing and Materials International (100 Barr Harbor Drive, West Conshohocken, Pennsylvania 19428-2959 U.S.A.; www.astm.org)
- AWPA ..... American Wood-Preservers’ Association (P.O. Box 388, Selma, Alabama 36702-0388 U.S.A.; www.awpa.com)
- BIA ..... Brick Industry Association (11490 Commerce Park Drive, Reston, Virginia 20191-1525 U.S.A.; www.bia.org)
- BNQ ..... Bureau de normalisation du Québec (333, rue Franquet, Sainte-Foy (Québec) G1P 4C7; www.bnq.qc.ca)

CAN .....	National Standard of Canada designation. (The number or name following the CAN designation represents the agency under whose auspices the standard is issued. CAN1 designates CGA, CAN2 designates CGSB, CAN3 designates CSA, and CAN4 designates ULC.)
CCBFC .....	Canadian Commission on Building and Fire Codes (National Research Council of Canada, Ottawa, Ontario K1A 0R6; <a href="http://www.nationalcodes.ca">www.nationalcodes.ca</a> )
CCCma .....	Canadian Centre for Climate Modelling and Analysis (University of Victoria, P.O. Box 1700, STN CSC, Victoria, British Columbia V8W 2Y2; <a href="http://www.cccma.bc.ec.gc.ca">www.cccma.bc.ec.gc.ca</a> )
CCMC .....	Canadian Construction Materials Centre (National Research Council of Canada, Ottawa, Ontario K1A 0R6; <a href="http://irc.nrc-cnrc.gc.ca/ccmc/">irc.nrc-cnrc.gc.ca/ccmc/</a> )
CGSB .....	Canadian General Standards Board (Place du Portage III, 6B1 11 Laurier Street, Gatineau, Quebec K1A 1G6; <a href="http://www.pwgsc.gc.ca/cgsb">www.pwgsc.gc.ca/cgsb</a> )
CMHC .....	Canada Mortgage and Housing Corporation (700 Montreal Road, Ottawa, Ontario K1A 0P7; <a href="http://www.cmhc.ca">www.cmhc.ca</a> )
CRCA .....	Canadian Roofing Contractors' Association (2430 Don Reid Drive, Suite 100, Ottawa, Ontario K1H 1E1; <a href="http://www.roofingcanada.com">www.roofingcanada.com</a> )
CSA .....	Canadian Standards Association (5060 Spectrum Way, Suite 100, Mississauga, Ontario L4W 5N6; <a href="http://www.csa.ca">www.csa.ca</a> )
CWC .....	Canadian Wood Council (99 Bank Street, Suite 400, Ottawa, Ontario K1P 6B9; <a href="http://www.cwc.ca">www.cwc.ca</a> )
EPA .....	Environmental Protection Agency (Office of Radiation and Indoor Air, 1200 Pennsylvania Avenue, NW, 6609G, Washington, D.C. 20460 U.S.A.; <a href="http://www.epa.gov">www.epa.gov</a> )
FCC .....	Forintek Canada Corporation (319, rue Franquet, Sainte-Foy (Québec) G1P 4R4; <a href="http://www.forintek.ca">www.forintek.ca</a> )
FINA .....	Fédération Internationale de Natation Amateur (425 Walnut Street, Suite 1610, Cincinnati, Ohio 45202 U.S.A.; <a href="http://www.fina.org">www.fina.org</a> )
FM Global ...	FM Global (1151 Boston-Providence Turnpike, P.O. Box 9102, Norwood, Massachusetts 02062 U.S.A.; <a href="http://www.fmglobal.com">www.fmglobal.com</a> )
HC .....	Health Canada (Communications Directorate, Ottawa, Ontario K1A 0K9; <a href="http://www.hc-sc.gc.ca">www.hc-sc.gc.ca</a> )
HI .....	Hydronics Institute (35 Russo Place, Berkley Heights, New Jersey 07922 U.S.A.; <a href="http://www.gamanet.org">www.gamanet.org</a> )
HRAI .....	Heating, Refrigeration and Air Conditioning Institute of Canada (5045 Orbitor Drive, Building 11, Suite 300, Mississauga, Ontario L4W 4Y4; <a href="http://www.hrai.ca">www.hrai.ca</a> )
HVI .....	Home Ventilating Institute (1000 N. Rand Road, Suite 214, Wauconda, Illinois 60084 U.S.A.; <a href="http://www.hvi.org">www.hvi.org</a> )
IAPMO .....	International Association of Plumbing and Mechanical Officials (5001 E. Philadelphia Street, Ontario, California 91761 U.S.A.; <a href="http://www.iapmo.org/iapmo">www.iapmo.org/iapmo</a> )
ILBA .....	International Log Builders' Association (P.O. Box 775, Lumby, British Columbia VOE 2G0; <a href="http://www.logassociation.org">www.logassociation.org</a> )
IRC .....	Institute for Research in Construction (National Research Council of Canada, Ottawa, Ontario K1A 0R6; <a href="http://irc.nrc-cnrc.gc.ca">irc.nrc-cnrc.gc.ca</a> )
ISO .....	International Organization for Standardization (Standards Council of Canada, 270 Albert Street, Suite 200, Ottawa, Ontario K1P 6N7; <a href="http://www.iso.org">www.iso.org</a> )

- MA&H ..... Alberta Municipal Affairs and Housing (16th Floor, Commerce Place, 10155 – 102 Street, Edmonton, Alberta, T5J 4L4; [www.municipalaffairs.gov.ab.ca](http://www.municipalaffairs.gov.ab.ca))
- NBC ..... National Building Code of Canada 2005 (see CCBFC)
- NCMA ..... National Concrete Masonry Association (13750 Sunrise Valley Drive, Herndon, Virginia 20171-4662 U.S.A.; [www.ncma.org](http://www.ncma.org))
- NFC ..... National Fire Code of Canada 2005 (see CCBFC)
- NFPA ..... National Fire Protection Association (1 Batterymarch Park, Quincy, Massachusetts 02169-7471 U.S.A.; [www.nfpa.org](http://www.nfpa.org))
- NLGA ..... National Lumber Grades Authority (406 - First Capital Place, 960 Quayside Drive, New Westminster, British Columbia V3M 6G2; [www.nlga.org](http://www.nlga.org))
- NRC ..... National Research Council of Canada (Ottawa, Ontario K1A 0R6; [www.nrc-cnrc.gc.ca](http://www.nrc-cnrc.gc.ca))
- NRCA ..... National Roofing Contractors Association (10255 W. Higgins Road, Suite 600, Rosemont, Illinois 60018-5607 U.S.A.; [www.nrca.net](http://www.nrca.net))
- NSF ..... National Sanitation Foundation (789 N. Dixboro Road, P.O. Box 130140, Ann Arbor, Michigan 48113-0140 U.S.A.; [www.nsf.org](http://www.nsf.org))
- NYCDH ..... New York City Department of Health and Mental Hygiene (Environmental and Occupational Disease Epidemiology, 253 Broadway, Suite 402, CN-34C, New York, New York 10007-2333 U.S.A.; [www.nyc.gov/html/doh](http://www.nyc.gov/html/doh))
- OMMAH ..... Ontario Ministry of Municipal Affairs and Housing (777 Bay Street, 2nd Floor, Toronto, Ontario M5G 2E5; [www.obc.mah.gov.on.ca](http://www.obc.mah.gov.on.ca))
- ONHWP ..... Ontario New Home Warranty Program (now Tarion Warranty Corporation, 5150 Yonge Street, Concourse Level, Toronto, Ontario M2N 6L8; [www.tarion.com](http://www.tarion.com))
- SCC ..... Safety Codes Council (10707-100 Avenue, Suite 800, Edmonton, Alberta T5J 3M1; [www.safetycodes.ab.ca](http://www.safetycodes.ab.ca))
- SFPE ..... Society of Fire Protection Engineers (7315 Wisconsin Avenue, Suite 620E, Bethesda, Maryland 20814 U.S.A.; [www.sfpe.org](http://www.sfpe.org))
- SMACNA ..... Sheet Metal and Air Conditioning Contractors' National Association (4201 Lafayette Center Drive, Chantilly, Virginia 20151-1209 U.S.A.; [www.smacna.org](http://www.smacna.org))
- TC ..... Transport Canada (Public Affairs, Tower C, Place de Ville, 330 Sparks Street, Area B, 19th Floor, Ottawa, Ontario K1A 0N5; [www.tc.gc.ca](http://www.tc.gc.ca))
- TPIC ..... Truss Plate Institute of Canada (c/o. 16 Nixon Road, Bolton, Ontario L7E 1K3, Attn: Kenneth Koo; [www.tpica.ca](http://www.tpica.ca))
- UL ..... Underwriters Laboratories Inc. (333 Pfingsten Road, Northbrook, Illinois 60062-2096 U.S.A.; [www.ul.com](http://www.ul.com))
- ULC ..... Underwriters' Laboratories of Canada (7 Underwriters Road, Toronto, Ontario M1R 3B4; [www.ulc.ca](http://www.ulc.ca))
- WCLIB ..... West Coast Lumber Inspection Bureau (P.O. Box 23145, Portland, Oregon 97281 U.S.A.; [www.wclib.org](http://www.wclib.org))
- WWPA ..... Western Wood Products Association (522 SW Fifth Avenue, Suite 500, Portland, Oregon 97204-2122 U.S.A.; [www.wwpa.org](http://www.wwpa.org))



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**Division B**

**Part 2**  
**Reserved**



# **Part 3**

## **Fire Protection, Occupant Safety and Accessibility**

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# **Part 3**

## **Fire Protection, Occupant Safety and Accessibility**

(See Appendix A.)

### **Section 3.1. General**

#### **3.1.1. Scope and Definitions**

##### **3.1.1.1. Scope**

- 1)** The scope of this Part shall be as described in Subsection 1.3.3. of Division A.

##### **3.1.1.2. Defined Words**

- 1)** Words that appear in italics are defined in Article 1.4.1.2. of Division A.

##### **3.1.1.3. Fire Protection Information**

- 1)** Information to be submitted regarding major components of fire protection shall conform to the requirements of Subsection 2.2.3. of Division C.

#### **3.1.2. Classification of Buildings or Parts of Buildings by Major Occupancy**

(See Appendix A.)

##### **3.1.2.1. Classification of Buildings**

- 1)** Except as permitted by Articles 3.1.2.3. to 3.1.2.7., every *building* or part thereof shall be classified according to its *major occupancy* as belonging to one of the Groups or Divisions described in Table 3.1.2.1. (See Appendix A.)
- 2)** A *building* intended for use by more than one *major occupancy* shall be classified according to all *major occupancies* for which it is used or intended to be used.

**Table 3.1.2.1.**  
**Major Occupancy Classification**  
 Forming Part of Sentence 3.1.2.1.(1)

Group	Division	Description of <i>Major Occupancies</i>
A	1	<i>Assembly occupancies</i> intended for the production and viewing of the performing arts
A	2	<i>Assembly occupancies</i> not elsewhere classified in Group A
A	3	<i>Assembly occupancies</i> of the arena type
A	4	<i>Assembly occupancies</i> in which occupants are gathered in the open air
B	1	<i>Care or detention occupancies</i> in which persons are under restraint or are incapable of self-preservation because of security measures not under their control
B	2	<i>Care or detention occupancies</i> in which persons having cognitive or physical limitations require special care or treatment
C	—	<i>Residential occupancies</i>
D	—	<i>Business and personal services occupancies</i>
E	—	<i>Mercantile occupancies</i>
F	1	<i>High-hazard industrial occupancies</i>
F	2	<i>Medium-hazard industrial occupancies</i>
F	3	<i>Low-hazard industrial occupancies</i>

### 3.1.2.2. Occupancies of Same Classification

**1)** Any *building* is deemed to be occupied by a single *major occupancy*, notwithstanding its use for more than one *major occupancy*, provided that all *occupancies* are classified as belonging to the same Group classification or, where the Group is divided into Divisions, as belonging to the same Division classification described in Table 3.1.2.1.

### 3.1.2.3. Arena-Type Buildings

**1)** An arena-type *building* intended for occasional use for trade shows and similar exhibition purposes shall be classified as a Group A, Division 3 *occupancy*. (See Appendix A.)

### 3.1.2.4. Police Stations

**1)** A police station with detention quarters is permitted to be classified as a Group B, Division 2 *major occupancy* provided the station is not more than 1 *storey* in *building height* and 600 m<sup>2</sup> in *building area*.

### 3.1.2.5. Convalescent and Children's Custodial Homes

**1)** Convalescent homes and children's custodial homes are permitted to be classified as *residential occupancies* provided that occupants are ambulatory and live as a single housekeeping unit in a *dwelling unit* with sleeping accommodation for not more than 10 persons.

**2)** A care facility accepted for residential use pursuant to provincial legislation is permitted to be classified as a *residential occupancy* provided

- a) the occupants live in a *dwelling unit* used as a single housekeeping unit with sleeping accommodation for not more than 10 persons,
- b) interconnected *smoke alarms* are installed in each sleeping room in addition to the requirements of Article 3.2.4.20.,
- c) emergency lighting is provided in conformance with Subsection 3.2.7., and
- d) the *building* is *sprinklered* throughout.

**3.1.2.6. Pre-School Facilities**

1) Facilities for pre-school programmes, involving not more than 3 h attendance per day, in which no child is less than 2.5 years old, shall be classified as a Group A, Division 2 occupancy.

**3.1.2.7. Drama Facilities**

1) A drama facility located in an elementary, junior or high school for the purpose of educating students of the facility, including public performances associated with the students' education programme, shall be classified as a Group A, Division 2 occupancy.

**3.1.3. Multiple Occupancy Requirements**

**3.1.3.1. Separation of Major Occupancies**

1) Except as permitted by Sentences (2) and (3), major occupancies shall be separated from adjoining major occupancies by fire separations having fire-resistance ratings conforming to Table 3.1.3.1.

2) In a building not more than 3 storeys in building height, if not more than 2 dwelling units are contained together with a Group E major occupancy, the fire-resistance rating of the fire separation between the 2 major occupancies need not be more than 1 h.

3) In a building conforming to the requirements of Articles 3.2.8.2. to 3.2.8.9., the requirements of Sentence (1) for fire separations between major occupancies do not apply at the vertical plane around the perimeter of an opening through the horizontal fire separation.

**Table 3.1.3.1.**  
**Major Occupancy Fire Separations<sup>(1)</sup>**  
Forming Part of Sentence 3.1.3.1.(1)

Major Occupancy	Minimum Fire-Resistance Rating of Fire Separation, h											
	Adjoining Major Occupancy											
	A-1	A-2	A-3	A-4	B-1	B-2	C	D	E	F-1	F-2	F-3
A-1	—	1	1	1	2	2	1	1	2	(2)	2	1
A-2	1	—	1	1	2	2	1	1	2	(2)	2	1
A-3	1	1	—	1	2	2	1	1	2	(2)	2	1
A-4	1	1	1	—	2	2	1	1	2	(2)	2	1
B-1	2	2	2	2	—	2	2	2	2	(2)	2	2
B-2	2	2	2	2	2	—	2	2	2	(2)	2	2
C	1	1	1	1	2	2	—	1	2 <sup>(3)</sup>	(2)	2 <sup>(4)</sup>	1
D	1	1	1	1	2	2	1	—	—	3	—	—
E	2	2	2	2	2	2	2 <sup>(3)</sup>	—	—	3	—	—
F-1	(2)	(2)	(2)	(2)	(2)	(2)	(2)	3	3	—	2	2
F-2	2	2	2	2	2	2	2 <sup>(4)</sup>	—	—	2	—	—
F-3	1	1	1	1	2	2	1	—	—	2	—	—

**Notes to Table 3.1.3.1.:**

- (1) Section 3.3. contains requirements for the separation of occupancies and tenancies that are in addition to the requirements for the separation of major occupancies.
- (2) See Sentence 3.1.3.2.(1).
- (3) See Sentence 3.1.3.1.(2).
- (4) See Sentence 3.1.3.2.(2).

**3.1.3.2.****3.1.3.2. Prohibition of Occupancy Combinations**

1) No *major occupancy* of Group F, Division 1 shall be contained within a *building* with any *occupancy* classified as Group A, B or C.

2) Not more than one *suite of residential occupancy* shall be contained within a *building* classified as a Group F, Division 2 *major occupancy*.

**3.1.4. Combustible Construction****3.1.4.1. Combustible Materials Permitted**

1) A *building* permitted to be of *combustible construction* is permitted to be constructed of *combustible* materials, with or without *noncombustible* components.

2) The *flame-spread rating* on any exposed surface of foamed plastic insulation, and on any surface that would be exposed by cutting through the insulation in any direction, shall be not more than 500.

**3.1.4.2. Protection of Foamed Plastics**

1) *Foamed plastic* insulation that forms part of a wall or ceiling assembly in a *building* permitted to be of *combustible construction* shall be protected from adjacent spaces in the *building*, other than adjacent concealed spaces within *attic or roof spaces*, crawl spaces, and wall assemblies,

- a) by one of the interior finishes described in Subsections 9.29.4. to 9.29.9.,
- b) provided the *building* does not contain a Group B or Group C *major occupancy*, by sheet metal
  - i) mechanically fastened to the supporting assembly independent of the insulation,
  - ii) not less than 0.38 mm thick, and
  - iii) with a melting point not below 750°C, or
- c) by any *thermal barrier* that meets the requirements of Sentence 3.1.5.12.(2). (see Appendix A.)

**3.1.4.3. Wires and Cables**

1) Optical fibre cables and electrical wires and cables installed in a *building* permitted to be of *combustible construction* shall

- a) not convey flame or continue to burn for more than 1 min when tested in conformance with the Vertical Flame Test in Clause 4.11.1. of CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables," or
- b) be located in
  - i) totally enclosed *noncombustible* raceways (see Appendix A),
  - ii) masonry walls,
  - iii) concrete slabs, or
  - iv) totally enclosed non-metallic raceways conforming to Article 3.1.5.20.

(See Appendix A.)

(See also Sentence 3.6.4.3.(1).)

**3.1.4.4. Fire-Retardant-Treated Wood**

1) If *fire-retardant-treated wood* is specified in this Part, the wood shall

- a) be pressure impregnated with fire-retardant chemicals in conformance with CSA O80 Series, "Wood Preservation," and
- b) have a *flame-spread rating* not more than 25.

**3.1.4.5. Heavy Timber Construction Alternative**

1) If *combustible construction* is permitted and is not required to have a *fire-resistance rating* more than 45 min, *heavy timber construction* is permitted to be used.

2) If *heavy timber construction* is permitted, it shall conform to Article 3.1.4.6.

**3.1.4.6. Heavy Timber Construction**

**1)** Wood elements in *heavy timber construction* shall be arranged in heavy solid masses and with essentially smooth flat surfaces to avoid thin sections and sharp projections.

**2)** Except as permitted by Sentences (3) to (6) and (12), the minimum dimensions of wood elements in *heavy timber construction* shall conform to Table 3.1.4.6.

**Table 3.1.4.6.**  
**Heavy Timber Dimensions**  
Forming Part of Sentence 3.1.4.6.(2)

Supported Assembly	Structural Element	Solid Sawn (width x depth), mm x mm	Glued-Laminated (width x depth), mm x mm	Round (diam), mm
Roofs only	Columns	140 x 191	130 x 190	180
	Arches supported on the tops of walls or abutments	89 x 140	80 x 152	—
	Beams, girders and trusses	89 x 140	80 x 152	—
	Arches supported at or near the floor line	140 x 140	130 x 152	—
Floors, floors plus roofs	Columns	191 x 191	175 x 190	200
	Beams, girders, trusses and arches	140 x 241 or 191 x 191	130 x 228 or 175 x 190	—

**3)** Where splice plates are used at splices of roof arches supported on the tops of walls or abutments, roof trusses, roof beams and roof girders in *heavy timber construction*, they shall be not less than 64 mm thick.

**4)** Floors in *heavy timber construction* shall be of glued-laminated or solid sawn plank not less than

- a) 64 mm thick, splined or tongued and grooved, or
- b) 38 mm wide and 89 mm deep set on edge and well spiked together.

**5)** Floors in *heavy timber construction* shall be laid

- a) so that no continuous line of end joints will occur except at points of support, and covered with
  - i) tongued and grooved flooring not less than 19 mm thick laid crosswise or diagonally, or
  - ii) tongued and grooved phenolic-bonded plywood, strandboard or waferboard not less than 12.5 mm thick, and
- b) not closer than 15 mm to the walls to provide for expansion, with the gap covered at the top or bottom.

**6)** Roofs in *heavy timber construction* shall be of tongued and grooved phenolic-bonded plywood not less than 28 mm thick, or glued-laminated or solid sawn plank that is

- a) not less than 38 mm thick, splined or tongued and grooved, or
- b) not less than 38 mm wide and 64 mm deep set on edge and laid so that no continuous line of end joints will occur except at the points of support.

**7)** Wood columns in *heavy timber construction* shall be continuous or superimposed throughout all *storeys*.

**8)** Superimposed wood columns in *heavy timber construction* shall be connected by

- a) reinforced concrete or metal caps with brackets,
- b) steel or iron caps with pintles and base plates, or
- c) timber splice plates fastened to the columns by metal connectors housed within the contact faces.

**9)** Where beams and girders in *heavy timber construction* enter masonry, wall plates, boxes of the self-releasing type or hangers shall be used.

**10)** Wood girders and beams in *heavy timber construction* shall be closely fitted to columns, and adjoining ends shall be connected by ties or caps to transfer horizontal loads across the joints.

**11)** In *heavy timber construction*, intermediate wood beams used to support a floor shall be supported on top of the girders or on metal hangers into which the ends of the beams are closely fitted.

**12)** Roof arches supported on the top of walls or abutments, roof trusses, roof beams and roof girders in *heavy timber construction* shall be not less than 64 mm wide provided

- a) where two or more spaced members are used, the intervening spaces are
  - i) blocked solidly throughout, or
  - ii) tightly closed by a continuous wood cover plate not less than 38 mm thick secured to the underside of the members, or
- b) the underneath of the roof deck or sheathing is *sprinklered*.

### 3.1.5. Noncombustible Construction

#### 3.1.5.1. Noncombustible Materials

**1)** Except as permitted by Sentences (2) to (4) and Articles 3.1.5.2. to 3.1.5.21., 3.1.13.4. and 3.2.2.16., a *building* or part of a *building* required to be of *noncombustible construction* shall be constructed with *noncombustible* materials. (See also Subsection 3.1.13. for the requirements regarding the *flame-spread rating* of interior finishes.)

**2)** Notwithstanding the definition of *noncombustible* materials stated in Article 1.4.1.2. of Division A, a material is permitted to be used in *noncombustible construction* provided that, when tested in accordance with ULC-S135, "Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)," at a heat flux of 50 kW/m<sup>2</sup>,

- a) its average total heat release is not more than 3 MJ/m<sup>2</sup>,
- b) its average total smoke extinction area is not more than 1.0 m<sup>2</sup>, and
- c) the test duration is extended beyond the time stipulated in the referenced standard until it is clear that there is no further release of heat or smoke.

**3)** If a material referred to in Sentence (2) consists of a number of discrete layers and testing reveals that the surface layer or layers protect the underlying layers such that complete combustion of the underlying layers does not occur, the test shall be repeated by removing the outer layers sequentially until all layers have been exposed during testing, or until complete combustion has occurred.

**4)** The acceptance criteria for a material tested in accordance with Sentence (3) shall be based on the cumulative emissions from all layers, which must not exceed the criteria stated in Clauses (2)(a) and (b).

#### 3.1.5.2. Minor Combustible Components

**1)** The following minor *combustible* components are permitted in a *building* required to be of *noncombustible construction*:

- a) paint (see also Sentence 3.1.5.10.(1)),
- b) mastics and caulking materials, including foamed plastic air sealants, applied to provide a seal between the major components of exterior wall construction, (see also Article 3.6.4.3. for limits on the use of *combustible* materials in *plenum* spaces),
- c) fire stop materials conforming to Sentence 3.1.9.1.(1) and Article 3.1.11.7.,
- d) tubing for pneumatic controls provided it has an outside diameter of not more than 10 mm,
- e) adhesives, *vapour barriers* and sheathing papers,
- f) electrical outlet and junction boxes,
- g) wood blocking within wall assemblies intended for the attachment of handrails, fixtures, and similar items mounted on the surface of the wall, and
- h) similar minor components.

**3.1.5.3. Combustible Roofing Materials**

- 1) *Combustible* roof covering that has an A, B, or C classification determined in conformance with Subsection 3.1.15. is permitted on a *building* required to be of *noncombustible construction*.
- 2) *Combustible* roof sheathing and roof sheathing supports installed above a concrete deck are permitted on a *building* required to be of *noncombustible construction* provided
  - a) the concrete deck is not less than 50 mm thick,
  - b) the height of the roof space above the deck is not more than 1 m,
  - c) the roof space is divided into compartments by fire stops in conformance with Article 3.1.11.5.,
  - d) openings through the concrete deck other than for *noncombustible* roof drains and plumbing piping are protected by masonry or concrete shafts
    - i) constructed as *fire separations* having a *fire-resistance rating* not less than 1 h, and
    - ii) extending from the concrete deck to not less than 150 mm above the adjacent roof sheathing,
  - e) the perimeter of the roof is protected by a *noncombustible* parapet extending from the concrete deck to not less than 150 mm above the adjacent sheathing, and
  - f) except as permitted by Clause (d), the roof space does not contain any *building* services.
- 3) *Combustible* cant strips, roof curbs, nailing strips and similar components used in the installation of roofing are permitted on a *building* required to be of *noncombustible construction*.
- 4) Wood nailer facings to parapets, not more than 600 mm high, are permitted on a *building* required to be of *noncombustible construction*, if the facings and any roof membranes covering the facings are protected by sheet metal.

**3.1.5.4. Combustible Glazing and Skylights**

- 1) *Combustible* skylight assemblies are permitted in a *building* required to be of *noncombustible construction* if the assemblies have a *flame-spread rating* not more than
  - a) 150 provided the assemblies
    - i) have an individual area not more than 9 m<sup>2</sup>,
    - ii) have an aggregate horizontal projected area of the openings through the ceiling not more than 25% of the area of the ceiling of the room or space in which they are located, and
    - iii) are spaced not less than 2.5 m from adjacent assemblies and from required *fire separations*, or
  - b) 75 provided the assemblies
    - i) have an individual area not more than 27 m<sup>2</sup>,
    - ii) have an aggregate horizontal projected area of the openings through the ceiling not more than 33% of the area of the ceiling of the room or space in which they are located, and
    - iii) are spaced not less than 1.2 m from adjacent assemblies and from required *fire separations*.(See Appendix A.)
- 2) *Combustible* vertical glazing installed no higher than the second *storey* is permitted in a *building* required to be of *noncombustible construction*.
- 3) Except as permitted by Sentence (4), the *combustible* vertical glazing permitted by Sentence (2) shall have a *flame-spread rating* not more than 75.
- 4) The *flame-spread rating* of *combustible* glazing is permitted to be not more than 150 if the aggregate area of glazing is not more than 25% of the wall area of the *storey* in which it is located, and
  - a) the glazing is installed in a *building* not more than 1 *storey* in *building* height,

- b) the glazing in the *first storey* is separated from the glazing in the second *storey* in accordance with the requirements of Article 3.2.3.17. for opening protection, or
- c) the *building* is *sprinklered* throughout.

**5)** *Combustible* window sashes and frames are permitted in a *building* required to be of *noncombustible construction* provided

- a) each window in an exterior wall face is an individual unit separated by *noncombustible* wall construction from every other opening in the wall,
- b) windows in exterior walls in contiguous *storeys* are separated by not less than 1 m of *noncombustible construction*, and
- c) the aggregate area of openings in an exterior wall face of a *fire compartment* is not more than 40% of the area of the wall face.

### 3.1.5.5. Combustible Components for Exterior Walls

**1)** Except for an *exposing building face* with a maximum aggregate area of *unprotected openings* that is not more than 10% of the *exposing building face* as determined by Sentence 3.2.3.7.(1), an exterior non-loadbearing wall assembly that includes *combustible* components is permitted to be used in a *building* required to be of *noncombustible construction* provided

- a) the *building* is
  - i) not more than 3 *storeys* in *building height*, or
  - ii) *sprinklered* throughout,
- b) the interior surfaces of the wall assembly are protected by a *thermal barrier* conforming to Sentence 3.1.5.12.(3), and
- c) the wall assembly satisfies the criteria of Sentences (2) and (3) when subjected to testing in conformance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies."

(See Appendix A.)

**2)** Flaming on or in the wall assembly shall not spread more than 5 m above the opening during or following the test procedure referenced in Sentence (1). (See Appendix A.)

**3)** The heat flux during the flame exposure on a wall assembly shall be not more than 35 kW/m<sup>2</sup> measured 3.5 m above the opening during the test procedure referenced in Sentence (1). (See Appendix A.)

**4)** A wall assembly permitted by Sentence (1) that includes *combustible* cladding of *fire-retardant-treated wood* shall be tested for fire exposure after the cladding has been subjected to an accelerated weathering test as specified in ASTM D 2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing."

### 3.1.5.6. Nailing Elements

**1)** Wood nailing elements attached directly to or set into a continuous *noncombustible* backing for the attachment of interior finishes are permitted in a *building* required to be of *noncombustible construction* provided the concealed space created by the wood elements is not more than 50 mm thick.

### 3.1.5.7. Combustible Millwork

**1)** *Combustible* millwork, including interior trim, doors and door frames, show windows together with their frames, aprons and backing, handrails, shelves, cabinets and counters, is permitted in a *building* required to be of *noncombustible construction*.

### 3.1.5.8. Combustible Flooring Elements

**1)** *Combustible stage* flooring supported on *noncombustible* structural members is permitted in a *building* required to be of *noncombustible construction*.

**2)** Wood members more than 50 mm but not more than 300 mm high applied directly to or set into a *noncombustible* floor slab are permitted for the construction of a raised platform in a *building* required to be of *noncombustible construction* provided the concealed spaces are fire stopped in conformance with Sentence 3.1.11.3.(2).

3) The floor system for the raised platform referred to in Sentence (2) is permitted to include a *combustible* subfloor and *combustible* finished flooring.

4) *Combustible* finished flooring is permitted in a *building* required to be of *noncombustible construction*.

### 3.1.5.9. Combustible Stairs in Dwelling Units

1) *Combustible* stairs are permitted in a *dwelling unit* in a *building* required to be of *noncombustible construction*.

### 3.1.5.10. Combustible Interior Finishes

1) *Combustible* interior finishes, including paint, wallpaper, and other interior finishes not more than 1 mm thick, are permitted in a *building* required to be of *noncombustible construction*.

2) *Combustible* interior wall finishes, other than *foamed plastics*, are permitted in a *building* required to be of *noncombustible construction* provided they

- a) are not more than 25 mm thick, and
- b) have a *flame-spread rating* not more than 150 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction.

3) *Combustible* interior ceiling finishes, other than *foamed plastics*, are permitted in a *building* required to be of *noncombustible construction* provided they

- a) are not more than 25 mm thick, except for exposed *fire-retardant-treated wood battens*, and
- b) have a *flame-spread rating* not more than 25 on any exposed surface, or on any surface that would be exposed by cutting through the material in any direction, or are of *fire-retardant-treated wood*, except that not more than 10% of the ceiling area within each *fire compartment* is permitted to have a *flame-spread rating* not more than 150.

### 3.1.5.11. Gypsum Board

1) Gypsum board with a tightly adhering paper covering not more than 1 mm thick is permitted in a *building* required to be of *noncombustible construction* provided the *flame-spread rating* on the surface is not more than 25.

### 3.1.5.12. Combustible Insulation and its Protection

1) *Combustible* insulation, other than *foamed plastics*, is permitted in a *building* required to be of *noncombustible construction* provided that it has a *flame-spread rating* not more than 25 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, where the insulation is not protected as described in Sentences (3) and (4).

2) *Foamed plastic* insulation having a *flame-spread rating* not more than 25 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in a *building* required to be of *noncombustible construction* provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a *thermal barrier* consisting of

- a) not less than 12.7 mm thick gypsum board mechanically fastened to a supporting assembly independent of the insulation,
- b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,
- c) masonry,
- d) concrete, or
- e) any *thermal barrier* that meets the requirements of classification B when tested in conformance with CAN4-S124-M, "Test for the Evaluation of Protective Coverings for Foamed Plastic" (see Appendix A).

**3)** *Combustible* insulation having a *flame-spread rating* more than 25 but not more than 500 on an exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in the exterior walls of a *building* required to be of *noncombustible construction*, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a *thermal barrier* as described in Sentence (2), except that in a *building* that is not *sprinklered* throughout and is more than 18 m high, measured between *grade* and the floor level of the top *storey*, the insulation shall be protected by a *thermal barrier* consisting of

- a) gypsum board not less than 12.7 mm thick, mechanically fastened to a supporting assembly independent of the insulation and with all joints either backed or taped and filled,
- b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,
- c) masonry or concrete not less than 25 mm thick, or
- d) any *thermal barrier* that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," will not develop an average temperature rise more than 140°C or a maximum temperature rise more than 180°C at any point on its unexposed face within 10 min (see also Article 3.2.3.7.).

**4)** *Combustible* insulation having a *flame-spread rating* more than 25 but not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in the interior walls, within ceilings and within roof assemblies of a *building* required to be of *noncombustible construction*, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a *thermal barrier* as described in Sentence (2), except that in a *building* that is not *sprinklered* throughout and is more than 18 m high, measured between *grade* and the floor level of the top *storey*, the insulation shall be protected by a *thermal barrier* consisting of

- a) Type X gypsum board not less than 15.9 mm thick, mechanically fastened to a supporting assembly independent of the insulation and with all joints either backed or taped and filled, conforming to
  - i) ASTM C 36/C 36M, "Gypsum Wallboard,"
  - ii) ASTM C 442/C 442M, "Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board,"
  - iii) ASTM C 588/C 588M, "Gypsum Base for Veneer Plasters,"
  - iv) ASTM C 630/C 630M, "Water-Resistant Gypsum Backing Board,"
  - v) ASTM C 931/C 931M, "Exterior Gypsum Soffit Board,"
  - vi) ASTM C 960/C 960M, "Predecorated Gypsum Board," or
  - vii) CAN/CSA-A82.27-M, "Gypsum Board,"
- b) non-loadbearing masonry or concrete not less than 50 mm thick,
- c) loadbearing masonry or concrete not less than 75 mm thick, or
- d) any *thermal barrier* that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials,"
  - i) will not develop an average temperature rise more than 140°C or a maximum temperature rise more than 180°C at any point on its unexposed face within 20 min, and
  - ii) will remain in place for not less than 40 min.

**5)** *Combustible* insulation, including *foamed plastics*, installed above roof decks, outside of *foundation* walls below ground level and beneath concrete slabs-on-ground is permitted to be used in a *building* required to be of *noncombustible construction*.

**6)** Thermosetting *foamed plastic* insulation having a *flame-spread rating* not more than 500 that forms part of a factory-assembled exterior wall panel that does not incorporate an air space is permitted to be used in a *building* required to be of *noncombustible construction* provided

- a) the *foamed plastic* is protected on both sides by sheet steel not less than 0.38 mm thick that will remain in place for not less than 10 min when the wall panel is tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials,"

- b) the *flame-spread rating* of the wall panel, determined by subjecting a sample including an assembled joint to the appropriate test described in Subsection 3.1.12., is not more than the *flame-spread rating* permitted for the room or space that it bounds,
- c) the *building* does not contain a Group B or Group C *major occupancy*, and
- d) the *building* is not more than 18 m high, measured between *grade* and the floor level of the top *storey*.

**7)** A factory-assembled non-loadbearing interior or exterior wall or ceiling panel containing *foamed plastic* insulation having a *flame-spread rating* of not more than 500 is permitted to be used in a *building* required to be of *noncombustible construction* provided

- a) the *building* is *sprinklered*,
- b) the *building* is not more than 18 m high, measured between *grade* and the floor level of the uppermost *storey*,
- c) the *building* does not contain a Group A, Group B, or Group C *major occupancy*,
- d) the panel does not contain an air space,
- e) the panel, when tested in conformance with ULC/ORD-C376, "Fire Growth of Foamed Plastic Insulated Building Panels in a Full-Scale Room Configuration," meets the criteria defined in the document, and
- f) the *flame-spread rating* of the panel, determined by subjecting a sample that includes an assembled joint typical of field installation to the appropriate test described in Subsection 3.1.12., is not more than the *flame-spread rating* permitted for the room or space that it bounds.

### 3.1.5.13. Combustible Elements in Partitions

**1)** Except as permitted by Sentence (2), solid lumber *partitions* not less than 38 mm thick and wood framing in *partitions* located in a *fire compartment* not more than 600 m<sup>2</sup> in area are permitted to be used in a *building* required to be of *noncombustible construction* in a *floor area* that is not *sprinklered* throughout provided the *partitions*

- a) are not required *fire separations*, and
- b) are not located in a *care or detention occupancy*.

**2)** *Partitions* installed in a *building* of *noncombustible construction* are permitted to contain wood framing provided

- a) the *building* is not more than 3 *storeys* in *building height*,
- b) the *partitions* are not located in a *care or detention occupancy*, and
- c) the *partitions* are not installed as enclosures for *exits* or *vertical service spaces*.

**3)** Solid lumber *partitions* not less than 38 mm thick and *partitions* that contain wood framing are permitted to be used in a *building* required to be of *noncombustible construction* provided

- a) the *building* is *sprinklered* throughout, and
- b) the *partitions* are not
  - i) located in a *care or detention occupancy*,
  - ii) installed as enclosures for *exits* or *vertical service spaces*, or
  - iii) used to satisfy the requirements of Clause 3.2.8.1.(1)(a).

### 3.1.5.14. Storage Lockers in Residential Buildings

**1)** Storage lockers in storage rooms are permitted to be constructed of wood in a *building* of *residential occupancy* required to be of *noncombustible construction*.

### 3.1.5.15. Combustible Ducts

**1)** Except as required by Sentence 3.6.4.3.(1), *combustible ducts*, including *plenums* and duct connectors, are permitted to be used in a *building* required to be of *noncombustible construction* provided these ducts and duct connectors are used only in horizontal runs.

**2)** *Combustible* duct linings, duct coverings, duct insulation, vibration isolation connectors, duct tape, pipe insulation and pipe coverings are permitted to be used in a *building* required to be of *noncombustible construction* provided they conform to the appropriate requirements of Subsection 3.6.5.

**3)** In a *building* required to be of *noncombustible construction*, *combustible* ducts need not comply with the requirements of Sentences 3.6.5.1.(1) and (2) provided the ducts are

- a) part of a duct system conveying only ventilation air, and
- b) contained entirely within a *dwelling unit*.

### 3.1.5.16. Combustible Piping Materials

**1)** Except as permitted by Clause 3.1.5.2.(1)(d) and Sentences (2) and (3), *combustible* piping and tubing and associated adhesives are permitted to be used in a *building* required to be of *noncombustible construction* provided that, except when concealed in a wall or concrete floor slab, they

- a) have a *flame-spread rating* not more than 25, and
- b) if used in a *building* described in Subsection 3.2.6., have a smoke developed classification not more than 50.

**2)** *Combustible* sprinkler piping is permitted to be used within a *sprinklered floor area* in a *building* required to be of *noncombustible construction*. (See also Article 3.2.5.14.)

**3)** Polypropylene pipes and fittings are permitted to be used for drain, waste and vent piping for the conveyance of highly corrosive materials and for piping used to distribute distilled or dialyzed water in laboratory and hospital facilities in a *building* required to be of *noncombustible construction*, provided

- a) the *building* is *sprinklered* throughout,
- b) the piping is not located in a vertical shaft, and
- c) piping that penetrates a *fire separation* is sealed at the penetration by a fire stop system that, when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," has an FT rating not less than the *fire-resistance rating* of the *fire separation*.

### 3.1.5.17. Combustible Plumbing Fixtures

**1)** *Combustible* plumbing fixtures, including wall and ceiling enclosures that form part of the plumbing fixture, are permitted in a *building* required to be of *noncombustible construction* provided they are constructed of material having a *flame-spread rating* and smoke developed classification not more than that permitted for the wall surface of the room or space in which they are installed.

### 3.1.5.18. Wires and Cables

**1)** Except as permitted by Article 3.1.5.19., optical fibre cables and electrical wires and cables with *combustible* insulation, jackets or sheathes are permitted in a *building* required to be of *noncombustible construction*, provided

- a) the wires and cables exhibit a vertical char of not more than 1.5 m when tested in conformance with the Vertical Flame Test – Cables in Cabletrough in Clause 4.11.4 of CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables,"
- b) the wires and cables are located in
  - i) totally enclosed *noncombustible* raceways (see A-3.1.4.3.(1)(b)(i) in Appendix A),
  - ii) masonry walls,
  - iii) concrete slabs,
  - iv) a *service room* separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h, or
  - v) totally enclosed non-metallic raceways conforming to Article 3.1.5.20., or
- c) the wires and cables are communication cables used at the service entry to a *building* and are not more than 3 m long.

(See Appendix A.)

**3.1.5.19. Combustible Travelling Cables for Elevators**

1) *Combustible* travelling cables are permitted on elevating devices in a *building* required to be of *noncombustible construction*.

**3.1.5.20. Non-metallic Raceways**

1) Subject to the limits on the size of elements that penetrate *fire separations* as stated in Sentence 3.1.9.3.(2), within a *fire compartment* of a *building* required to be of *noncombustible construction*, totally enclosed non-metallic raceways not more than 175 mm in outside diameter, or of an equivalent rectangular area, are permitted to be used to enclose optical fibre cables and electrical wires and cables, provided the raceways exhibit a vertical char not more than 1.5 m when tested in conformance with the Vertical Flame Test (FT - 4) – Conduit or Tubing on Cable Tray in Clause 6.16 of CSA C22.2 No. 211.0, “General Requirements and Methods of Testing for Non-metallic Conduit.”

**3.1.5.21. Decorative Wood Cladding**

1) On *buildings* required to be of *noncombustible construction*, decorative wood cladding is permitted to be used on the exterior marquee fascias of a *storey* having direct access to a *street* or access route, provided the cladding is *fire-retardant-treated wood* that has been conditioned in conformance with ASTM D 2898, “Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing,” before being tested in accordance with CAN/ULC-S102, “Test for Surface Burning Characteristics of Building Materials and Assemblies.”

**3.1.6. Tents and Air-Supported Structures**

(See Appendix A.)

**3.1.6.1. Means of Egress**

1) Tents and *air-supported structures* shall conform to Sections 3.3. and 3.4.

**3.1.6.2. Restrictions**

1) An *air-supported structure* shall not be located above the *first storey* on any *building*.

2) An *air-supported structure* shall not be used for Groups B, C, or Group F, Division 1 *major occupancies* or for classrooms.

3) An *air-supported structure* shall be designed as open floor space without interior walls, *mezzanines*, intermediate floors or similar construction.

**3.1.6.3. Clearance to Other Structures**

1) Except as permitted by Sentences (2), (3) and (4), every tent and *air-supported structure* shall conform to Subsection 3.2.3.

2) Tents and *air-supported structures*

- a) shall not be erected closer than 3 m to other structures on the same property except as permitted by Sentences (3) and (4), and
- b) shall be sufficiently distant from one another to provide an area to be used as a means of emergency egress.

3) Tents and *air-supported structures* not occupied by the public

- a) need not be separated from one another, and
- b) are permitted to be erected less than 3 m from other structures on the same property provided this spacing does not create a hazard to the public.

4) Tents not more than 120 m<sup>2</sup> in ground area, located on fair grounds or similar open spaces, need not be separated from one another provided this does not create a hazard to the public.

**3.1.6.4.****3.1.6.4. Clearance to Flammable Material**

1) The ground enclosed by a tent or *air-supported structure* and not less than 3 m of ground outside the structure shall be cleared of all flammable material or vegetation that will spread fire.

**3.1.6.5. Flame Resistance**

1) Every tent and *air-supported structure* and all tarpaulins and decorative materials used in connection with these structures shall conform to CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films."

**3.1.6.6. Emergency Air Supply**

1) An *air-supported structure* used as a place of assembly for more than 200 persons shall have either

- a) an automatic emergency engine-generator set capable of powering one blower continuously for 4 h, or
- b) a supplementary blower powered by an automatic internal combustion engine.

**3.1.7. Fire-Resistance Ratings****3.1.7.1. Determination of Ratings**

1) Except as permitted by Sentence (2) and Article 3.1.7.2., the rating of a material, assembly of materials or a structural member that is required to have a *fire-resistance rating*, shall be determined on the basis of the results of tests conducted in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

2) A material, assembly of materials or a structural member is permitted to be assigned a *fire-resistance rating* on the basis of Appendix D.

**3.1.7.2. Exception for Exterior Walls**

1) The limit on the rise of temperature on the unexposed surface of an assembly as required by the tests referred to in Sentence 3.1.7.1.(1) shall not apply to an exterior wall that has a *limiting distance* of 1.2 m or more, provided correction is made for radiation from the unexposed surface in accordance with Sentence 3.2.3.1.(9).

**3.1.7.3. Exposure Conditions for Rating**

1) Floor, roof and ceiling assemblies shall be rated for exposure to fire on the underside.

2) *Firewalls* and interior vertical *fire separations* shall be rated for exposure to fire on each side.

3) Exterior walls shall be rated for exposure to fire from inside the *building*.

**3.1.7.4. Minimum Fire-Resistance Rating**

1) The use of materials or assemblies having a greater *fire-resistance rating* than required shall impose no obligation to exceed in whole or in part the minimum *fire-resistance ratings* required by this Part.

**3.1.7.5. Rating of Supporting Construction**

1) Except as permitted by Sentence (2) and by Articles 3.2.2.20. to 3.2.2.83. for mixed types of construction, all *loadbearing* walls, columns and arches in the *storey* immediately below a floor or roof assembly required to have a *fire-resistance rating* shall have a *fire-resistance rating* not less than that required for the supported floor or roof assembly.

2) *Loadbearing* walls, columns and arches supporting a *service room* or *service space* need not conform to Sentence (1).

3) If an assembly is required to be of *noncombustible construction* and have a *fire-resistance rating*, it shall be supported by *noncombustible construction*.

### 3.1.8. Fire Separations and Closures

#### 3.1.8.1. General Requirements

- 1) Any wall, *partition* or floor assembly required to be a *fire separation* shall
  - a) except as permitted by Sentence (2), be constructed as a continuous element, and
  - b) as required in this Part, have a *fire-resistance rating* as specified (see Appendix A).
- 2) Openings in a *fire separation* shall be protected with *closures*, shafts or other means in conformance with Articles 3.1.8.4. to 3.1.8.17. and Subsections 3.1.9. and 3.2.8. (See Appendix A.)

#### 3.1.8.2. Combustible Construction Support

1) *Combustible construction* that abuts on or is supported by a *noncombustible fire separation* shall be constructed so that its collapse under fire conditions will not cause the collapse of the *fire separation*.

#### 3.1.8.3. Continuity of Fire Separations

- 1) Except as permitted by Sentence 3.6.4.2.(2), a *horizontal service space* or other concealed space located above a required vertical *fire separation*, including the walls of a vertical shaft, shall be divided at the *fire separation* by an equivalent *fire separation* within the *service space*.
- 2) The *fire separation* required by Sentence (1) shall terminate so that smoke-tight joints are provided where it abuts on or intersects
  - a) a floor,
  - b) a roof slab, or
  - c) a roof deck.
- 3) Except as required by Subsection 3.6.3. for a shaft penetrating a roof assembly, a shaft, including an *exit enclosure*, that penetrates a *fire separation*, shall
  - a) extend through any *horizontal service space* or any other concealed space, and
  - b) terminate so that smoke-tight joints are provided where the shaft abuts on or intersects
    - i) a floor,
    - ii) a roof slab, or
    - iii) a roof deck.
- 4) The continuity of a *fire separation* shall be maintained where it abuts another *fire separation*, a floor, a ceiling, a roof, or an exterior wall assembly. (See Appendix A.)

#### 3.1.8.4. Determination of Ratings

- 1) Except as permitted by Sentences (2) and 3.1.8.14.(1), the *fire-protection rating* of a *closure* shall be determined based on the results of tests conducted in conformance with the appropriate provisions in
  - a) CAN4-S104-M, "Fire Tests of Door Assemblies,"
  - b) CAN4-S106-M, "Fire Tests of Window and Glass Block Assemblies," or
  - c) CAN/ULC-S112-M, "Fire Test of Fire-Damper Assemblies."(See Articles 3.1.8.15. to 3.1.8.17. for additional requirements for *closures*.)
- 2) Except as permitted by Sentence 3.1.8.10.(1), the *fire-protection rating* of a *closure* shall conform to Table 3.1.8.4. for the required *fire-resistance rating* of the *fire separation*.

**Table 3.1.8.4.**  
**Fire-Protection Rating of Closures**  
 Forming Part of Sentence 3.1.8.4.(2)

<i>Fire-Resistance Rating of Fire Separation</i>	<i>Minimum Fire-Protection Rating of Closure</i>
45 min	45 min
1 h	45 min
1.5 h	1 h
2 h	1.5 h
3 h	2 h
4 h	3 h

### 3.1.8.5. Installation of Closures

**1)** Except where *fire dampers*, window assemblies and glass block are used as *closures*, *closures* of the same *fire-protection rating* installed on opposite sides of the same opening are deemed to have a *fire-protection rating* equal to the sum of the *fire-protection ratings* of the *closures*. (See A-3.1.8.1.(2) in Appendix A.)

**2)** Except as otherwise specified in this Part, every door, window assembly or glass block used as a *closure* in a required *fire separation* shall be installed in conformance with NFPA 80, "Fire Doors and Fire Windows." (See A-3.1.8.1.(2) in Appendix A.)

**3)** If a door is installed such that it could damage the integrity of a *fire separation* if its swing is unrestricted, door stops shall be installed to prevent the damage.

### 3.1.8.6. Maximum Openings

**1)** The size of an opening in an interior *fire separation* required to be protected with a *closure* shall be not more than 11 m<sup>2</sup>, with no dimension more than 3.7 m, if a *fire compartment* on either side of the *fire separation* is not *sprinklered*.

**2)** The size of an opening in an interior *fire separation* required to be protected with a *closure* shall be not more than 22 m<sup>2</sup>, with no dimension more than 6 m, provided the *fire compartments* on both sides of the *fire separation* are *sprinklered*.

### 3.1.8.7. Fire Dampers

**1)** Except as permitted by Article 3.1.8.8., a duct that penetrates an assembly required to be a *fire separation* shall be equipped with a *fire damper*.

**2)** A *fire damper* required by Sentence (1) shall have a *fire-protection rating* conforming to Sentence 3.1.8.4.(2).

### 3.1.8.8. Fire Dampers Waived

**1)** *Fire dampers* need not be provided in *noncombustible* branch ducts that have a melting point above 760°C and that penetrate a required *fire separation* provided the ducts

- a) serve only air-conditioning units or combined air-conditioning and heating units discharging air not more than 1.2 m above the floor and have a cross-sectional area not more than 0.013 m<sup>2</sup>, or
- b) are connected to *exhaust duct* risers that are under negative pressure and in which the airflow is upward as required by Article 3.6.3.4. and the branch ducts are carried up inside the riser not less than 500 mm.

**2)** A duct penetrating a vertical *fire separation* not required to have a *fire-resistance rating* need not be equipped with a *fire damper* at the *fire separation*.

**3)** A *noncombustible* duct that penetrates a horizontal *fire separation* not required to have a *fire-resistance rating* need not be equipped with a *fire damper* at the *fire separation*.

**4)** A *noncombustible* duct that penetrates a *fire separation* that separates a *vertical service space* from the remainder of the *building* need not be equipped with a *fire damper* at the *fire separation* provided

- a) the duct has a melting point above 760°C, and
- b) each individual duct exhausts directly to the outside at the top of the *vertical service space*.

**5)** A continuous *noncombustible* duct having a melting point above 760°C that penetrates a vertical *fire separation* as required by Sentence 3.3.1.1.(1) between *suites* of other than *residential* or *care or detention occupancy* need not be equipped with a *fire damper* at the *fire separation*, provided the duct is tightly sealed at the penetration on all sides and extends for at least 1 m on both sides of the *fire separation* without any openings.

**6)** A duct that serves commercial cooking equipment and penetrates a required *fire separation* need not be equipped with a *fire damper* at the *fire separation*. (See also Article 6.2.2.6.)

### 3.1.8.9. Installation of Fire Dampers

**1)** A *fire damper* shall be arranged so as to close automatically upon the operation of a fusible link conforming to ULC-S505, "Fusible Links for Fire Protection Service," or other heat-actuated or smoke-actuated device.

- 2)** A heat-actuated device referred to in Sentence (1) shall
  - a) be located where it is readily affected by an abnormal rise in temperature in the duct, and
  - b) have a temperature rating approximately 30°C above the maximum temperature that would exist in the system, whether it is in operation or shut down.

**3)** A *fire damper* shall be installed in the plane of the *fire separation* so as to stay in place should the duct become dislodged during a fire.

**4)** A *fire damper* tested in the vertical or horizontal position shall be installed in the position in which it was tested.

**5)** A tightly fitted access door shall be installed for each *fire damper* to provide access for the inspection of the damper and the resetting of the release device. (See Appendix A.)

### 3.1.8.10. Twenty-Minute Closures

**1)** A door assembly having a *fire-protection rating* not less than 20 min is permitted to be used as a *closure* in

- a) a *fire separation* not required to have a *fire-resistance rating* more than 1 h, located between
  - i) a *public corridor* and a *suite*,
  - ii) a corridor and adjacent sleeping rooms, or
  - iii) a corridor and adjacent classrooms, offices and libraries in Group A, Division 2 *major occupancies*, or
- b) a *fire separation* not required to have a *fire-resistance rating* more than 45 min, located in a *building* not more than 3 *storeys* in *building height*.

**2)** The requirements for *noncombustible* sills and *combustible* floor coverings in NFPA 80, "Fire Doors and Fire Windows," do not apply to a door described in Sentence (1).

**3)** A door described in Sentence (1) shall have clearances of not more than 6 mm at the bottom and not more than 3 mm at the sides and top.

### 3.1.8.11. Self-closing Devices

**1)** Except as permitted by Sentence (2), every door in a *fire separation*, other than doors to freight elevators and dumbwaiters, shall be equipped with a self-closing device designed to return the door to the closed position after each use.

- 2) A self-closing device need not be provided on a door that is located between
  - a) a classroom and a corridor providing *access to exit* from the classroom in a *building* that is not more than 3 *storeys* in *building height*,
  - b) a *public corridor* and an adjacent room of *business and personal services occupancy* in a *building* that is not more than 3 *storeys* in *building height* provided the door is not located in a dead-end portion of the corridor,
  - c) a patients' sleeping room and a corridor serving the patients' sleeping room, provided the room and corridor are within a *fire compartment* in a hospital or nursing home that complies with the requirements of Article 3.3.3.5., or
  - d) a patients' sleeping room and an adjacent room that serves the patients' sleeping room, provided these rooms are within a *fire compartment* in a hospital or nursing home that complies with the requirements of Article 3.3.3.5.

### 3.1.8.12. Hold-Open Devices ★

- 1) A hold-open device is permitted on a door in a required *fire separation*, other than an *exit* door in a *building* more than 3 *storeys* in *building height*, and on a door for a vestibule required by Article 3.3.5.7., provided the device is designed to release the door in conformance with Sentences (2), (3) and (4).
- 2) Except as required by Sentence (3), a hold-open device permitted by Sentence (1) shall be designed to release by a signal from
  - a) an automatic sprinkler system,
  - b) a heat-actuated device, or
  - c) a *smoke detector* located as described in Appendix B of NFPA 80, "Fire Doors and Fire Windows."
- 3) A hold-open device permitted by Sentence (1) shall be designed to release upon a signal from a *smoke detector* located as described in Appendix B of NFPA 80, "Fire Doors and Fire Windows," if used on
  - a) an *exit* door,
  - b) a door opening into a *public corridor*,
  - c) an egress door referred to in Sentence 3.4.2.4.(2),
  - d) a door serving
    - i) an *assembly occupancy*,
    - ii) a *care or detention occupancy*, or
    - iii) a *residential occupancy*, or
  - e) a door required to function as part of a smoke control system.
- 4) A hold-open device permitted by Sentence (1) shall be designed to release upon a signal from the *building* fire alarm system if a fire alarm system is provided, except that this requirement does not apply to
  - a) a hold-open device on a door located between a corridor used by the public and an adjacent sleeping room in a hospital or nursing home, or
  - b) a hold-open device that is designed to release by a heat-actuated device in conformance with Sentence (2).

### 3.1.8.13. Door Latches

- 1) Except as permitted by Article 3.3.3.5., a swing-type door in a *fire separation* shall be equipped with a positive latching mechanism designed to hold the door in the closed position after each use.

### 3.1.8.14. Wired Glass and Glass Block

- 1) Except as permitted by Articles 3.1.8.16. and 3.1.8.17. for the separation of *exits*, an opening in a *fire separation* having a *fire-resistance rating* not more than 1 h is permitted to be protected with fixed wired glass assemblies or glass blocks installed in conformance with NFPA 80, "Fire Doors and Fire Windows."
- 2) Wired glass assemblies permitted by Sentence (1) and described in Appendix D are permitted to be used as  *closures* in vertical *fire separations* without being tested in accordance with Sentence 3.1.8.4.(1).

**3)** Glass blocks permitted by Sentence (1) shall be installed in accordance with Subsection 4.3.2. and reinforced with steel reinforcement in each horizontal joint.

**3.1.8.15. Temperature Rise Limit for Doors**

**1)** Except as permitted by Article 3.1.8.17., the maximum temperature rise on the opaque portion of the unexposed side of a door used as a *closure* in a *fire separation* in a location shown in Table 3.1.8.15., shall conform to the Table when tested in conformance with Sentence 3.1.8.4.(1).

**Table 3.1.8.15.**  
**Restrictions on Temperature Rise and Glazing for Closures**  
 Forming Part of Articles 3.1.8.15. and 3.1.8.16.

Location	Minimum Required Fire-Protection Rating of Door	Maximum Temperature Rise on Opaque Portion of Unexposed Side of Door, °C	Maximum Area of Wired Glass in Door, m <sup>2</sup>	Maximum Aggregate Area of Glass Block and Wired Glass Panels not in a Door, m <sup>2</sup>
Between a dead-end corridor and an adjacent <i>occupancy</i> where the corridor provides the only <i>access to exit</i> and is required to have a <i>fire-resistance rating</i>	Less than 45 min	No limit	No limit	No limit
	45 min	250 after 30 min	0.0645	0.0645
Between an <i>exit enclosure</i> and the adjacent <i>floor area</i> in a <i>building</i> not more than 3 <i>storeys</i> in <i>building height</i>	All ratings	No limit	0.8	0.8
Between an <i>exit enclosure</i> and the adjacent <i>floor area</i> (except as permitted above)	45 min	250 after 30 min	0.0645	0.0645
	1.5 h	250 after 1 h	0.0645	0.0645
	2 h	250 after 1 h	0.0645	0.0645
In a <i>firewall</i>	1.5 h	250 after 30 min	0.0645	0
	3 h	250 after 1 h	0	0

**3.1.8.16. Area Limits for Wired Glass and Glass Block**

**1)** Except as permitted by Article 3.1.8.17., the maximum area of wired glass in a door used in the locations shown in Table 3.1.8.15. shall conform to the Table. (See Appendix A.)

**2)** Except as permitted by Article 3.1.8.17., the maximum area of glass block and wired glass panels not in a door, used in the locations shown in Table 3.1.8.15., shall conform to the Table.

**3.1.8.17. Temperature Rise and Area Limits Waived**

**1)** The temperature rise limits and glass area limits required by Articles 3.1.8.15. and 3.1.8.16. are waived for a *closure* between an *exit enclosure* and an enclosed vestibule or corridor, provided

- a) the vestibule or corridor is separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* not less than 45 min,
- b) the *fire separation* required by Clause (a) contains no wired glass or glass block within 3 m of the *closure* into the *exit enclosure*, and
- c) the vestibule or corridor contains no *occupancy*.

(See Appendix A.)

## 3.1.9.1.

### 3.1.9. Building Services in Fire Separations and Fire-Rated Assemblies

(See Appendix A.)

#### 3.1.9.1. Fire Stopping of Service Penetrations

**1)** Except as required by Sentence (2), piping, tubing, ducts, *chimneys*, optical fibre cables, electrical wires and cables, totally enclosed *noncombustible* raceways, electrical outlet boxes and other similar *building* services that penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* shall be

- a) sealed by a fire stop system that, when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," has an F rating not less than the *fire-protection rating* required for *closures* in the *fire separation* in conformance with Table 3.1.8.4., or
- b) cast in place (see Appendix A).

(See also Article 3.1.9.4. for requirements regarding penetrations by *combustible* drain, waste and vent piping.)

**2)** Piping, tubing, ducts, *chimneys*, optical fibre cables, electrical wires and cables, totally enclosed *noncombustible* raceways, electrical outlet boxes and other similar *building* services that penetrate a *firewall* or a horizontal *fire separation* that is required to have a *fire-resistance rating* in conformance with Article 3.2.1.2., shall be sealed at the penetration by a fire stop system that, when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," has an FT rating not less than the *fire-resistance rating* for the *fire separation*.

#### 3.1.9.2. Combustibility of Service Penetrations

**1)** Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible*, unless the assembly was tested incorporating that service equipment. (See Appendix A.)

#### 3.1.9.3. Penetration by Wires, Cables and Outlet Boxes

**1)** Optical fibre cables and electrical wires and cables in totally enclosed *noncombustible* raceways are permitted to penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2.

**2)** Except as permitted by Sentence (3), totally enclosed non-metallic raceways conforming to Article 3.1.5.20., optical fibre cables, and electrical wires and cables, single or grouped, with *combustible* insulation, jackets or sheathes that conform to the requirements of Clause 3.1.5.18.(1)(a) and that are not installed in totally enclosed *noncombustible* raceways are permitted to penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the overall diameter of the single or grouped wires or cables, or the raceways is not more than 25 mm.

**3)** Single conductor metal sheathed cables with *combustible* jacketing that are more than 25 mm in overall diameter are permitted to penetrate a *fire separation* required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the cables are not grouped.

**4)** *Combustible* totally enclosed raceways that are embedded in a concrete floor slab are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the concrete cover between the raceway and the bottom of the slab is not less than 50 mm.

**5)** *Combustible* outlet boxes are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the opening through the membrane into the box is not more than 0.016 m<sup>2</sup>.

6) Outlet boxes that penetrate opposite sides of a wall assembly shall be offset where necessary to maintain the integrity of the *fire separation*.

#### 3.1.9.4. Combustible Piping Penetrations

1) *Combustible* sprinkler piping is permitted to penetrate a *fire separation* provided the *fire compartments* on each side of the *fire separation* are *sprinklered*. (See also Article 3.2.5.14.)

2) *Combustible* water distribution piping that has an outside diameter not more than 30 mm is permitted to penetrate a vertical *fire separation* that is required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the piping is sealed in conformance with Clause 3.1.9.1.(1)(a).

3) Except as permitted by Sentences (4) to (6), *combustible* piping shall not be used in a drain, waste and vent piping system if any part of that system penetrates

- a *fire separation* required to have a *fire-resistance rating*, or
- a membrane that forms part of an assembly required to have a *fire-resistance rating*.

4) *Combustible* drain, waste and vent piping is permitted to penetrate a *fire separation* required to have a *fire-resistance rating* or a membrane that forms part of an assembly required to have a *fire-resistance rating*, provided

- the piping is sealed at the penetration by a fire stop system that has an F rating not less than the *fire-resistance rating* required for the *fire separation* when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side, and
- the piping is not located in a vertical shaft.

5) *Combustible* drain piping is permitted to penetrate a horizontal *fire separation* provided it leads directly from a *noncombustible* water closet through a concrete floor slab.

6) *Combustible* drain, waste and vent piping is permitted on one side of a vertical *fire separation* provided it is not located in a vertical shaft.

#### 3.1.9.5. Openings through a Membrane Ceiling

1) A membrane ceiling forming part of an assembly assigned a *fire-resistance rating* on the basis of Appendix D is permitted to be penetrated by openings leading into ducts within the ceiling space, provided

- the ducts are sheet steel, and
- the number of openings and their protection conform to the requirements of Appendix D.

#### 3.1.9.6. Plenums

1) A ceiling assembly used as a *plenum* shall conform to Article 3.6.4.3.

### 3.1.10. Firewalls

#### 3.1.10.1. Prevention of Firewall Collapse

1) Except as permitted by Sentence (2), the connections and supports for structural framing members that are connected to or supported on a *firewall* and have a *fire-resistance rating* less than that required for the *firewall*, shall be designed so that the failure of the framing systems during a fire will not affect the integrity of the *firewall* during the fire.

**2)** Sentence (1) does not apply to a *firewall* consisting of two separate wall assemblies each tied to its respective *building* frame but not to each other, provided each wall assembly is

- a) a *fire separation* having one half of the *fire-resistance rating* required for the *firewall* by Sentences 3.1.10.2.(1) and (2), and
- b) designed so that the collapse of one wall assembly will not cause collapse of the other.

**3)** A *firewall* is permitted to be supported on the structural frame of a *building* of *noncombustible construction* provided the supporting frame has a *fire-resistance rating* not less than that required for the *firewall*.

**4)** Piping, ducts and totally enclosed *noncombustible* raceways shall be installed so that their collapse will not cause collapse of the *firewall*.

### 3.1.10.2. Rating of Firewalls

**1)** A *firewall* that separates a *building* or *buildings* with *floor areas* containing a Group E or a Group F, Division 1 or 2 *major occupancy* shall be constructed as a *fire separation* of *noncombustible construction* having a *fire-resistance rating* not less than 4 h, except that where the upper portion of a *firewall* separates *floor areas* containing other than Group E or Group F, Division 1 or 2 *major occupancies*, the *fire-resistance rating* of the upper portion of the *firewall* is permitted to be not less than 2 h.

**2)** A *firewall* that separates a *building* or *buildings* with *floor areas* containing *major occupancies* other than Group E or Group F, Division 1 or 2 shall be constructed as a *fire separation* of *noncombustible construction* having a *fire-resistance rating* not less than 2 h.

**3)** Except as permitted by Sentence (4), the required *fire-resistance rating* of a *firewall*, except for *closures*, shall be provided by masonry or concrete.

**4)** A *firewall* permitted to have a *fire-resistance rating* not more than 2 h need not be constructed of masonry or concrete, provided

- a) the assembly providing the *fire-resistance rating* is protected against damage that would compromise the integrity of the assembly, and
- b) the design conforms to Article 4.1.5.18.

(See Appendix A.)

### 3.1.10.3. Continuity of Firewalls

**1)** A *firewall* shall extend from the ground continuously through, or adjacent to, all *storeys* of a *building* or *buildings* so separated, except that a *firewall* located above a *basement storage garage* conforming to Article 3.2.1.2. is permitted to commence at the floor assembly immediately above the *storage garage*. (See also Sentence 3.1.10.1.(3).)

**2)** A *firewall* is permitted to terminate on the underside of a reinforced concrete roof slab, provided

- a) the roof slab on both sides of the *firewall* has a *fire-resistance rating* not less than
  - i) 1 h if the *firewall* is required to have a *fire-resistance rating* not less than 2 h, or
  - ii) 2 h if the *firewall* is required to have a *fire-resistance rating* not less than 4 h, and
- b) there are no concealed spaces within the roof slab in that portion immediately above the *firewall*.

**3)** In a *building* of *noncombustible construction*, a *firewall* may be offset at any intermediate floor construction provided

- a) the *fire separation* for the complete *firewall* assembly is continuous,
- b) the offset floor construction and all supporting elements have a *fire-resistance rating* not less than that required for the *firewall*, and
- c) the materials conform to Sentence 3.1.10.2.(3).

**3.1.10.4. Parapets**

- 1) Except as permitted by Sentences (2) and 3.1.10.3.(2), a *firewall* shall extend above the roof surface to form a parapet not less than
  - a) 150 mm high for a *firewall* required to have a *fire-resistance rating* not less than 2 h, and
  - b) 900 mm high for a *firewall* required to have a *fire-resistance rating* not less than 4 h.
- 2) A *firewall* that separates 2 *buildings* with roofs at different elevations need not extend above the upper roof surface to form a parapet, provided the difference in elevation between the roofs is more than 3 m.

**3.1.10.5. Maximum Openings**

- 1) Openings in a *firewall* shall conform to the size limits described in Article 3.1.8.6. and the aggregate width of openings shall be not more than 25% of the entire length of the *firewall*.

**3.1.10.6. Exposure Protection for Adjacent Walls**

- 1) The requirements of Article 3.2.3.14. shall apply to the external walls of 2 *buildings* that meet at a *firewall* at an angle less than 135°.

**3.1.10.7. Combustible Projections**

- 1) *Combustible* material shall not extend across the end of a *firewall* but is permitted to extend across a roof above a *firewall* that is terminated in conformance with Sentence 3.1.10.3.(2).
- 2) If *buildings* are separated by a *firewall*, *combustible* projections on the exterior of one *building*, including balconies, platforms, canopies, eave projections and stairs, that extend outward beyond the end of the *firewall*, shall not be permitted within 2.4 m of *combustible* projections and window or door openings of the adjacent *building*. (See also Article 3.2.3.6.)

**3.1.11. Fire Stops in Concealed Spaces****3.1.11.1. Separation of Concealed Spaces**

- 1) Concealed spaces in interior wall, ceiling and crawl spaces shall be separated from concealed spaces in exterior walls and *attic or roof spaces* by fire stops conforming to Article 3.1.11.7.

**3.1.11.2. Fire Stopping in Wall Assemblies**

- 1) Except as permitted by Sentence (2), fire stops conforming to Article 3.1.11.7. shall be provided to block off concealed spaces within a wall assembly
  - a) at every floor level,
  - b) at every ceiling level where the ceiling forms part of an assembly required to have a *fire-resistance rating*, and
  - c) so that the maximum horizontal dimension is not more than 20 m and the maximum vertical dimension is not more than 3 m.
- 2) Fire stops conforming to Sentence (1) are not required, provided
  - a) the wall space is filled with insulation,
  - b) the exposed construction materials and any insulation within the wall space are *noncombustible*,
  - c) the exposed construction materials and any insulation within the wall space have a *flame-spread rating* not more than 25 on any exposed surface, or on any surface that would be exposed by cutting through the material in any direction, and fire stops are installed so that the vertical distance between them is not more than 10 m, or
  - d) the insulated wall assembly contains not more than one concealed air space, and the horizontal thickness of that air space is not more than 25 mm.

**3.1.11.3.****3.1.11.3. Fire Stopping between Nailing and Supporting Elements**

**1)** In a *building* required to be of *noncombustible construction*, a concealed space in which there is an exposed ceiling finish with a *flame-spread rating* more than 25, shall be provided with fire stops conforming to Article 3.1.11.7. between wood nailing elements, so that the maximum area of the concealed space is not more than 2 m<sup>2</sup>.

**2)** In a *building* required to be of *noncombustible construction*, fire stops conforming to Article 3.1.11.7. shall be provided in the concealed spaces created by the wood members permitted by Sentence 3.1.5.8.(2) so that the maximum area of a concealed space is not more than 10 m<sup>2</sup>.

**3.1.11.4. Fire Stopping between Vertical and Horizontal Spaces**

- 1)** Fire stops conforming to Article 3.1.11.7. shall be provided
- a) at all interconnections between concealed vertical and horizontal spaces in interior coved ceilings, drop ceilings and soffits in which the exposed construction materials within the space have a *flame-spread rating* more than 25, and
  - b) at the end of each run and at each floor level in concealed spaces between stair stringers in which the exposed construction materials within the space have a *flame-spread rating* more than 25.

**3.1.11.5. Fire Stopping of Horizontal Concealed Spaces**

**1)** Except for crawl spaces conforming to Sentence 3.1.11.6.(1), horizontal concealed spaces within a floor assembly or roof assembly of *combustible construction*, in which sprinklers are not installed, shall be separated by construction conforming to Article 3.1.11.7. into compartments not more than

- a) 600 m<sup>2</sup> in area with no dimension more than 60 m if the exposed construction materials within the space have a *flame-spread rating* not more than 25, and
- b) 300 m<sup>2</sup> in area with no dimension more than 20 m if the exposed construction materials within the space have a *flame-spread rating* more than 25.

(See Appendix A.)

**2)** A concealed space in an exterior cornice, a mansard-style roof, a balcony or a canopy in which exposed construction materials within the space have a *flame-spread rating* more than 25, shall be separated by construction conforming to Article 3.1.11.7.

- a) at locations where the concealed space extends across the ends of required vertical *fire separations*, and
- b) so that the maximum dimension in the concealed space is not more than 20 m.

**3.1.11.6. Fire Stopping of Crawl Spaces**

**1)** A crawl space that is not considered as a *basement* by Article 3.2.2.9. and in which sprinklers are not installed, shall be separated by construction conforming to Article 3.1.11.7. into compartments not more than 600 m<sup>2</sup> in area with no dimension more than 30 m.

**3.1.11.7. Fire Stop Materials**

**1)** Except as permitted by Sentences (2) to (4) and (7), materials used to separate concealed spaces into compartments shall remain in place and prevent the passage of flames for not less than 15 min when subjected to the standard fire exposure in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

**2)** Gypsum board not less than 12.7 mm thick and sheet steel not less than 0.38 mm thick need not be tested in conformance with Sentence (1), provided all joints have continuous support.

**3)** In a *building* required to be of *noncombustible construction*, wood nailing elements described in Article 3.1.5.6. need not be tested in conformance with Sentence (1).

**4)** In a *building* permitted to be of *combustible construction*, in a *combustible* roof system permitted by Sentence 3.1.5.3.(2), and in a raised platform permitted by Sentence 3.1.5.8.(2), materials used to separate concealed spaces into compartments are permitted to be

- a) solid lumber not less than 38 mm thick,
- b) phenolic bonded plywood, waferboard, or strandboard not less than 12.5 mm thick with joints supported, or
- c) two thicknesses of lumber, each not less than 19 mm thick with joints staggered, where the width or height of the concealed space requires more than one piece of lumber not less than 38 mm thick to block off the space.

**5)** Openings through materials referred to in Sentences (1) to (4) shall be protected to maintain the integrity of the construction.

**6)** Where materials referred to in Sentences (1) to (4) are penetrated by construction elements or by service equipment, fire stop materials shall be used to seal the penetration.

**7)** In *buildings* permitted to be of *combustible construction*, semi-rigid fibre insulation board produced from glass, rock or slag is permitted to be used to block the vertical space in a double stud wall assembly formed at the intersection of the floor assembly and the walls, provided the width of the vertical space does not exceed 25 mm and the insulation board

- a) has a density not less than 45 kg/m<sup>3</sup>,
- b) is securely fastened to one set of studs,
- c) extends from below the bottom of the top plates in the lower *storey* to above the top of the bottom plate in the upper *storey*, and
- d) completely fills the portion of the vertical space between the headers and between the wall plates.

(See Appendix A.)

### 3.1.12. Flame-Spread Rating and Smoke Developed Classification

#### 3.1.12.1. Determination of Ratings

**1)** Except as required by Sentence (2) and as permitted by Sentence (3), the *flame-spread rating* and smoke developed classification of a material, assembly, or structural member shall be determined on the basis of not less than three tests conducted in conformance with CAN/ULC-S102, "Test for Surface Burning Characteristics of Building Materials and Assemblies."

**2)** The *flame-spread rating* and smoke developed classification of a material or assembly shall be determined on the basis of not less than three tests conducted in conformance with CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies," if the material or assembly

- a) is designed for use in a relatively horizontal position with only its top surface exposed to air,
- b) cannot be tested in conformance with Sentence (1) without the use of supporting material that is not representative of the intended installation, or
- c) is thermoplastic.

**3)** A material, assembly, or structural member is permitted to be assigned a *flame-spread rating* and smoke developed classification on the basis of Appendix D.

### 3.1.13. Interior Finish

#### 3.1.13.1. Interior Finishes, Furnishings and Decorative Materials

**1)** Except as otherwise provided by this Subsection, interior finishes, furnishings and decorative materials shall conform to Section 2.3. of Division B of the Alberta Fire Code 2006.

- 2)** Interior finish material shall include any material that forms part of the interior surface of a floor, wall, *partition* or ceiling, including
- interior cladding of plaster, wood or tile,
  - surfacing of fabric, paint, plastic, veneer or wallpaper,
  - doors, windows and trim,
  - lighting elements such as light diffusers and lenses forming part of the finished surface of the ceiling, and
  - carpet material that overlies a floor that is not intended as the finished floor.

### 3.1.13.2. Flame-Spread Rating

- 1)** Except as otherwise required or permitted by this Subsection, the *flame-spread rating* of interior wall and ceiling finishes, including glazing and skylights, shall be not more than 150 and shall conform to Table 3.1.13.2.

**Table 3.1.13.2.**  
**Flame-Spread Ratings**  
Forming Part of Sentence 3.1.13.2.(1)

Occupancy, Location or Element	Maximum <i>Flame-Spread Rating</i> for Walls and Ceilings	
	<i>Sprinklered</i>	<i>Not Sprinklered</i>
Group A, Division 1 <i>occupancies</i> , including doors, skylights, glazing and light diffusers and lenses	150	75
Group B <i>occupancies</i>	150	75
<i>Exits</i> <sup>(1)</sup>	25	25
Lobbies described in Sentence 3.4.4.2.(2)	25	25
Covered vehicular passageways, except for roof assemblies of <i>heavy timber construction</i> in the passageways	25	25
<i>Vertical service spaces</i>	25	25

#### Notes to Table 3.1.13.2.:

<sup>(1)</sup> See Articles 3.1.13.8. and 3.1.13.10.

- 2)** Except as permitted by Sentence (3), doors, other than those in Group A, Division 1 *occupancies*, need not conform to Sentence (1) provided they have a *flame-spread rating* not more than 200. (See Appendix A.)
- 3)** Doors within a *dwelling unit* need not conform to Sentences (1) and (2).
- 4)** Up to 10% of the total wall area and 10% of the total ceiling area of a wall or ceiling finish that is required by Sentence (1) to have a *flame-spread rating* less than 150 is permitted to have a *flame-spread rating* not more than 150, except that up to 25% of the total wall area of lobbies described in Sentence 3.4.4.2.(2) is permitted to have a *flame-spread rating* not more than 150.
- 5)** Except in the case of Group A, Division 1 *occupancies*, *combustible* doors, skylights, glazing and light diffusers and lenses shall not be considered in the calculation of wall and ceiling areas described in Sentence (4).

### 3.1.13.3. Bathrooms in Residential Suites

- 1)** The *flame-spread rating* of interior wall and ceiling finishes for a bathroom within a *suite of residential occupancy* shall be not more than 200.

**3.1.13.4. Light Diffusers and Lenses**

- 1)** The *flame-spread rating* of *combustible* light diffusers and lenses in all *occupancies* other than Group A, Division 1 is permitted to be more than the *flame-spread rating* limits required elsewhere in this Subsection, provided the light diffusers and lenses
- a) have a *flame-spread rating* not more than 250 and a smoke developed classification not more than 600 when tested in conformance with CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies,"
  - b) fall to the bottom of the test apparatus before igniting when tested in conformance with ULC-S102.3-M, "Fire Test of Light Diffusers and Lenses,"
  - c) are not prevented from falling from the ceiling by construction located beneath the elements, and
  - d) are not used in a corridor that is required to be separated from the remainder of the *building* by a *fire separation* or in an *exit* shaft unless individual diffusers or lenses are not more than 1 m<sup>2</sup> in area and are not less than 1.2 m apart.

**3.1.13.5. Skylights**

- 1)** Individual *combustible* skylights in a corridor that is required to be separated from the remainder of the *building* by a *fire separation* shall be not more than 1 m<sup>2</sup> in area and not less than 1.2 m apart.

**3.1.13.6. Corridors**

- 1)** Except as permitted by Sentences (2) and (3), the *flame-spread rating* shall be not more than 75 for the interior wall finish of
- a) a *public corridor*,
  - b) a corridor used by the public in
    - i) an *assembly occupancy*, or
    - ii) a *care or detention occupancy*,
  - c) a corridor serving classrooms, or
  - d) a corridor serving sleeping rooms in a *care or detention occupancy*.
- 2)** The *flame-spread rating* limit specified in Sentence (1) does not apply to corridors referred to in Sentence (1) provided the *flame-spread rating* is not more than
- a) 25 on the upper half of the wall, and
  - b) 150 on the lower half of the wall.
- 3)** The *flame-spread rating* limits specified in Sentences (1) and (2) for corridors referred to in Sentence (1) does not apply to a corridor in which the *flame-spread rating* is not more than 150 provided the *building* is *sprinklered* throughout.
- 4)** The *flame-spread rating* limits specified in Sentences (1), (2) and (3) apply to *occupancies* in the corridor as well as to the corridor itself.
- 5)** Except in a *building* that is *sprinklered* throughout, the interior ceiling finish of corridors and *occupancies* referred to in Sentences (1) and (4) shall have a *flame-spread rating* not more than 25.

**3.1.13.7. High Buildings**

- 1)** Except as permitted by Sentences (2) to (4), the interior wall, ceiling and floor finishes in a *building* regulated by the provisions of Subsection 3.2.6. shall conform to the *flame-spread rating* requirements in Article 3.1.13.2. and to the *flame-spread rating* and smoke developed classification values in Table 3.1.13.7.

**Table 3.1.13.7.**  
**Flame-Spread Rating and Smoke Developed Classification in a High Building**  
 Forming Part of Sentence 3.1.13.7.(1)

Location or Element	Maximum <i>Flame-Spread Rating</i>			Maximum Smoke Developed Classification		
	Wall Surface	Ceiling Surface <sup>(1)</sup>	Floor Surface	Wall Surface	Ceiling Surface <sup>(1)</sup>	Floor Surface
<i>Exit</i> stairways, vestibules to <i>exit</i> stairs and lobbies described in Sentence 3.4.4.2.(2)	25	25	25	50	50	50
Corridors not within <i>suites</i>	(2)	(2)	300	100	50	500
Elevator cars and vestibules	25	25	300	100	100	300
<i>Service spaces</i> and <i>service rooms</i>	25	25	25	50	50	50
Other locations and elements	(2)	(2)	No Limit	300	50	No Limit

**Notes to Table 3.1.13.7.:**

(1) See Article 3.1.13.4. for lighting elements.

(2) Other requirements of this Part apply.

**2)** Except for a *building* of Group B *major occupancy* and elevator cars, the *flame-spread rating* and smoke developed classification of interior wall, floor and ceiling finishes need not conform to the values in Table 3.1.13.7., provided the *building* is *sprinklered* throughout.

**3)** Trim and millwork in an *exit* stairway, a vestibule to an *exit* stairway, a lobby described in Sentence 3.4.4.2.(2), or a corridor not within a *suite* need not conform to the *flame-spread rating* and smoke developed classification requirements of Sentence (1) provided they have

- a) a *flame-spread rating* not more than 150,
- b) a smoke developed classification not more than 300, and
- c) an aggregate area not more than 10% of the area of the wall or ceiling on which they occur.

**4)** A door serving an *exit* stairway, a vestibule to an *exit* stairway, a lobby described in Sentence 3.4.4.2.(2), or a corridor not within a *suite* need not conform to the *flame-spread rating* and smoke developed classification requirements of Sentence (1) provided

- a) it has a *flame-spread rating* not more than 200,
- b) it has a smoke developed classification not more than 300, and
- c) the aggregate area of all doors is not more than 10% of the area of the wall in which they are located.

**3.1.13.8. Noncombustible Construction**

**1)** In a *building* required to be of *noncombustible construction*,

- a) the *flame-spread ratings* required by Subsection 3.1.5. shall apply in addition to the requirements in this Subsection, and
- b) the *flame-spread ratings* for *exits* in this Subsection shall also apply to any surface in the *exit* that would be exposed by cutting through the material in any direction, except that this requirement does not apply to doors, *heavy timber construction* in a *sprinklered building* and *fire-retardant-treated wood*.

**3.1.13.9. Underground Walkways**

**1)** Except for paint, the interior wall and ceiling finishes of an underground *walkway* shall be of *noncombustible* materials.

**3.1.13.10. Exterior Exit Passageway**

1) The wall and ceiling finishes of an exterior *exit* passageway that provides the only *means of egress* from the rooms or *suites* it serves, including the soffit beneath and the *guard* on the passageway, shall have a *flame-spread rating* not more than 25, except that a *flame-spread rating* not more than 150 is permitted for up to 10% of the total wall area and for up to 10% of the total ceiling area.

**3.1.14. Roof Assemblies****3.1.14.1. Fire-Retardant-Treated Wood Roof Systems**

1) If a *fire-retardant-treated wood* roof system is used to comply with the requirements of Subsection 3.2.2., the roof deck assembly shall meet the conditions of acceptance of CAN/ULC-S126-M, "Test for Fire Spread Under Roof-Deck Assemblies."

- 2) Supports for the roof deck assembly referred to in Sentence (1) shall consist of
- fire-retardant-treated wood*,
  - heavy timber construction*,
  - noncombustible construction*, or
  - a combination thereof.

**3.1.14.2. Metal Roof Deck Assemblies**

1) Except as permitted by Sentence (2), a metal roof deck assembly shall meet the conditions of acceptance of CAN/ULC-S126-M, "Test for Fire Spread Under Roof-Deck Assemblies," if

- it supports a *combustible* material above the deck that could propagate a fire beneath the roof deck assembly, and
- the deck is used to comply with the requirements of Sentences 3.2.2.25.(2), 3.2.2.32.(2), 3.2.2.53.(2), 3.2.2.59.(2), 3.2.2.69.(2) and 3.2.2.76.(2) for *noncombustible construction*.

- 2) The requirements of Sentence (1) are waived provided
- the *combustible* material above the roof deck is protected by not less than 12.7 mm thick gypsum board, mechanically fastened to a supporting assembly if located beneath the roof deck, or by a *thermal barrier* conforming to one of Clauses 3.1.5.12.(2)(c) to (e) that is located
    - on the underside of the *combustible* material, or
    - beneath the roof deck,
  - the *building* is *sprinklered* throughout, or
  - the roof assembly has a *fire-resistance rating* not less than 45 min.

**3.1.15. Roof Covering****3.1.15.1. Roof Covering Classification**

1) A roof covering classification shall be determined in conformance with CAN/ULC-S107, "Fire Tests of Roof Coverings."

**3.1.15.2. Roof Coverings**

1) Except as permitted by Sentence (2), every roof covering shall have a Class A, B or C classification as determined in accordance with Article 3.1.15.1.

- 2) A roof covering is not required to have a Class A, B or C classification for
- a tent,
  - an *air-supported structure*, or
  - a *building* of Group A, Division 2 *occupancy* not more than 2 *storeys* in *building height* and not more than 1 000 m<sup>2</sup> in *building area* provided the roof covering is underlaid with *noncombustible* material.

**3.1.16.1.****3.1.16. Fabrics****3.1.16.1. Fabric Canopies and Marquees**

**1)** Fabrics used as part of an awning, canopy or marquee that is located within or attached to a *building* of any type of construction shall conform to CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films."

**3.1.17. Occupant Load****3.1.17.1. Occupant Load Determination**

- 1)** The *occupant load* of a *floor area* or part of a *floor area* shall be based on
- a) the number of seats in an *assembly occupancy* having fixed seats,
  - b) 2 persons per sleeping room in a *dwelling unit*, or
  - c) the number of persons for which the area is designed, but not less than that determined from Table 3.1.17.1. for *occupancies* other than those described in Clauses (a) and (b), unless it can be shown that the area will be occupied by fewer persons.
- 2)** If a *floor area* or part thereof has been designed for an *occupant load* other than that determined from Table 3.1.17.1., a permanent sign indicating that *occupant load* shall be posted in a conspicuous location.

**Table 3.1.17.1.**  
**Occupant Load**  
 Forming Part of Article 3.1.17.1.

Type of Use of <i>Floor Area</i> or Part Thereof	Area per person m <sup>2</sup>
<b>Assembly uses</b>	
space with fixed seats	(1)
space with non-fixed seats	0.75
<i>stages</i> for theatrical performances	0.75
space with non-fixed seats and tables	0.95
standing space	0.40
stadia and grandstands	0.60
bowling alleys, pool and billiard rooms	9.30
classrooms	1.85
school shops and vocational rooms	9.30
reading or writing rooms or lounges	1.85
dining, beverage and cafeteria space	1.20
laboratories in schools	4.60
<b>Care or detention uses</b>	
treatment and sleeping room areas	10.00
detention quarters	11.60
<b>Residential uses</b>	
<i>dwelling units</i>	(2)
dormitories	4.60
<b>Business and personal services uses</b>	
personal services shops	4.60
offices	9.30
<b>Mercantile uses</b>	
<i>basements</i> and <i>first storeys</i>	3.70
second <i>storeys</i> having a principal entrance from a pedestrian thoroughfare or a parking area	3.70
other <i>storeys</i>	5.60
<b>Industrial uses</b>	
manufacturing or process rooms	4.60
<i>storage garages</i>	46.00
storage spaces (warehouse)	28.00
aircraft hangars	46.00
<b>Other uses</b>	
cleaning and repair goods	4.60
kitchens	9.30
storage	46.00
<i>public corridors</i> intended for <i>occupancies</i> in addition to pedestrian travel	3.70 <sup>(3)</sup>

**Notes to Table 3.1.17.1.:**

- (1) See Clause 3.1.17.1.(1)(a).
- (2) See Clause 3.1.17.1.(1)(b).
- (3) See A-3.3. in Appendix A.

**3)** For the purposes of this Article, *mezzanines*, tiers and balconies shall be regarded as part of the *floor area*.

**4)** If a room or group of rooms is intended for different *occupancies* at different times, the value to be used from Table 3.1.17.1. shall be the value which gives the greatest number of persons for the *occupancies* concerned.

## Section 3.2. Building Fire Safety

### 3.2.1. General

#### 3.2.1.1. Exceptions in Determining Building Height

**1)** A roof-top enclosure provided for elevator machinery, a stairway or a *service room* used for no purpose other than for service to the *building*, shall not be considered as a *storey* in calculating the *building height*.

**2)** Space under tiers of seats in a *building* of the arena type shall not be considered as adding to the *building height* provided the space is used only for dressing rooms, concession stands and similar purposes incidental to the *major occupancy* of the *building*.

**3)** Except as required by Sentence (5), the space above a *mezzanine* need not be considered as a *storey* in calculating the *building height*, provided

- a) the aggregate area of *mezzanines* that are not superimposed does not exceed 40% of the open area of the room in which they are located (see Appendix A), and
- b) except as permitted in Sentences (7) and 3.3.2.12.(3), the space above the *mezzanine* is used as an open area without *partitions* or subdividing walls higher than 1 070 mm above the *mezzanine* floor.

**4)** Except as required by Sentence (5), the space above a *mezzanine* need not be considered as a *storey* in calculating the *building height*, provided

- a) the aggregate area of *mezzanines* that are not superimposed and do not meet the conditions of Sentence (3) does not exceed 10% of the *floor area* in which they are located, and
- b) the area of a *mezzanine* in a *suite* does not exceed 10% of the area of that *suite*.

**5)** Except as permitted by Sentence (6), each level of *mezzanine* that is partly or wholly superimposed above the first level of *mezzanine* shall be considered as a *storey* in calculating the *building height*.

**6)** Platforms intended solely for periodic inspection and elevated maintenance catwalks need not be considered as floor assemblies or *mezzanines* for the purpose of calculating *building height*, provided

- a) they are not used for storage, and
- b) they are constructed with *noncombustible* materials, unless the *building* is permitted to be of *combustible construction*.

**7)** The space above a *mezzanine* conforming to Sentence (3) is permitted to include an enclosed space whose area does not exceed 10% of the open area of the room in which the *mezzanine* is located provided the enclosed space does not obstruct visual communication between the open space above the *mezzanine* and the room in which it is located.

(See A-3.2.1.1.(3)(a) in Appendix A.)

**8)** A *service space* in which facilities are included to permit a person to enter and to undertake maintenance and other operations pertaining to *building services* from within the *service space* need not be considered a *storey* if it conforms to Articles 3.2.5.15. and 3.3.1.24., and Sentences 3.2.4.18.(12), 3.2.7.3.(2), 3.3.1.3.(7), 3.4.2.4.(3) and 3.4.4.4.(9). (See Appendix A.)

**3.2.1.2. Storage Garage Considered as a Separate Building**

**1)** A *basement* used primarily as a *storage garage* is permitted to be considered as a separate *building* for the purposes of Subsection 3.2.2., provided the floor and roof assemblies above the *basement* and the exterior walls of the *basement* above the adjoining ground level are constructed as *fire separations* of masonry or concrete having a *fire-resistance rating* not less than 2 h, except as permitted by Sentence (2).

**2)** The exterior wall of a *basement* that is required to be a *fire separation* with a *fire-resistance rating* in accordance with Sentence (1) is permitted to be penetrated by openings that are not protected by *closures* provided

- a) the *storage garage* is *sprinklered* throughout,
- b) every opening in the exterior wall is separated from *storeys* above the opening by a projection of the floor or roof assembly above the *basement*, extending not less than
  - i) 1 m beyond the exterior face of the *storage garage* if the upper *storeys* are required to be of *noncombustible construction*, or
  - ii) 2 m beyond the exterior face of the *storage garage* if the upper *storeys* are permitted to be of *combustible construction*, or
- c) the exterior walls of any *storeys* located above the floor or roof assembly referred to in Sentence (1) are recessed behind the outer edge of the assembly by not less than
  - i) 1 m if the upper *storeys* are required to be of *noncombustible construction*, or
  - ii) 2 m if the upper *storeys* are permitted to be of *combustible construction*.

**3)** The floor or roof assembly projection referred to in Clause (2)(b) shall have a *fire-resistance rating* not less than 2 h and shall have no openings within the projection.

**3.2.1.3. Roof Considered as a Wall**

**1)** For the purposes of this Section any part of a roof that is pitched at an angle of 60° or more to the horizontal and is adjacent to a space intended for *occupancy* within a *building* shall be considered as part of an exterior wall of the *building*.

**3.2.1.4. Floor Assembly over Basement**

**1)** Except as permitted by Sentences 3.2.2.42.(3), 3.2.2.43.(3), 3.2.2.44.(3), 3.2.2.45.(3), 3.2.2.46.(3), or 3.2.2.48.(3), a floor assembly immediately above a *basement* shall be constructed as a *fire separation* having a *fire-resistance rating* conforming to the requirements of Articles 3.2.2.20. to 3.2.2.83. for a floor assembly, but not less than 45 min.

**2)** All *loadbearing* walls, columns and arches supporting a floor assembly immediately above a *basement* shall have a *fire-resistance rating* not less than that required by Sentence (1) for the floor assembly.

**3.2.1.5. Fire Containment in Basements**

**1)** Except as permitted by Sentence (2), in a *building* in which an automatic sprinkler system is not required to be installed by Article 3.2.2.18., every *basement* shall

- a) be *sprinklered* throughout, or
- b) be subdivided into *fire compartments* not more than 600 m<sup>2</sup> in area by a *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly immediately above the *basement*.

**2)** An *open-air storey* need not conform to Sentence (1).

**3.2.1.6. Mezzanines**

**1)** The floor assembly of a *mezzanine* that is required to be considered as a *storey* in calculating the *building height* shall be constructed in conformance with the *fire separation* requirements for floor assemblies stated in Articles 3.2.2.20. to 3.2.2.83.

**3.2.1.7.****3.2.1.7. Automatic Fire Suppression Systems**

**1)** Except for *buildings* constructed under Articles 3.2.2.82. and 3.2.2.83. and except for curling rinks or arenas used exclusively for sports activities, a place of worship, a community hall, a gymnasium or a space containing a *swimming pool*, a *building* shall be protected with an automatic fire suppression system if it has a *fire compartment* more than 2 000 m<sup>2</sup> in area.

**2)** Where a *building* is divided into more than one *fire compartment* with respect to Sentence (1), the compartments shall be divided by *fire separations* having a *fire-resistance rating* of not less than 1 h.

**3)** Except for *day care facilities* or a children's custodial home, a *building* containing a *care or detention occupancy* shall be *sprinklered*.

**4)** In addition to the requirements for sprinklers under Subsection 3.2.2., all *floor areas* or parts of *floor areas* of *residential occupancy* shall be *sprinklered*.

**3.2.1.8. Height of Combustible Residential Buildings**

**1)** A *building* of *combustible construction* that contains a *residential occupancy* shall have no occupied floor level more than 9 m above the lowest *exit level*.

**3.2.2. Building Size and Construction Relative to Occupancy****3.2.2.1. Application**

**1)** Except as permitted by Article 3.2.2.3., a *building* shall be constructed in conformance with this Subsection to prevent fire spread and collapse caused by the effects of fire. (See Subsection 3.1.3. for *fire separations* between *major occupancies*.)

**3.2.2.2. Special and Unusual Structures**

**1)** A structure that cannot be identified with the characteristics of a *building* in Articles 3.2.2.20. to 3.2.2.83. shall be protected against fire spread and collapse in conformance with good fire protection engineering practice. (See Appendix A.) (See also A-3 and A-3.2.5.13.(1) in Appendix A.)

**2)** Underground service passageways shall be considered unusual structures under Sentence (1).

**3.2.2.3. Exceptions to Structural Fire Protection**

- 1)** Fire protection is not required for
  - a) steel lintels above openings not more than 2 m wide in *loadbearing* walls and not more than 3 m wide in *non-loadbearing* walls,
  - b) steel lintels above openings more than 2 m wide in *loadbearing* walls and more than 3 m wide in *non-loadbearing* walls provided the lintels are supported at intervals of not more than 2 m by structural members with the required *fire-resistance rating*,
  - c) the bottom flanges of shelf angles and plates that are not a part of the structural frame,
  - d) steel members for framework around elevator hoistway doorways, steel for the support of elevator and dumbwaiter guides, counterweights and other similar equipment, that are entirely enclosed in a hoistway and are not a part of the structural frame of the *building*,
  - e) steel members of stairways and escalators that are not a part of the structural frame of a *building*,

- f) steel members of porches, exterior balconies, exterior stairways, fire escapes, cornices, marquees and other similar appurtenances, provided they are outside an exterior wall of a *building*, and
- g) *loadbearing* steel or concrete members wholly or partly outside a *building* face in a *building* not more than 4 *storeys* in *building height* and classified as Group A, B, C, D or F, Division 3 *major occupancy* provided the members are
  - i) not less than 1 m away from any *unprotected opening* in an exterior wall, or
  - ii) shielded from heat radiation in the event of a fire within the *building* by construction that will provide the same degree of protection that would be necessary if the member was located inside the *building*, with the protection extending on either side of the member a distance equal to the projection of the member from the face of the wall.

(See also Article 3.2.3.9.)

#### 3.2.2.4. Buildings with Multiple Major Occupancies

**1)** The requirements restricting fire spread and collapse for a *building* of a single *major occupancy* classification are provided in this Subsection according to its *building height* and *building area*.

**2)** If a *building* contains more than one *major occupancy*, classified in more than one Group or Division, the requirements of this Subsection concerning *building* size and construction relative to *major occupancy* shall apply according to Articles 3.2.2.5. to 3.2.2.8.

#### 3.2.2.5. Applicable Building Height and Area

**1)** In determining the fire safety requirements of a *building* in relation to each of the *major occupancies* contained therein, the *building height* and *building area* of the entire *building* shall be used.

#### 3.2.2.6. Multiple Major Occupancies

**1)** Except as permitted by Articles 3.2.2.7. and 3.2.2.8., in a *building* containing more than one *major occupancy*, the requirements of this Subsection for the most restricted *major occupancy* contained shall apply to the whole *building*.

#### 3.2.2.7. Superimposed Major Occupancies

**1)** Except as permitted by Article 3.2.2.8. and as required by Sentence 3.2.2.18.(2), in a *building* in which one *major occupancy* is located entirely above another *major occupancy*, the requirements in this Subsection for each portion of the *building* containing a *major occupancy* shall apply to that portion as if the entire *building* was of that *major occupancy*.

**2)** If one *major occupancy* is located above another *major occupancy*, the *fire-resistance rating* of the floor assembly between the *major occupancies* shall be determined on the basis of the requirements of this Subsection for the lower *major occupancy*. (See also Article 3.1.3.1.)

#### 3.2.2.8. Exceptions for Major Occupancies

**1)** In a *building* in which the aggregate area of all *major occupancies* in a particular Group or Division is not more than 10% of the *floor area* of the *storey* in which they are located, these *major occupancies* need not be considered as *major occupancies* for the purposes of this Subsection, provided they are not classified as Group F, Division 1 or 2 *occupancies*.

**3.2.2.9.****3.2.2.9. Crawl Spaces**

- 1) For the purposes of Articles 3.2.1.4. and 3.2.1.5., a crawl space shall be considered as a *basement* if it is
  - a) more than 1.8 m high between the lowest part of the floor assembly and the ground or other surface below,
  - b) used for any *occupancy*,
  - c) used for the passage of *flue pipes*, or
  - d) used as a *plenum* in *combustible construction*.
- 2) A floor assembly immediately above a crawl space is not required to be constructed as a *fire separation* and is not required to have a *fire-resistance rating* provided the crawl space is not required to be considered as a *basement* by Sentence (1).

**3.2.2.10. Streets**

- 1) Every *building* shall face a *street* located in conformance with the requirements of Articles 3.2.5.4. and 3.2.5.5. for access routes.
- 2) For the purposes of Subsections 3.2.2. and 3.2.5. an access route conforming to Subsection 3.2.5. is permitted to be considered as a *street*.
- 3) A *building* is considered to face 2 *streets* provided not less than 50% of the *building* perimeter is located within 15 m of the *street* or *streets*.
- 4) A *building* is considered to face 3 *streets* provided not less than 75% of the *building* perimeter is located within 15 m of the *street* or *streets*.
- 5) Enclosed spaces, tunnels, bridges and similar structures, even though used for vehicular or pedestrian traffic, are not considered as *streets* for the purpose of this Part.

**3.2.2.11. Exterior Balconies**

- 1) An exterior balcony shall be constructed in accordance with the type of construction required by Articles 3.2.2.20. to 3.2.2.83., as applicable to the *occupancy* classification of the *building*.

**3.2.2.12. Exterior Passageways**

- 1) An elevated exterior passageway used as part of a *means of egress* shall conform to the requirements of Articles 3.2.2.20. to 3.2.2.83. for *mezzanines*.

**3.2.2.13. Occupancy on Roof**

- 1) A portion of a roof that supports an *occupancy* shall be constructed in conformance with the *fire separation* requirements of Articles 3.2.2.20. to 3.2.2.83. for floor assemblies, and not the *fire-resistance rating* for roof assemblies.

**3.2.2.14. Roof-Top Enclosures**

- 1) A roof-top enclosure for elevator machinery or for a *service room* shall be constructed in accordance with the type of construction required by Articles 3.2.2.20. to 3.2.2.83.
- 2) A roof-top enclosure for elevator machinery or for a *service room*, not more than one *storey* high, is not required to have a *fire-resistance rating*.
- 3) A roof-top enclosure for a stairway shall be constructed in accordance with the type of construction required by Articles 3.2.2.20. to 3.2.2.83.
- 4) A roof-top enclosure for a stairway need not have a *fire-resistance rating* nor be constructed as a *fire separation*.

**3.2.2.15. Storeys below Ground**

**1)** If a *building* is erected entirely below the adjoining finished ground level and does not extend more than one *storey* below that ground level, the minimum precautions against fire spread and collapse shall be the same as are required for *basements* under a *building* of 1 *storey* in *building height* having the same *occupancy* and *building area*.

**2)** If any portion of a *building* is erected entirely below the adjoining finished ground level and extends more than one *storey* below that ground level, the following minimum precautions against fire spread and collapse shall be taken:

- a) the *basements* shall be *sprinklered* throughout,
- b) a floor assembly below the ground level shall be constructed as a *fire separation* with a *fire-resistance rating* not less than
  - i) 3 h if the *basements* are used as Group E or Group F, Division 1 or 2 *occupancies*, or
  - ii) 2 h if the *basements* are not used as Group E or Group F, Division 1 or 2 *occupancies*, and
- c) all *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the construction that they support.

**3.2.2.16. Heavy Timber Roof Permitted**

**1)** Unless otherwise permitted by Articles 3.2.2.20. to 3.2.2.83., a roof assembly in a *building* up to 2 *storeys* in *building height* is permitted to be of *heavy timber construction* regardless of *building area* or type of construction required, provided the *building* is *sprinklered* throughout.

**2)** If Sentence (1) permits a roof assembly to be of *heavy timber construction*, structural members in the *storey* immediately below the roof assembly are permitted to be of *heavy timber construction*.

**3.2.2.17. Arena-Type Building Roof Assembly**

**1)** The requirements for a roof assembly to have a *fire-resistance rating* are permitted to be waived for a gymnasium, a swimming pool, an arena, or a rink if no part of the roof assembly is less than 6 m above the main floor or balcony and the roof carries no loads other than normal roof loads, including permanent access walks, and ventilating, sound and lighting equipment, except that the restriction concerning minimum distance shall not apply to

- a) an inclined and stepped floor ascending from the main floor which is used for seating purposes only, or
- b) a balcony used for seating purposes only.

**3.2.2.18. Automatic Sprinkler System Required**

**1)** Except as permitted by Sentence (2), an automatic sprinkler system conforming to the requirements of Articles 3.2.4.7., 3.2.4.8., 3.2.4.9. and 3.2.5.13. shall be installed throughout a *building* regulated by one or more of Articles 3.2.2.20., 3.2.2.21., 3.2.2.22., 3.2.2.23., 3.2.2.24., 3.2.2.26., 3.2.2.27., 3.2.2.29., 3.2.2.31., 3.2.2.33., 3.2.2.36., 3.2.2.37., 3.2.2.38., 3.2.2.39., 3.2.2.40., 3.2.2.41., 3.2.2.42., 3.2.2.43., 3.2.2.44., 3.2.2.45., 3.2.2.46., 3.2.2.48., 3.2.2.49., 3.2.2.51., 3.2.2.52., 3.2.2.54., 3.2.2.56., 3.2.2.57., 3.2.2.58., 3.2.2.60., 3.2.2.62., 3.2.2.63., 3.2.2.64., 3.2.2.65., 3.2.2.67., 3.2.2.68., 3.2.2.70., 3.2.2.72., 3.2.2.73., 3.2.2.75., 3.2.2.77., 3.2.2.79. and 3.2.2.81.

**2)** If a *storey* in a *building* or a *floor area* is required to have an automatic sprinkler system installed throughout in accordance with one or more of Articles 3.2.2.20. to 3.2.2.83. or Section 3.3., the automatic sprinkler system shall also be installed throughout all lower *storeys* in the *building* notwithstanding permission in Articles 3.2.2.20. to 3.2.2.83. to construct one or more of those *storeys* without installing automatic sprinkler protection. (See Appendix A.)

**3)** The requirements in Articles 3.2.2.20. to 3.2.2.83. for roof assemblies to have a *fire-resistance rating* are permitted to be waived provided

- a) the *building* is *sprinklered*,

- b) the sprinkler system in Clause (a) is electrically supervised in conformance with Sentence 3.2.4.9.(2),
- c) the operation of the sprinkler system in Clause (a) will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4), and
- d) the roof does not support any *occupancy* other than for servicing or maintenance.

(See Article 3.2.2.13. for roofs intended for *occupancy*.)

**4)** The requirements in Articles 3.2.2.20. to 3.2.2.83. for *mezzanines* to have a *fire-resistance rating* are permitted to be waived where the *building* is *sprinklered* and the *mezzanine* is 240 m<sup>2</sup> or less in area.

### 3.2.2.19. Buildings Containing Impeded Egress Zones

**1)** A *building* containing an *impeded egress zone* and conforming to the appropriate requirements of Articles 3.2.2.20. to 3.2.2.83. is not required to conform to the requirements of Articles 3.2.2.36. and 3.2.2.37. for a Group B, Division 1 *major occupancy* provided

- a) the *building* is *sprinklered* throughout,
- b) it is not more than 1 *storey* in *building height*,
- c) it does not include
  - i) a *contained use area*,
  - ii) sleeping accommodation,
  - iii) a *high-hazard industrial occupancy*, or
  - iv) a *mercantile occupancy*,
- d) the *building area* is not more than 6 400 m<sup>2</sup> if the *building* includes a *medium-hazard industrial occupancy*,
- e) the *impeded egress zone* does not extend beyond the boundaries of the *fire compartment* in which it is located, and
- f) the *occupant load* of the *impeded egress zone* is not more than 100.

### 3.2.2.20. Group A, Division 1, Any Height, Any Area, Sprinklered

**1)** Except as permitted by Articles 3.2.2.21. and 3.2.2.22., a *building* classified as Group A, Division 1 shall conform to Sentence (2).

**2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.21. Group A, Division 1, One Storey, Limited Area, Sprinklered

**1)** A *building* classified as Group A, Division 1 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 1 *storey* in *building height*,
- c) it has less than 40% of the area of the *building* as 2 *storeys* for the purpose of
  - i) development of productions, including preparation of scenery and costumes and rehearsal of performers,
  - ii) organization of performers, scenery and sound equipment,
  - iii) preparation by performers for a performance,
  - iv) managerial functions, or
  - v) toilets, rest rooms and similar public facilities,
- d) it has no *occupancy* above or below the auditorium other than one which serves it or is dependent on it,

- e) it is not more than 600 m<sup>2</sup> in *building area*, and
- f) the *occupant load* is not more than 600.

**2)** The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination, and

- a) floor assemblies shall be *fire separations*
  - i) with a *fire-resistance rating* not less than 45 min, or
  - ii) of *heavy timber construction*, and
- b) *loadbearing walls*, columns and arches shall
  - i) have a *fire-resistance rating* not less than that required for the supported assembly, or
  - ii) be of *heavy timber construction*.

### 3.2.2.22. Group A, Division 1, One Storey, Sprinklered

**1)** A *building* classified as Group A, Division 1 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 1 *storey* in *building height*,
- c) no part of an auditorium floor is more than 5 m above or below *grade*,
- d) no *occupancy* is above or below the auditorium other than one which serves it or is dependent on it, and
- e) the *occupant load* of the auditorium floor is not more than 300.

**2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly, or in combination, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
- c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
  - i) have a *fire-resistance rating* not less than 45 min, or
  - ii) be of *noncombustible construction*, and
- d) *loadbearing walls*, columns and arches supporting a *fire separation* shall have a *fire-resistance rating* not less than that required for the *fire separation*.

### 3.2.2.23. Group A, Division 2, Any Height, Any Area, Sprinklered

**1)** Except as permitted by Articles 3.2.2.24. to 3.2.2.28., a *building* classified as Group A, Division 2 shall conform to Sentence (2).

**2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.24. Group A, Division 2, up to 6 Storeys, Any Area, Sprinklered

**1)** A *building* classified as Group A, Division 2, that is not limited by *building area*, is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout, and
- b) it is not more than 6 *storeys* in *building height*.

**2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,

- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.25. Group A, Division 2, up to 3 Storeys

(See also Article 3.2.1.7.)

- 1) A *building* classified as Group A, Division 2 is permitted to conform to Sentence (2) provided
  - a) it is not more than 3 *storeys* in *building height*, and
  - b) it has a *building area* not more than the value in Table 3.2.2.25.

**Table 3.2.2.25.**  
**Maximum Building Area, Group A, Division 2, up to 3 Storeys**  
 Forming Part of Sentence 3.2.2.25.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1600	2000	2400
2	800	1000	1200
3	400	500	600

- 2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
  - a) *floor assemblies* shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
  - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
  - c) *roof assemblies* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1., and the *building area* is not more than
    - i) 800 m<sup>2</sup> if facing one *street*,
    - ii) 1000 m<sup>2</sup> if facing 2 *streets*, or
    - iii) 1200 m<sup>2</sup> if facing 3 *streets*, and
  - d) *loadbearing walls, columns and arches* supporting an assembly required to have a *fire-resistance rating* shall
    - i) have a *fire-resistance rating* not less than 45 min, or
    - ii) be of *noncombustible construction*.

### 3.2.2.26. Group A, Division 2, up to 3 Storeys, Increased Area, Sprinklered

- 1) A *building* classified as Group A, Division 2 is permitted to conform to Sentence (2) provided
  - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 3 *storeys* in *building height*, and
  - c) it has a *building area* not more than
    - i) 4800 m<sup>2</sup> if 1 *storey* in *building height*,
    - ii) 2400 m<sup>2</sup> if 2 *storeys* in *building height*, or
    - iii) 1200 m<sup>2</sup> if 3 *storeys* in *building height*.

- 2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
  - a) *floor assemblies* shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,

- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
- c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
  - i) have a *fire-resistance rating* not less than 45 min, or
  - ii) be of *noncombustible construction*.

### 3.2.2.27. Group A, Division 2, up to 2 Storeys, Sprinklered

- 1) A *building* classified as Group A, Division 2 is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 2 *storeys* in *building height*, and
  - c) it has a *building area* not more than
    - i) 2400 m<sup>2</sup> if 1 *storey* in *building height* with no *basement*,
    - ii) 1200 m<sup>2</sup> if 1 *storey* in *building height*, or
    - iii) 600 m<sup>2</sup> if 2 *storeys* in *building height*.

### 3.2.2.28. Group A, Division 2, One Storey

- 1) A *building* classified as Group A, Division 2 is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, provided
- a) it is not more than 1 *storey* in *building height*, and
  - b) except as permitted by Sentence (2), it has a *building area* not more than
    - i) 400 m<sup>2</sup> if facing one *street*,
    - ii) 500 m<sup>2</sup> if facing 2 *streets*, or
    - iii) 600 m<sup>2</sup> if facing 3 *streets*.
- 2) In a *building* referred to in Sentence (1) without a *basement*, the *building area* limits of Sentence (1) are permitted to be doubled provided a *fire separation* with a *fire-resistance rating* not less than 1 h is used to separate the *building* into *fire compartments*, each one of which does not exceed the limits of Clause (1)(b).

### 3.2.2.29. Group A, Division 3, Any Height, Any Area, Sprinklered

- 1) Except as permitted by Articles 3.2.2.30. to 3.2.2.34., a *building* classified as Group A, Division 3 shall conform to Sentence (2).
- 2) Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
  - c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.30. Group A, Division 3, up to 2 Storeys

(See also Article 3.2.1.7.)

- 1) A *building* classified as Group A, Division 3 is permitted to conform to Sentence (2) provided
- a) it is not more than 2 *storeys* in *building height*, and
  - b) it has a *building area* not more than the value in Table 3.2.2.30.

**Table 3.2.2.30.**  
**Maximum Building Area, Group A, Division 3, up to 2 Storeys**  
 Forming Part of Sentence 3.2.2.30.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	4000	5000	6000
2	2000	2500	3000

- 2)** Except as permitted by Clauses (c) and (d), the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h,
  - roof assemblies shall
    - have a *fire-resistance rating* not less than 45 min, or
    - be of *heavy timber construction*, and
  - loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly, except that arches and structural members within the *storey* immediately below a roof assembly are permitted to be of *heavy timber construction*.

**3)** If intended for occasional use for trade shows and similar exhibition purposes, a *building* referred to in Sentence (1) that is more than 1 500 m<sup>2</sup> in *building area* shall be *sprinklered* throughout.

### 3.2.2.31. Group A, Division 3, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group A, Division 3 is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 2 *storeys* in *building height*, and
  - it has a *building area* not more than
    - 12000 m<sup>2</sup> if 1 *storey* in *building height*, or
    - 6000 m<sup>2</sup> if 2 *storeys* in *building height*.
- 2)** Except as permitted by Clause (c) and Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly, except that arches are permitted to be of *heavy timber construction*.

### 3.2.2.32. Group A, Division 3, One Storey, Increased Area

(See also Article 3.2.1.7.)

- 1)** A *building* classified as Group A, Division 3 is permitted to conform to Sentence (2) provided
- it is not more than 1 *storey* in *building height*, and
  - it has a *building area* not more than
    - 2400 m<sup>2</sup> if facing one *street*,
    - 3000 m<sup>2</sup> if facing 2 *streets*, or
    - 3600 m<sup>2</sup> if facing 3 *streets*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,

- b) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1., and the *building area* is not more than
  - i) 1200 m<sup>2</sup> if facing one *street*,
  - ii) 1500 m<sup>2</sup> if facing 2 *streets*, or
  - iii) 1800 m<sup>2</sup> if facing 3 *streets*, and
- c) *loadbearing* walls, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
  - i) have a *fire-resistance rating* not less than 45 min, or
  - ii) be of *noncombustible construction*.

**3)** If intended for occasional use for trade shows and similar exhibition purposes, a *building* referred to in Sentence (1) that is more than 1 500 m<sup>2</sup> in *building area* shall be *sprinklered* throughout.

### 3.2.2.33. Group A, Division 3, One Storey, Sprinklered

- 1)** A *building* classified as Group A, Division 3 is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 1 *storey* in *building height*, and
  - c) it has a *building area* not more than 7 200 m<sup>2</sup>.

### 3.2.2.34. Group A, Division 3, One Storey

- 1)** A *building* classified as Group A, Division 3 is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination provided
- a) it is not more than 1 *storey* in *building height*, and
  - b) it has a *building area* not more than
    - i) 1000 m<sup>2</sup> if facing one *street*,
    - ii) 1250 m<sup>2</sup> if facing 2 *streets*, or
    - iii) 1500 m<sup>2</sup> if facing 3 *streets*.

### 3.2.2.35. Group A, Division 4

- 1)** Except as permitted by Sentences (2) and (3), a *building* classified as Group A, Division 4 shall be of *noncombustible construction*.
- 2)** Roof assemblies and supporting arches and columns are permitted to be of *heavy timber construction*.
- 3)** A *building* classified as Group A, Division 4 is permitted to be of *combustible construction* provided
- a) the *occupant load* is less than 1500, and
  - b) the *building* has a *limiting distance* not less than 6 m.
- 4)** Sprinklers shall be installed in all spaces below tiers of seats in a *building* classified as Group A, Division 4 if those spaces are used for *occupancy*. (See Appendix A.)

### 3.2.2.36. Group B, Division 1, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Article 3.2.2.37., a *building* classified as Group B, Division 1 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,

- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.37. Group B, Division 1, up to 3 Storeys, Sprinklered

- 1)** A *building* classified as Group B, Division 1 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 3 *storeys* in *building height*, and
  - c) it has a *building area*
    - i) that is not limited if the *building* is not more than 1 *storey* in *building height*,
    - ii) not more than 12000 m<sup>2</sup> if 2 *storeys* in *building height*, or
    - iii) not more than 8000 m<sup>2</sup> if 3 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.38. Group B, Division 2, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Articles 3.2.2.39. to 3.2.2.41., a *building* classified as Group B, Division 2 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
  - c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - d) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.39. Group B, Division 2, up to 3 Storeys, Sprinklered

- 1)** A *building* classified as Group B, Division 2 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 3 *storeys* in *building height*, and
  - c) it has a *building area*
    - i) that is not limited if the *building* is not more than 1 *storey* in *building height*,
    - ii) not more than 12000 m<sup>2</sup> if 2 *storeys* in *building height*, or
    - iii) not more than 8000 m<sup>2</sup> if 3 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.40. Group B, Division 2, up to 2 Storeys, Sprinklered**

- 1)** A *building* classified as Group B, Division 2 is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 2 *storeys* in *building height*, and
  - it has a *building area* not more than
    - 2400 m<sup>2</sup> if 1 *storey* in *building height*, or
    - 1600 m<sup>2</sup> if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
  - mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.41. Group B, Division 2, One Storey, Sprinklered**

- 1)** A *building* classified as Group B, Division 2 is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 1 *storey* in *building height*, and
  - it has a *building area* not more than 500 m<sup>2</sup>.

**3.2.2.42. Group C, Any Height, Any Area, Sprinklered**

- 1)** Except as permitted by Articles 3.2.2.43. to 3.2.2.48., a *building* classified as Group C shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - except as permitted by Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 3)** In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

**3.2.2.43. Group C, up to 6 Storeys, Sprinklered**

- 1)** A *building* classified as Group C is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 6 *storeys* in *building height*, and
  - it has a *building area*
    - that is not limited if the *building* is not more than 2 *storeys* in *building height*,
    - not more than 12000 m<sup>2</sup> if 3 *storeys* in *building height*,
    - not more than 9000 m<sup>2</sup> if 4 *storeys* in *building height*,
    - not more than 7200 m<sup>2</sup> if 5 *storeys* in *building height*, or
    - not more than 6000 m<sup>2</sup> if 6 *storeys* in *building height*.

- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 3)** In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

### 3.2.2.44. Group C, up to 3 Storeys, Noncombustible Construction, Sprinklered

- 1)** A *building* classified as Group C is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 3 *storeys* in *building height*, and
  - it has a *building area*
    - that is not limited if the *building* is not more than 2 *storeys* in *building height*, or
    - that is not more than 12 000 m<sup>2</sup> if 3 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h,
  - roof assemblies shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 3)** In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

### 3.2.2.45. Group C, up to 4 Storeys, Sprinklered

- 1)** A *building* classified as Group C is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 4 *storeys* in *building height*, and
  - it has a *building area* not more than
    - 7200 m<sup>2</sup> if 1 *storey* in *building height*,
    - 3600 m<sup>2</sup> if 2 *storeys* in *building height*,
    - 2400 m<sup>2</sup> if 3 *storeys* in *building height*, or
    - 1800 m<sup>2</sup> if 4 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- except as permitted by Sentences (3) and (4), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 3)** In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

4) In a *building* in which there is no *dwelling unit* above another *dwelling unit*, the *fire-resistance rating* for floor assemblies entirely within the *dwelling unit* is waived.

### 3.2.2.46. Group C, up to 3 Storeys, Increased Area, Sprinklered

1) A *building* classified as Group C is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 3 *storeys* in *building height*, and
- c) it has a *building area* not more than
  - i) 7200 m<sup>2</sup> if 1 *storey* in *building height*,
  - ii) 3600 m<sup>2</sup> if 2 *storeys* in *building height*, or
  - iii) 2400 m<sup>2</sup> if 3 *storeys* in *building height*.

2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) except as permitted by Sentences (3) and (4), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h,
- c) roof assemblies shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls*, columns, and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

4) In a *building* in which there is no *dwelling unit* above another *dwelling unit*, the *fire-resistance rating* for floor assemblies entirely within the *dwelling unit* is waived.

### 3.2.2.47. Reserved

### 3.2.2.48. Group C, up to 3 Storeys, Sprinklered

1) A *building* classified as Group C is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 3 *storeys* in *building height*, and
- c) it has a *building area* not more than
  - i) 5400 m<sup>2</sup> if 1 *storey* in *building height*,
  - ii) 2700 m<sup>2</sup> if 2 *storeys* in *building height*, or
  - iii) 1800 m<sup>2</sup> if 3 *storeys* in *building height*.

2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) except as permitted by Sentences (3) and (4), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 45 min but need not be constructed as *fire separations*.

4) In a *building* in which there is no *dwelling unit* above another *dwelling unit*, the *fire-resistance rating* for floor assemblies entirely within the *dwelling unit* is waived.

**3.2.2.49. Group D, Any Height, Any Area, Sprinklered**

- 1)** Except as permitted by Articles 3.2.2.51. to 3.2.2.56., a *building* classified as Group D shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.50. Reserved****3.2.2.51. Group D, up to 6 Storeys, Sprinklered**

- 1)** A *building* classified as Group D is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 6 *storeys* in *building height*, and
  - it has a *building area*
    - that is not limited if the *building* is not more than 2 *storeys* in *building height*,
    - not more than 14400 m<sup>2</sup> if 3 *storeys* in *building height*,
    - not more than 10800 m<sup>2</sup> if 4 *storeys* in *building height*,
    - not more than 8640 m<sup>2</sup> if 5 *storeys* in *building height*, or
    - not more than 7200 m<sup>2</sup> if 6 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.52. Group D, up to 4 Storeys, Sprinklered**

- 1)** A *building* classified as Group D is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 4 *storeys* in *building height*, and
  - it has a *building area* not more than 3600 m<sup>2</sup>.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.53. Group D, up to 3 Storeys**

- 1)** A *building* classified as Group D is permitted to conform to Sentence (2) provided
- it is not more than 3 *storeys* in *building height*, and
  - it has a *building area* not more than the value in Table 3.2.2.53.

**Table 3.2.2.53.**  
**Maximum Building Area, Group D, up to 3 Storeys**  
 Forming Part of Sentence 3.2.2.53.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	4800	6000	7200
2	2400	3000	3600
3	1600	2000	2400

- 2)** The building referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
  - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
  - c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a building not more than 1 storey in building height, the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1. and the building area is not more than
    - i) 2400 m<sup>2</sup> if facing one street,
    - ii) 3000 m<sup>2</sup> if facing 2 streets, or
    - iii) 3600 m<sup>2</sup> if facing 3 streets, and
  - d) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
    - i) have a *fire-resistance rating* not less than 45 min, or
    - ii) be of *noncombustible construction*.

**3.2.2.54. Group D, up to 3 Storeys, Sprinklered**

- 1)** A building classified as Group D is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
  - b) it is not more than 3 storeys in building height, and
  - c) it has a building area not more than
    - i) 14400 m<sup>2</sup> if 1 storey in building height,
    - ii) 7200 m<sup>2</sup> if 2 storeys in building height, or
    - iii) 4800 m<sup>2</sup> if 3 storeys in building height.
- 2)** The building referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
  - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
  - c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
    - i) have a *fire-resistance rating* not less than 45 min, or
    - ii) be of *noncombustible construction*.

**3.2.2.55. Group D, up to 2 Storeys**

- 1)** A building classified as Group D is permitted to conform to Sentence (2) provided
- a) it is not more than 2 storeys in building height, and
  - b) it has a building area not more than the value in Table 3.2.2.55.

**Table 3.2.2.55.**  
**Maximum Building Area, Group D, up to 2 Storeys**  
 Forming Part of Sentence 3.2.2.55.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1000	1250	1500
2	800	1000	1200

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
  - loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
    - have a *fire-resistance rating* not less than 45 min, or
    - be of *noncombustible construction*.

### 3.2.2.56. Group D, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group D is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 2 *storeys* in *building height*, and
  - it has a *building area* not more than
    - 3000 m<sup>2</sup> if 1 *storey* in *building height*, or
    - 2400 m<sup>2</sup> if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
  - loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
    - have a *fire-resistance rating* not less than 45 min, or
    - be of *noncombustible construction*.

### 3.2.2.57. Group E, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Articles 3.2.2.58. to 3.2.2.62., a *building* classified as Group E shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.58. Group E, up to 4 Storeys, Sprinklered

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 4 *storeys* in *building height*, and
  - it has a *building area* not more than 1800 m<sup>2</sup>.

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.59. Group E, up to 3 Storeys**

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- a) it is not more than 3 *storeys* in *building height*, and
  - b) it has a *building area* not more than the value in Table 3.2.2.59.

**Table 3.2.2.59.**  
**Maximum Building Area, Group E, up to 3 Storeys**  
 Forming Part of Sentence 3.2.2.59.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1500	1500	1500
2	1200	1500	1500
3	800	1000	1500

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
  - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
  - c) roof assemblies shall have a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided the roof assembly is of *noncombustible construction* or is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1.,
  - d) *loadbearing walls, columns and arches* supporting an assembly required to have a *fire-resistance rating* shall
    - i) have a *fire-resistance rating* not less than 45 min, or
    - ii) be of *noncombustible construction*, and
  - e) *loadbearing walls, columns and arches* supporting a *fire separation* shall have a *fire-resistance rating* not less than that required for the *fire separation*.

**3.2.2.60. Group E, up to 3 Storeys, Sprinklered**

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 3 *storeys* in *building height*, and
  - c) it has a *building area* not more than
    - i) 7200 m<sup>2</sup> if 1 *storey* in *building height*,
    - ii) 3600 m<sup>2</sup> if 2 *storeys* in *building height*, or
    - iii) 2400 m<sup>2</sup> if 3 *storeys* in *building height*.

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,

- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
- c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
  - i) have a *fire-resistance rating* not less than 45 min, or
  - ii) be of *noncombustible construction*, and
- d) *loadbearing walls*, columns and arches supporting a *fire separation* shall have a *fire-resistance rating* not less than that required for the *fire separation*.

**3.2.2.61. Group E, up to 2 Storeys**

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- a) it is not more than 2 *storeys* in *building height*, and
  - b) it has a *building area* not more than the value in Table 3.2.2.61.

**Table 3.2.2.61.**  
**Maximum Building Area, Group E, up to 2 Storeys**  
 Forming Part of Sentence 3.2.2.61.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1000	1250	1500
2	600	750	900

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min, and
  - b) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.62. Group E, up to 2 Storeys, Sprinklered**

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 2 *storeys* in *building height*, and
  - c) it has a *building area* not more than
    - i) 3000 m<sup>2</sup> if 1 *storey* in *building height*, or
    - ii) 1800 m<sup>2</sup> if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min, and
  - b) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.63. Group F, Division 1, up to 4 Storeys, Sprinklered**

- 1)** Except as permitted by Articles 3.2.2.64. to 3.2.2.66., a *building* classified as Group F, Division 1 shall conform to Sentence (2) provided
- a) it is not more than 4 *storeys* in *building height*, and
  - b) it has a *building area* not more than
    - i) 9000 m<sup>2</sup> if 1 *storey* in *building height*,
    - ii) 4500 m<sup>2</sup> if 2 *storeys* in *building height*,
    - iii) 3000 m<sup>2</sup> if 3 *storeys* in *building height*, or
    - iv) 2250 m<sup>2</sup> if 4 *storeys* in *building height*.

- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.64. Group F, Division 1, up to 3 Storeys, Sprinklered**

- 1)** A *building* classified as Group F, Division 1 is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 3 *storeys* in *building height*, and
  - it has a *building area* not more than
    - 3600 m<sup>2</sup> if 1 *storey* in *building height*,
    - 1800 m<sup>2</sup> if 2 *storeys* in *building height*, or
    - 1200 m<sup>2</sup> if 3 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min, and
  - loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.65. Group F, Division 1, up to 2 Storeys, Sprinklered**

- 1)** A *building* classified as Group F, Division 1 is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 2 *storeys* in *building height*, and
  - it has a *building area* not more than
    - 2400 m<sup>2</sup> if 1 *storey* in *building height*, or
    - 1200 m<sup>2</sup> if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
  - loadbearing* walls, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
    - have a *fire-resistance rating* not less than 45 min, or
    - be of *noncombustible construction*.

**3.2.2.66. Group F, Division 1, One Storey**

- 1)** A *building* classified as Group F, Division 1 is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination provided
- it is not more than 1 *storey* in *building height*, and
  - it has a *building area* not more than 800 m<sup>2</sup>.

**3.2.2.67. Group F, Division 2, Any Height, Any Area, Sprinklered**

- 1)** Except as permitted by Articles 3.2.2.68. to 3.2.2.72., a *building* classified as Group F, Division 2 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,

- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.68. Group F, Division 2, up to 4 Storeys, Increased Area, Sprinklered

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 4 *storeys* in *building height*, and
  - c) it has a *building area* not more than
    - i) 18000 m<sup>2</sup> if 1 *storey* in *building height*,
    - ii) 9000 m<sup>2</sup> if 2 *storeys* in *building height*,
    - iii) 6000 m<sup>2</sup> if 3 *storeys* in *building height*, or
    - iv) 4500 m<sup>2</sup> if 4 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

### 3.2.2.69. Group F, Division 2, up to 3 Storeys

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
- a) it is not more than 3 *storeys* in *building height*, and
  - b) it has a *building area* not more than the value in Table 3.2.2.69.

**Table 3.2.2.69.**  
**Maximum Building Area, Group F, Division 2, up to 3 Storeys**  
 Forming Part of Sentence 3.2.2.69.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1500	1500	1500
2	1500	1500	1500
3	1070	1340	1500

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
  - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
  - c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided that the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1.,

- d) *loadbearing walls, columns and arches supporting an assembly required to have a fire-resistance rating shall*
  - i) *have a fire-resistance rating not less than 45 min, or*
  - ii) *be of noncombustible construction, and*
- e) *loadbearing walls, columns and arches supporting a fire separation shall have a fire-resistance rating not less than that required for the fire separation.*

**3.2.2.70. Group F, Division 2, up to 4 Storeys, Sprinklered**

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
  - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - b) it is not more than 4 *storeys* in *building height*, and
  - c) it has a *building area* not more than
    - i) 9600 m<sup>2</sup> if 1 *storey* in *building height*,
    - ii) 4800 m<sup>2</sup> if 2 *storeys* in *building height*,
    - iii) 3200 m<sup>2</sup> if 3 *storeys* in *building height*, or
    - iv) 2400 m<sup>2</sup> if 4 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
  - a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
  - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
  - c) *loadbearing walls, columns and arches supporting an assembly required to have a fire-resistance rating shall*
    - i) *have a fire-resistance rating not less than 45 min, or*
    - ii) *be of noncombustible construction, and*
  - d) *loadbearing walls, columns and arches supporting a fire separation shall have a fire-resistance rating not less than that required for the fire separation.*

**3.2.2.71. Group F, Division 2, up to 2 Storeys**

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
  - a) it is not more than 2 *storeys* in *building height*, and
  - b) it has a *building area* not more than the value in Table 3.2.2.71.

**Table 3.2.2.71.**  
**Maximum Building Area, Group F, Division 2, up to 2 Storeys**  
 Forming Part of Sentence 3.2.2.71.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1000	1250	1500
2	600	750	900

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
  - a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
  - b) *loadbearing walls, columns and arches supporting an assembly required to have a fire-resistance rating shall*
    - i) *have a fire-resistance rating not less than 45 min, or*
    - ii) *be of noncombustible construction.*

**3.2.2.72. Group F, Division 2, up to 2 Storeys, Sprinklered**

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 2 *storeys* in *building height*, and
  - it has a *building area* not more than
    - 4500 m<sup>2</sup> if 1 *storey* in *building height*, or
    - 1800 m<sup>2</sup> if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
  - loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
    - have a *fire-resistance rating* not less than 45 min, or
    - be of *noncombustible construction*.

**3.2.2.73. Group F, Division 3, Any Height, Any Area, Sprinklered**

- 1)** Except as permitted by Articles 3.2.2.75. to 3.2.2.83., a *building* classified as Group F, Division 3 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
  - floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h, except that floor assemblies are permitted to be *fire separations* with a *fire-resistance rating* not less than 1 h in a *storage garage* with all *storeys* constructed as *open-air storeys*,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.74. Reserved****3.2.2.75. Group F, Division 3, up to 6 Storeys, Sprinklered**

- 1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
  - it is not more than 6 *storeys* in *building height*, and
  - it has a *building area*
    - that is not limited if the *building* is not more than 1 *storey* in *building height*,
    - not more than 21600 m<sup>2</sup> if 2 *storeys* in *building height*,
    - not more than 14400 m<sup>2</sup> if 3 *storeys* in *building height*,
    - not more than 10800 m<sup>2</sup> if 4 *storeys* in *building height*,
    - not more than 8640 m<sup>2</sup> if 5 *storeys* in *building height*, or
    - not more than 7200 m<sup>2</sup> if 6 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
  - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
  - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

**3.2.2.76. Group F, Division 3, up to 3 Storeys**

(See also Article 3.2.1.7.)

- 1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided
  - a) it is not more than 3 *storeys* in *building height*, and
  - b) it has a *building area* not more than the value in Table 3.2.2.76.

**Table 3.2.2.76.**  
**Maximum Building Area, Group F, Division 3, up to 3 Storeys**  
 Forming Part of Sentence 3.2.2.76.(1)

No. of Storeys	Maximum Area, m <sup>2</sup>		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	4800	6000	7200
2	2400	3000	3600
3	1600	2000	2400

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
  - a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
  - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
  - c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1., and the *building area* is not more than
    - i) 2400 m<sup>2</sup> if facing one *street*,
    - ii) 3000 m<sup>2</sup> if facing 2 *streets*, or
    - iii) 3600 m<sup>2</sup> if facing 3 *streets*, and
  - d) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
    - i) have a *fire-resistance rating* not less than 45 min, or
    - ii) be of *noncombustible construction*.

**3.2.2.77. Group F, Division 3, up to 4 Storeys, Sprinklered**

**1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 4 *storeys* in *building height*, and
- c) it has a *building area* not more than
  - i) 14400 m<sup>2</sup> if 1 *storey* in *building height*,
  - ii) 7200 m<sup>2</sup> if 2 *storeys* in *building height*,
  - iii) 4800 m<sup>2</sup> if 3 *storeys* in *building height*, or
  - iv) 3600 m<sup>2</sup> if 4 *storeys* in *building height*.

**2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
- c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
  - i) have a *fire-resistance rating* not less than 45 min, or
  - ii) be of *noncombustible construction*.

**3.2.2.78. Group F, Division 3, up to 2 Storeys**

**1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided

- a) it is not more than 2 *storeys* in *building height*, and
- b) it has a *building area* not more than the value in Table 3.2.2.78.

**Table 3.2.2.78.**  
**Maximum Building Area, Group F, Division 3, up to 2 Storeys**  
 Forming Part of Sentence 3.2.2.78.(1)

No. of <i>Storeys</i>	Maximum Area, m <sup>2</sup>		
	Facing 1 <i>Street</i>	Facing 2 <i>Streets</i>	Facing 3 <i>Streets</i>
1	1600	2000	2400
2	800	1000	1200

**2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
- b) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
  - i) have a *fire-resistance rating* not less than 45 min, or
  - ii) be of *noncombustible construction*.

**3.2.2.79. Group F, Division 3, up to 2 Storeys, Sprinklered**

**1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 2 *storeys* in *building height*, and
- c) it has a *building area* not more than
  - i) 7200 m<sup>2</sup> if 1 *storey* in *building height*, or
  - ii) 2400 m<sup>2</sup> if 2 *storeys* in *building height*.

**2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
- b) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
  - i) have a *fire-resistance rating* not less than 45 min, or
  - ii) be of *noncombustible construction*.

**3.2.2.80. Group F, Division 3, One Storey**

**1)** A *building* classified as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination provided

- a) it is not more than 1 *storey* in *building height*, and
- b) it has a *building area* not more than
  - i) 5600 m<sup>2</sup> if facing one *street*,
  - ii) 7000 m<sup>2</sup> if facing 2 *streets*, or
  - iii) 8400 m<sup>2</sup> if facing 3 *streets*.

**3.2.2.81. Group F, Division 3, One Storey, Sprinklered**

**1)** A *building* classified as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,

- b) it is not more than 1 *storey* in *building height*, and
- c) it has a *building area* not more than 16800 m<sup>2</sup>.

### 3.2.2.82. Group F, Division 3, One Storey, Any Area, Low Fire Load Occupancy

- 1) A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided it is
  - a) not more than 1 *storey* in *building height*,
  - b) used solely for low *fire load occupancies* such as
    - i) power generating plants, or
    - ii) plants for the manufacture or storage of *noncombustible* materials, and
  - c) not limited in *building area*.
- 2) The *building* referred to in Sentence (1) shall be of *noncombustible construction*.

### 3.2.2.83. Group F, Division 3, Storage Garages up to 22 m High

- 1) A *building* used as a *storage garage* with all *storeys* constructed as *open-air storeys* and having no other *occupancy* above it is permitted to have its floor, wall, ceiling and roof assemblies constructed without a *fire-resistance rating* provided it is
  - a) of *noncombustible construction*,
  - b) not more than 22 m high, measured between *grade* and the ceiling level of the top *storey*,
  - c) not more than 10000 m<sup>2</sup> in *building area*, and
  - d) designed so that every portion of each *floor area* is within 60 m of an exterior wall opening.

## 3.2.3. Spatial Separation and Exposure Protection

### 3.2.3.1. Limiting Distance and Area of Unprotected Openings

(See Appendix A.)

- 1) Except as permitted by Articles 3.2.3.10. to 3.2.3.12., the area of *unprotected openings* in an *exposing building face* for the applicable *limiting distance* shall be not more than the value determined in accordance with
  - a) Table 3.2.3.1.A. or Table 3.2.3.1.B. for an *exposing building face* conforming to Article 3.2.3.2. of a *building* or *fire compartment* which is not *sprinklered*, or
  - b) Table 3.2.3.1.C. or Table 3.2.3.1.D. for an *exposing building face* conforming to Article 3.2.3.2. of a *sprinklered fire compartment* that is part of a *building* which is *sprinklered* in conformance with Section 3.2.

(See A-3 in Appendix A.)

(See also Article 3.1.6.3.)

- 2) The area of the *unprotected openings* in an *exposing building face* shall be the aggregate area of *unprotected openings* expressed as a percentage of the area of the *exposing building face* in Table 3.2.3.1.A., Table 3.2.3.1.B., Table 3.2.3.1.C. or Table 3.2.3.1.D. (See Sentence 3.2.3.2.(1).)

- 3) For the purpose of determining the type of construction and cladding and the *fire-resistance rating* of an exterior wall,
  - a) the *exposing building face* shall be taken as the projection of the exterior wall onto a vertical plane located so that no portion of the exterior wall of the *building* or of a *fire compartment*, if the *fire compartment* complies with the requirements of Article 3.2.3.2., is between the vertical plane and the line to which the *limiting distance* is measured, and
  - b) the area of *unprotected openings* shall be determined from Table 3.2.3.1.A., Table 3.2.3.1.B., Table 3.2.3.1.C. or Table 3.2.3.1.D.

- 4) For the purpose of determining the actual percentage of *unprotected openings* permitted in an exterior wall, the location of the *exposing building face* is permitted to be taken at a vertical plane located so that there are no *unprotected openings* between the vertical plane and the line to which the *limiting distance* is measured. (See Appendix A.)

**5)** Individual *unprotected openings* in an *exposing building face* shall have a projected area that is not more than the value determined in accordance with Table 3.2.3.1.E., unless

- a) the *building* is *sprinklered* throughout, or
- b) the *limiting distance* is more than 2 m.

**6)** An individual *unprotected opening* described in Sentence (5) shall be separated by not less than 2 m horizontally and 2 m vertically from any other *unprotected opening* that is located on the same *exposing building face* and within the same *fire compartment*. (See Appendix A.)

**7)** For the purposes of Sentence (6),

- a) two adjacent spaces are permitted to be considered as separate *fire compartments* where there is a full height wall extending not less than 1.5 m from the interior face of the exterior wall, finished in accordance with Subsection 9.29.4. or 9.29.5., and
- b) two stacked spaces shall be considered to be a single room or space where the spaces are on the same *storey*.

**8)** A *limiting distance* equal to half the actual *limiting distance* shall be used as input to the requirements of this Subsection, where

- a) the time from receipt of notification of a fire by the fire department until the first fire department vehicle capable of beginning suppression activities arrives at the *building* is greater than 10 minutes in not less than 10% of all calls to the *building*, and
- b) any *storey* in the *building* is not *sprinklered*.

(See Appendix A and A-3.2.3.1. in Appendix A.)

**9)** If the surface temperature on the unexposed surface of a wall assembly exceeds the temperature limit of a standard fire test as permitted by Article 3.1.7.2., an allowance shall be made for the radiation from the hot unexposed wall surface by adding an equivalent area of *unprotected opening* to the area of actual openings as follows:

$$A_C = A + (A_F \times F_{EO})$$

where

$A_C$  = corrected area of *unprotected openings* including actual and equivalent openings,

$A$  = actual area of *unprotected openings*,

$A_F$  = area of exterior surface of the *exposing building face*, exclusive of openings, on which the temperature limit of the standard test is exceeded, and

$F_{EO}$  = an equivalent opening factor derived from the following expression:

$$F_{EO} = \frac{(T_u + 273)^4}{(T_e + 273)^4}$$

$T_u$  = average temperature in degrees Celsius of the unexposed wall surface at the time the required *fire-resistance rating* is reached under test conditions,

$T_e$  = 892°C for a *fire-resistance rating* not less than 45 min, 927°C for a *fire-resistance rating* not less than 1 h, and 1010°C for a *fire-resistance rating* not less than 2 h.

**10)** Unless a *closure* used to protect an opening in an *exposing building face* has a protective performance equivalent to that required for the wall assembly in which it is located, an equivalent area of *unprotected opening*, determined in accordance with the procedures of Sentence (9) shall be added to the greater of

- a) the actual area of *unprotected openings*, or
- b) the corrected area of *unprotected openings*.

**Table 3.2.3.1.A.**  
**Unprotected Opening Limits for a Building or Fire Compartment that is not Sprinklered Throughout**  
 Forming Part of Article 3.2.3.1.

Exposing Building Face		Area of Unprotected Opening for Groups A, C, D, and F, Division 3 Occupancies, %																																
		Limiting Distance, m																																
Max. Area, m <sup>2</sup>	Ratio (L/H or H/L) <sup>(1)</sup>	0	1.2	1.5	2.0	2.5	3	4	5	6	7	8	9	10	11	12	13	14	16	18	20	25	30	35	40	45	50							
10	Less than 3 : 1	0	8	10	18	29	46	91	100																									
	3 : 1 to 10 : 1	0	8	12	21	33	50	96	100																									
	over 10 : 1	0	11	18	32	48	68	100																										
15	Less than 3 : 1	0	7	9	14	22	33	63	100																									
	3 : 1 to 10 : 1	0	8	10	17	25	37	67	100																									
	over 10 : 1	0	10	15	26	39	53	87	100																									
20	Less than 3 : 1	0	7	9	12	18	26	49	81	100																								
	3 : 1 to 10 : 1	0	8	10	15	21	30	53	85	100																								
	over 10 : 1	0	9	14	23	33	45	72	100																									
25	Less than 3 : 1	0	7	8	11	16	23	41	66	98	100																							
	3 : 1 to 10 : 1	0	8	9	13	19	26	45	70	100																								
	over 10 : 1	0	9	13	21	30	39	62	90	100																								
30	Less than 3 : 1	0	7	8	11	15	20	35	56	83	100																							
	3 : 1 to 10 : 1	0	7	9	12	17	23	39	61	88	100																							
	over 10 : 1	0	8	12	19	27	36	56	79	100																								
40	Less than 3 : 1	0	7	8	10	13	17	28	44	64	89	100																						
	3 : 1 to 10 : 1	0	7	8	11	15	20	32	48	69	93	100																						
	over 10 : 1	0	8	11	17	24	31	47	66	88	100																							
50	Less than 3 : 1	0	7	8	9	12	15	24	37	53	72	96	100																					
	3 : 1 to 10 : 1	0	7	8	10	14	18	28	41	57	77	100																						
	over 10 : 1	0	8	10	15	21	28	41	57	76	97	100																						
60	Less than 3 : 1	0	7	8	9	11	14	21	32	45	62	81	100																					
	3 : 1 to 10 : 1	0	7	8	10	13	16	25	36	49	66	85	100																					
	over 10 : 1	0	8	10	14	20	25	38	51	67	85	100																						

Table 3.2.3.1.A. (Continued)

Exposing Building Face		Area of Unprotected Opening for Groups A, C, D, and F, Division 3 Occupancies, %																										
		Limiting Distance, m																										
Max. Area, m <sup>2</sup>	Ratio (L/H or H/L) <sup>(1)</sup>	0	1.2	1.5	2.0	2.5	3	4	5	6	7	8	9	10	11	12	13	14	16	18	20	25	30	35	40	45	50	
80	Less than 3 : 1	0	7	7	8	10	12	18	26	36	48	62	79	98	100													
	3 : 1 to 10 : 1	0	7	8	9	11	14	21	29	40	52	67	84	100														
	over 10 : 1	0	8	9	13	17	22	32	44	56	70	86	100															
100	Less than 3 : 1	0	7	7	8	9	11	16	22	30	40	51	65	80	97	100												
	3 : 1 to 10 : 1	0	7	8	9	11	13	18	25	34	44	56	69	84	100													
	over 10 : 1	0	7	9	12	16	20	29	39	49	61	74	89	100														
150	Less than 3 : 1	0	7	7	8	9	10	13	17	22	29	37	46	56	67	79	93	100										
	3 : 1 to 10 : 1	0	7	7	8	10	11	15	20	26	33	41	50	60	71	84	97	100										
	over 10 : 1	0	7	8	11	13	17	24	31	39	48	57	68	79	91	100												
250	Less than 3 : 1	0	7	7	7	8	9	10	13	16	20	25	30	36	43	51	59	68	87	100								
	3 : 1 to 10 : 1	0	7	7	8	9	10	12	15	19	24	28	34	40	47	55	63	72	92	100								
	over 10 : 1	0	7	8	9	11	14	19	24	30	36	43	50	57	65	73	82	92	100									
350	Less than 3 : 1	0	7	7	7	8	8	9	11	14	16	20	24	28	33	38	44	50	64	81	99	100						
	3 : 1 to 10 : 1	0	7	7	8	8	9	11	13	16	19	23	27	32	37	42	48	55	69	85	100							
	over 10 : 1	0	7	8	9	10	12	16	21	25	30	36	41	47	53	59	66	73	88	100								
500	Less than 3 : 1	0	7	7	7	7	8	9	10	12	14	16	19	22	25	29	33	37	47	59	71	100						
	3 : 1 to 10 : 1	0	7	7	7	8	8	10	12	14	16	19	22	25	29	33	37	41	52	63	76	100						
	over 10 : 1	0	7	7	8	9	11	14	18	22	25	30	34	38	43	48	53	58	70	82	96	100						
1000	Less than 3 : 1	0	7	7	7	7	7	8	9	9	10	12	13	14	16	18	20	22	27	33	39	58	82	100				
	3 : 1 to 10 : 1	0	7	7	7	7	8	9	10	11	12	14	15	17	19	21	23	26	31	37	43	63	86	100				
	over 10 : 1	0	7	7	8	8	9	11	13	16	19	21	24	27	30	33	36	39	46	53	60	82	100					
2000	Less than 3 : 1	0	7	7	7	7	7	7	8	8	9	9	10	11	12	13	14	15	17	20	23	33	44	58	74	93	100	
	3 : 1 to 10 : 1	0	7	7	7	7	7	8	8	9	10	11	12	13	14	15	16	17	20	23	27	37	49	63	79	97	100	
	over 10 : 1	0	7	7	7	8	8	9	11	12	14	16	18	19	21	23	25	27	32	36	40	53	66	82	99	100		

Notes to Table 3.2.3.1.A.:

(1) Apply whichever ratio is greater.

L = Length of exposing building face

H = Height of exposing building face

**Table 3.2.3.1.B.**  
**Unprotected Opening Limits for a Building or Fire Compartment that is not Sprinklered Throughout**  
 Forming Part of Article 3.2.3.1.

Exposing Building Face	Area of Unprotected Openings for Groups E and F, Division 1 and 2 Occupancies, %																																					
	Max. Area, m <sup>2</sup>	Ratio (L/H or H/L) <sup>(1)</sup>	Limiting Distance, m																																			
			0	1.2	1.5	2.0	2.5	3	4	5	6	7	8	9	10	11	12	13	14	16	18	20	25	30	35	40	45	50	55	60	65	70						
10	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	5	9	15	23	46	77	100																											
			0	4	6	10	17	25	48	79	100																											
			0	5	9	16	24	34	58	91	100																											
15	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	5	7	11	16	32	53	79	100																										
			0	4	5	8	13	18	34	55	82	100																										
			0	5	8	13	19	26	43	66	93	100																										
20	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	4	6	9	13	25	40	61	85	100																									
			0	4	5	7	11	15	27	43	63	87	100																									
			0	5	7	11	17	22	36	53	74	99	100																									
25	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	4	6	8	11	20	33	49	69	92	100																								
			0	4	5	7	9	13	22	35	51	71	94	100																								
			0	4	6	10	15	20	31	45	62	82	100																									
30	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	4	5	7	10	18	28	42	58	77	100																								
			0	4	4	6	9	12	20	30	44	60	80	100																								
			0	4	6	10	14	18	28	40	54	71	91	100																								
40	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	4	5	6	8	14	22	32	44	59	76	94	100																						
			0	4	4	6	8	10	16	24	34	47	61	78	97	100																						
			0	4	5	8	12	15	23	33	44	57	72	89	100																							
50	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	4	5	6	7	12	18	26	36	48	61	76	93	100																					
			0	4	4	5	7	9	14	20	29	38	50	63	79	95	100																					
			0	4	5	8	11	14	21	29	38	48	61	74	90	100																						
60	Less than 3 : 1 3 : 1 to 10 : 1 over 10 : 1		0	4	4	4	5	7	11	16	23	31	40	52	64	78	94	100																				
			0	4	4	5	6	8	12	18	25	33	43	54	66	81	96	100																				
			0	4	5	7	10	13	19	26	34	43	53	64	77	92	100																					

3.2.3.1.

Division B

Table 3.2.3.1.B. (Continued)

Exposing Building Face		Area of Unprotected Openings for Groups E and F, Division 1 and 2 Occupancies, %																														
		Limiting Distance, m																														
Max. Area, m <sup>2</sup>	Ratio (L/H or H/L) <sup>(1)</sup>	0	1.2	1.5	2.0	2.5	3	4	5	6	7	8	9	10	11	12	13	14	16	18	20	25	30	35	40	45	50	55	60	65	70	
80	Less than 3 : 1	0	4	4	4	5	6	9	13	18	24	31	40	49	60	71	84	98	100													
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	5	6	7	10	15	20	26	33	42	51	62	74	86	100														
100	Less than 3 : 1	0	4	4	4	5	5	8	11	15	20	26	32	40	48	58	68	79	100													
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	5	6	9	13	17	22	28	35	42	51	60	70	81	100													
150	Less than 3 : 1	0	4	4	4	4	5	6	8	11	14	18	23	28	33	40	46	54	70	89	100											
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	5	6	8	10	13	16	20	25	30	36	42	49	56	73	92	100											
250	Less than 3 : 1	0	4	4	4	4	4	5	7	8	10	12	15	18	22	25	29	34	44	55	68	100										
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	4	5	6	8	10	12	14	17	20	24	27	32	36	46	57	70	100										
350	Less than 3 : 1	0	4	4	4	4	5	6	7	9	12	15	18	21	25	28	32	37	41	46	56	68	81	100								
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	4	4	5	6	8	10	12	14	16	18	21	24	27	34	43	52	62	79	100								
500	Less than 3 : 1	0	4	4	4	4	4	4	5	6	7	8	9	11	13	14	16	19	24	29	36	44	53	62	78	100						
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	4	4	5	6	7	8	9	10	11	13	14	16	18	21	26	31	38	48	57	70	80	100					
1000	Less than 3 : 1	0	4	4	4	4	4	4	4	5	6	7	8	9	11	13	15	17	19	21	24	29	35	41	48	55	68	84	100			
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	4	4	4	5	6	7	8	9	10	11	12	13	15	16	18	20	23	26	30	34	41	53	68	84	100		
2000	Less than 3 : 1	0	4	4	4	4	4	4	4	4	4	4	5	6	7	8	9	10	11	14	16	20	29	41	55	71	89	100				
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	4	4	4	5	6	7	8	9	10	11	12	13	15	15	18	22	31	43	57	73	91	100					
	Less than 3 : 1	0	4	4	4	4	4	4	4	4	4	4	4	5	5	6	7	8	9	10	12	16	22	29	37	46	56	68	80	94	100	
	3 : 1 to 10 : 1 over 10 : 1	0	4	4	4	4	4	4	4	5	5	5	5	6	6	7	7	8	9	10	12	18	24	31	39	49	59	70	83	96	100	
		0	4	4	4	4	4	4	5	6	7	8	9	10	11	12	13	14	16	18	20	26	33	41	50	59	70	81	94	100		

Notes to Table 3.2.3.1.B.:

(1) Apply whichever ratio is greater.

L = Length of exposing building face

H = Height of exposing building face

**Table 3.2.3.1.C.**  
**Unprotected Opening Limits for a Building or Fire Compartment that is Sprinklered Throughout**  
 Forming Part of Article 3.2.3.1.

<i>Exposing Building Face</i>	<i>Area of Unprotected Opening for Groups A, B, C, D and F, Division 3 Occupancies, %</i>											
	<i>Limiting Distance, m</i>											
<i>Max. Area, m<sup>2</sup></i>	0	1.2	1.5	2.0	2.5	3	4	5	6	7	8	9
10	0	16	24	42	66	100						
15	0	16	20	34	50	74	100					
20	0	16	20	30	42	60	100					
25	0	16	18	26	38	52	90	100				
30	0	14	18	24	34	46	78	100				
40	0	14	16	22	30	40	64	96	100			
50	0	14	16	20	28	36	56	82	100			
60	0	14	16	20	26	32	50	72	98	100		
80	0	14	16	18	22	28	42	58	80	100		
100	0	14	16	18	22	26	36	50	68	88	100	
150 or more	0	14	14	16	20	22	30	40	52	66	82	100

**Table 3.2.3.1.D.**  
**Unprotected Opening Limits for a Building or Fire Compartment that is Sprinklered Throughout**  
 Forming Part of Article 3.2.3.1.

<i>Exposing Building Face</i>	<i>Area of Unprotected Opening for Groups E and F, Division 1 and 2 Occupancies, %</i>																	
	<i>Limiting Distance, m</i>																	
<i>Max. Area, m<sup>2</sup></i>	0	1.2	1.5	2.0	2.5	3	4	5	6	7	8	9	10	11	12	13	14	15
10	0	8	12	20	34	50	96	100										
15	0	8	10	16	26	36	68	100										
20	0	8	10	14	22	30	54	86	100									
25	0	8	10	14	18	26	44	70	100									
30	0	8	8	12	18	24	40	60	88	100								
40	0	8	8	12	16	20	32	48	68	94	100							
50	0	8	8	10	14	18	28	40	58	76	100							
60	0	8	8	10	12	16	24	36	50	66	86	100						
80	0	8	8	10	12	14	20	30	40	52	66	84	100					
100	0	8	8	8	10	12	18	26	34	44	56	70	84	100				
150	0	8	8	8	10	12	16	20	26	32	40	50	60	72	84	98	100	
200 or more	0	8	8	8	8	10	14	18	22	28	34	42	50	60	68	80	92	100

**Table 3.2.3.1.E.**  
**Maximum Concentrated Area of Unprotected Openings**  
 Forming Part of Sentence 3.2.3.1.(5)

Limiting Distance, m	Maximum Area of Individual <i>Unprotected Openings</i> , m <sup>2</sup>
0	0
1.2	0.35
1.5	0.78
2.0	1.88

### 3.2.3.2. Area of Exposing Building Face

**1)** Except as permitted by Sentences (2) and (3), the area of an *exposing building face* shall be calculated as the total area of an exterior wall facing in one direction on any side of a *building* measured from the finished ground level to the uppermost ceiling.

**2)** If a *building* is divided by *fire separations* into *fire compartments*, the area of *exposing building face* is permitted to be calculated for each *fire compartment* provided the *fire separations* have a *fire-resistance rating* not less than 45 min.

**3)** In a *building* that is *sprinklered* throughout and contains an *interconnected floor space*, the area of the *exposing building face* for the *interconnected floor space* is permitted to be determined by considering each *storey* as a separate *fire compartment* notwithstanding openings through the floor assemblies.

### 3.2.3.3. Wall Enclosing Attic or Roof Space

**1)** An exterior wall enclosing an *attic or roof space* and located above an *exposing building face*, shall be constructed in conformance with the requirements for the *exposing building face*.

### 3.2.3.4. Party Wall

**1)** A *party wall* shall be constructed as a *firewall*.

### 3.2.3.5. Wall with Limiting Distance Less Than 1.2 m

**1)** Openings in a wall that has a *limiting distance* less than 1.2 m shall be protected by *closures* whose *fire-protection rating* is in conformance with the *fire-resistance rating* required for the wall.

**2)** Wired glass or glass block shall not be used for a *closure* referred to in Sentence (1).

### 3.2.3.6. Combustible Projections

**1)** Except as provided in Sentence (2), *combustible* projections on the exterior of a wall that are more than 1 m above ground level and that could expose an adjacent *building* to fire spread shall not be permitted within

- a) 1.2 m of a property line or the centreline of a *public way*, or
- b) 2.4 m of a *combustible* projection on another *building* on the same property.

**2)** Sentence (1) shall not apply to

- a) *buildings* containing 1 or 2 *dwelling units*, and
- b) detached garages or accessory *buildings*, where
  - i) the detached garage or accessory *building* serves only one *dwelling unit* or a primary *dwelling unit* with a *secondary suite*,
  - ii) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
  - iii) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

(See A-9.10.15.5.(6) in Appendix A.)

- 3)** Where the *limiting distance* is not more than 0.45 m, projecting roof soffits shall not be constructed above an *exposing building face*.
- 4)** Where the *limiting distance* is more than 0.45 m, the face of roof soffits above an *exposing building face* are permitted to project to not less than 0.45 m from a property line.
- 5)** Where roof soffits project closer than 1.2 m from a property line, they shall
  - a) have no openings, and
  - b) be protected by
    - i) not less than 0.38 mm thick sheet steel conforming to CAN/CGSB-93.4, "Galvanized Steel and Aluminum-Zinc Alloy Coated Steel Siding, Soffits and Fascia, Prefinished, Residential,"
    - ii) unvented aluminum conforming to CAN/CGSB-93.2-M, "Prefinished Aluminum Siding, Soffits and Fascia for Residential Use,"
    - iii) not less than 12.7 mm thick gypsum board conforming to Sentence 9.29.5.1.(2), Subclauses 9.29.5.2.(1)(e) and (f), and Articles 9.29.5.3.to 9.29.5.10.,
    - iv) not less than 11 mm thick plywood conforming to Sentences 9.27.9.1.(1), 9.27.9.3.(1) and 9.27.9.4.(1),
    - v) not less than 12.5 mm thick OSB or waferboard conforming to Sentences 9.27.11.1.(1) and 9.27.11.3.(1), or
    - vi) not less than 11 mm thick lumber conforming to Sentence 9.27.6.1.(1).

**3.2.3.7. Construction of Exposing Building Face**

**1)** Except as provided in Sentences (2) and (3) and Articles 3.2.3.10. and 3.2.3.11., *fire-resistance rating*, construction and cladding for *exposing building faces* of buildings or *fire compartments* shall comply with Table 3.2.3.7.

**Table 3.2.3.7.**  
**Minimum Construction Requirements for Exposing Building Faces**  
 Forming Part of Sentence 3.2.3.7.(1)

<i>Occupancy Classification of Building or Fire Compartment</i>	<i>Maximum Area of Unprotected Openings Permitted, % of Exposing Building Face Area</i>	<i>Minimum Required Fire-Resistance Rating</i>	<i>Type of Construction Required</i>	<i>Type of Cladding Required</i>
Group A, B, C, D, or Group F, Division 3	0 – 10	1 h	<i>Noncombustible</i>	<i>Noncombustible</i>
	> 10 – 25	1 h	<i>Combustible or Noncombustible</i>	<i>Noncombustible<sup>(1)</sup></i>
	> 25 – 50	45 min	<i>Combustible or Noncombustible</i>	<i>Noncombustible<sup>(2)</sup></i>
	> 50 – < 100	45 min	<i>Combustible or Noncombustible</i>	<i>Combustible or Noncombustible</i>
Group E, or Group F, Division 1 or 2	0 – 10	2 h	<i>Noncombustible</i>	<i>Noncombustible</i>
	> 10 – 25	2 h	<i>Combustible or Noncombustible</i>	<i>Noncombustible<sup>(1)</sup></i>
	> 25 – 50	1 h	<i>Combustible or Noncombustible</i>	<i>Noncombustible<sup>(2)</sup></i>
	> 50 – < 100	1 h	<i>Combustible or Noncombustible</i>	<i>Combustible or Noncombustible</i>

Table 3.2.3.7. (Continued)

**Notes to Table 3.2.3.7.:**

- (1) See Sentence (2).  
 (2) See Sentence (3).

**2)** Except as provided in Sentence (3), cladding for *buildings* or *fire compartments* where the maximum aggregate area of *unprotected openings* is more than 10% of the *exposing building face* need not be *noncombustible* where the wall assembly satisfies the criteria of Sentences 3.1.5.5.(2) and (3) when subjected to testing in conformance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies."

**3)** Cladding for *buildings* or *fire compartments* where the maximum aggregate area of *unprotected openings* is more than 25% but not more than 50% of the *exposing building face* need not be *noncombustible* where

- a) the *limiting distance* is not less than 5 m,
- b) the *building* or *fire compartment* is *sprinklered* throughout,
- c) the cladding
  - i) conforms to Subsection 9.27.6., 9.27.7., 9.27.9., 9.27.10., or 9.27.11.,
  - ii) is installed with or without furring members, over gypsum sheathing not less than 12.7 mm thick conforming to Articles 9.23.16.2. and 9.23.16.3. or over masonry (see Articles 3.1.11.2. and 9.10.16.2. for additional requirements for fire stopping of concealed spaces in wall assemblies), and
  - iii) after conditioning in conformance with ASTM D 2898, "Methods for Accelerated Weathering on Fire-Retardant-Treated Wood for Fire Testing," has a *flame-spread rating* not more than 25 when tested in accordance with Sentence 3.1.12.1.(1), or
- d) the cladding
  - i) conforms to Subsection 9.27.13.,
  - ii) is installed with or without furring members, over gypsum sheathing not less than 12.7 mm thick conforming to Articles 9.23.16.2. and 9.23.16.3. or over masonry (see Articles 3.1.11.2. and 9.10.16.2. for additional requirements for fire stopping of concealed spaces in wall assemblies),
  - iii) has a *flame-spread rating* not more than 25 when tested in accordance with Sentence 3.1.12.1.(2), and
  - iv) does not exceed 2 mm in thickness exclusive of fasteners, joints and local reinforcements.

**4)** The construction requirements for the *exposing building face* stated in Sentence (1) shall be satisfied before increasing the *unprotected opening* area as permitted by Sentence 3.2.3.12.(1).

**3.2.3.8. Protection of Exterior Building Face**

**1)** Except as permitted by Sentence (3) and in addition to the requirements for *buildings* with a maximum aggregate area of *unprotected openings* more than 10% of the *exposing building face* as determined by Sentence 3.2.3.7.(1), *foamed plastic* insulation used in an exterior wall of a *building* more than 3 *storeys* in *building height* shall be protected on its exterior surface by

- a) concrete or masonry not less than 25 mm thick, or
- b) *noncombustible* material that complies with the criteria for testing and the conditions of acceptance stated in Sentence (2) when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

- 2)** The criteria for testing and the conditions of acceptance for a wall assembly to satisfy the requirements of Clause (1)(b) are that
- the fire exposed area of the wall assembly shall be not less than 9.3 m<sup>2</sup> and have no dimension less than 2.75 m,
  - the exposed surface shall include typical vertical and horizontal joints,
  - the test shall be continued for not less than 15 min and the standard time/temperature curve of the referenced standard shall be followed,
  - the *noncombustible* protective material must remain in place and no through openings should develop that are visible when viewed normal to the face of the material, and
  - the *noncombustible* protective material should not disintegrate in a manner that would permit fire to propagate along the surface of the test assembly.
- 3)** The requirements of Sentence (1) are waived for wall assemblies that comply with the requirements of Article 3.1.5.5. (See Appendix A.)

### 3.2.3.9. Protection of Structural Members

- 1)** Structural members, including beams, columns and arches, that are placed wholly or partly outside the exterior face of a *building* and are less than 3 m from the property line or the centre line of a public thoroughfare shall be protected from exterior fire exposure by fire protection having a *fire-resistance rating* not less than that required for their protection from interior fire exposure, as stated in Articles 3.2.2.20. to 3.2.2.83., but not less than 1 h.
- 2)** Structural members of *heavy timber construction*, including beams, columns and arches, that are placed wholly or partly outside the exterior face of a *building* and are 3 m or more from the property line or the centre line of a public thoroughfare need not be covered with *noncombustible* cladding.

### 3.2.3.10. Unlimited Unprotected Openings

- 1)** An *exposing building face* in a *storage garage* with all *storeys* constructed as *open-air storeys* is permitted to have unlimited *unprotected openings* provided it has a *limiting distance* not less than 3 m.
- 2)** The *exposing building face* of a *storey* that faces a *street* and is at the same level as the *street* is permitted to have unlimited *unprotected openings* if the *limiting distance* is not less than 9 m.

### 3.2.3.11. Low Fire Load, One Storey Building

- 1)** An *exposing building face* of a *building* of *low-hazard industrial occupancy* conforming to Article 3.2.2.82. is permitted to be of *noncombustible construction* without a *fire-resistance rating* provided
- it is not a *loadbearing wall*, and
  - the *limiting distance* is not less than 3 m.

### 3.2.3.12. Area Increase for Unprotected Openings

- 1)** Except as required by Sentence 3.2.3.7.(4), the maximum area of *unprotected openings* in any *exposing building face* of an unsprinklered *building* is permitted to be doubled if the openings are glazed with
- glass block conforming to the requirements of Article 3.1.8.14., or
  - wired glass assemblies conforming to D-2.3.14. in Appendix D.

**3.2.3.13. Protection of Exit Facilities**

**1)** Except as required by Sentence (3) and as permitted by Sentence 3.4.4.3.(1), if the plane of an exterior wall of an *exit* enclosure forms an angle less than 135° with the plane of an exterior wall of the *building* it serves, and an opening in the exterior wall of the *exit* enclosure could be exposed to fire from an opening in the exterior wall of the *building*, the opening in either the exterior wall of the *exit* or the exterior wall of the *building* shall be protected in conformance with the requirements of Sentence (4) where the opening in the exterior wall of the *building* is within 3 m horizontally and

- a) less than 10 m below an opening in the exterior wall of the *exit*, or
- b) less than 2 m above an opening in the exterior wall of the *exit*.

(See A-3.2.3.14.(1) in Appendix A.)

**2)** If an unenclosed exterior *exit* stair or ramp could be exposed to fire from an opening in the exterior wall of the *building* it serves, the opening in the exterior wall of the *building* shall be protected in conformance with the requirements of Sentence (4) where the opening in the exterior wall of the *building* is within 3 m horizontally and

- a) less than 10 m below the *exit* stair or ramp, or
- b) less than 5 m above the *exit* stair or ramp.

**3)** Except as permitted by Sentence 3.4.4.3.(1), if an exterior *exit* door in one *fire compartment* is within 3 m horizontally of an opening in another *fire compartment* and the exterior walls of these *fire compartments* intersect at an exterior angle of less than 135°, the opening shall be protected in conformance with the requirements of Sentence (4).

**4)** The opening protection referred to in Sentences (1), (2) and (3) shall consist of

- a) glass block conforming to the requirements of Article 3.1.8.14.,
- b) a wired glass assembly conforming to D-2.3.14. in Appendix D, or
- c) a *closure* conforming to the requirements of Subsection 3.1.8. and Articles 3.2.3.1. and 3.2.3.14.

**3.2.3.14. Wall Exposed to Another Wall**

**1)** Except as required by Sentences (3) and 3.2.3.13.(1) or as permitted by Sentence 3.2.3.19.(4), if an *unprotected opening* in an exterior wall of a *fire compartment* is exposed to an *unprotected opening* in the exterior wall of another *fire compartment*, and the planes of the 2 walls are parallel or at an angle less than 135°, measured from the exterior of the *building*, the *unprotected openings* in the 2 *fire compartments* shall be separated by a distance not less than  $D_o$  where  $D_o = 2D - ((\theta / 90) \times D)$  but in no case less than 1 m, and

$D$  = the greater required *limiting distance* for the *exposing building faces* of the 2 *fire compartments*, and

$\theta$  = the angle made by the intersecting planes of the *exposing building faces* of the 2 *fire compartments* (in the case where the exterior walls are parallel and face each other,  $\theta = 0^\circ$ ).

(See Appendix A.)

**2)** The exterior wall of each *fire compartment* referred to in Sentence (1) within the distance,  $D_o$ , shall have a *fire-resistance rating* not less than that required for the interior vertical *fire separation* between the *fire compartment* and the remainder of the *building*.

**3)** Sentence (1) does not apply to *unprotected openings* of *fire compartments* within a *building* that is *sprinklered* throughout, but shall apply to

- a) *unprotected openings* of *fire compartments* on opposite sides of a *firewall*, and
- b) exposure from *unprotected openings* of a *fire compartment* that is not protected by an automatic sprinkler system.

**3.2.3.15. Wall Exposed to Adjoining Roof**

**1)** Except as permitted by Sentence 3.2.3.19.(4), if a wall in a *building* is exposed to a fire hazard from an adjoining roof of a separate *fire compartment* that is not *sprinklered* in the same *building*, and the exposed wall contains windows within 3 *storeys* vertically and 5 m horizontally of the roof, the roof shall contain no skylights within 5 m of the exposed wall.

**3.2.3.16. Protection of Soffits**

**1)** Except as permitted by Sentences (3) and (4), where there is a common *attic or roof space* above more than 2 *suites of residential occupancy* or above more than 2 patients' sleeping rooms, and the common *attic or roof space* projects beyond the exterior wall of the *building*, the soffit, and any opening in the soffit or other surface of the projection located within 2 500 mm of a window or door opening, shall be protected by

- a) *noncombustible* material
  - i) not less than 0.38 mm thick, and
  - ii) having a melting point not below 650°C,
- b) plywood not less than 11 mm thick,
- c) strandboard or waferboard not less than 12.5 mm thick, or
- d) lumber not less than 11 mm thick.

**2)** The soffit protection required by Sentence (1) shall extend the full width of the opening and to not less than 1 200 mm on either side of it, and shall apply to all openings through the soffit within this limit.

**3)** If an eave overhang is completely separated from the remainder of the *attic or roof space* by fire stopping, the requirements of Sentence (1) do not apply.

**4)** The protection required by Sentence (1) for projections is permitted to be omitted if

- a) the *fire compartments* behind the window and door openings are *sprinklered* in accordance with Article 3.2.5.13., and
- b) all rooms, including closets and bathrooms, having openings in the wall beneath the soffit are *sprinklered*, notwithstanding exceptions permitted in the standards referenced in Article 3.2.5.13. for the installation of automatic sprinkler systems.

**3.2.3.17. Canopy Protection for Vertically Separated Openings**

**1)** Except as permitted by Sentences (2) and (3), if a *storey* classified as a Group E or Group F, Division 1 or 2 *major occupancy* is required to be separated from the *storey* above by a *fire separation*,

- a) every opening in the exterior wall of the lower *storey* that is located vertically below an opening in the *storey* above shall be separated from the *storey* above by a canopy projecting not less than 1 m from the face of the *building* at the intervening floor level, and
- b) the canopy required by Clause (a) shall have a *fire-resistance rating* not less than that required for the floor assembly but need not be more than 1 h, except as required elsewhere in this Subsection.

**2)** Except as permitted by Sentence (3), the canopy required by Sentence (1) is permitted to be omitted if the exterior wall of the upper *storey* is recessed not less than 1 m behind the exterior wall containing the opening in the lower *storey*.

**3)** The requirements of Sentences (1) and (2) are permitted to be waived if the *building* is *sprinklered* throughout.

**3.2.3.18. Covered Vehicular Passageway**

**1)** A covered vehicular passageway designed as a receiving or shipping area shall be separated from every *building* or part of a *building* adjoining it by a *fire separation* having a *fire-resistance rating* not less than 1.5 h.

**2)** A covered vehicular passageway constructed below *grade* shall be of *noncombustible construction*.

**3.2.3.19. Walkway between Buildings**

**1)** Except as required by Sentence 3.2.3.20.(2), if *buildings* are connected by a *walkway*, each *building* shall be separated from the *walkway* by a *fire separation* with a *fire-resistance rating* not less than 45 min .

**2)** Except as permitted by Sentence (3), a *walkway* connected to a *building* required to be of *noncombustible construction* shall also be of *noncombustible construction*.

- 3)** A *walkway* connected to a *building* required to be of *noncombustible construction* is permitted to be of *heavy timber construction* provided
- not less than 50% of the area of any enclosing perimeter walls is open to the outdoors, and
  - the *walkway* is at ground level.
- 4)** A *walkway* of *noncombustible construction* used only as a pedestrian thoroughfare need not conform to the requirements of Articles 3.2.3.14. and 3.2.3.15.
- 5)** A *walkway* between *buildings* shall be not more than 9 m wide.

### 3.2.3.20. Underground Walkway

- 1)** An underground *walkway* shall not be designed or used for any purpose other than pedestrian travel unless
- the purpose is acceptable to the *authority having jurisdiction*, and
  - sprinklers are installed in any space in the *walkway* containing an *occupancy*.
- 2)** *Buildings* connected by an underground *walkway* shall be separated from the *walkway* by a *fire separation* with a *fire-resistance rating* not less than 1 h.
- 3)** An underground *walkway* shall be of *noncombustible construction* suitable for an underground location.
- 4)** In an underground *walkway*
- smoke barrier doors shall be installed at intervals of not more than 100 m, or
  - the travel distance from the door of an adjacent room or space to the nearest *exit* shall be not more than one and a half times the least allowable travel distance to an *exit* for any of the adjacent *occupancies* as permitted by Sentence 3.4.2.5.(1).
- 5)** An underground *walkway* between *buildings* shall be not more than 9 m wide.

### 3.2.3.21. Storage and Process Equipment Located Outdoors

- 1)** Location of outdoor storage and outdoor process equipment in relation to *buildings* shall conform to Parts 3 and 4 of Division B of the Alberta Fire Code 2006.

## 3.2.4. Fire Alarm and Detection Systems

(See Appendix A.)

### 3.2.4.1. Determination of Requirement for a Fire Alarm System

- 1)** Except as permitted by Sentences (3) to (5) and by Sentence 3.2.4.2.(4), a fire alarm system shall be installed in a *building* in which an automatic sprinkler system is installed. (See Appendix A.)
- 2)** Except as permitted by Sentences (3) to (5) and Sentence 3.2.4.2.(4), a fire alarm system shall be installed in a *building* that is not *sprinklered* throughout and that contains
- a *contained use area*,
  - an *impeded egress zone*,
  - more than 3 *storeys*, including the *storeys* below the *first storey*,
  - a total *occupant load* more than 300, other than in open air seating areas,
  - an *occupant load* more than 150 above or below the *first storey*, other than in open air seating areas,
  - a school, college, or child care facility, including a *day care facility*, with an *occupant load* more than 40,
  - a licensed beverage establishment or a *restaurant*, with an *occupant load* more than 150,
  - a *medium-hazard industrial occupancy* or a *low-hazard industrial occupancy* with an *occupant load* more than 75 above or below the *first storey*,
  - a *residential occupancy* with sleeping accommodation for more than 10 persons,
  - a children's residential care facility with an *occupant load* more than 10,
  - a *high-hazard industrial occupancy* with an *occupant load* more than 25, or
  - an *occupant load* more than 300 below an open air seating area.

**3)** Where each *dwelling unit* in an apartment *building* has direct access to an exterior *exit* facility leading to ground level, a fire alarm system is not required if

- not more than 4 *dwelling units* share a common *means of egress*, or
- the *building* is not more than 3 *storeys* in *building height*.

**4)** A fire alarm system is not required in a hotel or motel 3 *storeys* or less in *building height* provided each *suite* has direct access to an exterior *exit* facility leading to ground level.

**5)** A fire alarm system is not required in a *storage garage* conforming to Article 3.2.2.83. provided there are no other *occupancies* in the *building*.

### 3.2.4.2. Continuity of Fire Alarm System

**1)** If there are openings through a *firewall*, other than those for piping, tubing, wiring and totally enclosed *noncombustible* raceways, the requirements in this Subsection shall apply to the *floor areas* on both sides of the *firewall* as if they were in the same *building*.

**2)** Except as permitted by Sentence (4), if a *building* contains more than one *major occupancy* and a fire alarm system is required, a single system shall serve all *occupancies*.

**3)** Except as permitted by Sentence (4), if a fire alarm system is required in any portion of a *building*, it shall be installed throughout the *building*.

**4)** Except as required by Sentence (5), the requirements in this Subsection are permitted to be applied to each portion of a *building* not more than 3 *storeys* in *building height*, in which a vertical *fire separation* having a *fire-resistance rating* not less than 1 h separates the portion from the remainder of the *building* as if it were a separate *building*, provided there are no openings through the *fire separation*, other than those for piping, tubing, wiring and totally enclosed *noncombustible* raceways.

**5)** The permission in Sentence (4) to consider separated portions of a *building* as separate *buildings* does not apply to *service rooms* and storage rooms.

### 3.2.4.3. Types of Fire Alarm Systems

- A fire alarm system shall be
  - a single stage system in a Group F, Division 1 *occupancy*,
  - a 2 stage system in a Group B *occupancy* other than those described in Clause (c),
  - a single or 2 stage system in a *building* 3 *storeys* or less in *building height* used for a children's custodial home, a convalescent home or an orphanage, and
  - a single or 2 stage system in all other cases.

### 3.2.4.4. Description of Fire Alarm Systems

**1)** A single stage fire alarm system shall, upon the operation of any manual station, waterflow detecting device, or *fire detector*, cause an *alarm signal* to sound on all audible signal devices in the system. (See Appendix A.)

- A 2 stage fire alarm system shall
  - cause an *alert signal* to sound upon the operation of any manual station, waterflow detecting device, or *fire detector*,
  - automatically cause an *alarm signal* to sound if the *alert signal* is not acknowledged within 5 min of its initiation, and
  - have manual stations, each of which is equipped so that the use of a key or other similar device causes an *alarm signal* to sound that continues to sound upon removal of the key or similar device from the manual station (see Appendix A).

(See Appendix A.)

- A 2 stage fire alarm system is permitted to be zone coded so that, upon the operation of any manual station, waterflow detecting device, or *fire detector*,
  - a coded *alert signal* is sounded indicating the zone of alarm initiation,

- b) the coded *alert signal* is repeated in its entirety not less than 4 times, and
- c) a continuous *alert signal* is sounded upon completion of the coded signals referred to in Clause (b) and Sentence (4).

**4)** If a second manual station, waterflow detecting device, or *fire detector* is operated in a fire alarm system with zone coding as permitted by Sentence (3), in a zone other than that for which the first *alert signal* was sounded, the coded *alert signal* for the first zone shall be completed before the coded *alert signal* for the second zone is repeated not less than 4 times.

#### 3.2.4.5. Installation and Verification of Fire Alarm Systems

**1)** Except as permitted by Articles 3.2.4.10. and 3.2.4.19., fire alarm systems, including the voice communication capability where provided, shall be installed in conformance with CAN/ULC-S524, "Installation of Fire Alarm Systems."

**2)** Fire alarm systems shall be verified in conformance with CAN/ULC-S537, "Verification of Fire Alarm Systems," to ensure they are operating satisfactorily.

#### 3.2.4.6. Silencing of Alarm Signals

**1)** A fire alarm system shall be designed so that when an *alarm signal* is actuated, it cannot be silenced automatically before a period of time has elapsed that is not less than

- a) 5 min for a *building* not required to be equipped with an annunciator, and
- b) 20 min for any other *building*.

**2)** Except as permitted by Sentence 3.2.4.18.(9) and Sentences 3.2.4.21.(2) and (3), a fire alarm system shall not incorporate manual silencing switches other than those installed inside the fire alarm control unit. (See Appendix A.)

#### 3.2.4.7. Signals to Fire Department

**1)** A single stage fire alarm system installed in a *building of assembly occupancy* that has an *occupant load* more than 300 shall be designed to notify the fire department, in conformance with Sentence (4), that an *alarm signal* has been initiated.

**2)** A fire alarm system that includes waterflow-indicating devices shall be designed to notify the fire department in conformance with Sentence (4) when an alarm is initiated.

**3)** A 2 stage fire alarm system shall be designed to notify the fire department, in conformance with Sentence (4), that an *alert signal* has been initiated.

**4)** Notification of the fire department, as required by Sentences (1), (2) and (3), shall be provided in conformance with CAN/ULC-S561, "Installation and Services for Fire Signal Receiving Centres and Systems." (See Appendix A.)

**5)** Where a single stage fire alarm system is installed in a *building* that is not *sprinklered* throughout and Sentence (1) does not apply, a legible notice that is not easily removed shall be affixed to the wall near each manual station stating

- a) that the fire department is to be notified in the event of a fire emergency, and
- b) the emergency telephone number for the municipality or for the fire department (see Appendix A).

**6)** The *owner* of a *building* for which Sentences (1) to (4) require signals to the fire department shall provide evidence of compliance to the *authority having jurisdiction* by means of a Fire Protective Signalling Certificate from a certified listing agency showing

- a) the address of the *building*,
- b) the listed fire alarm installation company, and
- c) the listed fire alarm monitoring company.

#### 3.2.4.8. Annunciator and Zone Indication

**1)** Except as permitted by Sentences (3) to (5), an annunciator shall be installed in close proximity to a *building* entrance that faces a *street* or an access route for fire department vehicles that complies with Sentence 3.2.5.5.(1).

**2)** Except as permitted by Sentence (6), the annunciator required by Sentence (1) shall have separate zone indication of the actuation of the alarm initiating devices in each

- a) *floor area* so that the area of coverage for each zone in a *building* that is not *sprinklered* is not more than 2000 m<sup>2</sup>,
- b) *floor area* so that the area of coverage for each zone is neither
  - i) more than one *storey*, nor
  - ii) more than the system area limits as specified in NFPA 13, "Installation of Sprinkler Systems,"
- c) shaft required to be equipped with *smoke detectors*,
- d) air-handling system required to be equipped with *smoke detectors*,
- e) *contained use area*,
- f) *impeded egress zone*, and
- g) *fire compartment* required by Sentence 3.3.3.5.(2).

(See Appendix A.)

**3)** An annunciator need not be provided for a fire alarm system if not more than one zone indicator is required by Sentence (2).

**4)** If an annunciator is not installed as part of a fire alarm system in conformance with Sentence (1), a visual and audible trouble signal device shall be provided inside the main entrance of the *building*.

- 5)** The requirements of Sentence (1) are waived in a *building*
  - a) in which an automatic sprinkler system is not installed,
  - b) that has an aggregate area for all *storeys* of not more than 2000 m<sup>2</sup>, and
  - c) that is not more than 3 *storeys* in *building height*.

**6)** The area limits of Clause (2)(a) are waived for an interior undivided open space used as an arena, a rink, or a swimming pool provided that other spaces in the *building* that are separated from the open space are individually zoned in accordance with the requirements of Sentence (2).

**7)** A fire alarm control unit installed in close proximity to a *building* entrance that faces a *street* or an access route for fire department vehicles that complies with Sentence 3.2.5.5.(1) is deemed to satisfy the requirement for an annunciator, provided all indicators required for an annunciator or trouble signal device are included on the control unit.

### 3.2.4.9. Electrical Supervision

**1)** Electrical supervision shall be provided for a fire alarm system.

**2)** An automatic sprinkler system shall be electrically supervised to indicate a supervisory signal on the *building* fire alarm system annunciator for each of the following:

- a) movement of a valve handle that controls the supply of water to sprinklers,
- b) loss of excess water pressure required to prevent false alarms in a wet pipe system,
- c) loss of air pressure in a dry pipe system,
- d) loss of air pressure in a pressure tank,
- e) a significant change in water level in any water storage container used for firefighting purposes,
- f) loss of power to any automatically starting fire pump (see Appendix A), and
- g) a temperature approaching the freezing point in any dry pipe valve enclosure or water storage container used for firefighting purposes.

**3)** Indication of a supervisory signal in accordance with Sentence (2) shall be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4).

### 3.2.4.10. Fire Detectors

**1)** *Fire detectors* required by this Code shall be connected to the fire alarm system.

**2)** Except as permitted by Sentences (3) to (5), if a fire alarm system is required in a *building* that is not *sprinklered* throughout, *fire detectors* shall be installed in the following spaces:

- a) storage rooms not within *dwelling units*,
- b) *service rooms* not within *dwelling units*,
- c) janitors' rooms,
- d) rooms in which hazardous substances are to be used or stored (see A-3.3.1.2.(1) in Appendix A),
- e) elevator hoistways and dumbwaiter shafts, and
- f) laundry rooms in *buildings of residential occupancy*, but not those within *dwelling units*.

**3)** *Fire detectors* required by Sentence (2) need not be provided within *floor areas* that are *sprinklered* throughout.

**4)** *Fire detectors* need not be installed in a room used for storage if the room is less than 1 m<sup>2</sup> in area unless

- a) the room is a janitor's closet, or
- b) the room is used for storage of hazardous substances.

**5)** A clothes closet not more than 800 mm in depth shall not be considered as a storage room for the purposes of this Article.

#### 3.2.4.11. Smoke Detectors

**1)** If a fire alarm system is installed, *smoke detectors* shall be installed in

- a) each sleeping room and each corridor serving as part of a *means of egress* from sleeping rooms in portions of a *building* classified as Group B *major occupancy*,
- b) each room in a *contained use area* and corridors serving those rooms,
- c) each corridor in portions of a *building* classified as Group A, Division 1 *major occupancy*,
- d) each *public corridor* in portions of a *building* classified as Group C *major occupancy*,
- e) each *exit* stair shaft, and
- f) the vicinity of draft stops required by Article 3.2.8.7.

(See Appendix A.)

**2)** *Smoke detectors* required in the sleeping rooms of a *care or detention occupancy* shall, upon actuation, provide an audible and visible signal to staff serving those rooms so that the room or location containing the actuated smoke detector can be easily identified. (See Appendix A.)

#### 3.2.4.12. Prevention of Smoke Circulation

**1)** If a fire alarm system is installed, an air-handling system shall be designed to prevent the circulation of smoke upon a signal from a duct-type *smoke detector* if the air-handling system

- a) serves more than one *storey*,
- b) serves more than one *suite* in a *storey*, or
- c) serves more than one *fire compartment* required by Sentence 3.3.3.5.(2).

#### 3.2.4.13. Vacuum Cleaning System Shutdown

**1)** A central vacuum cleaning system in a *building* equipped with a fire alarm system shall be designed to shut down upon actuation of the fire alarm system.

#### 3.2.4.14. Elevator Emergency Return

**1)** Except as permitted by Sentence (3), in a *building* having elevators that serve *storeys* above the *first storey* and that are equipped with an automatic emergency recall feature, *smoke detectors* shall be installed in the elevator lobbies on the recall level so that when these *smoke detectors* are actuated, the elevators will automatically return directly to an alternate floor level.

2) *Smoke detectors* required by Sentence (1) shall be designed as part of the *building* fire alarm system.

3) The alternate floor recall feature required by Sentence (1) is not required if the *floor area* containing the recall level is *sprinklered* throughout.

#### 3.2.4.15. System Monitoring

1) An automatic sprinkler system shall be equipped with waterflow detecting devices and, if an annunciator is required by Article 3.2.4.8., shall be installed so that each device serves

- a) not more than one *storey*, and
- b) an area on each *storey* that is not more than the system area limits as specified in NFPA 13, "Installation of Sprinkler Systems."

2) Waterflow-detecting devices required by Sentence (1) shall be connected to the fire alarm system so that, upon its actuation, an *alert signal* or an *alarm signal* is initiated.

3) The actuation of each waterflow detecting device required by Sentence (1) shall be indicated separately on the fire alarm system annunciator.

#### 3.2.4.16. Manual Stations

1) Except as permitted by Sentences (2) and (3), where a fire alarm system is installed, a manual station shall be installed in every *floor area* near

- a) every principal entrance to the *building*, and
- b) every *exit*.

(See Appendix A.)

2) In a *building* that is *sprinklered* throughout, a manual station is not required at an exterior egress doorway from a *suite* that does not lead to an interior shared *means of egress* in a hotel or motel not more than 3 *storeys* in *building height*, provided each *suite* is served by an exterior *exit* facility leading directly to ground level.

3) In a *building* that is *sprinklered* throughout, a manual station is not required at an exterior egress doorway from a *dwelling unit* that does not lead to an interior shared *means of egress* in a *building* not more than 3 *storeys* in *building height* containing only *dwelling units*, provided each *dwelling unit* is served by an exterior *exit* facility leading directly to ground level.

4) In a *building* referred to in Sentences (2) or (3), manual stations shall be installed near doorways leading from shared interior corridors to the exterior.

#### 3.2.4.17. Alert and Alarm Signals

1) In a 2 stage fire alarm system described in Sentence 3.2.4.4.(2), the same audible signal devices are permitted to be used to sound the *alert signals* and the *alarm signals*.

2) If audible signal devices with voice reproduction capabilities are intended for paging and similar voice message use, other than during a fire emergency, they shall be installed so that *alert signals* and *alarm signals* take priority over all other signals.

3) Audible signal devices forming part of a fire alarm or voice communication system shall not be used for playing music or background noise.

4) In a *building* or portion thereof intended for use primarily by persons with hearing impairment, visual signal devices shall be installed in addition to audible signal devices.

#### 3.2.4.18. Audibility of Alarm Systems

(See Appendix A.)

1) Audible signal devices forming part of a fire alarm system shall be installed in a *building* so that *alert signals* and *alarm signals* are clearly audible throughout the *floor area* in which they are installed. (See Appendix A.)

- 2)** The sound pattern of an *alarm signal* shall conform to the temporal pattern defined in Clause 4.2 of International Standard ISO 8201, "Acoustics – Audible emergency evacuation signal." (See Appendix A.)
- 3)** The sound patterns of *alert signals* shall be significantly different from the temporal patterns of *alarm signals*. (See Appendix A.)
- 4)** The fire *alarm signal* sound pressure level shall be not more than 110 dBA in any normally occupied area. (See Appendix A.)
- 5)** The sound pressure level in a sleeping room from a fire alarm audible signal device shall be not less than 75 dBA in a *building of residential occupancy* when any intervening doors between the device and the sleeping room are closed. (See Appendix A.)
- 6)** Except as required by Sentence (5), the sound pressure level from a fire alarm system's audible signal device within a *floor area* shall be not less than 10 dBA above the ambient noise level without being less than 65 dBA.
- 7)** Fire alarm audible signal devices shall be supplemented by visual signal devices in any *floor area* in which
- a) the ambient noise level is more than 87 dBA, or
  - b) the occupants of the *floor area*
    - i) use ear protective devices,
    - ii) are located within an audiometric booth, or
    - iii) are located within sound insulating enclosures.
- 8)** Sentence (7) shall also apply in an *assembly occupancy* in which music and other sounds associated with performances could exceed 100 dBA.
- 9)** Except as permitted by Sentence (13), audible signal devices located within a *dwelling unit* shall include a means for them to be manually silenced for a period of not more than 10 min, after which time the devices shall restore themselves to normal operation. (See Appendix A.)
- 10)** Audible signal devices within a *dwelling unit* or a *suite of residential occupancy* shall be connected to the fire alarm system
- a) in a manner such that a single open circuit at one device will not impair the operation of other audible signal devices on that same circuit that serve the other *dwelling units* or *suites of residential occupancy*, or
  - b) on separate signal circuits that are not connected to the devices in any other *dwelling unit, public corridor* or *suite of residential occupancy*.
- (See Appendix A.)
- 11)** In a *building* or part thereof classified as a *residential occupancy*,
- a) separate circuits shall be provided for audible signal devices on each *floor area*, and
  - b) audible signal devices within *dwelling units* or *suites of residential occupancy* shall be wired on separate signal circuits from those not within *suites of residential occupancy* or *dwelling units*.
- (See A-3.2.4.18.(10) in Appendix A.)
- 12)** Audible signal devices shall be installed in a *service space* referred to in Sentence 3.2.1.1.(8) and shall be connected to the fire alarm system.
- 13)** Audible signal devices within *dwelling units* that are wired on separate signal circuits need not include a means for silencing as required by Sentence (9) provided the fire alarm system includes a provision for an automatic signal silence within *dwelling units*, where
- a) the automatic signal silence cannot occur within the first 60 s of operation or within the zone of initiation,
  - b) a subsequent alarm elsewhere in the *building* will reactuate the silenced audible signal devices within *dwelling units*,

- c) after a period of not more than 10 min, the silenced audible signal devices will be restored to continuous audible signal if the alarm is not acknowledged, and
- d) the voice communication system referred to in Article 3.2.4.21. has a provision to override the automatic signal silence to allow the transmission of voice messages through silenced audible signal device circuits that serve the *dwelling units*.

(See A-3.2.4.18.(9) in Appendix A.)

**14)** If a 2 stage fire alarm system has been installed with an automatic signal silence as described in Sentence (13), the system shall be designed so that any silenced audible signal devices serving *dwelling units* are reactivated whenever an *alarm signal* is required to be transmitted as part of the second stage. (See A-3.2.4.18.(9) in Appendix A.)

### 3.2.4.19. Visual Signals

**1)** Visual signal devices required by Sentences 3.2.4.17.(4) and 3.2.4.18.(7) and (8) shall be installed so that the signal from at least one device is visible throughout the *floor area* or portion thereof in which they are installed. (See Appendix A.)

**2)** Visual signal devices shall conform to ULC-S526, "Visible Signal Devices for Fire Alarm Systems."

**3)** A visual signal device shall be installed in close proximity to each required audible signal appliance.

### 3.2.4.20. Smoke Alarms

**1)** *Smoke alarms* conforming to CAN/ULC-S531, "Smoke-Alarms," shall be installed in each *dwelling unit* and, except for *care or detention occupancies* required to have a fire alarm system, in each sleeping room not within a *dwelling unit*.

**2)** At least one *smoke alarm* shall be installed on each *storey* of a *dwelling unit*.

**3)** On any *storey* of a *dwelling unit* containing sleeping rooms, a *smoke alarm* shall be installed in a location between the sleeping rooms and the remainder of the *storey*, and if the sleeping rooms are served by a hallway, the *smoke alarm* shall be located in the hallway.

**4)** A *smoke alarm* shall be installed on or near the ceiling.

**5)** A *smoke alarm* shall be installed with permanent connections to an electrical circuit and shall have no disconnect switches between the overcurrent device and the *smoke alarm*. (See Appendix A.)

**6)** If more than one *smoke alarm* is required in a *dwelling unit*, the *smoke alarms* shall be wired so that the actuation of one *smoke alarm* will cause all *smoke alarms* within the *dwelling unit* to sound.

**7)** A *smoke alarm* required by Sentence (1) shall be installed in conformance with CAN/ULC-S553, "Installation of Smoke-Alarms."

**8)** A manually operated device is permitted to be incorporated within the circuitry of a *smoke alarm* installed in a *dwelling unit* so that it will silence the signal emitted by the *smoke alarm* for a period of not more than 10 min, after which the *smoke alarm* will reset and again sound the alarm if the level of smoke in the vicinity is sufficient to reactuate the *smoke alarm*.

**9)** The sound patterns of *smoke alarms* shall be significantly different from the temporal patterns of *alarm signals*. (See A-3.2.4.18.(3) in Appendix A.)

**3.2.4.21. Voice Communication Systems**

- 1)** A voice communication system required by Subsection 3.2.6. shall consist of
  - a) a 2-way communication system in each *floor area*, with connections to the central alarm and control facility and to the mechanical control centre, and
  - b) loudspeakers operated from the central alarm and control facility which are designed and located so as to be audible and the messages intelligible in all parts of the *building*, except that this requirement does not apply to elevator cars. (See Appendix A.)
- 2)** The voice communication system referred to in Sentence (1) shall include a means to silence the *alarm signal* in a single stage fire alarm system while voice instructions are being transmitted, but only after the *alarm signal* has initially sounded for not less than 30 s.
- 3)** The voice communication system referred to in Sentence (1) shall include a means to silence the *alert signal* and the *alarm signal* in a 2 stage fire alarm system while voice instructions are being transmitted, but only after the *alert signal* has initially sounded for not less than
  - a) 10 s in hospitals that have supervisory personnel on duty for twenty-four hours each day, or
  - b) 30 s for all other *occupancies*.
- 4)** The voice communication system referred to in Clause (1)(b) shall be designed so that the *alarm signal* in a 2 stage fire alarm system can be selectively transmitted to any zone or zones while maintaining an *alert signal* or selectively transmitting voice instructions to any other zone or zones in the *building*.
- 5)** The 2-way communication system referred to in Clause (1)(a) shall be installed so that emergency telephones are located in each *floor area* near *exit* stair shafts.

**3.2.5. Provisions for Firefighting**

(See A-3 in Appendix A.)

**3.2.5.1. Access to Above-grade Storeys**

- 1)** Except for *storeys* below the *first storey*, direct access for firefighting shall be provided from the outdoors to every *storey* that is not *sprinklered* throughout and whose floor level is less than 25 m above *grade*, by at least one unobstructed window or access panel for each 15 m of wall in each wall required to face a *street* by Subsection 3.2.2.
- 2)** An opening for access required by Sentence (1) shall
  - a) have a sill no higher than 900 mm above the inside floor, and
  - b) be not less than 1 100 mm high by not less than
    - i) 550 mm wide for a *building* not designed for the storage or use of dangerous goods, or
    - ii) 750 mm wide for a *building* designed for the storage or use of dangerous goods.

**3)** Access panels above the *first storey* shall be readily openable from both inside and outside, or the opening shall be glazed with plain glass.

**3.2.5.2. Access to Basements**

- 1)** Direct access from at least one *street* shall be provided from the outdoors in a *building* that is not *sprinklered* to each *basement* having a horizontal dimension more than 25 m.
- 2)** The access required by Sentence (1) is permitted to be provided by
  - a) doors, windows or other means that provide an opening not less than 1 100 mm high and 550 mm wide, with a sill no higher than 900 mm above the inside floor, or
  - b) an interior stairway immediately accessible from the outdoors.

**3.2.5.3. Roof Access**

(See also Article 3.6.4.7.)

**1)** On a *building* more than 3 storeys in *building height* where the slope of the roof is less than 1 in 4, all main roof areas shall be provided with direct access from the *floor areas* immediately below, either by

- a) a stairway, or
- b) a hatch not less than 550 mm by 900 mm with a fixed ladder.

**3.2.5.4. Access Routes**

**1)** A *building* which is more than 3 storeys in *building height* or more than 600 m<sup>2</sup> in *building area* shall be provided with access routes for fire department vehicles

- a) to the *building* face having a principal entrance, and
- b) to each *building* face having access openings for firefighting as required by Articles 3.2.5.1. and 3.2.5.2.

(See Appendix A.)

**3.2.5.5. Location of Access Routes**

**1)** Access routes required by Article 3.2.5.4. shall be located so that the principal entrance and every access opening required by Articles 3.2.5.1. and 3.2.5.2. are located not less than 3 m and not more than 15 m from the closest portion of the access route required for fire department use, measured horizontally from the face of the *building*.

**2)** Access routes shall be provided to a *building* so that

- a) for a *building* provided with a fire department connection, a fire department pumper vehicle can be located adjacent to the hydrants referred to in Article 3.2.5.16.,
- b) for a *building* not provided with a fire department connection, a fire department pumper vehicle can be located so that the length of the access route from a hydrant to the vehicle plus the unobstructed path of travel for the firefighter from the vehicle to the *building* is not more than 90 m, and
- c) the unobstructed path of travel for the firefighter from the vehicle to the *building* is not more than 45 m.

**3)** The unobstructed path of travel for the firefighter required by Sentence (2) from the vehicle to the *building* shall be measured from the vehicle to the fire department connection provided for the *building*, except that if no fire department connection is provided, the path of travel shall be measured to the principal entrance of the *building*.

**4)** If a portion of a *building* is completely cut off from the remainder of the *building* so that there is no access to the remainder of the *building*, the access routes required by Sentence (2) shall be located so that the unobstructed path of travel from the vehicle to one entrance of each portion of the *building* is not more than 45 m.

**3.2.5.6. Access Route Design**

**1)** A portion of a roadway or yard provided as a required access route for fire department use shall

- a) have a clear width not less than 6 m, unless it can be shown that lesser widths are satisfactory,
- b) have a centreline radius not less than 12 m,
- c) have an overhead clearance not less than 5 m,
- d) have a change of gradient not more than 1 in 12.5 over a minimum distance of 15 m,
- e) be designed to support the expected loads imposed by firefighting equipment and be surfaced with concrete, asphalt or other material designed to permit accessibility under all climatic conditions,
- f) have turnaround facilities for any dead-end portion of the access route more than 90 m long, and
- g) be connected with a public thoroughfare.

(See Appendix A.)

**3.2.5.7. Water Supply**

(See Appendix A.)

**1)** Except as required in Sentences (3) and (4), and except for a *building* that is neither more than 3 *storeys* in *building height* nor more than 600 m<sup>2</sup> in *building area*, a *building* shall have a supply of water available for firefighting purposes that is not less than the quantity derived from the following formula:

$$Q = V \times O \times S$$

where

- Q = minimum water supply (litres),
- V = total *building* volume (cubic metres),
- O = water supply coefficient (from Table 3.2.5.7.),
- S = spatial coefficient whose value is 1.5 for a *building* that has any *limiting distance* less than 7.5 m, otherwise whose value is 1.0.

**Table 3.2.5.7.**  
**Water Supply Coefficient**  
Forming Part of Sentence 3.2.5.7.(1)

Type of Construction	Classification by Group and Division in Accordance with Table 3.1.2.1.				
	A-1, A-3, F-3	A-2, B-1, B-2, C, D	A-4	E, F-2	F-1
	Applicable Water Supply Coefficient				
A <i>building</i> of <i>noncombustible construction</i> with all <i>loadbearing</i> walls, columns and arches, having a <i>fire-resistance rating</i> at least equivalent to that required for the supported assembly, but not less than 45 min	11	10	14	17	23
A <i>building</i> of <i>noncombustible construction</i> in accordance with Article 3.1.5.1.	17	15	20	25	34
A <i>building</i> having all structural members of <i>noncombustible</i> material, or if of <i>combustible</i> material, a <i>fire-resistance rating</i> of at least 45 min, or of <i>heavy timber construction</i>	22	19	27	34	45
A <i>building</i> of <i>combustible construction</i>	34	27	40	50	67

**2)** The water supply required by Sentence (1) shall be capable of being delivered at a rate of not less than 45 L/s for a *building* required to have a quantity less than 75 000 L and at a rate of not less than 60 L/s for a *building* requiring a quantity of 75 000 L and greater.

**3)** Water supply for a standpipe system shall conform to the requirements of NFPA 14, "Installation of Standpipe and Hose Systems."

- 4)** Water supply for a *sprinklered building* shall conform to the requirements of
- a) NFPA 13, "Installation of Sprinkler Systems," or
  - b) NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."

**3.2.5.8. Standpipe Systems**

**1)** Except as permitted by Sentence 3.2.5.9.(4), a standpipe system shall be installed in a *building* that is

- a) more than 3 *storeys* in *building height*,

- b) more than 14 m high measured between *grade* and the ceiling of the top *storey*, or
- c) not more than 14 m high measured between *grade* and the ceiling of the top *storey* but has a *building area* exceeding the area shown in Table 3.2.5.8. for the applicable *building height* unless the *building* is *sprinklered* throughout.

**Table 3.2.5.8.**  
**Building Limits without Standpipe Systems**  
Forming Part of Sentence 3.2.5.8.(1)

Occupancy Classification	Building Area, m <sup>2</sup>		
	1 storey	2 storeys	3 storeys
Group A	2500	2000	1500
Group C	2000	1500	1000
Group D	4000	3000	2000
Group F, Division 2	1500	1500	1000
Group F, Division 3	3000	2000	1000

**3.2.5.9. Standpipe System Design**

- 1)** Except as required or permitted by Sentences (2) to (6) and Articles 3.2.5.10., 3.2.5.11. and 3.2.5.12., the design, construction, installation and testing of a standpipe system shall conform to NFPA 14, "Installation of Standpipe and Hose Systems."
- 2)** A dry standpipe that is not connected to a water supply shall not be considered as fulfilling the requirements of this Article.
- 3)** If more than one standpipe is provided, the total water supply need not be more than 30 L/s.
- 4)** A standpipe need not be installed in a *storage garage* conforming to Article 3.2.2.83. provided the *building* is not more than 15 m high.
- 5)** The residual water pressure at the design flow rate at the topmost hose connection of a standpipe system that is required to be installed in a *building* is permitted to be less than 690 kPa provided
  - a) the *building* is *sprinklered* throughout,
  - b) the water supply at the base of the sprinkler riser is capable of meeting, without a fire pump, the design flow rate and pressure demand of the sprinkler system, including the inside and outside hose allowance, and
  - c) fire protection equipment is available to deliver, by means of the fire department connection, the full demand flow rate at a residual water pressure of 690 kPa at the topmost hose connection of the standpipe system. (See Appendix A.)
- 6)** A fire department connection shall be provided for every standpipe system.

**3.2.5.10. Hose Connections**

- 1)** Hose connections shall be located in *exits*, in accordance with NFPA 14, "Installation of Standpipe and Hose Systems."
- 2)** Hose connections are not required within a *floor area*.
- 3)** Hose connections shall be provided with sufficient clearance to permit the use of a standard fire department hose key.
- 4)** Except as permitted by Sentences (5) and (6), 65 mm diam hose connections shall be installed in a standpipe system.

**3.2.5.11.**

**5)** Hose connections for 65 mm diam hose are not required in a *building* that is not *sprinklered* and is not more than 25 m high, measured between *grade* and the ceiling level of the top *storey*.

**6)** Hose connections for 65 mm diam hose are permitted to be 38 mm diam in a *sprinklered building* having a *building area* not more than 4 000 m<sup>2</sup> and not more than 25 m high, measured between *grade* and the ceiling level of the top *storey*.

**3.2.5.11. Hose Stations and Cabinets**

**1)** Hose stations for 38 mm diam hose shall be installed for a standpipe system in a *building* that is not *sprinklered* throughout.

**2)** Hose stations for a 38 mm diam hose shall be installed for a standpipe system within every *floor area* that is not *sprinklered* throughout. (See Appendix A.)

**3)** Hose stations shall be located in the *floor area* within 5 m of *exits* and at other locations to provide coverage of the entire *floor area*.

**4)** A hose station located on one side of a *horizontal exit* shall be considered to serve only the *floor area* on that side of the *horizontal exit*.

**5)** A hose cabinet shall be located so that its door, when fully opened, will not obstruct the required width of a *means of egress*.

**6)** Except as permitted by Sentence (7), a hose cabinet shall be provided with a glass viewing panel not less than 5 mm thick and not less than 70% of the door area.

**7)** A hose cabinet located in a part of a *floor area* and used only for *industrial occupancy* may have a solid door with no glass viewing panel provided

- a) the door is painted red, and
- b) the words "FIRE HOSE" are
  - i) in raised lettering on the front of the door,
  - ii) painted in white, and
  - iii) at least 100 mm high with 12 mm strokes.

**8)** Hose cabinets with 38 mm diameter hose are to be installed in a *building* that

- a) is not required by Article 3.2.1.7. to have an automatic fire suppression system, or

- b) is required by Article 3.2.1.7. to have an automatic fire suppression system and the system does not comply with
  - i) NFPA 13, "Installation of Sprinkler Systems," and
  - ii) Sentences 3.2.4.9.(2) and (3).

**9)** Where hose cabinets with 38 mm diameter hose are not required by Sentence (8) in a *building* required to have an automatic fire suppression system,

- a) the standpipe system shall be equipped with hose stations having both 65 mm and 38 mm diameter hose connections and valves, and
- b) hose stations shall be located so that all parts of the *building* are within 9 m of a hose nozzle when attached to not more than 30 m of connected hose.

**10)** Fittings for inlets and outlets for firefighting use shall conform to the Alberta Fire Code 2006.

**3.2.5.12. Trouble Signal Annunciation for Valves**

**1)** If a fire alarm system in a *building* is required to have an annunciator by Sentence 3.2.4.8.(1), except for hose valves, all valves controlling water supplies in a standpipe system shall be equipped with an electrically supervised switch for transmitting a trouble signal to the annunciator in the event of movement of the valve handle.

**3.2.5.13. Automatic Sprinkler Systems**

**1)** Except as permitted by Sentences (2), (3) and (4), an automatic sprinkler system shall be designed, constructed, installed and tested in conformance with NFPA 13, "Installation of Sprinkler Systems." (See Appendix A.)

**2)** Except as required by Sentences (10) and (11), NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," is permitted to be used for the design, construction, installation and testing of an automatic sprinkler system installed in a *building of residential occupancy* throughout, not more than 4 *storeys in building height* conforming to Articles 3.2.2.42. to 3.2.2.48.

**3)** Instead of the requirements of Sentence (1) NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," is permitted to be used for the design, construction, installation and testing of an automatic sprinkler system installed in a *building of residential occupancy* throughout that contains not more than 2 *dwelling units*.

**4)** If a *building* contains fewer than 9 sprinklers, the water supply for these sprinklers is permitted to be supplied from the domestic water system for the *building* provided the required flow for the sprinklers can be met by the domestic system.

**5)** If a water supply serves both an automatic sprinkler system and a system serving other equipment, control valves shall be provided so that either system can be shut off independently.

**6)** Notwithstanding the requirements of the standards referenced in Sentences (1) and (2) regarding the installation of automatic sprinkler systems, sprinklers shall not be omitted in any room or closet in the *storey* immediately below a roof assembly. (See Appendix A.)

**7)** Fast response sprinklers shall be installed in *residential occupancies* and in *care or detention occupancies*. (See Appendix A.)

**8)** Sprinklers in elevator machine rooms shall have a temperature rating not less than that required for an intermediate temperature classification and shall be protected against physical damage. (See Appendix A.)

**9)** If a *sprinklered building* receives its water supply for the sprinkler system from sources other than a piped municipal water system, external provision shall be made for the fire department to use the water supply.

**10)** Notwithstanding the requirements of Sentence (2) regarding the installation of automatic sprinkler systems, in *buildings of combustible construction*, sprinklers shall be required in

- a) porches and balconies,
- b) *public corridors*,
- c) stairs that are open and attached,
- d) attics and floor/ceiling spaces,
- e) penthouse equipment rooms,
- f) elevator machine rooms,
- g) concealed spaces dedicated exclusively to and containing only *dwelling unit* ventilation equipment,
- h) crawl spaces,
- i) closets or storage rooms on exterior balconies, and
- j) other concealed spaces that are not used or intended for living purposes or storage and do not contain fuel-fired *appliances*.

**11)** A concealed space mentioned in Sentence (10) does not require sprinkler protection, provided the concealed space meets one of the criteria described in Clause 8.14.1.2. of NFPA 13, "Installation of Sprinkler Systems."

### 3.2.5.14. Combustible Sprinkler Piping

**1)** *Combustible* sprinkler piping shall be used only for wet systems in *residential occupancies* and other light-hazard *occupancies*. (See Appendix A.)

**2)** *Combustible* sprinkler piping shall meet the requirements of ULC/ORD-C199P, "Combustible Piping for Sprinkler Systems."

**3)** Except as permitted by Sentence (5), *combustible* sprinkler piping shall be separated from the area served by the sprinkler system, and from any other *fire compartment*, by ceilings, walls, or soffits consisting of, as a minimum,

- a) lath and plaster,
- b) gypsum board not less than 9.5 mm thick,
- c) plywood not less than 13 mm thick, or
- d) a suspended membrane ceiling with
  - i) steel suspension grids, and
  - ii) lay-in panels or tiles having a mass not less than 1.7 kg/m<sup>2</sup>.

**4)** Except as permitted by Sentence (5), *combustible* sprinkler piping may be located above a ceiling provided that the distance between the edge of any ceiling opening that is not protected in conformance with Sentence (3) and the nearest sprinkler is not more than 300 mm. (See also Sentences 3.1.5.16.(2) and 3.1.9.4.(1).)

**5)** Where *combustible* sprinkler piping has been tested in conformance with ULC/ORD-C199P, "Combustible Piping for Sprinkler Systems," and has been shown to meet the requirements therein without additional protection, conformance to Sentences (3) and (4) is not required.

### 3.2.5.15. Sprinklered Service Space

**1)** An automatic sprinkler system shall be installed in a *service space* referred to in Sentence 3.2.1.1.(8) if flooring for access within the *service space* is other than catwalks.

**2)** The sprinkler system required by Sentence (1) shall be equipped with waterflow detecting devices, with each device serving not more than one *storey*.

**3)** The waterflow detecting devices required by Sentence (2) shall be connected to the fire alarm system, to

- a) initiate an *alert signal* in a 2 stage system or an *alarm signal* in a single stage system, and
- b) indicate separately on the fire alarm system annunciator the actuation of each device.

### 3.2.5.16. Fire Department Connections

**1)** The fire department connection for a standpipe system shall be located so that the distance from the fire department connection to a hydrant is not more than 45 m and is unobstructed.

**2)** The fire department connection for an automatic sprinkler system shall be located so that the distance from the fire department connection to a hydrant is not more than 45 m and is unobstructed.

**3)** The fire department connection referred to in Sentences (1) and (2) shall be located no closer than 3 m and no further than 15 m from the principal entrance to the *building*.

### 3.2.5.17. Portable Fire Extinguishers

**1)** Portable extinguishers shall be provided and installed in conformance with the Alberta Fire Code 2006.

**2)** In a Group B, Division 1 *major occupancy*, portable fire extinguishers are permitted to be located in secure areas, or in lockable cabinets provided

- a) identical keys for all cabinets are located at all supervisory or security stations, or
- b) electrical remote release devices are provided and are connected to an emergency power supply.

**3)** Except as permitted by Sentence (2), in *assembly occupancies, business and personal services occupancies, care or detention occupancies, mercantile occupancies and residential occupancies*, each portable fire extinguisher shall be located in a cabinet that

- a) is not lockable,

- b) is not obscured or obstructed from view, and
- c) has a door that, if the door is not glazed,
  - i) is painted red, and
  - ii) is clearly marked with the words "FIRE EXTINGUISHER" in raised white lettering on the front with letters not less than 100 mm high and with 12 mm strokes.

### 3.2.5.18. Protection from Freezing

- 1)** Equipment forming part of a fire protection system shall be protected from freezing if
- a) it could be adversely affected by freezing temperatures, and
  - b) it is located in an unheated area.

### 3.2.5.19. Fire Pumps

- 1)** If a fire pump is installed, it shall be
- a) installed in accordance with the requirements of NFPA 20, "Installation of Stationary Pumps for Fire Protection,"
  - b) tested to ensure satisfactory operation in conformance with NFPA 20, "Installation of Stationary Pumps for Fire Protection," and
  - c) provided with emergency power meeting the requirements of Article 3.2.7.9. (See Appendix A.)

## 3.2.6. Additional Requirements for High Buildings

(See Appendix B.)

### 3.2.6.1. Application

- 1)** This Subsection applies to a *building*
- a) of Group A, D, E or F *major occupancy* classification that is more than
    - i) 36 m high, measured between *grade* and the floor level of the top *storey*, or
    - ii) 18 m high, measured between *grade* and the floor level of the top *storey*, and in which the cumulative or total *occupant load* on or above any *storey* above *grade*, other than the *first storey*, divided by 1.8 times the width in metres of all *exit stairs* at that *storey*, exceeds 300,
  - b) containing a Group B *major occupancy* in which the floor level of the highest *storey* of that *major occupancy* is more than 18 m above *grade*,
  - c) containing a *floor area* or part of a *floor area* located above the third *storey* designed or intended as a Group B, Division 2 *occupancy*, and
  - d) containing a Group C *major occupancy* whose floor level is more than 18 m above *grade*.

### 3.2.6.2. Limits to Smoke Movement

**1)** A *building* to which this Subsection applies shall be designed in accordance with Sentences (2) to (5) and Article 3.2.6.3. to limit the danger to occupants and firefighters from exposure to smoke in a *building* fire.

**2)** A *building* referred to in Sentence (1) shall be designed so that, during a period of 2 h after the start of a fire, each *exit* stair serving *storeys* below the lowest *exit level* will not contain more than 1% by volume of contaminated air from the fire floor, assuming an outdoor temperature equal to the January design temperature on a 2.5% basis determined in accordance with Subsection 1.1.3. (See Appendix B.)

**3)** Each stairway that serves *storeys* above the lowest *exit level* shall have a vent to the outdoors, at or near the bottom of the stair shaft, that

- a) has an openable area of 0.05 m<sup>2</sup> for every door between the stair shaft and a *floor area*, but not less than 1.8 m<sup>2</sup>,

- b) opens directly to the outdoors or into a vestibule that has a similar opening to the outdoors, and
- c) has a door or *closure* that
  - i) is openable manually, and
  - ii) can remain in the open position during a fire emergency.

(See Appendix B.)

**4)** Measures shall be taken to limit movement of smoke from a fire in a *floor area* below the lowest *exit storey* into upper *storeys*. (See Appendix B.)

**5)** Except for exhaust fans in kitchens, washrooms and bathrooms in *dwelling units*, and except for fans used for smoke venting as required by Article 3.2.6.6., air moving fans in a system that serves more than 2 *storeys* shall be designed and installed so that in the event of a fire these fans can be stopped by means of a manually operated switch at the central alarm and control facility.

### 3.2.6.3. Connected Buildings

**1)** If a *building* described in Article 3.2.6.1. is connected to any other *building*, measures shall be taken to limit movement of contaminated air from one *building* into another during a fire. (See Appendix B.)

### 3.2.6.4. Emergency Operation of Elevators

**1)** Elevators shall comply with the elevating devices regulations made pursuant to the Safety Codes Act.

**2)** Special Emergency Services as defined in the elevating devices regulations made pursuant to the Safety Codes Act shall be provided in all elevators.

**3)** Manual emergency recall shall be provided for all elevators serving *storeys* above the *first storey*.

**4)** Key-operated switches for emergency recall required by Sentence (3) shall be provided in a conspicuous location at

- a) each elevator lobby on the recall level, and
- b) the central alarm and control facility required by Article 3.2.6.7.

**5)** In-car emergency service switches shall be provided in all elevator cars.

- 6)** Keys to operate the switches required by Sentences (4) and (5) shall be
- a) provided in a suitably identified box conspicuously located on the outside of an elevator hoistway near the central alarm and control facility required by Article 3.2.6.7., and
  - b) kept at the central alarm and control facility.

### 3.2.6.5. Elevator for Use by Firefighters

**1)** All elevators shall be capable of operating on emergency power.

**2)** Not more than one elevator at one time is required to operate on emergency power.

**3)** At least one elevator shall be provided with the features described in Sentences (4) to (8).

**4)** The elevator referred to in Sentence (3) shall have a useable platform area not less than 2.2 m<sup>2</sup> and shall be capable of carrying a load of 900 kg to the top floor that it serves from a landing on the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5. within 1 min.

- 5)** Each elevator for use by firefighters shall
- a) be provided with a *closure* at each shaft opening so that the interlock mechanism remains mechanically engaged and electrical continuity is maintained in the interlock circuits and associated wiring for a period of not less than 1 h when the assembly is subjected to the standard fire exposure described in CAN4-S104-M, "Fire Tests of Door Assemblies,"

- b) be protected with a vestibule containing no *occupancy* and separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* not less than 45 min, or
- c) be protected with a corridor containing no *occupancy* and separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

**6)** Except as permitted by Sentence (7), an elevator referred to in Sentence (3) shall be capable of providing transportation from the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5. to every floor that is above *grade* in the *building* and that is normally served by the elevator system.

**7)** If it is necessary to change elevators to reach any floor referred to in Sentence (6), the system shall be designed so that not more than one change of elevator is required when travelling to any floor in the *building* from the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5.

**8)** Electrical conductors for the operation of the elevator referred to in Sentence (3) shall be

- a) installed in *service spaces* conforming to Section 3.6. that do not contain other *combustible* material, or
- b) protected against exposure to fire from the service entrance of the emergency power supply, or the normal service entrance of the normal power supply, to the equipment served, to ensure operation for a period of 1 h when subjected to the standard fire exposure described in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials." (See Appendix B.)

### 3.2.6.6. Venting to Aid Firefighting

**1)** Means of venting each *floor area* to the outdoors shall be provided by windows, wall panels, smoke shafts, or the *building* exhaust system. (See Appendix B.)

**2)** Fixed glass windows shall not be used for the venting required by Sentence (1) if the breaking of the windows could endanger pedestrians below.

**3)** Openable windows used for the venting required by Sentence (1) shall be permanently marked so that they are easily identifiable.

**4)** Elevator hoistways shall not be designed for the venting required by Sentence (1).

### 3.2.6.7. Central Alarm and Control Facility

**1)** A central alarm and control facility shall be provided on the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5. in a location that

- a) is readily accessible to firefighters entering the *building*, and
- b) takes into account the effect of background noise likely to occur under fire emergency conditions, so that the facility can properly perform its required function under these conditions.

(See Appendix B.)

**2)** The central alarm and control facility required by Sentence (1) shall include

- a) means to control the voice communication system required by Article 3.2.6.8., so that messages can be sent to
  - i) all loudspeakers simultaneously,
  - ii) individual *floor areas*, and
  - iii) *exit* stairwells,
- b) means to indicate audibly and visually *alert signals* and *alarm signals* and a switch to
  - i) silence the audible portion of these signals, and
  - ii) indicate visually that the audible portion has been silenced,
- c) means to indicate visually that elevators are on emergency recall,
- d) an annunciator conforming to Article 3.2.4.8.,
- e) means to transmit *alert signals* and *alarm signals* to the fire department in conformance with Article 3.2.4.7.,

**3.2.6.8.**

- f) means to release hold-open devices on doors to vestibules,
- g) means to manually actuate *alarm signals* in the *building* selectively to any zone or zones,
- h) means to silence the *alarm signals* referred to in Clause (g) in conformance with Sentences 3.2.4.21.(2) and 3.2.4.21.(3),
- i) means, as appropriate to the measure for fire safety provided in the *building*, to
  - i) actuate auxiliary equipment, or
  - ii) communicate with a continually staffed auxiliary equipment control centre,
- j) means to communicate with telephones in elevator cars, separate from connections to firefighters' telephones, if elevator cars are required to be equipped with a telephone by the elevating devices regulations made pursuant to the Safety Codes Act,
- k) means to indicate visually, individual sprinkler system waterflow signals,
- l) means to indicate audibly and visually, sprinkler system supervisory signals and trouble signals,
- m) a switch to silence the audible portion of a supervisory signal or a trouble signal, and
- n) visual indication that the audible portion of a supervisory signal or a trouble signal has been silenced.

(See Appendix B.)

**3.2.6.8. Voice Communication System**

**1)** A voice communication system or systems conforming to Article 3.2.4.21. shall be provided in a *building* if

- a) the floor of the top *storey* is more than 36 m above *grade*, or
- b) a *floor area* or part of a *floor area* located above the third *storey* is designed or intended for use as a Group B, Division 2 *occupancy*.

**3.2.6.9. Protection of Electrical Conductors**

**1)** Electrical conductors that are installed in *service spaces* containing other *combustible* material and are used in connection with fire alarm systems and emergency equipment described in Articles 3.2.6.2. to 3.2.6.8. shall be

- a) separated from the remainder of the *service space* by a *fire separation* having a *fire-resistance rating* not less than 1 h, or
- b) protected against fire exposure from the source of power supply to the branch circuits serving the equipment to ensure continued operation for not less than 1 h.

**2)** If the central alarm and control facility and the fire alarm control unit are in different *fire compartments*, the electrical conductors connecting the fire alarm control unit to the central alarm and control facility shall be protected against fire exposure to ensure continued operation for not less than 1 h.

**3.2.6.10. Testing**

**1)** The systems for control of smoke movement and mechanical venting required by Articles 3.2.6.2. and 3.2.6.6. shall be tested to ensure satisfactory operation. (See Appendix B.)

**3.2.7. Lighting and Emergency Power Systems****3.2.7.1. Minimum Lighting Requirements**

**1)** An *exit*, a *public corridor*, or a corridor providing *access to exit* for the public or serving patients' sleeping rooms or classrooms shall be equipped to provide illumination to an average level not less than 50 lx at floor or tread level and at angles and intersections at changes of level where there are stairs or ramps.

**2)** Rooms and spaces used by the public shall be illuminated as described in Article 9.34.2.7.

3) Lighting outlets in a *building of residential occupancy* shall be provided in conformance with Subsection 9.34.2.

### 3.2.7.2. Recessed Lighting Fixtures

1) A recessed lighting fixture shall not be located in an insulated ceiling unless the fixture is designed for this type of installation.

### 3.2.7.3. Emergency Lighting

1) Unless it can be shown to be unnecessary, emergency lighting shall be provided to an average level of illumination not less than 10 lx at floor or tread level in

- a) *exits*,
- b) principal routes providing *access to exit* in open *floor areas* and in *service rooms*,
- c) corridors used by the public,
- d) corridors serving patients' sleeping rooms,
- e) corridors serving classrooms,
- f) underground *walkways*,
- g) *public corridors*,
- h) *floor areas* or parts thereof where the public may congregate
  - i) in Group A, Division 1 *occupancies*, or
  - ii) in Group A, Division 2 and 3 *occupancies* having an *occupant load* of 60 or more,
- i) *floor areas* or parts thereof of *day care facilities* where persons are cared for, and
- j) food preparation areas in commercial kitchens.

2) Emergency lighting to provide an average level of illumination of not less than 10 lx at floor or catwalk level shall be included in a *service space* referred to in Sentence 3.2.1.1.(8).

3) The minimum value of the illumination required by Sentences (1) and (2) shall be not less than 1 lx. (See Appendix A.)

4) In addition to the requirements of Sentences (1) to (3), the installation of battery-operated emergency lighting in health care facilities shall conform to the appropriate requirements of CAN/CSA-Z32, "Electrical Safety and Essential Electrical Systems in Health Care Facilities."

5) Lighting required in Sentence (1) shall be designed to be automatically activated when the electric lighting in the affected area is interrupted.

### 3.2.7.4. Emergency Power for Lighting

- 1) An emergency power supply shall be
- a) provided to maintain the emergency lighting required by this Subsection from a power source such as batteries or generators that will continue to supply power in the event that the regular power supply to the *building* is interrupted, and
  - b) so designed and installed that upon failure of the regular power it will assume the electrical load automatically for a period of
    - i) 2 h for a *building* within the scope of Subsection 3.2.6.,
    - ii) 1 h for a *building* of Group B *major occupancy* classification that is not within the scope of Subsection 3.2.6., and
    - iii) 30 min for a *building* of any other *occupancy*.
- (See Appendix A.)

2) If self-contained emergency lighting units are used, they shall conform to CSA C22.2 No. 141, "Unit Equipment for Emergency Lighting."

### 3.2.7.5. Emergency Power Supply Installation

1) Except as required by Articles 3.2.7.6. and 3.2.7.7., an emergency electrical power supply system shall be installed in conformance with CAN/CSA-C282, "Emergency Electrical Power Supply for Buildings." (See Sentence 3.2.7.8.(1) for emergency electrical power supply for voice communication systems.)

**3.2.7.6.****3.2.7.6. Emergency Power for Health Care Facilities**

**1)** Except as required by Article 3.2.7.7., an emergency electrical power supply system for emergency equipment required by this Part for health care facilities shall be installed in conformance with CAN/CSA-Z32, "Electrical Safety and Essential Electrical Systems in Health Care Facilities." (See Appendix A.)

**3.2.7.7. Fuel Supply Shut-off Valves**

**1)** If a liquid or gas fuel-fired engine or turbine for an emergency electric power supply is dependent on a fuel supply from outside the *building*, the fuel supply shall be provided with a suitably-identified separate shut-off valve outside the *building*.

**3.2.7.8. Emergency Power for Fire Alarm Systems**

**1)** Fire alarm systems, including those incorporating a voice communication system, shall be provided with an emergency power supply conforming to Sentences (2), (3) and (4).

- 2)** The emergency power supply required by Sentence (1) shall be supplied from
- a) a generator,
  - b) batteries, or
  - c) a combination thereof.

**3)** The emergency power supply required by Sentence (1) shall be capable of providing

- a) supervisory power for not less than 24 h, and
- b) immediately following that period, emergency power under full load for not less than
  - i) 2 h for a *building* within the scope of Subsection 3.2.6.,
  - ii) 1 h for a *building* classified as a Group B *major occupancy* that is not within the scope of Subsection 3.2.6.,
  - iii) 5 min for a *building* not required to be equipped with an annunciator, and
  - iv) 30 min for any other *building*.

(See Appendix A.)

**4)** The emergency power supply required by Sentence (1) shall be designed so that, in the event of a failure of the normal power source, there is an immediate automatic transfer to emergency power with no loss of information.

**3.2.7.9. Emergency Power for Building Services**

**1)** An emergency power supply capable of operating under a full load for not less than 2 h shall be provided by an emergency generator for

- a) every elevator in a *building* required to conform to Subsection 3.2.6., assuming that only one elevator will operate at one time,
- b) water supply for firefighting in conformance with Article 3.2.5.7., if the supply is dependent on electrical power supplied to the *building*,
- c) fans and other electrical equipment that are installed to maintain the air quality specified in Articles 3.2.6.2., 3.3.3.6. and 3.3.3.7., and
- d) fans required for venting by Articles 3.2.6.6. and 3.2.8.8.

(See Appendix A.)

**2)** Fuel supply storage for a generator prime mover shall be provided on site and shall be independent of fuel supplies for other *building* services.

**3.2.8. Mezzanines and Openings through Floor Assemblies****3.2.8.1. Application**

**1)** Except as permitted by Article 3.2.8.2. and Sentence 3.3.4.2.(3), the portions of a *floor area* or a *mezzanine* that do not terminate at an exterior wall, a *firewall* or a vertical shaft shall

- a) terminate at a vertical *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly and extending from the floor assembly to the underside of the floor or roof assembly above, or
- b) be protected in conformance with the requirements of Articles 3.2.8.3. to 3.2.8.9.

**2)** The penetration of a floor assembly by an *exit* or a *vertical service space* shall conform to the requirements of Sections 3.4., 3.5. and 3.6.

**3)** A *floor area* containing sleeping rooms in a *building* of Group B, Division 2 *major occupancy* shall not be constructed as part of an *interconnected floor space*.

**3.2.8.2. Exceptions to Special Protection**

**1)** A *mezzanine* need not terminate at a vertical *fire separation* nor be protected in conformance with the requirements of Articles 3.2.8.3. to 3.2.8.9. provided the *mezzanine*

- a) serves a Group A, Division 1 *major occupancy*,
- b) serves a Group A, Division 3 *major occupancy* in a *building* not more than 2 *storeys* in *building* height, or
- c) serves a Group A, C, D, E or F *major occupancy* and
  - i) is 500 m<sup>2</sup> or less in area, and
  - ii) conforms to Sentence 3.2.1.1.(3) or (4).

**2)** Except for floors referred to in Sentence 3.1.10.3.(1) and Article 3.2.1.2., openings through a horizontal *fire separation* for vehicular ramps in a *storage garage* are not required to be protected with *closures* and need not conform to this Subsection.

**3)** If a *closure* in an opening in a *fire separation* would disrupt the nature of a manufacturing process, such as a continuous flow of material from *storey* to *storey*, the *closure* for the opening is permitted to be omitted provided precautions are taken to offset the resulting hazard. (See Appendix A.)

**4)** An *interconnected floor space* in a Group B, Division 1 *occupancy* need not conform to the requirements of Articles 3.2.8.3. to 3.2.8.9. provided the *interconnected floor space* does not interconnect more than 2 adjacent *storeys*.

**5)** Except as permitted by Sentence (6), openings for escalators and inclined moving walks need not conform to the requirements in Articles 3.2.8.3. to 3.2.8.9. provided

- a) the opening for each escalator or walk does not exceed 10 m<sup>2</sup>,
- b) the *building* is *sprinklered* throughout, and
- c) the *interconnected floor space* contains only Group A, Division 1, 2 or 3, Group D or Group E *major occupancies* (see A-3.2.8.2.(6)(c) in Appendix A).

**6)** An *interconnected floor space* need not conform to the requirements of Articles 3.2.8.3. to 3.2.8.9. provided

- a) the *interconnected floor space* consists of the *first storey* and the *storey* next above or below it, but not both,
- b) the openings through the floor are used only for stairways, escalators or moving walks or the *interconnected floor space* is *sprinklered* throughout (see Appendix A),
- c) the *interconnected floor space* contains only Group A, Division 1, 2 or 3, Group D, Group E, or Group F, Division 2 or 3 *major occupancies* (see Appendix A), and
- d) the *building area* is not more than one half of the area permitted by Subsection 3.2.2.

**3.2.8.3.****3.2.8.3. Construction Requirements**

1) A *building* constructed in conformance with Articles 3.2.8.4. to 3.2.8.9. shall be of *noncombustible construction*, except that *heavy timber construction* is permitted if Subsection 3.2.2. permits the *building* to be constructed of *combustible construction*.

**3.2.8.4. Sprinklers**

1) A *building* containing an *interconnected floor space* shall be *sprinklered* throughout.

**3.2.8.5. Vestibules**

1) An *exit* opening into an *interconnected floor space* shall be protected at each opening into the *interconnected floor space* by a vestibule

- a) with doorways that are not less than 1.8 m apart,
- b) that is separated from the remainder of the *floor area* by a *fire separation* that is not required to have a *fire-resistance rating* (see A-3.1.8.1.(1)(b) in Appendix A), and
- c) that is designed to limit the passage of smoke so that the level of contamination in an *exit* stair shaft does not exceed the limit described in Sentence 3.2.6.2.(2).

2) An *exit* opening into an *interconnected floor space* shall conform to Sentence 3.4.3.2.(6).

3) If an elevator hoistway opens into an *interconnected floor space* and into *storeys* above the *interconnected floor space*, either the elevator doors opening into the *interconnected floor space* or the elevator doors opening into the *storeys* above the *interconnected floor space* shall be protected by vestibules conforming to Sentence (1).

**3.2.8.6. Protected Floor Space**

1) A *protected floor space* used to satisfy the requirements of Clause 3.4.3.2.(6)(b) shall

- a) be separated from the *interconnected floor space* by a *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly of the *storey* in which it is located,
- b) have all openings in the vertical *fire separation* between a *protected floor space* and the adjacent *interconnected floor space* protected by vestibules conforming to Sentence 3.2.8.5.(1), and
- c) be designed so that it is not necessary to enter the *interconnected floor space* to reach an *exit*.

**3.2.8.7. Draft Stops**

1) A draft stop shall be provided at each floor level within an *interconnected floor space*, immediately adjacent to and surrounding the opening, and shall be not less than 500 mm deep measured from ceiling level down to the underside of the draft stop.

**3.2.8.8. Mechanical Exhaust System**

1) A mechanical exhaust system shall be provided to remove air from an *interconnected floor space* at a rate of 4 air changes per hour. (See Appendix A.)

2) The mechanical exhaust system required by Sentence (1) shall be actuated by a switch located on the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5. near the annunciator for the fire alarm system.

**3.2.8.9. Combustible Content Limits**

1) An *interconnected floor space* shall be designed so that the *combustible* contents, excluding interior finishes, in those parts of a *floor area* in which the ceiling is more than 8 m above the floor, are limited to not more than 16 g of *combustible* material for each cubic metre of volume of the *interconnected floor space*.

## Section 3.3. Safety within Floor Areas

(See Appendix A.)

### 3.3.1. All Floor Areas

#### 3.3.1.1. Separation of Suites

**1)** Except as permitted by Sentences (2) and (3), each *suite* in other than *business and personal services occupancies* shall be separated from adjoining *suites* by a *fire separation* having a *fire-resistance rating* not less than 1 h. (See also Subsection 3.3.3. for *care or detention occupancies*, Article 3.3.4.2. for *residential occupancies* and Article 3.1.8.7. for *fire dampers*.)

**2)** The *fire-resistance rating* of the *fire separation* required by Sentence (1) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for

- a) the floor assembly above the *floor area*, or
- b) the floor assembly below the *floor area*, if there is no floor assembly above.

**3)** *Occupancies* that are served by *public corridors* conforming to Clause 3.3.1.4.(4)(b) in a *building* that is *sprinklered* throughout, are not required to be separated from one another by *fire separations* provided the *occupancies* are

- a) *suites of business and personal services occupancy*,
- b) fast food vending operations that do not provide seating for customers,
- c) *suites of mercantile occupancy*, or
- d) any combination of these occupancies.

#### 3.3.1.2. Hazardous Substances, Equipment and Processes

**1)** Except as provided in Subsection 3.3.5., the storage, handling and use of hazardous substances shall be in conformance with the Alberta Fire Code 2006. (See Appendix A.)

**2)** Cooking equipment, not within a *dwelling unit*, used in processes producing grease-laden vapours shall be designed and installed in conformance with Part 6. (See Appendix A.)

**3)** A fuel-fired *appliance* shall not be installed in a corridor serving as an *access to exit*.

**4)** Rooms or spaces for the storage and handling of *flammable liquids* and *combustible liquids* shall conform to the Alberta Fire Code 2006.

#### 3.3.1.3. Means of Egress

**1)** *Access to exit* within *floor areas* shall conform to Subsections 3.3.2. to 3.3.5., in addition to the requirements of this Subsection.

**2)** If a podium, terrace, platform or contained open space is provided, egress requirements shall conform to the appropriate requirements of Sentence 3.3.1.5.(1) for rooms and *suites*.

**3)** *Means of egress* shall be provided from every roof which is intended for *occupancy*, and from every podium, terrace, platform or contained open space.

**4)** At least two separate *means of egress* shall be provided from a roof, used or intended for an *occupant load* more than 60, to stairs designed in conformance with the requirements regarding *exit* stairs stated in Section 3.4.

- 5)** A rooftop enclosure shall be provided with an *access to exit* that leads to an *exit*
- a) at the roof level, or
  - b) on the *storey* immediately below the roof.

**6)** A rooftop enclosure which is more than 200 m<sup>2</sup> in area shall be provided with at least 2 *means of egress*.

- 7)** Two points of egress shall be provided for a *service space* referred to in Sentence 3.2.1.1.(8) if
- the area is more than 200 m<sup>2</sup>, or
  - the travel distance measured from any point in the *service space* to a point of egress is more than 25 m.
- 8)** Except as permitted by Sentences 3.3.4.4.(5) and (6), each *suite* in a *floor area* that contains more than one *suite* shall have
- an exterior *exit* doorway, or
  - a doorway
    - into a *public corridor*, or
    - to an exterior passageway.
- 9)** Except as permitted by this Section and by Sentence 3.4.2.1.(2), at the point where a doorway referred to in Sentence (8) opens onto a *public corridor* or exterior passageway, it shall be possible to go in opposite directions to each of 2 separate *exits*.
- 10)** No *access to exit* for patrons in an *assembly occupancy* shall pass through a kitchen, *service space* or storage room.

#### 3.3.1.4. Public Corridor Separations

- 1)** Except as otherwise required by this Part or as permitted by Sentence (4), a *public corridor* shall be separated from the remainder of the *storey* by a *fire separation*.
- 2)** Except as permitted by Sentence (3) and Clauses (4)(a) and (b), the *fire separation* between a *public corridor* and the remainder of the *storey* shall have a *fire-resistance rating* not less than 45 min.
- 3)** If a *storey* is *sprinklered* throughout, no *fire-resistance rating* is required for a *fire separation* between a *public corridor* and the remainder of the *storey* provided the corridor does not serve a *care or detention occupancy* or a *residential occupancy*. (See A-3.1.8.1.(1)(b) in Appendix A.)
- 4)** No *fire separation* is required in a *sprinklered floor area* between a *public corridor* and
- except as required by Sentences 3.3.3.5.(9) and 3.3.4.2.(1), and notwithstanding Sentence 3.4.2.4.(2), the remainder of a *storey*, provided the travel distance from any part of the *floor area* to an *exit* is not more than 45 m,
  - a room or a *suite*, provided the *public corridor* complies with Sentence 3.3.1.9.(6) and Clause 3.4.2.5.(1)(d), or
  - a space containing plumbing fixtures required by Section 7.2., provided the space and the *public corridor* are separated from the remainder of the *storey* by a *fire separation* having a *fire-resistance rating* not less than that required between the *public corridor* and the remainder of the *storey*.

#### 3.3.1.5. Egress Doorways

- 1)** Except for *dwelling units*, a minimum of 2 egress doorways located so that one doorway could provide egress from the room or *suite* as required by Article 3.3.1.3. if the other doorway becomes inaccessible to the occupants due to a fire which originates in the room or *suite*, shall be provided for every room and every *suite*
- that is used for a *high-hazard industrial occupancy* and whose area is more than 15 m<sup>2</sup>,
  - intended for an *occupant load* more than 60,

- c) in a *floor area* that is not *sprinklered* throughout, and
  - i) the area of a room or *suite* is more than the value in Table 3.3.1.5.A., or
  - ii) the travel distance within the room or *suite* to the nearest egress doorway is more than the value in Table 3.3.1.5.A., or
- d) in a *floor area* that is *sprinklered* throughout and does not contain a *high-hazard industrial occupancy* and
  - i) the travel distance to an egress doorway is more than 25 m, or
  - ii) the area of the room or *suite* is more than the value in Table 3.3.1.5.B.

**Table 3.3.1.5.A.**  
**Egress in Floor Area not Sprinklered Throughout**  
 Forming Part of Sentence 3.3.1.5.(1)

<i>Occupancy of Room or Suite</i>	Maximum Area of Room or <i>Suite</i> , m <sup>2</sup>	Maximum Distance to Egress Doorway, m
Group A	150	15
Group C	100 <sup>(1)</sup>	15 <sup>(1)</sup>
Group D	200	25
Group E	150	15
Group F, Division 2	150	10
Group F, Division 3	200	15

**Notes to Table 3.3.1.5.A.:**

(1) See Article 3.3.4.4. for *dwelling units*.

**Table 3.3.1.5.B.**  
**Egress in Floor Area Sprinklered Throughout**  
 Forming Part of Sentence 3.3.1.5.(1)

<i>Occupancy of Room or Suite</i>	Maximum Area of Room or <i>Suite</i> , m <sup>2</sup>
Group A	200
Group B, Division 1	100
Group B, Division 2	
sleeping rooms	100
other than sleeping rooms	200
Group C	150 <sup>(1)</sup>
Group D	300
Group E	200
Group F, Division 2	200
Group F, Division 3	300

**Notes to Table 3.3.1.5.B.:**

(1) See Article 3.3.4.4. for *dwelling units*.

**3.3.1.6. Travel Distance**

**1)** If more than one egress doorway is required from a room or *suite* referred to in Article 3.3.1.5., the travel distance within the room or *suite* to the nearest egress doorway shall not exceed the maximum travel distances specified in Clauses 3.4.2.5.(1)(a), (b), (c) and (f) for *exits*.

**3.3.1.7. Protection on Floor Areas with a Barrier-Free Path of Travel**

**1)** Every *floor area* above or below the *first storey* that is not *sprinklered* throughout and that has a *barrier-free* path of travel shall

- a) be served by an elevator
    - i) conforming to Sentences 3.2.6.5.(6) to (8), and
    - ii) protected against fire in conformance with Clause 3.2.6.5.(5)(b) or (c),
  - b) be divided into at least 2 zones by *fire separations* conforming to Sentences (2) and (3) so that
    - i) persons with physical disabilities can be accommodated in each zone, and
    - ii) the travel distance from any point in one zone to a doorway leading to another zone shall be not more than the value for travel distance permitted by Sentence 3.4.2.5.(1) for the *occupancy* classification of the zone,
  - c) have an exterior *exit* at ground level, or
  - d) have a ramp leading to ground level.
- (See Appendix A.)

**2)** The *fire separations* referred to in Clause (1)(b) shall have a *fire-resistance rating* not less than 45 min.

**3)** A door acting as a *closure* in a *fire separation* referred to in Clause (1)(b) shall be weatherstripped or otherwise designed and installed to retard the passage of smoke. (See A-3.3.3.5.(6) in Appendix A.)

**4)** In a *barrier-free* path of travel, a downward change in elevation shall be signalled by the use of a 600 mm wide tactile warning strip placed 250 mm from the edge and for the full width of a stair, escalator, moving *walkway*, ramp or platform, and identified using colour and brightness contrast.

**3.3.1.8. Headroom Clearance**

**1)** Except within the *floor area* of a *storage garage*, the minimum headroom clearance in every *access to exit* shall conform to the requirements of Article 3.4.3.4. for *exits*. (See also Sentence 3.3.5.4.(5).)

**3.3.1.9. Corridors**

**1)** The minimum width of a *public corridor* shall be 1100 mm.

**2)** Except as required by Sentence 3.3.3.3.(2), the minimum unobstructed width of a corridor used by the public or a corridor serving classrooms or patients' sleeping rooms shall be 1100 mm.

**3)** Except as permitted by Sentence (4), obstructions located within 1980 mm of the floor shall not project more than 100 mm horizontally into an *exit* passageway, a *public corridor*, a corridor used by the public or a corridor serving classrooms or patients' sleeping rooms in a manner that would create a hazard for a person with a visual disability traveling adjacent to the walls.

**4)** The horizontal projection of an obstruction referred to in Sentence (3) is permitted to be more than 100 mm provided the clearance between the obstruction and the floor is less than 680 mm. (See Appendix A.)

**5)** If a corridor contains an *occupancy*, the *occupancy* shall not reduce the unobstructed width of the corridor to less than its required width.

- 6)** If a *public corridor* conforming to Clause 3.4.2.5.(1)(d) contains an *occupancy*,
- a) the *occupancy* shall be located so that for pedestrian travel there is an unobstructed width not less than 3 m at all times adjacent and parallel to all rooms and *suites* that front onto the *public corridor*, and
  - b) the combined area of all *occupancies* in the *public corridor* shall be not more than 15% of the area of the *public corridor*.

7) Except for a dead end corridor that is entirely within a *suite* or as permitted by Sentences 3.3.3.3.(1) and 3.3.4.4.(6), a dead end corridor is permitted provided it is not more than 3 m long.

#### 3.3.1.10. Aisles

1) Except as otherwise stated in this Section, aisles shall be provided in conformance with the Alberta Fire Code 2006.

#### 3.3.1.11. Door Swing

1) Except as permitted by Article 3.3.1.12., a door that opens into a corridor or other facility providing *access to exit* from a *suite* or room not located within a *suite* shall swing on a vertical axis.

2) Except as permitted by Article 3.3.1.12., a door that opens into a corridor or other facility providing *access to exit* from a room or *suite* that is used or intended for an *occupant load* more than 60 or for a *high-hazard industrial occupancy* shall swing in the direction of travel to the *exit*.

3) Every door that divides a corridor that is not wholly contained within a *suite* shall swing on a vertical axis in the direction of travel to the *exit*.

4) If a pair of doors is installed in a corridor that provides *access to exit* in both directions, the doors shall swing in opposite directions, with the door on the right hand side swinging in the direction of travel to the *exit*.

#### 3.3.1.12. Sliding Doors

1) Except as permitted by Sentence (2), a sliding door provided in the locations described in Article 3.3.1.11. shall

- a) be designed and installed to swing on the vertical axis in the direction of travel to the *exit* when pressure is applied, and
- b) be identified as a swinging door by means of a label or decal affixed to it.

2) In a Group B, Division 1 *occupancy*, or in an *impeded egress zone* in other *occupancies*, sliding doors used in an *access to exit* need not conform to Sentence (1) and Article 3.3.1.11.

3) Movable *partitions* used to separate a *public corridor* from an adjacent *business and personal services occupancy* or a *mercantile occupancy* need not conform to Sentence (1) and Sentences 3.3.1.11.(1) and (2), provided the *partitions* are not located in the only *means of egress*. (See Appendix A.)

#### 3.3.1.13. Doors and Door Hardware

1) A door that opens into or is located within a *public corridor* or other facility that provides *access to exit* from a *suite* shall

- a) provide a clear opening of not less than 800 mm if there is only one door leaf,
- b) in a doorway with multiple leaves, have the active leaf providing a clear opening of not less than 800 mm, and,
- c) not open onto a step.

2) A door in an *access to exit* shall be readily openable in travelling to an *exit* without requiring keys, special devices or specialized knowledge of the door opening mechanism, except that this requirement does not apply to a door serving a *contained use area*, or an *impeded egress zone*, provided the locking devices conform to Sentence (6).

3) Except as permitted by Sentence (4), door release hardware shall be operable by one hand and the door shall be openable with not more than one releasing operation. (See also Sentence 3.8.3.3.(3).)

4) An egress door from an individual *dwelling unit* or from a *suite of residential occupancy* is permitted to be provided with additional devices that require a releasing operation additional to the main door release hardware, provided the devices are readily operable from the inside without the use of keys, special devices or specialized knowledge. (See Appendix A.)

- 5) Door release hardware shall be installed not more than 1200 mm above the finished floor.
- 6) An egress door in an *access to exit* serving a *contained use area* or an *impeded egress zone* is permitted to be equipped with locking devices that can be released either locally or remotely in conformance with Sentence (7) or (8). (See Appendix A.)
- 7) Local locking devices permitted by Sentence (6) shall be operable by a key from both sides of the door.
- 8) Controls for the remote release of door locking devices permitted by Sentence (6) shall be located in an area readily available to security personnel.
- 9) Locking devices permitted by Sentence (6) that are electrically operated shall be
  - a) designed to operate on emergency power, and
  - b) capable of manual release by security personnel.
- 10) Except as stated in Sentence (6), electromagnetic locks are permitted to be used on egress doors located in an *access to exit* provided
  - a) the locks and doors are installed in conformance with Sentence 3.4.6.15.(4), and
  - b) if electromagnetic locks are also used on the *exit* doors in the same *means of egress*, then the total time delay for all electromagnetic locks in the *means of egress* is not more than 30 s.

#### 3.3.1.14. Ramps and Stairways

- 1) Except as permitted by Sentence (2), Article 3.3.4.7. and Subsection 3.3.2., ramps and stairways that do not serve as *exits* shall conform to the dimensional, *guard*, handrail and slip-resistance requirements for *exit* ramps and stairways stated in Sentence 3.4.3.2.(8) and Articles 3.4.3.4., and 3.4.6.1. to 3.4.6.8.
- 2) Ramps and stairways that do not conform to the requirements of Sentence (1) are permitted to serve *service rooms* and *service spaces* and in *industrial occupancies*, provided the ramps and stairways are intended only for occasional use for servicing equipment and machinery.

#### 3.3.1.15. Exterior Passageways

- 1) An exterior passageway leading to a required *exit* shall conform to the requirements of Section 3.4. for exterior *exit* passageways.

#### 3.3.1.16. Curved or Spiral Stairs

- 1) A curved or spiral stair is permitted in a stairway not required as an *exit*, provided the stair has
  - a) treads with
    - i) a minimum run not less than 150 mm, and
    - ii) an average run not less than 200 mm, and
  - b) risers in conformance with Sentence 3.4.6.7.(2).

#### 3.3.1.17. Capacity of Access to Exits

(See Article 3.3.1.9. for minimum widths of corridors.)

- 1) The capacity of an *access to exit* shall be based on the *occupant load* of the portion of the *floor area* served.
- 2) In an *access to exit* the required width of ramps with a slope not more than 1 in 8, doorways, and corridors shall be based on not less than 6.1 mm per person.
- 3) In an *access to exit* the required width of a ramp with a slope more than 1 in 8 shall be based on not less than 9.2 mm per person.
- 4) In an *access to exit* from a *floor area* used or intended to be used for patients in a Group B, Division 2 *occupancy*, the required width of corridors, doorways, and ramps shall be based on not less than 18.4 mm per person.

5) The capacity of stairs in an *access to exit* shall conform to the requirements for stairs in Sentences 3.4.3.2.(1) to (3).

### 3.3.1.18. Guards

1) Except as provided in Sentence (4) and Article 3.3.2.9., a *guard* not less than 1 070 mm high shall be provided

- a) around any roof to which access is provided for purposes other than maintenance,
- b) at openings into smoke shafts referred to in Subsection 3.2.6. that are less than 1 070 mm above the floor, and
- c) at each raised floor, *mezzanine*, balcony, gallery, interior or exterior vehicular ramp, and at other locations where the difference in level is more than 600 mm.

2) Except as permitted by Sentence 3.3.2.9.(4) and unless it can be shown that the size of openings that exceed this limit does not present a hazard, there shall be no opening that permits the passage of a sphere whose diameter is more than 100 mm through a *guard* serving

- a) an exterior balcony, or
- b) a room, stairway, or space not within a *suite of residential occupancy*.

3) Unless it can be shown that the location and size of openings do not present a hazard, a *guard* shall be designed so that no member, attachment or opening located between 140 mm and 900 mm above the level protected by the *guard* will facilitate climbing.

4) Sentence (1) does not apply to the front edges of *stages* or to loading docks.

### 3.3.1.19. Transparent Doors and Panels

1) Except as permitted by Sentence (4), a glass or transparent door shall be designed and constructed so that the existence and position of the door is readily apparent, by attaching non-transparent hardware, bars or other permanent fixtures to it.

2) A glass door shall be constructed of

- a) laminated or tempered safety glass conforming to CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass," or
- b) wired glass conforming to CAN/CGSB-12.11-M, "Wired Safety Glass."

3) Except as permitted by Sentence (4), transparent panels used in an *access to exit* that, because of their physical configuration or design, could be mistaken as a *means of egress* shall be made inaccessible by barriers or railings.

4) Sliding glass *partitions* that separate a *public corridor* from an adjacent *occupancy* and that are open during normal working hours need not conform to Sentences (1) and (3), provided the *partitions* are suitably marked to indicate their existence and position.

5) Glass in doors and in sidelights that could be mistaken for doors, within or at the entrances to *dwelling units* and in public areas, shall conform to the requirements of Article 9.6.6.2.

6) A window in a public area that extends to less than 1000 mm above the floor and is located above the second *storey* in a *building of residential occupancy*, shall be protected by a barrier or railing to not less than 1070 mm above the floor, or the window shall be non-openable and designed to withstand the lateral design loads for balcony *guards* required by Article 4.1.5.15.

### 3.3.1.20. Exhaust Ventilation and Explosion Venting

1) An exhaust ventilation system designed in conformance with the appropriate requirements of Part 6 shall be provided in a *building* or part of a *building* in which dust, fumes, gases, vapour or other impurities or contaminants have the potential to create a fire or explosion hazard. (See also Article 4.2.4.13.)

## 3.3.1.21.

2) Explosion relief devices, vents or other protective measures conforming to Subsection 6.2.2. shall be provided for a space in which substances or conditions that have the potential to create an explosion hazard are present as a result of the principal use of a *building*.

## 3.3.1.21. Janitors' Rooms

1) Except as permitted by Sentences (2) and (3), a room or space within a *floor area* for the storage of janitorial supplies shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

2) The *fire-resistance rating* of the *fire separation* required by Sentence (1) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for

- a) the floor assembly above the *floor area*, or
- b) the floor assembly below the *floor area*, if there is no floor assembly above.

3) The *fire separation* required by Sentence (1) is not required to have a *fire-resistance rating* if the *floor area* in which the room or space is located is *sprinklered* throughout.

## 3.3.1.22. Common Laundry Rooms

1) Except as permitted by Sentences (2) and (3), in a *building of residential occupancy*, a laundry room in a *floor area* that is not within a *dwelling unit* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

2) The *fire-resistance rating* of the *fire separation* required by Sentence (1) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for

- a) the floor assembly above the *floor area*, or
- b) the floor assembly below the *floor area*, if there is no floor assembly above.

3) The *fire separation* required by Sentence (1) is not required to have a *fire-resistance rating* if the *floor area* in which the laundry room is located is *sprinklered* throughout.

## 3.3.1.23. Obstructions

1) No obstruction shall be permitted in any *occupancy* that would restrict the width of a normal *means of egress* from any part of a *floor area* to less than 750 mm unless an alternative *means of egress* is provided adjacent to, accessible from, and plainly visible from the obstructed *means of egress*. (See Appendix A.)

## 3.3.1.24. Signs in Service Spaces

1) Illuminated signs conforming to Sentences 3.4.5.1.(3) and (5) shall be provided to indicate the direction to egress points in a *service space* referred to in Sentence 3.2.1.1.(8).

## 3.3.1.25. Welding and Cutting

1) Except as provided in Sentence (2), welding and cutting operations shall be carried out in a room

- a) separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h, or
- b) protected by an automatic fire extinguishing system.

2) Sentence (1) shall not apply to *industrial occupancies* where the welding and cutting operations do not present a fire or explosion hazard to adjacent areas.

3) Welding and cutting operations in *buildings* shall be carried out in areas with walls, ceilings and floors lined with *noncombustible* materials.

**3.3.1.26. Storage Rooms**

1) A storage room more than 1 m<sup>2</sup> in area serving a *care or detention occupancy* or an *assembly occupancy* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h, except that the *fire-resistance rating* may be reduced to 45 min if the *fire-resistance rating* of the floor assembly is permitted to be less than 1 h.

2) A clothes closet not more than 800 mm in depth shall not be considered as a storage room for the purposes of this Article.

**3.3.1.27. Drapes, Curtains and Decorative Materials**

1) Drapes, curtains and other decorative materials, including textiles and films, used in a *building* shall meet the requirements of the Alberta Fire Code 2006.

**3.3.2. Assembly Occupancy****3.3.2.1. Scope**

1) This Subsection applies to *assembly occupancies* and to outdoor places of assembly.

**3.3.2.2. Fire Separations**

1) Except as permitted by Sentence (2), the seating area of a Group A, Division 1 *occupancy* shall be separated from adjacent *occupancies* in the *floor area* by a *fire separation* having a *fire-resistance rating* not less than 1 h if the *occupant load* in the seating area exceeds 200.

2) The *fire-resistance rating* of the *fire separation* required by Sentence (1) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for

- a) the floor assembly above the *floor area*, or
- b) the floor assembly below the *floor area*, if there is no floor assembly above.

3) If usable space exists under tiers of seats in arena-type *buildings*, a *fire separation* with a *fire-resistance rating* not less than 45 min shall be provided between the space and the seats or the space shall be *sprinklered*.

**3.3.2.3. Non-fixed Seating**

1) Non-fixed seating shall conform to the Alberta Fire Code 2006.

**3.3.2.4. Fixed Seats**

1) Except for the requirements of Article 3.3.2.8. for bench-type seats and except as required or permitted by Sentence (2) and Articles 3.3.2.10. and 3.3.2.11., fixed seats in places of assembly shall be

- a) attached or secured to the floor, platform or platform riser,
- b) provided with arms and back, and
- c) arranged in rows having an unobstructed passage not less than 400 mm wide measured horizontally between plumb lines from the backs of the seats in one row and the edges of the furthest forward projection of the seats in the next row in the unoccupied position.

2) For fixed seats with backs and with folding tablet arms, the value of 400 mm required by Clause (1)(c) shall be measured when the tablet arms are in the use position, but is permitted to be measured in the stored position provided

- a) there are not more than 7 seats between any seat and the nearest aisle,
- b) the seats are located in a lecture hall or an auditorium used for instructional purposes, and
- c) the tablet arm, when raised manually to a vertical position, falls by the force of gravity to the stored position.

(See Appendix A.)

**3)** Except as permitted by Sentence (4), aisles shall be located so that there are not more than 7 seats with backs or 20 seats without backs between any seat and the nearest aisle.

- 4)** The requirements of Sentence (3) do not apply if
- a) egress doorways are provided to serve both ends of rows of seats,
  - b) each doorway referred to in Clause (a) serves not more than 3 rows of seats, and
  - c) each row contains not more than 100 seats.

### 3.3.2.5. Aisles

**1)** Except as required by Articles 3.3.2.10. and 3.3.2.11., aisles leading to *exits* shall be provided in conformance with Sentences (2) to (17) in places of assembly which contain fixed seats.

**2)** The minimum clear width of aisles shall be not less than 1100 mm, except that the width is permitted to be reduced to not less than

- a) 750 mm if serving not more than 60 seats, and
- b) 900 mm if serving seats on one side only.

**3)** Except in the case of bleacher seats, the minimum clear width of aisles referred to in Sentence (2) shall be measured at the point farthest from an *exit*, cross aisle or foyer and shall be increased by 25 mm for each metre of distance toward the *exit*, cross aisle or foyer.

**4)** Aisles shall terminate in a cross aisle, foyer or *exit*, and the width of the cross aisle, foyer or *exit* shall be not less than the required width of the widest aisle plus 50% of the total required width of the remaining aisles that it serves.

**5)** Dead-end aisles shall be not more than 6 m long.

**6)** The length of travel to an *exit* door by any aisle shall be not more than 45 m.

**7)** Side aisles shall be not less than 1100 mm wide if seating is provided in conformance with Sentence 3.3.2.4.(4).

**8)** An aisle that has a slope not more than 1 in 8 shall not be stepped.

**9)** An aisle that slopes more than 1 in 8 shall be stepped.

**10)** The passageway between rows of seats served by a stepped aisle shall be level at right angles to the line of travel.

**11)** The riser of a step in an aisle shall be

- a) not less than 110 mm high, and
- b) not more than 200 mm high.

**12)** Variations are permitted in riser height provided

- a) the height of adjacent risers does not vary by more than 6 mm, and
- b) the width of a tread or a platform in the direction of travel is not less than 430 mm.

**13)** Steps in an aisle shall

- a) have a run not less than 230 mm exclusive of nosings,
- b) have a tread width not less than 250 mm,
- c) extend to the adjacent rows of seats in a manner that will not create a hazard from tripping, and
- d) have a finish on the treads conforming to Sentence 3.4.6.1.(1).

**14)** The location of every riser in an aisle shall be made apparent from both directions of travel by strategically placed lighting or contrasting marking stripes.

**15)** A platform in an aisle shall be level, except that a slope not more than 1 in 50 is permitted for a platform that is not less than 430 mm wide in the direction of *exit* travel.

**16)** If a step is used at the entry to a row of seats from a stepped aisle, an unobstructed platform not less than 800 mm square shall be provided adjacent to the aisle.

17) The finish of the surface of a platform in or adjacent to a stepped aisle shall conform to Sentence 3.4.6.1.(1).

### 3.3.2.6. Corridors

1) Except as permitted by Sentences (2) to (4), a corridor used by the public in an *assembly occupancy* as an *access to exit* shall be separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

2) The *fire-resistance rating* of the *fire separation* required by Sentence (1) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for

- a) the floor assembly above the *floor area*, or
- b) the floor assembly below the *floor area*, if there is no floor assembly above.

3) The *fire-resistance rating* required by Sentence (1) is permitted to be waived if the *floor area* in which the corridor is located is *sprinklered* throughout.

4) The requirement for a *fire separation* stated in Sentence (1) is permitted to be waived if the distance from any point in the *floor area* to an *exit* measured along the path of travel to the *exit* does not exceed the travel distance permitted by Article 3.4.2.5.

### 3.3.2.7. Doors

1) A door equipped with a latching mechanism in an *access to exit* from a room or *suite of assembly occupancy* containing an *occupant load* more than 100 shall be equipped with a device that will release the latch and allow the door to swing wide open when a force not more than that specified in Sentence 3.8.3.3.(7) is applied to the device in the direction of travel to the *exit*.

### 3.3.2.8. Fixed Bench-Type Seats without Arms

1) If fixed bench-type seats without arms are provided, the seat width per person shall be assumed to be 450 mm.

2) The centre-to-centre spacing between rows of bench-type seats shall be not less than 760 mm if back rests are provided, and not less than 550 mm if back rests are not provided.

3) A clear space of not less than 300 mm shall be provided between the back of each seat and the front of the seat immediately behind it.

### 3.3.2.9. Guards

1) Except as required by Sentences (2) to (4) for bleacher seats, *guards* shall be installed in outdoor and indoor places of assembly with fixed seats so that

- a) at the fascia of every box, balcony or gallery where the seats extend to the edge, the height of *guards* is not less than
  - i) 760 mm in front of the seats, and
  - ii) 920 mm if located at the end of aisles or at the foot of steps,
- b) the height of *guards* along every cross aisle other than those adjacent to the fascia of every box, balcony or gallery is not less than 660 mm, except that *guards* need not be provided if the backs of the seats along the front side of the aisle are not less than 600 mm above the floor of the aisle, and
- c) where the seating is arranged in successive tiers and the height of rise between platforms is more than 450 mm, the height of *guards* is not less than 660 mm along the entire row of seats at the edge of the platform.

2) The backs and ends of bleacher seats more than 1 200 mm above the ground or floor that are not adjacent to a wall shall be protected with a *guard*

- a) not less than 1070 mm high above an adjacent aisle surface or foot rest, and
- b) not less than 920 mm high above the centre of an adjacent seat board.

3) If the front of a bleacher is more than 600 mm above the ground or floor, it shall be protected with a *guard* not less than 840 mm high above the front foot rest.

4) The size of any opening in a *guard* required by Sentences (2) and (3) shall not allow the passage of a sphere whose diameter is more than 300 mm.

### 3.3.2.10. Outdoor Places of Assembly

1) A Group A, Division 4 *occupancy* and each tier or balcony that has a capacity of more than

- a) 1000 persons shall have not less than 3 separate *exits*, or
- b) 4000 persons shall have not less than 4 separate *exits*.

2) In a Group A, Division 4 *occupancy*, every seat shall be located so that the travel distance is not more than 45 m measured along the path of travel from the seat to

- a) the ground,
- b) an *exit*,
- c) an opening to a passageway leading from the seating area, or
- d) a portal, a vomitory or any other opening through the seating deck structure.

3) *Exits* from outdoor stadia or grandstands shall be located not more than 25 m apart.

4) The capacity of a *means of egress* for a Group A, Division 4 *occupancy* shall conform to the requirements of Sentence 3.4.3.2.(3).

5) Aisles in a Group A, Division 4 *occupancy* shall

- a) be located so that there are not more than 20 seats between any seat and the nearest aisle, and
- b) be not less than 1200 mm wide, except that an aisle serving less than 60 persons is permitted to be 750 mm wide.

### 3.3.2.11. Bleachers

1) Steps provided in aisles of bleachers of the telescopic type shall

- a) have risers not more than 250 mm high, and
- b) have treads with a run not less than 280 mm.

2) If the vertical distance between seating platforms in bleachers is more than 280 mm, an intermediate step shall be provided the full width of the aisle and proportioned to provide 2 equal risers between platforms.

3) If the vertical distance between seating platforms in bleachers is more than 450 mm, 2 intermediate steps shall be provided the full width of the aisle so that there are 3 equal risers between platforms.

4) If the passageway between rows of seats is not a closed deck, footboards shall be provided so that

- a) the total width of the footboards shall be not less than three quarters of the centre-to-centre spacing between rows of seats, and
- b) the spacing between footboard members shall be not more than 25 mm.

5) Openings above footboards and below the seats in rows of bleacher seats shall be provided with intermediate construction so that there is no opening that would permit the passage of a sphere of more than 100 mm in diameter.

### 3.3.2.12. Libraries

1) Except as permitted by Sentence (2), a library book storage room that is not normally accessible to the public shall be separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 2 h if it

- a) is more than 250 m<sup>2</sup> in area, or
- b) contains book stacks that
  - i) are more than 10 m high, or
  - ii) penetrate more than one floor assembly.

2) The *fire separation* required by Sentence (1) is not required if the book storage room is *sprinklered*.

3) Open book shelves are permitted above and below a *mezzanine* floor in a library *building* provided the height of the shelves is not more than 2.1 m but not more than 75% of the floor-to-ceiling height of the space above or below the *mezzanine* floor assembly.

### 3.3.2.13. Stages for Theatrical Performances

1) A *stage* for theatrical performances and ancillary spaces, including workshops, dressing rooms and storage areas, shall be *sprinklered*.

2) A *fire separation* with a *fire-resistance rating* not less than 1 h shall be provided between a *stage* for theatrical performances and ancillary spaces, including workshops, dressing rooms and storage areas.

3) Except as permitted by Sentence (6), a *stage* for theatrical performances and ancillary spaces, including workshops, dressing rooms and storage areas, shall be separated from the seating area by a *fire separation* having a *fire-resistance rating* not less than 1 h, except for a proscenium opening protected with

- a) a sprinkler deluge system conforming to the requirements of NFPA 13, "Installation of Sprinkler Systems,"
- b) an unframed fire curtain if the opening is not more than 20 m wide, or
- c) a semi-rigid fire curtain if the opening is more than 20 m wide.

4) A fire curtain required by Sentence (3) shall be of a type acceptable to the *authority having jurisdiction* and designed to close

- a) automatically upon the actuation of the sprinkler system,
- b) automatically upon actuation of the fire alarm system, and
- c) manually by remote control devices located at the curtain control panel and at each side of the *stage*.

5) At least 2 vents for the purpose of venting fire and smoke to the outside of a *building* shall be provided above a *stage* designed for theatrical performances and shall

- a) have an aggregate area not less than one eighth of the area of the *stage* behind the proscenium opening, and
- b) be arranged to open automatically upon actuation of the sprinkler system.

6) The *fire separation* referred to in Sentence (3) is not required between a *stage* and a seating area in a *building* that is *sprinklered* throughout, provided a sprinkler deluge system is installed at the boundary between the *stage* and the seating area.

### 3.3.2.14. Risers for Stairs

1) In a Group A, Division 2 *occupancy* used for the serving of food and beverages, an interior flight of stairs with fewer than 3 risers is permitted provided it

- a) is not less than 900 mm wide,
- b) is illuminated at all times that occupants are on the premises, and
- c) has a handrail on each side.

## 3.3.3. Care or Detention Occupancy

### 3.3.3.1. Scope

1) This Subsection applies to *care or detention occupancies*. (See Appendix A.)

### 3.3.3.2. Separations between Care or Detention Occupancies and Repair Garages

1) The *fire separation* required by Sentence 3.3.5.5.(1) between a *care or detention occupancy* and a *repair garage* shall have no openings.

### 3.3.3.3. Corridors

1) A corridor used by the public or serving patients' sleeping rooms shall have no dead-end portion unless the area served by the dead-end portion has a second and separate *means of egress*.

- 2)** A corridor in which it may be necessary to move a patient in a bed shall be not less than 2 400 mm wide.
- 3)** Paired doors in a corridor referred to in Sentence (2) shall
- swing in opposite directions, the right hand door swinging in the direction of travel, and
  - be not less than 1 100 mm wide.

#### 3.3.3.4. Doorway Width

- 1)** The minimum clear width of doorways through which it is necessary to move patients in bed shall be 1050 mm. (See Appendix A.)

#### 3.3.3.5. Hospitals and Nursing Homes

- 1)** *Floor areas* containing patients' sleeping rooms in a hospital or nursing home shall conform to Sentences (2) to (13). (See Appendix A.)
- 2)** Except as permitted by Sentence (3), a *floor area* containing patients' sleeping rooms in a hospital or nursing home shall be divided into not less than 2 *fire compartments*, each not more than 1000 m<sup>2</sup> in area.
- 3)** The *floor area* on either side of a *horizontal exit* conforming to Article 3.4.6.9. is permitted to be considered as a *fire compartment* in applying the requirements of this Article.
- 4)** Except as permitted by Sentence (5), *fire separations* separating *fire compartments* required by Sentence (2) shall have a *fire-resistance rating* not less than 1 h.
- 5)** The *fire-resistance rating* of a *fire separation* referred to in Sentence (4) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for
- the floor assembly above the *floor area*, or
  - the floor assembly below the *floor area*, if there is no floor assembly above.
- 6)** A *closure* in a *fire separation* between *fire compartments* referred to in Sentence (2) shall be weatherstripped or otherwise designed and installed to retard the passage of smoke. (See Appendix A.)
- 7)** The travel distance from any point within each *fire compartment* referred to in Sentence (2) to a door to an adjoining *fire compartment* shall be not more than 45 m.
- 8)** Each *fire compartment* referred to in Sentence (2) shall be capable of accommodating, in addition to its own occupants, the occupants of the largest adjacent *fire compartment* based on a clear floor space of 2.5 m<sup>2</sup> per patient in the adjacent *fire compartment*.
- 9)** Except as permitted by Sentences (11) and (12), walls between patients' sleeping rooms and the remainder of the *floor area* shall be constructed as *fire separations* but are not required to have a *fire-resistance rating* unless one is required by other provisions in this Part. (See A-3.1.8.1.(1)(b) in Appendix A.)
- 10)** The *fire separation* requirements of Sentence (9) do not apply to walls within a group of intercommunicating patients' rooms, provided the group of rooms does not
- contain more than 5 patients, or
  - include storage, bathing or toilet facilities serving persons not occupying the group of rooms.
- (See Appendix A.)
- 11)** A door in a *fire separation* required by Sentence (9) is permitted to be equipped with a roller latch.
- 12)** Except as permitted by Sentence (13), a *fire separation* required by Sentence (9) shall not have any grilles, louvres or other openings.

**13)** A door or wall separating a patient's sleeping room from an ensuite toilet room, shower room or similar ancillary space is permitted to incorporate grilles and louvres provided

- a) the adjacent rooms are not used to store flammable or *combustible* materials, and
- b) the openings are located so that smoke cannot pass through these rooms to other parts of the *building*.

(See Appendix A.)

### 3.3.3.6. Areas of Refuge

**1)** Compartments containing rooms such as operating rooms, recovery rooms, delivery rooms and intensive care units, from which it is impracticable to move patients in an emergency, shall be

- a) separated from adjacent spaces by *fire separations* having a *fire-resistance rating* not less than 1 h, and
- b) provided with a mechanical air supply so that during a period of 2 h after the start of a fire in another space, the compartments will not contain more than 1% by volume of contaminated air from the fire area.

### 3.3.3.7. Contained Use Areas

**1)** A *contained use area* shall conform to Sentences (2) to (5).

**2)** A *contained use area* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

**3)** Except as permitted by Sentence (4), a *building* that includes a *contained use area* shall be *sprinklered* throughout.

**4)** A *contained use area*, in a *building* for which Articles 3.2.2.20. to 3.2.2.83. do not require the installation of an automatic sprinkler system, is not required to be *sprinklered* as required by Sentence (3) provided

- a) the *building* is designed so that during a period of 2 h after the start of a fire in the *contained use area* other *fire compartments* will not contain more than 1% by volume of contaminated air from the *contained use area*,
- b) the *building* is designed so that during a period of 2 h after the start of a fire in another part of the *building* the *contained use area* will not contain more than 1% by volume of contaminated air from the other part of the *building*,
- c) all doors are designed to be remotely released in conformance with Sentence 3.3.1.13.(6), and
- d) the *contained use area* does not contain any rooms lined with *combustible* padding.

**5)** A corridor serving a *contained use area* shall have no dead-end portion unless the area served by the dead-end portion has a second and separate *means of egress*.

### 3.3.3.8. Windows

**1)** Except in a sleeping room where a person is under legal restraint, a sleeping room in a *care or detention occupancy* shall be provided with a window whose unobstructed glass area is not less than 5% of the area served.

## 3.3.4. Residential Occupancy

### 3.3.4.1. Scope

**1)** This Subsection applies to *residential occupancies*.

### 3.3.4.2. Fire Separations

**1)** Except as permitted by Sentences (2) and 3.2.2.9.(2), *suites* of *residential occupancy* shall be separated from each other and the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

**2)** The *fire-resistance rating* of the *fire separation* required by Sentence (1) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for

- a) the floor assembly above the *floor area*, or
- b) the floor assembly below the *floor area*, if there is no floor assembly above.

**3)** Floor assemblies within a *dwelling unit* need not be constructed as *fire separations* provided

- a) the distance between the lowest floor level and the uppermost floor level within the *dwelling unit* is not more than 6 m, and
- b) the *dwelling unit* is separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than
  - i) 1 h if the *building* is not *sprinklered* throughout,
  - ii) 45 min if the *building* is *sprinklered* throughout and it is not more than 3 *storeys* in *building height*, or
  - iii) 1 h if the *building* is *sprinklered* throughout and it is more than 3 *storeys* in *building height*.

**4)** The *fire-resistance rating* of the *fire separation* required by Sentence 3.3.5.6.(1) is permitted to be waived if the *fire separation* is located between a *dwelling unit* and an attached *storage garage* containing not more than 5 vehicles, provided

- a) the *dwelling unit* and the attached *storage garage* are *sprinklered*,
- b) the *dwelling unit* and the attached *storage garage* are separated from the remainder of the *building* in conformance with Sentences (1), (2) and (3),
- c) there are no air duct systems connecting the *storage garage* and the *dwelling unit*,
- d) the construction between the *storage garage* and the *dwelling unit* provides an effective barrier to gas and exhaust fumes, and
- e) every door between the *storage garage* and the *dwelling unit* is
  - i) tight fitting and weather-stripped to provide an effective barrier against the passage of gas and exhaust fumes,
  - ii) fitted with a self-closing device, and
  - iii) not located in a room intended for sleeping.

**5)** The *fire separation* required by Sentence 3.3.5.6.(1) is not required between a *dwelling unit* and an attached *storage garage*, serving that *dwelling unit* only, provided

- a) the *dwelling unit* and its attached *storage garage* are separated from the remainder of the *building* in conformance with Sentences (1), (2) and (3),
- b) there are no air duct systems connecting the *storage garage* and the *dwelling unit*,
- c) the construction between the *storage garage* and the *dwelling unit* provides an effective barrier to gas and exhaust fumes, and
- d) every door between the *storage garage* and the *dwelling unit* is
  - i) tight fitting and weather-stripped to provide an effective barrier against the passage of gas and exhaust fumes,
  - ii) fitted with a self-closing device, and
  - iii) not located in a room intended for sleeping.

### 3.3.4.3. Storage Rooms

**1)** Sprinklers shall be installed in a storage room provided for the use of tenants in a *residential occupancy* within a *floor area* but not contained within a *suite*.

**2)** Except as permitted by Sentence (3), a storage room referred to in Sentence (1) shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

**3)** The *fire-resistance rating* of the *fire separation* required by Sentence (2) is permitted to be less than 1 h but not less than 45 min provided the *fire-resistance rating* required by Subsection 3.2.2. is permitted to be less than 1 h for

- a) the floor assembly above the *floor area*, or
- b) the floor assembly below the *floor area*, if there is no floor assembly above.

**3.3.4.4. Egress from Dwelling Units**

**1)** Single *storey dwelling units* in an apartment *building* need not lead to a *public corridor* or exterior passageway on the same *storey* provided the *dwelling units* are served by private stairways leading directly to a *public access to exit* on the *storey*

- a) immediately above, and
- b) immediately below.

(See Appendix A.)

**2)** Except as permitted by Sentences (3) and (4), a *dwelling unit* containing more than one *storey* shall have an *exit* door or an egress door opening directly into a *public access to exit* from the uppermost *storey* and from the lowest *storey* of the *dwelling unit* so that each *storey* is served by an *exit* or egress door located not more than 1.5 m above or below its floor level.

**3)** A single *exit* is permitted from a *dwelling unit* provided the *exit* is an exterior doorway not more than 1.5 m above adjacent ground level and

- a) it is not necessary to travel up or down more than one *storey* to reach the *exit* door, or
- b) the uppermost floor level opens to a balcony not more than 6 m above adjacent ground level.

**4)** An egress door from either the uppermost *storey* or the lowest *storey* of a *dwelling unit*, as required by Sentence (2), need not be provided if that *storey* is served by a stairway that

- a) leads to a *public access to exit*,
- b) has no direct access to any other *storey* in the *dwelling unit*, and
- c) is separated from the other *storeys* in the *dwelling unit* by a *fire separation* having a *fire-resistance rating* not less than 45 min.

**5)** In a *building* of *residential occupancy* not more than 3 *storeys* in *building height*, a doorway from a *dwelling unit* is permitted to open directly into an *exit* stairway provided the *dwelling unit* has a second and separate *means of egress*.

**6)** If a *dwelling unit* has a second and separate *means of egress*, one *means of egress* from a *dwelling unit* is permitted to pass through

- a) an interior corridor served by a single *exit*,
- b) an exterior balcony served by a single *exit* stairway, or
- c) an exterior passageway served by a single *exit* stairway.

**3.3.4.5. Automatic Locking Prohibition**

**1)** Except for hotels and motels, a door opening onto a *public corridor* which provides *access to exit* from a *suite* shall be designed not to lock automatically. (See Appendix A.)

**3.3.4.6. Sound Transmission**

**1)** Sound transmission class ratings of *building* assemblies shall conform to Section 5.9.

**3.3.4.7. Stairs, Handrails and Guards for Dwelling Units**

**1)** Stairs, handrails and *guards* within a *dwelling unit* shall conform to the appropriate requirements in Section 9.8.

**3.3.5. Industrial Occupancy**

(See Appendix A.)

**3.3.5.1. Scope**

**1)** This Subsection applies to *industrial occupancies*.

**3.3.5.2.****3.3.5.2. Fire Extinguishing Systems**

- 1) If sprinklers are required but not suitable for the hazard in question, another type of automatic fire extinguishing system shall be installed to provide protection compatible with the nature of the risk. (See Appendix A.)
- 2) If an industrial process poses a fire risk, an appropriate fire extinguishing system shall be installed in the process area to provide protection compatible with the nature of the risk. (See Appendix A.)

**3.3.5.3. Basements**

- 1) A *basement* shall not be used for the storage, manufacture or handling of volatile solids, liquids or gases that generate explosive air-vapour mixtures or for processes that involve explosive dusts.
- 2) Entrances and *exits* to a *basement* and to rooms containing *building* services shall be separate from the remainder of the *building* in a *building* in which
  - a) the storage, manufacture or handling of volatile materials can generate explosive air-vapour mixtures, or
  - b) processes occur that produce explosive dusts.
- 3) *Basements* and rooms referred to in Sentence (2) shall be separated from the remainder of the *building* with a vapour-tight separation.

**3.3.5.4. Repair and Storage Garages**

- 1) If access is provided from a *storage garage* to a stair tower or elevator serving *occupancies* above the level of the *storage garage*, the access shall be through a vestibule conforming to Sentence 3.3.5.7.(3).
- 2) Treads and landings in interior stairs that extend to the roof of a *storage garage* shall be designed to be free of accumulations of ice and snow.
- 3) A mechanical *storage garage* not more than 4 *storeys* in *building height*, in which no persons other than parking attendants are permitted above the *street* floor level, need not have a *fire separation* between the *exits* and the remainder of the *building*.
- 4) A garage shall be provided with natural or mechanical ventilation in conformance with the requirements of Subsection 6.2.2. to prevent excessive accumulation of carbon monoxide, exhaust fumes or flammable and toxic vapours.
- 5) The clear height in a *storage garage* shall be not less than 2 m.
- 6) A continuous curb not less than 150 mm high and a *guard* not less than 1070 mm high shall be provided at every garage floor opening and around the perimeter of every floor where the exterior walls are omitted.
- 7) Except for *open-air storeys*, every *storey* of a *storage garage* or *repair garage* located below *grade* shall be *sprinklered*.

**3.3.5.5. Repair Garage Separation**

- 1) A *repair garage* and any ancillary spaces serving it, including waiting rooms, reception rooms, tool and parts storage areas and supervisory office space, shall be separated from other *occupancies* by a *fire separation* having a *fire-resistance rating* not less than 2 h.

**3.3.5.6. Storage Garage Separation**

- 1) Except as permitted by Sentences 3.3.4.2.(4) and (5), a *storage garage* shall be separated from other *occupancies* by a *fire separation* with a *fire-resistance rating* not less than 1.5 h.

**3.3.5.7. Vestibules**

- 1) If access is provided through a *fire separation* between a *storage garage* and a Group A, Division 1 or Group B *occupancy*, the access shall be through a vestibule conforming to Sentence (3).

2) In a *building* more than 3 storeys in *building height*, access through a *fire separation* between a *storage garage* and a Group A, Division 2, 3 or 4, or a Group C *occupancy*, shall be through a vestibule conforming to Sentence (3).

3) If access is provided through a vestibule, as required by Sentences (1), (2) and 3.3.5.4.(1), the vestibule shall

- a) be not less than 1.8 m long,
- b) be pressurized and ventilated mechanically at a rate of 14 m<sup>3</sup>/h for each square metre of vestibule floor surface area, and
- c) have openings between the vestibule and an adjoining *occupancy* provided with self-closing doors with no hold-open devices.

### 3.3.5.8. Dispensing of Fuel

1) Facilities for the dispensing of fuel having a *flash point* below 37.8°C shall not be installed above any space intended for *occupancy*.

2) Facilities for the dispensing of fuel having a *flash point* below 37.8°C shall not be installed in any *building*, except that this requirement does not apply to a canopy that is open on not less than 75% of its perimeter or to a *building* of Group F *occupancy* that complies with the requirements of the Alberta Fire Code 2006.

### 3.3.5.9. Multiple Tenant Self Storage Warehouses

1) Unless the *building* is *sprinklered* throughout, each individual tenancy in a multiple tenant self storage warehouse classified as an *industrial occupancy* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 45 min.

### 3.3.5.10. Industrial Ovens

1) Industrial baking and drying ovens which during operation contain flammable vapours given off by the product being dried or baked shall conform to the Alberta Fire Code 2006.

### 3.3.5.11. Tire Storage

1) This Article applies to *buildings* or parts of *buildings* used for the storage of rubber tires.

2) A tire storage area designed to contain more than 375 m<sup>3</sup> of rubber tires shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 2 h. (See Appendix A.)

3) *Buildings* regulated by this Article shall be *sprinklered* in conformance with NFPA 13, "Installation of Sprinkler Systems," whenever

- a) the aggregate of individual storage areas in the *building* exceeds 500 m<sup>2</sup>,
- b) any individual storage area exceeds 250 m<sup>2</sup>, or
- c) the height of storage is more than 3.6 m, and the total volume of tires in the *building* is more than 375 m<sup>3</sup>.

4) A clearance of not less than 900 mm shall be maintained between the top of storage and sprinkler deflectors.

5) There shall be not less than one multipurpose dry chemical portable extinguisher for every 500 m<sup>2</sup> of *floor area*, rated 4-A:80-B and installed in conformance with NFPA 10, "Portable Fire Extinguishers."

6) The travel distance to any extinguisher required by Sentence (5) shall be not more than 25 m.

### 3.3.5.12. Industrial Trucks

1) *Buildings* or parts thereof for the storage of industrial trucks shall be in conformance with the Alberta Fire Code 2006.

**3.3.5.13. Compressed Gas Cylinders**

- 1) Cylinders of compressed gas containing propane or natural gas for use with fuel-burning *appliances* or equipment shall comply with the gas regulations made pursuant to the Safety Codes Act and others shall comply with Sentences (2) to (6).
- 2) Where containers of compressed gas are stored, they shall be secured to prevent dislodgement and when stored outdoors, they shall be supported on raised concrete or other *noncombustible* platforms in a fenced enclosure.
- 3) The fence required by Sentence (2) shall be designed to discourage climbing and shall be substantially constructed, with a height not less than 1.8 m, with a gate which shall be kept locked when the enclosure is not staffed.
- 4) Except as provided in Sentence (5), containers of flammable compressed gas stored indoors shall be located in a room that
  - a) is separated from the remainder of the *building* by a gas-tight *fire separation* having a *fire-resistance rating* not less than 2 h,
  - b) is located on an exterior wall of the *building*,
  - c) is designed to be entered from the exterior, and any doors into the interior of the *building* shall be equipped with self-closing devices, and be constructed so as to prevent migration of gases from the room into other parts of the *building*,
  - d) is designed to prevent critical structural and mechanical damage from an internal explosion in conformance with good engineering practice such as that described in NFPA 68, "Venting of Deflagrations,"
  - e) is provided with natural ventilation with non-closing louvered openings at the floor and ceiling in an outside wall,
  - f) does not contain fuel-fired equipment or high temperature heating elements, and
  - g) is used for no purpose other than for the storage of compressed gas.
- 5) A storage room for compressed flammable gases lighter than air need not conform with Sentence (4) if the aggregate capacity of expanded gas stored in the room does not exceed
  - a) 60 m<sup>3</sup> in a *building of combustible construction* that is not *sprinklered*, and
  - b) 170 m<sup>3</sup> in a *sprinklered building of combustible construction* or in a *building of noncombustible construction*.
- 6) A room for the storage of poisonous or corrosive compressed gas shall be
  - a) separated from the remainder of the *building* by gas-tight *fire separations* having a *fire-resistance rating* not less than 1 h,
  - b) located on an exterior wall, and
  - c) designed to be entered from the exterior, and any doors into the interior of the *building* shall be equipped with self-closing devices, and be constructed so as to prevent migration of gases from the room into other parts of the *building*.

**3.3.5.14. Dust Explosions**

- 1) A *building* in which manufacturing activities create significant concentrations of *combustible* dusts shall have explosion venting to the outdoors not less than 0.065 m<sup>2</sup> for each cubic metre of room or *building* volume, with the vents designed to release at a pressure of not more than 1 kPa.

**3.3.5.15. Oxidizing Materials**

- 1) Except as provided in Subsection 3.2.7. of Division B of the Alberta Fire Code 2006, a part of a *building* intended for the storage of oxidizing materials shall be cool, ventilated and dry, and separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 2 h.

**3.3.5.16. Corrosive Liquids**

1) A *building* intended for the storage of corrosive liquids shall be designed so that the corrosive liquids are located in a room separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h and the corrosive liquids are isolated from any oxidizing material.

**3.3.5.17. Reactive Substances**

1) A room used for the storage of reactive substances shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 2 h.

2) Every *building* or part of a *building* that is used for the storage or use of any substance that reacts violently with water shall be plainly and conspicuously marked on the outside with the words “REACTIVE SUBSTANCE, USE NO WATER” using letters of strongly contrasting colours that are not less than 450 mm high and 50 mm in stroke.

**3.3.5.18. Flammable and Combustible Liquid Storage Tanks**

1) Except as provided in Sentence (5), storage tanks of *flammable liquids* or *combustible liquids* shall be

- a) located in dedicated rooms conforming to Sentence (6), and
- b) located in conformance with Table 3.3.5.18.

**Table 3.3.5.18.**  
**Tank Storage of Flammable Liquids and Combustible Liquids in Rooms**  
 Forming Part of Sentence 3.3.5.18.(1)

Class of Liquid	Location of Dedicated Room	Maximum Quantity per Storey, L (One or more tanks)	
		Protected Storage <sup>(1)</sup>	Unprotected Storage
<i>Flash point below 37.8°C</i>	<i>First storey</i>	40 000	25 000
	<i>Storeys above the first storey</i>	7 500	Not Permitted
	<i>Basement</i>	Not Permitted	Not Permitted
<i>Flash point at or above 37.8°C and below 93.3°C</i>	<i>First storey</i>	200 000	100 000
	<i>Storeys above the first storey</i>	20 000	Not Permitted
	<i>Basement</i>	20 000	Not Permitted

**Notes to Table 3.3.5.18.:**

(1) Where protection is required, storage areas shall be protected by an acceptable automatic sprinkler system or equivalent fixed fire suppression system.

2) When quantities greater than are permitted for incidental use are required for special process operations, storage tanks for *flammable liquids* or *combustible liquids* are permitted to be located outside of a storage room conforming to Sentence (6), provided that

- a) total quantities are not more than one-half the quantities permitted in Table 3.3.5.18.,
- b) they are located on the *first storey*, and
- c) provisions for fire suppression are available in close proximity.

3) Quantities permitted in Sentence (2) to be outside of a storage room shall be included in the total quantity allowed per *storey* in Table 3.3.5.18.

4) When two or more types of *flammable liquids* or *combustible liquids* are stored together, the total permitted quantities shall be calculated in accordance with the Alberta Fire Code 2006.

- 5) Where storage tanks for *flammable liquids* or *combustible liquids* are located outside of storage rooms conforming to Sentence (6),
- provision shall be made to contain 100% of the volume of the largest storage tank, or to drain away spilled *flammable liquids* or *combustible liquids* safely,
  - all electrical equipment and wiring in the vicinity of the storage tank shall be installed in conformance with electrical regulations made pursuant to the Safety Codes Act, and
  - the *floor area* in which the storage tank is located shall be ventilated.
- 6) Rooms for storage tanks inside *buildings* shall be
- separated from the rest of the *building* by a *fire separation* having a *fire-resistance rating* not less than 2 h,
  - designed to contain 100% of the volume of the largest storage tank, or to drain away spilled *flammable liquids* or *combustible liquids* safely,
  - made liquid-tight where the walls join the floor,
  - provided with natural or mechanical ventilation, and
  - used for no other purposes than the storage and handling of *flammable liquids* or *combustible liquids*.
- 7) A minimum clear space not less than 550 mm in width shall be maintained between the walls of a room described in Sentence (6) and the sides of any storage tanks within the room.

### 3.3.5.19. Dust Collectors

- 1) Except as provided in Sentence (2), dust collectors shall be located outside *buildings* or shall be equipped with exhaust stacks or ducts leading to the outside.
- 2) Dust collecting equipment located inside *buildings* shall be designed in conformance with good engineering practices such as those described in The National Fire Protection Association Standards on dust explosion hazards. (See Appendix A.)

### 3.3.5.20. Structure

- 1) Exterior walls and structural members of a *building* in which unstable liquids or *flammable liquids* having a *flash point* below 22.8°C are processed shall be designed and constructed to accommodate the pressure from an explosion so that all principal *loadbearing* members will remain intact.

### 3.3.5.21. Ammonium Nitrate

- 1) *Buildings* for the storage of ammonium nitrate shall conform to the Alberta Fire Code 2006.

### 3.3.5.22. Spray Application

- 1) A part of a *building* in which there is spray application of flammable or *combustible* paints, coatings or finishings shall conform to the requirements of NFPA 33, "Spray Application Using Flammable or Combustible Materials."

## Section 3.4. Exits

### 3.4.1. General

#### 3.4.1.1. Scope

- 1) *Exit* facilities complying with this Section shall be provided from every *floor area* that is intended for *occupancy*. (See Appendix A.)

#### 3.4.1.2. Separation of Exits

- 1) Except as permitted by Sentence (2), if more than one *exit* is required from a *floor area*, each *exit* shall be separate from every other *exit* leading from that *floor area*.

2) If more than 2 *exits* are provided from a *floor area*, *exits* are permitted to converge in conformance with Sentence 3.4.3.1.(2), provided the cumulative capacity of the converging *exits* does not contribute more than 50% of the total required *exit* width for the *floor area*.

#### 3.4.1.3. Access to Exits

1) *Access to exits* shall conform to Section 3.3.

#### 3.4.1.4. Types of Exit

1) Subject to the requirements of this Section, an *exit* from any *floor area* shall be one of the following, used singly or in combination:

- a) an exterior doorway,
- b) an exterior passageway,
- c) an exterior ramp,
- d) an exterior stairway,
- e) a fire escape (conforming to Subsection 3.4.7.),
- f) a *horizontal exit*,
- g) an interior passageway,
- h) an interior ramp, or
- i) an interior stairway.

#### 3.4.1.5. Exterior Exit Passageways

1) Access to an exterior *exit* passageway from a *floor area* shall be through *exit* doors at the floor level.

#### 3.4.1.6. Restricted Use of Horizontal Exits

1) Except as permitted by Sentence (2), *horizontal exits* shall not comprise more than one half of the required number of *exits* from any *floor area*.

2) In a hospital or nursing home, *horizontal exits* serving patients' sleeping rooms shall comprise not more than two thirds of the required number of *exits* from any *floor area*. (See Appendix A.)

#### 3.4.1.7. Slide Escapes

1) A slide escape shall not be erected on any *building* as a required *exit*, but is permitted to be provided as an additional egress facility if unusual hazards are foreseen.

#### 3.4.1.8. Transparent Doors and Panels

1) Glass and transparent panels in an *exit* shall conform to the appropriate requirements of Article 3.3.1.19. for glass and transparent panels in an *access to exit*.

#### 3.4.1.9. Mirrors near Exits

1) No mirror shall be placed in or adjacent to any *exit* in a manner that would confuse the direction of *exit*.

#### 3.4.1.10. Combustible Glazing in Exits

1) *Combustible* glazing is not permitted in wall or ceiling assemblies or in *closures* used to construct an *exit* enclosure.

### 3.4.2. Number and Location of Exits from Floor Areas

#### 3.4.2.1. Minimum Number of Exits

1) Except as permitted by Sentences (2) to (4), every *floor area* intended for *occupancy* shall be served by at least 2 *exits*.

**2)** A floor area in a building not more than 2 storeys in building height, is permitted to be served by one exit provided the total occupant load served by the exit is not more than 60, and

- a) in a floor area that is not sprinklered throughout, the floor area and the travel distance are not more than the values in Table 3.4.2.1.A., or
- b) in a floor area that is sprinklered throughout
  - i) the travel distance is not more than 25 m, and
  - ii) the floor area is not more than the value in Table 3.4.2.1.B.

**Table 3.4.2.1.A.**  
**Criteria for One Exit (Floor Area Not Sprinklered Throughout)**  
 Forming Part of Sentence 3.4.2.1.(2)

Occupancy of Floor Area	Maximum Floor Area , m <sup>2</sup>	Maximum Travel Distance, m
Group A	150	15
Group B	75	10
Group C	100	15
Group D	200	25
Group E	150	15
Group F, Division 2	150	10
Group F, Division 3	200	15

**Table 3.4.2.1.B.**  
**Criteria for One Exit (Floor Area Sprinklered Throughout)**  
 Forming Part of Sentence 3.4.2.1.(2)

Occupancy of Floor Area	Maximum Floor Area , m <sup>2</sup>
Group A	200
Group B	100
Group C	150
Group D	300
Group E	200
Group F, Division 2	200
Group F, Division 3	300

**3)** Except as permitted by Sentence (4), if Sentence (2) permits a single exit from a floor area classified as Group B or Group C occupancy, the exit shall be an exterior doorway not more than 1.5 m above adjacent ground level.

**4)** The requirements of Sentences (1) and (2) are permitted to be waived for dwelling units that have an access to exit conforming to Sentences 3.3.4.4.(1) to (4).

**5)** Exits are not required directly from rooftop enclosures that are provided with access to exits in conformance with Sentences 3.3.1.3.(5) and (6).

### 3.4.2.2. Means of Egress from Mezzanines

**1)** Except as permitted by Sentences (2) and (3), the space above a mezzanine shall be served by means of egress leading to exits accessible at the mezzanine level on the same basis as floor areas.

- 2)** The means of egress from a mezzanine need not conform to Sentence (1), provided
  - a) the mezzanine is not required to terminate at a vertical fire separation, as permitted in Sentence 3.2.8.2.(1),
  - b) the occupant load of the mezzanine is not more than 60,

- c) the area of the *mezzanine* does not exceed the area limits stated in Table 3.4.2.2., and
- d) the distance limits stated in Table 3.4.2.2. measured along the path of travel are not exceeded from any point on the *mezzanine* to
  - i) an egress door serving the space that the *mezzanine* overlooks, if the space is served by a single egress door, or
  - ii) the egress stairway leading to an *access to exit* in the space below if that space is required to be served by 2 or more egress doorways in conformance with Sentence 3.3.1.5.(1).

**3)** At least half of the required *means of egress* from a *mezzanine* shall comply with Sentence (1) if the *mezzanine* is not required to terminate at a *fire separation* as permitted by Sentence 3.2.8.2.(1).

**Table 3.4.2.2.**  
**Criteria for Egress from Mezzanine Space**  
 Forming Part of Sentence 3.4.2.2.(2)

Occupancy of Space	Maximum Area, m <sup>2</sup>	Distance Limits, m
<i>Assembly occupancy</i>	150	15
<i>Residential occupancy</i>	100	15
<i>Business and personal services occupancy</i>	200	25
<i>Mercantile occupancy</i>	150	15
<i>Medium-hazard industrial occupancy</i>	150	10
<i>Low-hazard industrial occupancy</i>	200	15

**3.4.2.3. Distance between Exits**

**1)** Except as provided in Sentence (2), the least distance between 2 *exits* from a *floor area* shall be

- a) one half the maximum diagonal dimension of the *floor area*, but need not be more than 9 m for a *floor area* having a *public corridor*, or
- b) one half the maximum diagonal dimension of the *floor area*, but not less than 9 m for all other *floor areas*.

(See Appendix A.)

**2)** *Exits* need not comply with Sentence (1) where

- a) the *floor area* is divided so that not less than one third of the *floor area* is on each side of a *fire separation*, and
- b) it is necessary to pass through the *fire separation* to travel from one *exit* to another *exit*.

**3)** The minimum distance between *exits* referred to in Sentence (1) shall be the shortest distance that smoke would have to travel between the *exits*, assuming that the smoke will not penetrate an intervening *fire separation*.

**3.4.2.4. Travel Distance**

**1)** Except as permitted by Sentence (2), for the purposes of this Subsection, travel distance means the distance from any point in the *floor area* to an *exit* measured along the path of travel to the *exit*.

**3.4.2.5.**

- 2)** The travel distance from a *suite* or a room not within a *suite* is permitted to be measured from an egress door of the *suite* or room to the nearest *exit*, provided
- a) the *suite* or room is separated from the remainder of the *floor area* by a *fire separation*
    - i) having a *fire-resistance rating* not less than 45 min in a *floor area* that is not *sprinklered* throughout, or
    - ii) which is not required to have a *fire-resistance rating*, in a *floor area* that is *sprinklered* throughout, and
  - b) the egress door opens onto
    - i) an exterior passageway,
    - ii) a corridor used by the public that is separated from the remainder of the *floor area* in conformance with the requirements in Article 3.3.1.4. for the separation of *public corridors*, or
    - iii) a *public corridor* that is separated from the remainder of the *floor area* in conformance with Article 3.3.1.4. (See A-3.1.8.1.(1)(b) in Appendix A.)
- 3)** Travel distance to an *exit* shall be not more than 50 m from any point in a *service space* referred to in Sentence 3.2.1.1.(8).

**3.4.2.5. Location of Exits**

- 1)** Except as permitted by Sentences (2) and 3.3.2.5.(6), if more than one *exit* is required from a *floor area*, the *exits* shall be located so that the travel distance to at least one *exit* shall be not more than
- a) 25 m in a *high-hazard industrial occupancy*,
  - b) 40 m in a *business and personal services occupancy*,
  - c) 45 m in a *floor area* that contains an *occupancy* other than a *high-hazard industrial occupancy*, provided it is *sprinklered* throughout,
  - d) 105 m in any *floor area*, served by a *public corridor*, in which rooms and *suites* are not separated from the remainder of the *floor area* by a *fire separation*, provided
    - i) the *public corridor* is not less than 9 m wide,
    - ii) the ceiling height in the *public corridor* is not less than 4 m above all floor surfaces,
    - iii) the *building* is *sprinklered* throughout, and
    - iv) not more than one half of the required egress doorways from a room or *suite* open into the *public corridor* if the room or *suite* is required to have more than one egress doorway,
  - e) 60 m in any *storage garage* that conforms to the requirements of Article 3.2.2.83., and
  - f) 30 m in any *floor area* other than those referred to in Clauses (a) to (e).
- 2)** Except for a *high-hazard industrial occupancy*, Sentence (1) need not apply if *exits* are placed along the perimeter of the *floor area* and are not more than 60 m apart, measured along the perimeter, provided each main aisle in the *floor area* leads directly to an *exit*.
- 3)** *Exits* shall be located and arranged so that they are clearly visible or their locations are clearly indicated and they are accessible at all times.

**3.4.2.6. Principal Entrances**

- 1)** For the purposes of this Section, at least one door at every principal entrance to a *building* providing access from the exterior at ground level shall be designed in accordance with the requirements for *exits*.

**3.4.3. Width and Height of Exits****3.4.3.1. Exit Width Based on Occupant Load**

- 1)** For the purpose of determining the aggregate width of *exits*, the *occupant load* of every room or *floor area* shall be determined in conformance with Subsection 3.1.17.

2) Except as permitted by Sentence 3.4.3.2.(4), the required *exit* width shall be cumulative if 2 or more *exits* converge.

### 3.4.3.2. Exit Width

1) Except as permitted by Sentence (3), the minimum aggregate required width of *exits* serving *floor areas* intended for *assembly occupancies, residential occupancies, business and personal services occupancies, mercantile occupancies, and industrial occupancies* shall be determined by multiplying the *occupant load* of the area served by

- a) 6.1 mm per person for ramps with a slope of not more than 1 in 8, doorways, corridors and passageways,
- b) 8 mm per person for a stair consisting of steps whose rise is not more than 180 mm and whose run is not less than 280 mm, or
- c) 9.2 mm per person for
  - i) ramps with a slope of more than 1 in 8, or
  - ii) stairs, other than stairs conforming to Clause (b).

2) The minimum aggregate width of *exits* serving *floor areas* intended for a *care or detention occupancy* shall be determined by multiplying the *occupant load* of the area served by 18.4 mm per person.

3) The minimum aggregate width of *means of egress* serving a Group A, Division 4 *occupancy* shall be determined by multiplying the *occupant load* of the area served by

- a) 1.8 mm per person for
  - i) aisles,
  - ii) stairs other than *exit* stairs, and
  - iii) ramps and passageways in vomitories and *exits*, and
- b) 2.4 mm per person for *exit* stairs.

4) Except as required by Sentences 3.4.3.2.(5) and (6), the required *exit* width need not be cumulative in an *exit* serving 2 or more *floor areas* located one above the other.

5) The required *exit* width for an *exit* stair in an assembly hall or *theatre* serving more than one balcony level shall conform to Sentence (6).

6) The required *exit* width for *exit* stairs that serve *interconnected floor space* designed in accordance with Articles 3.2.8.3. to 3.2.8.9. shall be cumulative, unless

- a) the stairs provide not less than 0.3 m<sup>2</sup> of area of treads and landings for each occupant of the *interconnected floor space* (see Appendix A), or
- b) *protected floor spaces* conforming to Article 3.2.8.6. are provided at each floor level and the *protected floor space* on a floor level has not less than 0.5 m<sup>2</sup> of space for each occupant of that floor level of the *interconnected floor space*.

(See Appendix A.)

7) If more than one *exit* is required, every *exit* shall be considered as contributing not more than one half of the required *exit* width.

8) The width of an *exit* shall be not less than

- a) 1 100 mm for corridors and passageways,
- b) 1 100 mm for ramps not serving patients' sleeping rooms,
- c) 1 100 mm for stairs, not serving patients' sleeping rooms, that serve more than two *storeys* above the lowest *exit level* or more than one *storey* below the lowest *exit level*,
- d) 900 mm for stairs, not serving patients' sleeping rooms, that serve not more than two *storeys* above the lowest *exit level* or not more than one *storey* below the lowest *exit level*,
- e) 1 650 mm for stairs and ramps serving patients' sleeping rooms,
- f) 1 050 mm for doorways serving patients' sleeping rooms, and
- g) 800 mm for doorways not serving patients' sleeping rooms.

### 3.4.3.3. Exit Width Reduction

1) Except as permitted by Sentences (2) and (4), no fixture, turnstile or construction shall project into or be fixed within the required width of an *exit*.

**3.4.3.4.**

- 2)** Swinging doors in their swing shall not reduce the required width of *exit* stairs or landings to less than 750 mm or reduce the width of an *exit* passageway to less than the minimum required width.
- 3)** Doors shall be installed so that, when open, they do not diminish nor obstruct the required width of the *exit*.
- 4)** Handrails and construction below handrails are permitted to project into the required width of *means of egress* but the projections shall be not more than 100 mm on each side of the required width.

**3.4.3.4. Headroom Clearance**

- 1)** Except as permitted by Sentences (3) and (4), every *exit* shall have a headroom clearance of not less than 2100 mm.
- 2)** The headroom clearance for a stairway shall be measured vertically from any landing or from the nosing of any stair tread.
- 3)** Except as permitted by Sentence (4), the headroom clearance for doorways shall be not less than 2 030 mm.
- 4)** No door closer or other device shall be installed so as to reduce the headroom clearance of a doorway to less than 1980 mm.

**3.4.4. Fire Separation of Exits****3.4.4.1. Fire-Resistance Rating of Exit Separations**

- 1)** Except as permitted by Sentences (2), 3.3.5.4.(3), 3.4.4.2.(2) and 3.4.4.3.(1), every *exit* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than that required by Subsection 3.2.2., but not less than 45 min, for
  - a) the floor assembly above the *storey*, or
  - b) the floor assembly below the *storey*, if there is no floor assembly above.
- 2)** The *fire-resistance rating* of the *fire separation* referred to in Sentence (1) need not be more than 2 h.
- 3)** If an *exit* stair in an assembly hall or *theatre* serves more than one balcony level, the *exit* stair shall be separated from the remainder of the *building* in conformance with Sentence (1).

**3.4.4.2. Exits through Lobbies**

- 1)** Except as permitted by Sentence (2), no *exit* from a *floor area* above or below the *first storey* shall lead through a lobby.
- 2)** Not more than one *exit* from a *floor area* is permitted to lead through a lobby, provided
  - a) the lobby floor is not more than 4.5 m above *grade*,
  - b) the path of travel through the lobby to the outdoors is not more than 15 m,
  - c) the adjacent rooms or premises having direct access to the lobby do not contain a *residential occupancy* or an *industrial occupancy*,
  - d) the lobby is not located within an *interconnected floor space* other than as described in Sentence 3.2.8.2.(6),

- e) the lobby conforms to the requirements for *exits*, except that
  - i) rooms other than *service rooms* and storage rooms are permitted to open onto the lobby,
  - ii) the *fire separation* between the lobby and a room used for the sole purpose of control and supervision of the *building* need not have a *fire-resistance rating*,
  - iii) the *fire separation* between the lobby and adjacent *occupancies* that are permitted to open onto the lobby need not have a *fire-resistance rating* provided the lobby and adjacent *occupancies* are *sprinklered*, and
  - iv) passenger elevators are permitted to open onto the lobby, provided the elevator doors are designed to remain closed except while loading and unloading passengers, and  
(see Appendix A)
- f) a *fire separation*, constructed in accordance with Sentence 3.4.4.1.(1), is maintained between the lobby and any *exit* permitted by this Sentence to lead through the lobby.

#### 3.4.4.3. Exterior Passageway Exceptions

- 1) The requirements of Sentences 3.4.4.1.(1) and 3.2.3.13.(1) and (3) do not apply to an exterior *exit* passageway provided
  - a) not less than 50% of the exterior side is open to the outdoors, and
  - b) an *exit* stair is provided at each end of the passageway.

#### 3.4.4.4. Integrity of Exits

- 1) A *fire separation* that separates an *exit* from the remainder of the *building* shall have no openings except for
  - a) standpipe and sprinkler piping,
  - b) electrical wires and cables, totally enclosed *noncombustible* raceways and *noncombustible* piping that serve only the *exit*,
  - c) openings required by the provisions of Subsection 3.2.6.,
  - d) *exit* doorways, and
  - e) wired glass and glass block permitted by Article 3.1.8.14.
- 2) *Exits* within scissors stairs and other contiguous *exit* stairways shall be separated from each other by a smoke-tight *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly through which they pass.
- 3) *Fire separations* separating contiguous stairs described in Sentence (2) shall not be pierced by doorways, ductwork, piping or any other openings that affect the continuity of the separation.
  - 4) A fuel-fired *appliance* shall not be installed in an *exit*.
  - 5) An *exit* shall not be used as a *plenum* for a heating, ventilating or air-conditioning system.
  - 6) An *exit* shall be designed for no purpose other than for exiting, except that an *exit* is permitted also to be designed to serve as an access to a *floor area*.
  - 7) A *service room* shall not open directly into an *exit*.
  - 8) Storage rooms, washrooms, toilet rooms, laundry rooms and similar ancillary rooms shall not open directly into an *exit*.
  - 9) *Service spaces* referred to in Sentence 3.2.1.1.(8) shall not open directly into an *exit*.

### 3.4.5. Exit Signs

#### 3.4.5.1. Exit Signs

- 1) Every *exit* door shall have an *exit* sign placed over or adjacent to it if the *exit* serves
  - a) a *building* more than 2 storeys in *building height*,

- b) a *building* having an *occupant load* of more than 150, or
- c) a room or *floor area* that has a fire escape as part of a required *means of egress*.

**2)** Every *exit* sign shall

- a) be visible from the *exit* approach,
- b) have the word EXIT displayed in plain legible letters, and
- c) be illuminated continuously while the *building* is occupied.

**3)** *Exit* signs shall consist of

- a) red letters on a contrasting background or contrasting letters on a red background, with the letters not less than 114 mm high and having a 19 mm stroke, if the sign is internally illuminated, and
- b) white letters on a red background or red letters on a contrasting background that is white or a light tint, with letters not less than 150 mm high and having a 19 mm stroke, if the sign is externally illuminated.

**4)** If illumination of an *exit* sign is provided from an electrical circuit, that circuit shall

- a) serve no equipment other than emergency equipment, and
- b) be connected to an emergency power supply as described in Sentence 3.2.7.4.(1).

**5)** If necessary, the direction of egress in *public corridors* and passageways shall be indicated by a sign conforming to Sentence (3) with a suitable arrow or pointer indicating the direction of egress.

**6)** Except for egress doorways described in Sentence 3.3.2.4.(4), an *exit* sign conforming to Sentences (2), (3) and (4) shall be placed over or adjacent to every egress doorway from rooms with an *occupant load* of more than 60 in Group A, Division 1 *occupancies*, dance halls, licensed beverage establishments, and other similar *occupancies* that, when occupied, have lighting levels below that which would provide easy identification of the egress doorway.

### 3.4.5.2. Signs for Stairs and Ramps at Exit Level

**1)** In a *building* more than 2 *storeys* in *building height*, any part of an *exit* ramp or stairway that continues up or down past the lowest *exit level* shall have a posted sign clearly indicating that it does not lead to an *exit*.

### 3.4.6. Types of Exit Facilities

(See Appendix A.)

#### 3.4.6.1. Slip Resistance of Ramps and Stairs

- 1)** The surfaces of ramps, and landings and treads
  - a) shall have a finish that is slip resistant, and
  - b) if accessible to the public, shall have either a colour contrast or a distinctive pattern to demarcate the leading edge of the tread and the leading edge of the landing, as well as the beginning and end of a ramp.

**2)** Treads and landings of exterior *exit* stairs more than 10 m high shall be designed to be free of ice and snow accumulations.

#### 3.4.6.2. Minimum Number of Risers

**1)** Except as permitted by Sentence 3.3.2.14.(1), every flight of interior stairs shall have not less than 3 risers.

#### 3.4.6.3. Landings and Maximum Vertical Rise of Stair Flights

**1)** No flight of stairs shall have a vertical rise of more than 3.7 m between floors or landings, except that a flight of stairs serving as an *exit* in a Group B, Division 2 *occupancy* shall have a vertical rise not more than 2.4 m between floors or landings.

**2)** The length and width of a landing shall be at least the width of the stairway in which it occurs, except that in a straight run the length of the landing need not be more than 1100 mm.

**3)** Where a doorway or stairway empties onto a ramp through a side wall, there shall be a level area extending across the full width of the ramp, and for a distance of 300 mm on either side of the wall opening, except one side if it abuts on an end wall.

**4)** Where a doorway or stairway empties onto a ramp through an end wall, there shall be a level area extending across the full width of the ramp and along its length for not less than 900 mm.

**5)** A landing shall be provided at the top and bottom of every flight of stairs or section of a ramp.

#### 3.4.6.4. Handrails

**1)** A stairway shall have a handrail on at least one side, but if it is 1 100 mm or more wide, it shall have handrails on both sides.

**2)** If the required width of a ramp or flight of stairs is more than 2200 mm, one or more intermediate handrails continuous between landings shall be provided, and located so that there will be not more than 1650 mm between handrails.

**3)** Handrails shall be continuously graspable along their entire length and shall have

- a) a circular cross-section with an outside diameter not less than 30 mm and not more than 43 mm, or
- b) a non-circular cross-section with a graspable portion that has a perimeter not less than 100 mm and not more than 125 mm and whose largest cross-sectional dimension is not more than 45 mm.

**4)** Handrails on stairs and ramps shall be not less than 865 mm and not more than 965 mm high, measured vertically from a line drawn through the outside edges of the stair nosing or from the surface of the ramp, except that handrails not meeting these requirements are permitted provided they are installed in addition to the required handrail.

**5)** Except where interrupted by doorways or newels at changes in direction, at least one handrail shall be continuous throughout the length of a stairway or ramp, including landings. (See Appendix A.)

**6)** Handrails shall be terminated in a manner which will not obstruct pedestrian travel or create a hazard. (See A-3.4.6.4.(5) in Appendix A.)

**7)** At least one handrail at the side of a stairway or ramp shall extend horizontally not less than 300 mm beyond the top and bottom of the stairway or ramp. (See A-3.4.6.4.(5) in Appendix A.)

**8)** The clearance between a handrail and any surface behind it shall be not less than

- a) 50 mm, or
- b) 60 mm if the surface behind the handrail is rough or abrasive.

**9)** Handrails and their supports shall be designed and constructed to withstand the loading values obtained from the non-concurrent application of

- a) a concentrated load not less than 0.9 kN applied at any point and in any direction for all handrails, and
- b) a uniform load not less than 0.7 kN/m applied in any direction to handrails not located within *dwelling units*.

**10)** A ramp shall have handrails on both sides.

#### 3.4.6.5. Guards

**1)** Every *exit* shall have a wall or a well-secured *guard* on each side.

**2)** Except as required by Sentence (4), the height of *guards* for *exit* stairs shall be not less than 920 mm measured vertically to the top of the *guard* from a line drawn through the outside edges of the stair nosings and 1070 mm around landings.

**3.4.6.6.**

- 3)** The height of *guards* for *exit* ramps and their landings shall be not less than 1070 mm measured vertically to the top of the *guard* from the ramp surface.
- 4)** The height of *guards* for exterior stairs and landings more than 10 m above adjacent ground level shall be not less than 1 500 mm measured vertically to the top of the *guard* from the surface of the landing or from a line drawn through the outside edges of the stair nosings.
- 5)** Unless it can be shown that the size of openings that exceed this limit does not present a hazard, there shall be no opening that permits the passage of a sphere whose diameter is more than 100 mm through a *guard* for an *exit*.
- 6)** In a stairway, a window for which the distance measured vertically between the bottom of the window and a line drawn through the outside edges of the stair nosings is less than 900 mm, or a window that extends to less than 1070 mm above the landing, shall
- a) be protected by a *guard* that is
    - i) located approximately 900 mm above a line drawn through the outside edges of the stair nosings, or
    - ii) not less than 1070 mm high measured to the top of the *guard* from the surface of the landing, or
  - b) be fixed in position and designed to resist the lateral design loads specified for *guards* and walls in Articles 4.1.5.15. and 4.1.5.17.
- 7)** Unless it can be shown that the location and size of openings do not present a hazard, a *guard* shall be designed so that no member, attachment or opening located between 140 mm and 900 mm above the level being protected by the *guard* will facilitate climbing.

**3.4.6.6.****Ramp Slope**

(See also Article 3.8.3.4.)

- 1)** Except as required for aisles by Article 3.3.2.5., the maximum slope of a ramp shall be
- a) 1 in 10 in any *assembly occupancy, care or detention occupancy or residential occupancy,*
  - b) 1 in 6 in rooms or *floor areas* classified as *mercantile occupancy or industrial occupancy,*
  - c) 1 in 8 in any other *floor area,* and
  - d) 1 in 10 for an exterior ramp.

**3.4.6.7.****Treads and Risers**

- 1)** Except as permitted for *dwelling units* and by Sentence 3.4.7.5.(1) for fire escapes, steps for stairs shall have a run of not less than 280 mm between successive steps.
- 2)** Steps for stairs referred to in Sentence (1) shall have a rise between successive treads not less than 125 mm and not more than 180 mm.
- 3)** Treads and risers in every *exit* stair, except a fire escape stair, shall have uniform run and rise in any one flight, and shall not alter significantly in run and rise in successive flights in any stair system. (See Appendix A.)
- 4)** Except as permitted by Sentence (6), the leading edge of a stair tread shall have either a radius or bevel between 6 mm and 10 mm in horizontal dimension.
- 5)** The front edge of stair treads in *exits* and public *access to exits* shall be at right angles to the direction of *exit* travel.
- 6)** If resilient material is used to cover the leading edge of a stair tread, the minimum radius or bevel required by Sentence (4) is permitted to be reduced to 3 mm.

**3.4.6.8.****Curved Stairs**

- 1)** Except as permitted by Sentence (2), tapered treads shall not be used in an *exit*.
- 2)** A curved stair used as an *exit* shall have
- a) a handrail on each side,

- b) treads with a minimum run of 240 mm exclusive of nosings,
- c) treads that conform to Article 3.4.6.7. where they are measured 230 mm away from the handrail at the narrow end of the tread, and
- d) an inside radius that is not less than twice the stair width.

#### 3.4.6.9. Horizontal Exits

**1)** The *floor area* on each side of a *horizontal exit* shall be sufficient to accommodate the occupants of both *floor areas*, allowing not less than 0.5 m<sup>2</sup> of clear floor space per person, except that 1.5 m<sup>2</sup> shall be provided for each person in a wheelchair and 2.5 m<sup>2</sup> for each bedridden patient.

**2)** If vestibules, enclosed balconies or bridges are used as parts of a *horizontal exit*, their clear width shall be not less than that of the *exit* doorways opening into them, except that handrails are not permitted to project into this clear width more than 100 mm.

**3)** In a *horizontal exit* where there is a difference in level between the connected *floor areas*, slopes not more than those specified for ramps in Article 3.4.6.6. are permitted to be used.

**4)** No stairs or steps shall be used in a *horizontal exit*.

**5)** If 2 doors are provided in a *horizontal exit* that comprises a part of the required number of *exits* from the *floor areas* on both sides of the *exit*

- a) the doors shall be mounted adjacent to each other with the door on the right side in the direction of travel through the *horizontal exit* swinging in the direction of travel through the *horizontal exit*, and
- b) signs shall be provided on each side of the *horizontal exit* to indicate the door that swings in the direction of travel from that side.

(See Appendix A.)

**6)** If a *horizontal exit* utilizes bridges between *buildings* or outside balconies, the bridges or balconies shall conform to Article 3.2.3.19.

#### 3.4.6.10. Doors

**1)** The distance between a stair riser and the leading edge of a door during its swing shall be not less than 300 mm.

**2)** No *exit* door shall open directly onto a step except that, if there is danger of blockage from ice or snow, an *exit* door is permitted to open onto not more than one step which shall be not more than 150 mm high.

**3)** *Exit* doors shall be clearly identifiable. (See Appendix A.)

**4)** No door leaf in an *exit* doorway with more than one leaf shall be less than 610 mm wide.

#### 3.4.6.11. Direction of Door Swing

**1)** Except for doors serving a single *dwelling unit* and except as permitted by Article 3.4.6.13., every *exit* door shall

- a) open in the direction of *exit* travel, and
- b) swing on its vertical axis.

#### 3.4.6.12. Self-closing Devices

**1)** An *exit* door that is normally required to be kept closed

- a) shall be provided with a self-closing mechanism, and
- b) shall never be secured in an open position except as permitted by Sentence 3.1.8.12.(1).

#### 3.4.6.13. Sliding Doors

**1)** Except as permitted by Sentence (2) an *exit* door leading directly to outdoors at ground level is permitted to be a sliding door provided it conforms to Sentence 3.3.1.12.(1).

**2)** An *exit* door serving a Group B, Division 1 *occupancy*, or an *impeded egress zone* in other *occupancies*, is permitted to be a sliding door that does not conform to Sentence 3.3.1.12.(1) provided it is designed to be released in conformance with Article 3.3.1.13.

#### 3.4.6.14. Revolving Doors

- 1)** Except as permitted by Sentence (3), a revolving door, if used, shall
  - a) be collapsible,
  - b) have hinged doors providing equivalent exiting capacity located adjacent to it,
  - c) be used as an *exit* from the ground floor level only,
  - d) not be used at the foot of any stairway, and
  - e) have all glass in door leaves and enclosure panels conforming to
    - i) CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass," or
    - ii) CAN/CGSB-12.11-M, "Wired Safety Glass."

**2)** Except as permitted by Sentence (3), a revolving door shall not be considered to have an exiting capacity for more than 45 persons.

- 3)** An electrically powered revolving door is not required to conform to Sentences (1) and (2) provided
  - a) the door leaves will collapse and stop automatic rotation of the door system and not obstruct the doorway if a force not more than that specified in Sentence 3.4.6.15.(2) is applied at the centre of a door leaf,
  - b) the door leaves are capable of being opened from inside the *building* without requiring keys, special devices, or specialized knowledge of the door opening mechanism,
  - c) the allowable exiting capacity is based on the clear width of passage through the door enclosure when the doors are fully collapsed,
  - d) a permanent sign, whose centreline is between 1000 mm and 1500 mm above the floor, is placed on each face of each door leaf indicating the method for collapsing the door leaf in an emergency, and
  - e) glass used for door leaves and enclosure panels is safety glass conforming to
    - i) CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass," or
    - ii) CAN/CGSB-12.11-M, "Wired Safety Glass."

#### 3.4.6.15. Door Release Hardware

**1)** Except for devices on doors serving a *contained use area* or an *impeded egress zone* designed to be remotely released in conformance with Article 3.3.1.13., and except as permitted by Sentence (4) and Article 3.4.6.16., locking, latching and other fastening devices on a principal entrance door to a *building* as well as on every *exit* door shall permit the door to be readily opened from the inside with not more than one releasing operation and without requiring keys, special devices or specialized knowledge of the door opening mechanism. (See Appendix A.)

- 2)** If a door is equipped with a latching mechanism, a device that will release the latch and allow the door to swing wide open when a force of not more than 90 N is applied to the device in the direction of travel to the *exit* shall be installed on
  - a) every *exit* door from a *floor area* containing an *assembly occupancy* having an *occupant load* more than 100,
  - b) every door leading to an *exit* lobby from an *exit* stair shaft, and every exterior door leading from an *exit* stair shaft in a *building* having an *occupant load* more than 100, and
  - c) every *exit* door from a *floor area* containing a *high-hazard industrial occupancy*.

**3)** Except as required by Sentence 3.8.3.3.(7), every *exit* door shall be designed and installed so that, when the latch is released, the door will open under a force of not more than 90 N, applied at the knob or other latch releasing device.

- 4) Electromagnetic locks that do not incorporate latches, pins or other similar devices to keep the door in the closed position are permitted to be installed on *exit* doors other than doors leading directly from a *high-hazard industrial occupancy*, provided
- the *building* is equipped with a fire alarm system,
  - the locking device, and all similar devices in the *access to exit* leading to the *exit* door, release upon actuation of the fire *alarm signal*,
  - the locking device releases immediately upon loss of power controlling the electromagnetic locking mechanism and its associated auxiliary controls,
  - the locking device releases immediately upon actuation of a manually operated switch readily accessible only to authorized personnel,
  - a force of not more than 90 N applied to the door opening hardware initiates an irreversible process that will release the locking device within 15 s and not relock until the door has been opened,
  - upon release, the locking device must be reset manually by the actuation of the switch referred to in Clause (d), and
  - a legible sign is permanently mounted on the *exit* door to indicate that the locking device will release within 15 s of applying pressure to the door-opening hardware.

(See Appendix A.)

- 5) Door hardware for the operation of the doors referred to in this Section shall be installed at a height not more than 1200 mm above the finished floor.

### 3.4.6.16. Security for Banks and Mercantile Floor Areas

- 1) If a *building* is *sprinklered* throughout, the requirements of Sentence 3.4.6.15.(1) are permitted to be waived for *exit* and egress doors complying with Sentences (2) to (9) that serve a *floor area* or part of a *floor area* used exclusively for

- a bank, or
- the sale of retail merchandise.

(See Appendix A.)

- 2) *Exit* and egress doors referred to in Sentence (1) shall be designed to prevent locking at any time that the part of the *floor area* that they serve is open to the public.

- 3) A sign with the words "This door shall not be locked at any time that the public is present" in letters not less than 50 mm high shall be permanently affixed to both sides of doors referred to in Sentence (1).

- 4) *Exit* and egress facilities complying with Sentences (5) to (9) shall be incorporated for egress by persons other than the public from a *floor area* or a part of a *floor area* referred to in Sentence (1) during times when the public is neither present nor being admitted to the area that they serve.

- 5) In *exit* and egress facilities referred to in Sentence (4), at least one door at each *exit* and egress location shall

- be operable in conformance with Sentence 3.4.6.15.(1), or
- be equipped with locks conforming to Sentence 3.4.6.15.(4) that release immediately
  - if an *alert signal* or *alarm signal* is initiated in the fire alarm system, or
  - the sprinkler system is actuated.

- 6) A door referred to in Sentence (5) shall be permanently and distinctly marked to indicate that it is an emergency *exit*.

- 7) *Exit* and egress facilities required for evacuation of persons other than the public from a *floor area* or a part of a *floor area* referred to in Sentence (1) shall have an aggregate width based on the maximum number of persons other than the public and determined in accordance with Articles 3.4.3.1. to 3.4.3.3.

- 8) Travel distance to an *exit* referred to in Sentence (7) shall not exceed the travel distance determined in accordance with Subsection 3.4.2.

**9)** *Exit* and egress doors serving a *floor area* or part of a *floor area* referred to in Sentence (1) are permitted to be equipped with locks that require keys, special devices or specialized knowledge of the door opening mechanism provided

- a) the doors do not lead into *exit* stairs,
- b) the doors do not lead from *exit* stairs to the exterior of the *building*,
- c) the doors do not serve any other *occupancy*,
- d) the area served contains at least one telephone
  - i) that is accessible and in operation at all times,
  - ii) that is not coin or card operated, and
  - iii) marked to indicate that it is for emergency use,
- e) the area served is illuminated by normal power or by emergency power when the doors are locked,
- f) there are provisions that enable an announcement to be made throughout the area served before the locks are fastened, and
- g) the locks are designed for use during times that the *building* is not occupied.

### 3.4.6.17. Emergency Access to Floor Areas

- 1)** In a *building* more than 6 *storeys* in *building height*,
- a) doors providing access to *floor areas* from *exit* stairs shall not have locking devices to prevent entry into any *floor area* from which the travel distance up or down to an unlocked door is more than 2 *storeys*,
  - b) doors referred to in Clause (a) that provide access into the *floor area* shall be identified by a sign on the stairway side to indicate that they are openable from that side, and
  - c) a master key to fit all door locking devices that are intended to prevent entry into a *floor area* from an *exit* stair shall be provided in a designated location accessible to firefighters, or the door shall be provided with a wired glass panel not less than 0.0645 m<sup>2</sup> in area and located not more than 300 mm from the door opening hardware.

**2)** If access to *floor areas* through unlocked doors is required by Clause (1)(a), it shall be possible for a person entering the *floor area* to have access through unlocked doors within the *floor area* to at least one other *exit*.

### 3.4.6.18. Floor Numbering

- 1)** Arabic numerals indicating the assigned floor number shall
- a) be mounted permanently on the stair side of the wall at the latch side of doors to *exit* stair shafts,
  - b) be not less than 60 mm high, raised approximately 0.7 mm above the surface,
  - c) be located 1350 mm from the finished floor and beginning not more than 150 mm from the door, and
  - d) be contrasting in colour with the surface to which they are applied (see Appendix A).

## 3.4.7. Fire Escapes

### 3.4.7.1. Scope

**1)** Except as permitted by Sentence (2), fire escapes shall not be erected on a *building*.

**2)** If it is impracticable to provide one or more of the *exit* facilities listed in Article 3.4.1.4., fire escapes conforming to Articles 3.4.7.2. to 3.4.7.7. are permitted to serve *floor areas* in an existing *building* provided the *floor areas* served are not more than

- a) 2 *storeys* above ground level in *care or detention occupancies*, and
- b) 5 *storeys* above ground level in other *occupancies*.

**3.4.7.2. Fire Escape Construction**

1) Fire escapes shall be of metal or concrete, of the stair type extending to ground level, constructed throughout in a strong substantial manner and securely fixed to the *building*, except that wooden fire escapes are permitted to be used on *buildings of combustible construction* if all posts and brackets are not less than 89 mm in their least dimension and all other woodwork is not less than 38 mm in its least dimension.

**3.4.7.3. Access to Fire Escapes**

1) Access to fire escapes shall be from corridors through doors at floor level, except that access from a *dwelling unit* is permitted to be through a casement window having an unobstructed opening not less than 1100 mm high by 550 mm wide with a sill height of not more than 900 mm above the inside floor.

2) The clear area of a fire escape balcony onto which a door opens, shall be not less than 1 m<sup>2</sup>.

**3.4.7.4. Protection of Fire Escapes**

1) If a fire escape serves any *storey* above the second, openings located in a zone described in Sentence (2), including access doorways in the exterior walls of the *building* to which the fire escape is attached, shall be protected by *closures* conforming to Subsection 3.1.8.

2) The zone referred to in Sentence (1) extends from any balcony, platform or stairway of a fire escape to a distance

- a) 3 m horizontally,
- b) 10 m below, or
- c) 1.8 m above.

**3.4.7.5. Stairs**

1) Stairs shall be inclined at an angle of not more than 45° with the horizontal, and their steps shall have risers not more than 210 mm high and treads not less than 220 mm wide exclusive of nosing.

2) Stairway headroom shall be not less than 1950 mm plus the height of one riser measured vertically above the nosing of any tread or platform.

3) The width of a fire escape shall conform to Articles 3.4.3.1. to 3.4.3.3., except that the width is permitted to be reduced to 550 mm provided the fire escape serves

- a) not more than 3 *storeys*, and
- b) not more than 15 persons.

4) If a flight of stairs leading to the ground at the foot of a fire escape is not fixed in position, it shall be held in the raised position without a latch or locking device, and shall be fitted with a counterbalancing device that will permit it to be easily and quickly brought into position for use.

**3.4.7.6. Guards and Railings**

1) The open sides of every platform, balcony and stairway forming part of a fire escape shall be protected by *guards* not less than 920 mm high measured vertically above the nosing of any tread or platform.

2) The top rail of a *guard* is permitted to serve as a handrail if it is free from obstructions which could break a handhold.

3) A wall handrail shall be installed if the fire escape is more than 550 mm wide.

4) Unless it can be shown that the size of openings that exceed this limit does not present a hazard, there shall be no opening that permits the passage of a sphere whose diameter is more than 100 mm through a *guard* for a fire escape.

5) Unless it can be shown that the location and size of an opening do not present a hazard, a *guard* for a fire escape shall be designed so that no member, attachment or opening located between 140 mm and 900 mm above a platform or the nosing of any tread will facilitate climbing.

**3.4.7.7.****3.4.7.7. Landings**

1) Platforms for a fire escape shall be provided in conformance with the requirements for stair landings in Article 3.4.6.3.

**Section 3.5. Vertical Transportation****3.5.1. General****3.5.1.1. Scope**

1) This Section applies to vertical transportation facilities installed in a *building*, including elevators, escalators and dumbwaiters.

2) Elevators in a *building* within the scope of Subsection 3.2.6. shall conform to Articles 3.2.6.4., 3.2.6.5. and 3.2.6.6.

**3.5.2. Standards****3.5.2.1. Elevators, Escalators and Dumbwaiters**

1) The design, construction, installation and *alteration* of every elevator, escalator, passenger-elevating device, moving walk, freight platform lift and dumbwaiter shall conform to the elevating devices regulations made pursuant to the Safety Codes Act. (See Appendix A.)

2) Before being placed in service, every elevator, escalator, passenger-elevating device, moving walk, freight platform lift or dumbwaiter installation, including safety and control devices, shall be inspected and tested in accordance with the elevating devices regulations made pursuant to the Safety Codes Act.

3) Passenger elevators shall conform to Appendix E of CSA B44, "Safety Code for Elevators."

**3.5.3. Fire Separations****3.5.3.1. Fire Separations for Elevator Hoistways**

1) Except as permitted by Sentence (2), a *vertical service space* used as an elevator hoistway shall be separated from all other portions of each adjacent *storey* by a *fire separation* having a *fire-resistance rating* conforming to Table 3.5.3.1. for the *fire-resistance rating* required by Subsection 3.2.2. for

- a) the floor assembly above the *storey*, or
- b) the floor assembly below the *storey*, if there is no floor assembly above.

**Table 3.5.3.1.**  
**Fire Separation for Vertical Transportation Space**  
 Forming Part of Articles 3.5.3.1 and 3.5.3.2.

<i>Fire-Resistance Rating of Fire Separation Required for Floor Assembly</i>	<i>Minimum Fire-Resistance Rating of Vertical Service Space for Elevator Hoistway</i>	<i>Minimum Fire-Resistance Rating of Vertical Service Space for Dumbwaiters</i>
less than 45 min	45 min	—
45 min	45 min	45 min
1 h	1 h	45 min
1.5 h	1.5 h	1 h
2 h or more	2 h	1 h

**2)** Passenger elevators, other than those provided for firefighters in accordance with Article 3.2.6.5., are permitted to be located within *interconnected floor space* without being enclosed in a hoistway separated from the remainder of the *building*, provided the elevator machinery is located in a room separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than that required for hoistways by Sentence (1).

**3.5.3.2. Vertical Service Spaces for Dumbwaiters**

**1)** A *vertical service space* containing a dumbwaiter shall be separated from all other portions of each adjacent *storey* by a *fire separation* having a *fire-resistance rating* conforming to Table 3.5.3.1. for the *fire-resistance rating* required by Subsection 3.2.2. for

- a) the floor assembly above the *storey* or
- b) the floor assembly below the *storey*, if there is no floor assembly above.

**3.5.3.3. Fire Separations for Elevator Machine Rooms**

**1)** Except as permitted by Sentence (2), a room containing elevator machinery shall be separated from all other parts of the *building* by a *fire separation* having a *fire-resistance rating* not less than that required for the *vertical service space* containing the elevator hoistway.

**2)** A room containing elevator machinery need not be separated from the elevator hoistway that it serves provided the room and the hoistway are separated from all other parts of the *building* by a *fire separation* having a *fire-resistance rating* not less than that required for the *vertical service space* containing the elevator hoistway.

**3.5.4. Dimensions and Signs**

**3.5.4.1. Elevator Car Dimensions**

**1)** If one or more elevators are provided in a *building*, all *storeys* shall be served by at least one elevator which has inside dimensions that will accommodate and provide adequate access for a patient stretcher 2010 mm long and 610 mm wide in the prone position. (See Appendix A.)

**2)** An elevator satisfying the requirements of Sentence (1) shall be clearly identified on the main entrance level of the *building*.

**3.5.4.2. Floor Numbering**

**1)** Arabic numerals indicating the assigned floor number shall be mounted permanently on both jambs of passenger elevator hoistway entrances in conformance with Appendix E of CSA B44, "Safety Code for Elevators."

## Section 3.6. Service Facilities

### 3.6.1. General

#### 3.6.1.1. Scope

1) The provisions of this Section apply to *horizontal service spaces, vertical service spaces, attic or roof spaces, ducts, crawl spaces, shaft spaces, service rooms, and mechanical penthouses, and facilities contained therein.*

#### 3.6.1.2. Electrical Wiring and Equipment

1) The installation of electrical wiring and electrical equipment shall conform to the requirements of the electrical regulations made pursuant to the Safety Codes Act.

#### 3.6.1.3. Storage Use Prohibition

1) *Service rooms and service spaces* shall not be designed to facilitate subsequent use as storage space.

#### 3.6.1.4. Appliances Installed outside a Building

1) A fuel-fired *appliance* installed on the roof of a *building* or in another location outside the *building* shall be installed not less than

- a) 1.2 m from a property line, measured horizontally, and
- b) 3 m from an adjacent wall of the same *building* if that wall contains any opening within 3 *storeys* above and 5 m horizontally from the *appliance*, unless every opening within these limits is protected by
  - i) a *closure* having a *fire-protection rating* not less than 45 min determined in accordance with Article 3.1.8.4., or
  - ii) a wired glass assembly permitted for use in a vertical *fire separation* and described in Appendix D-2.3.14.

### 3.6.2. Service Rooms

#### 3.6.2.1. Fire Separations around Service Rooms

1) Except as permitted by Sentences (2), (8), (9) and (10), fuel-fired *appliances* shall be installed in *service rooms* separated from the remainder of the *building* by *fire separations* having a *fire-resistance rating* not less than 1 h.

2) Except as required by Sentence (3), a fuel-fired *appliance* that serves only one room or *suite* is not required to be installed in a *service room* separated from the remainder of the *building*.

3) A solid-fuel-burning *appliance* shall not be located in a *repair garage, a storage garage, or any other location* where it could be exposed to flammable vapours or gases, unless

- a) it is enclosed in a *service room* that is separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h,
- b) it is supplied with combustion air directly from outside the *building*, and
- c) the heat that it generates is supplied indirectly to the space served by means of ducts or piping.

4) A *service room* containing an incinerator shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 2 h.

5) Equipment that uses a liquid having a *flash point* below 93.3°C shall be installed in a *service room* separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

6) Electrical equipment that is required to be located in a *service room* according to the electrical regulations made pursuant to the Safety Codes Act shall be installed in a *service room* separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

7) Except as permitted by Sentence (8), in a *storey* that is not *sprinklered* throughout, a *service room* that contains service equipment other than that addressed by Sentences (1) to (6) shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.

8) Where a *service room* contains a limited quantity of service equipment, and the service equipment neither constitutes a fire hazard nor is essential to the operation of fire safety systems in the *building*, the requirements for a *fire separation* shall not apply.

9) A *fire separation* is not required between a fireplace and the space it serves.

10) A *fire separation* is not required between a roof-top *appliance* and the *building* it serves.

### 3.6.2.2. Service Rooms under Exits

1) A *service room* containing service equipment subject to possible explosion, such as *boilers* operating in excess of 100 kPa (gauge) and some types of refrigerating machinery and transformers, shall not be located directly under a required *exit*.

### 3.6.2.3. Service Equipment

1) A *service room* containing space heating, space cooling and service water heating *appliances* is permitted to contain other service equipment such as electrical service equipment.

### 3.6.2.4. Incinerator Rooms

1) A *service room* containing an incinerator shall not contain other fuel-fired *appliances*.

### 3.6.2.5. Combustible Refuse Storage

1) Except as required by Sentence 3.6.3.3.(9), a room for the storage of *combustible* refuse shall be

- a) separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 1 h, and
- b) *sprinklered*.

(See Appendix A.)

### 3.6.2.6. Door Swing for Service Rooms

1) A swing-type door from a *service room* containing a *boiler* or incinerator shall swing outward from the room, except that the door shall swing inward if the door opens onto a corridor or any room used for an *assembly occupancy*. (See also Sentence 3.4.4.4.(7).)

### 3.6.2.7. Electrical Equipment Vaults

1) An electrical equipment vault shall conform to Sentences (2) to (9) if it is required by the electrical regulations made pursuant to the Safety Codes Act.

2) An electrical equipment vault referred to in Sentence (1) shall be separated from the remainder of the *building* by a *fire separation* of solid masonry or concrete construction having a *fire-resistance rating* not less than

- a) 3 h if the vault is not protected by an automatic fire extinguishing system, or
- b) 2 h if the vault is protected by an automatic fire extinguishing system.

3) If a *building* is *sprinklered* throughout, an electrical equipment vault referred to in Sentence (1) need not be *sprinklered* provided

- a) the vault is designed for no purpose other than to contain the electrical equipment, and
- b) the vault contains a *smoke detector* which will actuate the *building* fire alarm system in the event of a fire in the vault.

4) Only pipes or ducts necessary for fire protection or the proper operation of the electrical installation shall penetrate the *fire separation* referred to in Sentence (2).

- 5) Explosion-relief devices and vents or other protective measures conforming to Sentence 3.3.1.20.(2) shall be provided for an electrical equipment vault referred to in Sentence (1) that contains dielectric-liquid-filled electrical equipment. (See Appendix A.)
- 6) An electrical equipment vault referred to in Sentence (1) shall be provided with a ventilation system designed in conformance with Part 6 to prevent the ambient temperature in the vault from exceeding 40°C.
- 7) The ventilation system required by Sentence (6) shall be separate from the system for the remainder of the *building* and shall be designed so that it is automatically shut off in the event of a fire in the vault.
- 8) The floor of an electrical equipment vault referred to in Sentence (1) shall be liquid tight and surrounded by liquid tight walls and sills of sufficient height to confine within the vault all of the liquid from the largest item of electrical equipment, but to a height of not less than 100 mm.
- 9) An electrical equipment vault that contains a dielectric-liquid filled piece of electrical equipment shall not be drained to a storm drain, a *sanitary drainage system* or a *private sewage disposal system*, and shall have
  - a) a floor that drains to a sump with sufficient capacity for all the liquid in the transformers, or
  - b) a curb of sufficient height around each transformer so that all the liquid in the transformer can be contained within the curb system.

**3.6.2.8. Emergency Power Installations**

- 1) A generator intended to supply emergency power for lighting, fire safety and life safety systems shall be located in a room that
  - a) is separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 2 h, and
  - b) contains only the generating set and equipment related to the emergency power supply system.

**3.6.3. Vertical Service Spaces and Service Facilities**

**3.6.3.1. Fire Separations for Vertical Service Spaces**

- 1) Except as required by Section 3.5., a *vertical service space* shall be separated from all other portions of each adjacent *storey* by a *fire separation* having a *fire-resistance rating* conforming to Table 3.6.3.1. for the *fire-resistance rating* required by Subsection 3.2.2. for
  - a) the floor assembly above the *storey*, or
  - b) the floor assembly below the *storey*, if there is no floor assembly above.
 (See Appendix A.)

**Table 3.6.3.1.**  
**Fire Separations for Vertical Service Spaces**  
 Forming Part of Sentence 3.6.3.1.(1)

<i>Fire-Resistance Rating of Fire Separation Required for Floor Assembly</i>	<i>Minimum Fire-Resistance Rating of Vertical Service Space</i>
less than 45 min	—
45 min	45 min
1 h	45 min
1.5 h	1 h
2 h or more	1 h

- 2) A *vertical service space* that does not extend through the roof of a *building* shall be enclosed at the top with construction having a *fire-resistance rating* not less than that required for the *vertical service space* walls.

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**3)** A *vertical service space* that does not extend to the bottom of a *building* shall be enclosed at the lowest level with construction having a *fire-resistance rating* not less than that required for the *vertical service space* walls.

**4)** A vent from a *vertical service space* not extending to the roof shall be enclosed within the *building* with construction having a *fire-resistance rating* not less than that required for the *vertical service space* walls.

**5)** Only openings that are necessary for the use of the *vertical service space* shall be permitted through a *vertical service space* enclosure.

### 3.6.3.2. Foamed Plastic Protection

**1)** *Foamed plastic* insulation in a *vertical service space* shall be protected in conformance with Article 3.1.5.12.

### 3.6.3.3. Linen and Refuse Chutes

- 1)** A linen chute or refuse chute shall
- be impervious to moisture,
  - have a smooth internal surface,
  - be corrosion-resistant,
  - be constructed of *noncombustible* material, and
  - be located in a shaft in which there are no services other than *noncombustible* drain, waste and vent piping or *noncombustible* water piping.

**2)** A shaft containing a linen chute or refuse chute shall have a *fire-resistance rating* conforming to Sentence 3.6.3.1.(1), but not less than

- 1 h if the chute outlet for the discharge room is protected by an automatic, self-latching *closure* held open by a fusible link, or
- 2 h if no *closure* is provided at the chute outlet into the discharge room.

**3)** An interior linen chute or refuse chute shall extend not less than 1 m above the roof and shall be vented above the roof with a vent which

- has an unobstructed area not less than the cross-sectional area of the chute, and
- is equipped with a cover that will open automatically, or that can be opened manually, in the event of a fire in the chute.

**4)** Intake openings for a linen chute or a refuse chute shall

- have an area not more than 60% of the cross-sectional area of the chute, and
- be fitted with *closures* designed to close automatically and latch after use.

**5)** Intake openings for a linen chute or a refuse chute shall be located in rooms or compartments that

- have no dimension less than 750 mm,
- are separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 45 min,
- are designed for no other purpose, and
- do not open directly into an *exit*.

**6)** Sprinklers shall be installed at the top of each linen chute or refuse chute, at alternate floor levels and in the room or bin into which the chute discharges.

**7)** The room into which a linen chute discharges shall be separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 1 h.

**8)** A refuse chute shall be equipped at the top with spray equipment for washing-down purposes.

**9)** A refuse chute shall discharge only into a room or bin separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than 2 h.

**10)** The room or bin into which a refuse chute discharges shall be of sufficient size to contain the refuse between normal intervals of emptying, be impervious to moisture and be equipped with a water connection and floor drain for washing-down purposes.

**11)** A room into which a refuse chute discharges shall contain no service equipment that is not related to refuse handling and disposal.

**3.6.3.4.****3.6.3.4. Exhaust Duct Negative Pressure**

- 1) If a *vertical service space* contains an *exhaust duct* that serves more than one *fire compartment*,
  - a) the duct shall have a fan located at or near the exhaust outlet to ensure that the duct is under negative pressure, and
  - b) the individual *fire compartments* shall not have individual fans that exhaust directly into the duct in the *vertical service space*.

**3.6.4. Horizontal Service Spaces and Service Facilities****3.6.4.1. Scope**

- 1) This Subsection applies to *horizontal service spaces* and service facilities, including ceiling spaces, duct spaces, crawl spaces and *attic or roof spaces*.

**3.6.4.2. Fire Separations for Horizontal Service Spaces**

- 1) A *horizontal service space* that penetrates a required vertical *fire separation* shall be separated from the remainder of the *building* it serves in conformance with Sentence (2).
- 2) If a *horizontal service space* or other concealed space is located above a required vertical *fire separation* other than a vertical shaft, this space need not be divided at the *fire separation* as required by Article 3.1.8.3. provided the construction between this space and the space below is a *fire separation* with a *fire-resistance rating* equivalent to that required for the vertical *fire separation*, except that the *fire-resistance rating* is permitted to be not less than 30 min if the vertical *fire separation* is not required to have a *fire-resistance rating* more than 45 min. (See Appendix A.)

**3.6.4.3. Plenum Requirements**

- 1) A concealed space used as a *plenum* within a floor assembly or within a roof assembly need not conform to Sentence 3.1.5.15.(1) and Article 3.6.5.1. provided
  - a) all materials within the concealed space have a *flame-spread rating* not more than 25 and a smoke developed classification not more than 50, except for
    - i) tubing for pneumatic controls,
    - ii) optical fibre cables and electrical wires and cables that exhibit a vertical char not more than 1.5 m when tested in conformance with the Vertical Flame Test – Cables in Cabletrough in Clause 4.11.4 of CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables,"
    - iii) optical fibre cables and electrical wires and cables that are located in totally enclosed *noncombustible* raceways (see A-3.1.4.3.(1)(b)(i) in Appendix A), and
    - iv) totally enclosed non-metallic raceways conforming to Article 3.1.5.20., and
  - b) the supports for the ceiling membrane are of *noncombustible* material having a melting point not below 760°C .
- 2) If a concealed space referred to in Sentence (1) is used as a return-air *plenum* and incorporates a ceiling membrane that forms part of the required *fire-resistance rating* of the assembly, every opening through the membrane shall be protected by a *fire stop flap* that
  - a) stops the flow of air into the concealed space in the event of a fire,
  - b) is supported in a manner that will maintain the integrity of the ceiling membrane for the duration of time required to provide the required *fire-resistance rating*, and
  - c) conforms to the appropriate requirements of Appendix D.

**3.6.4.4. Attic or Roof Space Access**

- 1) An *attic or roof space* more than 900 mm high shall be provided with access from the floor immediately below by a hatchway not less than 550 mm by 900 mm or by a stairway.

**3.6.4.5. Horizontal Service Space Access**

1) A *horizontal service space*, consisting of ceiling and duct spaces, which is more than 1200 mm high and 600 mm wide shall have inspection doors not less than 300 mm in both horizontal and vertical dimensions placed so that the entire interior of the duct or space can be viewed.

**3.6.4.6. Crawl Space Access**

1) A crawl space shall have at least one access opening not less than 550 mm by 900 mm.

**3.6.4.7. Roof Access**

1) A *building* shall be provided with direct access to the roof by an interior stairway if

- a) heating, ventilating or air-conditioning equipment is installed on the roof, and
- b) the roof elevation is more than 4 m above *grade*.

2) Access shall be provided to roof areas in which tie back and anchor systems are provided for window cleaning suspended power platforms and if access is through

- a) the roof, it shall be by means of an interior staircase, or
- b) a wall, the panels shall be openable from the outside without the use of keys or any specialized device or knowledge.

(See Appendix A-3.6.4.7.(2).)

3) Fixed access shall be provided to rooftop heating, ventilating or air-conditioning equipment that is installed on a sloped roof.

**3.6.5. Air Duct and Plenum Systems****3.6.5.1. Duct Materials**

1) Except as permitted by Sentences (2) to (5) and Article 3.6.4.3., all ducts, duct connectors, associated fittings and *plenums* used in air duct systems shall be constructed of steel, aluminum alloy, copper, clay, asbestos-cement or other *noncombustible* material.

2) Except as permitted by Sentence (3), ducts, associated fittings and *plenums* are permitted to contain *combustible* material provided they

- a) conform to the appropriate requirements for Class 1 duct materials in CAN/ULC-S110-M, "Test for Air Ducts,"
- b) conform to Article 3.1.5.15. in a *building* required to be of *noncombustible construction*,
- c) conform to Subsection 3.1.9.,
- d) are used only in horizontal runs in a *building* required to be of *noncombustible construction*,
- e) are not used in vertical runs serving more than 2 *storeys* in a *building* permitted to be of *combustible construction*, and
- f) are not used in air duct systems in which the air temperature could be more than 120°C.

3) *Combustible* ducts which are part of a duct system conveying only ventilation air and are contained entirely within a *dwelling unit* need not comply with the requirements of Sentences (1) and (2).

4) Duct sealants shall have a *flame-spread rating* not more than 25 and a smoke developed classification not more than 50.

5) Duct connectors that contain *combustible* materials and that are used between ducts and air outlet units shall

- a) conform to the appropriate requirements for Class 1 air duct materials in CAN/ULC-S110-M, "Test for Air Ducts,"
- b) be not more than 4 m long,
- c) be used only in horizontal runs, and
- d) not penetrate a required *fire separation*.

**3.6.5.2.****3.6.5.2. Vibration Isolation Connectors**

- 1) Except as permitted by Sentence (2), vibration isolation connectors in air duct systems shall be *noncombustible*.
- 2) *Combustible* fabric vibration isolation connectors are permitted provided they
  - a) are not more than 250 mm long,
  - b) comply with the flame-resistance requirements of CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films," and
  - c) are not used in a location where they are exposed to heated air or radiation from heat sources that could cause the exposed surface temperature to be more than 120°C.

**3.6.5.3. Tape**

- 1) Tape used to seal joints in air ducts, *plenums* and other parts of air duct systems shall meet the flame-resistance requirements for fabric in CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films."

**3.6.5.4. Coverings, Linings, Adhesives and Insulation**

- 1) Coverings, linings and associated adhesives and insulation for air ducts, *plenums* and other parts of air duct systems that would have an exposed surface temperature more than 120°C when exposed to heated air or radiation from heat sources shall be of *noncombustible* material.
- 2) Except as permitted by Sentence (3), *combustible* coverings and linings, including associated adhesives and insulation, shall have
  - a) a *flame-spread rating* not more than 25 on any exposed surface or any surface that would be exposed by cutting through the material in any direction, and
  - b) a smoke developed classification not more than 50.
- 3) The outer covering of ducts, *plenums* and other parts of air duct systems used within an assembly of *combustible construction* is permitted to have
  - a) an exposed surface *flame-spread rating* not more than 75, and
  - b) a smoke developed classification not more than 50.
- 4) *Combustible* coverings and linings referred to in Sentences (2) and (3) shall not flame, glow, smoulder or smoke when tested in accordance with the method of test in ASTM C 411, "Hot-Surface Performance of High-Temperature Thermal Insulation," at the maximum temperature to which the coverings and linings are to be exposed in service.
- 5) Except as permitted by Sentence (6), *foamed plastic* insulation shall not be used as part of an air duct system or for insulating an air duct.
- 6) *Foamed plastic* insulation is permitted to be installed in a ceiling space that is used as a return air *plenum* provided the *foamed plastic* insulation is protected from exposure to the *plenum* in accordance with Article 3.1.5.12.
- 7) *Combustible* coverings and linings of ducts, including associated adhesives and insulation, shall be interrupted where the duct penetrates a *fire separation* and at the immediate area of operation of heat sources in a duct system, including electric resistance heaters or fuel-burning heaters or *furnaces*.

**3.6.5.5. Insulation and Coverings**

- 1) Insulation and coverings on pipes in which the temperature of the fluid exceeds 120°C shall
  - a) be made of *noncombustible* material, or
  - b) not flame, glow, smoulder or smoke when tested in accordance with the method of test ASTM C 411, "Hot-Surface Performance of High-Temperature Thermal Insulation," at the maximum temperature to which the insulation or covering is to be exposed in service.

- 2)** Except as permitted by Sentence (5), where *combustible* insulation is used on piping in a *horizontal service space* or a *vertical service space*, the insulation and coverings on that piping shall have a *flame-spread rating*, on any exposed surface and on any surface that would be exposed by cutting through the material in any direction,
- a) not more than 25 in a *building* required to be of *noncombustible construction*, or
  - b) not more than 75 in a *building* permitted to be of *combustible construction*.
- 3)** Except as permitted by Sentence (5), insulation and coverings on piping located in rooms and spaces other than the *service spaces* described in Sentence (2) shall have a *flame-spread rating* not more than that required for the interior finish of the ceiling of the room or space.
- 4)** Except as permitted by Sentence (5), *combustible* insulation and covering used on piping in a *building* within the scope of Subsection 3.2.6. shall have a smoke developed classification not more than 100.
- 5)** No *flame-spread rating* or smoke developed classification limits are required for *combustible* insulation and coverings used on piping located within a
- a) concealed space in a wall,
  - b) floor slab, or
  - c) *noncombustible* enclosure.

### 3.6.5.6. Clearance of Ducts and Plenums

**1)** The clearance of *furnace plenums* from *combustible* material shall conform to the requirements of the appropriate standards referenced in Sentence 6.2.1.4.(1).

**2)** If the *plenum* clearance required in accordance with Sentence (1) is not more than 75 mm, the clearance between a *supply duct* and *combustible* material shall be not less than

- a) the required *plenum* clearance within a horizontal distance of 450 mm from the *plenum*, and
- b) 12 mm at a horizontal distance of 450 mm or more from the *plenum*, except that this clearance is permitted to be reduced to zero beyond a bend or offset in the duct sufficiently large to shield the remainder of the *supply duct* from direct radiation from the *furnace* heat exchanger.

(See Appendix A.)

**3)** If the *plenum* clearance required in accordance with Sentence (1) is more than 75 mm but not more than 150 mm, the clearance between a *supply duct* and *combustible* material shall be not less than

- a) the required *plenum* clearance within a horizontal distance of 1800 mm from the *plenum*, and
- b) 12 mm at a horizontal distance of 1800 mm or more from the *plenum*, except that this distance is permitted to be reduced to zero beyond a bend or offset in the duct sufficiently large to shield the remainder of the *supply duct* from direct radiation from the *furnace* heat exchanger.

(See Appendix A.)

**4)** If the *plenum* clearance required in accordance with Sentence (1) is more than 150 mm, the clearance between a *supply duct* and *combustible* material shall be not less than

- a) the required *plenum* clearance within a horizontal distance of 1000 mm from the *plenum*,
- b) 150 mm within a horizontal distance between 1000 mm and 1800 mm from the *plenum*, and
- c) 25 mm at a horizontal distance of 1800 mm or more from the *plenum*, except that this distance is permitted to be reduced to 8 mm beyond a bend or offset in the duct sufficiently large to shield the remainder of the *supply duct* from direct radiation from the *furnace* heat exchanger.

(See Appendix A.)

5) If a register is installed in a floor directly over a pipeless *furnace*, a double-walled register box with not less than 100 mm between walls, or a register box with the warm-air passage completely surrounded by the cold-air passage, shall be permitted instead of the clearances listed in Sentences (2), (3) and (4).

### 3.6.5.7. Supply, Return, Intake and Exhaust-Air Openings

1) *Combustible* grilles, diffusers and other devices for supply, return, and exhaust-air openings in rooms shall conform to the *flame-spread rating* and smoke developed classification requirements for the interior finish of the surface on which they are installed.

### 3.6.5.8. Return-Air System

1) Except as required by Sentences (2) and (3), *return ducts* shall be constructed of material having a *flame-spread rating* not more than 150.

2) If any part of a *return duct* will be exposed to radiation from the *furnace* heat exchanger or other radiating part within the *furnace*, that part of a *return duct* directly above or within 600 mm of the outside *furnace* casing shall be *noncombustible*.

3) *Return ducts* serving solid-fuel-burning *furnaces* shall be constructed of *noncombustible* material.

- 4) *Combustible return ducts* shall be lined with *noncombustible* material
- a) below floor registers,
  - b) at the bottom of vertical ducts, and
  - c) under *furnaces* having a bottom return.

## Section 3.7. Reserved

## Section 3.8. Barrier-Free Design

(See Appendix A.)

### 3.8.1. General

#### 3.8.1.1. Application

- 1) The requirements of this Section apply to all *buildings* except
- a) houses, including semi-detached houses, duplexes, triplexes, town houses, row houses and boarding houses, that are not used in social programmes such as group homes, halfway houses and shelters,
  - b) relocatable industrial accommodations,
  - c) *buildings* of Group F, Division 1 *major occupancy*, in which only the requirements dealing with hearing sensory disabilities would apply, and
  - d) *buildings* that are not intended to be occupied on a daily or full-time basis, including automatic telephone exchanges, pumphouses and substations, in which only the requirements dealing with hearing sensory disabilities would apply.

(See Appendix A.)

2) *Buildings* required to be *barrier-free* must comply with all requirements designed to assist persons with physical, sensory and developmental disabilities.

3) If a residential *project* is funded in whole or in part by the Government of Alberta, adaptable *dwelling units* which could be made to meet *barrier-free* design principles shall be provided as follows:

- a) 2 or more in a *project* of 10 to 25 *dwelling units*,
- b) 5 or more in a *project* of 26 to 50 *dwelling units*,
- c) 10 or more in a *project* of 51 to 100 *dwelling units*,

- d) 15 or more in a *project* of 101 to 200 *dwelling units*, and
  - e) 20 or more in a *project* exceeding 200 *dwelling units*.
- (See Appendix A.)

**4)** If *barrier-free dwelling units* are provided in accordance with Sentence (3), one parking stall per unit shall be provided meeting the requirements of Sentence 3.8.2.2.(4).

### 3.8.1.2. Entrances

(See Appendix A.)

**1)** In addition to the *barrier-free* entrances required by Sentence (2), not less than 50% of the pedestrian entrances to a *building* in Sentence 3.8.1.1.(1), including *walkways* leading to the entrances from a public thoroughfare and from on-site parking areas, shall be *barrier-free*.

**2)** A *suite of assembly occupancy, business and personal services occupancy or mercantile occupancy* that is located in the *first storey* of a *building*, or in a *storey* to which a *barrier-free* path of travel is provided, and that is completely separated from the remainder of the *building* so that there is no access to the remainder of the *building*, shall have at least one *barrier-free* entrance.

**3)** A *barrier-free* entrance required by Sentences (1) or (2) shall be designed in accordance with Article 3.8.3.3.

**4)** At a *barrier-free* entrance that includes more than one doorway, only one of the doorways is required to be designed in accordance with the requirements of Article 3.8.3.3.

**5)** If a *walkway* or pedestrian bridge connects two *barrier-free storeys* in different *buildings*, the path of travel from one *storey* to the other *storey* by means of the *walkway* or bridge shall be *barrier-free*.

**6)** If an entrance is equipped with a security system, both visual and audible signals shall be used to indicate when the door lock is released.

### 3.8.1.3. Barrier-Free Path of Travel

**1)** Except as required elsewhere in this Part or as permitted by Article 3.8.3.3. pertaining to doorways, the unobstructed width of a *barrier-free* path of travel shall be not less than 920 mm.

**2)** Interior and exterior walking surfaces that are within a *barrier-free* path of travel shall

- a) have no opening that will permit the passage of a sphere more than 13 mm diam,
- b) have any elongated openings oriented approximately perpendicular to the direction of travel,
- c) be stable, firm and slip-resistant,
- d) be bevelled at a maximum slope of 1 in 2 at changes in level not more than 13 mm, and
- e) be provided with sloped floors or ramps at changes in level more than 13 mm.

**3)** A *barrier-free* path of travel is permitted to include ramps, passenger elevators or other platform-equipped passenger-elevating devices to overcome a difference in level.

**4)** The width of a *barrier-free* path of travel that is more than 30 m long shall be increased to not less than 1 500 mm for a length of 1 500 mm at intervals not exceeding 30 m.

### 3.8.1.4. Access to Storeys Served by Escalators and Moving Walks

**1)** In a *building* in which an escalator or inclined moving walk provides access to any floor level above or below the entrance floor level, an interior *barrier-free* path of travel shall also be provided to that floor level. (See Appendix A.)

**2)** The route from the escalator or inclined moving walk to the *barrier-free* path of travel that leads from floor to floor as required by Sentence (1) shall be clearly indicated by appropriate signs.

### 3.8.1.5. Controls

**1)** Except as required by Sentence 3.5.2.1.(3) and Article 3.8.3.5. for elevators and platform-equipped passenger-elevating devices, controls for the operation of *building* services or safety devices, including electrical switches, thermostats and intercom switches, that are intended to be operated by the occupant and are located in or adjacent to a *barrier-free* path of travel shall be accessible to a person in a wheelchair, operable with one hand, and mounted between 400 mm and 1 200 mm above the floor.

## 3.8.2. Occupancy Requirements

### 3.8.2.1. Areas Requiring a Barrier-Free Path of Travel

(See Appendix A.)

**1)** Except as permitted by Sentences (2), (4) and (5), a *barrier-free* path of travel from the entrances required by Sentences 3.8.1.2.(1) and (2) shall be provided throughout all normally occupied *floor areas*. (See Article 3.3.1.7. for additional requirements regarding *floor areas* above or below the *first storey* to which a *barrier-free* path of travel is required.)

**2)** A *barrier-free* path of travel for persons using wheelchairs is not required

- a) to *service rooms*,
- b) to elevator machine rooms,
- c) to janitors' rooms,
- d) to *service spaces*,
- e) to crawl spaces,
- f) to *attic or roof spaces*,
- g) to floor levels not served by a passenger elevator, a platform equipped passenger elevating device, an escalator, or an inclined moving walk,
- h) to *high-hazard industrial occupancies*,
- i) within portions of a *floor area* with fixed seats in an *assembly occupancy* where those portions are not part of the *barrier-free* path of travel to spaces designated for use by persons using wheelchairs,
- j) within floor levels of a *suite of residential occupancy* that are not at the same level as the entry level to the *suite*,
- k) within a *suite of residential occupancy* that has not been required by other provisions of this Code to be *barrier-free*, or
- l) within those parts of a *floor area* that are not at the same level as the entry level, provided amenities and uses provided on any raised or sunken level are accessible on the entry level by means of a *barrier-free* path of travel.

**3)** Unless a *barrier-free* path of travel is not required in an *assembly occupancy* by Clause (2)(i), the number of spaces designated for use by persons using wheelchairs within rooms or areas with fixed seats shall conform to Table 3.8.2.1. and be dispersed

- a) in each floor level of seating,
- b) in each price range of seating, and
- c) in each viewing section of seating.

(See Article 3.8.3.6. for the design requirements.)

**Table 3.8.2.1.**  
**Designated Wheelchair Spaces**  
 Forming Part of Sentence 3.8.2.1.(3)

Number of Fixed Seats in Seating Area	Number of Spaces Required for Wheelchairs
2 - 100	2
101 - 200	3
201 - 300	4
301 - 400	5
401 - 500	6
501 - 900	7
901 - 1300	8
1301 - 1700	9
each increment of up to 400 seats in excess of 1700	one additional space

**4)** Except as provided in Sentence (5), Sentence (1) does not apply to a *storey* that is not more than 600 m<sup>2</sup> in area and is above or below the *first storey* of a *building* that does not exceed two *storeys* in *building height*.

**5)** Sentence (1) does not apply to a *storey* above or below the *first storey* in a *building* of *residential occupancy* that is neither more than 3 *storeys* in *building height* nor more than 600 m<sup>2</sup> in *building area* and is not served by a passenger-type elevator or other platform-equipped passenger-elevating device.

**3.8.2.2. Access to Parking Areas**  
 (See Appendix A.)

**1)** A *barrier-free* path of travel shall be provided from the entrance described in Article 3.8.1.2. to

- a) an exterior parking area, if exterior parking is provided,
- b) at least one parking level in a parking structure, and
- c) to every parking level in a parking structure served by a passenger elevator.

**2)** If more than eleven parking stalls are required by the planning regulations made pursuant to the Municipal Government Act, parking stalls for use by persons with physical disabilities shall be provided in conformance with Table 3.8.2.2.

**Table 3.8.2.2.**  
**Designated Parking Spaces**  
 Forming Part of Sentence 3.8.2.2.(2)

Number of Parking Stalls Required	Number of Designated Stalls for Use by Persons with Physical Disabilities
11 – 25	1
26 – 50	2
51 – 100	3
for each additional increment of 100 or part thereof	one additional stall

- 3)** If an exterior passenger loading zone is provided, it shall have
  - a) an access aisle not less than 1 500 mm wide and 6 000 mm long adjacent and parallel to the vehicle pull-up space,

- b) a curb ramp, where there are curbs between the access aisle and the vehicle pull-up space, and
  - c) a clear height of not less than 2 750 mm at the pull-up space and along the vehicle access and egress routes.
- 4)** A parking stall intended for use by persons using a wheelchair shall
- a) be at least 3.7 m wide,
  - b) have a firm, slip-resistant and level surface, and
  - c) be clearly marked as being for the use of persons with disabilities only.
- (See Appendix A.)

### 3.8.2.3. Washrooms Required to be Barrier-Free

(See Appendix A.)

- 1)** Except as permitted by Sentence (2), all washrooms in a *barrier-free* path of travel shall be *barrier-free* in accordance with the appropriate requirements in Articles 3.8.3.8. to 3.8.3.12.
- 2)** A washroom need not conform to the requirements of Sentence (1) provided it is located
- a) within a *suite of residential occupancy* that has not been designated by Sentence 3.8.1.1.(3) to be accessible, or
  - b) in an individual *suite* having an area less than 500 m<sup>2</sup> and there are *barrier-free* washrooms on the same *floor area* within 45 m.
- 3)** In a *building* in which water closets are required in accordance with Section 7.2., at least one *barrier-free* water closet shall be provided in the entrance *storey*, unless
- a) a *barrier-free* path of travel is provided to *barrier-free* water closets elsewhere in the *building*, or
  - b) the water closets required by Section 7.2. are for *dwelling units* only.
- 4)** If *alterations* are made to an existing *building*, universal toilet rooms conforming to Article 3.8.3.12. are permitted to be provided in lieu of facilities for persons with physical disabilities in washrooms used by the general public.
- 5)** In addition to the requirements of Sentence (1), at least one universal toilet room conforming to Article 3.8.3.12. shall be provided in a regional transportation terminal.
- 6)** If more than one water closet is provided in a washroom, a *barrier-free* stall shall be provided for every 10 stalls or part thereof.
- 7)** For temporary uses, such as outdoor fairs and festivals, a *barrier-free* stall shall be provided for every 10 stalls or part thereof.

### 3.8.3. Design Standards

#### 3.8.3.1. Accessibility Signs

- 1)** Signs incorporating the international symbol of accessibility for persons with physical disabilities shall be installed to indicate the location of a *barrier-free* entrance. (See Appendix A.)
- 2)** A washroom, shower, elevator or parking space designed to be *barrier-free* shall be identified by a sign consisting of the international symbol of accessibility for persons with physical disabilities and by appropriate graphic or written directions to indicate clearly the type of facility available. (See Appendix A.)
- 3)** Facilities and services for persons with a specific disability shall be identified using nationally recognized symbols. (See Appendix A.)
- 4)** Accessibility signs for universal toilet rooms shall be installed in accordance with Clause (5)(b).
- 5)** Where tactile signage is installed, it shall
- a) be not less than 60 mm high, raised approximately 0.7 mm above the surface,
  - b) be located not more than 1 200 mm above the finished floor,
  - c) begin not more than 150 mm from the door or entrance,

- d) be contrasting in colour with the surface on which it is applied, and
- e) include Braille identification by use of Braille dots not less than 1 mm in relief, located directly below the tactile signage.

### 3.8.3.2. Exterior Walks

- 1) Exterior walks that form part of a *barrier-free* path of travel shall
  - a) have a cross slope not more than 1:50,
  - b) be not less than 1100 mm wide,
  - c) have a level area conforming to Clause 3.8.3.4.(1)(c) adjacent to an entrance doorway,
  - d) have a curb not less than 75 mm high wherever there is a vertical drop more than 75 mm from the walk surface and there is no wall, railing, or other barrier to provide protection,
  - e) have a surface not less than 1100 mm wide of a different texture and contrasting in colour to that surrounding it, if the path of travel is level and even with adjacent surfaces,
  - f) be free of obstructions for the full width of the walk to not less than 1980 mm high, except that handrails are permitted to project not more than 100 mm from either or both sides into the clear area, and
  - g) be designed as a ramp where the slope of the walk is more than 1 in 20.

### 3.8.3.3. Doorways and Doors

1) Every doorway that is located in a *barrier-free* path of travel shall have a clear width not less than 800 mm when the door is in the open position. (See Appendix A.)

2) Every doorway into rooms within a *suite of residential occupancy* shall have a clear width not less than 800 mm when the door is in the open position. (See Appendix A.)

3) Door operating devices shall be of a design which does not require tight grasping and twisting of the wrist as the only means of operation. (See Appendix A.)

4) A threshold for a doorway referred to in Sentences (1) or (2) shall be not more than 13 mm higher than the finished floor surface and shall be bevelled to facilitate the passage of wheelchairs.

5) Except as permitted by Sentences (6) and (12), every door that provides a *barrier-free* path of travel through an entrance referred to in Article 3.8.1.2. shall be equipped with a power door operator that allows persons to activate the opening of the door from either side if the entrance serves

- a) a hotel,
- b) a *building* of Group B, Division 2 *major occupancy*, or
- c) a *building* of Group A, D or E *major occupancy* more than 500 m<sup>2</sup> in *building area*.

(See Appendix A.)

6) The requirements of Sentence (5) do not apply to an individual *suite* having an area less than 500 m<sup>2</sup> in a *building* having only *suites of assembly occupancy, business and personal services occupancy or mercantile occupancy* if the *suite* is completely separated from the remainder of the *building* so that there is no access to the remainder of the *building*.

7) Except as permitted by Sentence (8) and except for a door with a power door operator, a closer for a door in a *barrier-free* path of travel shall be designed to permit the door to open when the force applied to the handle, push plate or latch-releasing device is not more than

- a) 38 N in the case of an exterior door, or
- b) 22 N in the case of an interior door.

8) Sentence (7) does not apply to a door at the entrance to a *dwelling unit*, or where greater forces are required in order to close and latch the door against the prevailing difference in air pressure on opposite sides of the door. (See Appendix A.)

**9)** Except for a door at the entrance to a *dwelling unit*, a closer for an interior door in a *barrier-free* path of travel shall have a closing period of not less than 3 s measured from when the door is in an open position of 70° to the doorway, to when the door reaches a point 75 mm from the closed position, measured from the leading edge of the latch side of the door. (See Appendix A.)

**10)** Unless equipped with a power door operator or within a *suite*, a door in a *barrier-free* path of travel shall have a clear space on the latch side extending the height of the doorway and not less than

- a) 600 mm beyond the edge of the door opening if the door swings toward the approach side, and
- b) 300 mm beyond the edge of the door opening if the door swings away from the approach side.

(See Appendix A.)

**11)** A vestibule located in a *barrier-free* path of travel shall be arranged to allow the movement of wheelchairs between doors and shall provide a distance between 2 doors in series of not less than 1200 mm plus the width of any door that swings into the space in the path of travel from one door to another.

**12)** Only the active leaf in a multiple leaf door in a *barrier-free* path of travel need conform to the requirements of this Article.

**13)** Except as provided in Clause 3.8.3.4.(1)(c), the floor surface on each side of a door in a *barrier-free* path of travel shall be level within a rectangular area

- a) as wide as the door plus the clearance required on the latch side by Sentence 3.8.3.3.(10), and
- b) whose dimension perpendicular to the closed door is not less than the width of the *barrier-free* path of travel but need not exceed 1 500 mm.

#### 3.8.3.4. Ramps

- 1)** A ramp located in a *barrier-free* path of travel shall
  - a) have a width not less than 870 mm between handrails,
  - b) have a slope not more than 1 in 12 (see Appendix A),
  - c) have a level area not less than 1500 by 1500 mm at the top and bottom and at intermediate levels of a ramp leading to a door, so that on the latch side the level area extends not less than
    - i) 600 mm beyond the edge of the door opening where the door opens towards the ramp, or
    - ii) 300 mm beyond the edge of the door opening where the door opens away from the ramp
 (see Appendix A),
  - d) have a level area not less than 1200 mm long and at least the same width as the ramp at intervals not more than 9 m along its length,
  - e) except as permitted by Sentence (2), be equipped with handrails and *guards* conforming to Articles 3.4.6.4. and 3.4.6.5.,
  - f) have a level area not less than 1 200 by 1 200 mm where a ramp makes a 90° turn, and
  - g) have a level area not less than 1 500 by 1 500 mm where a ramp makes a 180° turn.

**2)** The requirement for handrails in Clause (1)(e) need not apply to a ramp serving as an aisle for fixed seating.

**3)** Floors or walks in a *barrier-free* path of travel having a slope steeper than 1 in 20 shall be designed as ramps.

#### 3.8.3.5. Passenger-elevating devices

**1)** Where passenger elevators are used in a *barrier-free* path of travel, features described in Appendix E of CSA B44, "Safety Code for Elevators" shall be included in their design and construction.

**2)** A platform-equipped passenger-elevating device used in a *barrier-free* path of travel shall conform to the elevating devices regulations made pursuant to the Safety Codes Act.

### 3.8.3.6. Spaces in Seating Area

- 1)** Spaces designated for use by persons using wheelchairs referred to in Sentence 3.8.2.1.(3) shall be
- clear and level, or level with easily removable seating,
  - not less than 900 mm wide and 1525 mm long to allow a person using a wheelchair to enter from a side approach and 1220 mm long where the person using a wheelchair enters from the front or rear of the space,
  - arranged so that at least 2 designated spaces are side by side,
  - located adjoining a *barrier-free* path of travel without infringing on egress from any row of seating or any aisle requirements, and
  - situated, as part of the designated seating plan, to provide a choice of viewing locations and a clear view of the event taking place.

### 3.8.3.7. Assistive Listening Devices

(See Appendix A.)

**1)** Except as permitted by Sentence (2), in a *building of assembly occupancy*, all assembly areas with an area of more than 100 m<sup>2</sup> shall be equipped with an assistive listening system encompassing the entire seating area.

**2)** If the assistive listening system required by Sentence (1) is an induction loop system, only half the seating area in the room need be encompassed.

### 3.8.3.8. Water Closet Stalls

- 1)** A water closet stall or enclosure in a washroom required by Article 3.8.2.3. to be *barrier-free* shall
- be designed to allow a person using a wheelchair to turn in an open space that has a diameter of not less than 1500 mm,
  - be equipped with a door that
    - can be latched from the inside with a closed fist,
    - provides a clear opening of not less than 800 mm wide with the door in the open position,
    - swings outward, unless sufficient room is provided within the stall or enclosure to allow the door to be closed without interfering with the person using a wheelchair (see Appendix A),
    - is provided with a door pull on the inside not less than 140 mm long located so that its midpoint is not less than 200 mm and not more than 300 mm from the hinged side of the door and not less than 900 mm and not more than 1000 mm from the floor (see Appendix A), and
    - is provided with a door pull on the outside, near the latch side of the door,
  - have a water closet located so that its centreline is not less than 460 mm and not more than 480 mm from an adjacent side wall on one side,
  - be equipped with knurled finished grab bars as described in Sentence (2),
  - be equipped with a coat hook mounted not more than 1400 mm above the floor on a side wall and projecting not more than 50 mm from the wall, and
  - have a clearance of not less than 1700 mm between the outside of the stall face and the face of an in-swinging washroom door and 1400 mm between the outside of the stall face and any wall-mounted fixture.

- 2)** A grab bar required by Sentence (1) shall
- a) be mounted
    - i) horizontally on the wall beside the water closet, and be not less than 1 200 mm in length, located with its centreline between 300 mm and 330 mm above the height of the water closet seat and with its midpoint located in line with the front edge of the water closet, or
    - ii) on the wall beside the water closet and have a horizontal portion 600 mm in length with a 600 mm extension extending upwards to the front and away from the horizontal portion at an angle of 60° to the horizontal with the centreline of the horizontal portion between 300 mm and 330 mm above the height of the water closet seat and the intersection of the horizontal and sloping portions located in line with the front edge of the water closet,
  - b) be mounted horizontally on the wall behind the water closet, if the water closet does not have an attached water tank, centred on the toilet bowl, and be not less than 600 mm in length,
  - c) be installed to resist a load not less than 1.3 kN applied vertically or horizontally,
  - d) be not less than 30 mm and not more than 40 mm in diameter, and
  - e) have a clearance not less than 35 mm and not more than 45 mm from the wall.

(See Appendix A.)

### 3.8.3.9. Water Closets

- 1)** A water closet for a person with physical disabilities shall
- a) be equipped with a seat located at not less than 400 mm and not more than 460 mm above the floor,
  - b) be equipped with hand-operated flushing controls that are easily accessible to a wheelchair user or be automatically operable,
  - c) be equipped with a seat lid or other back support, and
  - d) not have a spring-actuated seat.

(See Appendix A.)

### 3.8.3.10. Urinals

- 1)** If urinals are provided in a *barrier-free* washroom, at least one urinal shall be
- a) wall mounted, with the rim located between 488 mm and 512 mm above the floor, or
  - b) floor mounted, with the rim level with the finished floor.
- 2)** The urinal described in Sentence (1) shall have
- a) a clear width of approach of 800 mm centred on the urinal,
  - b) no step in front, and
  - c) installed on each side a vertically mounted grab bar that is not less than 300 mm long, with its centreline 1000 mm above the floor, and located not more than 380 mm from the centreline of the urinal.

(See Appendix A.)

### 3.8.3.11. Lavatories

- 1)** A *barrier-free* washroom shall be provided with a lavatory that
- a) is located so that the distance between the centreline of the lavatory and the side wall is not less than 460 mm,
  - b) has a rim height not more than 865 mm above the floor,

- c) has a clearance beneath the lavatory not less than
    - i) 760 mm wide,
    - ii) 735 mm high at the front edge,
    - iii) 685 mm high at a point 205 mm back from the front edge, and
    - iv) 230 mm high over the distance from a point 280 mm to a point 430 mm back from the front edge
 (see Appendix A),
  - d) has insulated pipes where they would otherwise present a burn hazard (see Appendix A),
  - e) has a soap dispenser located close to the lavatory, not more than 1200 mm above the floor and accessible to persons in wheelchairs, and
  - f) has a towel dispenser or other hand-drying equipment located close to the lavatory, not more than 1200 mm above the floor in an area that is accessible to persons in wheelchairs.
- 2)** If mirrors are provided in a *barrier-free* washroom, at least one mirror shall be
- a) mounted with its bottom edge not more than 1000 mm above the floor, or
  - b) be inclined to the vertical to be usable by a person in a wheelchair.

### 3.8.3.12. Universal Toilet Rooms

(See Appendix A.)

- 1)** A universal toilet room shall
- a) be served by a *barrier-free* path of travel,
  - b) have a door capable of being locked from the inside and released from the outside in case of emergency and having
    - i) a latch-operating mechanism that is operable with a closed fist, located not less than 900 mm and not more than 1 000 mm above the floor,
    - ii) if it is an outward swinging door, a door pull not less than 140 mm long located on the inside so that its midpoint is not less than 200 mm and not more than 300 mm from the hinged side of the door and not less than 900 mm and not more than 1 000 mm above the floor (see A-3.8.3.8.(1)(b)(iv) in Appendix A), and
    - iii) if it is an outward swinging door, a door closer, spring hinges or gravity hinges, so that the door closes automatically,
  - c) have one lavatory conforming to Article 3.8.3.11.,
  - d) have one water closet conforming to the requirements of Article 3.8.3.9. that has a clearance to the walls of
    - i) not less than 285 mm and not more than 305 mm on one side, and
    - ii) not less than 875 mm on the other side,
  - e) have grab bars conforming to Clause 3.8.3.8.(1)(d),
  - f) have no internal dimension between the walls that is less than 1 700 mm,
  - g) have a coat hook conforming to Clause 3.8.3.8.(1)(e) and a shelf located not more than 1 200 mm above the floor,
  - h) be designed to permit a wheelchair to back in alongside the water closet in the space referred to in Subclause (d)(ii), and
    - i) be designed to permit a wheelchair to turn in an open space not less than 1 500 mm in diameter.

### 3.8.3.13. Showers

- 1)** Except within a *suite of residential occupancy*, where showers are provided in a *building*, at least one shower stall in each group of showers shall be *barrier-free* and shall
- a) be not less than 1 500 mm wide and 900 mm deep,

- b) have a clear floor space at the entrance to the shower, not less than 900 mm deep and the same width as the shower, except that fixtures are permitted to project into that space provided they do not restrict access to the shower (see Appendix A),
- c) have a slip-resistant floor surface,
- d) have a bevelled threshold not more than 13 mm higher than the finished floor,
- e) have a hinged seat that is not spring-loaded or a fixed seat that is
  - i) not less than 450 mm wide and 400 mm deep,
  - ii) mounted approximately 450 mm above the floor, and
  - iii) designed to carry a minimum load of 1.3 kN,
- f) have a horizontal knurled finished grab bar conforming to Clauses 3.8.3.8.(2)(c), (d) and (e) that is
  - i) not less than 900 mm long located on the wall 100 mm from the back of the seat,
  - ii) mounted between 750 mm and 850 mm above the floor, and
  - iii) located on the wall opposite the entrance to the shower so that not less than 300 mm of its length is at one side of the seat,
 (see Appendix A),
- g) have a pressure-equalizing or thermostatic mixing valve controlled by a lever or other device operable with a closed fist from the seated position, located on the side wall between 200 mm and 300 mm in front of the seat,
- h) have a hand-held shower head with not less than 1 800 mm of flexible hose, located so that it can be reached from the seated position and equipped with a support so that it can operate as a fixed shower head, and
- i) have fully recessed soap holders which can be reached from the seated position and located on the side wall between 100 mm and 200 mm in front of the seat.

**2)** Within a *building* containing *suites of residential occupancy*, where more than one *suite* is required to be *barrier-free* and contains bathing facilities, 50% of the *barrier-free suites* shall contain wheelchair-accessible showers conforming to Clauses (1)(a) to (i) and 50% shall contain bathtubs conforming to Sentence 3.8.3.17.(1).

### 3.8.3.14. Counters

- 1)** Every counter more than 2 m long, at which the public is served, shall have at least one *barrier-free* section not less than 760 mm long centred over a knee space conforming to Sentence (3). (See Appendix A.) (See also A-3.8.2.1. in Appendix A.)
- 2)** A *barrier-free* counter surface shall be not more than 865 mm above the floor.
- 3)** Except as permitted in Sentence (4), the knee space beneath a *barrier-free* counter intended to be used as a work surface shall be not less than
  - a) 760 mm wide,
  - b) 685 mm high, and
  - c) 485 mm deep.
- 4)** A counter that is used in a cafeteria, or one that performs a similar function whereat movement takes place parallel to the counter, need not provide a knee space underneath it.

### 3.8.3.15. Shelves or Counters for Telephones

(See Appendix A.)

- 1)** If built-in shelves or counters are provided for public telephones, they shall be level and shall
  - a) be not less than 265 mm deep, and
  - b) have, for each telephone provided, a clear space adjacent to the phone, not less than 265 mm wide, having no obstruction within 265 mm above the surface.
- 2)** The top surface of a section of the shelf or counter described in Sentence (1) serving at least one telephone shall be not more than 865 mm above the floor.

3) If a wall-hung telephone is provided above a shelf or counter section described in Sentence (2), it shall be located so that the receiver and coin slot are not more than 1 370 mm above the floor.

4) At least one telephone with a built-in telecommunication device for the deaf (TTY/TDD) shall be provided if public telephones are installed in lobbies or entrance foyers of

- a) *buildings* classified as Group A, Group B, Division 1, or Group E *major occupancies*,
- b) hospitals in Group B, Division 2 *major occupancies*,
- c) police stations in Group D *major occupancies*, or
- d) hotels and motels.

#### 3.8.3.16. Drinking Fountains

- 1) If drinking fountains are provided, at least one shall be *barrier-free* and shall
- a) have a spout located near the front of the unit not more than 915 mm above the floor, and
  - b) be equipped with controls that are easily operable from a wheelchair using one hand with a force of not more than 22 N or be automatically operable.

#### 3.8.3.17. Bathtubs

- 1) A bathtub that is installed in a *suite of residential occupancy* required to be *barrier-free* shall
- a) be located in a room complying with the dimensions of Sentence 3.8.3.12.(1),
  - b) conform to Article 7.2.1.8.,
  - c) be equipped with a hand-held shower head mounted on a vertical slide bar not less than 760 mm long and with the bottom of the slide bar at a height not less than 1 200 mm above the floor, and controls and flexible hose conforming to Article 3.8.3.13.,
  - d) have grab bars that
    - i) can resist a load not less than 1.3 kN applied vertically or horizontally,
    - ii) are not less than 1 200 mm long, located vertically at the end of the bathtub that is adjacent to the clear floor space, with the lower end between 180 mm and 280 mm above the bathtub rim, and
    - iii) are not less than 1 200 mm long located horizontally along the length of the bathtub located 180 mm to 280 mm above the bathtub rim, and
  - e) have a clear floor space not less than 900 mm wide along its length.

## Section 3.9. Objectives and Functional Statements

### 3.9.1. Objectives and Functional Statements

#### 3.9.1.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.1. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)



# Part 4

## Structural Design

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# **Part 4**

## **Structural Design**

### **Section 4.1. Structural Loads and Procedures**

#### **4.1.1. General**

##### **4.1.1.1. Scope**

- 1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A.

##### **4.1.1.2. Definitions**

- 1) Words that appear in italics in this Part are defined in Article 1.4.1.2. of Division A.

##### **4.1.1.3. Design Requirements**

- 1) *Buildings* and their structural members and connections, including formwork and falsework, shall be designed to have sufficient structural capacity and structural integrity to safely and effectively resist all loads, effects of loads and influences that may reasonably be expected, having regard to the expected service life of *buildings*, and shall in any case satisfy the requirements of this Section. (See Appendix A.)

- 2) *Buildings* and their structural members shall be designed for serviceability, in accordance with Articles 4.1.3.4., 4.1.3.5. and 4.1.3.6. (See Appendix A.)

- 3) All permanent and temporary structural members, including the formwork and falsework of a *building*, shall be protected against loads exceeding the specified loads during the construction period except when, as verified by analysis or test, temporary overloading of a structural member would result in no impairment of that member or any other member.

- 4) Falsework, scaffolding, and formwork shall be designed in conformance with
  - a) CSA S269.1, "Falsework for Construction Purposes,"
  - b) CAN/CSA-S269.2-M, "Access Scaffolding for Construction Purposes," or
  - c) CAN/CSA-S269.3-M, "Concrete Formwork."

- 5) Precautions shall be taken during all phases of construction to ensure that the *building* is not damaged or distorted due to loads applied during construction.

##### **4.1.1.4. Structural Drawings and Related Documents**

- 1) Structural drawings and related documents shall conform to the appropriate requirements of Section 2.2. of Division C. (See Subsection 2.2.4. of Division C.)

##### **4.1.1.5. Design Basis**

- 1) Except as provided in Sentence (2), *buildings* and their structural members shall be designed in conformance with the procedures and practices provided in this Part.

**4.1.2.1.**

**2)** Provided the design is carried out by a person especially qualified in the specific methods applied and provided the design demonstrates a level of safety and performance in accordance with the requirements of Part 4, *buildings* and their structural components falling within the scope of Part 4 that are not amenable to analysis using a generally established theory may be designed by

- a) evaluation of a full-scale structure or a prototype by a loading test, or
- b) studies of model analogues.

(See Appendix A.)

**4.1.2. Specified Loads and Effects**

**4.1.2.1. Loads and Effects**

(See Appendix A.)

**1)** Except as provided in Article 4.1.2.2., the following categories of loads, specified loads and effects shall be taken into consideration in the design of a *building* and its structural members and connections:

- D** ..... *dead load* – a permanent load due to the weight of *building* components, as specified in Subsection 4.1.4.,
- E** ..... earthquake load and effects – a rare load due to an earthquake, as specified in Subsection 4.1.8.,
- H** ..... a permanent load due to lateral earth pressure, including *groundwater*,
- L** ..... *live load* – a variable load due to intended use and *occupancy* (including loads due to cranes and the pressure of liquids in containers), as specified in Subsection 4.1.5.,
- P** ..... permanent effects caused by pre-stress,
- S** ..... variable load due to snow, including ice and associated rain, as specified in Article 4.1.6.2., or due to rain, as specified in Article 4.1.6.4.,
- T** ..... effects due to contraction, expansion, or deflection caused by temperature changes, shrinkage, moisture changes, creep, ground settlement, or a combination thereof (see Appendix A), and
- W** ..... wind load – a variable load due to wind, as specified in Subsection 4.1.7.,

where

- a) load means the imposed deformations (i.e. deflections, displacements or motions that induce deformations and forces in the structure), forces and pressures applied to the *building* structure,
- b) permanent load is a load that changes very little once it has been applied to the structure, except during repair,
- c) variable load is a load that frequently changes in magnitude, direction or location, and
- d) rare load is a load that occurs infrequently and for a short time only.

**2)** Minimum specified values of the loads described in Sentence (1), as set forth in Subsections 4.1.4. to 4.1.8., shall be increased to account for dynamic effects where applicable.

**3)** For the purpose of determining specified loads S, W or E in Subsections 4.1.6., 4.1.7. and 4.1.8., *buildings* shall be assigned an Importance Category based on intended use and *occupancy*, in accordance with Table 4.1.2.1. (See Appendix A.)

**Table 4.1.2.1.**  
**Importance Categories for Buildings**  
 Forming Part of Sentence 4.1.2.1.(3)

Use and <i>Occupancy</i>	Importance Category
<p><i>Buildings</i> that represent a low direct or indirect hazard to human life in the event of failure, including:</p> <ul style="list-style-type: none"> <li>• low human-<i>occupancy buildings</i>, where it can be shown that collapse is not likely to cause injury or other serious consequences</li> <li>• minor storage <i>buildings</i></li> </ul>	Low <sup>(1)</sup>
All <i>buildings</i> except those listed in Importance Categories Low, High and Post-disaster	Normal
<p><i>Buildings</i> that are likely to be used as post-disaster shelters, including <i>buildings</i> whose primary use is:</p> <ul style="list-style-type: none"> <li>• as an elementary, middle or secondary school</li> <li>• as a community centre</li> </ul> <p>Manufacturing and storage facilities containing toxic, explosive or other hazardous substances in sufficient quantities to be dangerous to the public if released<sup>(1)</sup></p>	High
<p><i>Post-disaster buildings</i> are <i>buildings</i> that are essential to the provision of services in the event of a disaster, and include:</p> <ul style="list-style-type: none"> <li>• hospitals, emergency treatment facilities and blood banks</li> <li>• telephone exchanges</li> <li>• power generating stations and electrical substations</li> <li>• control centres for air, land and marine transportation</li> <li>• public water treatment and storage facilities, and pumping stations</li> <li>• sewage treatment facilities and <i>buildings</i> having critical national defence functions</li> <li>• <i>buildings</i> of the following types, unless exempted from this designation by the <i>authority having jurisdiction</i>:<sup>(2)</sup> <ul style="list-style-type: none"> <li>• emergency response facilities</li> <li>• fire, rescue and police stations, and housing for vehicles, aircraft or boats used for such purposes</li> <li>• communications facilities, including radio and television stations</li> </ul> </li> </ul>	Post-disaster

**Notes to Table 4.1.2.1.:**

<sup>(1)</sup> See Appendix A.

<sup>(2)</sup> See A-1.4.1.2.(1), Post-disaster Buildings, in Appendix A of Division A.

**4.1.2.2. Loads Not Listed**

**1)** Where a *building* or structural member can be expected to be subjected to loads, forces or other effects not listed in Article 4.1.2.1., such effects shall be taken into account in the design based on the most appropriate information available.

**4.1.3. Limit States Design**

(See Appendix A.)

**4.1.3.1. Definitions**

- 1)** In this Subsection, the term
- a) limit states means those conditions of a *building* structure that result in the *building* ceasing to fulfill the function for which it was designed (those limit states concerning safety are called ultimate limit states (ULS) and include exceeding the load-carrying capacity, overturning, sliding and fracture; those limit states that restrict the intended use and *occupancy* of the *building* are called serviceability limit states (SLS) and include deflection, vibration, permanent deformation and local structural damage such as cracking; and those limit states that represent failure under repeated loading are called fatigue limit states),
  - b) specified loads (**D, E, H, L, P, S, T** and **W**) means those loads defined in Article 4.1.2.1.,
  - c) principal load means the specified variable load or rare load that dominates in a given load combination,

- d) companion load means a specified variable load that accompanies the principal load in a given load combination,
- e) service load means a specified load used for the evaluation of a serviceability limit state,
- f) principal-load factor means a factor applied to the principal load in a load combination to account for the variability of the load and load pattern and the analysis of its effects,
- g) companion-load factor means a factor that, when applied to a companion load in the load combination, gives the probable magnitude of a companion load acting simultaneously with the factored principal load,
- h) importance factor,  $I$ , means a factor applied in Subsections 4.1.6., 4.1.7. and 4.1.8. to obtain the specified load and take into account the consequences of failure as related to the limit state and the use and *occupancy* of the *building*,
- i) factored load means the product of a specified load and its principal-load factor or companion-load factor,
- j) effects refers to forces, moments, deformations or vibrations that occur in the structure,
- k) nominal resistance,  $R$ , of a member, connection or structure, is based on the geometry and on the specified properties of the structural materials,
- l) resistance factor,  $\phi$ , means a factor applied to a specified material property or to the resistance of a member, connection or structure, and that, for the limit state under consideration, takes into account the variability of dimensions and material properties, workmanship, type of failure and uncertainty in the prediction of resistance, and
- m) factored resistance,  $\phi R$ , means the product of nominal resistance and the applicable resistance factor.

#### 4.1.3.2. Strength and Stability

- 1) A *building* and its structural components shall be designed to have sufficient strength and stability so that the factored resistance,  $\phi R$ , is greater than or equal to the effect of factored loads, which shall be determined in accordance with Sentence 4.1.3.2.(2).
- 2) The effect of factored loads for a *building* or structural component shall be determined in accordance with the load combination cases listed in Table 4.1.3.2. and the requirements of Article 4.1.3.2., the applicable combination being that which results in the most critical effect. (See Appendix A.)
- 3) Where the effects due to lateral earth pressure,  $H$ , restraint effects from pre-stress,  $P$ , and imposed deformation,  $T$ , affect the structural safety, they shall be taken into account in the calculations, with load factors of 1.5, 1.0 and 1.25 assigned to  $H$ ,  $P$  and  $T$  respectively. (See Appendix A.)
- 4) Except as provided in Sentence 4.1.8.16.(1), the counteracting factored *dead load*,  $0.9D$  in load combination cases 2, 3 and 4 and  $1.0D$  in load combination case 5, shall be used when the *dead load* acts to resist overturning, uplift, sliding, failure due to stress reversal, and to determine anchorage requirements and the factored resistance of members. (See Appendix A.)
- 5) The principal-load factor 1.5 for *live load*,  $L$ , in Table 4.1.3.2. may be reduced to 1.25 for liquids in tanks.
- 6) The companion-load factor 0.5 for *live load*,  $L$ , in Table 4.1.3.2. shall be increased to 1.0 for storage areas, and equipment areas and *service rooms* referred to in Table 4.1.5.3.
- 7) The load factor 1.25 for *dead load*,  $D$ , in Table 4.1.3.2. for *soil*, superimposed earth, plants and trees shall be increased to 1.5, except that when the *soil* depth exceeds 1.2 m, the factor may be reduced to  $1 + 0.6/h_s$  but not less than 1.25, where  $h_s$  is the depth of *soil* in metres supported by the structure.

**8)** Earthquake load, *E*, in load combination case 5 of Table 4.1.3.2. includes horizontal earth pressure due to earthquake determined in accordance with Sentence 4.1.8.16.(4).

**9)** Provision shall be made to ensure adequate stability of the structure as a whole and adequate lateral, torsional and local stability of all structural parts.

**10)** Sway effects produced by vertical loads acting on the structure in its displaced configuration shall be taken into account in the design of *buildings* and their structural members.

**Table 4.1.3.2.**  
**Load Combinations for Ultimate Limit States**  
Forming Part of Sentence 4.1.3.2.(2)

Case	Load Combination <sup>(1)</sup>	
	Principal Loads	Companion Loads <sup>(2)</sup>
1	1.4D	
2	(1.25D <sup>(3)</sup> or 0.9D <sup>(4)</sup> ) + 1.5L <sup>(5)</sup>	0.5S <sup>(6)</sup> or 0.4W
3	(1.25D <sup>(3)</sup> or 0.9D <sup>(4)</sup> ) + 1.5S	0.5L <sup>(6)(7)</sup> or 0.4W
4	(1.25D <sup>(3)</sup> or 0.9D <sup>(4)</sup> ) + 1.4W	0.5L <sup>(7)</sup> or 0.5S
5	1.0D <sup>(4)</sup> + 1.0E <sup>(8)</sup>	0.5L <sup>(6)(7)</sup> + 0.25S <sup>(6)</sup>

**Notes to Table 4.1.3.2.:**

- (1) See Sentences 4.1.3.2.(2) and (3).
- (2) See Appendix A.
- (3) See Sentence 4.1.3.2.(7).
- (4) See Sentence 4.1.3.2.(4).
- (5) See Sentence 4.1.3.2.(5).
- (6) See Article 4.1.5.5.
- (7) See Sentence 4.1.3.2.(6).
- (8) See Sentence 4.1.3.2.(8).

**4.1.3.3. Fatigue**

**1)** A *building* and its structural components, including connections, shall be checked for fatigue failure under the effect of cyclical loads, as required in the standards listed in Section 4.3. (See Appendix A.)

**2)** Where vibration effects, such as resonance and fatigue resulting from machinery and equipment, are likely to be significant, a dynamic analysis shall be carried out. (See Appendix A.)

**4.1.3.4. Serviceability**

**1)** A *building* and its structural components shall be checked for serviceability limit states as defined in Clause 4.1.3.1.(1)(a) under the effect of service loads for serviceability criteria specified or recommended in Articles 4.1.3.5. and 4.1.3.6. and in the standards listed in Section 4.3. (See Appendix A.)

**4.1.3.5. Deflection**

- 1)** In proportioning structural members to limit serviceability problems resulting from deflections, consideration shall be given to
- a) the intended use of the *building* or member,
  - b) limiting damage to non-structural members made of materials whose physical properties are known at the time of design,

## 4.1.3.6.

- c) limiting damage to the structure itself, and
  - d) creep, shrinkage, temperature changes and pre-stress.
- (See Appendix A.)

**2)** The lateral deflection of *buildings* due to service wind and gravity loads shall be checked to ensure that structural elements and non-structural elements whose nature is known at the time the structural design is carried out will not be damaged.

**3)** Except as provided in Sentence (4), the total drift per *storey* under service wind and gravity loads shall not exceed 1/500 of the *storey* height unless other drift limits are specified in the design standards referenced in Section 4.3. (See Appendix A.)

**4)** The deflection limits required in Sentence (3) do not apply to industrial *buildings* or sheds if experience has proven that greater movement will have no significant adverse effects on the strength and function of the *building*.

**5)** The *building* structure shall be designed for lateral deflection due to E, in accordance with Article 4.1.8.13.

## 4.1.3.6.

**Vibration**

**1)** Floor systems susceptible to vibration shall be designed so that vibrations will have no significant adverse effects on the intended *occupancy* of the *building*. (See Appendix A.)

**2)** Where the fundamental vibration frequency of a structural system supporting an *assembly occupancy* used for rhythmic activities, such as dancing, concerts, jumping exercises or gymnastics, is less than 6 Hz, the effects of resonance shall be investigated by means of a dynamic analysis. (See Appendix A.)

**3)** A *building* susceptible to lateral vibration under wind load shall be designed in accordance with Article 4.1.7.2. so that the vibrations will have no significant adverse effects on the intended use and *occupancy* of the *building*. (See Appendix A.)

## 4.1.4.

**Dead Loads**

## 4.1.4.1.

**Dead Loads**

- 1)** The specified *dead load* for a structural member consists of
- a) the weight of the member itself,
  - b) the weight of all materials of construction incorporated into the *building* to be supported permanently by the member,
  - c) the weight of *partitions*,
  - d) the weight of permanent equipment, and
  - e) the vertical load due to earth, plants and trees.

**2)** Except as provided in Sentence (5), in areas of a *building* where *partitions* other than permanent *partitions* are shown on the drawings, or where *partitions* might be added in the future, allowance shall be made for the weight of such *partitions*.

**3)** The *partition* weight allowance referred to in Sentence (2) shall be determined from the actual or anticipated weight of the *partitions* placed in any probable position, but shall be not less than 1 kPa over the area of floor being considered.

**4)** *Partition* loads used in design shall be shown on the drawings as provided in Clause 2.2.4.3.(1)(d) of Division C.

**5)** In cases where the *dead load* of the *partition* is counteractive, the load allowances referred to in Sentences (2) and (3) shall not be included in the design calculations.

**6)** Except for structures where the *dead load* of *soil* is part of the load-resisting system, where the *dead load* due to *soil*, superimposed earth, plants and trees is counteractive, it shall not be included in the design calculations. (See Appendix A.)

**4.1.5. Live Loads Due to Use and Occupancy****4.1.5.1. Loads Due to Use of Floors and Roofs**

**1)** Except as provided in Sentence (2), the specified *live load* on an area of floor or roof depends on the intended use and *occupancy*, and shall not be less than either the uniformly distributed load patterns listed in Article 4.1.5.3., the loads resulting from the intended use, or the concentrated loads listed in Article 4.1.5.10., whichever produces the most critical effect.

**2)** For *buildings* in the Low Importance Category as described in Table 4.1.2.1., a factor of 0.8 may be applied to the *live load*.

**4.1.5.2. Uses Not Stipulated**

**1)** Except as provided in Sentence (2), where the use of an area of floor or roof is not provided for in Article 4.1.5.3., the specified *live loads* due to the use and *occupancy* of the area shall be determined from an analysis of the loads resulting from the weight of

- a) the probable assembly of persons,
- b) the probable accumulation of equipment and furnishings, and
- c) the probable storage of materials.

**2)** For *buildings* in the Low Importance Category as described in Table 4.1.2.1., a factor of 0.8 may be applied to the *live load*.

**4.1.5.3. Full and Partial Loading**

**1)** The uniformly distributed *live load* shall be not less than the value listed in Table 4.1.5.3., which may be reduced as provided in Article 4.1.5.9., applied uniformly over the entire area or on any portions of the area, whichever produces the most critical effects in the members concerned.

**Table 4.1.5.3.**  
**Specified Uniformly Distributed Live Loads on an Area of Floor or Roof**  
 Forming Part of Sentence 4.1.5.3.(1)

Use of Area of Floor or Roof	Minimum Specified Load, kPa
Assembly Areas a) Except for the areas listed under b) and c), assembly areas with or without fixed seats including Arenas Auditoria Churches Dance floors Dining areas <sup>(1)</sup> Foyers and entrance halls Grandstands, reviewing stands and bleachers Gymnasias Museums Promenades Rinks Stadia Theatres Other areas with similar uses	4.8
b) Assembly areas with fixed seats that have backs over at least 80% of the assembly area for the following uses: Churches Courtrooms Lecture Halls Theatres	2.4
c) Classrooms with or without fixed seats	2.4
Attics Accessible by a stairway in <i>residential occupancies</i> only Having limited accessibility so that there is no storage of equipment or material <sup>(2)</sup>	1.4 0.5
Balconies Exterior Interior and <i>mezzanines</i> that could be used by an assembly of people as a viewing area <sup>(2)</sup> Interior and <i>mezzanines</i> other than above	4.8 4.8 (3)
Corridors, lobbies and aisles Other than those listed below Not more than 1 200 mm in width and all upper floor corridors of residential areas only of apartments, hotels and motels (that cannot be used by an assembly of people as a viewing area) <sup>(2)</sup>	4.8 (3)

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**Table 4.1.5.3. (Continued)**

Use of Area of Floor or Roof	Minimum Specified Load, kPa
Equipment areas and <i>service rooms</i> including Generator rooms Mechanical equipment exclusive of elevators Machine rooms Pump rooms Transformer vaults Ventilating or air-conditioning equipment	3.6 <sup>(4)</sup>
<i>Exits</i> and fire escapes	4.8
Factories	6.0 <sup>(4)</sup>
Footbridges	4.8
Garages for Passenger cars Light trucks and unloaded buses Loaded buses and trucks and all other trucking spaces	2.4 6.0 12.0
Kitchens (other than residential)	4.8
Libraries Stack rooms Reading and study rooms	7.2 2.9
Office areas (not including record storage and computer rooms) located in <i>Basement</i> and the <i>first storey</i> Floors above the <i>first storey</i>	4.8 2.4
Operating rooms and laboratories	3.6
Patients' bedrooms	1.9
Recreation areas that cannot be used for assembly purposes including Billiard rooms Bowling alleys Pool rooms	3.6
Residential areas (within the scope of Article 1.3.3.2. of Division A) Sleeping and living quarters in apartments, hotels, motels, boarding schools and colleges	1.9
Residential areas (within the scope of Article 1.3.3.3. of Division A) Bedrooms Other areas Stairs within <i>dwelling units</i>	1.9 1.9 1.9
Retail and wholesale areas	4.8
Roofs	1.0 <sup>(5)</sup>
Sidewalks and driveways over areaways and <i>basements</i>	12.0

Table 4.1.5.3. (Continued)

Use of Area of Floor or Roof	Minimum Specified Load, kPa
Storage areas	4.8 <sup>(4)</sup>
Toilet areas	2.4
Underground slabs with earth cover	<sup>(6)</sup>
Warehouses	4.8 <sup>(4)</sup>

**Notes to Table 4.1.5.3.:**

- (1) See Article 4.1.5.6.  
 (2) See Appendix A.  
 (3) See Article 4.1.5.4.  
 (4) See Article 4.1.5.7.  
 (5) See Article 4.1.6.1.  
 (6) See Article 4.1.5.5.

**4.1.5.4. Loads for Occupancy Served**

- 1)** The following shall be designed to carry not less than the specified load required for the *occupancy* they serve, provided they cannot be used by an assembly of people as a viewing area:
- corridors, lobbies and aisles not more than 1200 mm wide,
  - all corridors above the *first storey* of residential areas of apartments, hotels and motels, and
  - interior balconies and *mezzanines*.

**4.1.5.5. Loads on Exterior Areas**

- 1)** Exterior areas accessible to vehicular traffic shall be designed for their intended use, including the weight of firefighting equipment, but not for less than the snow and rain loads prescribed in Subsection 4.1.6.
- 2)** Except as provided in Sentences (3) and (4), roofs shall be designed for either the uniform *live loads* specified in Table 4.1.5.3., the concentrated *live loads* listed in Table 4.1.5.10., or the snow and rain loads prescribed in Subsection 4.1.6., whichever produces the most critical effects in the members concerned.
- 3)** Exterior areas accessible to pedestrian traffic, but not vehicular traffic, shall be designed for their intended use, but not for less than the greater of
- the *live load* prescribed for assembly areas in Table 4.1.5.3., or
  - the snow and rain loads prescribed in Subsection 4.1.6.
- 4)** Roof parking decks shall be designed for either the uniformly distributed *live loads* specified in Table 4.1.5.3., the concentrated *live loads* listed in Table 4.1.5.10., or the roof snow load, whichever produces the most critical effect in the members concerned.

**4.1.5.6. Loads for Dining Areas**

- 1)** The minimum specified *live load* listed in Table 4.1.5.3. for dining areas may be reduced to 2.4 kPa for areas in *buildings* that are being converted to dining areas, provided that the *floor area* does not exceed 100 m<sup>2</sup> and the dining area will not be used for other assembly purposes, including dancing.

**4.1.5.7. Floor Loads Due to Intended Use**

- 1)** Equipment areas and *service rooms*, factories, storage areas and warehouses shall be designed for the *live loads* due to their intended use but not for less than the specified loads listed in Table 4.1.5.3.

**4.1.5.8. More Than One Occupancy**

**1)** Where an area of floor or roof is intended for 2 or more *occupancies* at different times, the value to be used from Table 4.1.5.3. shall be the greatest value for any of the *occupancies* concerned.

**4.1.5.9. Variation with Tributary Area**

(See Appendix A.)

**1)** An area used for *assembly occupancies* designed for a *live load* of less than 4.8 kPa and roofs designed for the minimum loading specified in Table 4.1.5.3. shall have no reduction for tributary area.

**2)** Where a structural member supports a tributary area of a floor or a roof, or a combination thereof, that is greater than 80 m<sup>2</sup> and either used for *assembly occupancies* designed for a *live load* of 4.8 kPa or more, or used for storage, manufacturing, retail stores, garages or as a footbridge, the specified *live load* due to use and *occupancy* is the load specified in Article 4.1.5.3. multiplied by

$$0.5 + \sqrt{20/A}$$

where A is the tributary area in square metres for this type of use and *occupancy*.

**3)** Where a structural member supports a tributary area of a floor or a roof, or a combination thereof, that is greater than 20 m<sup>2</sup> and used for any use or *occupancy* other than those indicated in Sentences (1) and (2), the specified *live load* due to use and *occupancy* is the load specified in Article 4.1.5.3. multiplied by

$$0.3 + \sqrt{9.8/B}$$

where B is the tributary area in square metres for this type of use and *occupancy*.

**4)** Where the specified *live load* for a floor is reduced in accordance with Sentences (2) or (3), the structural drawings shall indicate that a *live load* reduction factor for tributary area has been applied.

**4.1.5.10. Concentrated Loads**

**1)** The specified *live load* due to possible concentrations of load resulting from the use of an area of floor or roof shall not be less than that listed in Table 4.1.5.10. applied over an area of 750 mm by 750 mm located so as to cause maximum effects, except that for *occupancies* not listed in Table 4.1.5.10., the concentrations of load shall be determined in accordance with Article 4.1.5.2.

**Table 4.1.5.10.**  
**Specified Concentrated Live Loads on an Area of Floor or Roof**  
 Forming Part of Sentence 4.1.5.10.(1)

Area of Floor or Roof	Minimum Specified Concentrated Load, kN
Roof surfaces	1.3
Floors of classrooms	4.5
Floors of offices, manufacturing <i>buildings</i> , hospital wards and <i>stages</i>	9.0
Floors and areas used by passenger cars	11
Floors and areas used by vehicles not exceeding 3600 kg gross weight	18
Floors and areas used by vehicles exceeding 3600 kg but not exceeding 9000 kg gross weight	36
Floors and areas used by vehicles exceeding 9000 kg gross weight <sup>(1)</sup>	54
Driveways and sidewalks over areaways and <i>basements</i> <sup>(1)</sup>	54

**Notes to Table 4.1.5.10.:**

(1) See Appendix A.

**4.1.5.11. Sway Forces in Assembly Occupancies**

**1)** The floor assembly and other structural elements that support fixed seats in any *building* used for *assembly occupancies* accommodating large numbers of people at one time, such as grandstands, stadia and *theatre* balconies, shall be designed to resist a horizontal force equal to not less than 0.3 kN for each metre length of seats acting parallel to each row of seats, and not less than 0.15 kN for each metre length of seats acting at right angles to each row of seats, based on the assumption that these forces are acting independently of each other.

**4.1.5.12. Crane-Supporting Structures and Impact of Machinery and Equipment**

(See Appendix A.)

**1)** The minimum specified load due to equipment, machinery or other objects that may produce impact shall be the sum of the weight of the equipment or machinery and its maximum lifting capacity, multiplied by an appropriate factor listed in Table 4.1.5.12.

**2)** Crane runway structures shall be designed to resist a horizontal force applied normal to the top of the rails equal to not less than 20% of the sum of the weights of the lifted load and the crane trolley (excluding other parts of the crane).

**3)** The force described in Sentence (2) shall be equally distributed on each side of the runway and shall be assumed to act in either direction.

**4)** Crane runway structures shall be designed to resist a horizontal force applied parallel to the top of the rails equal to not less than 10% of the maximum wheel loads of the crane.

**Table 4.1.5.12.**  
**Factors for the Calculation of Impact Loads**  
 Forming Part of Sentence 4.1.5.12.(1)

Cause of Impact	Factor
Operation of cab or radio-operated cranes	1.25
Operation of pendant or hand-operated cranes	1.10
Operation of elevators	(1)
Supports for light machinery, shaft or motor-driven	1.20
Supports for reciprocating machinery (e.g. compressors)	1.50
Supports for power-driven units (e.g. piston engines)	1.50

**Notes to Table 4.1.5.12.:**

(1) See CSA B44, "Safety Code for Elevators."

**4.1.5.13. Bleachers**

**1)** Bleacher seats shall be designed for a uniformly distributed *live load* of 1.75 kN for each linear metre or for a concentrated load of 2.2 kN distributed over a length of 0.75 m, whichever produces the most critical effect on the supporting members.

**2)** Bleachers shall be checked by the erector after erection to ensure that all structural members, including bracing specified in the design, have been installed.

**3)** Telescopic bleachers shall be provided with locking devices to ensure stability while in use.

**4.1.5.14. Helicopter Landing Areas**

**1)** Helicopter landing areas on roofs shall be constructed in conformance with the requirements contained in the "Canadian Aviation Regulations – Part III," published by Transport Canada.

**4.1.5.15. Loads on Guards**

(See Appendix A.)

**1)** The minimum specified horizontal load applied inward or outward at the top of every required *guard* shall be

- a) 3.0 kN/m for *means of egress* in grandstands, stadia, bleachers and arenas,
- b) a concentrated load of 1.0 kN applied at any point for access ways to equipment platforms, contiguous stairs and similar areas where the gathering of many people is improbable, and
- c) 0.75 kN/m or a concentrated load of 1.0 kN applied at any point, whichever governs for locations other than those described in Clauses (a) and (b).

**2)** Individual elements within the *guard*, including solid panels and pickets, shall be designed for a load of 0.5 kN applied over an area of 100 mm by 100 mm located at any point in the element or elements so as to produce the most critical effect.

**3)** The loads required in Sentence (2) need not be considered to act simultaneously with the loads provided for in Sentences (1) and (4).

**4)** The minimum specified load applied vertically at the top of every required *guard* shall be 1.5 kN/m and need not be considered to act simultaneously with the horizontal load provided for in Sentence (1).

**5)** For loads on handrails, refer to Sentence 3.4.6.4.(9).

**4.1.5.16. Loads on Vehicle Guardrails**

**1)** Vehicle guardrails for *storage garages* shall be designed for a concentrated load of 22 kN applied horizontally outward at any point 500 mm above the floor surface. (See Appendix A.)

**4.1.5.17.**

**4.1.5.17. Loads on Walls Acting As Guards**

1) Where the floor elevation on one side of a wall, including a wall around a shaft, is more than 600 mm higher than the elevation of the floor or ground on the other side, the wall shall be designed to resist the appropriate lateral design loads prescribed elsewhere in this Section or 0.5 kPa, whichever produces the more critical effect.

**4.1.5.18. Firewalls**

(See Appendix A.)

1) *Firewalls* shall be designed to resist the maximum effect due to  
 a) the appropriate lateral design loads prescribed elsewhere in this Section, or  
 b) a factored lateral load of 0.5 kPa under fire conditions, as described in Sentence (2).

2) Under fire conditions, where the *fire-resistance rating* of the structure is less than that of the *firewall*,  
 a) lateral support shall be assumed to be provided by the structure on one side only, or  
 b) another structural support system capable of resisting the loads imposed by a fire on either side of the *firewall* shall be provided.

**4.1.5.19. Roof Suspended Platforms**

1) This Article applies to a *building* that is more than 12 m in height between *grade* and the edge of the roof or a parapet around the edge of the roof.

2) Roof tie back anchors and *building* face anchor systems shall be provided for window cleaning suspended power platforms and such platforms shall comply with  
 a) CAN/CSA-Z91, "Health and Safety Code for Suspended Equipment Operations," and  
 b) CAN/CSA-Z271, "Safety Code for Suspended Elevating Platforms."  
 (See Sentence 3.6.4.7.(2).)

**4.1.6. Loads Due to Snow and Rain**

**4.1.6.1. Specified Load Due to Rain or to Snow and Associated Rain**

1) The specified load on a roof or any other *building* surface subject to snow and associated rain shall be the snow load specified in Article 4.1.6.2., or the rain load specified in Article 4.1.6.4., whichever produces the more critical effect.

**4.1.6.2. Specified Snow Load**

(See Appendix A.)

1) The specified load, *S*, due to snow and associated rain accumulation on a roof or any other *building* surface subject to snow accumulation shall be calculated using the formula

$$S = I_s [S_s (C_b C_w C_s C_a) + S_r]$$

where

*I<sub>s</sub>* = importance factor for snow load as provided in Table 4.1.6.2.,

*S<sub>s</sub>* = 1-in-50-year ground snow load, in kPa, determined in accordance with Subsection 1.1.3.,

*C<sub>b</sub>* = basic roof snow load factor in Sentence (2),

*C<sub>w</sub>* = wind exposure factor in Sentences (3) and (4),

*C<sub>s</sub>* = slope factor in Sentences (5), (6) and (7),

*C<sub>a</sub>* = shape factor in Sentence (8), and

*S<sub>r</sub>* = 1-in-50-year associated rain load, in kPa, determined in accordance with Subsection 1.1.3., but not greater than *S<sub>s</sub>(C<sub>b</sub>C<sub>w</sub>C<sub>s</sub>C<sub>a</sub>)*.

**Table 4.1.6.2.**  
**Importance Factor for Snow Load,  $I_s$**   
 Forming Part of Sentence 4.1.6.2.(1)

Importance Category	Importance Factor, $I_s$	
	ULS	SLS
Low	0.8	0.9
Normal	1	0.9
High	1.15	0.9
Post-disaster	1.25	0.9

**2)** The basic roof snow load factor,  $C_b$ , shall be 0.8, except that for large roofs it shall be

- a)  $1.0 - (30/l_c)^2$ , for roofs with  $C_w = 1.0$  and  $l_c$  greater than or equal to 70 m, or
- b)  $1.3 - (140/l_c)^2$ , for roofs with  $C_w = 0.75$  or  $0.5$  and  $l_c$  greater than or equal to 200 m,

where

$l_c$  = characteristic length of the upper or lower roof, defined as  $2w - w^2/l$ , in metres,

$w$  = smaller plan dimension of the roof, in metres,

$l$  = larger plan dimension of the roof, in metres.

**3)** Except as provided for in Sentence (4), the wind exposure factor,  $C_w$ , shall be 1.0.

**4)** For *buildings* in the Low and Normal Importance Categories as set out in Table 4.1.2.1., the wind exposure factor given in Sentence (3) may be reduced to 0.75, or to 0.5 in exposed areas north of the treeline, where

- a) the *building* is exposed on all sides to wind over open terrain as defined in Clause 4.1.7.1.(5)(a), and is expected to remain so during its life,
- b) the area of roof under consideration is exposed to the wind on all sides with no significant obstructions on the roof, such as parapet walls, within a distance of at least 10 times the difference between the height of the obstruction and  $C_b C_w S_s / \gamma$  metres, where  $\gamma$  is the unit weight of snow on roofs (see Appendix A), and
- c) the loading does not involve the accumulation of snow due to drifting from adjacent surfaces.

**5)** Except as provided for in Sentences (6) and (7), the slope factor,  $C_s$ , shall be

- a) 1.0 where the roof slope,  $\alpha$ , is equal to or less than  $30^\circ$ ,
- b)  $(70^\circ - \alpha) / 40^\circ$  where  $\alpha$  is greater than  $30^\circ$  but not greater than  $70^\circ$ , and
- c) 0 where  $\alpha$  exceeds  $70^\circ$ .

**6)** The slope factor,  $C_s$ , for unobstructed slippery roofs where snow and ice can slide completely off the roof shall be

- a) 1.0 where the roof slope,  $\alpha$ , is equal to or less than  $15^\circ$ ,
- b)  $(60^\circ - \alpha) / 45^\circ$  where  $\alpha$  is greater than  $15^\circ$  but not greater than  $60^\circ$ , and
- c) 0 where  $\alpha$  exceeds  $60^\circ$ .

**7)** The slope factor,  $C_s$ , shall be 1.0 when used in conjunction with shape factors for increased snow loads as given in Clauses (8)(b) and (e).

**8)** The shape factor,  $C_a$ , shall be 1.0, except that where appropriate for the shape of the roof, it shall be assigned other values that account for

- a) non-uniform snow loads on gable, arched or curved roofs and domes,
- b) increased snow loads in valleys,
- c) increased non-uniform snow loads due to snow drifting onto a roof that is at a level lower than other parts of the same *building* or at a level lower than another *building* within 5 m of it,

- d) increased non-uniform snow loads on areas adjacent to roof projections, such as penthouses, large *chimneys* and equipment, and
- e) increased snow or ice loads due to snow sliding or meltwater draining from adjacent roofs.

#### 4.1.6.3. Full and Partial Loading

- 1) A roof or other *building* surface and its structural members subject to loads due to snow accumulation shall be designed for the specified load given in Sentence 4.1.6.2.(1), distributed over the entire loaded area.
- 2) In addition to the distribution mentioned in Sentence (1), flat roofs and shed roofs, gable roofs of 15° slope or less, and arched or curved roofs shall be designed for the specified uniform snow load indicated in Sentence 4.1.6.2.(1), which shall be calculated using  $C_a = 1.0$ , distributed on any one portion of the loaded area and half of this load on the remainder of the loaded area, in such a way as to produce the most critical effects on the member concerned. (See Appendix A.)

#### 4.1.6.4. Specified Rain Load

- 1) Except as provided in Sentence (4), the specified load,  $S$ , due to the accumulation of rainwater on a surface whose position, shape and deflection under load make such an accumulation possible, is that resulting from the one-day rainfall determined in conformance with Subsection 1.1.3. and applied over the horizontal projection of the surface and all tributary surfaces. (See Appendix A.)
- 2) The provisions of Sentence (1) apply whether or not the surface is provided with a means of drainage, such as rainwater leaders.
- 3) Except as provided in Sentence 4.1.6.2.(1), loads due to rain need not be considered to act simultaneously with loads due to snow. (See Appendix A.)
- 4) Where scuppers are provided and where the position, shape and deflection of the loaded surface make an accumulation of rainwater possible, the loads due to rain shall be the lesser of either the one-day rainfall determined in conformance with Subsection 1.1.3. or a depth of rainwater equal to 30 mm above the level of the scuppers, applied over the horizontal projection of the surface and tributary areas.

### 4.1.7. Wind Load

#### 4.1.7.1. Specified Wind Load

- 1) The specified external pressure or suction due to wind on part or all of a surface of a *building* shall be calculated using the formula

$$p = I_W q C_e C_g C_p$$

where

- $p$  = specified external pressure acting statically and in a direction normal to the surface, either as a pressure directed towards the surface or as a suction directed away from the surface,
- $I_W$  = importance factor for wind load, as provided in Table 4.1.7.1.,
- $q$  = reference velocity pressure, as provided in Sentence (4),
- $C_e$  = exposure factor, as provided in Sentence (5),
- $C_g$  = gust effect factor, as provided in Sentence (6), and
- $C_p$  = external pressure coefficient, averaged over the area of the surface considered.

(See Appendix A.)

**Table 4.1.7.1.**  
**Importance Factor for Wind Load,  $I_w$**   
 Forming Part of Sentences 4.1.7.1.(1) and (3)

Importance Category	Importance Factor, $I_w$	
	ULS	SLS
Low	0.8	0.75
Normal	1	0.75
High	1.15	0.75
Post-disaster	1.25	0.75

**2)** The net wind load for the *building* as a whole shall be the algebraic difference of the loads on the windward and leeward surfaces, and in some cases, may be calculated as the sum of the products of the external pressures or suctions and the areas of the surfaces over which they are averaged as provided in Sentence (1). (See Appendix A.)

**3)** The net specified pressure due to wind on part or all of a surface of a *building* shall be the algebraic difference of the external pressure or suction as provided in Sentence (1) and the specified internal pressure or suction due to wind calculated using the following formula:

$$p_i = I_w q C_e C_{gi} C_{pi}$$

where

$p_i$  = specified internal pressure acting statically and in a direction normal to the surface, either as a pressure directed towards the surface or as a suction directed away from the surface,

$I_w$  = importance factor for wind load, as provided in Table 4.1.7.1.,

$q$  = reference velocity pressure, as provided in Sentence (4),

$C_e$  = exposure factor, as provided in Sentence (5),

$C_{gi}$  = internal gust effect factor, as provided in Sentence (6), and

$C_{pi}$  = internal pressure coefficient.

(See Appendix A.)

**4)** The reference velocity pressure,  $q$ , shall be the appropriate value determined in conformance with Subsection 1.1.3., based on a probability of being exceeded in any one year of 1 in 50.

**5)** The exposure factor,  $C_e$ , shall be

- a)  $(h/10)^{0.2}$  but not less than 0.9 for open terrain, where open terrain is level terrain with only scattered *buildings*, trees or other obstructions, open water or shorelines thereof,  $h$  being the reference height above *grade* in metres for the surface or part of the surface (see Appendix A),
- b)  $0.7(h/12)^{0.3}$  but not less than 0.7 for rough terrain, where rough terrain is suburban, urban or wooded terrain extending upwind from the *building* uninterrupted for at least 1 km or 10 times the *building height*, whichever is greater,  $h$  being the reference height above *grade* in metres for the surface or part of the surface (see Appendix A),
- c) an intermediate value between the two exposures defined in Clauses (a) and (b) in cases where the site is less than 1 km or 10 times the *building height* from a change in terrain conditions, whichever is greater, provided an appropriate interpolation method is used (see Appendix A), or
- d) if a dynamic approach to the action of wind gusts is used, an appropriate value depending on both height and shielding (see Appendix A).

**6)** The gust effect factor,  $C_g$ , shall be one of the following values:

- a) for the *building* as a whole and main structural members,  $C_g = 2.0$  (see Appendix A),

## 4.1.7.2.

- b) for external pressures and suctions on small elements including cladding,  $C_g = 2.5$ ,
- c) for internal pressures,  $C_{gi} = 2.0$  or a value determined by detailed calculation that takes into account the sizes of the openings in the *building* envelope, the internal volume and the flexibility of the *building* envelope (see Appendix A), or
- d) if a dynamic approach to wind action is used,  $C_g$  is a value that is appropriate for the turbulence of the wind and the size and natural frequency of the structure (see Appendix A).

4.1.7.2. **Dynamic Effects of Wind**

**1)** *Buildings* whose height is greater than 4 times their minimum effective width, which is defined in Sentence (2), or greater than 120 m and other *buildings* whose light weight, low frequency and low damping properties make them susceptible to vibration shall be designed

- a) by experimental methods for the danger of dynamic overloading, vibration and the effects of fatigue, or
- b) by using a dynamic approach to the action of wind gusts (see Appendix A).

**2)** The effective width,  $w$ , of a *building* shall be calculated using

$$w = \frac{\sum h_i w_i}{\sum h_i}$$

where the summations are over the height of the *building* for a given wind direction,  $h_i$  is the height above *grade* to level  $i$ , as defined in Sentence 4.1.7.1.(5), and  $w_i$  is the width normal to the wind direction at height  $h_i$ ; the minimum effective width is the lowest value of the effective width considering all possible wind directions.

4.1.7.3. **Full and Partial Loading**

- 1)** *Buildings* and structural members shall be capable of withstanding the effects of
- a) the full wind loads acting along each of the 2 principal horizontal axes considered separately,
  - b) the wind loads as described in Clause (a) but with 100% of the load removed from any portion of the area,
  - c) the wind loads as described in Clause (a) but considered simultaneously at 75% of their full value, and
  - d) the wind loads as described in Clause (c) but with 50% of these loads removed from any portion of the area.

(See Appendix A.)

4.1.7.4. **Interior Walls and Partitions**

- 1)** In the design of interior walls and *partitions*, due consideration shall be given to differences in air pressure on opposite sides of the wall or *partition* which may result from
- a) pressure differences between the windward and leeward sides of a *building*,
  - b) stack effects due to a difference in air temperature between the exterior and interior of the *building*, and
  - c) air pressurization by the mechanical services of the *building*.

4.1.8. **Earthquake Load and Effects**4.1.8.1. **Analysis**

**1)** The deflections and specified loading due to earthquake motions shall be determined according to the requirements in this Subsection, except that the requirements in this Subsection need not be considered in design if  $S(0.2)$ , as defined in Sentence 4.1.8.4.(6), is less than or equal to 0.12.

**4.1.8.2. Notation**

**1) In this Subsection**

- $A_r$  = response amplification factor to account for type of attachment of mechanical/electrical equipment, as defined in Sentence 4.1.8.17.(1),
- $A_x$  = amplification factor at level  $x$  to account for variation of response of mechanical/electrical equipment with elevation within the *building*, as defined in Sentence 4.1.8.17.(1),
- $B_x$  = ratio at level  $x$  used to determine torsional sensitivity, as defined in Sentence 4.1.8.11.(9),
- $B$  = maximum value of  $B_x$ , as defined in Sentence 4.1.8.11.(9),
- $C_p$  = seismic coefficient for mechanical/electrical equipment, as defined in Sentence 4.1.8.17.(1),
- $D_{nx}$  = plan dimension of the *building* at level  $x$  perpendicular to the direction of seismic loading being considered,
- $e_x$  = distance measured perpendicular to the direction of earthquake loading between centre of mass and centre of rigidity at the level being considered (see Appendix A),
- $F_a$  = acceleration-based site coefficient, as defined in Sentence 4.1.8.4.(4),
- $F_t$  = portion of  $V$  to be concentrated at the top of the structure, as defined in Sentence 4.1.8.11.(6),
- $F_v$  = velocity-based site coefficient, as defined in Sentence 4.1.8.4.(4),
- $F_x$  = lateral force applied to level  $x$ , as defined in Sentence 4.1.8.11.(6),
- $h_i, h_n, h_x$  = the height above the base ( $i = 0$ ) to level  $i, n$ , or  $x$  respectively, where the base of the structure is the level at which horizontal earthquake motions are considered to be imparted to the structure,
- $h_s$  = interstorey height ( $h_i - h_{i-1}$ ),
- $I_E$  = earthquake importance factor of the structure, as described in Sentence 4.1.8.5.(1),
- $J$  = numerical reduction coefficient for base overturning moment, as defined in Sentence 4.1.8.11.(5),
- $J_x$  = numerical reduction coefficient for overturning moment at level  $x$ , as defined in Sentence 4.1.8.11.(7),
- Level  $i$  = any level in the *building*,  $i = 1$  for first level above the base,
- Level  $n$  = level that is uppermost in the main portion of the structure,
- Level  $x$  = level that is under design consideration,
- $M_v$  = factor to account for higher mode effect on base shear, as defined in Sentence 4.1.8.11.(5),
- $M_x$  = overturning moment at level  $x$ , as defined in Sentence 4.1.8.11.(7),
- $N$  = total number of *storeys* above exterior *grade* to level  $n$ ,
- $\bar{N}_{60}$  = Average Standard Penetration Resistance for the top 30 m, corrected to a rod energy efficiency of 60% of the theoretical maximum,
- PGA = Peak Ground Acceleration expressed as a ratio to gravitational acceleration, as defined in Sentence 4.1.8.4.(1),
- PI = plasticity index for clays,
- $R_d$  = ductility-related force modification factor reflecting the capability of a structure to dissipate energy through inelastic behaviour, as given in Article 4.1.8.9.,
- $R_o$  = overstrength-related force modification factor accounting for the dependable portion of reserve strength in a structure designed according to these provisions, as defined in Article 4.1.8.9.,
- $S_p$  = horizontal force factor for part or portion of a *building* and its anchorage, as given in Sentence 4.1.8.17.(1),
- $S(T)$  = design spectral response acceleration, expressed as a ratio to gravitational acceleration, for a period of  $T$ , as defined in Sentence 4.1.8.4.(6),
- $S_a(T)$  = 5% damped spectral response acceleration, expressed as a ratio to gravitational acceleration, for a period of  $T$ , as defined in Sentence 4.1.8.4.(1),
- SFRS = Seismic Force Resisting System(s) is that part of the structural system that has been considered in the design to provide the required resistance to the earthquake forces and effects defined in Subsection 4.1.8.,

- $s_u$  = average undrained shear strength in the top 30 m of *soil*,  
 $T$  = period in seconds,  
 $T_a$  = fundamental lateral period of vibration of the *building* or structure in seconds in the direction under consideration, as defined in Sentence 4.1.8.11.(3),  
 $T_x$  = floor torque at level  $x$ , as defined in Sentence 4.1.8.11.(10),  
 $V$  = lateral earthquake design force at the base of the structure, as determined by Article 4.1.8.11.,  
 $V_d$  = lateral earthquake design force at the base of the structure, as determined by Article 4.1.8.12.,  
 $V_e$  = lateral earthquake elastic force at the base of the structure, as determined by Article 4.1.8.12.,  
 $V_p$  = lateral force on a part of the structure, as determined by Article 4.1.8.17.,  
 $\bar{V}_s$  = average shear wave velocity in the top 30 m of *soil* or *rock*,  
 $W$  = *dead load*, as defined in Article 4.1.4.1., except that the minimum *partition* load as defined in Sentence 4.1.4.1.(3) need not exceed 0.5 kPa, plus 25% of the design snow load specified in Subsection 4.1.6., plus 60% of the storage load for areas used for storage, except that *storage garages* need not be considered storage areas, and the full contents of any tanks (see Appendix A),  
 $W_i, W_x$  = portion of  $W$  that is located at or is assigned to level  $i$  or  $x$  respectively,  
 $W_p$  = weight of a part or portion of a structure, e.g., cladding, *partitions* and appendages,  
 $\delta_{ave}$  = average displacement of the structure at level  $x$ , as defined in Sentence 4.1.8.11.(9), and  
 $\delta_{max}$  = maximum displacement of the structure at level  $x$ , as defined in Sentence 4.1.8.11.(9).

#### 4.1.8.3. General Requirements

- 1) The *building* shall be designed to meet the requirements of this Subsection and of the design standards referenced in Section 4.3.
- 2) Structures shall be designed with a clearly defined load path, or paths, that will transfer the inertial forces generated in an earthquake to the supporting ground.
- 3) The structure shall have a clearly defined Seismic Force Resisting System(s) (SFRS), as defined in Article 4.1.8.2.
- 4) The SFRS shall be designed to resist 100% of the earthquake loads and their effects. (See Appendix A.)
- 5) All structural framing elements not considered to be part of the SFRS must be investigated and shown to behave elastically or to have sufficient non-linear capacity to support their gravity loads while undergoing earthquake-induced deformations calculated from the deflections determined in Article 4.1.8.13.
- 6) Stiff elements that are not considered part of the SFRS, such as concrete, masonry, brick or pre-cast walls or panels, shall be
  - a) separated from all structural elements of the *building* such that no interaction takes place as the *building* undergoes deflections due to earthquake effects as calculated in this Subsection, or
  - b) made part of the SFRS and satisfy the requirements of this Subsection. (See Appendix A.)
- 7) Stiffness imparted to the structure from elements not part of the SFRS, other than those described in Sentence (6), shall not be used to resist earthquake deflections but shall be accounted for
  - a) in calculating the period of the structure for determining forces if the added stiffness decreases the fundamental lateral period by more than 15%,
  - b) in determining the irregularity of the structure, except the additional stiffness shall not be used to make an irregular SFRS regular or to reduce the effects of torsion (see Appendix A), and
  - c) in designing the SFRS if inclusion of the elements not part of the SFRS in the analysis has an adverse effect on the SFRS (see Appendix A).

**8)** Structural modelling shall be representative of the magnitude and spatial distribution of the mass of the *building* and of the stiffness of all elements of the SFRS, including stiff elements that are not separated in accordance with Sentence 4.1.8.3.(6), and shall account for

- a) the effect of cracked sections in reinforced concrete and reinforced masonry elements,
- b) the effect of the finite size of members and joints,
- c) sway effects arising from the interaction of gravity loads with the displaced configuration of the structure, and
- d) other effects that influence the lateral stiffness of the *building*.

(See Appendix A.)

**4.1.8.4. Site Properties**

**1)** The peak ground acceleration (PGA) and the 5% damped spectral response acceleration values,  $S_a(T)$ , for the reference ground conditions (Site Class C in Table 4.1.8.4.A.) for periods  $T$  of 0.2 s, 0.5 s, 1.0 s, and 2.0 s, shall be determined in accordance with Subsection 1.1.3. and are based on a 2% probability of exceedance in 50 years.

**Table 4.1.8.4.A.**  
**Site Classification for Seismic Site Response**  
 Forming Part of Sentences 4.1.8.4.(2) and (3)

Site Class	Ground Profile Name	Average Properties in Top 30 m, as per Appendix A		
		Average Shear Wave Velocity, $\bar{V}_s$ (m/s)	Average Standard Penetration Resistance, $\bar{N}_{60}$	Soil Undrained Shear Strength, $s_u$
A	Hard rock	$\bar{V}_s > 1500$	n/a	n/a
B	Rock	$760 < \bar{V}_s \leq 1500$	n/a	n/a
C	Very dense soil and soft rock	$360 < \bar{V}_s < 760$	$\bar{N}_{60} > 50$	$s_u > 100$ kPa
D	Stiff soil	$180 < \bar{V}_s < 360$	$15 \leq \bar{N}_{60} \leq 50$	$50 \text{ kPa} < s_u \leq 100 \text{ kPa}$
E	Soft soil	$\bar{V}_s < 180$	$\bar{N}_{60} < 15$	$s_u < 50$ kPa
		Any profile with more than 3 m of soil with the following characteristics: <ul style="list-style-type: none"> <li>• plasticity index: <math>PI &gt; 20</math></li> <li>• moisture content: <math>w \geq 40\%</math>, and</li> <li>• undrained shear strength: <math>s_u &lt; 25</math> kPa</li> </ul>		
F	Other soils <sup>(1)</sup>	Site-specific evaluation required		

**Notes to Table 4.1.8.4.A.:**

<sup>(1)</sup> Other soils include:

- (a) liquefiable soils, quick and highly sensitive clays, collapsible weakly cemented soils, and other soils susceptible to failure or collapse under seismic loading,
- (b) peat and/or highly organic clays greater than 3 m in thickness,
- (c) highly plastic clays ( $PI > 75$ ) more than 8 m thick, and
- (d) soft to medium stiff clays more than 30 m thick.

**2)** Site classifications for ground shall conform to Table 4.1.8.4.A. and shall be determined using  $\bar{V}_s$  except as provided in Sentence (3).

**3)** If average shear wave velocity,  $\bar{V}_s$ , is not known, Site Class shall be determined from energy-corrected Average Standard Penetration Resistance,  $\bar{N}_{60}$ , or from soil average undrained shear strength,  $s_u$ , as noted in Table 4.1.8.4.A.,  $\bar{N}_{60}$  and  $s_u$  being calculated based on rational analysis. (See Appendix A.)

4) Acceleration- and velocity-based site coefficients,  $F_a$  and  $F_v$ , shall conform to Tables 4.1.8.4.B. and 4.1.8.4.C. using linear interpolation for intermediate values of  $S_a(0.2)$  and  $S_a(1.0)$ .

**Table 4.1.8.4.B.**  
**Values of  $F_a$  as a Function of Site Class and  $S_a(0.2)$**   
 Forming Part of Sentence 4.1.8.4.(4)

Site Class	Values of $F_a$				
	$S_a(0.2) \leq 0.25$	$S_a(0.2) = 0.50$	$S_a(0.2) = 0.75$	$S_a(0.2) = 1.00$	$S_a(0.2) \geq 1.25$
A	0.7	0.7	0.8	0.8	0.8
B	0.8	0.8	0.9	1.0	1.0
C	1.0	1.0	1.0	1.0	1.0
D	1.3	1.2	1.1	1.1	1.0
E	2.1	1.4	1.1	0.9	0.9
F	(1)	(1)	(1)	(1)	(1)

**Notes to Table 4.1.8.4.B.:**

(1) See Sentence 4.1.8.4.(5).

**Table 4.1.8.4.C.**  
**Values of  $F_v$  as a Function of Site Class and  $S_a(1.0)$**   
 Forming Part of Sentence 4.1.8.4.(4)

Site Class	Values of $F_v$				
	$S_a(1.0) \leq 0.1$	$S_a(1.0) = 0.2$	$S_a(1.0) = 0.3$	$S_a(1.0) = 0.4$	$S_a(1.0) \geq 0.5$
A	0.5	0.5	0.5	0.6	0.6
B	0.6	0.7	0.7	0.8	0.8
C	1.0	1.0	1.0	1.0	1.0
D	1.4	1.3	1.2	1.1	1.1
E	2.1	2.0	1.9	1.7	1.7
F	(1)	(1)	(1)	(1)	(1)

**Notes to Table 4.1.8.4.C.:**

(1) See Sentence 4.1.8.4.(5).

5) To determine  $F_a$  and  $F_v$  for Site Class F, site-specific geotechnical investigations and dynamic site response analysis shall be performed.

6) The design spectral acceleration values of  $S(T)$  shall be determined as follows, using linear interpolation for intermediate values of  $T$ :

$$\begin{aligned}
 S(T) &= F_a S_a(0.2) \text{ for } T \leq 0.2 \text{ s} \\
 &= F_v S_a(0.5) \text{ or } F_a S_a(0.2), \text{ whichever is smaller for } T = 0.5 \text{ s} \\
 &= F_v S_a(1.0) \text{ for } T = 1.0 \text{ s} \\
 &= F_v S_a(2.0) \text{ for } T = 2.0 \text{ s} \\
 &= F_v S_a(2.0)/2 \text{ for } T \geq 4.0 \text{ s}
 \end{aligned}$$

**4.1.8.5. Importance Factor**

1) The earthquake importance factor,  $I_E$ , shall be determined according to Table 4.1.8.5.

**Table 4.1.8.5.**  
**Importance Factor for Earthquake Loads and Effects,  $I_E$**   
 Forming Part of Sentence 4.1.8.5.(1)

Importance Category	Importance Factor, $I_E$	
	ULS	SLS <sup>(1)</sup>
Low	0.8	(2)
Normal	1.0	
High	1.3	
Post-disaster	1.5	

**Notes to Table 4.1.8.5.:**

- (1) See Article 4.1.8.13.
- (2) See Appendix A.

**4.1.8.6. Structural Configuration**

- 1)** Structures having any of the features listed in Table 4.1.8.6. shall be designated irregular.
- 2)** Structures not classified as irregular according to Sentence 4.1.8.6.(1) may be considered regular.
- 3)** Except as required by Article 4.1.8.10., in cases where  $I_E F_a S_a(0.2)$  is equal to or greater than 0.35, structures designated as irregular must satisfy the provisions referenced in Table 4.1.8.6.

**Table 4.1.8.6.**  
**Structural Irregularities<sup>(1)</sup>**  
 Forming Part of Sentence 4.1.8.6.(1)

Type	Irregularity Type and Definition	Notes
1	<b>Vertical Stiffness Irregularity</b> Vertical stiffness irregularity shall be considered to exist when the lateral stiffness of the SFRS in a <i>storey</i> is less than 70% of the stiffness of any adjacent <i>storey</i> , or less than 80% of the average stiffness of the three <i>storeys</i> above or below.	(2)(3)(4)
2	<b>Weight (mass) Irregularity</b> Weight irregularity shall be considered to exist where the weight, $W_i$ , of any <i>storey</i> is more than 150% of the weight of an adjacent <i>storey</i> . A roof that is lighter than the floor below need not be considered.	(2)
3	<b>Vertical Geometric Irregularity</b> Vertical geometric irregularity shall be considered to exist where the horizontal dimension of the SFRS in any <i>storey</i> is more than 130% of that in an adjacent <i>storey</i> .	(2)(3)(4)(5)
4	<b>In-Plane Discontinuity in Vertical Lateral-Force-Resisting Element</b> An in-plane offset of a lateral-force-resisting element of the SFRS or a reduction in lateral stiffness of the resisting element in the <i>storey</i> below.	(2)(3)(4)(5)
5	<b>Out-of-Plane Offsets</b> Discontinuities in a lateral force path, such as out-of-plane offsets of the vertical elements of the SFRS.	(2)(3)(4)(5)

Table 4.1.8.6. (Continued)

Type	Irregularity Type and Definition	Notes
6	<b>Discontinuity in Capacity - Weak Storey</b> A weak storey is one in which the storey shear strength is less than that in the storey above. The storey shear strength is the total strength of all seismic-resisting elements of the SFRS sharing the storey shear for the direction under consideration.	(3)
7	<b>Torsional Sensitivity (to be considered when diaphragms are not flexible)</b> Torsional sensitivity shall be considered to exist when the ratio B calculated according to Sentence 4.1.8.11.(9) exceeds 1.7.	(2)(3)(4)(6)
8	<b>Non-orthogonal Systems</b> A non-orthogonal system irregularity shall be considered to exist when the SFRS is not oriented along a set of orthogonal axes.	(4)(7)

**Notes to Table 4.1.8.6.:**

- (1) One-storey penthouses with a weight of less than 10% of the level below need not be considered in the application of this Table.  
 (2) See Article 4.1.8.7.  
 (3) See Article 4.1.8.10.  
 (4) See Appendix A.  
 (5) See Article 4.1.8.15.  
 (6) See Sentences 4.1.8.11.(9), (10) and 4.1.8.12.(4).  
 (7) See Article 4.1.8.8.

**4.1.8.7. Methods of Analysis**

**1)** Analysis for design earthquake actions shall be carried out in accordance with the Dynamic Analysis Procedure described in Article 4.1.8.12. (see Appendix A), except that the Equivalent Static Force Procedure described in Article 4.1.8.11. may be used for structures that meet any of the following criteria:

- a) in cases where  $I_E F_a S_a(0.2)$  is less than 0.35,
- b) regular structures that are less than 60 m in height and have a fundamental lateral period,  $T_{av}$ , less than 2 s in each of two orthogonal directions as defined in Article 4.1.8.8., or
- c) structures with structural irregularity, of Type 1, 2, 3, 4, 5, 6 or 8 as defined in Table 4.1.8.6., that are less than 20 m in height and have a fundamental lateral period,  $T_{av}$ , less than 0.5 s in each of two orthogonal directions as defined in Article 4.1.8.8.

**4.1.8.8. Direction of Loading**

**1)** Earthquake forces shall be assumed to act in any horizontal direction, except that the following shall be considered to provide adequate design force levels in the structure:

- a) where components of the SFRS are oriented along a set of orthogonal axes, independent analyses about each of the principal axes of the structure shall be performed,
- b) where the components of the SFRS are not oriented along a set of orthogonal axes and  $I_E F_a S_a(0.2)$  is less than 0.35, independent analyses about any two orthogonal axes is permitted, or
- c) where the components of the SFRS are not oriented along a set of orthogonal axes and  $I_E F_a S_a(0.2)$  is equal to or greater than 0.35, analysis of the structure independently in any two orthogonal directions for 100% of the prescribed earthquake loads applied in one direction plus 30% of the prescribed earthquake loads in the perpendicular direction, with the combination requiring the greater element strength being used in the design.

**4.1.8.9. SFRS Force Reduction Factors, System Overstrength Factors, and General Restrictions**

- 1)** The values of  $R_d$  and  $R_o$  and the corresponding system restrictions shall conform to Table 4.1.8.9. and the requirements of this Subsection.
- 2)** When a particular value of  $R_d$  is required by this Article, the corresponding  $R_o$  shall be used.
- 3)** For combinations of different types of SFRS acting in the same direction in the same storey,  $R_d R_o$  shall be taken as the lowest value of  $R_d R_o$  corresponding to these systems.
- 4)** For vertical variations of  $R_d R_o$ , excluding penthouses whose weight is less than 10% of the level below, the value of  $R_d R_o$  used in the design of any storey shall be less than or equal to the lowest value of  $R_d R_o$  used in the given direction for the storeys above, and the requirements of Sentence 4.1.8.15.(3) must be satisfied. (See Appendix A.)
- 5)** If it can be demonstrated through testing, research and analysis that the seismic performance of a structural system is at least equivalent to one of the types of SFRS mentioned in Table 4.1.8.9., then such a structural system will qualify for values of  $R_d$  and  $R_o$  corresponding to the equivalent type in that Table. (See Appendix A.)

**Table 4.1.8.9.**  
**SFRS Ductility-Related Force Modification Factors,  $R_d$ , Overstrength-Related Force Modification Factors,  $R_o$ , and General Restrictions<sup>(1)</sup>**  
 Forming Part of Sentence 4.1.8.9.(1)

Type of SFRS	$R_d$	$R_o$	Restrictions <sup>(2)</sup>				
			Cases Where $I_E F_a S_a(0.2)$				Cases Where $I_E F_v S_a(1.0)$
			< 0.2	≥ 0.2 to < 0.35	≥ 0.35 to ≤ 0.75	> 0.75	> 0.3
<b>Steel Structures Designed and Detailed According to CAN/CSA-S16</b>							
Ductile moment-resisting frames	5.0	1.5	NL	NL	NL	NL	NL
Moderately ductile moment-resisting frames	3.5	1.5	NL	NL	NL	NL	NL
Limited ductility moment-resisting frames	2.0	1.3	NL	NL	60	30	30
Moderately ductile concentrically braced frames							
Non-chevron braces	3.0	1.3	NL	NL	40	40	40
Chevron braces	3.0	1.3	NL	NL	40	40	40
Tension only braces	3.0	1.3	NL	NL	20	20	20
Limited ductility concentrically braced frames							
Non-chevron braces	2.0	1.3	NL	NL	60	60	60
Chevron braces	2.0	1.3	NL	NL	60	60	60
Tension only braces	2.0	1.3	NL	NL	40	40	40
Ductile eccentrically braced frames	4.0	1.5	NL	NL	NL	NL	NL
Ductile frame plate shear walls	5.0	1.6	NL	NL	NL	NL	NL

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Table 4.1.8.9. (Continued)

Type of SFRS	$R_d$	$R_o$	Restrictions <sup>(2)</sup>				
			Cases Where $I_E F_a S_a(0.2)$				Cases Where $I_E F_v S_a(1.0)$
			< 0.2	$\geq 0.2$ to < 0.35	$\geq 0.35$ to $\leq 0.75$	> 0.75	> 0.3
Moderately ductile plate shear walls	2.0	1.5	NL	NL	60	60	60
Conventional construction of moment frames, braced frames or shear walls	1.5	1.3	NL	NL	15	15	15
Other steel SFRS(s) not defined above	1.0	1.0	15	15	NP	NP	NP
Concrete Structures Designed and Detailed According to CSA A23.3							
Ductile moment-resisting frames	4.0	1.7	NL	NL	NL	NL	NL
Moderately ductile moment-resisting frames	2.5	1.4	NL	NL	60	40	40
Ductile coupled walls	4.0	1.7	NL	NL	NL	NL	NL
Ductile partially coupled walls	3.5	1.7	NL	NL	NL	NL	NL
Ductile shear walls	3.5	1.6	NL	NL	NL	NL	NL
Moderately ductile shear walls	2.0	1.4	NL	NL	NL	60	60
Conventional construction							
Moment-resisting frames	1.5	1.3	NL	NL	15	NP	NP
Shear walls	1.5	1.3	NL	NL	40	30	30
Other concrete SFRS(s) not listed above	1.0	1.0	15	15	NP	NP	NP
Timber Structures Designed and Detailed According to CAN/CSA-O86							
Shear walls							
Nailed shear walls: wood-based panel	3.0	1.7	NL	NL	30	20	20
Shear walls: wood-based and gypsum panels in combination	2.0	1.7	NL	NL	20	20	20
Braced or moment-resisting frames with ductile connections							
Moderately ductile	2.0	1.5	NL	NL	20	20	20
Limited ductility	1.5	1.5	NL	NL	15	15	15
Other wood- or gypsum-based SFRS(s) not listed above	1.0	1.0	15	15	NP	NP	NP
Masonry Structures Designed and Detailed According to CSA S304.1							
Moderately ductile shear walls	2.0	1.5	NL	NL	60	40	40
Limited ductility shear walls	1.5	1.5	NL	NL	40	30	30
Conventional construction							
Shear walls	1.5	1.5	NL	60	30	15	15
Moment-resisting frames	1.5	1.5	NL	30	NP	NP	NP

Table 4.1.8.9. (Continued)

Type of SFRS	$R_d$	$R_o$	Restrictions <sup>(2)</sup>				
			Cases Where $I_E F_a S_a(0.2)$				Cases Where $I_E F_v S_a(1.0)$
			< 0.2	$\geq 0.2$ to < 0.35	$\geq 0.35$ to $\leq 0.75$	> 0.75	> 0.3
Unreinforced masonry	1.0	1.0	30	15	NP	NP	NP
Other masonry SFRS(s) not listed above	1.0	1.0	15	NP	NP	NP	NP

**Notes to Table 4.1.8.9.:**

(1) See Article 4.1.8.10.

(2) NP = system is not permitted.

NL = system is permitted and not limited in height as an SFRS; height may be limited in other Parts of the Code.

Numbers in this Table are maximum height limits in m.

The most stringent requirement governs.

**4.1.8.10. Additional System Restrictions**

**1)** Except as required by Clause (2)(b), structures with a Type 6 irregularity, Discontinuity in Capacity - Weak Storey, as described in Table 4.1.8.6., are not permitted unless  $I_E F_a S_a(0.2)$  is less than 0.2 and the forces used for design of the SFRS are multiplied by  $R_d R_o$ .

**2)** *Post-disaster buildings* shall

- a) not have any irregularities conforming to Types 1, 3, 4, 5 and 7 as described in Table 4.1.8.6., in cases where  $I_E F_a S_a(0.2)$  is equal to or greater than 0.35,
- b) not have a Type 6 irregularity as described in Table 4.1.8.6., and
- c) have an SFRS with an  $R_d$  of 2.0 or greater.

**3)** For *buildings* having fundamental lateral periods,  $T_{a,}$  of 1.0 s or greater, and where  $I_E F_v S_a(1.0)$  is greater than 0.25, walls forming part of the SFRS shall be continuous from their top to the *foundation* and shall not have irregularities of Type 4 or 5 as described in Table 4.1.8.6.

**4.1.8.11. Equivalent Static Force Procedure for Structures Satisfying the Conditions of Article 4.1.8.7.**

**1)** The static loading due to earthquake motion shall be determined according to the procedures given in this Article.

**2)** The minimum lateral earthquake force,  $V$ , shall be calculated using the following formula:

$$V = S(T_a) M_v I_E W / (R_d R_o)$$

except that  $V$  shall not be less than

$$S(2.0) M_v I_E W / (R_d R_o)$$

and for an SFRS with an  $R_d$  equal to or greater than 1.5,  $V$  need not be greater than

$$\frac{2}{3} S(0.2) I_E W / (R_d R_o)$$

**3)** The fundamental lateral period,  $T_a$ , in the direction under consideration in Sentence (2) shall be determined as:

- a) for moment-resisting frames that resist 100% of the required lateral forces and where the frame is not enclosed by or adjoined by more rigid elements that would tend to prevent the frame from resisting lateral forces, and where  $h_n$  is in metres:
  - i)  $0.085 (h_n)^{3/4}$  for steel moment frames,
  - ii)  $0.075 (h_n)^{3/4}$  for concrete moment frames, or
  - iii)  $0.1 N$  for other moment frames,
- b)  $0.025h_n$  for braced frames where  $h_n$  is in metres,
- c)  $0.05 (h_n)^{3/4}$  for shear wall and other structures where  $h_n$  is in metres, or
- d) other established methods of mechanics using a structural model that complies with the requirements of Sentence 4.1.8.3.(8), except that
  - i) for moment-resisting frames,  $T_a$  shall not be taken greater than 1.5 times that determined in Clause (a),
  - ii) for braced frames,  $T_a$  shall not be taken greater than 2.0 times that determined in Clause (b),
  - iii) for shear wall structures,  $T_a$  shall not be greater than 2.0 times that determined in Clause (c), and
  - iv) for the purpose of calculating the deflections, the period without the upper limit specified herein may be used.

(See Appendix A.)

**4)** The weight,  $W$ , of the *building* shall be calculated using the following formula:

$$W = \sum_{i=1}^n W_i$$

**5)** The higher mode factor,  $M_v$ , and its associated base overturning moment reduction factor,  $J$ , shall conform to Table 4.1.8.11.

**Table 4.1.8.11.**  
**Higher Mode Factor,  $M_v$ , and Base Overturning Reduction Factor,  $J$  <sup>(1)(2)</sup>**  
 Forming Part of Sentence 4.1.8.11.(5)

$S_a(0.2)/S_a(2.0)$	Type of Lateral Resisting Systems	$M_v$ For $T_a \leq 1.0$	$M_v$ For $T_a \geq 2.0$	$J$ For $T_a \leq 0.5$	$J$ For $T_a \geq 2.0$
< 8.0	Moment-resisting frames or coupled walls <sup>(3)</sup>	1.0	1.0	1.0	1.0
	Braced frames	1.0	1.0	1.0	0.8
	Walls, wall-frame systems, other systems <sup>(4)</sup>	1.0	1.2	1.0	0.7
$\geq 8.0$	Moment-resisting frames or coupled walls <sup>(3)</sup>	1.0	1.2	1.0	0.7
	Braced frames	1.0	1.5	1.0	0.5
	Walls, wall-frame systems, other systems <sup>(4)</sup>	1.0	2.5	1.0	0.4

**Notes to Table 4.1.8.11.:**

- (1) For values of  $M_v$  between fundamental lateral periods,  $T_a$ , of 1.0 and 2.0 s, the product  $S(T_a) \cdot M_v$  shall be obtained by linear interpolation.
- (2) Values of  $J$  between fundamental lateral periods,  $T_a$ , of 0.5 and 2.0 s shall be obtained by linear interpolation.
- (3) A "coupled wall" is a wall system with coupling beams, where at least 66% of the base overturning moment resisted by the wall system is carried by the axial tension and compression forces resulting from shear in the coupling beams.
- (4) For hybrid systems, values corresponding to walls must be used or a dynamic analysis must be carried out as per Article 4.1.8.12.

**6)** The total lateral seismic force,  $V$ , shall be distributed such that a portion,  $F_t$ , shall be assumed to be concentrated at the top of the *building*, where  $F_t$  is equal to  $0.07 T_a V$  but need not exceed  $0.25 V$  and may be considered as zero where the fundamental lateral period,  $T_a$ , does not exceed  $0.7$  s; the remainder,  $V - F_t$ , shall be distributed along the height of the *building*, including the top level, in accordance with the following formula:

$$F_x = (V - F_t) W_x h_x / \left( \sum_{i=1}^n W_i h_i \right)$$

**7)** The structure shall be designed to resist overturning effects caused by the earthquake forces determined in Sentence (6) and the overturning moment at level  $x$ ,  $M_x$ , shall be determined using the following equation:

$$M_x = J_x \sum_{i=x}^n F_i (h_i - h_x)$$

where

$$J_x = 1.0 \text{ for } h_x \geq 0.6h_n, \text{ and}$$

$$J_x = J + (1 - J)(h_x / 0.6h_n) \text{ for } h_x < 0.6h_n$$

where

$J$  = base overturning moment reduction factor conforming to Table 4.1.8.11.

**8)** Torsional effects that are concurrent with the effects of the forces mentioned in Sentence (6) and are caused by the following torsional moments shall be considered in the design of the structure according to Sentence (10):

- a) torsional moments introduced by eccentricity between the centres of mass and resistance and their dynamic amplification, or
- b) torsional moments due to accidental eccentricities.

**9)** Torsional sensitivity shall be determined by calculating the ratio  $B_x$  for each level  $x$  according to the following equation for each orthogonal direction determined independently:

$$B_x = \delta_{\max} / \delta_{\text{ave}}$$

where

$B$  = maximum of all values of  $B_x$  in both orthogonal directions, except that the  $B_x$  for one-storey penthouses with a weight less than 10% of the level below need not be considered,

$\delta_{\max}$  = maximum *storey* displacement at the extreme points of the structure, at level  $x$  in the direction of the earthquake induced by the equivalent static forces acting at distances  $\pm 0.10 D_{nx}$  from the centres of mass at each floor, and

$\delta_{\text{ave}}$  = average of the displacements at the extreme points of the structure at level  $x$  produced by the above-mentioned forces.

**10)** Torsional effects shall be accounted for as follows:

- a) for a *building* with  $B \leq 1.7$ , by applying torsional moments about a vertical axis at each level throughout the *building*, derived for each of the following load cases considered separately:

- i)  $T_x = F_x(e_x + 0.10 D_{nx})$ , and

- ii)  $T_x = F_x(e_x - 0.10 D_{nx})$

where  $F_x$  is the lateral force at each level determined according to Sentence (6) and where each element of the *building* is designed for the most severe effect of the above load cases, or

- b) for a *building* with  $B > 1.7$ , in cases where  $I_E F_a S_a(0.2)$  is equal to or greater than  $0.35$ , by a Dynamic Analysis Procedure as specified in Article 4.1.8.12.

**4.1.8.12. Dynamic Analysis Procedure**

- 1)** The Dynamic Analysis Procedure shall be in accordance with one of the following methods:
  - a) Linear Dynamic Analysis by either the Modal Response Spectrum Method or the Numerical Integration Linear Time History Method using a structural model that complies with the requirements of Sentence 4.1.8.3.(8) (see Appendix A), or
  - b) Non-linear Dynamic Analysis, in which case a special study shall be performed (see Appendix A).
- 2)** The spectral acceleration values used in the Modal Response Spectrum Method shall be the design spectral acceleration values,  $S(T)$ , defined in Sentence 4.1.8.4.(6).
- 3)** The ground motion histories used in the Numerical Integration Linear Time History Method shall be compatible with a response spectrum constructed from the design spectral acceleration values,  $S(T)$ , defined in Sentence 4.1.8.4.(6). (See Appendix A.)
- 4)** The effects of accidental torsional moments acting concurrently with the lateral earthquake forces that cause them shall be accounted for by the following methods:
  - a) the static effects of torsional moments due to  $(\pm 0.10 D_{nx})F_x$  at each level  $x$ , where  $F_x$  is determined from Sentence 4.1.8.11.(6) or from the dynamic analysis, shall be combined with the effects determined by dynamic analysis (see Appendix A), or
  - b) if  $B$ , as defined in Sentence 4.1.8.11.(9), is less than 1.7, it is permitted to use a three-dimensional dynamic analysis with the centres of mass shifted by a distance of  $-0.05 D_{nx}$  and  $+0.05 D_{nx}$ .
- 5)** The elastic base shear,  $V_e$ , obtained from a Linear Dynamic Analysis shall be multiplied by the importance factor,  $I_E$ , as determined in Article 4.1.8.5., and shall be divided by  $R_d R_o$ , as determined in Article 4.1.8.9., to obtain the base shear,  $V_d$ .
- 6)** Except as required by Sentence (7), if the base shear,  $V_d$ , obtained in Sentence (5) is less than 80% of the lateral earthquake design force,  $V$ , of Article 4.1.8.11.,  $V_d$  shall be taken as 0.8  $V$ .
- 7)** For irregular structures requiring dynamic analysis in accordance with Article 4.1.8.7.,  $V_d$  shall be taken as the larger of the  $V_d$  determined in Sentence (5) and 100% of  $V$ .
- 8)** Except as required by Sentence (9), the values of elastic *storey* shears, *storey* forces, member forces, and deflections obtained from the Linear Dynamic Analysis shall be multiplied by  $V_d/V_e$  to determine their design values, where  $V_d$  is the base shear.
- 9)** For the purpose of calculating deflections, it is permitted to use a value for  $V$  based on the value for  $T_a$  determined in Clause 4.1.8.11.(3)(d) to obtain  $V_d$  in Sentences (6) and (7).

**4.1.8.13. Deflections and Drift Limits**

- 1)** Lateral deflections of a structure shall be calculated in accordance with the loads and requirements defined in this Subsection.
- 2)** Lateral deflections obtained from a linear elastic analysis using the methods given in Articles 4.1.8.11. and 4.1.8.12. and incorporating the effects of torsion, including accidental torsional moments, shall be multiplied by  $R_d R_o / I_E$  to give realistic values of anticipated deflections.
- 3)** Based on the lateral deflections calculated in Sentence (2), the largest interstorey deflection at any level shall be limited to 0.01  $h_s$  for *post-disaster buildings*, 0.02  $h_s$  for schools, and 0.025  $h_s$  for all other *buildings*.
- 4)** The deflections calculated in Sentence (2) shall be used to account for sway effects as required by Sentence 4.1.3.2.(10). (See Appendix A.)

**4.1.8.14. Structural Separation**

**1)** Adjacent structures shall either be separated by the square root of the sum of the squares of their individual deflections calculated in Sentence 4.1.8.13.(2), or shall be connected to each other.

**2)** The method of connection required in Sentence (1) shall take into account the mass, stiffness, strength, ductility and anticipated motion of the connected *buildings* and the character of the connection.

**3)** Rigidly connected *buildings* shall be assumed to have the lowest  $R_dR_o$  value of the *buildings* connected.

**4)** *Buildings* with non-rigid or energy-dissipating connections require special studies.

**4.1.8.15. Design Provisions**

**1)** Diaphragms and their connections shall be designed so as not to yield, and the design shall account for the shape of the diaphragm, including openings, and for the forces generated in the diaphragm due to the following cases, whichever one governs (see Appendix A):

- a) forces due to loads determined in Articles 4.1.8.11. or 4.1.8.12. applied to the diaphragm are increased to reflect the lateral load capacity of the SFRS, plus forces in the diaphragm due to the transfer of forces between elements of the SFRS associated with the lateral load capacity of such elements and accounting for discontinuities and changes in stiffness in these elements, or
- b) a minimum force corresponding to the design-based shear divided by  $N$  for the diaphragm at level  $x$ .

**2)** In cases where  $I_e F_a S_a(0.2)$  is equal to or greater than 0.35, the elements supporting any discontinuous wall, column or braced frame shall be designed for the lateral load capacity of the components of the SFRS they support. (See Appendix A.)

**3)** Where structures have vertical variations of  $R_dR_o$  satisfying Sentence 4.1.8.9.(4), the elements of the SFRS below the level where the change in  $R_dR_o$  occurs shall be designed for the forces associated with the lateral load capacity of the SFRS above that level. (See Appendix A.)

**4)** Where earthquake effects can produce forces in a column or wall due to lateral loading along both orthogonal axes, account shall be taken of the effects of potential concurrent yielding of other elements framing into the column or wall from all directions at the level under consideration and as appropriate at other levels. (See Appendix A.)

**5)** Except as provided in Sentence (6), the design forces need not exceed the forces determined in accordance with Sentence 4.1.8.7.(1), multiplied by  $R_dR_o$ . (See Appendix A.)

**6)** If *foundation* rocking is accounted for, the design forces for the SFRS need not exceed the maximum values associated with *foundation* rocking, provided that  $R_d$  and  $R_o$  for the type of SFRS used conform to Table 4.1.8.9. and that the *foundation* is designed in accordance with Sentence 4.1.8.16.(1).

**4.1.8.16. Foundation Provisions**

**1)** *Foundations* shall be designed to resist the lateral load capacity of the SFRS, except that when the *foundations* are allowed to rock, the design forces for the *foundation* need not exceed those determined in Sentence 4.1.8.7.(1) using an  $R_dR_o$  equal to 2.0. (See Appendix A.)

**2)** The design of *foundations* shall be such that they are capable of transferring earthquake loads and effects between the *building* and the ground without exceeding the capacities of the *soil* and *rock*.

- 3)** In cases where  $I_E F_a S_a(0.2)$  is equal to or greater than 0.35, the following requirements shall be satisfied:
- piles* or *pile caps*, drilled piers, and *caissons* shall be interconnected by continuous ties in not less than two directions (see Appendix A),
  - piles*, drilled piers, and *caissons* shall be embedded a minimum of 100 mm into the *pile cap* or structure, and
  - piles*, drilled piers, and *caissons*, other than wood *piles*, shall be connected to the *pile cap* or structure for a minimum tension force equal to 0.15 times the factored compression load on the *pile*.
- 4)** At sites where  $I_E F_a S_a(0.2)$  is equal to or greater than 0.35, *basement* walls shall be designed to resist earthquake lateral pressures from backfill or natural ground. (See Appendix A.)
- 5)** At sites where  $I_E F_a S_a(0.2)$  is greater than 0.75, the following requirements shall be satisfied:
- piles*, drilled piers, or *caissons* shall be designed and detailed to accommodate cyclic inelastic behaviour when the design moment in the element due to earthquake effects is greater than 75% of its moment capacity (see Appendix A), and
  - spread footings founded on *soil* defined as Site Class E or F shall be interconnected by continuous ties in not less than two directions.
- 6)** Each segment of a tie between elements that is required by Clauses (3)(a) or (5)(b) shall be designed to carry by tension or compression a horizontal force at least equal to the greatest factored *pile cap* or column vertical load in the elements it connects, multiplied by a factor of 0.10  $I_E F_a S_a(0.2)$ , unless it can be demonstrated that equivalent restraints can be provided by other means. (See Appendix A.)
- 7)** The potential for liquefaction of the *soil* and its consequences, such as significant ground displacement and loss of *soil* strength and stiffness, shall be evaluated based on the ground motion parameters referenced in Subsection 1.1.3. and shall be taken into account in the design of the structure and its *foundations*. (See Appendix A.)

#### 4.1.8.17. Elements of Structures, Non-structural Components and Equipment

- 1)** Except as provided in Sentences (2) and (8), elements and components of *buildings* described in Table 4.1.8.17. and their connections to the structure shall be designed to accommodate the *building* deflections calculated in accordance with Article 4.1.8.13. and the element or component deflections calculated in accordance with Sentence (10), and shall be designed for a lateral force,  $V_p$ , applied through the centre of mass of the element or component, that is equal to:

$$V_p = 0.3 F_a S_a(0.2) I_E S_p W_p$$

where

$F_a$  = as defined in Table 4.1.8.4.B.,

$S_a(0.2)$  = spectral response acceleration value at 0.2 s, as defined in Sentence 4.1.8.4.(1),

$I_E$  = importance factor for the *building*, as defined in Article 4.1.8.5.,

$S_p$  =  $C_p A_r A_x / R_p$  (the maximum value of  $S_p$  shall be taken as 4.0 and the minimum value of  $S_p$  shall be taken as 0.7), where

$C_p$  = element or component factor from Table 4.1.8.17.,

$A_r$  = element or component force amplification factor from Table 4.1.8.17.,

$A_x$  = height factor  $(1 + 2 h_x / h_n)$ ,

$R_p$  = element or component response modification factor from Table 4.1.8.17., and

$W_p$  = weight of the component or element.

- 2)** For *buildings* other than *post-disaster buildings*, where  $I_E F_a S_a(0.2)$  is less than 0.35, the requirements of Sentence (1) need not apply to Categories 6 through 21 of Table 4.1.8.17.

- 3)** The values of  $C_p$  in Sentence (1) shall conform to Table 4.1.8.17.

**4)** For the purpose of applying Sentence (1) and Categories 11 and 12 of Table 4.1.8.17., elements or components shall be assumed to be flexible or flexibly connected unless it can be shown that the fundamental period of the element or component and its connection is less than or equal to 0.06 s, in which case the element or component is classified as being rigid or rigidly connected.

**5)** The weight of access floors shall include the *dead load* of the access floor and the weight of permanent equipment, which shall not be taken as less than 25% of the floor *live load*.

**6)** When the mass of a tank plus its contents is greater than 10% of the mass of the supporting floor, the lateral forces shall be determined by rational analysis.

**7)** Forces shall be applied in the horizontal direction that results in the most critical loading for design, except for Category 6 of Table 4.1.8.17., where the forces shall be applied up and down vertically.

**8)** Connections to the structure of elements and components listed in Table 4.1.8.17. shall be designed to support the component or element for gravity loads, shall conform to the requirements of Sentence (1), and shall also satisfy these additional requirements:

- a) friction due to gravity loads shall not be considered to provide resistance to seismic forces,
- b)  $R_p$  for non-ductile connections, such as adhesives or power-actuated fasteners, shall be taken as 1.0,
- c)  $R_p$  for anchorage using shallow expansion, chemical, epoxy or cast-in-place anchors shall be 1.5, where shallow anchors are those with a ratio of embedment length to diameter of less than 8,
- d) power-actuated fasteners and drop-in anchors shall not be used for tension loads,
- e) connections for non-structural elements or components of Categories 1, 2 or 3 of Table 4.1.8.17. attached to the side of a *building* and above the first level above *grade* shall satisfy the following requirements:
  - i) for connections where the body of the connection is ductile, the body shall be designed for values of  $C_p$ ,  $A_r$  and  $R_p$  given in Table 4.1.8.17., and the fasteners, such as anchors, welds, bolts and inserts, shall also be designed for values of  $C_p$  and  $A_r$  given in this Table, and  $R_p = 1.0$ , and
  - ii) connections where the body of the connection is not ductile shall be designed for values of  $C_p = 2.0$ ,  $R_p = 1.0$  and  $A_r$  given in Table 4.1.8.17., and
- f) for the purpose of applying Clause (e), a ductile connection is one where the body of the connection yields at its design load (see Appendix A).

**9)** Floors and roofs acting as diaphragms shall satisfy the requirements for diaphragms stated in Article 4.1.8.15.

**10)** Lateral deflections of elements or components shall be based on the loads defined in Sentence (1) and lateral deflections obtained from an elastic analysis shall be multiplied by  $R_p/I_E$  to give realistic values of the anticipated deflections.

**11)** The elements or components shall be designed so as not to transfer to the structure any forces unaccounted for in the design, and rigid elements such as walls or panels shall satisfy the requirements of Sentence 4.1.8.3.(6).

**12)** Seismic restraint for suspended equipment, pipes, ducts, electrical cable trays, etc. shall be designed to meet the force and displacement requirements of this Article and be constructed in a manner that will not subject hanger rods to bending.

**13)** Isolated suspended equipment and components, such as pendent lights, may be designed as a pendulum system provided that adequate chains or cables capable of supporting 2.0 times the weight of the suspended component are provided and the deflection requirements of Sentence (11) are satisfied.

**Table 4.1.8.17.**  
**Elements of Structures and Non-structural Components and Equipment**  
 Forming Part of Sentence 4.1.8.17.(1)

Category	Part or Portion of <i>Building</i>	C <sub>p</sub>	A <sub>r</sub>	R <sub>p</sub>
1	All exterior and interior walls except those in Category 2 or 3 <sup>(1)</sup>	1.00	1.00	2.50
2	Cantilever parapet and other cantilever walls except retaining walls <sup>(1)</sup>	1.00	2.50	2.50
3	Exterior and interior ornamentations and appendages <sup>(1)</sup>	1.00	2.50	2.50
4	Floors and roofs acting as diaphragms <sup>(2)</sup>	-	-	-
5	Towers, <i>chimneys</i> , smokestacks and penthouses when connected to or forming part of a <i>building</i>	1.00	2.50	2.50
6	Horizontally cantilevered floors, balconies, beams, etc.	1.00	1.00	2.50
7	Suspended ceilings, light fixtures and other attachments to ceilings with independent vertical support	1.00	1.00	2.50
8	Masonry veneer connections	1.00	1.00	1.50
9	Access floors	1.00	1.00	2.50
10	Masonry or concrete fences more than 1.8 m tall	1.00	1.00	2.50
11	Machinery, fixtures, equipment, ducts and tanks (including contents)			
	that are rigid and rigidly connected <sup>(3)</sup>	1.00	1.00	1.25
	that are flexible or flexibly connected <sup>(3)</sup>	1.00	2.50	2.50
12	Machinery, fixtures, equipment, ducts and tanks (including contents) containing toxic or explosive materials, materials having a <i>flash point</i> below 38°C or firefighting fluids			
	that are rigid and rigidly connected <sup>(3)</sup>	1.50	1.00	1.25
	that are flexible or flexibly connected <sup>(3)</sup>	1.50	2.50	2.50
13	Flat bottom tanks (including contents) attached directly to a floor at or below <i>grade</i> within a <i>building</i>	0.70	1.00	2.50
14	Flat bottom tanks (including contents) attached directly to a floor at or below <i>grade</i> within a <i>building</i> containing toxic or explosive materials, materials having a <i>flash point</i> below 38°C or firefighting fluids	1.00	1.00	2.50
15	Pipes, ducts, cable trays (including contents)	1.00	1.00	3.00
16	Pipes, ducts (including contents) containing toxic or explosive materials	1.50	1.00	3.00
17	Electrical cable trays, bus ducts, conduits	1.00	2.50	5.00
18	Rigid components with ductile material and connections	1.00	1.00	2.50
19	Rigid components with non-ductile material or connections	1.00	1.00	1.00
20	Flexible components with ductile material and connections	1.00	2.50	2.50
21	Flexible components with non-ductile material or connections	1.00	2.50	1.00

**Notes to Table 4.1.8.17.:**

(1) See Sentence 4.1.8.17.(8).

(2) See Sentence 4.1.8.17.(9).

(3) See Sentence 4.1.8.17.(4).

## Section 4.2. Foundations

### 4.2.1. General

#### 4.2.1.1. Application

- 1) This Section applies to *excavations* and *foundation* systems for *buildings*.

### 4.2.2. Subsurface Investigations, Drawings and Reviews

#### 4.2.2.1. Subsurface Investigation

1) A *subsurface investigation*, including *groundwater* conditions, shall be carried out by or under the direction of a *professional engineer* having knowledge and experience in planning and executing such investigations to a degree appropriate for the *building* and its use, the ground and the surrounding site conditions. (See Appendix A.)

#### 4.2.2.2. Drawings

1) Drawings associated with *foundations* and *excavations* shall conform to the appropriate requirements of Section 2.2. of Division C. (See Article 2.2.4.6. of Division C.)

#### 4.2.2.3. Field Review

1) A field review shall be carried out by the *designer* or by another suitably qualified person to ascertain that the subsurface conditions are consistent with the design and that construction is carried out in accordance with the design and good engineering practice. (See Appendix A.)

2) The review required by Sentence (1) shall be carried out

- a) on a continuous basis
  - i) during the construction of all *deep foundation units* with all pertinent information recorded for each *foundation unit*,
  - ii) during the installation and removal of retaining structures and related backfilling operations, and
  - iii) during the placement of engineered *fills* that are to be used to support the *foundation units*, and
- b) as required, unless otherwise directed by the *authority having jurisdiction*,
  - i) in the construction of all *shallow foundation units*, and
  - ii) in excavating, dewatering and other related works.

#### 4.2.2.4. Altered Subsurface Condition

1) If, during construction, the *soil*, *rock* or *groundwater* is found not to be of the type or in the condition used in design and as indicated on the drawings, the design shall be reassessed by the *designer*.

2) If, during construction, climatic or any other conditions change the properties of the *soil*, *rock* or *groundwater*, the design shall be reassessed by the *designer*.

### 4.2.3. Materials Used in Foundations

#### 4.2.3.1. Wood

1) Wood used in *foundations* or in support of *soil* or *rock* shall conform with the appropriate requirements of Subsection 4.3.1.

## 4.2.3.2.

## 4.2.3.2. Preservation Treatment of Wood

1) Wood exposed to *soil* or air above the lowest anticipated *groundwater* table shall be treated with preservative in conformance with CSA O80 Series, "Wood Preservation," and the requirements of the appropriate commodity standard as follows:

- a) CSA O80.2, "Preservative Treatment of Lumber, Timber, Bridge Ties, and Mine Ties by Pressure Processes,"
- b) CSA O80.3, "Preservative Treatment of Piles by Pressure Processes," or
- c) CSA O80.15, "Preservative Treatment of Wood for Building Foundation Systems, Basements, and Crawl Spaces by Pressure Processes."

2) Where timber has been treated as required in Sentence (1), it shall be cared for as provided in AWPA-M4, "Care of Preservative-Treated Wood Products," as revised by Clause 6 of CSA O80 Series, "Wood Preservation."

## 4.2.3.3. Plain and Reinforced Masonry

1) Plain or reinforced masonry used in *foundations* or in support of *soil* or *rock* shall conform with the requirements of Subsection 4.3.2.

## 4.2.3.4. Prevention of Deterioration of Masonry

1) Where plain or reinforced masonry in *foundations* or in structures supporting *soil* or *rock* may be subject to conditions conducive to deterioration, protection shall be provided to prevent such deterioration.

## 4.2.3.5. Concrete

1) Plain, reinforced or pre-stressed concrete used in *foundations* or in support of *soil* or *rock* shall conform with the requirements of Subsection 4.3.3.

## 4.2.3.6. Protection Against Chemical Attack

1) Where concrete in *foundations* may be subject to chemical attack, it shall be treated in conformance with the requirements in CAN/CSA-A23.1, "Concrete Materials and Methods of Concrete Construction."

## 4.2.3.7. Steel

1) Steel used in *foundations* or in support of *soil* or *rock* shall conform with the appropriate requirements of Subsections 4.3.3. or 4.3.4., unless otherwise specified in this Section.

## 4.2.3.8. Steel Piles

1) Where steel *piles* are used in *deep foundations* and act as permanent load-carrying members, the steel shall conform with one of the following standards:

- a) ASTM A 252, "Welded and Seamless Steel Pipe Piles,"
- b) ASTM A 283/A 283M, "Low and Intermediate Tensile Strength Carbon Steel Plates,"
- c) ASTM A 1008/A 1008M, "Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability,"
- d) ASTM A 1011/A 1011M, "Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability," or
- e) CAN/CSA-G40.21, "Structural Quality Steel."

**4.2.3.9. High Strength Steel Tendons**

1) Where high strength steel is used for tendons in anchor systems used for the permanent support of a *foundation* or in the erection of temporary support of *soil* or *rock* adjacent to an *excavation*, it shall conform with the requirements of CAN/CSA-A23.1, "Concrete Materials and Methods of Concrete Construction."

**4.2.3.10. Corrosion of Steel**

1) Where conditions are corrosive to steel, adequate protection of exposed steel shall be provided. (See Article 1.2.1.1. of Division A for use of other materials.)

**4.2.4. Design Requirements****4.2.4.1. Design Basis**

1) The design of *foundations*, *excavations* and *soil-* and *rock-*retaining structures shall be based on a *subsurface investigation* carried out in conformance with the requirements of this Section, and on any of the following, as appropriate:

- a) application of generally accepted geotechnical and civil engineering principles by a *professional engineer* especially qualified in this field of *work*, as provided in this Section and other Sections of Part 4,
- b) established local practice, where such practice includes successful experience both with *soils* and *rocks* of similar type and condition and with a *foundation* or *excavation* of similar type, construction method, size and depth, or
- c) in situ testing of *foundation units*, such as the load testing of *piles*, anchors or footings, carried out by a person competent in this field of *work*.

(See Appendix A.)

2) The *foundations* of a *building* shall be capable of resisting all the loads stipulated in Section 4.1., in accordance with limit states design in Subsection 4.1.3.

3) For the purpose of the application of the load combinations given in Table 4.1.3.2., the geotechnical components of loads and the factored geotechnical resistances at ULS shall be determined by a suitably qualified and experienced *professional engineer*. (See Appendix A.)

4) Geotechnical components of service loads and geotechnical reactions for SLS shall be determined by a suitably qualified and experienced *professional engineer*.

5) The *foundation* of a *building* shall be designed to satisfy SLS requirements within the limits that the *building* is designed to accommodate, including total settlement and differential settlement, heave, lateral movement, tilt or rotation. (See Appendix A.)

**4.2.4.2. Subsurface Investigation**

1) A *subsurface investigation* shall be carried out to the depth and extent to which the *building* or *excavation* will significantly change the stress in the *soil* or *rock*, or to such a depth and extent as to provide all the necessary information for the design and construction of the *excavation* or the *foundations*.

**4.2.4.3. Identification**

1) The identification and classification of *soil*, *rock* and *groundwater* and descriptions of their engineering and physical properties shall be in accordance with a widely accepted system.

**4.2.4.4.****4.2.4.4. Depth of Foundations**

1) Except as permitted in Sentence (2), the *bearing surface* of a *foundation* shall be below the level of potential damage, including damage resulting from *frost action*, and the *foundation* shall be designed to prevent damage resulting from *adfreezing* and frost jacking. (See Appendix A.)

2) The *bearing surface* of a *foundation* need not be below the level of potential damage from frost where the *foundation*

- a) is designed against *frost action*, or
- b) overlies material not susceptible to *frost action*.

**4.2.4.5. Sloping Ground**

1) Where a *foundation* is to rest on, in or near sloping ground, this particular condition shall be provided for in the design.

**4.2.4.6. Eccentric and Inclined Loads**

1) Where there is eccentricity or inclination of loading in *foundation units*, this effect shall be fully investigated and provided for in the design.

**4.2.4.7. Dynamic Loading**

1) Where dynamic loading conditions apply, the effects shall be assessed by a special investigation of these conditions and provided for in the design.

**4.2.4.8. Hydrostatic Uplift**

1) Where a *foundation* or any part of a *building* is subject to hydrostatic uplift, the effects shall be provided for in the design.

**4.2.4.9. Groundwater Level Change**

1) Where proposed construction will result in a temporary or permanent change in the *groundwater level*, the effects of this change on adjacent *buildings* shall be fully investigated and provided for in the design.

**4.2.4.10. Permafrost**

1) Where conditions of permafrost are encountered or proven to exist, the design of the *foundation* shall be based upon analysis of these conditions by a person especially qualified in that field of work.

**4.2.4.11. Swelling and Shrinking Soils**

1) Where swelling or shrinking *soils*, in which movements resulting from moisture content changes may be sufficient to cause damage to a structure, are encountered or known to exist, such a condition shall be fully investigated and provided for in the design.

**4.2.4.12. Expanding and Deteriorating Rock**

1) Where *rock* that expands or deteriorates when subjected to unfavourable environmental conditions or to stress release is known to exist, this condition shall be fully investigated and provided for in the design.

**4.2.4.13. Construction on Fill**

- 1) *Buildings* may be placed on *fill* if it can be shown by *subsurface investigation* that
- a) the *fill* is or can be made capable of safely supporting the *building*,
  - b) detrimental movement of the *building* or of services leading to the *building* will not occur, and
  - c) explosive gases can be controlled or do not exist.

**4.2.4.14. Structural Design**

1) The structural design of the *foundation* of a *building*, the procedures and construction practices shall conform with the appropriate Sections of this Code unless otherwise specified in this Section.

**4.2.5. Excavations****4.2.5.1. Design of Excavations**

1) The design of *excavations* and of supports for the sides of *excavations* shall conform with Subsection 4.2.4. and with this Subsection. (See Appendix A.)

**4.2.5.2. Excavation Construction**

- 1) Every *excavation* shall be undertaken in such a manner as to
- prevent movement that would cause damage to adjacent *buildings* at all phases of construction, and
  - comply with the appropriate requirements of Part 8.

2) Material shall not be placed nor shall equipment be operated or placed in or adjacent to an *excavation* in a manner that may endanger the integrity of the *excavation* or its supports.

**4.2.5.3. Supported Excavations**

1) The sides of an *excavation* in *soil* or *rock* shall be supported by a retaining structure conforming with the requirements of Articles 4.2.5.1. and 4.2.5.2., except as permitted in Article 4.2.5.4.

**4.2.5.4. Unsupported Excavations**

1) The sides of an *excavation* in *soil* or *rock* may be unsupported where a design is prepared in conformance with the requirements of Articles 4.2.5.1. and 4.2.5.2.

**4.2.5.5. Control of Water around Excavations**

1) Surface water, all *groundwater*, *perched groundwater* and in particular *artesian groundwater* shall be kept under control at all phases of *excavation* and construction.

**4.2.5.6. Loss of Ground**

1) At all phases of *excavation* and construction, loss of ground due to water or any other cause shall be prevented.

**4.2.5.7. Protection and Maintenance at Excavations**

1) All sides of an *excavation*, supported and unsupported, shall be continuously maintained and protected from possible deterioration by construction activity or by the action of frost, rain and wind.

**4.2.5.8. Backfilling**

- 1) Where an *excavation* is backfilled, the backfill shall be placed so as to
- provide lateral support to the *soil* adjacent to the *excavation*, and
  - prevent detrimental movements.

2) The material used as backfill or *fill* supporting a footing, *foundation* or a floor on *grade* shall be of a type that is not subject to detrimental volume change with changes in moisture content and temperature.

**4.2.6.1.****4.2.6. Shallow Foundations****4.2.6.1. Design of Shallow Foundations**

**1)** The design of *shallow foundations* shall be in conformance with Subsection 4.2.4. and the requirements of this Subsection. (See Appendix A.)

**4.2.6.2. Support of Shallow Foundations**

**1)** Where a *shallow foundation* is to be placed on *soil* or *rock*, the *soil* or *rock* shall be cleaned of loose and unsound material and shall be adequate to support the design load taking into account temperature, precipitation, construction activities and other factors that may lead to changes in the properties of *soil* or *rock*.

**4.2.6.3. Incorrect Placement of Shallow Foundations**

**1)** Where a *shallow foundation unit* has not been placed or located as indicated on the drawings,

- the error shall be corrected, or
- the design of the *foundation unit* shall be recalculated for the altered conditions by the *designer* and action taken as required in Article 2.2.4.7. of Division C.

**4.2.6.4. Damaged Shallow Foundations**

**1)** If a *shallow foundation unit* is damaged,

- it shall be repaired, or
- the design of the *foundation unit* shall be recalculated for the damaged condition by the *designer* and action taken as required in Article 2.2.4.7. of Division C.

**4.2.7. Deep Foundations****4.2.7.1. General**

**1)** A *deep foundation* shall provide support for a *building* by transferring loads by end-bearing to a competent stratum at considerable depth below the structure, or by mobilizing resistance by adhesion or friction, or both, in the *soil* or *rock* in which it is placed. (See Appendix A.)

**4.2.7.2. Design of Deep Foundations**

**1)** *Deep foundations* shall be designed in conformance with Subsection 4.2.4. and this Subsection. (See Appendix A.)

**2)** Where *deep foundation units* are load tested, as required in Clause 4.2.4.1.(1)(c), the determination of the number and type of load test and the interpretation of the results shall be carried out by a *professional engineer* especially qualified in this field of *work*. (See Appendix A.)

**3)** The design of *deep foundations* shall be determined on the basis of geotechnical considerations taking into account

- the method of installation,
- the degree of inspection,
- the spacing of *foundation units* and group effects,
- other requirements in this Subsection, and
- the appropriate structural requirements in Section 4.1. and Subsections 4.3.1., 4.3.3. and 4.3.4.

**4)** The portion of a *deep foundation unit* permanently in contact with *soil* or *rock* shall be structurally designed as a laterally supported compression member.

5) The portion of a *deep foundation unit* that is not permanently in contact with *soil* or *rock* shall be structurally designed as a laterally unsupported compression member.

6) The structural design of prefabricated *deep foundation units* shall allow for all stresses resulting from driving, handling and testing.

#### 4.2.7.3. Tolerance in Alignment and Location

1) Permissible deviations from the design alignment and the location of the top of *deep foundation units* shall be determined by design analysis and shall be indicated on the drawings.

#### 4.2.7.4. Incorrect Alignment and Location

1) Where a *deep foundation unit* has not been placed within the permissible deviations referred to in Article 4.2.7.3., the condition of the *foundation* shall be assessed by the *designer*, any necessary changes made and action taken as required in Article 2.2.4.7. of Division C.

#### 4.2.7.5. Installation of Deep Foundations

- 1) *Deep foundation units* shall be installed in such a manner as not to impair
- a) the strength of the *deep foundation units* and the properties of the *soil* or *rock* on or in which they are placed beyond the calculated or anticipated limits,
  - b) the integrity of previously installed *deep foundation units*, or
  - c) the integrity of neighbouring *buildings*.

#### 4.2.7.6. Damaged Deep Foundation Units

- 1) Where inspection shows that a *deep foundation unit* is damaged or not consistent with design or good engineering practice,
- a) such a unit shall be reassessed by the *designer*,
  - b) any necessary changes shall be made, and
  - c) action shall be taken as required in Article 2.2.4.7. of Division C.

### 4.2.8. Special Foundations

#### 4.2.8.1. General

1) Where special *foundation* systems are used, such systems shall conform to Subsection 4.2.4., Sentence 4.1.1.5.(2) and Article 1.2.1.1. of Division A.

#### 4.2.8.2. Use of Existing Foundations

1) Existing *foundations* may be used to support new or altered *buildings* provided they comply with all pertinent requirements of this Section.

## Section 4.3. Design Requirements for Structural Materials

### 4.3.1. Wood

#### 4.3.1.1. Design Basis for Wood

1) *Buildings* and their structural members made of wood shall conform to CAN/CSA-O86, "Engineering Design in Wood."

**4.3.1.2.****4.3.1.2. Glued-Laminated Members**

1) Glued-laminated members shall be fabricated in plants conforming to CAN/CSA-O177-M, "Qualification Code for Manufacturers of Structural Glued-Laminated Timber."

**4.3.1.3. Termites**

1) In areas known to be infested by termites, the requirements in Articles 9.3.2.9., 9.12.1.1. and 9.15.5.1. shall apply.

**4.3.2. Plain and Reinforced Masonry****4.3.2.1. Design Basis for Plain and Reinforced Masonry**

1) *Buildings* and their structural members made of plain and reinforced masonry shall conform to CSA S304.1, "Design of Masonry Structures."

**4.3.3. Plain, Reinforced and Pre-stressed Concrete****4.3.3.1. Design Basis for Plain, Reinforced and Pre-stressed Concrete**

1) *Buildings* and their structural members made of plain, reinforced and pre-stressed concrete shall conform to CSA A23.3, "Design of Concrete Structures." (See Appendix A.)

**4.3.4. Steel****4.3.4.1. Design Basis for Structural Steel**

1) *Buildings* and their structural members made of structural steel shall conform to CAN/CSA-S16, "Limit States Design of Steel Structures." (See Appendix A.)

**4.3.4.2. Design Basis for Cold-Formed Steel**

1) *Buildings* and their structural members made of cold-formed steel shall conform to CAN/CSA-S136, "North American Specification for the Design of Cold-Formed Steel Structural Members." (See Appendix A.)

**4.3.4.3. Steel Building Systems**

1) Steel *building* systems shall be manufactured by companies certified in accordance with the requirements of CSA A660, "Certification of Manufacturers of Steel Building Systems."

**4.3.5. Aluminum****4.3.5.1. Design Basis for Aluminum**

1) *Buildings* and their structural members made of aluminum shall conform to CAN3-S157, "Strength Design in Aluminum," using the loads stipulated in Section 4.1., in accordance with limit states design in Subsection 4.1.3.

**4.3.6. Glass****4.3.6.1. Design Basis for Glass**

1) Glass used in *buildings* shall be designed in conformance with CAN/CGSB-12.20-M, "Structural Design of Glass for Buildings."

## Section 4.4. Design Requirements for Special Structures

### 4.4.1. Air-Supported Structures

#### 4.4.1.1. Design Basis for Air-Supported Structures

1) The structural design of *air-supported structures* shall conform to CAN3-S367-M, "Air-Supported Structures," using the loads stipulated in Section 4.1., in accordance with limit states design in Subsection 4.1.3.

### 4.4.2. Parking Structures

#### 4.4.2.1. Design Basis for Parking Structures

1) Parking structures shall be designed in conformance with CSA S413, "Parking Structures."

## Section 4.5. Objectives and Functional Statements

### 4.5.1. Objectives and Functional Statements

#### 4.5.1.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.2. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)



# **Part 5**

## **Environmental Separation**

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# **Part 5**

## **Environmental Separation**

(See Appendix A.)

### **Section 5.1. General**

#### **5.1.1. Scope**

##### **5.1.1.1. Scope**

- 1)** This Part is concerned with
  - a) the control of condensation
    - i) in *building* components and assemblies, and
    - ii) on *building* materials, components and assemblies, and
  - b) the transfer of heat, air, moisture and sound through
    - i) *building* materials, components and assemblies, and
    - ii) interfaces between *building* materials, components and assemblies.

(See Appendix A.)

#### **5.1.2. Application**

##### **5.1.2.1. Exposure to Exterior Space or the Ground and Separation of Dissimilar Environments**

- 1)** This Part applies, as described in Subsection 1.3.3. of Division A, to
  - a) *building* materials, components and assemblies exposed to exterior space or the ground, including those separating interior space from exterior space or separating interior space from the ground,
  - b) *building* materials, components and assemblies separating environmentally dissimilar interior spaces (see A-5.9. in Appendix A), and
  - c) site materials, components, assemblies and grading that may affect environmental loads on *building* materials, components and assemblies exposed to exterior space or the ground.

(See Appendix A.)

#### **5.1.3. Definitions**

##### **5.1.3.1. Defined Words**

- 1)** Words that appear in italics are defined in Article 1.4.1.2. of Division A.

## 5.1.4.1.

## 5.1.4. Resistance to Loads and Deterioration

## 5.1.4.1. Structural and Environmental Loads

(See Appendix A.)

**1)** *Building* materials, components and assemblies that separate dissimilar environments or are exposed to the exterior shall have sufficient capacity and integrity to resist or accommodate

- a) all environmental loads, and effects of those loads, that may reasonably be expected having regard to
  - i) the intended use of the *building*, and
  - ii) the environment to which the materials, components and assemblies are subject, and
- b) all structural loads, and effects of those loads, that may reasonably be expected.

**2)** Compliance with Clause (1)(a) shall be demonstrated by design complying with Subsection 5.2.1. and construction conforming to that design.

**3)** Compliance with Clause (1)(b) shall be demonstrated by design complying with Subsection 5.2.2., and construction conforming to that design, with regard to

- a) materials, components and assemblies, and associated loads, that are identified in Part 4,
- b) air pressure loads imposed on *air barrier systems*,
- c) wind up-lift imposed on roofing, and
- d) hydrostatic pressure imposed on the means of protection from moisture in the ground.

**4)** For materials, components, assemblies and loads to which Sentence (3) does not apply, compliance with Clause (1)(b) shall be demonstrated

- a) by design complying with Subsection 5.2.2. for individual applicable loads and construction conforming to that design, or
- b) in the case of common materials, components and assemblies, and their installation, by proven past performance over a period of several years for individual applicable loads.

(See Appendix A.)

**5)** Materials, components and assemblies separating dissimilar environments and assemblies exposed to the exterior, including their connections, that are subject to structural loads, shall

- a) transfer such loads to the *building* structure without adverse effects on the performance of other materials, components or assemblies,
- b) not deflect to a degree that adversely affects the performance of other materials, components or assemblies, and
- c) be designed, and constructed according to that design, to accommodate
  - i) the maximum relative structural movement that may reasonably be expected, and
  - ii) construction tolerances that may be reasonably expected.

(See Article 4.1.3.5., Sentence 4.1.3.3.(2) and Subsection 4.1.8. for information on different types of structural movements.) (See A-5.1.4.1. and A-5.1.4.1.(5)(b) and (c) in Appendix A.)

## 5.1.4.2. Resistance to Deterioration

(See Appendix A.)

**1)** Except as provided in Sentence (2), materials used in *building* components and assemblies that separate dissimilar environments, or in assemblies exposed to the exterior, shall be

- a) compatible with adjoining materials, and
- b) resistant to any mechanisms of deterioration that may reasonably be expected, given the nature, function and exposure of the materials.

- 2) Material compatibility and deterioration resistance are not required where it can be shown that incompatibility or uncontrolled deterioration will not adversely affect any of
- the health or safety of *building* users,
  - the intended use of the *building*, or
  - the operation of *building* services.

### 5.1.5. Other Requirements

#### 5.1.5.1. Requirements in Other Parts of the Code

- 1) Structural and fire safety requirements in other Parts of this Code shall apply.

## Section 5.2. Loads and Procedures

### 5.2.1. Environmental Loads and Design Procedures

#### 5.2.1.1. Exterior Environmental Loads

- 1) Above ground climatic loads shall be determined according to Subsection 1.1.3.
- 2) Except as provided in Sentence (3), below ground exterior environmental loads not described in Subsection 1.1.3. shall be determined from existing geological and hydrological data or from site tests.
- 3) Where local design and construction practice has shown *soil* temperature analysis to be unnecessary, *soil* temperatures need not be determined. (See Appendix A.)

#### 5.2.1.2. Interior Environmental Loads

- 1) Interior environmental loads shall be determined in accordance with good practice as described in Sentence 6.2.1.1.(1) based on the intended use of the space. (See Appendix A.)

#### 5.2.1.3. Environmental Load and Transfer Calculations

- 1) Calculations related to the transfer of heat, air and moisture and the transmission of sound shall conform to good practice such as that described in the ASHRAE Handbooks.
- 2) For the purposes of any analysis conducted to indicate conformance to the thermal resistance levels required in Article 5.3.1.2., *soil* temperatures shall be determined based on annual average *soil* temperature, seasonal amplitude of variation and attenuation of variation with depth.
- 3) Wind load calculations shall conform to Subsection 4.1.7.

### 5.2.2. Structural Loads and Design Procedures

#### 5.2.2.1. Determination of Structural Loads

- 1) Where materials, components or assemblies that separate dissimilar environments or are exposed to the exterior, or their connections, are required to be designed to withstand structural loads, these loads shall be determined in accordance with Part 4. (See also Subsection 2.2.5. of Division C.)
- 2) The structural loads referred to in Sentence (1) shall include
- dead loads* transferred from structural elements,
  - wind, snow, rain, hydrostatic and earth pressures, as well as earthquake loads and effects,

- c) *live loads* due to use and *occupancy*, and
- d) loads due to thermal or moisture-related expansion and contraction, deflection, deformation, creep, shrinkage, settlement, and differential movement.

**3)** Where materials, components or assemblies that separate dissimilar environments or are exposed to the exterior, or their connections, can be expected to be subject to loads or other effects not described in this Subsection or in Part 4, such loads or effects shall be taken into account in the design based on the most current and applicable information available.

### 5.2.2.2. Wind Load and Other Air Pressure Loads

(See Appendix A.)

**1)** This Article applies to the determination of wind load to be used in the design of materials, components and assemblies, including their connections, that separate dissimilar environments or are exposed to the exterior, where these are

- a) subject to wind load, and
- b) required to be designed to resist wind load.

**2)** Except as provided in Sentence (3), the wind load referred to in Sentence (1) shall be 100% of the specified wind load determined in accordance with Part 4 and based on

- a) the reference velocity pressure defined in Sentence 4.1.7.1.(4), and
- b) the gust effect factor defined in Sentence 4.1.7.1.(6).

**3)** Where it can be shown by test or analysis that a material, component, assembly or connection referred to in Sentence (1) will be subject to less than 100% of the specified wind load, the wind load referred to in Sentence (1) shall be not less than the load determined by test or analysis.

### 5.2.2.3. Design Procedures

**1)** Structural design shall be carried out in accordance with Subsection 4.1.3. and other applicable requirements in Part 4.

## Section 5.3. Heat Transfer

(See Appendix A.)

### 5.3.1. Thermal Resistance of Assemblies

#### 5.3.1.1. Required Resistance to Heat Transfer

(See Appendix A.)

**1)** Except as provided in Sentence (2), where a *building* component or assembly will be subjected to an intended temperature differential, the component or assembly shall include materials to resist heat transfer or a means to dissipate transferred heat in accordance with the remainder of this Subsection.

**2)** The installation of materials to resist heat transfer in accordance with the remainder of this Subsection is not required where it can be shown that uncontrolled heat transfer will not adversely affect any of

- a) the health or safety of *building* users,
- b) the intended use of the *building*, or
- c) the operation of *building* services.

**5.3.1.2. Properties to Resist Heat Transfer or Dissipate Heat**

(See Appendix A.)

**1)** Taking into account the conditions on either side of the environmental separator, materials and components installed to provide the required resistance to heat transfer or the means implemented to dissipate heat shall provide sufficient resistance or dissipation,

- a) to minimize surface condensation on the warm side of the component or assembly,
- b) in conjunction with other materials and components in the assembly, to minimize condensation within the component or assembly,
- c) in conjunction with systems installed for space conditioning, to meet the interior design thermal conditions for the intended *occupancy*, and
- d) to minimize ice damming on sloped roofs.

(See Appendix A.)

**2)** Except as provided in Sentence (3), all metal-framed glazed assemblies separating interior *conditioned space* from interior unconditioned space or exterior space shall incorporate a thermal break to minimize condensation.

**3)** Metal-framed glazed assemblies need not comply with Sentence (2) where these assemblies are

- a) storm windows or doors, or
- b) windows or doors that are required to have a *fire-protection rating*.

(See Appendix A.)

**5.3.1.3. Location and Installation of Materials Providing Thermal Resistance**

**1)** Where a material required by Article 5.3.1.1. is intersected by a *building* assembly, penetrated by a high conductance component or interrupted by expansion, control or construction joints, and where condensation is likely to occur at these intersections, penetrations or interruptions, sufficient thermal resistance shall be provided so as to minimize condensation at these locations.

**2)** Materials providing required thermal resistance shall have sufficient inherent resistance to airflow or be positioned in the assembly so as to prevent convective airflow through and around the material. (See Appendix A.)

**3)** Spray-in-place polyurethane insulation shall be installed in accordance with the requirements of CAN/ULC-S705.2, "Thermal Insulation—Spray-Applied Rigid Polyurethane Foam, Medium Density—Application."

## Section 5.4. Air Leakage

**5.4.1. Air Barrier Systems****5.4.1.1. Required Resistance to Air Leakage**

(See Appendix A.)

**1)** Where a *building* component or assembly separates interior *conditioned space* from exterior space, interior space from the ground, or environmentally dissimilar interior spaces, the properties and position of the materials and components in those components or assemblies shall be such that they control air leakage or permit venting to the exterior so as to

- a) provide acceptable conditions for the *building* occupants,
- b) maintain appropriate conditions for the intended use of the *building*,
- c) minimize the accumulation of condensation in and the penetration of precipitation into the *building* component or assembly,
- d) control heat transfer to roofs where ice damming can occur, and
- e) not compromise the operation of *building* services.

**2)** Except as provided in Sentence (3), an *air barrier system* shall be installed to provide the principal resistance to air leakage.

- 3)** An *air barrier system* is not required where it can be shown that uncontrolled air leakage will not adversely affect any of
- the health or safety of *building* users,
  - the intended use of the *building*, or
  - the operation of *building* services.

#### 5.4.1.2. Air Barrier System Properties

**1)** Except as provided in Sentence (2), materials intended to provide the principal resistance to air leakage shall have an air leakage characteristic not greater than  $0.02 \text{ L}/(\text{s}\cdot\text{m}^2)$  measured at an air pressure difference of 75 Pa. (See Appendix A.)

**2)** The air leakage limit specified in Sentence (1) is permitted to be increased where it can be shown that the higher rate of leakage will not adversely affect any of

- the health or safety of the *building* users,
- the intended use of the *building*, or
- the operation of *building* services.

(See Appendix A.)

- 3)** The *air barrier system* shall be continuous
- across construction, control and expansion joints,
  - across junctions between different *building* assemblies, and
  - around penetrations through the *building* assembly.

**4)** The structural design of *air barrier systems* installed in assemblies subject to air pressure loads shall comply with Article 5.1.4.1. and Subsection 5.2.2.

## Section 5.5. Vapour Diffusion

### 5.5.1. Vapour Barriers

#### 5.5.1.1. Required Resistance to Vapour Diffusion

(See Appendix A.)

**1)** Where a *building* component or assembly is subjected to differentials in temperature and water vapour pressure, the properties and position of the materials and components in those components or assemblies shall be such that they control vapour diffusion or permit venting to the exterior so as to minimize the accumulation of condensation in the *building* component or assembly.

**2)** Except as provided in Sentence (3), a *vapour barrier* shall be installed to provide the principal resistance to water vapour diffusion.

- 3)** A *vapour barrier* is not required where it can be shown that uncontrolled vapour diffusion will not adversely affect any of
- the health or safety of *building* users,
  - the intended use of the *building*, or
  - the operation of *building* services.

**5.5.1.2. Vapour Barrier Properties and Installation**

(See A-5.3.1.2. in Appendix A.)

- 1)** The *vapour barrier* shall have sufficiently low permeance and shall be positioned in the *building* component or assembly so as to
  - a) minimize moisture transfer by diffusion, to surfaces within the assembly that would be cold enough to cause condensation at the design temperature and humidity conditions, or
  - b) reduce moisture transfer by diffusion, to surfaces within the assembly that would be cold enough to cause condensation at the design temperature and humidity conditions, to a rate that will not allow sufficient accumulation of moisture to cause deterioration or otherwise adversely affect any of
    - i) the health or safety of *building* users,
    - ii) the intended use of the *building*, or
    - iii) the operation of *building* services.

(See Appendix A.)

**2)** Coatings applied to gypsum wallboard to provide required resistance to vapour diffusion shall conform to the requirements of Sentence (1) when tested in accordance with CAN/CGSB-1.501-M, "Method for Permeance of Coated Wallboard."

**3)** Coatings applied to materials other than gypsum wallboard to provide required resistance to vapour diffusion shall conform to the requirements of Sentence (1) when tested in accordance with ASTM E 96, "Water Vapor Transmission of Materials" by the desiccant method (dry cup).

## Section 5.6. Precipitation

### 5.6.1. Protection from Precipitation

#### 5.6.1.1. Required Protection from Precipitation

(See Appendix A.)

- 1)** Except as provided in Sentence (2), where a *building* component or assembly is exposed to precipitation, the component or assembly shall
  - a) minimize ingress of precipitation into the component or assembly, and
  - b) prevent ingress of precipitation into interior space.
- 2)** Protection from ingress of precipitation is not required where it can be shown that such ingress will not adversely affect any of
  - a) the health or safety of *building* users,
  - b) the intended use of the *building*, or
  - c) the operation of *building* services.

#### 5.6.1.2. Protective Material and Component Properties

- 1)** Except as provided in Sentence (2), where western cedar shakes or shingles are installed to provide the required protection from precipitation,
  - a) the shakes shall be not less than No. 1 or Handsplit grade, and
  - b) the shingles shall be not less than No. 2 grade.
- 2)** Where western cedar shakes or shingles are installed as undercoursing to provide the required protection from precipitation on vertical assemblies, they shall be not less than No. 3 grade.
- 3)** Except as provided in Sentence (4), where eastern white cedar shingles are installed to provide the required protection from precipitation, they shall be not less than B (clear) grade.
- 4)** Where eastern white cedar shingles are installed as undercoursing to provide the required protection from precipitation on vertical assemblies, they shall be not less than C grade.

**5.6.1.3. Installation of Protective Materials**

**1)** Where a material applied to a sloped or horizontal assembly is installed to provide required protection from precipitation and its installation is covered in the scope of one of the standards listed below, installation shall conform to the requirements of the respective standard:

- a) CAN/CGSB-37.51-M, "Application for Hot-Applied Rubberized Asphalt for Roofing and Waterproofing,"
- b) CGSB 37-GP-55M, "Application of Sheet Applied Flexible Polyvinyl Chloride Roofing Membrane,"
- c) CAN3-A123.51-M, "Asphalt Shingle Application on Roof Slopes 1:3 and Steeper," or
- d) CAN3-A123.52-M, "Asphalt Shingle Application on Roof Slopes 1:6 to Less Than 1:3."

**2)** Where masonry applied to vertical assemblies is installed to provide required protection from precipitation, installation shall conform to the requirements of CSA A371, "Masonry Construction for Buildings."

**3)** Where protective materials are applied to assemblies to provide the required protection from precipitation, they shall be installed so as to shed precipitation or otherwise minimize its entry into the assembly and prevent its penetration through the assembly. (See Appendix A.) (See also Clause 5.3.1.2.(1)(d).)

**5.6.2. Sealing, Drainage, Accumulation and Disposal****5.6.2.1. Sealing and Drainage**

(See Appendix A.)

**1)** Except as provided in Sentence (2), materials, components, assemblies, joints in materials, junctions between components and junctions between assemblies exposed to precipitation shall be

- a) sealed to prevent ingress of precipitation, or
- b) drained to direct precipitation to the exterior.

**2)** Sealing or drainage are not required where it can be shown that the omission of sealing and drainage will not adversely affect any of

- a) the health or safety of *building* users,
- b) the intended use of the *building*, or
- c) the operation of *building* services.

**5.6.2.2. Accumulation and Disposal**

**1)** Where water, snow or ice can accumulate on a *building*, provision shall be made to minimize the likelihood of hazardous conditions arising from such accumulation.

**2)** Where precipitation can accumulate on sloped or horizontal assemblies, provision shall be made for drainage conforming to the plumbing and drainage regulations made pursuant to the Safety Codes Act.

**3)** Where downspouts are provided and are not connected to a sewer, provisions shall be made to

- a) divert the water from the *building*, and
- b) prevent *soil* erosion.

**4)** Junctions between vertical assemblies, and sloped or horizontal assemblies, shall be designed and constructed to minimize the flow of water from the sloped or horizontal assembly onto the vertical assembly.

## Section 5.7. Surface Water

### 5.7.1. Protection from Surface Water

#### 5.7.1.1. Prevention of Accumulation and Ingress

- 1) Except as provided in Sentence (3), the *building* shall be located, the *building* site shall be graded, or catch basins shall be installed so that surface water will not accumulate against the *building*.
- 2) Except as provided in Sentence (3), *foundation* walls shall be constructed so that surface water will not
  - a) enter the *building*, or
  - b) damage moisture-susceptible materials.
- 3) *Buildings* specifically designed to accommodate the accumulation of water at the *building* or the ingress of water need not comply with Sentence (1) or Clause (2)(a).

## Section 5.8. Moisture in the Ground

### 5.8.1. Foundation and Floor Drainage

#### 5.8.1.1. Required Drainage

- 1) Except where a wall or floor is subject to continuous hydrostatic pressure, or unless it can be shown to be unnecessary, the bottom of every exterior *foundation* wall and every floor-on-ground shall be provided with drainage. (See Appendix A.)

#### 5.8.1.2. Drainage Materials and Installation

- 1) Drainage shall be specified and installed to accommodate the drainage load.

### 5.8.2. Protection from Moisture in the Ground

(See Appendix A.)

#### 5.8.2.1. Required Moisture Protection

(See Appendix A.)

- 1) Except as provided in Sentence (2), where a *building* element separates interior space from the ground, materials, components or assemblies shall be installed to prevent moisture transfer into the space.
- 2) Materials, components or assemblies need not be installed to prevent moisture transfer from the ground where it can be shown that such transfer will not adversely affect any of
  - a) the health or safety of *building* users,
  - b) the intended use of the *building*, or
  - c) the operation of *building* services.

#### 5.8.2.2. Protective Material and Component Properties

- 1) Except where it can be shown that lesser protection will not lead to adverse conditions, or as provided in Article 5.8.2.3., materials and components installed to provide required moisture protection shall conform to the requirements of this Article.
- 2) Except as provided in Sentences (3) and (7), materials installed to provide the required moisture protection shall be capable of bridging
  - a) construction, control and expansion joints,
  - b) junctions between different *building* assemblies, and
  - c) junctions between *building* assemblies and elements penetrating *building* assemblies.

**3)** Except as provided in Sentence (7), where the material installed to provide the required moisture protection is not capable of bridging construction, control and expansion joints, those joints shall be designed to maintain the continuity of the moisture protection.

**4)** Materials and components installed to provide the required moisture protection shall have sufficiently low water permeance to resist moisture loads.

**5)** Except as provided in Sentence (7), moisture protection shall be designed and constructed to resist design hydrostatic pressures determined in accordance with Section 4.2.

**6)** Except as provided in Sentence (7), materials covered in the scope of the standards listed below shall not be installed to provide the required resistance to moisture transfer:

- a) CGSB 37-GP-6Ma, "Asphalt, Cutback, Unfilled, for Dampproofing," or
- b) CGSB 37-GP-18Ma, "Tar, Cutback, Unfilled, for Dampproofing."

**7)** Where the substrate is cast-in-place concrete, and a drainage layer is installed between the *building* assembly and the *soil*, and the assembly will not be subject to hydrostatic pressure,

- a) materials and components installed to provide the required resistance to moisture transfer need not conform to Sentences (2), (3), (5) and (6), and
- b) materials covered in the scope of the following standards are permitted to be installed to provide the required resistance to moisture transfer where those materials conform to the requirements of the standards:
  - i) CGSB 37-GP-6Ma, "Asphalt, Cutback, Unfilled, for Dampproofing," or
  - ii) CGSB 37-GP-18Ma, "Tar, Cutback, Unfilled, for Dampproofing."

(See Appendix A.)

### 5.8.2.3. Installation of Moisture Protection

**1)** Except as provided in Sentence (2), where materials are installed to provide the required resistance to moisture transfer and their installation is covered in the scope of the standards listed below, installation shall conform to the waterproofing requirements of the respective standards:

- a) CAN/CGSB-37.3-M, "Application of Emulsified Asphalts for Dampproofing or Waterproofing,"
- b) CGSB 37-GP-36M, "Application of Filled Cutback Asphalts for Dampproofing and Waterproofing,"
- c) CGSB 37-GP-37M, "Application of Hot Asphalt for Dampproofing or Waterproofing," or
- d) CAN/CGSB-37.51-M, "Application for Hot-Applied Rubberized Asphalt for Roofing and Waterproofing."

**2)** Where the substrate is cast-in-place concrete, and a drainage layer is installed between the *building* assembly and the *soil*, and the assembly will not be subject to hydrostatic pressure

- a) materials and components installed to provide the required resistance to moisture transfer and whose installation is covered in the scope of the standards listed in Sentence (1), are permitted to be installed in conformance with the dampproofing requirements of the standards listed in Sentence (1), or
- b) materials installed to provide the required resistance to moisture transfer and whose installation is covered in the scope of the standards listed below, shall be installed in conformance with the requirements of the respective standards:
  - i) CGSB 37-GP-12Ma, "Application of Unfilled Cutback Asphalt for Dampproofing," or
  - ii) CAN/CGSB-37.22-M, "Application of Unfilled, Cutback Tar Foundation Coating for Dampproofing."

(See A-5.8.2.2.(7) in Appendix A.)

## **Section 5.9. Sound Transmission**

(See Appendix A.)

### **5.9.1. Protection from Noise**

#### **5.9.1.1. Sound Transmission Class**

**1)** Sound transmission class ratings shall be determined in accordance with ASTM E 413, "Classification for Rating Sound Insulation," using the results from measurements carried out in accordance with

- a) ASTM E 90, "Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements," or
- b) ASTM E 336, "Measurement of Airborne Sound Insulation in Buildings."

(See Appendix A.)

#### **5.9.1.2. Required Protection from Noise**

**1)** Except as provided in Sentence (2), a *dwelling unit* shall be separated from every other space in a *building* in which noise may be generated by construction providing a sound transmission class rating not less than 50, measured in accordance with the standards referenced in Sentence 5.9.1.1.(1). (See A-9.11.1.1.(1) in Appendix A.)

**2)** Construction separating a *dwelling unit* from an elevator hoistway or a refuse chute shall have a sound transmission class rating not less than 55, measured in accordance with the standards referenced in Sentence 5.9.1.1.(1).

## **Section 5.10. Standards**

### **5.10.1. Applicable Standards**

#### **5.10.1.1. Compliance with Applicable Standards**

**1)** Except as provided in Sentences (2) and (3) and elsewhere in this Part, materials and components, and their installation, shall conform to the requirements of the applicable standards in Table 5.10.1.1. where those materials or components are

- a) incorporated into environmental separators or assemblies exposed to the exterior, and
- b) installed to fulfill the requirements of this Part.

(See Appendix A.)

**2)** The requirements for *flame-spread ratings* contained in thermal insulation standards shall be applied only as required in Part 3.

**3)** Where a wired glass assembly is installed in a required *fire separation*, it need not conform to CAN/CSA-A440, "Windows," or CAN/CSA-A440.1, "User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows." (See Appendix A.)

**4)** Skylights not covered in the scope of CAN/CGSB-63.14-M, "Plastic Skylights," shall nonetheless conform to the performance requirements of that standard.

**Table 5.10.1.1.**  
**Standards Applicable to Environmental Separators and Assemblies Exposed to the Exterior**  
Forming Part of Sentence 5.10.1.1.(1)

Issuing Agency	Document Number	Title of Document
ANSI	A208.1	Particleboard, Mat-Formed Wood
ANSI/ASME	B18.6.1	Wood Screws (Inch Series)
ASTM	A 123/A 123M	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM	A 153/A 153M	Zinc Coating (Hot-Dip) on Iron and Steel Hardware

Table 5.10.1.1. (Continued)

Issuing Agency	Document Number	Title of Document
ASTM	A 653/A 653M	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM	C 4	Clay Drain Tile and Perforated Clay Drain Tile
ASTM	C 36/C 36M	Gypsum Wallboard
ASTM	C 37/C 37M	Gypsum Lath
ASTM	C 79	Gypsum Sheathing Board
ASTM	C 126	Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
ASTM	C 212	Structural Clay Facing Tile
ASTM	C 412M	Concrete Drain Tile (Metric)
ASTM	C 442/C 442M	Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board
ASTM	C 444M	Perforated Concrete Pipe (Metric)
ASTM	C 588/C 588M	Gypsum Base for Veneer Plasters
ASTM	C 630/C 630M	Water-Resistant Gypsum Backing Board
ASTM	C 700	Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated
ASTM	C 931/C 931M	Exterior Gypsum Soffit Board
ASTM	C 960/C 960M	Predecorated Gypsum Board
ASTM	C 1002	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM	C 1177/C 1177M	Glass Mat Gypsum Substrate for Use as Sheathing
ASTM	C 1178/C 1178M	Glass Mat Water-Resistant Gypsum Backing Panel
ASTM	C 1395/C 1395M	Gypsum Ceiling Board
ASTM	C 1396/C 1396M	Gypsum Board
ASTM	D 2178	Asphalt Glass Felt Used in Roofing and Waterproofing
AWPA	M4	Care of Preservative-Treated Wood Products
BNQ	NQ 3624-115	Polyethylene (PE) Pipe and Fittings – Flexible Corrugated Pipes for Drainage – Characteristics and Test Methods
CGSB	CAN/CGSB-11.3-M	Hardboard
CGSB	CAN/CGSB-11.5-M	Hardboard, Precoated, Factory Finished, for Exterior Cladding
CGSB	CAN/CGSB-12.1-M	Tempered or Laminated Safety Glass
CGSB	CAN/CGSB-12.2-M	Flat, Clear Sheet Glass
CGSB	CAN/CGSB-12.3-M	Flat, Clear Float Glass
CGSB	CAN/CGSB-12.4-M	Heat Absorbing Glass
CGSB	CAN/CGSB-12.8	Insulating Glass Units
CGSB	CAN/CGSB-12.10-M	Glass, Light and Heat Reflecting
CGSB	CAN/CGSB-12.11-M	Wired Safety Glass

**Table 5.10.1.1. (Continued)**

Issuing Agency	Document Number	Title of Document
CGSB	19-GP-5M	Sealing Compound, One Component, Acrylic Base, Solvent Curing
CGSB	CAN/CGSB-19.13-M	Sealing Compound, One-Component, Elastomeric, Chemical Curing
CGSB	19-GP-14M	Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing
CGSB	CAN/CGSB-19.24-M	Multicomponent, Chemical-Curing Sealing Compound
CGSB	CAN/CGSB-34.4-M	Siding, Asbestos-Cement, Shingles and Clapboards
CGSB	CAN/CGSB-34.5-M	Sheets, Asbestos-Cement, Corrugated
CGSB	CAN/CGSB-34.14-M	Sheets, Asbestos-Cement, Decorative
CGSB	CAN/CGSB-34.16-M	Sheets, Asbestos-Cement, Flat, Fully Compressed
CGSB	CAN/CGSB-34.17-M	Sheets, Asbestos-Cement, Flat, Semicompressed
CGSB	CAN/CGSB-34.21-M	Panels, Sandwich, Asbestos-Cement with Insulating Cores
CGSB	CAN/CGSB-34.22	Asbestos-Cement Drain Pipe
CGSB	CAN/CGSB-37.1-M	Chemical Emulsifier Type, Emulsified Asphalt for Dampproofing
CGSB	CAN/CGSB-37.2-M	Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings
CGSB	CAN/CGSB-37.3-M	Application of Emulsified Asphalts for Dampproofing or Waterproofing
CGSB	CAN/CGSB-37.4-M	Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing
CGSB	CAN/CGSB-37.5-M	Cutback Asphalt Plastic, Cement
CGSB	37-GP-6Ma	Asphalt, Cutback, Unfilled, for Dampproofing
CGSB	CAN/CGSB-37.8-M	Asphalt, Cutback, Filled, for Roof Coating
CGSB	37-GP-9Ma	Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing
CGSB	37-GP-12Ma	Application of Unfilled Cutback Asphalt for Dampproofing
CGSB	CAN/CGSB-37.16-M	Filled, Cutback Asphalt for Dampproofing and Waterproofing
CGSB	37-GP-18Ma	Tar, Cutback, Unfilled, for Dampproofing
CGSB	37-GP-21M	Tar, Cutback, Fibrated, for Roof Coating
CGSB	CAN/CGSB-37.22-M	Application of Unfilled, Cutback Tar Foundation Coating for Dampproofing
CGSB	37-GP-36M	Application of Filled Cutback Asphalts for Dampproofing and Waterproofing
CGSB	37-GP-37M	Application of Hot Asphalt for Dampproofing or Waterproofing
CGSB	CAN/CGSB-37.50-M	Hot-Applied, Rubberized Asphalt for Roofing and Waterproofing
CGSB	CAN/CGSB-37.51-M	Application for Hot-Applied Rubberized Asphalt for Roofing and Waterproofing
CGSB	37-GP-52M	Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric
CGSB	CAN/CGSB-37.54	Polyvinyl Chloride Roofing and Waterproofing Membrane

Table 5.10.1.1. (Continued)

Issuing Agency	Document Number	Title of Document
CGSB	37-GP-55M	Application of Sheet Applied Flexible Polyvinyl Chloride Roofing Membrane
CGSB	37-GP-56M	Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing
CGSB	37-GP-64M	Mat Reinforcing, Fibrous Glass, for Membrane Waterproofing Systems and Built-Up Roofing
CGSB	41-GP-6M	Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced
CGSB	CAN/CGSB-41.24	Rigid Vinyl Siding, Soffits and Fascia
CGSB	CAN/CGSB-51.25-M	Thermal Insulation, Phenolic, Faced
CGSB	51-GP-27M	Thermal Insulation, Polystyrene, Loose Fill
CGSB	CAN/CGSB-51.32-M	Sheathing, Membrane, Breather Type
CGSB	CAN/CGSB-51.33-M	Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction
CGSB	CAN/CGSB-51.34-M	Vapour Barrier, Polyethylene Sheet for Use in Building Construction
CGSB	CAN/CGSB-63.14-M	Plastic Skylights
CGSB	CAN/CGSB-82.1-M	Sliding Doors
CGSB	CAN/CGSB-82.5-M	Insulated Steel Doors
CGSB	CAN/CGSB-93.1-M	Sheet, Aluminum Alloy, Prefinished, Residential
CGSB	CAN/CGSB-93.2-M	Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use
CGSB	CAN/CGSB-93.3-M	Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use
CGSB	CAN/CGSB-93.4	Galvanized Steel and Aluminum-Zinc Alloy Coated Steel Siding, Soffits and Fascia, Prefinished, Residential
CSA	CAN/CSA-A23.1	Concrete Materials and Methods of Concrete Construction
CSA	CAN/CSA-A82.1-M	Burned Clay Brick (Solid Masonry Units Made from Clay or Shale)
CSA	A82.3-M	Calcium Silicate (Sand-Lime) Building Brick
CSA	A82.4-M	Structural Clay Load-Bearing Wall Tile
CSA	A82.5-M	Structural Clay Non-Load-Bearing Tile
CSA	CAN3-A82.8-M	Hollow Clay Brick
CSA	CAN/CSA-A82.27-M	Gypsum Board
CSA	A82.30-M	Interior Furring, Lathing and Gypsum Plastering
CSA	A82.31-M	Gypsum Board Application
CSA	CAN3-A93-M	Natural Airflow Ventilators for Buildings
CSA	CAN/CSA-A123.1	Asphalt Shingles Made From Organic Felt and Surfaced with Mineral Granules
CSA	A123.2	Asphalt-Coated Roofing Sheets
CSA	CAN/CSA-A123.3	Asphalt Saturated Organic Roofing Felt

**Table 5.10.1.1. (Continued)**

Issuing Agency	Document Number	Title of Document
CSA	CAN/CSA-A123.4	Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems
CSA	CAN/CSA-A123.5	Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules
CSA	A123.17	Asphalt Glass Felt Used in Roofing and Waterproofing
CSA	CAN3-A123.51-M	Asphalt Shingle Application on Roof Slopes 1:3 and Steeper
CSA	CAN3-A123.52-M	Asphalt Shingle Application on Roof Slopes 1:6 to Less Than 1:3
CSA	A165.1	Concrete Block Masonry Units
CSA	A165.2	Concrete Brick Masonry Units
CSA	A165.3	Prefaced Concrete Masonry Units
CSA	CAN3-A165.4	Autoclaved Cellular Units
CSA	A179	Mortar and Grout for Unit Masonry
CSA	CAN/CSA-A220 Series-M91	Concrete Roof Tiles
CSA	A371	Masonry Construction for Buildings
CSA	CAN/CSA-A440	Windows
CSA	CAN/CSA-A440.1	User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows
CSA	CAN/CSA-A3001	Cementitious Materials for Use in Concrete
CSA	CAN/CSA-B182.1	Plastic Drain and Sewer Pipe and Pipe Fittings
CSA	CAN/CSA-G40.21	Structural Quality Steel
CSA	G401	Corrugated Steel Pipe Products
CSA	O80 Series	Wood Preservation
CSA	O80.1	Preservative Treatment of All Timber Products by Pressure Processes
CSA	O80.2	Preservative Treatment of Lumber, Timber, Bridge Ties, and Mine Ties by Pressure Processes
CSA	O80.9	Preservative Treatment of Plywood by Pressure Processes
CSA	O80.15	Preservative Treatment of Wood for Building Foundation Systems, Basements, and Crawl Spaces by Pressure Processes
CSA	O80.34	Pressure Preservative Treatment of Lumber and Timbers with Borates for Use Out of Ground Contact and Continuously Protected from Liquid Water
CSA	O115-M	Hardwood and Decorative Plywood
CSA	O118.1	Western Cedars Shakes and Shingles
CSA	O118.2-M	Eastern White Cedar Shingles
CSA	O121-M	Douglas Fir Plywood
CSA	CAN/CSA-O132.2 Series	Wood Flush Doors
CSA	CAN/CSA-O141	Softwood Lumber
CSA	O151	Canadian Softwood Plywood

Table 5.10.1.1. (Continued)

Issuing Agency	Document Number	Title of Document
CSA	O153-M	Poplar Plywood
CSA	CAN/CSA-O325.0	Construction Sheathing
CSA	O437.0	OSB and Waferboard
ULC	CAN/ULC-S701	Thermal Insulation, Polystyrene, Boards and Pipe Covering
ULC	CAN/ULC-S702	Mineral Fibre Thermal Insulation for Buildings
ULC	CAN/ULC-S703	Cellulose Fibre Insulation (CFI) for Buildings
ULC	CAN/ULC-S704	Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced
ULC	CAN/ULC-S705.1	Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density, Material – Specification
ULC	CAN/ULC-S705.2	Thermal Insulation – Spray-Applied Rigid Polyurethane Foam, Medium Density – Application
ULC	CAN/ULC-S706	Wood Fibre Thermal Insulation for Buildings

## Section 5.11. Objectives and Functional Statements

### 5.11.1. Objectives and Functional Statements

#### 5.11.1.1. Attribution to Acceptable Solutions

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.3. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)

# **Part 6**

## **Heating, Ventilating and Air-conditioning**

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# **Part 6**

## **Heating, Ventilating and Air-conditioning**

### **Section 6.1. General**

#### **6.1.1. Application**

##### **6.1.1.1. Scope**

- 1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A.

##### **6.1.1.2. Application**

- 1) This Part applies to systems and equipment for heating, ventilating and air-conditioning services.

#### **6.1.2. Definitions**

##### **6.1.2.1. Defined Terms**

- 1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

#### **6.1.3. Plans and Specifications**

##### **6.1.3.1. Required Plans and Specifications**

- 1) Plans, specifications and other information for heating, ventilating and air-conditioning systems shall conform to Subsection 2.2.6. of Division C.

### **Section 6.2. Design and Installation**

#### **6.2.1. General**

##### **6.2.1.1. Good Engineering Practice**

(See Appendix A.)

- 1) Heating, ventilating and air-conditioning systems, including mechanical refrigeration equipment, shall be designed, constructed and installed in conformance with good engineering practice such as that described in, but not limited to,

- a) the ASHRAE Handbooks and Standards,
- b) the HRAI Digest,
- c) the Hydronics Institute Manuals,
- d) the NFPA Standards,
- e) the SMACNA Manuals,
- f) the Industrial Ventilation Manual published by the American Conference of Governmental Industrial Hygienists,
- g) CAN/CSA-B214, "Installation Code for Hydronic Heating Systems," and
- h) CAN/CSA-Z317.2, "Special Requirements for Heating, Ventilation, and Air Conditioning (HVAC) Systems in Health Care Facilities."

- 2) Where a health or safety hazard to a worker could result from the production or dissemination of airborne contaminants or from oxygen deficiency in the air, the ventilation systems serving these spaces shall conform to the Occupational Health and Safety Code.

**6.2.1.2. Fire Safety Requirements**

- 1) The fire safety characteristics of heating, ventilating and air-conditioning systems shall comply with Subsection 3.6.5.
- 2) Characteristics referred to in Sentence (1) include but are not limited to
  - a) use of *combustible* materials in duct systems,
  - b) *flame-spread ratings* and smoke-developed ratings of duct and pipe materials and coverings,
  - c) installation of equipment relative to property lines, and
  - d) requirements for *fire dampers* and *fire-stop flaps*.

**6.2.1.3. Structural Movement**

(See Appendix A.)

- 1) Mechanical systems and equipment shall be designed and installed to accommodate the maximum relative structural movement provided for in the construction of the *building*. (See Article 4.1.3.5., Subsection 4.1.8. and Sentence 4.1.3.3.(2) for information on the types of structural movements that may be encountered.)

**6.2.1.4. Installation Standards**

- 1) In addition to the requirements of this Code, the installation of heating, ventilating and air-conditioning equipment, including mechanical refrigeration equipment, and including provisions for mounting, clearances and air supply, shall conform to the requirements of
  - a) the boiler and pressure vessel regulations made pursuant to the Safety Codes Act,
  - b) CSA B52, "Mechanical Refrigeration Code,"
  - c) CAN/CSA-B139, "Installation Code for Oil-Burning Equipment,"
  - d) the gas regulations made pursuant to the Safety Codes Act,
  - e) CAN/CSA-B365, "Installation Code for Solid-Fuel-Burning Appliances and Equipment,"
  - f) the electrical regulations made pursuant to the Safety Codes Act, or
  - g) the Environmental Protection and Enhancement Act.

**6.2.1.5. Fireplaces and Solid-Fuel-Burning Appliances**

- 1) Fireplaces shall conform to the requirements of Section 9.22.
- 2) A solid-fuel burning *appliance* shall not be installed in a location where there is or could be a corrosive or explosive atmosphere.

**6.2.1.6. Heat Recovery Ventilators**

- 1) Heat recovery ventilators with rated capacities of not less than 25 L/s and not more than 200 L/s shall be installed in accordance with Subsection 9.32.3.

**6.2.1.7. Outside Design Conditions**

- 1) The outside conditions to be used in designing heating, ventilating and air-conditioning systems shall be determined in conformance with Subsection 1.1.3.

**6.2.1.8. Installation – General**

- 1) Equipment requiring periodic maintenance and forming part of a heating, ventilating or air-conditioning system shall be installed with provision for access for inspection, maintenance, repair and cleaning. (See Appendix A.)
- 2) Mechanical equipment shall be provided with guards so as to prevent injury.
- 3) Heating, ventilating or air-conditioning systems shall be protected from freezing if they may be adversely affected by freezing temperatures.

**6.2.1.9. Expansion, Contraction and System Pressure**

1) Heating and cooling systems shall be designed to allow for expansion and contraction of the heat transfer fluid and to maintain the system pressure within the rated working pressure limits of all components of the system.

**6.2.1.10. Heat Exchanger Material**

1) If the mixed air temperature upstream of a fuel-fired heat exchanger is less than 6°C, the heat exchanger shall be of corrosion-resistant material.

**6.2.1.11. Access Openings**

1) Any covering of an access opening through which a person could enter shall be openable from the inside without the use of keys where there is a possibility of the opening being accidentally closed while the system or equipment is being serviced.

**6.2.1.12. Exit Stairway HVAC**

1) An enclosed *exit* stairway that serves more than 1 *storey* shall not be heated, ventilated or air-conditioned using an air system that serves other parts of the *building*.

**6.2.1.13. Indoor Design Parameters**

1) Except as required by Sentence (2), all *buildings* shall be equipped with heating facilities capable of maintaining the designed indoor air temperature commensurate with the use of the *building* at the outside winter design temperature.

2) Except as permitted by Sentence (3), heating facilities capable of maintaining an indoor air temperature of 22°C at the outside winter design temperature shall be provided

- a) for all sleeping rooms in a *care or detention occupancy*, or
- b) in a *building* used for *residential occupancy* intended for use in the winter months on a continuing basis.

3) Heating facilities shall be provided in a *building* used for *residential occupancy* which shall be capable of maintaining an air temperature at the outside winter design temperature of not less than

- a) 18°C in an unfinished *basement*, and
- b) 15°C in a crawl space required to be heated.

4) Thermostatic control of the heat supply shall be provided in each *dwelling unit*.

5) Devices shall be provided that enable the heat supply to be controlled to

- a) each sleeping room in a *building* used for *care or detention occupancy*, and
- b) each room in a *residential occupancy* that is used or intended to be used for living, sleeping, eating or cooking purposes.

**6.2.2. Ventilation****6.2.2.1. Required Ventilation**

1) Except as provided in Sentence (3), all *buildings* shall be ventilated in accordance with this Part.

2) Except in *storage garages* covered by Article 6.2.2.3., the rates at which outdoor air is supplied in *buildings* by ventilation systems shall be not less than the rates required by ANSI/ASHRAE 62, "Ventilation for Acceptable Indoor Air Quality."

3) Self-contained mechanical ventilation systems serving only one *dwelling unit* that conform to the requirements of Subsection 9.32.3. shall be considered to satisfy the requirements of this Article.

**6.2.2.2.****6.2.2.2. Natural Ventilation**

**1)** Where climatic conditions permit, *buildings* containing *occupancies* other than *residential occupancies* may be ventilated by natural ventilation methods in lieu of mechanical ventilation where engineering data demonstrates that such a method will provide the required ventilation for the type of *occupancy*. (See Appendix A.)

**6.2.2.3. Ventilation of Storage Garages**

**1)** Except as provided in Sentences (4) and (6), an enclosed *storage garage* shall have a mechanical ventilation system designed to

- a) limit the concentration of carbon monoxide to not more than 100 parts per million parts of air when measured between 900 mm and 1 200 mm above the floor, or
- b) limit the concentration of nitrogen dioxide to not more than 3 parts per million parts of air when measured between 900 mm and 1 200 mm above the floor, where the majority of the vehicles stored are powered by diesel-fuelled engines.

**2)** Mechanical ventilation systems provided in accordance with Clause (1)(a) shall be controlled by carbon monoxide monitoring devices, and systems provided in accordance with Clause (1)(b) shall be controlled by nitrogen dioxide or other acceptable monitoring devices. (See Appendix A.)

**3)** Mechanical ventilation systems provided in accordance with Sentence (1) shall be designed such that the pressure in the *storage garage* is less than the pressure in adjoining *buildings* of other *occupancy*, or in adjacent portions of the same *building* having a different *occupancy*.

**4)** In *storage garages* subject to the requirements of Sentences (1) and (2), where motor vehicles are parked by mechanical means, the ventilation requirements may be reduced by one half.

**5)** Except as provided in Sentence (6), ticket and attendant booths of *storage garages* shall be pressurized with a supply of uncontaminated air.

**6)** The requirements of Sentences (1) to (5) are waived for an open-air *storey* in a *storage garage* in which

- a) no portion of the *storey* is more than 1 m below the adjacent ground level, and
- b) no tarpaulins, glass or other material are used to close the required openings at any time.

**6.2.2.4. Air Contaminants**

**1)** Air contaminants released within *buildings* shall be removed insofar as possible at their points of origin and shall not be permitted to accumulate in concentrations greater than permitted in the Industrial Ventilation Manual published by the American Conference of Governmental Industrial Hygienists.

**2)** Systems serving spaces that contain sources of contamination and systems serving other occupied parts of the *building* but located in or running through spaces that contain sources of contamination shall be designed in such a manner as to prevent spreading of such contamination to other occupied parts of the *building*.

**3)** Heating, ventilating and air-conditioning systems shall be designed to minimize the growth of micro-organisms. (See Appendix A.)

**4)** Air contaminants in spaces where workers will be present shall not exceed the occupational exposure limits set out in Part 4 of the Occupational Health and Safety Code.

**6.2.2.5. Hazardous Gases, Dusts or Liquids**

- 1) Systems serving spaces that contain hazardous gases, dusts or liquids, such as grain elevators, metal powder plants and ammonium nitrate storage, shall be designed, constructed and installed to conform to the requirements of this Code or, in the absence of specific requirements, to good engineering practice such as that described in the publications of the National Fire Protection Association and in the Alberta Fire Code 2006. (See Appendix A.)
- 2) Ventilation systems in storage rooms where *flammable liquids* or *combustible liquids* are stored in compliance with Sentence 3.3.1.2.(4) shall provide at least 5 L/s of exhaust air per square metre of room area, but not less than 70 L/s in total.
- 3) Exhaust air from a ventilation system required in Sentence (2) shall be discharged outdoors and shall be taken from a point within 300 mm of the floor near a wall, with at least one makeup air inlet located near the opposite wall.
- 4) Makeup air openings for a ventilation system described in Sentence (2) shall be
  - a) protected in conformance with the requirements of Subsection 3.1.8., where the makeup air is taken from within the *building*, and
  - b) remote from any discharge referred to in Sentence (3), where the makeup air is taken from outside the *building*.
- 5) Ducts used to ventilate a *flammable liquids* or *combustible liquids* storage room described in Sentence (2) shall be used solely for that purpose.
- 6) Industrial ovens in which flammable vapours may be present or through which products of combustion are circulated shall be ventilated in accordance with NFPA 86, "Ovens and Furnaces."

**6.2.2.6. Commercial Cooking Equipment**

- 1) Systems for the ventilation of commercial cooking equipment shall be designed, constructed and installed to conform to NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," except as required by Sentence 3.6.3.1.(1) and Article 3.6.4.2.
- 2) Fire protection systems for commercial cooking equipment referred to in Sentence (1) using vegetable oil or animal fat shall conform to
  - a) UL-300, "Fire Extinguishing Systems for Protection of Commercial Cooking Equipment," or
  - b) ULC/ORD-C1254.6, "Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units."
- 3) A ventilation system for a *food establishment* shall not have components that allow drips to fall onto surfaces where food is prepared or into food.
- 4) A ventilation system for a *food establishment* shall have all openings to the exterior of the *building* located and protected to prevent the entry of vermin, dust, dirt and other contaminating material into the *food establishment*.
- 5) Canopies, hoods and ductwork for a ventilation system exposed within a *food establishment* shall be constructed of stainless steel.
- 6) A *food establishment* in which food is prepared and the process generates odours, smoke, steam or heat shall have a mechanical ventilation system that includes canopies, ductwork and fans to remove odours, smoke, steam or heat to the exterior of the *building*.

**6.2.2.7. Crawl Spaces and Attic or Roof Spaces**

- 1) Unconditioned and unoccupied crawl spaces and unconditioned and unoccupied *attic or roof spaces* shall be ventilated by natural or mechanical means as required by Part 5. (See Appendix A.)

**6.2.2.8. Projection Rooms**

- 1) This Article applies to a projection room in which equipment is used to handle film more than 16 mm in width.

## 6.2.3.1.

2) The temperature of a projection room shall be thermostatically controllable from within the projection room in order to maintain the temperature of the room at any value within the range of 18°C to 25°C.

3) A projection room exhaust air system shall be independent of any other air system in the *building*.

## 6.2.3. Air Duct Systems

## 6.2.3.1. Application

1) This Subsection applies to the design, construction and installation of air duct distribution systems serving heating, ventilating and air-conditioning systems other than those in *dwelling units* covered by Part 9.

## 6.2.3.2. Materials in Air Duct Systems

1) All ducts, duct connectors, associated fittings and *plenums* used in air duct systems shall be constructed of materials as described in Article 3.6.5.1.

2) Ducts that are used in a location where they may be subjected to excessive moisture shall have no appreciable loss of strength when wet and shall be resistant to moisture-induced corrosion.

3) All ductwork and fittings shall be constructed and installed as recommended in SMACNA Manuals and ASHRAE Standards.

4) All duct materials shall be suitable for exposure to the temperature and humidity of the air being carried and shall be resistant to corrosion caused by contaminants in the air being conveyed in the duct.

5) A crawl space shall not be used as a supply air *plenum*.

## 6.2.3.3. Connections and Openings in Air Duct Systems

- 1) Air duct systems shall have
- a) tight-fitting connections throughout, and
  - b) no openings other than those required for the proper operation and maintenance of the system.

2) Access openings shall be provided in duct systems to allow the removal of material that may accumulate in *plenums* and ducts.

3) *Air supply ducts* shall be continuous from the *furnace* to the room supply outlet.

## 6.2.3.4. Duct Coverings and Linings

1) Coverings, linings and associated adhesives and insulation used in air ducts, *plenums* and other parts of air duct systems shall comply with Article 3.6.5.4.

2) Insulation and coverings on piping used in heating systems shall comply with Article 3.6.5.5.

3) Duct linings shall be installed so that they will not interfere with the operation of volume or balancing dampers or of *fire dampers*, *fire stop flaps* and other *closures*.

## 6.2.3.5. Underground Ducts

- 1) Underground ducts shall
- a) be constructed and installed to provide interior drainage from and access to all low points,
  - b) not be connected directly to a sewer,
  - c) be installed and constructed of materials recommended by ASHRAE and SMACNA Standards and HRAI Manuals, and
  - d) be surrounded by concrete not less than 50 mm thick.

2) A clean-out or pump-out connection shall be provided in an underground duct system at every low point of the duct system.

3) If a perimeter warm air duct is installed in or under a slab within 900 mm of ground level, a rigid water-resistant type insulation not less than 25 mm thick with a thermal resistance not less than RSI 4.4 shall be installed between the duct and the outside edge of the *building*.

#### 6.2.3.6. Fire Dampers

1) *Fire dampers* shall conform to Article 3.1.8.9.

#### 6.2.3.7. Smoke Detectors

1) Air handling systems shall incorporate *smoke detectors* where and as required by Article 3.2.4.12.

#### 6.2.3.8. Exhaust Ducts and Outlets

1) Except as provided in Sentence (2), *exhaust ducts* of non-mechanical ventilating systems serving separate rooms or spaces shall not be combined.

2) *Exhaust ducts* of non-mechanical ventilating systems serving similar *occupancies* may be combined immediately below the point of final delivery to the outside, such as at the base of a roof ventilator.

3) *Exhaust ducts* of ventilating systems shall have provision for the removal of condensation where this may be a problem.

4) Exhaust outlets shall be designed to prevent backdraft under wind conditions.

5) Except as permitted in Sentence (6), exhaust systems shall discharge directly to the outdoors. (See Appendix A.)

- 6) Exhaust systems are permitted to exhaust into a *storage garage*, provided
- they serve rooms that are accessible only from that *storage garage*,
  - the exhaust contains no contaminants that would adversely affect the air quality in the *storage garage* (see Appendix A), and
  - they are designed in accordance with Sentence 6.2.3.9.(3).

(See Appendix A.)

- 7) *Exhaust ducts* connected to laundry drying equipment shall
- be independent of other *exhaust ducts*, *gas vents* or *chimneys*,
  - be accessible for inspection and cleaning,
  - be constructed of a smooth corrosion-resistant material,
  - be ducted to the outside,
  - not include screens,
  - not be secured with screws protruding into the duct, and
  - if collectively vented, be provided with a sheet metal duct and a continuously operating fan positioned downstream from all dryer ducts that exhausts all moisture and lint positively whenever any of the connected dryers are operating.

8) Except as provided in Sentence (10) and except for self-contained systems serving individual *dwelling units*, *exhaust ducts* serving rooms containing water closets, urinals, basins, showers or slop sinks shall be independent of other *exhaust ducts*.

9) Except as provided in Sentence (10) and except for self-contained systems serving individual *dwelling units*, *exhaust ducts* serving rooms containing residential cooking equipment shall be independent of other *exhaust ducts*.

**10)** Two or more exhaust systems described in Sentences (8) and (9) may be interconnected or connected with *exhaust ducts* serving other areas of the *building*, provided

- a) the connections are made at the inlet of an exhaust fan, and all interconnected systems are equipped with suitable back pressure devices to prevent the passage of odours from one system to another when the fan is not in operation, or
- b) the *exhaust ducts* discharge to a shaft that is served by an exhaust fan having a capacity that is equal to or greater than the combined capacity of the exhaust fans discharging to the *plenum* multiplied by the operation diversity factor, provided that the exhaust fan serving the shaft operates continuously (see Appendix A).

**11)** Where *exhaust ducts* containing air from *conditioned spaces* pass through or are adjacent to unconditioned spaces, the ducts shall be constructed to prevent condensation from forming on the inside or outside of the ducts.

**12)** Where an *exhaust duct* system is used for smoke removal in a high *building*, the requirements of Article 3.2.6.6. shall apply.

**13)** Where *exhaust duct* systems from more than one *fire compartment* are connected to an *exhaust duct* in a *vertical service space*, the requirements of Article 3.6.3.4. shall apply.

#### 6.2.3.9. Interconnection of Systems

**1)** In a *residential occupancy*, air from one *suite* shall not be circulated to any other *suite* or to a *public corridor*.

**2)** Except as permitted by Sentences (3) and 6.2.3.8.(6), air duct systems serving *storage garages* shall not be directly interconnected with other parts of the *building*.

**3)** *Exhaust ducts* referred to in Sentence 6.2.3.8.(8) may exhaust through an enclosed *storage garage* or *boiler* room prior to exhausting to the outdoors, provided

- a) the exhaust system runs continuously,
- b) the capacity of the exhaust system is equal to or exceeds the volume of the exhaust entering the *storage garage* or *boiler* room, and
- c) a leakage rate 1 smoke/*fire damper* rated in accordance with CAN/ULC-S112.1-M, "Leakage Rated Dampers for Use in Smoke Control Systems," is provided near the duct outlet location in the *storage garage* or *boiler* room to prevent air from the *storage garage* or *boiler* room from entering the exhaust ductwork system in the event the *building's* exhaust fan is shut down.

#### 6.2.3.10. Ducts in Exits

**1)** Where ducts penetrate *fire separations* separating *exits* from the remainder of the *building*, they shall be in accordance with Article 3.4.4.4.

#### 6.2.3.11. Makeup Air

(See A-6.2.1.1. in Appendix A.)

**1)** In ventilating systems that exhaust air to the outdoors, provision shall be made for the admission of a supply of makeup air in sufficient quantity so that the operation of the exhaust system and other exhaust equipment or combustion equipment is not adversely affected.

**2)** Makeup air facilities required by Sentence (1) shall be interlocked with the exhaust devices they serve so that both operate together.

**3)** Where makeup air facilities introduce air directly from the outdoors into the *building* in winter, they shall incorporate means of preheating that air to maintain the indoor design temperature.

**6.2.3.12. Supply, Return, Intake and Exhaust Air Openings**

1) Supply, return and exhaust air openings located less than 2 m above the floor in rooms or spaces in *buildings* shall be protected by grilles having openings of a size that will not allow the passage of a 15 mm diam sphere.

2) Outdoor air intakes and exhaust outlets on the exterior of *buildings* shall be designed or located so that air entering the *building* system does not contain more contaminants than the normal exterior air of the locality in which the *building* is situated.

3) Exterior openings for outdoor air intakes and exhaust outlets shall be shielded from the entry of snow and rain and shall be fitted with corrosion-resistant screens of mesh having openings not larger than 15 mm, except where experience has shown that climatic conditions require larger openings to prevent the screen openings from icing over.

4) Screens required in Sentence (3) shall be accessible for maintenance.

5) *Combustible* grilles, diffusers and other devices covering supply, return, intake and exhaust openings shall comply with Article 3.6.5.7.

**6.2.3.13. Filters and Odour Removal Equipment**

1) Air filters for air duct systems shall conform to the requirements for Class 2 air filter units as described in ULC-S111, "Fire Tests for Air Filter Units."

2) When electrostatic-type filters are used, they shall be installed so as to ensure that the electric circuit is automatically de-energized when filter access doors are opened or, in *dwelling units*, when the *furnace* circulation fan is not operating.

3) When odour removal equipment of the adsorption type is used, it shall be  
a) installed to allow access so that adsorption material can be reactivated or renewed, and  
b) protected from dust accumulation by air filters installed on the inlet side.

4) Facilities for flushing and drainage shall be provided where filters are designed to be washed in place.

**6.2.3.14. Air Washers and Evaporative Cooling Sections or Towers**

1) The filter and water evaporation medium of every air washer and evaporative cooling section enclosed within a *building* shall be made of *noncombustible* material.

2) Sumps for air washers and evaporative cooling sections shall be constructed and installed so that they can be flushed and drained.

3) Evaporative cooling sections or towers shall comply with the requirements of NFPA 214, "Water-Cooling Towers."

**6.2.3.15. Fans and Associated Air-Handling Equipment**

1) Fans for heating, ventilating and air-conditioning systems shall be located and installed so that their operation

a) does not adversely affect the draft required for proper operation of fuel-fired *appliances*, and  
b) does not allow the air in the duct system to be contaminated by air or gases from the *boiler* room or *furnace* room.

2) Fans and associated air-handling equipment, such as air washers, filters and heating and cooling units, when installed on the roof or elsewhere outside the *building*, shall be of a type designed for outdoor use.

**6.2.3.16. Vibration Isolation Connectors**

1) Vibration isolation connectors in air duct systems shall comply with Article 3.6.5.2.

**6.2.3.17. Tape**

1) Tape used for sealing joints in air ducts, *plenums* and other parts of air duct systems shall comply with Article 3.6.5.3.

**6.2.3.18. Insulation and Coverings**

1) Insulation and coverings on pipes shall comply with Article 3.6.5.5.

**6.2.3.19. Clearance of Ducts and Plenums**

1) The clearance of ducts and *plenums* from *combustible* materials shall comply with Article 3.6.5.6.

**6.2.3.20. Return-Air System**

1) Return-air systems shall comply with Article 3.6.5.8.

2) Where a ceiling space is used as a return-air *plenum*, the requirements of Article 3.6.4.3. shall apply.

3) A *public corridor* or *exit* shall not be used as a return-air *plenum*.

**6.2.4. Carbon Monoxide Alarms****6.2.4.1. Carbon Monoxide Alarms**

1) This Article applies to every *building* that contains a *residential occupancy* and that also contains

- a) a fuel-burning *appliance*, or
- b) a *storage garage*.

2) Carbon monoxide alarms required by this Article shall

- a) conform to CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"
- b) be equipped with an integral alarm that satisfies the audibility requirements of CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"
- c) have no disconnect switch between the overcurrent device and the carbon monoxide alarm, where the carbon monoxide alarm is powered by the *dwelling unit's* electrical system (see Appendix A), and
- d) be mechanically fixed at a height above the floor as recommended by the manufacturer.

3) Where a fuel-burning *appliance* is installed in a *suite of residential occupancy*, a carbon monoxide alarm shall be installed

- a) inside each bedroom, or
- b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

4) Where a fuel-burning *appliance* is installed in a *service room* that is not in a *suite of residential occupancy*, a carbon monoxide alarm shall be installed

- a) either inside each bedroom, or if outside, within 5 m of each bedroom door, measured following corridors and doorways, in every *suite of residential occupancy* that shares a wall or floor/ceiling assembly with the *service room*, and
- b) in the *service room*.

5) For each *suite of residential occupancy* that shares a wall or floor/ceiling assembly with a *storage garage* or that is adjacent to an attic or crawl space to which the *storage garage* is also adjacent, a carbon monoxide alarm shall be installed

- a) inside each bedroom, or
- b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

## 6.2.5. Heating Appliances, General

### 6.2.5.1. Location of Appliances

1) Except for *appliances* installed in *dwelling units*, fuel-fired heating *appliances* shall be located, enclosed or separated from the remainder of the *building* in conformance with Section 3.6. (See also Subsection 9.10.10.)

### 6.2.5.2. Appliances Installed Outside the Building

1) Fuel-fired *appliances* installed outside a *building* shall be designed and constructed for outdoor use.

## 6.2.6. Incinerators

### 6.2.6.1. Applicable Standard

1) The design, construction, installation and *alteration* of every indoor incinerator shall conform to NFPA 82, "Incinerators and Waste and Linen Handling Systems and Equipment."

## 6.2.7. Unit Heaters

### 6.2.7.1. Clearances

1) Every *unit heater* using either steam or hot water as the heating medium shall be installed such that the clearances between the *appliance* and adjacent *combustible* material conform to Table 6.2.9.3.

## 6.2.8. Radiators and Convectors

### 6.2.8.1. Lining or Backing

1) A *noncombustible* lining or backing shall be provided for every steam or hot water radiator and convector

- a) located in a recess or concealed space, or
- b) attached to the face of a wall of *combustible construction*.

2) Every steam or hot water radiator and convector shall be installed so as to conform to the clearance requirements of Table 6.2.9.3.

## 6.2.9. Piping for Heating and Cooling Systems

### 6.2.9.1. Piping Materials and Installation

1) Piping shall be made from materials designed to withstand the effects of temperatures and pressures that may occur in the system. (See Articles 3.1.5.16., 3.1.9.1., 9.10.9.6. and 9.10.9.7. for fire safety requirements.)

2) Every pipe used in a heating or air-conditioning system shall be installed to allow for expansion and contraction due to temperature changes.

3) Supports and anchors for piping in a heating or air-conditioning system shall be designed and installed to ensure that undue stress is not placed on the supporting structure.

### 6.2.9.2. Insulation and Coverings

1) Insulation and coverings on pipes shall be composed of material that will withstand deterioration from softening, melting, mildew and mould at the operating temperature of the system.

2) Exposed piping or equipment subject to human contact shall be insulated so that the temperature of the exposed surface does not exceed 70°C. (See Appendix A.)

**6.2.9.3. Clearances**

1) Clearances between *combustible* material and bare pipes carrying steam or hot water shall conform to Table 6.2.9.3.

**Table 6.2.9.3.**  
**Clearance Between Steam or Hot Water Pipes and Combustible Material**  
 Forming Part of Articles 6.2.7.1. and 6.2.9.3., and Sentence 6.2.8.1.(2)

Steam or Water Temperature, °C	Minimum Clearance, mm
Up to 95	No clearance
Above 95 to 120	15
Above 120	25

**6.2.9.4. Surface Temperature**

1) The exposed surface temperature of a steam or hot water radiator shall not exceed 70°C unless precautions are taken to prevent human contact.

**6.2.9.5. Protection**

1) Where a pipe carrying steam or hot water at a temperature above 120°C passes through a *combustible* floor, ceiling or wall, the construction shall be protected by a sleeve of metal or other *noncombustible* material not less than 50 mm larger in diameter than the pipe.

**6.2.9.6. Piping in Shafts**

1) Where piping for heating or air-conditioning systems is enclosed in a shaft, the requirements of Article 3.6.3.1. for shafts shall apply.

**6.2.10. Refrigerating Systems and Equipment for Air-conditioning****6.2.10.1. Cooling Units**

1) Where a cooling unit is combined with a fuel-fired *furnace* in the same duct system, the cooling unit shall be installed

- in parallel with the heating *furnace*,
- upstream of the *furnace* provided the *furnace* is designed for such application, or
- downstream of the *furnace* provided the cooling unit is designed to prevent excessive temperature or pressure in the refrigeration system.

**6.2.11. Storage Bins****6.2.11.1. Storage Bins**

1) Service pipes passing through a storage bin for solid fuel shall be protected or so located as to avoid damage to the pipes.

2) Except for fuel-thawing pipes, every pipe designed to operate at a temperature of 50°C or above shall be located where solid fuel cannot be stored in contact with it.

3) A storage bin for solid fuel shall not be located above a sewer opening or drain opening.

4) Storage bins for solid fuel shall be designed and constructed so that the air temperature in the bin or the surface temperature of any part of the floor or walls is below 50°C.

**6.2.11.2. Ash Storage Bins**

1) Every ash storage bin shall be constructed of *noncombustible* material.

- 2) Every opening in an ash storage bin shall be protected by a tight-fitting metal door with the metal frame securely fastened to the bin.

## Section 6.3. Chimneys and Venting Equipment

### 6.3.1. General

#### 6.3.1.1. Requirement for Venting

- 1) Except as provided in Articles 6.3.1.2. and 6.3.1.3., the products of combustion from oil-, gas- and solid-fuel-burning *appliances* shall be vented in conformance with the requirements in the applicable *appliance* installation standard listed in Article 6.2.1.4.

#### 6.3.1.2. Masonry or Concrete Chimneys

- 1) Rectangular *masonry or concrete chimneys* not more than 12 m in height shall conform to Part 9 if they serve
  - a) *appliances* with a combined total rated heat output of 120 kW or less, or
  - b) fireplaces.
- 2) *Masonry or concrete chimneys* other than those described in Sentence (1) shall be designed and installed in conformance with the appropriate requirements in NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances."

#### 6.3.1.3. Metal Smoke Stacks

- 1) Single wall metal smoke stacks shall be designed and installed in conformance with NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances."

#### 6.3.1.4. Common Flue

- 1) A *chimney flue* serving a fireplace, incinerator or *slow burning solid fuel fired appliance* shall not serve any other *appliance*.

#### 6.3.1.5. Access Ladders

- 1) Access ladders for *chimneys*, when provided, shall consist of steel or bronze rungs, built into the walls of the *chimneys*.
- 2) Rungs for external ladders shall begin at not less than 2.5 m from ground level.

## Section 6.4. Objectives and Functional Statements

### 6.4.1. Objectives and Functional Statements

#### 6.4.1.1. Attribution to Acceptable Solutions

- 1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.4. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)



# **Part 7**

## **Plumbing Services and Health**

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# Part 7

## Plumbing Services and Health

### Section 7.1. General

#### 7.1.1. Scope

##### 7.1.1.1. Scope

- 1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A.

##### 7.1.1.2. Application

- 1) This Part applies to the design, construction, extension, *alteration*, renewal or repair of
  - a) *plumbing systems*,
  - b) *swimming pools, water theme parks*, steam rooms, sauna rooms and beaches,
  - c) non-flammable medical gas piping systems,
  - d) *food establishments and personal service facilities*,
  - e) child care institutions and *day care facilities*,
  - f) *dairy manufacturing plants*,
  - g) *abattoirs and secondary meat processing plants*,
  - h) laboratories using biological agents, and
  - i) *cemeteries and related buildings*.

#### 7.1.2. Required Facilities

##### 7.1.2.1. All Buildings Except Dwelling Units

- 1) *Buildings* shall be equipped with plumbing facilities as required in Section 7.2. and Article 3.8.2.3.

##### 7.1.2.2. Dwelling Units

- 1) *Dwelling units* shall be equipped with plumbing facilities as required in Section 7.2.

#### 7.1.3. Definitions

##### 7.1.3.1. Defined Terms

- 1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

#### 7.1.4. Height of Rooms

##### 7.1.4.1. Room and Space Height

- 1) The height of every room and space shall be sufficient so that the ceiling or ceiling fixtures do not obstruct movement or activities below.
- 2) The unobstructed height in *dwelling units* shall conform to Subsection 9.5.3.

## 7.1.5.1.

## 7.1.5. Windows

## 7.1.5.1. General

1) Except as permitted in Article 3.3.3.8., every sleeping room in a *building*, and every principal room in a *dwelling unit*, including living rooms and dining rooms or combinations thereof, shall be provided with windows conforming to Subsection 9.7.1.

## 7.1.5.2. Insect Screens

1) All openable windows in a *dwelling unit* shall be screened to protect against the entry of insects.

## 7.1.6. Appliances in Sleeping Rooms

## 7.1.6.1. General

1) Cooking *appliances* installed in a sleeping room shall be of the electrical type.

## Section 7.2. Plumbing Facilities

## 7.2.1. General

## 7.2.1.1. Conformance with Regulations

1) Every *plumbing system* and *private sewage disposal system* shall be designed and installed in conformance with the plumbing and drainage regulations made pursuant to the Safety Codes Act.

## 7.2.1.2. Plumbing Systems and Fixtures

1) Every *building* shall be provided with, or have accessible to its occupants, a supply of potable water, a *sanitary drainage system* and plumbing fixtures.

2) If the installation of a *sanitary drainage system* as required in Sentence (1) is not possible because of the absence of a water supply, outdoor privies complying with Subsection 7.2.3., chemical toilets or other means for the disposal of human waste shall be provided.

3) A *building* shall have piping for cold water connected to every

- a) water closet, and
- b) urinal.

4) Where a piped water supply is available, a *building* shall have piping for hot and cold water connected to every

- a) kitchen sink,
- b) lavatory,
- c) bathtub,
- d) shower,
- e) slop sink, and
- f) laundry area.

5) Where a piped water supply is available, a *suite of residential occupancy* shall have

- a) a supply of hot water, and
- b) at least one
  - i) kitchen sink,
  - ii) bathtub or shower,
  - iii) lavatory, and
  - iv) water closet.

6) Sentences (3) and (4) do not apply to a *building* of low human occupancy. (See Appendix A-7.2.1.2.(6).)

7) Every plumbing fixture shall be piped to the *plumbing system*.

8) Non-potable water shall not be connected to plumbing fixtures that provide water for human consumption, cooking, cleaning, showering or bathing.

9) Except for *dwelling units* and *day care facilities*, a *building of residential occupancy* or *care or detention occupancy* shall have available to its occupants at least one bath or shower, water closet and lavatory.

#### 7.2.1.3. Sewer Hook-up

1) *Building* sewers shall discharge into a public sewage system where such system is available.

2) Where a public sewage system is not available, the *building* sewer shall discharge into a *private sewage disposal system*.

#### 7.2.1.4. Floor Drains

1) A floor drain shall be installed in a washroom containing a urinal equipped with an automatic flushing device.

2) Where gravity drainage to a sewer, drainage ditch or dry well is possible, a floor drain shall be installed in a *basement* forming part of a *dwelling unit*.

3) A floor drain shall be provided in a garbage room, incinerator room, laundry room or *boiler* room serving more than one *dwelling unit*.

#### 7.2.1.5. Corrosion Protection

1) Metal pipes in contact with cinders or other corrosive material shall be protected by a heavy coating of bitumen or other corrosion protection.

#### 7.2.1.6. Safety Glass

1) Glass used in shower and bathtub enclosures shall be laminated or tempered safety glass conforming to CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass."

#### 7.2.1.7. Grab Bar Installation

1) Grab bars that are installed shall resist a load not less than 1.3 kN applied vertically or horizontally.

#### 7.2.1.8. Bathtubs in Hotels and Motels

- 1) Where a bathtub is installed in a hotel or a motel, it shall
- a) have faucets that conform to Clause 7.2.4.1.(4)(b),
  - b) have grab bars that
    - i) conform to Sentence 7.2.1.7.(1),
    - ii) are not less than 1 200 mm long, located vertically at the end of the bathtub, with the lower end between 180 mm and 280 mm above the bathtub rim, and
    - iii) are not less than 1 200 mm long located horizontally along the length of the bathtub at 180 mm to 280 mm above the bathtub rim, and
  - c) be open along its length with no tracks mounted on the bathtub rim.

#### 7.2.1.9. Common Bathrooms and Water Closets

1) Bathrooms and water closet rooms for the use of more than one *dwelling unit* in an apartment *building*, or more than one *suite* in a hotel, motel, institution or lodging house shall be accessible only from a common corridor.

#### 7.2.1.10. Employee Facilities

1) Facilities provided for employees may be counted as part of those required for the *occupancy* if those facilities are made accessible to the public.

**7.2.1.11. Laundry Facilities**

**1)** Laundry facilities or a space for laundry facilities shall be provided in every *dwelling unit*, or grouped elsewhere in the *building* in a location conveniently accessible to the occupants of every *dwelling unit*.

**2)** Except as permitted by Sentence (3), if the *plumbing system* of a *building* is connected to a municipal sewer system, roughed-in plumbing for automatic clothes washer drains shall be provided in every *dwelling unit*.

**3)** Sentence (2) does not apply to a *building* containing more than one *dwelling unit* if a central clothes washing and drying facility is available to all occupants of the *building*.

**7.2.2. Water Closets****7.2.2.1. General**

**1)** The minimum number of water closets shall be determined in accordance with this Subsection for the *occupant load* of the *occupancy* calculated from Table 3.1.17.1., except that for *business and personal services occupancies* the *occupant load* shall be calculated by assuming a net area of 14 m<sup>2</sup> for each person.

**2)** Except as permitted by Sentence (3) and in *day care facilities*, water closets shall be provided for each sex assuming that the *occupant load* is equally divided between males and females, unless the proportion of each sex expected in the *building* can be determined with reasonable accuracy. (See Appendix A.)

**3)** Both sexes are permitted to be served by a single water closet if the *occupant load* in an *occupancy* referred to in Articles 7.2.2.5. to 7.2.2.10. is not more than 10.

**4)** Urinals are permitted to be substituted for two thirds of the number of water closets for males required by this Subsection, except that if only 2 water closets are required for males, one urinal is permitted to be substituted for one of the water closets.

**5)** In a *building* whose *floor area* is more than 600 m<sup>2</sup> and that includes one or more individual tenant spaces for a *business and personal services occupancy* or *mercantile occupancy*, water closets shall be located so that they are accessible to the public when the *building* is occupied.

- 6)** No water closet or urinal shall be installed in
- a) a room used for sleeping, unless accepted by the *authority having jurisdiction*,
  - b) a *basement* without adequate light and ventilation,
  - c) a room used for the preparation, processing, serving or storage of food, or
  - d) a room for the cleaning, sanitizing or storing of utensils.

**7.2.2.2. Privacy**

**1)** Except for washrooms serving children in a *day care facility*, a room containing sanitary facilities serving one sex only shall be enclosed and have a full height door that shall be clearly marked to show the sex served.

**2)** A room providing separate water closets or urinals for more than one male or female shall be designed so that the water closets or urinals are not visible when the door to the room opens onto a place where persons of the other sex work or pass.

**7.2.2.3. Water Closet Room or Cubicle**

**1)** Except for facilities provided in accordance with Section 3.8., every cubicle containing a water closet shall be not less than 1 400 mm deep and 800 mm wide.

**2)** Water closet cubicles shall be constructed of smooth, easily cleanable material.

**3)** A room or cubicle containing a water closet shall have

- a) toilet paper dispensers, and
- b) receptacles for the disposal of sanitary napkins if the facilities are to be used by females.

**4)** In other than *dwelling units* and *suites of residential occupancy*, a room in which a water closet or urinal is installed shall be mechanically ventilated to the exterior of the *building* and have a self-closing door.

**7.2.2.4. Surface Protection**

**1)** Wall and floor surfaces below the uppermost surfaces of a urinal shall be protected from deterioration by impervious and durable material for a distance from the urinal to a point not less than 900 mm from the projected outline of the urinal on to the wall or floor.

**2)** Floor surfaces around a water closet shall be protected from deterioration by an impervious and durable material for a distance not less than 900 mm from the projected outline of the water closet on the floor.

**7.2.2.5. Fixtures for Eating Areas and Establishments Serving Alcoholic Beverages**

**1)** Except as permitted by Sentence (4), the number of water closets required for dining rooms, *restaurants*, banquet rooms, lounges, taverns and clubs shall be

- a) one for each 25 females, and
- b) one for each 35 males.

**2)** Not less than one urinal shall be provided in washrooms for males if there are more than 20 males and the urinal shall be in addition to the water closet required by Sentence (1) if there are not more than 35 males.

**3)** The requirements of Sentence (1) are permitted to be waived for a *food establishment* located in a shopping mall, provided sanitary facilities are provided and maintained by the *owner* of the mall outside the *food establishment*.

**4)** A *restaurant* that has sufficient water closets for the staff and patrons of all indoor areas need not have additional water closets for seasonally used outdoor seating areas operated as an integral part of the *restaurant*, provided the number of seats in the outdoor seating area is not more than 50.

**7.2.2.6. Water Closets for Assembly Occupancies**

**1)** Except as required by Article 7.2.2.5. and Sentences (2) to (6), the number of water closets required for auditoria, gymnasia, lecture halls, secondary schools, non-residential colleges, passenger stations and depots, and similar *assembly occupancies* shall conform to Table 7.2.2.6.A.

**Table 7.2.2.6.A.**  
**Water Closets for an Assembly Occupancy**  
 Forming Part of Sentence 7.2.2.6.(1)

Number of Persons of Each Sex	Minimum Number of Water Closets	
	Male	Female
1 - 50	1	2
51 - 75	2	3
76 - 100	2	4
101 - 125	3	5
126 - 150	3	6
151 - 175	4	7
176 - 200	4	8
201 - 250	5	9
251 - 300	5	10

Table 7.2.2.6.A. (Continued)

Number of Persons of Each Sex	Minimum Number of Water Closets	
	Male	Female
301 - 350	6	11
351 - 400	6	12
Over 400	7 plus 1 for each additional increment of 200 males in excess of 400	13 plus 1 for each additional increment of 100 females in excess of 400

**2)** If it can be shown that activities are sufficiently spaced and informally structured, the number of water closets required by Sentence (1) is permitted to conform to Table 7.2.2.6.B.

**Table 7.2.2.6.B.**  
**Water Closets for an Assembly Occupancy**  
 Forming Part of Sentence 7.2.2.6.(2)

Number of Persons of Each Sex	Minimum Number of Water Closets	
	Male	Female
1 - 25	1	1
26 - 50	1	2
51 - 75	2	3
76 - 100	2	4
101 - 150	3	5
151 - 200	4	6
201 - 300	5	7
301 - 400	6	8
Over 400	7 plus 1 for each additional increment of 200 males	9 plus 1 for each additional increment of 150 females

**3)** Except as required by Article 7.2.2.5. and Sentences (4) to (6), the number of water closets required for non-residential clubs, bowling alleys, community halls, lodge rooms, *day use areas*, *constructed beaches* and *commercial beaches*, art galleries, exhibition halls, libraries, museums, courtrooms and similar *assembly occupancies* shall conform to Table 7.2.2.6.C.

**Table 7.2.2.6.C.**  
**Water Closets for an Assembly Occupancy**  
 Forming Part of Sentence 7.2.2.6.(3)

Number of Persons of Each Sex	Minimum Number of Water Closets for Each Sex
1 - 25	1
26 - 50	2
Over 50	3 plus 1 for each additional increment of 50 persons of each sex

**4)** The number of water closets required for primary schools shall be at least one for each 30 males and one for each 25 females.

5) The number of water closets required for *day care facilities* shall be at least one for each 10 children.

6) The number of water closets required for places of worship and undertaking premises shall be at least one for each 150 persons of each sex.

**7.2.2.7. Water Closets for Care or Detention Occupancies**

1) The number of water closets required for *care or detention occupancies* shall be determined on the basis of the special needs of those *occupancies*.

**7.2.2.8. Water Closets for Mercantile Occupancies**

1) Except as permitted by Sentence (2), the number of water closets required for a *mercantile occupancy* shall be at least one for each 300 males and one for each 150 females.

2) The number of water closets required in a *suite of mercantile occupancy* whose area is not more than 500 m<sup>2</sup> is permitted to be served by one water closet for males and one water closet for females.

**7.2.2.9. Water Closets for Residential, Business and Personal Services, and Industrial Occupancies**

1) The number of water closets required for *residential occupancies* other than *dwelling units* and *suites* conforming to the requirements for *dwelling units, business and personal services occupancies, and industrial occupancies* shall conform to Table 7.2.2.9.

**Table 7.2.2.9.**  
**Water Closets for Residential, Business and Personal Services, and Industrial Occupancies**  
 Forming Part of Sentence 7.2.2.9.(1)

Number of Persons of Each Sex	Minimum Number of Water Closets for Each Sex
1 - 10	1
11 - 25	2
26 - 50	3
51 - 75	4
76 - 100	5
Over 100	6 plus 1 for each additional increment of 30 persons of each sex

**7.2.2.10. Sanitary Facilities for Recreation Camps**

1) If plumbing and sewage disposal facilities are available, a *recreation camp* shall be provided with

- a) water closets in accordance with Table 7.2.2.9.,
- b) one shower for each 30 persons of each sex, and
- c) one lavatory for each water closet.

**7.2.3. Outdoor Privies**

**7.2.3.1. General**

- 1) An outdoor privy shall be provided with
  - a) a self-closing door,
  - b) natural lighting,
  - c) seats and covers of non-absorbent, easily cleanable material,
  - d) a ventilated containment that is protected from surface water and *groundwater*,

- e) insect proof screens on ventilation openings, and
- f) a toilet paper dispenser.

### 7.2.3.2. Location

- 1) An outdoor privy shall be located not less than
  - a) 0.6 m to a property line,
  - b) 6 m to a *dwelling unit*, store, restaurant, or other place where food is stored, prepared or consumed, or
  - c) 15 m to a well.

### 7.2.3.3. Substitution of Privies

- 1) The facilities required by Sentence 7.2.2.6.(3) for a day use area, a *constructed beach* and a *commercial beach*, or by Sentence 7.2.2.10.(1) for a *recreation camp* are permitted to be omitted if plumbing and sewage disposal facilities are not available.
- 2) Where the facilities are permitted to be omitted by Sentence (1), outdoor privies shall be provided and their number shall be the same as the number of water closets required by Table 7.2.2.6.C. or Table 7.2.2.9., as appropriate.
- 3) The requirements of Sentences 7.2.2.6.(3), 7.2.2.10.(1) and 7.2.5.1.(2) for water closets are permitted to be satisfied by a combination of water closets and outdoor privies.

## 7.2.4. Lavatories

### 7.2.4.1. General

- 1) Except as permitted by Sentence (2), at least one lavatory shall be provided in a room containing one or 2 water closets or urinals, and at least one additional lavatory shall be provided for each additional 2 water closets or urinals.
- 2) Wash fountains in circular form are permitted to be provided in lieu of lavatories required by Sentence (1) provided each 500 mm of circumference is considered to be the equivalent of one lavatory.
- 3) Any shelf or projection above a lavatory shall be located so that it will not be a hazard to any person, including a person with a visual disability.
- 4) Except in a *suite of residential occupancy*, lavatories required by Sentence (1) shall be equipped with faucets that
  - a) operate automatically, or
  - b) have lever-type handles that do not close under spring action.
- 5) A room used for the changing of diapers shall have one or more lavatories installed within that space.
- 6) A room in which one or more lavatories are installed shall have not less than
  - a) one electric hot air dryer or paper or cloth towel dispenser,
  - b) one receptacle for paper towels if a paper towel dispenser is provided, and
  - c) one soap dispenser or tray.

### 7.2.4.2. Day Care Facilities

- 1) *Day care facilities* shall have at least one lavatory in a washroom, a sink suitable for the washing of toys, and a sink for the diapering area available to the occupants.

### 7.2.4.3. Food Establishments

- 1) A *food establishment* in which food is prepared or processed shall have a lavatory for use by food handlers that is readily accessible to every area where food is prepared or processed.
- 2) If the lavatories required by Sentence (1) are not readily accessible to areas where food is served, an additional lavatory shall be located adjacent to those areas.

**3)** Sentences (1) and (2) do not apply to a *food establishment* in which the only food kept and served is in sealed containers.

**7.2.5. Service Buildings for Manufactured Home Parks and Campgrounds**

**7.2.5.1. General**

**1)** If *manufactured homes* do not have individual sanitary facilities connected to a central water supply and drainage system, a service *building* shall be provided for public use.

**2)** Except as permitted by Sentence (5), a *campground* shall have a service *building* provided for public use.

**3)** The service *building* required by Sentences (1) and (2) shall contain water closets conforming to Table 7.2.5.1.

**Table 7.2.5.1.**  
**Water Closets for Manufactured Home Parks and Campgrounds**  
 Forming Part of Sentence 7.2.5.1.(3)

Number of <i>Manufactured Homes</i> or Camping Sites	Minimum Number of Water Closets for Each Sex
1 - 10	1
11 - 22	2
23 - 35	3
36 - 45	4
46 - 55	5
56 - 65	6
66 - 75	7
Over 75	8 plus 1 for each additional increment of 10 sites

**4)** If a service *building* is required by Sentences (1) or (2), it shall contain lavatories as required in Sentence 7.2.2.10.(1) and not less than

- a) one laundry tray or similar facility, and
- b) one bathtub or shower for each sex.

**5)** The number of water closets required by Sentence (3) is permitted to be provided by self-contained recreation vehicles or camping sites served by water and sewer connections, provided that the number of camping sites used to calculate water closet requirements is not reduced to less than one third of the total number of camping sites.

**7.2.6. Service Water Heating Facilities**

**7.2.6.1. Hot Water Temperature**

**1)** Where a hot water supply is required by Sentence 7.2.1.2.(4), equipment shall be installed that is capable of heating to at least 45°C but not above 60°C an adequate supply of service hot water for every *dwelling unit*.

**7.2.6.2. Supply Source**

**1)** Service hot water is permitted to be distributed from a centrally located heater to supply the entire *building* or be supplied by individual *service water heaters*.

**7.2.6.3. Equipment and Installation**

1) Every *service water heater* and its installation shall conform to Part 6 and, as applicable, to the plumbing and drainage regulations made pursuant to the Safety Codes Act.

2) Where the *building* is in a location where the spectral response acceleration,  $S_a(0.2)$ , is greater than 0.55, *service water heaters* shall be secured to the structure to prevent overturning. (See Appendix A.)

**7.2.6.4. Corrosion-Resistant Coating**

1) Where storage tanks for *service water heaters* are of steel, they shall be coated with zinc, vitreous enamel (glass lined), hydraulic cement or other corrosion-resistant material.

**7.2.6.5. Fuel-Burning Heaters**

1) Fuel-burning *service water heaters* shall be connected to a *chimney flue* conforming to Section 9.21.

**7.2.6.6. Heating Coils**

1) Heating coils of *service water heaters* shall not be installed in a *flue* or in the combustion chamber of a *boiler* or *furnace* heating a *building*.

**7.2.6.7. Burn Prevention**

1) If the *authority having jurisdiction* deems it necessary to protect children, the elderly, or persons with disabilities or infirmities from burns,

- a) piping used to distribute service hot water and other hot water in *assembly occupancies*, *care or detention occupancies* and *residential occupancies* shall be concealed or insulated, and
- b) except as provided by the plumbing regulations made pursuant to the Safety Codes Act, the temperature of the water from faucets shall be limited to a maximum of 54°C.

**Section 7.3. Swimming Pools and Beaches****7.3.1. General****7.3.1.1. Application**

1) Except for specific requirements for a *private swimming pool* or a *wading pool*, this Section applies to *public swimming pools* and *semi-public swimming pools*.

**7.3.2. Pool Location and Layout****7.3.2.1. Male, Female Design Criteria**

1) Any portion of the *swimming pool* construction concerning itself with facilities for its occupants shall be designed on the basis of 50% male and 50% female, or as dictated from experience or proposed use.

**7.3.2.2. Showers**

1) Dressing room facilities shall have a shower area at the entrance to a *swimming pool* or adjoining the entrance located so that no *bather* can enter the *swimming pool* area without passing through the shower area.

**7.3.2.3. Fence and Gate Design and Construction**

- 1)** The entire area of an outdoor *swimming pool* shall be protected by a fence, *building wall* or enclosure that can prevent access by unauthorized persons, and its height above the outside ground level shall be not less than
  - a) 1.8 m for a *private swimming pool*, and
  - b) 2.0 m for all other *swimming pools*.
- 2)** An opening for access through a fence around a *swimming pool* or a *private swimming pool* shall be protected by a gate that is
  - a) the same height as the fence,
  - b) equipped with a self-closing device,
  - c) equipped with a self-latching device on the inside of the gate located not less than 1.5 m above the ground level, and
  - d) capable of being locked.
- 3)** The fence and gate around a *swimming pool* or a *private swimming pool* shall be constructed so that all horizontal and diagonal members are located on the *swimming pool* side.
- 4)** Barbed wire shall not be used on or as a fence or gate around a *swimming pool* or a *private swimming pool*.
- 5)** No device shall be installed on or adjacent to a fence or gate around a *swimming pool* or a *private swimming pool* that could cause an electric current to pass through the fence or gate.
- 6)** A fence is not required around any portion of an outdoor *private swimming pool* if the top of the outside wall of the *private swimming pool* is not less than 1.8 m above the level of the ground outside the wall and the wall is constructed so that the only means of access to the *private swimming pool* is through a gate or similar facility.

**7.3.2.4. Bathing Load**

- 1)** The *bathing load* shall not exceed
  - a) one *bather* for each 1.5 m<sup>2</sup> of *swimming pool* area or the *maximum design bathing load* for the water circulation system, whichever is lesser, for a *swimming pool*, other than a *whirlpool*, and
  - b) one *bather* for each 1.0 m<sup>2</sup> of *swimming pool* area or the *maximum design bathing load* for the water circulation system, whichever is lesser, for *whirlpools*.

**7.3.2.5. Spectator Areas**

- 1)** There shall be a physical separation of the space used by spectators and that used by *bathers*, with separate entrances to each.
- 2)** The floor and curb of the area used by spectators shall be tightly constructed of impervious material and shall be sloped and adequately drained.
- 3)** Water drainage from spectator bleachers shall not flow onto a *swimming pool* deck.

**7.3.2.6. Food and Beverage Areas**

- 1)** Food and beverage consumption shall be provided only in designated areas set aside for the purpose.
- 2)** Areas for concessions, exercise or other special purposes shall not be located within the minimum surrounding deck areas required by this Code.

**7.3.2.7. Waste Water Discharge**

- 1)** Waste water from a *private swimming pool* shall be discharged to an existing municipal drainage system as directed by the *authority having jurisdiction*.

## 7.3.3.1.

**7.3.3. Swimming Pool Construction****7.3.3.1. Plumbing and Drainage Regulations**

1) All plumbing installations shall comply with plumbing and drainage regulations made pursuant to the Safety Codes Act.

**7.3.3.2. Materials**

1) *Swimming pools* and all appurtenances thereto shall be constructed of materials that are non-toxic to man, impervious and enduring, that will withstand design stresses, that will provide a watertight structure with a smooth and easily cleaned surface without cracks or joints (excluding structural joints) or to which a smooth easily cleaned surface finish can be applied or attached.

**7.3.3.3. Entrapments**

1) No *swimming pool* shall contain any protrusions, means of entanglement or other obstruction that might cause the submerged entrapment of a *bather*.

**7.3.3.4. Colour**

1) Except for the lane, depth and orientation markings, the sides and bottom of a *swimming pool* shall be uniform and white in colour to provide clear visibility of *bathers*.

**7.3.3.5. Skimmers and Glazed Surfaces**

1) If skimmers are used in a concrete *swimming pool*, the *swimming pool* walls shall have a glazed surface for a distance of 150 mm above and below the normal water level.

**7.3.3.6. Wall and Floor Intersections**

1) The radius of curvature between the walls and floor of a *swimming pool* shall not exceed 150 mm where the water depth is less than 1.5 m.

**7.3.3.7. Slopes to Drain**

1) All bottom slopes of a *swimming pool* shall be directed to the main drains.

**7.3.3.8. Vertical Wall Slopes**

1) Side and end walls of a *swimming pool* shall not be sloped more than 11° to the vertical.

**7.3.3.9. Bottom Slopes**

1) The slope of the bottom of a *swimming pool* where the water is less than 1.5 m deep shall be a uniform slope not more than 1:12 for a *public swimming pool* and 1:10 for a *semi-public swimming pool*.

2) Except for stand-alone diving tanks, the slope of the bottom of a *swimming pool* where the water is greater than 1.5 m deep shall be not more than 1:3.

**7.3.3.10. Wave Shutdown**

1) At least 2 emergency wave shutdown switches, one located on each side of the pool, shall be provided at pool side for use by the supervisory staff of a *wave pool*.

**7.3.3.11. Ledges**

1) Below surface ledges on the sides of a *swimming pool* are prohibited where the depth of water exceeds 1.5 m.

**7.3.3.12. Pool Access**

1) Ramps, ladders or recessed stairs shall be provided at the shallow end of a *swimming pool* if the water depth is greater than 600 mm.

2) Ramps shall comply with the requirements of Article 3.8.3.4.

- 3) Two ladders shall be provided at the deep end of a *swimming pool*, one at each side of the *swimming pool*.
- 4) Stairs or ladders in the deep end of a *swimming pool* shall be placed to direct a *bather* away from diving boards and the diving area.
- 5) Recessed steps with grab-rails may be used in lieu of ladders.
- 6) Stairs or ramps used in a *swimming pool* shall have a slip-resistant surface sufficiently sloped towards the *swimming pool* to prevent an accumulation of settleable solids.
- 7) Stairs and seats or their edges shall be finished in a manner that contrasts with the *swimming pool* colour.
- 8) Treads of a ladder in a *swimming pool* shall be not less than 75 mm wide over their full length and have slip-resistant surfaces.
- 9) A ladder shall be corrosion-resistant and shall be rigidly installed.
- 10) Steps shall be designed with a maximum riser height of 200 mm and a minimum tread width of 250 mm.

#### 7.3.3.13. Diving Boards or Platforms

- 1) Any diving board or platform that is provided shall have corrosion-resistant anchorage fittings and hardware and be rigidly constructed and properly anchored at the base with sufficient bracing to ensure stability under the heaviest possible design load.
- 2) Manufacturer's specifications shall be adhered to regarding installation of a diving board or platform.
- 3) There shall be not less than 5 m of free and unobstructed head room above diving boards and towers and not less than 4 m above deck-level diving boards.
- 4) The clearances required by Sentence (3) shall extend not less than 3 m on either side and in front of all diving boards and towers measured from the tip or end of the board.
- 5) Around the portion of a diving board or platform that is not above the water, adequate *guard* rails shall be provided if the diving board or platform is more than 1 m above the water surface.
- 6) Except as required by Sentence (7), the design of a diving board or platform and the corresponding water depths and clearances for a *public swimming pool* shall be in accordance with the "FINA Handbook." (See Appendix A.)
- 7) The design of deck-level diving boards and the corresponding water depths and clearances for a *public swimming pool* shall be in accordance with ANSI/NSPI-1, "Public Swimming Pools." (See Appendix A.)
- 8) The design of a diving board or platform and the corresponding water depths and clearances for a *semi-public swimming pool* shall be in accordance with ANSI/NSPI-1, "Public Swimming Pools." (See Appendix A.)

#### 7.3.3.14. Anchorage Fittings and Hardware

- 1) Anchorage fittings and hardware for play equipment shall be corrosion-resistant.

#### 7.3.3.15. Decks

- 1) Except for specific requirements of Article 7.3.5.4., Sentences 7.3.6.2.(8), (9) and (10), Sentence 7.3.6.3.(2) and Sentences 7.3.7.3.(19) and (20), a non-porous, impervious, hard-surfaced area shall be provided around the entire *swimming pool*, solely for the use of *bathers*, not less than 1.8 m wide and providing not less than 0.9 m of unobstructed passage behind a diving board, support column, or a slide or other piece of play equipment and its supporting structure.

**2)** The deck area of a deck-level *swimming pool* shall have a slope not less than 1:50 and not more than 1:25 away from the *swimming pool* for a distance of at least 0.6 m with positive drainage to the deck drains.

**3)** For a deck-level *swimming pool*, the width of deck beyond the edge of the gutter drained to the circulation system of the deck-level *swimming pool* shall be not more than 900 mm.

**4)** For the deck area of a *swimming pool* in which recessed gutters or skimmers are used, the deck shall be sloped not less than 1:50 and not more than 1:25 away from the *swimming pool* and drained to waste.

**5)** All walks, decks and terraces surrounding a *swimming pool* shall be uniformly sloped not less than 1:50 and not more than 1:25 to drains or points at which the water will have a free unobstructed flow at all times to points of collection.

**6)** A deck surface shall be slip-resistant when wet, sufficiently smooth to facilitate disinfecting, and finished so that there will be no discomfort to bare feet. (See Appendix A.)

**7)** If a brushed concrete finish is used on a deck surface, the brushing shall be done toward the drains.

**8)** The deck of an outdoor *swimming pool* shall be not less than 150 mm above the finished ground elevation.

#### 7.3.3.16. Drainage System

**1)** A drainage opening shall be free from obstruction, including benches and lockers, to allow for ease of cleaning.

**2)** A drainage system shall be designed in accordance with good engineering practice.

**3)** The minimum pipe size used for walkway, deck and terrace drainage shall conform with the plumbing and drainage regulations made pursuant to the Safety Codes Act.

#### 7.3.3.17. Hose Bibcocks

**1)** Hose bibcocks that are not less than 19 mm in diameter shall be provided so that all parts of a *swimming pool* deck area, dressing rooms, shower and toilet areas are within reach of a 30 m hose.

**2)** Hot and cold water shall be available from the hose bibcocks for deck cleaning and disinfecting.

#### 7.3.3.18. Pool Markings

**1)** The depth of water in a *swimming pool* shall be plainly marked at the points of minimum depth, maximum depth, 1.2 m depth, and at the points of break between gentle and steep bottom slopes.

**2)** The words "DEEP AREA" and "SHALLOW AREA" shall be clearly marked at appropriate locations.

**3)** Depth markings for a *swimming pool* shall be placed on the deck in legible numerals at least 100 mm high in a colour contrasting with the background and be visible both by day and under artificial lighting.

**4)** If possible, depth markings shall also be located on the wall of the *swimming pool*, above the operating water level.

**5)** Depth markings must be placed on both sides and both ends of a *swimming pool*, and the distance between markings shall be not more than 7.6 m.

**6)** At the 1.2 m mark and at any point in a *swimming pool* where the slope is greater than 1:12, the *swimming pool* shall be equipped with provisions for the installation of a safety line having a minimum diameter of 19 mm and equipped with floats.

7) If movable or adjustable water depth or floors are installed in a *swimming pool*, suitable markings shall be incorporated to advise *bathers* of these features.

8) The words "VARIABLE DEPTH - NO DIVING" shall be clearly marked at appropriate locations.

#### 7.3.3.19. Underwater Lighting

1) If underwater lighting is to be used in a *swimming pool*, the total lamp lumens shall be not less than

- a) 650 multiplied by the area in square metres of the water surface for an outdoor *swimming pool*, or
- b) 1 100 multiplied by the area in square metres of the water surface for an indoor *swimming pool*.

2) If underwater lighting is to be used and night swimming is to be permitted at an outdoor *swimming pool*, area lighting shall be provided for the deck areas and directed towards the deck areas and away from the *swimming pool* surface so as to provide a minimum of 215 lx at deck level.

3) If underwater lighting is not used and night swimming is permitted at an outdoor *swimming pool*, area lighting shall be designed to provide a minimum of 215 lx at deck level and at the water surface.

4) Lights shall be located so that bulbs can be replaced even when the *swimming pool* is in full use.

#### 7.3.3.20. Emergency Lighting

1) An emergency lighting system that automatically operates whenever the main lighting system fails shall be provided for

- a) an indoor *swimming pool*, or
- b) an outdoor *swimming pool* with lighting for night use.

2) The emergency lighting system shall be installed and arranged to ensure that the water surface of the *swimming pool*, the deck, the dressing room facility and the *exit* passages are lit to a minimum average level of 10 lx to facilitate prompt evacuation.

#### 7.3.3.21. General Lighting

1) Lighting with a minimum of 215 lx shall be provided at deck level and at the water surface of an indoor *swimming pool* facility.

2) Lighting with a minimum of 215 lx at floor level shall be provided in *swimming pool* dressing rooms and any other area of the facility used by *bathers*.

#### 7.3.3.22. Electrical Installations

1) Electrical installations for a *swimming pool* shall comply with electrical regulations made pursuant to the Safety Codes Act.

2) Structural and reinforcing steel shall be grounded for every class of *swimming pool* at the initial stages of construction, even if electrical equipment or wiring is not involved, in accordance with electrical regulations made pursuant to the Safety Codes Act.

#### 7.3.3.23. Dressing Rooms

1) Exclusive of washroom and shower areas, 0.5 m<sup>2</sup> for each male and 0.5 m<sup>2</sup> for each female is required for dressing room space on the basis of the *bathing load*.

2) No steps or curbs shall be permitted in the interior of a dressing area nor between the dressing room and adjoining *swimming pool* deck areas.

3) If dressing room facilities are required to be at a different elevation from the *swimming pool* deck, a ramp with a slip-resistant surface and a slope not more than 1:12 shall be provided.

**7.3.3.24. Partitions and Walls**

1) All *partitions* and walls between portions of the dressing room areas, screen *partitions*, shower, water closet cubicles and dressing room booths shall be of durable material not subject to damage by water and shall be so designed that a gap of not less than 150 mm above floor level is provided between the *partitions* and the floor.

2) Walls or *partitions* of wood construction shall be mounted not less than 200 mm above the finished floor.

**7.3.3.25. Dressing Room Floors**

1) Floors that are wet traffic areas for *bathers*, including dressing rooms, shall

- a) have a smooth but slip-resistant finish,
- b) be impervious to moisture with no open cracks or joints,
- c) be drained with no pooling of water,
- d) have a slope not less than 1:50 and not more than 1:25 in the direction of the closest drain, and
- e) have rounded corners for ease of cleaning where floors intersect with walls and *partitions*.

**7.3.3.26. Dressing Room Hose Bibcock**

1) Not less than one 19 mm hose bibcock shall be provided in each dressing room for flushing down and disinfecting the dressing room interior.

2) Hose bibcocks required by Sentence (1) shall be installed with a connection to both hot and cold water systems.

**7.3.3.27. Showers**

1) A water heater and thermostatically controlled mixing valve accessible only to authorized staff shall be installed and shall be capable of providing 0.15 L/s of water to each shower head with a temperature range of 35°C to 40°C.

2) The number of showers provided in each dressing room shall be one for each 50 *bathers* and not less than 3 showers per dressing room.

3) Floor drains shall be so designed that waste water from one shower head shall not pass over the *floor area* of another shower.

4) The lower 2.4 m of walls in a shower area shall have a smooth and impervious finish.

**7.3.3.28. Plumbing Fixtures**

1) The number of water closets, lavatories and urinals serving dressing rooms shall be based on the *bathing load* and Subsections 7.2.2. and 7.2.4.

**7.3.3.29. Accessories**

1) A mirror provided over a lavatory shall be of the unbreakable type.

2) Sanitary napkin dispensers shall be installed in water closet and shower areas used by females.

**7.3.3.30. Non-Bather Washroom Facilities**

1) Plumbing fixtures for persons, other than *bathers*, using a *swimming pool* facility shall be provided outside the dressing room and wet traffic areas and shall be in conformance with Section 7.2.

**7.3.3.31. Swimming Pool Inlets and Outlets**

1) *Swimming pool* inlets shall be constructed of corrosion-resistant material and shall be designed to minimize the effects of being blocked by *bathers* and to minimize the water stream effect.

2) *Swimming pool* inlets and outlets shall be provided and arranged to produce a uniform circulation of water and to maintain a uniform concentration of chlorine or equivalent disinfectant throughout the *swimming pool* with provisions to adjust the flow through all inlets.

3) Provision shall be made for directing water flow to poor circulation areas including recessed ladders, steps, nooks and steep slopes.

4) The minimum number of inlets shall be calculated on the basis of the maximum flow rate of the filter system divided by the manufacturer's recommended maximum circulation rate for each inlet fitting but in no case shall the velocities exceed the maximum values allowed by this Code.

5) Floor inlets shall be provided in *swimming pools* more than 12.8 m wide.

6) If wall inlets are used, they shall be submerged not less than 0.6 m.

7) If wall inlets are installed in water areas more than 1.5 m deep, they shall alternate between one third of the depth from the top of the water and one third of the depth from the bottom.

### 7.3.3.32. Prefinished Gutter Sections

1) Nothing in this Subsection shall prohibit the use of prefinished gutter sections that are properly sized and installed to meet other applicable requirements of this Code.

### 7.3.3.33. Pool Drains

1) There shall be not less than 2 interconnected drain outlets not less than 300 mm apart at the lowest level of a *swimming pool*.

2) The total orifice area of all the *swimming pool* drain outlets shall be not less than 4 times the cross-sectional area of the main *swimming pool* drain line, which shall be sized in accordance with Sentence (5).

3) A floor outlet shall not permit a flow of water with a velocity more than 0.5 m/s through the grating.

4) Slotted openings in a grating shall be not more than 12.5 mm wide.

5) In a *swimming pool* designed to circulate the overflow water, the main drain piping shall be sized to accommodate not less than 50% of the circulated water to the filtration equipment, based on the design flow rate.

6) If it is possible to drain a *swimming pool* by gravity, the drain line shall be no smaller than that required by Sentence (5).

7) Anti-vortex drains, consisting of parallel plates, where the water enters from the sides rather than through the top, are permitted to be installed provided the distance between the parallel plates is not more than 12.5 mm.

8) The velocity through an anti-vortex drain may be increased to 1.8 m/s.

9) The top plate of an anti-vortex drain shall be flush with the *swimming pool* floor.

### 7.3.3.34. Overflow

1) An overflow structure is permitted to be either a perimeter overflow gutter or a skimmer system.

2) Except where skimmers are provided, a *swimming pool* shall be provided with a level overflow channel around the entire perimeter of the *swimming pool*.

3) A perimeter overflow channel shall be designed to prevent matter entering it from being washed back into the *swimming pool*, and dimensioned to minimize the risk of a *bather's* arms or feet becoming caught in it.

4) A perimeter overflow channel shall be adequately sloped to provide rapid drainage to drains that are not less than 50 mm diam and spaced not more than 4.5 m apart.

5) The overflow channel drainage and collection system shall have a hydraulic capacity sufficient to carry 125% of the designed flow rate.

#### 7.3.3.35. Continuous Skimming

1) Depressions are permitted in a *swimming pool* lip to provide continuous skimming during off-peak loads.

#### 7.3.3.36. Surge Capacity

1) All deck-level systems shall be installed with adequate surge capacity in the gutters or with a properly designed surge tank with level controls, based on the displacement of the *bathing load*.

2) A surge tank, pipe or channel required in Sentence (1) shall be installed and have a working capacity of not less than 28 L per *bather*, based on the *bathing load*.

#### 7.3.3.37. Skimming Devices

1) A *swimming pool* is permitted to be provided with suitable skimming devices that will fulfil the requirements of an overflow channel.

2) The minimum number of skimming devices shall be determined by providing one device for each 40 m<sup>2</sup> of *swimming pool* area, or one device for each 3 L/s based on the flow rate for the *swimming pool*, whichever is greater.

3) Collection piping from skimming devices shall be hydraulically designed to carry not less than 100% of the design flow rate.

4) A skimmer shall

- a) be constructed of substantial corrosion-resistant materials,
- b) be fully recessed behind the face of the *swimming pool* wall,
- c) have access provided in the deck to each skimmer,
- d) have automatic adjustment of the overflow weir to variations in water level through a vertical distance of not less than 100 mm,
- e) have a valve or other device at each skimmer discharge for flow regulation so that uniform skimming action can be achieved,
- f) be designed to take not less than 3 L/s for each unit,
- g) have an equalizer if water is drawn by pump suction, and
- h) have skimmer equalizer inlets covered with a grille or grating at the *swimming pool* wall.

#### 7.3.3.38. Circulation System

1) The circulation system includes the piping, pumps, hair catchers, filters, flow meters, water heaters, thermometers, pressure and vacuum gauges, suction cleaners and all appurtenances.

2) Except as otherwise provided in this Code, the circulation system shall be installed in accordance with the manufacturer's specification or, in the absence of a specification, in accordance with the IAPMO "Uniform Swimming Pool, Spa and Hot Tub Code."

3) All circulation system components shall comply with NSF/ANSI-50, "Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs," and shall have the approval of an accepted testing laboratory.

#### 7.3.3.39. Turnover Period

1) A filtration system shall be designed to accommodate the maximum number of *bathers* in any one day on the basis of providing 2 m<sup>3</sup> of filtered chemically treated water per *bather* per day.

2) Except as otherwise required, no circulation system shall be designed with a turnover period more than

- a) 4 h for a *public swimming pool* or a *semi-public swimming pool*, and
- b) 2 h for a *special purpose swimming pool*.

**7.3.3.40. Operation and Maintenance**

- 1) The piping and filtration system shall be designed to minimize friction losses and to
  - a) circulate the *swimming pool* water through the treatment equipment,
  - b) permit each filter to be back washed individually where necessary,
  - c) filter the waste,
  - d) empty the *swimming pool*,
  - e) drain or blow out the entire system,
  - f) measure the circulation rate of flow,
  - g) permit the circulation of water in a closed system between a diatomaceous earth filter and the pump during the precoat operation to avoid diatomaceous earth from entering the *swimming pool*, if a diatomaceous earth system is used,
  - h) vacuum *swimming pool* water to a waste sump or to a filter tank, if a vacuum system is installed,
  - i) provide for chemical treatment, and
  - j) provide for heating.
- 2) Adequate, accessible and easily serviceable valves shall be provided in a piping system to permit complete flexible operation of the filtration equipment.
- 3) Buried lines in a piping system shall be valved so that sections can be isolated to determine leaks.
- 4) The circulating water from a skimmer or overflow system and the circulating water from the main drains shall be separately valved and piped to the mechanical room, but are permitted to be joined at that location.

**7.3.3.41. Velocities**

- 1) The water velocity in a suction pipe shall be not more than 1.5 m/s.
- 2) The water velocity in a discharge pipe shall be not more than
  - a) 2.3 m/s for plastic piping,
  - b) 2.0 m/s for copper piping, and
  - c) 1.5 m/s for cast iron piping.

**7.3.3.42. Materials**

- 1) The circulation piping and fittings shall be of a non-toxic, corrosion-resistant material and able to withstand operating pressures.

**7.3.3.43. Flanges and Unions**

- 1) Flange joints or unions shall be inserted at intervals to permit any part of the piping system to be disassembled for cleaning or repairs.

**7.3.3.44. Sump or Blow Off Device**

- 1) A sump or blow off device shall be provided at the lowest part of the piping system to permit cleaning and draining.

**7.3.3.45. Flow Indicators and Gauges**

- 1) A rate of flow indicator shall be provided in a *swimming pool* to show the rate of water circulation.
- 2) A rate of flow indicator shall be installed in strict accordance with the manufacturer's recommendations and shall
  - a) be located where practicable near the filters and provide not less than 95% degree of accuracy at all times,
  - b) be provided with a scale calibrated for reading in litres per second or litres per minute, and
  - c) have a range of 0 to 150% of the established filtration rate.

3) If a single treatment plant serves 2 or more separate *swimming pools*, provision shall be made for measuring the flow into or from each *swimming pool*.

4) Gauges shall be installed in all piping systems to measure the pressure drop across pressure type filter systems and the suction pressure on vacuum filter systems, and on both sides of circulation pumps for checking their operational performance.

#### 7.3.3.46. Heating

1) Discharge of steam into, or placing heating coils directly in a *swimming pool* is prohibited.

2) Valved piping shall be provided for regulating flow through the heater and for by-passing or isolating the heater.

3) One or more thermometers shall be inserted in the piping system.

4) If a water heater is provided, thermometers shall be installed to measure the temperature of the water leaving the *swimming pool* and the water returning to the *swimming pool*.

5) All thermometers shall be legible in single degrees Celsius with a range of at least 20°C embracing the operating temperature, and shall be installed so that they can be easily read.

#### 7.3.3.47. Equipment and Mechanical Room

1) The equipment and mechanical room shall be reasonably accessible from the *swimming pool* enclosure using doors that are locked to unauthorized persons.

2) Additional outside access for *public swimming pools* shall be provided to the equipment and mechanical room.

3) The floor of an equipment or mechanical room shall have a slope not less than 1:50 and not more than 1:25 to floor drains.

4) Adequate space shall be provided for servicing the filtration equipment.

#### 7.3.3.48. Storage Room

1) A storage room shall be provided for all operating chemicals.

2) The storage area provided for chemicals shall not be near heating equipment nor have direct access to areas that are accessible to the public.

#### 7.3.3.49. Disinfection Equipment

1) A *swimming pool* shall be equipped with suitable and efficient disinfecting equipment to provide continuous disinfection when in use and a residual level of free chlorine necessary to maintain the *swimming pool* water in a bacteriologically and chemically safe condition at all times.

2) Disinfection equipment shall be installed and connected so that no feeding can take place unless positive flow through the pool circulation system is assured.

#### 7.3.3.50. Chlorine

1) All aspects of chlorine storage and handling shall conform to the Occupational Health and Safety Act and regulations made pursuant to that Act.

#### 7.3.3.51. Chemical Feed Equipment

1) Hypochlorinators or other adjustable output rate chemical feeding equipment shall

- a) conform to the requirements of NSF/ANSI-50, "Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs,"
- b) bear the seal of an approved testing laboratory,
- c) have no cross connection with any domestic water supply, and
- d) include positive features to prevent siphoning if installed above the *swimming pool*.

2) Erosion feeders using stabilized chlorine are not approved as chlorinators for the purposes of this Article.

#### 7.3.3.52. Water Operated Gas Chlorinator

1) If elemental chlorine is supplied, a water operated gas chlorinator shall be used, which controls and regulates the flow of the gas.

2) A water operated gas chlorinator shall provide an automatic shutoff of gas when water pressure fails and shall vent leakage to the outside atmosphere.

3) The capacity of gas chlorinators used for an outdoor *swimming pool* shall be sufficient to feed at a rate of 1.35 kg of chlorine per 24 h per 45000 L of *swimming pool* capacity.

4) Gas chlorinators used for an indoor *swimming pool* shall have a capacity that is not less than 0.45 kg of chlorine per 24 h per 45000 L of *swimming pool* capacity.

#### 7.3.3.53. Disinfectant Injection Equipment

1) The disinfectant injection equipment shall be on the *swimming pool* supply line and as close to the *swimming pool* inlet as possible.

#### 7.3.3.54. Gaseous Chlorine Equipment

- 1) If gaseous chlorine equipment is provided,
  - a) the mechanical proportioning device and cylinders of chlorine shall be housed in a reasonably gas-tight corrosion-resistant and mechanically vented enclosure having not less than a 1 h *fire-resistance rating*, of adequate size to house the chlorinator and as many extra tanks as are deemed necessary,
  - b) only chlorination equipment shall be kept in the chlorine room,
  - c) the chlorine room shall be at ground level with access to the outside through outwardly opening doors,
  - d) the chlorine room shall have a separate positive exhaust ventilation system that gives one complete air change per minute,
  - e) switches for fans and lights shall be outside the room and located adjacent to the viewing window,
  - f) a signal light located directly adjacent to the switches noted in Clause (e) shall indicate when the ventilation fan is operating,
  - g) the intake for the exhaust fan from the room shall be not more than 150 mm above the floor and the point of discharge shall be located so as not to contaminate air inlets to *buildings* or areas used by people,
  - h) ventilation air shall be supplied through louvred inlets near the ceiling or by a mechanical ventilation system, and the air temperature shall be in the range required by Clause (l),
  - i) the vent hose from the chlorine feed machine shall discharge to the outside atmosphere above ground and in a location not used by the public,
  - j) vents shall be of stainless steel and protected to prevent the entry of insects, rain and snow,
  - k) a weigh scale shall be provided in a chlorine room for weighing all chlorine cylinders in use and the scale platform shall be within 50 mm of the surrounding floor elevation,
    - l) a chlorine room shall be capable of being heated to not less than 15°C but shall be protected against heating to a temperature more than 30°C,
  - m) the *swimming pool* shall utilize a monitor alarm system that activates in the event of a chlorine emergency,
  - n) the monitor alarm system noted in Clause (m) shall constantly monitor the air in the chlorine room and activate an audible alarm signal where it can be heard,
  - o) there shall be a steel-framed wire-reinforced glass window with a glass area not less than 0.15 m<sup>2</sup> located so that the chlorinator and its operating parts are visible at all times to the operator from outside the chlorine room,

- p) wall anchors and chains shall be provided to secure all cylinders housed in the chlorine room,
- q) a dust-tight cabinet for the exclusive purpose of storing breathing apparatuses shall be mounted outside, and immediately adjacent to, the chlorine room, and
- r) the minimum distance between a chlorine room exhaust and a *building* system air intake shall be 3 m measured between the closest points, and the *building* system air intake shall not be below the level of the chlorine room exhaust.

#### 7.3.3.55. pH Control

1) A mechanical device for feeding and monitoring a regulated adequate dosage of pH buffering chemicals shall be provided for a *swimming pool*.

#### 7.3.3.56. Diatomaceous Earth Filter

1) A diatomaceous earth filter system shall be equipped with a suitable means of feeding a constant supply of filter aid at an adjustable rate of sufficient capacity relative to the filter system.

#### 7.3.3.57. ORP

1) An ORP probe and meter shall be installed in the *swimming pool* water recirculation line in accordance with the manufacturer's installation instructions. (See Appendix A.)

### 7.3.4. Above-Ground Swimming Pools

#### 7.3.4.1. General

1) Except for the changes and additional standards listed in this Subsection, all above-ground *swimming pools* shall be designed in accordance with the requirements of Subsections 7.3.2. and 7.3.3.

2) An above-ground *swimming pool* is permitted to be installed and operated as a *public swimming pool* or *semi-public swimming pool* adjacent to or near existing dressing rooms if

- a) the existing dressing rooms are in satisfactory condition and the layout and number of showers meet the requirements of this Code, and
- b) an impervious walkway, not less than 1.2 m wide, is provided between the *swimming pool* and dressing rooms.

3) Tiling at the water line of an above-ground *swimming pool* is not required.

4) Not less than one *swimming pool* ladder with grab rails shall be located adjacent to the platform of an above-ground *swimming pool* and one ladder shall be provided at the opposite side or end of the *swimming pool*.

5) A minimum horizontal clearance not less than 1.2 m in width, of which 0.6 m shall be completely free of obstructions, shall be provided around the entire perimeter of an above-ground *swimming pool*.

6) The normal operating water level of a skimmer for an above-ground *swimming pool* shall be not less than 150 mm below the top of the *swimming pool* wall.

7) The filtration system for an above-ground *swimming pool* shall be designed to circulate the entire volume of the *swimming pool* in not more than 4 h.

#### 7.3.4.2. Platforms

1) An above-ground *swimming pool* platform shall be supplied for not less than 30% of the *swimming pool* perimeter.

2) The surface of an above-ground *swimming pool* platform shall be flush with the top of the *swimming pool* tank.

3) An above-ground *swimming pool* platform shall be securely fastened to the *swimming pool* wall or securely supported to withstand anticipated design loads.

4) An above-ground *swimming pool* platform shall be not less than 1.2 m wide and shall have a non-porous, impervious, slip-resistant surface, properly drained away from the *swimming pool*.

5) A barrier or *guard* rail not less than 1070 mm in height shall be provided around the entire outer perimeter of an above-ground *swimming pool* platform except at the entry and egress points.

#### 7.3.4.3. Drainage

1) The area surrounding an above-ground *swimming pool* shall be sloped away from the *swimming pool* and shall be adequately drained away from the *swimming pool*.

2) Adequate water drainage shall be provided under an above-ground *swimming pool* platform.

#### 7.3.4.4. Stairs

1) Stairs with handrails shall be provided at entry and egress points of an above-ground *swimming pool* and treads shall have a non-skid finish when wet.

### 7.3.5. Semi-Public Swimming Pools

#### 7.3.5.1. General

1) Except for the requirements of Articles 7.3.5.2. to 7.3.5.7., a *semi-public swimming pool* shall be designed in accordance with the requirements of Subsections 7.3.2. and 7.3.3.

#### 7.3.5.2. Pool Egress

1) Stairs or one ladder shall be provided at the shallow end of a *semi-public swimming pool*.

2) One ladder shall be provided at the deep end of a *semi-public swimming pool*.

#### 7.3.5.3. Inlets

1) An adequate number of directional inlets shall be provided for a *semi-public swimming pool* based on the design circulation rate and pipe velocities.

#### 7.3.5.4. Deck Space and Clearances

1) A *semi-public swimming pool* that is less than 168 m<sup>2</sup> in area shall have not less than 1.2 m wide clear deck space and 0.9 m clearance around equipment.

#### 7.3.5.5. Circulation System and Turnover Period

1) The circulation system for a *semi-public swimming pool* shall be designed in accordance with Article 7.3.3.39.

#### 7.3.5.6. Diving Tank

1) A diving tank for a *semi-public swimming pool* shall be constructed in accordance with ANSI/NSPI-1, "Public Swimming Pools." (See A-7.3.3.13.(7) and (8) in Appendix A.)

**7.3.5.7. Ancillary Facilities**

- 1)** Notwithstanding anything in this Code to the contrary, a *semi-public swimming pool* is permitted to be installed and operated without providing a bathhouse, dressing room, lockers, showers, lavatory, urinal, or water closet if
- a) the summer camp, apartment *building*, condominium, private club, multiple housing unit, mobile home park, trailer park, or residential school is equipped with an adequate number of water closets, showers or baths, and lavatories, and
  - b) the use of the *swimming pool* is restricted entirely to registered guests, tenants, or members and their guests, except that if conditions exist, develop or are anticipated whereby the maintenance of satisfactory water quality is jeopardized, the *authority having jurisdiction* may require the installation of shower and water closet facilities.

**7.3.6. Special Purpose Swimming Pools, Whirlpools and Wading Pools****7.3.6.1. Special Purpose Swimming Pools**

- 1)** If a *special purpose swimming pool* is not drained after every use, it shall be designed in accordance with the requirements of Subsections 7.3.2. and 7.3.3.

**7.3.6.2. Whirlpools**

(See Appendix A.)

- 1)** Except for the requirements of Sentences (2) to (10), a *whirlpool* shall be constructed in accordance with Subsections 7.3.2. and 7.3.3.
- 2)** The maximum water depth of a *whirlpool* shall be 1.2 m measured from the *whirlpool* floor to the operating water surface.
- 3)** The maximum depth of water to a seat or bench in a *whirlpool* shall be 600 mm.
- 4)** The maximum freeboard for a *whirlpool* shall be 300 mm.
- 5)** There shall be a minimum of 2 main drains for a *whirlpool*, separated by not less than 300 mm and designed not to exceed the maximum velocities specified by the equipment manufacturer.
- 6)** In no case shall the circulation system of a *whirlpool* be designed with a turnover period more than
- a) 20 min for a *whirlpool* with a volume more than 4 m<sup>3</sup>, or
  - b) 15 min for a *whirlpool* with a volume not more than 4 m<sup>3</sup>.
- 7)** If cartridge-type filters are used for a *whirlpool*, they shall be the surface-type designed with a maximum flow rate of 0.27 L/s/m<sup>2</sup> of effective filter area. (See Appendix A.)
- 8)** A *whirlpool* shall have a minimum clear deck space not less than 1.8 m at the main entrance point.
- 9)** Except as required by Sentence (8) and permitted by Sentence (10), a *whirlpool* shall have a clear deck space not less than 900 mm on all sides.
- 10)** Except where a ramp is incorporated in the design, a *whirlpool* that has an area less than 6 m<sup>2</sup> or has no interior dimension more than 2.5 m is permitted to have the clear deck space on 25% of its perimeter less than 900 mm but where the clear deck space is less than 900 mm it shall not be more than 300 mm.

**7.3.6.3. Wading Pools**

- 1)** Neither fencing nor a circulation system is required for a *wading pool* that is not operated in conjunction with, or in the same enclosure as, a *swimming pool*.
- 2)** A *wading pool* shall
- a) be made of durable material that is impervious to moisture and retains a slip-resistant texture,

- b) be completely free of obstructions that may be hazardous,
- c) have a floor with a maximum slope of 1:25 and a minimum slope of 1:50,
- d) be entirely surrounded by a walkway not less than 1.2 m wide that slopes away from the *wading pool* or basin edge at a uniform slope not less than 1:50 and not more than 1:25, and
- e) have a maximum depth of 600 mm.

**3)** If a *wading pool* is operated within the same enclosure as a *swimming pool*, it shall use water chlorinated in accordance with the requirements of Subsection 7.3.3. and completely circulated through an approved filter with a turnover period not more than 2 h.

**4)** Inlet fittings for a *wading pool* using a circulation system shall be submerged and located to produce uniform distribution of clean water throughout the *wading pool*.

**5)** The circulation system for a *wading pool* shall be designed in accordance with Article 7.3.3.39.

**6)** There shall be no cross connections between a *wading pool* and the water circulation system of a *swimming pool* or between a *wading pool* and a sewer.

**7)** The floor of a *wading pool* shall be finished in white or a light colour.

### 7.3.7. Water Theme Parks

#### 7.3.7.1. General

**1)** In addition to the requirements of this Subsection, a *water theme park* shall be constructed in accordance with Subsections 7.3.2. and 7.3.3.

#### 7.3.7.2. Materials

**1)** The materials used in and around a water slide flume shall ensure that the operational strength of the entire assembly and each of its components is not adversely affected by exposure to rain, snow, ice, sunlight, local normal temperature extremes, local wind pressures, expected local air pollution products, and the mechanical, electrical and chemical environment in and around the water slide flume.

**2)** Materials selected for components and accessories used in and around a water slide flume shall have all parts with external surfaces and edges that may come into contact with a *slider* assembled, arranged and finished so that they will not constitute a cutting, pinching, puncturing or abrasion hazard in casual contact and in intended use.

#### 7.3.7.3. Flume and Receiving Pool Design and Construction

**1)** Structural design of a water slide flume, its supporting structure and ancillary facilities shall conform to Part 4 or, in the absence of specific requirements, to good engineering practice.

**2)** A water slide flume and its *receiving pool* shall be watertight with smooth, inert, non-toxic surfaces that are easy to clean.

**3)** A water slide flume shall be designed to prevent a hazardous concentration of disinfectant fumes and enclosed sections shall be ventilated if necessary.

**4)** All curves, turns, and tunnels within the path of a water slide flume shall be designed so that body impact with the walls of the flume or ceiling of a tunnel does not present a hazard.

**5)** A water slide flume shall be banked to keep a *slider's* body safely inside the flume or curve under all foreseeable circumstances.

**6)** All slopes within the path of a water slide flume shall be designed so that the *slider's* speed does not exceed a level where a safe equilibrium of dynamic forces can be maintained on any curve or turn within a path, as required by Sentences (4) and (5).

**7)** In sections of an elevated water slide flume where, contrary to intended use, a *slider* may stop, there shall be safety walls or other provisions to keep a *slider* from falling out of the flume.

**8)** The construction, dimensions, and mechanical attachments of the components of a water slide flume shall ensure that the surface of the water slide flume is continuous and smooth throughout its length.

**9)** The wall thickness of a water slide flume shall be designed so that the continuous and combined action of hydrostatic, dynamic and static loads and normal environmental deterioration do not cause structural failure, which could result in injury, or continually require repair, which would weaken the strength of the original structure.

**10)** The distance between the side of a water slide flume discharge and a *receiving pool* side wall shall be not less than 1.5 m.

**11)** The distance between the sides of adjacent water slide flume extensions shall be not less than 1.8 m.

**12)** The slope of the floor of a *receiving pool* shall be not more than 1:7.

**13)** Special provision shall be made in water slide flume discharge design, *receiving pool* depth, and *receiving pool* width measured from flume discharge, to safely accommodate slides with greater slopes or other special features that allow an unusually rapid descent.

**14)** Except as required by Sentence (15), multiple-egress water slide flumes shall have parallel discharges or be constructed so that their centrelines do not intersect for a distance not less than 6 m from the discharge of each flume.

**15)** If water slide flumes with nonparallel discharges discharge *sliders* at a high speed, the centrelines shall not intersect for not less than 10 m.

**16)** A water slide flume discharge system shall provide safe entry into the *receiving pool*.

**17)** Methods to ensure safe entry, in addition to water backup, deceleration distance and attitude control, are acceptable if safe discharge velocities and *slider* attitudes are assured under normal use.

**18)** Except as required in Sentence 2.2.2.7.(1) of Division C, a water slide flume shall terminate either at a depth not less than 150 mm below the *receiving pool* operating water surface level or not more than 75 mm above the water surface if the flume is level for a distance of not less than 3 m from the discharge end.

**19)** A *receiving pool* shall have a deck area on not less than three sides.

**20)** A deck along the egress side of a *receiving pool* shall be not less than 3 m wide, have slip-resistant surfaces, and be sloped not less than 1:50 and not more than 1:25 away from the *receiving pool* to drainage or to deck drains.

**21)** Any decks at the entrance to the top of a water slide flume shall be drained as required by Sentence (20).

**22)** The pump reservoirs shall have sufficient volume to contain at least 2 min of combined flow from all water treatment and water slide flume pumps and enough water to ensure that the *receiving pool* will maintain a constant water depth.

**23)** A surge-free automatic water level control system shall be installed to ensure that the water in a *receiving pool* is maintained at the proper level.

**24)** If surface skimmers are used as the sole overflow system, not less than two skimmers shall be used and they shall maintain effective skimming action over the entire surface.

#### **7.3.7.4. Walkways, Steps and Stairs**

**1)** Walkways, steps and stairs between a *receiving pool* and the top of a water slide flume and between other facilities shall be not less than 1100 mm in width.

**2)** Walkways, steps and stairs shall be well drained, slip-resistant, and separated from any water slide flume by a physical barrier, set back not less than 1 m from the flume so that *sliders* cannot contact it on the way down.

3) Steps and stairs shall conform to the requirements for *exit* stairs stated in Part 3, including slip resistance, dimensions, handrails and *guards*.

#### 7.3.7.5. First Aid

1) An area or room for the rendering of first aid shall be incorporated in a *water theme park*.

2) The facility required by Sentence (1) shall be capable of being heated to not less than 22°C.

#### 7.3.7.6. Dispatch Area

1) A dispatch area at the top of a water slide flume shall be provided to permit staff to control *sliders* in a safe manner and to provide space for staff to supervise the area at all times when the flume is in operation.

2) A means of communication shall be provided between the dispatch area and other areas from which supervision is undertaken or assistance can be obtained.

### 7.3.8. Steam Rooms and Sauna Rooms

#### 7.3.8.1. Finishes

1) All steam room and sauna room floor finishes shall be slip-resistant when wet.

2) All steam room and sauna room floor, wall and ceiling finishes shall be sufficiently smooth to facilitate disinfecting.

#### 7.3.8.2. Doors

1) A door to a steam room or sauna room shall be readily openable and not provided with locking devices.

### 7.3.9. Commercial Beaches and Constructed Beaches

#### 7.3.9.1. Underwater Hazards

1) Piers, wharfs, fixed platforms and floats in the water at a *commercial beach* or *constructed beach* shall be constructed with

- a) an air space of not less than 300 mm underneath,
- b) as little underwater construction as is consistent with strength requirements, and
- c) all braces, struts and other below-water items designed to prevent entanglement or trapping of a *bather* underneath the structure.

#### 7.3.9.2. Changing Facilities

- 1) A change house provided at a *commercial beach* or *constructed beach* shall
- a) provide sufficient space for *bathers* to change,
  - b) provide privacy for each sex,
  - c) have floors that slope to drains, and
  - d) provide showers in conformance with Article 7.3.3.27.

2) The interior finish of a change house at a *commercial beach* or *constructed beach* shall be capable of being thoroughly cleaned and disinfected and the floor shall be impervious and non-absorbent.

#### 7.3.9.3. Storm Water Retention Ponds and Constructed Lakes

1) Portions of on-site storm water retention ponds and constructed lakes shall be fenced where changes in elevation pose a hazard. (See Appendix A.)

## Section 7.4. Medical Gas Piping Systems

### 7.4.1. General

#### 7.4.1.1. Standard

- 1) Except as amended by Sentence (2), a non-flammable medical gas piping system shall be installed in conformance with CAN/CSA-Z305.1, "Nonflammable Medical Gas Piping Systems."
- 2) For the purposes of this Code, CAN/CSA-Z305.1, "Nonflammable Medical Gas Piping Systems," is amended as follows:
  - a) in Clause 4.2.2.2(a), by striking out "at least two cylinders" and substituting "provision for at least two cylinders,"
  - b) by adding the following to the end of Clause 4.2.5.2(i) "This Clause does not apply to existing systems that are being modified,"
  - c) in Clause 4.2.5.2(d), by adding "except for existing systems," before "the cut-in pressure,"
  - d) in Clause 4.2.5.10, by striking out "16 m (50 ft)" and substituting "5 m,"
  - e) in Clause 4.2.7.9, by striking out "16 m (50 ft)" and substituting "5 m,"
  - f) by adding the following to the end of Clause 4.3.2.1 "This Clause does not apply to existing systems that are being modified,"
  - g) in Clause 11.2, by striking out "or the regulatory authority,"
  - h) by striking out Clause 22.3,
  - i) by adding the following to the end of Clause 1.4 "Installation of medical gas outlets in Biomedical Workshops within health care facilities will be acceptable provided that such workshops are being designated as special areas inaccessible to unauthorized personnel, and to be engaged only in the testing and servicing of medical equipment for use in conjunction with the medical gas system,"
  - j) in Clause 4.2.5.2(g), by replacing "compressor system" with "average calculated demand of the system," and adding "Such filters shall be installed upstream of the dryer units." at the end of the Clause,
  - k) in Clause 4.3.3.1(c), by adding "openable" ahead of the word "window,"
  - l) by adding the following to the end of Clause 4.3.3.1(c) "Vents from several pressure relief valves serving the same gas system may be connected to a common pipe having an equivalent area to the sum of all outlet ports of the relief valves,"
  - m) by revising the average flow per terminal unit for "Medical Air" in Table 2 from 25 LPM to 10 LPM, and the minimum permissible flow listed under "Medical Air" in Table 4 from 250, 470 and 1250 LPM to 100, 190 and 500 LPM respectively, and
  - n) by revising Clause 4.2.8.1 as follows: "When an oxygen concentrator is used as a source of oxygen supply for the facility's medical gas system it shall meet the requirements of this Standard and CSA Standard CAN/CSA-Z305.6, except as varied below:
    - i) only oil-less type air compressors having both a dry air compression chamber and a dry crank case may be used for the compressed air supply covered under Article 8.2 of the Standard,
    - ii) delete Section 12 (the filling of oxygen cylinders is not permitted), and
    - iii) an emergency power supply must be provided for the oxygen concentrator system to ensure the system will operate in the event of a primary power failure, i.e. delete reference note under Clause 14.3.2."

#### 7.4.1.2. Dental Facilities

- 1) Compressed air systems and vacuum systems are exempt from the requirements of Article 7.4.1.1. if the system is
  - a) used in a dental facility,

- b) directly connected to and designed to serve only dental equipment or dental chairs,
- c) not used for respiration, and
- d) not connected to a central piping system that serves other uses.

#### 7.4.1.3. Alterations to Systems

1) If an *alteration* is made to an existing non-flammable medical gas piping system, the colour codes of the existing system may be used for the *alteration* if identification labels, lettered, coloured and placed in accordance with CAN/CSA-Z305.1, "Nonflammable Medical Gas Piping Systems," are affixed to both the existing system and the *alteration*.

## Section 7.5. Food Establishments and Personal Service Facilities

### 7.5.1. Food Establishments

#### 7.5.1.1. Plumbing Facilities

1) A *food establishment* in which dishware and utensils are washed shall be provided with a double compartment sink if an automatic dishwasher is provided and a triple compartment sink if an automatic dishwasher is not provided.

2) If manual dishwashing procedures are used for cleaning and sanitizing equipment or cooking utensils, the manual dishwashing equipment shall include

- a) at least a double compartment sink, and
- b) draining boards.

3) A washroom for patrons' use in a *restaurant* shall be located so that patrons are not required to pass through kitchens, storage rooms or other *food areas*.

#### 7.5.1.2. Separation of Functions

1) Laundry facilities in a *food establishment* shall be completely separated from a *food area*.

2) No parts of a *food area* or a place from which there is direct access to a *food area* shall be used as sleeping rooms.

#### 7.5.1.3. Insect Screens

1) Except for a *food establishment* in which the only food kept or served is food in sealed containers, every doorway, window or other opening to the outside that is used to provide ventilation for a *food establishment* shall be screened to protect against insects.

#### 7.5.1.4. Provision of Storage Space

1) Adequate storage space shall be provided in a *food establishment* for

- a) food,
- b) personal items of the staff,
- c) unused articles, and
- d) cleaning equipment and supplies.

2) The storage space for food required by Clause (1)(a) shall be a separate room or *building*.

#### 7.5.1.5. Cleaning and Storage of Mobile Units

1) A *building* in which a mobile *restaurant* or vending cart is cleaned and stored shall have

- a) floors, walls and ceilings with impervious finishes,
- b) a sink supplied with hot and cold potable water,

- c) a floor drain, and
- d) any related food storage and preparation area fully separated by a wall or *partition* from the cleaning area.

### 7.5.1.6. Interior Finishes

- 1) This Article applies to
  - a) areas, other than dining and service areas, in which food is prepared or processed,
  - b) areas where utensils are cleaned,
  - c) walk-in refrigerators,
  - d) walk-in freezers,
  - e) rooms containing water closets, lavatories or showers,
  - f) garbage storage areas or rooms, and
  - g) all food or utensil storage areas or rooms except in food warehouses that contain only packaged food.

2) The surface of floors in areas referred to in Sentence (1) shall be smooth, slip-resistant, non-absorbent, non-peeling and constructed of durable material that is resistant to acids, alkalis, grease and other substances that are normally constituents of food and cleaning materials.

3) The surface of walls in areas referred to in Sentence (1) shall be constructed of durable materials that are smooth, non-absorbent and capable of wet washing and easy cleaning.

4) The surface of ceilings in areas referred to in Sentence (1) shall be constructed of durable materials that are smooth, non-absorbent and free of ledges and *building* services not easily accessible for cleaning, on which dust can accumulate.

5) In addition to the requirements of Sentence (4), the surface of ceilings in all food storage areas and rooms in a *food establishment* where food is prepared or processed shall be capable of easy cleaning.

6) The requirements for floors, walls and ceilings in Sentences (2) to (5) shall also apply to unpackaged *food areas* in a *building* or part of a *building* used for a grocery store.

### 7.5.1.7. Lighting

1) Lighting outlets with fixtures shall be installed to provide illumination not less than 550 lx in areas of a *food establishment* where food is prepared or utensils are cleaned.

2) Lighting outlets with fixtures shall be installed to provide illumination not less than 330 lx in all areas of a *food establishment* other than those referred to in Sentence (1).

3) Light fixtures serving areas where food is prepared or processed shall be constructed or located to prevent contamination of food by broken glass in the event that a bulb or tube breaks.

## 7.5.2. Personal Service Facilities

### 7.5.2.1. Separation of Functions

- 1) A *personal service facility* shall be in a room entirely separate from
  - a) a room used for living, dining or sleeping purposes,
  - b) a room used for the preparation or storage of food, and
  - c) a *restaurant* or other business handling unwrapped food.

### 7.5.2.2. Interior Finishes

1) The material used on the floors, walls and ceilings of a *personal service facility* shall provide surfaces that can be easily cleaned.

### 7.5.2.3. Lighting

1) Lighting outlets with fixtures shall be installed to provide illumination not less than 500 lx in *personal service facilities*.

## Section 7.6. Child Care Institutions and Day Care Facilities

### 7.6.1. General

#### 7.6.1.1. Room and Window Area

- 1) Rooms or areas that are used for playing, resting or sleeping shall have a net *floor area* of not less than
  - a) 3.0 m<sup>2</sup> per child in *day care facilities*, or
  - b) 2.5 m<sup>2</sup> per child in nursery schools or drop-in centres.
- 2) All play areas in a *day care facility* shall have a minimum window glass area of 10% of the area served.

#### 7.6.1.2. Washrooms

- 1) Washrooms serving *day care facilities* shall be located within close proximity of the play area.

#### 7.6.1.3. Location Restriction

- 1) A *day care facility* shall not be located
  - a) above the second *storey* unless the safe evacuation of the *day care facility* from higher *storeys* can be assured, or
  - b) totally below ground level.

#### 7.6.1.4. Interior Finishes

- 1) Wall, ceiling and floor finishes in every room in a child care institution or in *day care facilities* shall be constructed so as to be easily cleaned.
- 2) The paint used on surfaces in *day care facilities*, paediatric facilities and similar locations where preschool children gather, and in *care or detention occupancies* shall be lead-free and non-toxic when dry.

#### 7.6.1.5. Lighting

- 1) A child care institution or *day care facility* shall have lighting outlets and fixtures that provide illumination not less than
  - a) 215 lx in a sleeping room, hallway, stairway or washroom,
  - b) 800 lx in a classroom, and
  - c) 375 lx in all rooms other than those specified in Clauses (a) and (b).
- 2) Lighting fixtures in play areas of *day care facilities* shall be protected against mechanical damage.

## Section 7.7. Dairy Manufacturing Plants

### 7.7.1. General

#### 7.7.1.1. General

- 1) Rooms in a *dairy manufacturing plant* used or intended to be used for the processing of milk, cream or manufactured dairy products shall not open directly into any room or space used for any purpose that might unfavourably affect the quality of the milk, cream or manufactured dairy products.
- 2) Dressing rooms for plant staff shall be provided.
- 3) Refrigerated rooms shall be provided for the storage of dairy products.
- 4) A *dairy manufacturing plant* shall have adequate facilities for the thorough washing, cleaning and sanitization of all equipment used in the manufacturing, processing, packing or repacking of dairy products.

5) Adequate hand washing facilities shall be provided convenient to all work areas where dairy products are processed.

#### 7.7.1.2. Room Finishes

1) Walls, ceiling and other structural components of rooms in which milk and milk products are handled or stored shall be

- a) smooth,
- b) impervious to moisture,
- c) light in colour,
- d) free of pitting,
- e) free of indentations,
- f) free of cracks,
- g) free of crevices,
- h) free of ledges, and
- i) capable of easy cleaning.

#### 7.7.1.3. Floors

1) Floors in a *dairy manufacturing plant* shall be

- a) watertight,
- b) of non-absorbent material,
- c) capable of wet washing,
- d) capable of easy cleaning,
- e) equipped with a sufficient number of drains, and
- f) sloped properly to drains.

#### 7.7.1.4. Utility Lines

1) All utility lines shall be covered and capable of easy cleaning.

#### 7.7.1.5. Ventilation

1) A *dairy manufacturing plant* shall have all doors, windows and other openings adequately screened or provided with other suitable barriers to prevent the entrance of insects, rodents and other vermin.

#### 7.7.1.6. Light Fixtures

1) Light fixtures in areas where dairy products are handled or stored or where packaging materials are stored shall have

- a) shatterproof bulbs or tubes, or
- b) shatterproof covers to prevent contamination by broken glass in the event that a bulb or tube breaks.

## Section 7.8. Abattoirs and Secondary Meat Processing Plants

### 7.8.1. General

#### 7.8.1.1. Application

1) Except for specific requirements in Subsections 7.8.2. and 7.8.3., the requirements of this Section apply to both *abattoirs* and *secondary meat processing plants*.

#### 7.8.1.2. Lighting

1) All operational areas shall have a lighting level not less than 500 lx at a distance of 1 m from the floor.

2) Lighting susceptible to mechanical damage shall be protected by a *guard* and lighting for use in damp or wet locations shall be listed for use in such locations.

**7.8.1.3. Ventilation**

1) All outside openings capable of being opened, except loading doors, shall be screened sufficiently to prevent the entry of flies or other insects.

**7.8.1.4. Floor, Wall and Ceiling Finishes**

1) Floors in killing rooms of *abattoirs*, operational areas of *secondary meat processing plants*, rooms in which carcasses of meat are chilled or stored, and storage rooms for offal, condemned material and refuse shall be

- a) constructed of smooth, slip-resistant concrete, and
- b) sloped to drains that provide adequate drainage.

2) All corners in floors and walls in killing rooms of *abattoirs*, storage rooms for offal, condemned material and refuse, and coolers shall be coved smoothly so as to be readily cleanable.

3) Ceilings in refrigerated rooms shall be

- a) of smooth material, and
- b) impervious to liquid.

4) Walls shall be of smooth material, finished in a light colour and impervious to liquids,

- a) to a height not less than 3 m in all operational areas of the plant, and
- b) to the ceiling in refrigerated areas of the plant.

**7.8.1.5. Staff Facilities**

1) Every *abattoir* and *secondary meat processing plant* shall provide

- a) adequate washroom facilities,
- b) adequate dressing rooms,
- c) a lunch room adjacent to dressing and washroom facilities,
- d) hand, knee or pedal operated washing facilities with hot and cold water for the use of employees in all production areas, and
- e) towel and soap dispensers at washing facilities.

2) The washroom facilities referred to in Clause (1)(a) shall be

- a) located so that they do not open directly into any room in which meat is processed, cooled or stored,
- b) equipped with full-length self-closing doors, and
- c) fully lighted.

**7.8.1.6. Refrigeration**

1) Adequate refrigeration facilities for chilling and storing dressed carcasses shall be provided or shall be readily available.

2) Every refrigerated room shall be equipped with a direct reading thermometer with an accuracy of not less than  $\pm 1^{\circ}\text{C}$ .

**7.8.1.7. Water Supply and Pressure**

1) A supply of potable hot and cold water with a pressure not less than 3450 kPa shall be provided.

**7.8.1.8. Sterilizers**

1) One or more hot water or steam sterilizers capable of maintaining a temperature not less than  $80^{\circ}\text{C}$  shall be provided.

**7.8.1.9. Storage of Hoses**

1) Suitable racks or reels shall be provided for the storage of hoses.

**7.8.1.10. Sewage Lines and Floor Drains**

- 1)** Sewage lines from washrooms and bathrooms shall
  - a) not connect directly to sewage lines from floor drains, and
  - b) go by separate lines equipped with a backflow device to the septic tank or sewage disposal system.
- 2)** All floor drains shall be
  - a) constructed of 10 cm or larger sewage pipes,
  - b) sloped not less than 1:48 to the main drain, and
  - c) capped or trapped in accordance with the plumbing and draining regulations made pursuant to the Safety Codes Act.

**7.8.1.11. Prohibition of Catch Basins**

- 1)** A catch basin shall not be located in
  - a) a killing room,
  - b) a processing room,
  - c) a room in which carcasses of meat are chilled or stored, or
  - d) any other operational area.

**7.8.1.12. Rails, Racks and Hooks**

- 1)** Rails, racks and hooks shall be
  - a) unpainted,
  - b) constructed of corrosion-resistant material,
  - c) arranged to prevent the contact of carcass, primal cuts or other portions of meat with a wall, and
  - d) of a height
    - i) adequate to protect carcasses or food from touching the floor in *secondary meat processing plants*, and
    - ii) not less than 3.3 m from the floor in *abattoirs*.

**7.8.2. Abattoirs****7.8.2.1. Facilities**

- 1)** Every *abattoir* shall have
  - a) pens for the purpose of holding animals before slaughter that are constructed with a concrete floor and a roof capable of providing shade and shelter from precipitation,
  - b) a killing room for the purpose of slaughtering animals,
  - c) a refrigerated storage room for offal,
  - d) a hide room for salting hides, and
  - e) a hoist.
- 2)** Every *abattoir* in which poultry is slaughtered shall have
  - a) adequate facilities for
    - i) receiving and holding live poultry,
    - ii) slaughtering poultry and scalding carcasses,
    - iii) plucking carcasses,
    - iv) eviscerating carcasses and chilling dressed carcasses,
    - v) storing offal, condemned material and refuse,
    - vi) storing dressed carcasses, and
    - vii) cleaning and disinfecting live poultry containers,
  - b) sufficient water pressure to operate spray washing equipment to wash carcasses thoroughly, and
  - c) a refrigerated room for the holding of poultry carcasses at a temperature not more than 4°C.

**7.8.2.2. Construction Materials**

1) The killing area, cutting area, coolers, offal storage and hide storage areas of an *abattoir* shall be constructed of masonry, metal or other similarly durable material, with the exception of the roof and beams carrying overhead rails, which may be *heavy timber construction* using glued-laminated wood beams if all exposed wood is properly sealed.

**7.8.2.3. Ramps**

1) Ramps or inclines used for the movement of animals shall be constructed to provide safe ascent and descent.

**7.8.2.4. Ventilation**

1) Every *abattoir* shall have a minimum ventilation rate of five air changes per hour in all killing and processing areas. (See Appendix A.)

2) Holding pens for animals awaiting slaughter shall have adequate ventilation.

**7.8.2.5. Lighting**

1) Inspection stations of an *abattoir* shall have a lighting level not less than 1000 lx at a distance of 1 m from the floor.

**7.8.3. Secondary Meat Processing Plants****7.8.3.1. Ventilation**

1) Every *secondary meat processing plant* shall have adequate ventilation to prevent the accumulation of condensation in areas where food is prepared, processed and stored.

**7.8.3.2. Heating System**

1) Every *secondary meat processing plant* shall have a heating system capable of maintaining a temperature not less than 10°C and not more than 18°C in areas where food is prepared or processed.

**7.8.3.3. Floor, Wall and Ceiling Finishes**

1) The cutting areas, coolers, offal storage and other operational areas shall be constructed of masonry, metal or other similarly durable material, with the exception of the roof and beams carrying overhead rails, which may be *heavy timber construction* using glued-laminated wood beams if all exposed wood is properly sealed.

**7.8.3.4. Windows**

- 1) All windows shall be
  - a) installed flush with the inside wall of the plant, or
  - b) equipped with window ledges on the inside of the wall sloped at not less than 45°.

**Section 7.9. Laboratories Using Biological Agents****7.9.1. General****7.9.1.1. Laboratories Using Biological Agents**

1) Laboratories using or intending to use biological agents classified in the Laboratory Biosafety Guidelines proposed by the Medical Research Council of Canada and the Laboratory Centre for Disease Control, Health Protection Branch, Department of National Health and Welfare, shall be designed and constructed in accordance with the containment requirements of these guidelines.

## Section 7.10. Cemeteries and Related Buildings

### 7.10.1. General

#### 7.10.1.1. Application

1) This Section applies to *cemeteries* and the construction of *buildings* or parts thereof used for the storage, burial or disposal of dead human bodies or other human remains.

#### 7.10.1.2. Columbarium

1) A *columbarium* shall only be constructed in a *cemetery* or as part of a church, *crematory* or *mausoleum*.

#### 7.10.1.3. Mausoleum

1) A *mausoleum* shall only be constructed in a *cemetery*.

#### 7.10.1.4. Fencing

1) The entire area of a *cemetery* shall be enclosed by a suitable fence that is provided with adequate entrances.

### 7.10.2. Design Requirements

#### 7.10.2.1. Materials and Construction

1) Every *columbarium* and *mausoleum* shall be constructed of *noncombustible* materials, having roof, floor and wall assemblies substantially of masonry or concrete.

2) A chapel or vault constructed in a *cemetery* and used as a repository for the dead during the winter months shall

- a) be constructed of *noncombustible* materials, having roof, floor and wall assemblies substantially of masonry or concrete,
- b) have vault doors and frames of iron or wood encased in iron, and
- c) have windows that are protected by iron sheeted shutters.

#### 7.10.2.2. Design

1) There shall be no open connections between the vault and chapel except underneath the floor for the reception of coffins.

## Section 7.11. Objectives and Functional Statements

### 7.11.1. Objectives and Functional Statements

#### 7.11.1.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.5. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)

# **Part 8**

## **Safety Measures at Construction and Demolition Sites**

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# **Part 8**

## **Safety Measures at Construction and Demolition Sites**

### **Section 8.1. General**

#### **8.1.1. Scope**

##### **8.1.1.1. Scope**

1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A.

2) This Part applies to fire safety and the protection of the public during the construction, *alteration* or demolition of every *building*, including any incomplete or abandoned *building*.

3) Fire safety at construction and demolition sites shall conform to Section 5.6. of Division B of the Alberta Fire Code 2006.

##### **8.1.1.2. Definitions**

1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

##### **8.1.1.3. Demolition Procedures**

1) Measures shall be taken during demolition to protect the public in conformance with CSA S350-M, "Code of Practice for Safety in Demolition of Structures," and Section 5.6. of Division B of the Alberta Fire Code 2006.

#### **8.1.2. Application**

##### **8.1.2.1. Application**

1) Where a *building* is undergoing construction, *alteration* or demolition, measures shall be taken at the *building* site in conformance with this Code. (See Appendix A.)

##### **8.1.2.2. Protection from Risk**

1) Precautions shall be taken to ensure that no person is exposed to undue risk.

### **Section 8.2. Protection of the Public**

#### **8.2.1. Fencing and Barricades**

##### **8.2.1.1. Covered Way Exceptions**

1) Where the construction may constitute a hazard to the public, work shall not commence on the construction, *alteration* or repair of a *building* until a covered way has been provided as described in Article 8.2.1.2. to protect the public, except where

- a) the work is done within a solid enclosure,
- b) the *building* is at a distance of 2 m or more from a *public way* used by pedestrians, or
- c) site conditions warrant a distance greater than provided in Clause (b).

## 8.2.1.2.

## 8.2.1.2. Covered Way Construction

- 1) A covered way shall
  - a) have a clear height of not less than 2.5 m,
  - b) have a clear width of not less than 1.5 m or the width of the *public way*, whichever is the lesser,
  - c) be designed and constructed to support safely all loads that may be reasonably expected to be applied to it, but in no case less than 2.4 kPa on the roof,
  - d) have a weathertight roof sloped towards the site or, if flat, be equipped with a splash board not less than 300 mm high on the *street* side,
  - e) be totally enclosed on the site side with a structure having a reasonably smooth surface facing the *public way*,
  - f) have a railing 1 070 mm high on the *street* side where the covered way is supported by posts on the *street* side,
  - g) be adequately lighted when the *public way* is lighted, and
  - h) have, at each opening for pedestrian access, a gate not less than 1 200 mm high that can be locked or bolted in a closed position.

## 8.2.1.3. Fencing, Boarding or Barricades

1) When a construction or demolition activity may constitute a hazard to the public and is located 2 m or more from a *public way*, a strongly constructed fence, boarding or barricade not less than 1.8 m high shall be erected between the site and the *public way* or open sides of a construction site.

2) Barricades shall have a reasonably smooth surface facing the *public way* and shall be without openings, except those required for access.

- 3) Access openings through barricades shall be equipped with gates that shall be
  - a) kept closed and locked when the site is unattended, and
  - b) maintained in place until completion of the construction or demolition activity.

## 8.2.1.4. Special Hazards

1) Where any special hazard exists from which it is not possible to protect the public by other means, persons shall be employed to prevent the public from entering the danger zone at any time of the day or night.

## 8.2.1.5. Work Shutdown

1) When work on a construction site is suspended or ceases so that it will not be occupied during normal working hours, the hazardous part of the construction site shall be protected by

- a) covering all windows, doors and other openings located within 3 m of the ground which may give access to the *building* with a securely fastened barricade, or
- b) a fence or barricade constructed according to the requirements of Article 8.2.1.3.

## 8.2.2. Excavation

## 8.2.2.1. Water Removal

1) *Excavations* shall be kept reasonably clear of water.

## 8.2.2.2. Protection of Adjoining Property

1) If the stability of adjoining *buildings* may be endangered by the work of excavating, adequate underpinning, shoring and bracing shall be provided to prevent
 

- a) damage to, or movement of, any part of the adjoining *building*, and
- b) the creation of a hazard to the public.

**8.2.3. Use of Streets or Public Property****8.2.3.1. Safe Passage Past Site**

- 1) Except as provided in Article 8.2.3.2., provisions shall be made at all times for the safe passage of pedestrian and vehicular traffic past the site.
- 2) Material or equipment shall not be placed on any *street* or other public property except as authorized.
- 3) Except as provided in Sentence (4), where a sidewalk exists adjacent to the site it shall be kept clear of obstructions at all times.
- 4) Where construction operations necessitate the obstruction of a sidewalk, a temporary sidewalk shall be provided and it shall be kept clear of obstruction at all times.

**8.2.3.2. Protection from Dangerous Activities**

- 1) Operations such as the hoisting of major components onto a tall *building* or other activities that constitute a hazard from which the public cannot be protected by barricades, covered ways or similar means shall not be carried out until the *street* or other *public way* is closed.
- 2) If the safety of pedestrians cannot be assured during hoisting or the undertaking of other hazardous operations, then the gates required by Sentence 8.2.1.3.(3) and Clause 8.2.1.2.(1)(h) that are located in the danger zone shall be closed and locked and pedestrians shall be redirected away from the danger.

**8.2.3.3. Barricades**

- 1) *Excavations* in *streets* or public property shall
  - a) be adequately barricaded, and
  - b) have warning signs or lights installed on each section of the barricades referred to in Clause (a).

**8.2.3.4. Restoration and Repair**

- 1) All sidewalks, *streets* or other public property that have been damaged shall be restored to a safe condition.
- 2) All obstructions on sidewalks, *streets* or other public property shall be removed when the need for such obstructions is ended.

**8.2.3.5. Warning Lights**

- 1) Warning lights shall be placed and shall be in operation during the hours of darkness at all obstructions on *streets* or other *public ways*.

**8.2.4. Direction of Vehicular Traffic****8.2.4.1. Hazards to Vehicular Traffic**

- 1) Where a hazard to vehicular traffic on a *public way* is created by work on a construction site, the following shall be provided to direct the traffic:
  - a) one or more workers,
  - b) warning signs,
  - c) barriers,
  - d) lane control devices, or
  - e) flashing lights or flares located at a suitable distance from the hazard.

**8.2.4.2. Flags Used for Directing Traffic**

- 1) A flag used to direct traffic shall be
  - a) red,
  - b) not less than 450 mm by 500 mm,

- c) mounted on a staff not less than 1 m long, with the long side of the flag attached securely to the staff along its entire length, and
- d) maintained in a clean and untornd condition when being used.

#### 8.2.4.3. Signs Used for Directing Traffic

- 1) A sign used to direct traffic shall be
  - a) diamond-shaped and of material not less rigid than 6 mm thick plywood,
  - b) not less than 450 mm by 450 mm in size and mounted at one corner on a substantial pole not less than 1.2 m long,
  - c) red on one side with black corner areas so that the red area is a regular 8-sided figure, and with the word "STOP" in clearly distinguishable white letters not less than 150 mm high located centrally on the sign,
  - d) yellow on the other side with the word "SLOW" in clearly distinguishable black letters not less than 150 mm high located centrally on the sign, or symbols recognized by the International Traffic Code, and
  - e) maintained in a clean condition when being used.

#### 8.2.4.4. Worker Directing Traffic

- 1) A worker who is directing traffic shall
  - a) be equipped as required by Article 8.2.4.5.,
  - b) be instructed in the signals to be used in controlling traffic,
  - c) be provided with a copy of written instructions on the correct methods for traffic direction, and
  - d) direct traffic by using either a flag or sign.

#### 8.2.4.5. Clothing While Directing Traffic

- 1) A worker while directing traffic shall wear the following clothing which shall be fluorescent and coloured either blaze orange or red:
  - a) a vest, or
  - b) sleeves that extend from above the elbow to the wrist.

### 8.2.5. Waste Material

#### 8.2.5.1. Control of Waste Material

- 1) Waste material or other material shall not be permitted to fall freely from one *storey* to another.

#### 8.2.5.2. Removal of Waste Material

- 1) Waste material shall be removed as quickly as possible by means of
  - a) appropriate containers,
  - b) an enclosed shaft or chute conforming to Sentence 8.2.5.4.(1), or
  - c) a hoisting apparatus if large pieces or objects are involved.

#### 8.2.5.3. Enclosures for Waste Material

- 1) Waste material cleared as provided in Sentence 8.2.5.2.(1) shall be deposited in an enclosure
  - a) so arranged as to prevent waste material from being projected beyond the confines of the enclosure, and
  - b) not accessible to the public.

#### 8.2.5.4. Chutes for Waste Material

- 1) The chute described in Clause 8.2.5.2.(1)(b) shall be closed if it is inclined more than 45° to the horizontal.

## **Section 8.3. Objectives and Functional Statements**

### **8.3.1. Objectives and Functional Statements**

#### **8.3.1.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.6. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)



# Part 9

## Housing and Small Buildings

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I



# **Part 9**

## **Housing and Small Buildings**

### **Section 9.1. General**

#### **9.1.1. Application**

##### **9.1.1.1. Application**

1) The application of this Part shall be as described in Subsection 1.3.3. of Division A. (See Appendix A regarding application to seasonally and intermittently occupied *buildings*.)

### **Section 9.2. Definitions**

#### **9.2.1. General**

##### **9.2.1.1. Defined Words**

1) Words in italics are defined in Article 1.4.1.2. of Division A.

### **Section 9.3. Materials, Systems and Equipment**

#### **9.3.1. Concrete**

##### **9.3.1.1. General**

1) Except as provided in Sentence (2), nominally unreinforced concrete shall be designed, mixed, placed, cured and tested in accordance with CAN/CSA-A438, "Concrete Construction for Housing and Small Buildings."

2) Nominally unreinforced site-batched concrete shall be designed, mixed, placed and cured in accordance with Articles 9.3.1.2. to 9.3.1.9.

3) Except as provided in Sentence (4), reinforced concrete shall be designed to conform to the requirements of Part 4.

4) For flat insulating concrete form walls not exceeding 2 *storeys* and having a maximum floor to floor height of 3 m, in *buildings* of light-frame construction containing only a single *dwelling unit*, the concrete and reinforcing shall comply with Part 4 or

- a) the concrete shall conform to CAN/CSA-A23.1, "Concrete Materials and Methods of Concrete Construction," with a maximum aggregate size of 19 mm, and
- b) the reinforcing shall
  - i) conform to CAN/CSA-G30.18-M, "Billet-Steel Bars for Concrete Reinforcement,"
  - ii) have a minimum specified yield strength of 400 MPa, and
  - iii) be lapped a minimum of 450 mm for 10M bars and 650 mm for 15M bars (see also Articles 9.15.4.5. and 9.20.17.2. to 9.20.17.4.).

**9.3.1.2.****9.3.1.2. Cement**

1) Cement shall meet the requirements of CAN/CSA-A3001, "Cementitious Materials for Use in Concrete."

**9.3.1.3. Concrete in Contact with Sulphate Soil**

1) Concrete in contact with sulphate *soil*, which is deleterious to normal cement, shall conform to the requirements in Clause 4.1.1.6 of CAN/CSA-A23.1, "Concrete Materials and Methods of Concrete Construction."

**9.3.1.4. Aggregates**

- 1) Aggregates shall
- consist of sand, gravel, crushed *rock*, crushed air-cooled blast *furnace* slag, expanded shale or expanded clay conforming to CAN/CSA-A23.1, "Concrete Materials and Methods of Concrete Construction," and
  - be clean, well-graded and free of injurious amounts of organic and other deleterious material.

**9.3.1.5. Water**

1) Water shall be clean and free of injurious amounts of oil, organic matter, sediment or any other deleterious material.

**9.3.1.6. Compressive Strength**

(See also Article 9.12.4.1., Sentence 9.15.4.2.(1) and Article 9.18.6.1.)

1) Except as provided elsewhere in this Part, the compressive strength of unreinforced concrete after 28 days shall be not less than

- 15 MPa for walls, columns, fireplaces and *chimneys*, footings, *foundation* walls, grade beams and piers,
- 20 MPa for floors other than those in garages and carports, and
- for garage and carport floors, and the exterior steps,
  - 32 MPa, or
  - 30 MPa where indigenous aggregates do not achieve 32 MPa with a 0.45 water to cementing material ratio.

2) Concrete used for garage and carport floors and exterior steps shall have air entrainment of 5 to 8%. (See Appendix A.)

**9.3.1.7. Concrete Mixes**

(See Appendix A.)

1) For site-batched concrete, the concrete mixes described in Table 9.3.1.7. shall be considered acceptable if the ratio of water to cementing materials does not exceed

- 0.70 for walls, columns, fireplaces and *chimneys*, footings, *foundation* walls, grade beams and piers,
- 0.65 for floors other than those in garages and carports, and
- 0.45 for garage and carport floors, and exterior steps.

**Table 9.3.1.7.**  
**Concrete Mixes**  
 Forming Part of Sentence 9.3.1.7.(1)

Maximum Size of Coarse Aggregate, mm	Materials, volume					
	Cement		Fine Aggregate (damp average coarse sand)		Coarse Aggregate (gravel or crushed stone)	
	Parts	L <sup>(1)</sup>	Parts	L	Parts	L
14	1	28	1.75	49	2	56
20	1	28	1.75	49	2.5	70
28	1	28	2	56	3	84
40	1	28	2	56	3.5	98

**Notes to Table 9.3.1.7.:**

(1) A 40-kg bag of cement contains 28 L.

- 2)** The size of aggregate in unreinforced concrete mixes referred to in Sentence (1) shall not exceed
  - a) 1/5 the distance between the sides of vertical forms, or
  - b) 1/3 the thickness of flatwork.

**9.3.1.8. Admixtures**

**1)** Admixtures shall conform to ASTM C 260, "Air-Entraining Admixtures for Concrete," or ASTM C 494/C 494M, "Chemical Admixtures for Concrete," as applicable.

**9.3.1.9. Cold Weather Requirements**

- 1)** When the air temperature is below 5°C, concrete shall be
  - a) kept at a temperature of not less than 10°C or more than 25°C while being mixed and placed, and
  - b) maintained at a temperature of not less than 10°C for 72 h after placing.
- 2)** No frozen material or ice shall be used in concrete described in Sentence (1).
- 3)** Concrete shall not be placed
  - a) into mud, standing water or snow, or
  - b) on, against or above any frozen material.

**9.3.2. Lumber and Wood Products**

**9.3.2.1. Grade Marking**

**1)** Lumber for joists, rafters, trusses and beams and for the uses listed in Table 9.3.2.1. shall be identified by a grade stamp to indicate its grade as determined by the NLGA "Standard Grading Rules for Canadian Lumber (Interpretation Included)." (See Appendix A.)

**Table 9.3.2.1.**  
**Minimum Lumber Grades for Specific End Uses**  
 Forming Part of Sentence 9.3.2.1.(1)

Use	Boards <sup>(1)</sup>			Framing
	Paragraph in the NLGA grading rules under which boards are graded			
	All Species		Eastern White Pine & Red Pine	All Species
	Para 113	Para 114	Para 118	
Stud wall framing ( <i>loadbearing</i> members)	—	—	—	Stud, Standard, No. 2
Stud wall framing ( <i>non-loadbearing</i> members)	—	—	—	Stud, Utility, No. 3
Plank frame construction ( <i>loadbearing</i> members)	No. 3 Common	—	No. 3 Common	No. 2
Plank frame construction ( <i>non-loadbearing</i> members)	No. 5 Common	—	No. 5 Common	Economy, No. 3
Posts and beams less than 114 mm in thickness	—	—	—	Standard, No. 2
Posts and beams not less than 114 mm in thickness	—	—	—	Standard
Roof sheathing	No. 3 Common	Standard	No. 4 Common	—
Subflooring	No. 3 Common	Standard	No. 3 Common	—
Wall sheathing when required as a nailing base	No. 4 Common	Utility	No. 4 Common	—
Wall sheathing not required as a nailing base	No. 5 Common	Economy	No. 5 Common	—

**Notes to Table 9.3.2.1.:**

(1) See Appendix A.

**9.3.2.2. Lumber Grades**

**1)** Except for joists, rafters, trusses and beams, visually graded lumber shall conform to the grades in Table 9.3.2.1. (See Article 9.23.4.2. for joists, rafters and beams and Article 9.23.13.11. for trusses.)

**9.3.2.3. Machine Stress Rated Lumber**

**1)** Machine stress rated lumber shall conform to the requirements of Subsection 4.3.1.

**9.3.2.4. OSB, Waferboard and Plywood Marking**

**1)** OSB, waferboard and plywood used for roof sheathing, wall sheathing and subflooring shall be legibly identified on the face of the material indicating

- a) the manufacturer of the material,
- b) the standard to which it is produced, and
- c) that the material is of an exterior type.

**9.3.2.5. Moisture Content**

**1)** Moisture content of lumber shall be not more than 19% at the time of installation.

**9.3.2.6. Lumber Dimensions**

**1)** Lumber dimensions referred to in this Part are actual dimensions determined in conformance with CAN/CSA-O141, "Softwood Lumber."

**9.3.2.7. Panel Thickness Tolerances**

**1)** The thicknesses specified in this Part for plywood, hardboard, particleboard, OSB and waferboard shall be subject to the tolerances permitted in the standards referenced for these products unless specifically indicated herein.

**9.3.2.8. Undersized Lumber**

**1)** Joist, rafter, lintel and beam members up to 5% less than the actual Canadian standard sizes are permitted to be used provided the allowable spans for the grade and species of lumber under consideration are reduced 5% from those shown in the span tables for full size members. (See Appendix A.)

**9.3.2.9. Termite and Decay Protection**

- 1)** In localities where termites are known to occur,
- a) clearance between structural wood elements and the finished ground level directly below them shall be not less than 450 mm and, except as provided in Sentence (2), all sides of the supporting elements shall be visible to permit inspection, or
  - b) structural wood elements, supported by elements in contact with the ground or exposed over bare soil, shall be pressure-treated with a chemical that is toxic to termites.

(See Appendix A.)

**2)** In localities where termites are known to occur and *foundations* are insulated or otherwise finished in a manner that could conceal a termite infestation,

- a) a metal or plastic barrier shall be installed through the insulation and any other separation or finish materials above finished ground level to control the passage of termites behind or through the insulation, separation or finish materials, and
- b) all sides of the finished supporting assembly shall be visible to permit inspection.

**3)** Structural wood elements shall be pressure-treated with a preservative to resist decay,

- a) where the vertical clearance between structural wood elements and the finished ground level is less than 150 mm (see also Articles 9.23.2.2. and 9.23.2.3.), or
- b) where
  - i) the wood elements are not protected from exposure to precipitation,
  - ii) the configuration is conducive to moisture accumulation, and
  - iii) the moisture index is greater than 1.00.

(See Appendix A.)

**4)** Structural wood elements used in retaining walls and cribbing shall be pressure-treated with a preservative to resist decay, where

- a) the retaining wall or cribbing supports ground that is critical to the stability of *building foundations*, or
- b) the retaining wall or cribbing is greater than 1.2 m in height.

(See Appendix A.)

**5)** Where wood is required by this Article to be treated to resist termites or decay, such treatment shall be in accordance with the requirements of

- a) CSA O80.1, "Preservative Treatment of All Timber Products by Pressure Processes,"
- b) CSA O80.2, "Preservative Treatment of Lumber, Timber, Bridge Ties, and Mine Ties by Pressure Processes,"
- c) CSA O80.9, "Preservative Treatment of Plywood by Pressure Processes,"

## 9.3.3.1.

- d) CSA O80.15, "Preservative Treatment of Wood for Building Foundation Systems, Basements, and Crawl Spaces by Pressure Processes," or
  - e) CSA O80.34, "Pressure Preservative Treatment of Lumber and Timbers with Borates for Use Out of Ground Contact and Continuously Protected from Liquid Water."
- 6)** Where wood is protected in accordance with CSA O80.34, "Pressure Preservative Treatment of Lumber and Timbers with Borates for Use Out of Ground Contact and Continuously Protected from Liquid Water," the wood shall be
- a) protected from direct exposure to moisture during and after the completion of construction, and
  - b) separated from permeable supporting materials by a moisture barrier that is resistant to all expected mechanisms of deterioration in the service environment if the vertical clearance to the ground is less than 150 mm.
- 7)** Wood that is required by this Article to be treated to resist termites or decay shall be identified by a mark to indicate its conformance to the relevant required standard.

## 9.3.3. Metal

## 9.3.3.1. Sheet Metal Thickness

**1)** Minimum thicknesses for sheet metal material that are stated in this Part refer to the actual minimum base metal thicknesses measured at any point of the material and, in the case of galvanized steel described in Sentence 9.3.3.2.(1), include the thickness of the galvanizing coating unless otherwise indicated.

## 9.3.3.2. Galvanized Sheet Steel

- 1)** Where sheet steel is required to be galvanized, it shall be metallic-coated with zinc or an alloy of 55% aluminum-zinc meeting the requirements of
- a) ASTM A 653/A 653M, "Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," or
  - b) ASTM A 792/A 792M, "Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process."
- 2)** Where galvanized sheet steel is intended for use in locations exposed to the weather or as a flashing material, it shall have a zinc coating not less than the G90 [Z275] coating designation or an aluminum-zinc alloy coating not less than the AZM150 coating designation, as referred to in Sentence (1).

## Section 9.4. Structural Requirements

## 9.4.1. Structural Design Requirements and Application Limitations

## 9.4.1.1. General

(See Appendix A.)

- 1)** Subject to the application limitations defined elsewhere in this Part, structural members and their connections shall
- a) conform to requirements provided elsewhere in this Part,
  - b) be designed according to good engineering practice such as that provided in the "Engineering Guide for Wood Frame Construction," published by the Canadian Wood Council, or
  - c) be designed according to Part 4 using the loads and deflection and vibration limits specified in
    - i) Part 9, or
    - ii) Part 4.
- 2)** Where floor framing is designed in accordance with Clause (1)(b) or (c), and where supporting wall framing and fastenings, or footings, are designed according to Clause (1)(a), the specified *live load* on the floor shall not exceed 2.4 kPa.

**3)** Location-specific information for structural design, including snow and wind loads and seismic spectral response accelerations, shall be determined according to Subsection 1.1.3. (See Appendix A.)

## 9.4.2. Specified Loads

### 9.4.2.1. Application

**1)** This Subsection applies to light-frame constructions whose wall, floor and roof planes are generally comprised of frames of small repetitive structural members, and where

- a) the roof and wall planes are clad, sheathed or braced on at least one side,
- b) the small repetitive structural members are spaced not more than 600 mm o.c.,
- c) the clear span of any structural member does not exceed 12.2 m,
- d) the maximum deflection of the structural roof members conforms to Article 9.4.3.1.,
- e) the maximum total roof area, notwithstanding any separation of adjoining *buildings* by *firewalls*, is 4 550 m<sup>2</sup>, and
- f) for flat roofs, there are no significant obstructions on the roof, such as parapet walls, spaced closer than the distance calculated by

$$D_o = 10 (H_o - 0.8S_s/\gamma)$$

where

$D_o$  = minimum distance between obstructions, m,

$H_o$  = height of the obstruction above the roof, m,

$S_s$  = ground snow load, kPa, and

$\gamma$  = unit weight of snow, kN/m<sup>3</sup>.

(See Appendix A.)

### 9.4.2.2. Specified Snow Loads

**1)** Except as provided in Sentences (2) and (3), specified snow loads shall be not less than those calculated using the following formula:

$$S = C_b S_s + S_r$$

where

$S$  = specified snow load,

$C_b$  = basic snow load roof factor, which is 0.45 where the entire width of the roof does not exceed 4.3 m and 0.55 for all other roofs,

$S_s$  = 1-in-50-year ground snow load in kPa, determined according to Subsection 1.1.3., and

$S_r$  = associated 1-in-50-year rain load in kPa, determined according to Subsection 1.1.3.

**2)** In no case shall the specified snow load be less than 1 kPa.

**3)** Bow string, arch or semi-circular roof trusses having an unsupported span greater than 6 m shall be designed in conformance with the snow load requirements in Subsection 4.1.6.

### 9.4.2.3. Platforms Subject to Snow and Occupancy Loads

**1)** Balconies, decks and other accessible exterior platforms intended for an *occupancy* and subject to snow loads shall be designed to carry the specified roof snow load or 1.9 kPa, whichever is greater, where the platform, or each segregated area of the platform, serves a single *dwelling unit*. (See Appendix A.)

**9.4.2.4.**

**9.4.2.4. Attics and Roof Spaces**

**1)** The ceiling joists or truss bottom chords in residential *attic or roof spaces* having limited accessibility that precludes the storage of equipment or material shall be designed for a total specified load of not less than 0.35 kPa, where the total specified load is the sum of the specified *dead load* plus the specified *live load* of the ceiling. (See Appendix A.)

**9.4.2.5. Roofs at Different Levels**

**1)** If roofs are at different levels, or there are projections above the roof level, the design roof snow load shall include allowance for the effects of drifting snow in accordance with Part 4.

**9.4.3. Deflections**

**9.4.3.1. Deflections**

- 1)** The maximum deflection of structural members shall conform to Table 9.4.3.1.
- 2)** *Dead loads* need not be considered in computing deflections referred to in Sentence (1).

**Table 9.4.3.1.**  
**Maximum Deflections**  
Forming Part of Sentence 9.4.3.1.(1)

Structural Members	Type of Ceiling Supported	Max. Allowable Deflection as an Expressed Ratio of the Clear Span
Roof rafters, roof joists and roof beams	No ceiling	1/180
	Other than plaster or gypsum board	1/240
	Plaster or gypsum board	1/360
Ceiling joists	Other than plaster or gypsum board	1/240
	Plaster or gypsum board	1/360
Floor beams, floor joists and floor decking	All cases	1/360
Beams, joists and decking for balconies, decks and other accessible exterior platforms	Serving a single <i>dwelling unit</i>	1/240
	Other	1/360

**9.4.4. Foundation Conditions**

**9.4.4.1. Allowable Bearing Pressures**

- 1)** Footing sizes for *shallow foundations* shall be
  - a) determined in accordance with Section 9.15., or
  - b) designed in accordance with Section 4.2. using
    - i) the maximum allowable bearing pressures in Table 9.4.4.1., or
    - ii) allowable bearing pressures determined from *subsurface investigation*.

**Table 9.4.4.1.**  
**Allowable Bearing Pressure for Soil or Rock**  
 Forming Part of Sentence 9.4.4.1.(1)

Type and Condition of <i>Soil or Rock</i>	Maximum Allowable Bearing Pressure, kPa
Dense or compact sand or gravel <sup>(1)</sup>	150
Loose sand or gravel <sup>(1)</sup>	50
Dense or compact silt <sup>(1)</sup>	100
Stiff clay <sup>(1)</sup>	150
Firm clay <sup>(1)</sup>	75
Soft clay <sup>(1)</sup>	40
Till	200
Clay shale	300
Sound <i>rock</i>	500

**Notes to Table 9.4.4.1.:**

<sup>(1)</sup> See Appendix A.

**9.4.4.2. Foundation Capacity in Weaker Soil and Rock**

**1)** Where a *soil or rock* within a distance equal to twice the footing width below the *bearing surface* has a lower allowable bearing pressure than that at the *bearing surface* as shown in Article 9.4.4.1., the design capacity of the *foundation* shall not be greater than would cause the weakest *soil or rock* to be stressed beyond its allowable bearing pressure.

**2)** In calculating subsurface pressures referred to in Sentence (1), the loads from the footings shall be assumed to be distributed uniformly over a horizontal plane within a frustum extending downward from the footing at an angle of 60° to the horizontal.

**9.4.4.3. High Water Table**

**1)** Where a *foundation* bears on gravel, sand or silt, and the water table is within a distance below the *bearing surface* equal to the width of the *foundation*, the allowable bearing pressure shall be 50% of that determined in Article 9.4.4.1.

**9.4.4.4. Soil Movement**

**1)** Where a *foundation* is located in an area where *soil* movement caused by changes in *soil* moisture content, freezing, or chemical-microbiological oxidation is known to occur to the extent that it will damage a *building*, measures shall be taken to preclude such movement or to reduce its effects on the *building* so that the *building's* stability and the performance of assemblies will not be adversely affected. (See Appendix A.)

**9.4.4.5. Retaining Walls**

**1)** Walls shall be designed to resist the lateral pressure of the retained material.

**9.4.4.6. Walls Supporting Drained Earth**

(See A-9.4.4.6. and 9.15.1.1. in Appendix A.)

**1)** Except where constructed in accordance with Section 9.15., walls supporting drained earth shall be designed

- a) for a pressure equivalent to that exerted by a fluid that has a density of not less than 480 kg/m<sup>3</sup> and a depth equal to that of the retained earth, or
- b) in accordance with Section 4.2. so as to be able to resist the loads and effects described in Article 4.1.2.1.

## 9.5.1.1.

- 2) Walls supporting other than drained earth shall be designed
  - a) for the pressure described in Clause (1)(a) plus the fluid pressure of the surcharge, or
  - b) in accordance with Section 4.2. so as to be able to resist the loads and effects described in Article 4.1.2.1.

## Section 9.5. Design of Areas and Spaces

### 9.5.1. General

#### 9.5.1.1. Method of Measurement

1) Unless otherwise indicated herein, dimensions of rooms or spaces shall be measured between finished wall surfaces and between finished floor and ceiling surfaces.

#### 9.5.1.2. Combination Rooms

(See Appendix A.)

1) Two or more areas may be considered as a combination room if the opening between the areas occupies the larger of 3 m<sup>2</sup> or 40% or more of the area of the wall measured on the side of the dependent area.

2) Where the dependent area is a bedroom, direct passage shall be provided between the two areas.

### 9.5.2. Barrier-Free Design

#### 9.5.2.1. General

1) Except as provided in Articles 9.5.2.3. and 3.8.1.1., every *building* shall be designed in conformance with Section 3.8.

#### 9.5.2.2. Protection on Floor Areas with a Barrier-Free Path of Travel

1) Where a *barrier-free* path of travel required in Article 9.5.2.1. is provided to any *storey* above the *first storey*, the requirements in Article 3.3.1.7. shall apply.

2) In addition to the requirements of Article 3.3.1.7., every *floor area* above or below the *first storey* that is not *sprinklered* throughout and that has a *barrier-free* path of travel shall, in the case of *residential occupancies*, be provided with balconies conforming to Sentence (3), except on the *storey* containing the *barrier-free* entrance required by Article 3.8.1.2.

- 3) A balcony required by Sentence (2) shall
  - a) have direct *barrier-free* access from the *suite* or *floor area*,
  - b) be not less than 1.5 m deep from the outside face of the exterior wall to the inside edge of the balcony, and
  - c) provide not less than 1.5 m<sup>2</sup> of balcony space for each non-ambulatory occupant and 0.5 m<sup>2</sup> for each ambulatory occupant.

#### 9.5.2.3. Exception for Apartment Buildings

1) Except as provided in Sentence (2), if the *building* is not equipped with an elevator, the *barrier-free* path of travel described in Section 3.8. need only be provided on the entrance level of an apartment *building*.

2) The *barrier-free* path of travel on the entrance level described in Sentence (1) need not be provided where the difference in floor elevation between the entrance level and every *dwelling unit* exceeds 600 mm.

**9.5.3. Ceiling Heights**

**9.5.3.1. Ceiling Heights of Rooms or Spaces**

**1)** The ceiling heights of rooms or spaces in *residential occupancies* shall conform to Table 9.5.3.1.

**2)** Areas in rooms or spaces over which ceiling height is not less than the minimum specified in Table 9.5.3.1. shall be contiguous with the entry or entries to those rooms or spaces.

**Table 9.5.3.1.**  
**Room Ceiling Heights**  
Forming Part of Sentences 9.5.3.1.(1) and (2)

Room or Space	Minimum Ceiling Height, m	Minimum Clear Height, m	Minimum Area Over Which Minimum Ceiling Height Shall Be Provided <sup>(1)</sup>
Living room or space	2.1	2.0	Lesser of area of the space or 10.0 m <sup>2</sup>
Dining room or space	2.1		Lesser of area of the space or 5.2 m <sup>2</sup>
Kitchen or kitchen space	2.1		Lesser of area of the space or 3.2 m <sup>2</sup>
Master bedroom or bedroom space	2.1		Lesser of area of the space or 4.9 m <sup>2</sup>
Other bedroom or sleeping space	2.1		Lesser of area of the space or 3.5 m <sup>2</sup>
Unfinished <i>basement</i> including laundry area therein			Clear height under beams and in any location that would normally be used for passage
Bathroom, water-closet room or laundry area above <i>grade</i>	2.1		Lesser of area of the space or 2.2 m <sup>2</sup>
Passage, hall or main entrance vestibule	2.1		Area of the space
Habitable rooms and spaces not specifically mentioned above	2.1		Lesser of area of the space or 2.2 m <sup>2</sup>

**Notes to Table 9.5.3.1.:**

<sup>(1)</sup> Area of the space shall be measured at floor level.

**9.5.3.2. Mezzanines**

**1)** The ceiling height above and below a *mezzanine* floor assembly in *occupancies* other than *residential occupancies* shall be not less than 2.1 m.

**9.5.3.3. Storage Garages**

**1)** The clear height in a *storage garage* shall be not less than 2 m.

**9.5.4. Hallways**

**9.5.4.1. Hallway Width**

**1)** The unobstructed width of a hallway within a *dwelling unit* shall be not less than 860 mm, except that the hallway width is permitted to be 710 mm where

- a) there are only bedrooms and bathrooms at the end of the hallway furthest from the living area, and
- b) a second *exit* is provided
  - i) in the hallway near the end farthest from the living area, or
  - ii) in each bedroom served by the hallway.

**9.6.1.1.**

**Section 9.6. Doors**

**9.6.1. General**

**9.6.1.1. Application**

1) This Section applies to doors, to glazed areas in doors and to sidelights for doors. (See also Sections 3.8., 9.9. and 9.10.)

**9.6.2. Required Doors**

**9.6.2.1. Doors for Dwelling Units**

1) A door shall be provided at each entrance to a *dwelling unit* and to each room containing a *boiler* or *furnace* within a *dwelling unit*. (See Article 9.10.13.15.)

2) In a *building* containing more than one *dwelling unit*, doors shall be provided at exterior entrances and *exits*, common laundry and drying rooms, common garbage rooms, public water closet rooms and at other locations where they are needed to satisfy the requirements of Section 9.10.

**9.6.2.2. Doors for Storage Garages**

1) Notwithstanding the installation of overhead doors for vehicular access, at least one egress door not less than 1 980 mm high and 760 mm wide, swinging on a vertical axis shall be installed to serve a *storage garage*.

**9.6.3. Doorway Sizes**

**9.6.3.1. Doorway Opening Sizes**

1) Except as provided in Articles 9.6.3.3., 9.9.6.2. and 9.9.6.3., doorway openings within *dwelling units* shall be designed to accommodate at least the door sizes in Table 9.6.3.1. for swing-type doors or folding doors.

**Table 9.6.3.1.**  
**Size of Doors**  
Forming Part of Sentence 9.6.3.1.(1)

At Entrance to:	Minimum Width, mm	Minimum Height, mm
<i>Dwelling unit</i> (required entrance) Vestibule or entrance hall	810	1980
Stairs to a floor level that contains a finished space All doors in at least one line of passage from the exterior to the <i>basement</i> Utility rooms	810	1980
Walk-in closet	610	1980
Bathroom, water-closet room, shower room <sup>(1)</sup>	610	1980
Rooms located off hallways that are permitted to be 710 mm wide	610	1980
Rooms not mentioned above, exterior balconies	760	1980

**Notes to Table 9.6.3.1.:**

<sup>(1)</sup> See Article 9.6.3.3.

**9.6.3.2. Doors to Public Water-Closet Rooms**

1) Doors to public water-closet rooms shall be not less than 810 mm wide and 2 030 mm high.

**9.6.3.3. Doors to Bathrooms**

1) Where one or more bathrooms is served by a hallway of not less than 860 mm, at least one of those bathrooms shall accommodate a door not less than 760 mm wide.

**9.6.3.4. Doors to Balconies**

1) Except for a *suite* designed in accordance with Section 3.8. and except for balconies provided to satisfy Subsection 9.5.2. and Article 3.3.1.5., the door height required by Table 9.6.3.1. from a *dwelling unit* to an exterior balcony shall be measured from the finished floor surface to the top of the door.

2) A sill not more than 300 mm in height above the finished floor surface is permitted to be included within the doorway opening in Sentence (1).

**9.6.4. Door Sill Height****9.6.4.1. Height of Door Sills above Floors or Ground**

1) Doors in *buildings of residential occupancy*, where the finished floor on one side of the door is more than 600 mm above the floor or other constructed surface or ground level on the other side of the door, shall be protected by

- a) a *guard*, in accordance with Subsection 9.8.8., or
- b) a mechanism capable of controlling the free swinging or sliding of the door so as to limit any clear unobstructed opening to not more than 100 mm.

**9.6.5. Exterior Doors****9.6.5.1. Exterior Wood Doors**

1) Exterior wood doors shall conform to CAN/CSA-O132.2 Series, "Wood Flush Doors."

- 2) Each door described in Sentence (1) shall indicate legibly
- a) the name of the manufacturer,
  - b) the standard to which it is produced, and
  - c) that it is of an exterior type.

**9.6.5.2. Sliding Doors**

1) Sliding doors shall conform to CAN/CGSB-82.1-M, "Sliding Doors."

**9.6.5.3. Insulated Steel Doors**

1) Insulated steel doors shall conform to CAN/CGSB-82.5-M, "Insulated Steel Doors."

**9.6.6. Glass****9.6.6.1. Maximum Area of Glass**

1) The maximum area of individual panes of glass for doors shall conform to Table 9.6.6.1.

**Table 9.6.6.1.**  
**Glass Area for Doors**  
 Forming Part of Sentence 9.6.6.1.(1)

Glass Thickness, mm	Maximum Glass Area, m <sup>2</sup> (1)						
	Type of Glass						
	Annealed	Annealed, Multiple-Glazed, Factory-Sealed Units	Laminated	Wired	Heat-Strengthened	Fully Tempered	Fully Tempered, Multiple-Glazed, Factory-Sealed
3	0.50	0.70	(2)	(2)	1.00	1.00	2.00
4	1.00	1.50	(2)	(2)	1.50	4.00	4.00
5	1.50	1.50	(2)	(2)	1.50	No limit	No limit
6	1.50	1.50	1.20	1.00	1.50	No limit	No limit

**Notes to Table 9.6.6.1.:**

(1) See Appendix A.

(2) Not generally available.

**9.6.6.2. Glass in Doors and Sidelights**

**1)** Glass in doors and in sidelights for doors shall conform to Sentence 9.7.3.1.(1).

**2)** Glass sidelights greater than 500 mm wide that could be mistaken for doors, glass in storm doors and glass in sliding doors within or at every entrance to a *dwelling unit* and in public areas shall be

- a) safety glass of the tempered or laminated type conforming to CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass," or
- b) wired glass conforming to CAN/CGSB-12.11-M, "Wired Safety Glass."

**3)** Except as provided in Article 9.7.5.2., glass in entrance doors to *dwelling units* and in public areas, other than the entrance doors described in Sentence (2), shall be safety glass or wired glass of the type described in Sentence (2) where the glass area exceeds 0.5 m<sup>2</sup> and extends to less than 900 mm from the bottom of the door.

**9.6.6.3. Mirrored Glass Doors**

**1)** Mirrored glass doors may be used only at the entrance to clothes closets and shall conform to the requirements of CAN/CGSB-82.6-M, "Doors, Mirrored Glass, Sliding or Folding, Wardrobe."

**9.6.6.4. Visibility of Glass or Transparent Doors**

**1)** Except as provided in Article 9.7.5.2., every glass or transparent door accessible to the public shall be equipped with hardware, bars or other permanent fixtures designed so that the existence and position of such door will be readily apparent.

**9.6.6.5. Glass for Shower or Bathtub Enclosures**

**1)** Glass other than safety glass shall not be used for a shower or bathtub enclosure.

**9.6.6.6. Double Glazing**

**1)** Except where a separate storm door is provided, glass in doors and adjacent sidelights separating heated space from unheated space or from the exterior shall be equipped with double glazing. (See Appendix A.) (See also A-9.7.1.4.(1) in Appendix A.)

**9.6.7. Thermal Breaks****9.6.7.1. Application**

**1)** This Subsection applies to doors and sidelights separating heated space from unheated space or the exterior.

**9.6.7.2. Required Thermal Breaks**

**1)** Except as provided in Sentence (2), metal frames for doors, for glazing in doors, and for sidelights for doors shall incorporate a thermal break.

**2)** Thermal breaks need not be installed in accordance with Sentence (1) where the doors are

- a) garage doors,
- b) storm doors, or
- c) doors that are required to have a *fire-resistance rating*.

**9.6.8. Resistance to Forced Entry****9.6.8.1. Application**

(See Appendix A.)

**1)** Except as permitted in Sentence (2), this Subsection applies to

- a) swinging entrance doors to *dwelling units*,
- b) swinging doors between *dwelling units* and attached garages or other ancillary spaces, and
- c) swinging doors which provide access directly or indirectly from a *storage garage* to a *dwelling unit*.

**2)** Sentence (1) does not apply to exterior doors to garages and to other ancillary spaces.

**9.6.8.2. Wood Doors**

**1)** Except as permitted in Article 9.6.8.10., wood doors as described in Sentence 9.6.8.1.(1) shall

- a) be solid core or stile and rail type,
- b) be not less than 45 mm thick, and
- c) if of the stile and rail panel type, have a panel thickness of not less than 19 mm, with a total panel area not more than half of the door area.

**9.6.8.3. Deadbolt Lock**

**1)** Except as permitted in Article 9.6.8.10., doors described in Sentence 9.6.8.1.(1) shall be provided with a deadbolt lock with a cylinder having no fewer than 5 pins and a bolt throw not less than 25 mm, protected with a solid or hardened free-turning ring or bevelled cylinder housing. (See Article 9.9.6.7.)

**9.6.8.4. Double Doors**

**1)** Except as permitted in Article 9.6.8.10., an inactive leaf in double doors used in locations specified in Sentence 9.6.8.1.(1) shall be provided with heavy duty bolts top and bottom having an engagement of not less than 15 mm.

**9.6.8.5. Fastening of Hinges**

**1)** Except as permitted in Article 9.6.8.10., hinges for doors described in Sentence 9.6.8.1.(1) shall be fastened to wood doors with wood screws not less than 25 mm long and to wood frames with wood screws so that at least 2 screws per hinge penetrate not less than 30 mm into solid wood. (See Appendix A.)

**2)** Except as permitted in Article 9.6.8.10., hinges for doors described in Sentence 9.6.8.1.(1) shall be fastened to metal doors and metal frames with machine screws not smaller than No. 10 and not less than 10 mm long.

**9.6.8.6. Fastening of Strikeplates**

1) Except as permitted in Article 9.6.8.10., strikeplates for deadbolts described in Article 9.6.8.3. shall be fastened to wood frames with wood screws that penetrate not less than 30 mm into solid wood. (See A-9.6.8.5.(1) in Appendix A.)

2) Except as permitted in Article 9.6.8.10., strikeplates for deadbolts described in Article 9.6.8.3. shall be fastened to metal frames with machine screws not smaller than No. 8 and not less than 10 mm long.

**9.6.8.7. Outward Swinging Doors**

1) Except for storm or screen doors, doors described in Sentence 9.6.8.1.(1) which swing outward shall be provided with hinges or pins so that the doors cannot be removed when they are in the closed position. (See Appendix A.)

**9.6.8.8. Door Viewer**

- 1) Main entrance doors to *dwelling units* shall be provided with
- a) a door viewer or transparent glazing in the door, or
  - b) a sidelight.

**9.6.8.9. Solid Blocking**

1) Solid blocking shall be provided on both sides at the lock height between the jambs for doors described in Sentence 9.6.8.1.(1) and the structural framing so that the jambs will resist spreading by force.

**9.6.8.10. Alternate Test Procedure**

1) Doors, frames and hardware that conform to a security level of at least Grade 10 as described in the Annex to ASTM F 476, "Security of Swinging Door Assemblies," are not required to conform to Articles 9.6.8.2. to 9.6.8.6. (See Appendix A.)

**Section 9.7. Windows and Skylights****9.7.1. General****9.7.1.1. Application**

1) Windows and skylights shall conform to the requirements of this Section. (See also Sections 9.10. and 9.32. for fire protection and ventilation.)

**9.7.1.2. Bedroom Windows**

1) Except where the *suite* is *sprinklered*, each bedroom or combination bedroom shall have at least one outside window or exterior door openable from the inside without the use of keys, tools or special knowledge and without the removal of sashes or hardware. (See Article 9.5.1.2. and Appendix A.)

- 2) The window referred to in Sentence (1) shall
- a) provide an unobstructed opening of not less than 0.35 m<sup>2</sup> in area with no dimension less than 380 mm, and
  - b) maintain the required opening during an emergency without the need for additional support.

(See Article 9.7.1.3. and Appendix A.)

3) If the window referred to in Sentence (1) is provided with security bars, the security bars shall be openable from the inside without the use of keys, tools or special knowledge.

**9.7.1.3. Window Opening into a Window Well**

1) Where a window required in Article 9.7.1.2. opens into a window well, a clearance of not less than 550 mm shall be provided in front of the window.

2) Where the sash of a window referred to in Sentence (1) swings towards the window well, the operation of the sash shall not reduce the clearance in a manner that would restrict escape in an emergency.

3) Where a protective enclosure is installed over the window well referred to in Sentence (1), the enclosure shall be openable from the inside without the use of keys, tools or special knowledge of the opening mechanism.

#### 9.7.1.4. Double Glazing or Storm Sash

1) Windows which separate heated space from unheated space or from the exterior shall be provided with storm sash or double glazing. (See Appendix A.)

#### 9.7.1.5. Height of Window Sills above Floors or Ground

(See Appendix A.)

1) Except as provided in Sentence (2), openable windows in *buildings of residential occupancy* shall be protected by

- a) a *guard*, in accordance with Section 9.8., or
- b) a mechanism capable of controlling the free swinging or sliding of the openable part of the window so as to limit any clear unobstructed opening to not more than 100 mm measured either vertically or horizontally where the other dimension is greater than 380 mm.

2) Windows need not be protected according to Sentence (1) where

- a) the window serves a *dwelling unit* that is not located above another *suite*,
- b) the only opening greater than 100 mm by 380 mm is a horizontal opening at the top of the window,
- c) the window sill is located more than 450 mm above the finished floor on one side of the window, or
- d) the window is located in a room or space with the finished floor described in Clause (c) located less than 1800 mm above the floor or ground on the other side of the window.

#### 9.7.1.6. Openable Windows into a Garage or Carport

1) An openable window shall not be located in that part of a wall separating a *dwelling unit* from an attached garage.

2) An openable window is permitted to be located in that part of a wall separating a *dwelling unit* from a carport provided

- a) at least 40 percent of the surface of the perimeter of the carport, including the wall separating the *dwelling unit* from the carport, is open,
- b) openings in the perimeter of the carport are located so as to provide adequate cross ventilation, and
- c) the bottom sill of any openable window is not less than 1.2 m above the floor of the carport.

#### 9.7.1.7. Non-Openable Windows into a Garage or Carport

1) A non-openable window between an attached garage or carport and a *dwelling unit* shall be built to prevent any air infiltration and shall provide an effective barrier to gas and exhaust fumes.

### 9.7.2. Window Standards

#### 9.7.2.1. Window Standards

1) Except as provided in Sentence (2), windows shall conform to

- a) CAN/CSA-A440, "Windows," and
- b) CAN/CSA-A440.1, "User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows."

(See Appendix A and Article 9.7.6.1.)

## 9.7.3.1.

2) Windows need not comply with Clause 10.15 of CAN/CSA-A440, "Windows," Energy Rating for Heating Conditions of Residential Windows.

## 9.7.3. Glass

## 9.7.3.1. Glass Standards

- 1) Glass shall conform to
  - a) CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass,"
  - b) CAN/CGSB-12.2-M, "Flat, Clear Sheet Glass,"
  - c) CAN/CGSB-12.3-M, "Flat, Clear Float Glass,"
  - d) CAN/CGSB-12.4-M, "Heat Absorbing Glass,"
  - e) CAN/CGSB-12.8, "Insulating Glass Units,"
  - f) CAN/CGSB-12.10-M, "Glass, Light and Heat Reflecting," or
  - g) CAN/CGSB-12.11-M, "Wired Safety Glass."

## 9.7.3.2. Structural Design of Glass

1) Glass in windows, sloped glazing and skylights shall be designed in conformance with CAN/CGSB-12.20-M, "Structural Design of Glass for Buildings." (See Appendix A.)

## 9.7.4. Caulking and Glazing

## 9.7.4.1. Sealing Compound

1) The sealing compound used to seal the glass component of a factory-sealed double-glazed unit to the sash component shall be compatible with the sealing compound used to edge seal the glass component.

## 9.7.4.2. Caulking Compound

1) Caulking shall be provided between window frames or trim and the exterior siding or masonry in conformance with Subsection 9.27.4.

## 9.7.5. Protection of Windows in Public Areas

## 9.7.5.1. Transparent Panels

1) Except as provided in Article 9.7.5.2., transparent panels that could be mistaken as a *means of egress* shall be protected by barriers or railings.

## 9.7.5.2. Sliding Glass Partitions

1) Sliding glass *partitions* that separate a *public corridor* from an adjacent *occupancy* and that are open during normal working hours need not conform to Article 9.7.5.1. and Sentence 9.6.6.2.(3), except that such *partitions* shall be suitably marked to indicate their existence and position.

## 9.7.5.3. Windows over Stairs, Ramps and Landings

1) Except as provided in Sentence (2), windows over *stairs*, ramps and landings that extend to less than 1 070 mm above the surface of the treads, ramp or landing shall be

- a) protected by *guards*, in accordance with Subsection 9.8.8., or
- b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.15.

2) In *dwelling units*, windows over *stairs*, ramps and landings that extend to less than 900 mm above the surface of the treads, ramp or landing shall be

- a) protected by *guards*, in accordance with Subsection 9.8.8., or
- b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.15.

**9.7.5.4. Windows above the Second Storey**

- 1) Windows in public areas that extend to less than 1 m from the floor and are located above the second *storey* in *buildings of residential occupancy* shall be
  - a) protected by *guards* in accordance with Subsection 9.8.8., or
  - b) non-openable and designed to withstand the specified lateral loads for balcony *guards* as provided in Article 4.1.5.15.

**9.7.6. Resistance to Forced Entry****9.7.6.1. Forced Entry through Windows**

- 1) In *dwelling units*, windows, any part of which is located within 2 m of adjacent ground level, shall conform to the requirements for resistance to forced entry as described in Clause 10.13 of CAN/CSA-A440, "Windows." (See Appendix A.)

**9.7.7. Skylights****9.7.7.1. Plastic Skylights**

- 1) Plastic skylights shall conform to CAN/CGSB-63.14-M, "Plastic Skylights."

**9.7.7.2. Glass Skylights**

- 1) Factory-built glass skylights shall meet the performance requirements of CAN/CGSB-63.14-M, "Plastic Skylights."

**Section 9.8. Stairs, Ramps, Handrails and Guards****9.8.1. Application****9.8.1.1. General**

- 1) This Section applies to the design and construction of interior and exterior stairs, steps, ramps, handrails and *guards*.

**9.8.1.2. Exit Stairs, Ramps and Landings**

- 1) Where a stair, ramp or landing forms part of an *exit*, the appropriate requirements in Sections 9.9. and 9.10. shall also apply.

**9.8.1.3. Escalators and Moving Walkways**

- 1) Escalators and moving *walkways* shall conform to the appropriate requirements in Part 3.

**9.8.2. Stair Dimensions****9.8.2.1. Stair Width**

- 1) Required *exit* stairs and public stairs shall have a width of not less than 900 mm.
- 2) At least one stair between each floor level within a *dwelling unit*, and exterior stairs serving a single *dwelling unit* except required *exit* stairs, shall have a width of not less than 860 mm.

**9.8.2.2. Height over Stairs**

- 1) The clear height over stairs, measured vertically from a line drawn through the leading edges of the treads, shall be not less than
  - a) 1 950 mm for stairs within *dwelling units*, and
  - b) 2 050 mm for stairs not within *dwelling units*.

**9.8.3.1.****9.8.3. Stair Configurations****9.8.3.1. Straight and Curved Runs in Stairs**

- 1)** Except as provided in Sentence (2), stairs shall consist of
  - a) straight-run flights, or
  - b) curved flights.
- 2)** Stairs within *dwelling units* shall consist of
  - a) straight-run flights,
  - b) curved flights, or
  - c) straight runs with winders.
- 3)** Only one set of winders described in Sentence (2) shall be permitted between floor levels.

**9.8.3.2. Minimum Number of Risers**

- 1)** Except for stairs within a *dwelling unit*, at least 3 risers shall be provided in interior flights.

**9.8.3.3. Maximum Height of Stairs**

- 1)** The vertical height of any flight of stairs shall not exceed 3.7 m.

**9.8.4. Step Dimensions**

(See Appendix A.)

**9.8.4.1. Uniformity and Tolerances for Risers and Treads**

- 1)** Except as provided in Sentence (2), risers shall be of uniform height in any one flight, with a maximum tolerance of
  - a) 6 mm between adjacent treads or landings, and
  - b) 6 mm between the tallest and shortest risers in a flight.
- 2)** Except for required *exit* stairs, where the top or bottom riser in a stair adjoins a sloping finished walking surface, such as a garage floor, driveway or sidewalk, the height of the riser across the stair shall vary by not more than 1 in 12.
- 3)** Treads shall have a uniform run and tread depth, with a maximum tolerance of
  - a) 6 mm between adjacent treads, and
  - b) 6 mm between the deepest and shallowest runs and treads in a flight.
- 4)** Where angled treads or winders are incorporated into a stair, the treads in all sets of angled treads or winders within a flight shall turn in the same direction.
- 5)** Cross-slope of treads shall not exceed 1 in 100.

**9.8.4.2. Dimensions for Risers**

- 1)** Risers shall conform to Table 9.8.4.2.

**Table 9.8.4.2.**  
**Riser Height, Run and Tread Depth for Rectangular Treads**  
 Forming Part of Sentences 9.8.4.2.(1) and 9.8.4.3.(1)

Stair Type	All Steps		Rectangular Treads			
	Rise, mm		Run, mm		Tread Depth, mm	
	Max.	Min.	Max.	Min.	Max.	Min.
Service <sup>(1)</sup>	No limit	125	355	No limit	355	No limit
Private <sup>(2)</sup>	200	125	355	210	355	235
Public <sup>(3)</sup>	200	125	355	230	355	250

**Notes to Table 9.8.4.2.:**

- (1) Service stairs serve areas only used as *service rooms* or *service spaces*.
- (2) Private stairs are stairs within *dwelling units*, including stairs in attached garages, and exterior stairs serving a single *dwelling unit*.
- (3) Public stairs are all stairs not described as service stairs or private stairs.

**9.8.4.3. Dimensions for Rectangular Treads**

(See A-9.8.4. in Appendix A.)

- 1)** The run and tread depth of rectangular treads shall conform to Table 9.8.4.2.
- 2)** The depth of a rectangular tread shall be not less than its run and not more than its run plus 25 mm.

**9.8.4.4. Dimensions for Angled Treads**

(See A-9.8.4. in Appendix A.)

- 1)** Angled treads in required *exit* stairs shall conform to the requirements in Article 3.4.6.8.
- 2)** Except as provided in Article 9.8.4.5., angled treads in other than required *exit* stairs shall have an average run of not less than 200 mm and a minimum run of 150 mm.
- 3)** The depth of an angled tread shall be not less than its run at any point and not more than its run at any point plus 25 mm.

**9.8.4.5. Winders**

(See Appendix A.)

- 1)** Individual treads in winders that converge on a centre point shall turn through an angle of
  - a) 30° with no deviation above or below 30°, or
  - b) 45° with no deviation above or below 45°.
- 2)** Where winders are incorporated into a stair, each set shall not turn through more than 90°.

**9.8.4.6. Leading Edges of Treads**

(See Appendix A.)

- 1)** Leading edges of treads that are bevelled or rounded
  - a) shall not reduce the required tread depth by more than 15 mm, and
  - b) shall not, in any case, exceed 25 mm horizontally.

**9.8.4.7. Spiral Stairs**

- 1)** A spiral stair not required as part of a *means of egress* may be used in a *dwelling unit* if
  - a) the maximum rise is 230 mm,
  - b) the average run is not less than 140 mm,

- c) the length of each tread is at least 660 mm, and
- d) a handrail is provided on the outside edge of the stair.

## 9.8.5. Ramps

### 9.8.5.1. Application

- 1) This Subsection applies to pedestrian ramps, except ramps in a *barrier-free* path of travel.
- 2) Ramps in a *barrier-free* path of travel shall conform to the requirements in Article 3.8.3.4.

### 9.8.5.2. Ramp Width

(See Article 9.9.3.2. for ramps in *exits*.)

- 1) Except for required *exit* ramps, public ramps shall have a width of not less than 900 mm.
- 2) Ramps within *dwelling units*, and exterior ramps serving a single *dwelling unit* except required *exit* ramps, shall have a width of not less than 860 mm.

### 9.8.5.3. Height over Ramps

- 1) The clear height over ramps shall be not less than
  - a) 1 950 mm for ramps within *dwelling units*, and
  - b) 2 050 mm for ramps not within *dwelling units*.

### 9.8.5.4. Slope

- 1) The slope of ramps shall be not more than
  - a) 1 in 10 for exterior ramps,
  - b) 1 in 10 for interior ramps serving *residential occupancies*,
  - c) 1 in 6 for *mercantile* or *industrial occupancies*, and
  - d) 1 in 8 for all other *occupancies*.

### 9.8.5.5. Maximum Rise

- 1) Where the slope of the ramp is greater than 1 in 12, the maximum rise between floors or landings shall be 1 500 mm.

## 9.8.6. Landings

### 9.8.6.1. Application

- 1) This Subsection applies to landings, except landings for ramps in a *barrier-free* path of travel.
- 2) Landings for ramps in a *barrier-free* path of travel shall conform to the requirements in Article 3.8.3.4.
- 3) Finished floors, and ground surfaces with a slope not exceeding 1 in 100, at the top and bottom of stairs or ramps shall be considered as landings.

### 9.8.6.2. Required Landings

- 1) Except as provided in Sentences (2) to (4) and Sentence 9.9.6.6.(2), a landing shall be provided
  - a) at the top and bottom of each flight of interior and exterior stairs, including stairs in garages,
  - b) at the top and bottom of every ramp with a slope greater than 1 in 50,
  - c) where a doorway opens onto a stair or ramp,
  - d) where a ramp opens onto a stair, and
  - e) where a stair opens onto a ramp.
- 2) Where a door at the top of a stair within a *dwelling unit* swings away from the stair, no landing is required between the doorway and the stair.

**3)** A landing may be omitted at the top of an exterior flight serving a secondary entrance to a single *dwelling unit*, not including entrances from attached garages, provided

- a) the stair does not contain more than 3 risers,
- b) the principal door is a sliding door or swings away from the stair, and
- c) only a storm or screen door, if any, swings over the stair and is equipped with hardware to hold it open.

**4)** A landing may be omitted at the bottom of an exterior stair or ramp provided there is no obstruction, such as a gate or door, within the lesser of the width of the stair or ramp or

- a) 900 mm for stairs or ramps serving a single *dwelling unit*, and
- b) 1 100 mm for stairs or ramps not serving a single *dwelling unit*.

**9.8.6.3. Dimensions of Landings**

(See Articles 9.9.6.1. and 9.9.6.6. regarding landings in exits.)

**1)** Except as provided in Sentences (2) to (4), the width and length of landings shall comply with Table 9.8.6.3. (See Appendix A.)

**Table 9.8.6.3.**  
**Dimensions of Landings**  
Forming Part of Sentence 9.8.6.3.(1)

	Landing Configuration	Minimum Width, mm	Length, mm
Stairs and ramps serving a single <i>dwelling unit</i>	In straight-run stair or ramp, or landing turning through less than 30°, within a <i>dwelling unit</i>	Width of stair or ramp	Not less than 860
	In straight-run exterior stair or ramp, or exterior landing turning through less than 30°	Width of stair or ramp	Not less than 900
	Landing turning through an angle of 30° or more, but less than 90°	Width of stair or ramp measured at right angle to path of travel	(a) Not less than 230 measured at the inside edge of the landing, and (b) Not less than 370 measured 230 mm from inside edge of landing or handrail
	Landing turning through not less than 90°	Width of stair or ramp measured at right angle to path of travel	Not less than width of landing
Stairs and ramps serving other than single <i>dwelling units</i>	In straight-run stair or ramp, or landing turning through less than 30°	Width of stair or ramp	Lesser of required width of stair or ramp, or 1 100
	Landing turning through 30° or more	Width of stair or ramp measured at right angle to path of travel	Not less than width of stair or ramp

**2)** Where stair flights or ramps of different widths adjoin a single landing, the width of the landing shall be

- a) where one or more of the stair or ramp widths do not exceed their respective required widths, not less than the greater required stair or ramp width, or
- b) where all of the widths of the stairs or ramps exceed their respective required widths, not less than the lesser actual stair or ramp width.

**3)** Where a door swings toward a stair, the full arc of the swing shall be over the landing.

## 9.8.6.4.

4) Where a doorway or stairway opens onto the side of a ramp, the landing shall extend for a distance of not less than 300 mm on either side of the doorway or stairway, except on a side abutting an end wall.

## 9.8.6.4. Height over Landings

- 1) The clear height over landings shall be not less than
  - a) 1 950 mm for landings within *dwelling units*, and
  - b) 2 050 mm for landings not within *dwelling units*.

## 9.8.7. Handrails

## 9.8.7.1. Required Handrails

- 1) Except as permitted in Sentences (2) and (3), a handrail shall be provided
  - a) on at least one side of stairs or ramps less than 1 100 mm in width,
  - b) on 2 sides of curved stairs or curved ramps of any width, except curved stairs within *dwelling units*, and
  - c) on 2 sides of stairs or ramps 1 100 mm in width or greater.
- 2) Handrails are not required for
  - a) stairs having not more than 3 risers and serving a single *dwelling unit*,
  - b) ramps with a slope of less than 1 in 12, or
  - c) ramps rising not more than 400 mm and serving a single *dwelling unit*.
- 3) Only one handrail is required on exterior stairs having more than 3 risers provided such stairs serve not more than one *dwelling unit*.

## 9.8.7.2. Continuity of Handrails

(See Appendix A.)

- 1) Except as provided in Sentence (2), at least one required handrail shall be continuous throughout the length of the stair or ramp, including landings, except where interrupted by
  - a) doorways, or
  - b) newel posts at changes in direction.
- 2) For stairs or ramps serving a single *dwelling unit*, at least one required handrail shall be continuous throughout the length of the stair or ramp, except where interrupted by
  - a) doorways,
  - b) landings, or
  - c) newel posts at changes in direction.

## 9.8.7.3. Termination of Handrails

- 1) Handrails shall be terminated in a manner that will not obstruct pedestrian travel or create a hazard. (See Appendix A.)
- 2) Except for stairs and ramps serving only one *dwelling unit*, at least one handrail at the sides of a stair or ramp shall extend horizontally not less than 300 mm beyond the top and bottom of each flight or ramp. (See Appendix A.)

## 9.8.7.4. Height of Handrails

(See Appendix A.)

- 1) The height of handrails on stairs and ramps shall be measured vertically from the top of the handrail to
  - a) a line drawn through the leading edge of the stair treads served by the handrail, or
  - b) the surface of the ramp, floor or landing served by the handrail.
- 2) Except as provided in Sentence (3), the height of handrails on stairs and ramps shall be
  - a) not less than 800 mm, and
  - b) not more than 965 mm.

3) Where *guards* are required, handrails required on landings shall be not more than 1 070 mm in height.

#### 9.8.7.5. Ergonomic Design

1) A clearance of not less than 50 mm shall be provided between a handrail and any surface behind it.

2) All handrails shall be constructed so as to be continually graspable along their entire length with no obstruction on or above them to break a handhold, except where the handrail is interrupted by newels at changes in direction. (See Appendix A.)

#### 9.8.7.6. Projections into Stairs and Ramps

1) Handrails and constructions below handrails, including handrail supports and stair stringers, shall not project more than 100 mm into the required width of a stair or ramp. (See also Articles 9.8.2.1. and 9.8.5.2.)

#### 9.8.7.7. Design and Attachment of Handrails

(See Appendix A.)

1) Handrails and any *building* element that could be used as a handrail shall be designed and attached in such a manner as to resist

- a) a concentrated load at any point of not less than 0.9 kN, and
- b) for handrails other than those serving a single *dwelling unit*, a uniformly distributed load of 0.7 kN/m.

2) Where a handrail serving a single *dwelling unit* is attached to wood studs or blocking, the attachment shall be deemed to comply with Sentence (1) where

- a) the attachment points are spaced not more than 1.2 m apart,
- b) the first attachment point at either end is located no more than 300 mm from the end of the handrail, and
- c) the fasteners consist of not less than 2 wood screws at each point, penetrating not less than 32 mm into solid wood.

### 9.8.8. Guards

#### 9.8.8.1. Required Guards

(See Appendix A.) (See also Article 9.7.5.3.)

1) Except as provided in Sentences (2) and (3), every surface to which access is provided for other than maintenance purposes, including but not limited to flights of steps and ramps, exterior landings, porches, balconies, *mezzanines*, galleries and raised *walkways*, shall be protected by a *guard* on each side that is not protected by a wall for the length where

- a) there is a difference in elevation of more than 600 mm between the walking surface and the adjacent surface, or
- b) the adjacent surface within 1.2 m of the walking surface has a slope of more than 1 in 2.

2) *Guards* are not required

- a) at loading docks,
- b) at floor pits in *repair garages*, or
- c) where access is provided for maintenance purposes only.

3) Where an interior stair has more than 2 risers or an interior ramp rises more than 400 mm, the sides of the stair or ramp and the landing or floor level around the stairwell or ramp shall be protected by a *guard* on each side that is not protected by a wall.

#### 9.8.8.2. Loads on Guards

(See Appendix A.)

1) *Guards* shall be designed to resist the specified loads prescribed in Table 9.8.8.2.

**Table 9.8.8.2.**  
**Specified Loads for Guards**  
 Forming Part of Sentence 9.8.8.2.(1)

Location of <i>Guard</i>	Minimum Design Loads		
	Horizontal Load Applied Inward or Outward at any Point at the Top of the <i>Guard</i>	Horizontal Load Applied Inward or Outward on Elements Within the <i>Guard</i> , Including Solid Panels and Pickets	Evenly Distributed Vertical Load Applied at the Top of the <i>Guard</i>
<i>Guards</i> within <i>dwelling units</i> and exterior <i>guards</i> serving not more than 2 <i>dwelling units</i>	0.5 kN/m OR concentrated load of 1.0 kN applied at any point <sup>(1)</sup>	0.5 kN applied over a maximum width of 300 mm and a height of 300 mm <sup>(2)</sup>	1.5 kN/m
<i>Guards</i> serving access walkways to equipment platforms, contiguous stairs and similar areas	Concentrated load of 1.0 kN applied at any point	Concentrated load of 0.5 kN applied at any point on individual elements	1.5 kN/m
All other <i>guards</i>	0.75 kN/m OR concentrated load of 1.0 kN applied at any point <sup>(1)</sup>	Concentrated load of 0.5 kN applied at any point on individual elements	1.5 kN/m

**Notes to Table 9.8.8.2.:**

- (1) The load that creates the most critical condition shall apply.  
 (2) See Sentence (2).

**2)** Where the width and spacing of balusters in *guards* within *dwelling units* and in exterior *guards* serving not more than 2 *dwelling units* is such that 3 balusters can be engaged by a load imposed over a 300 mm width, the load shall be imposed so as to engage 3 balusters.

**3)** None of the loads specified in Table 9.8.8.2. need be considered to act simultaneously.

**4)** For *guards* within *dwelling units* and for exterior *guards* serving not more than 2 *dwelling units*, Table 9.8.8.2. need not apply where the *guard* construction used has been demonstrated to provide effective performance.

**9.8.8.3. Height of Guards**

(See Appendix A.)

**1)** Except as provided in Sentences (2) to (4), all *guards* shall be not less than 1 070 mm high.

**2)** All *guards* within *dwelling units* shall be not less than 900 mm high.

**3)** Exterior *guards* serving not more than one *dwelling unit* shall be not less than 900 mm high where the walking surface served by the *guard* is not more than 1 800 mm above the finished ground level.

**4)** *Guards* for flights of steps, except in required *exit* stairs, shall be not less than 900 mm high.

**5)** The height of *guards* for flights of steps shall be measured vertically from the top of the *guard* to a line drawn through the leading edge of the treads served by the *guard*.

**9.8.8.4. Guards for Floors and Ramps in Garages**

**1)** Except for floors of garages referred to in Section 9.35., where garage floors or ramps are 600 mm or more above the adjacent ground or floor level, every opening through a garage floor and the perimeter of floors and ramps that have no exterior walls shall be provided with

- a continuous curb not less than 150 mm in height, and
- a *guard* not less than 1070 mm above the floor level.

**9.8.8.5. Openings in Guards**

**1)** Except as provided in Sentence (2), openings through any *guard* that is required by Article 9.8.8.1. shall be of a size that will prevent the passage of a spherical object having a diameter of 100 mm unless it can be shown that the location and size of openings that exceed this limit do not represent a hazard. (See A-9.8.8.5.(1) and (2) in Appendix A.)

**2)** Openings through any *guard* that is required by Article 9.8.8.1. and that is installed in a *building of industrial occupancy* shall be of a size that will prevent the passage of a spherical object having a diameter of 200 mm unless it can be shown that the location and size of openings that exceed this limit do not represent a hazard. (See A-9.8.8.5.(1) and (2) in Appendix A.)

**3)** Unless it can be shown that the location and size of openings that do not comply with the following limits do not represent a hazard, openings through any *guard* that is not required by Article 9.8.8.1. and that serves a *building of other than industrial occupancy*, shall be of a size that:

- a) will prevent the passage of a spherical object having a diameter of 100 mm, or
  - b) will permit the passage of a spherical object having a diameter of 200 mm.
- (See Appendix A.)

**9.8.8.6. Design to Prevent Climbing**

(See Appendix A.)

**1)** *Guards* required by Article 9.8.8.1., except those in *industrial occupancies* and where it can be shown that the location and size of openings do not represent a hazard, shall be designed so that no member, attachment or opening will facilitate climbing.

**2)** *Guards* shall be deemed to comply with Sentence (1) where any elements protruding from the vertical and located within the area between 140 mm and 900 mm above the floor or walking surface protected by the *guard*

- a) are located more than 450 mm horizontally and vertically from each other,
- b) provide not more than 15 mm horizontal offset,
- c) do not provide a toe-space more than 45 mm horizontally and 20 mm vertically, or
- d) present more than a 1-in-2 slope on the offset.

**9.8.8.7. Glass in Guards**

**1)** Glass in *guards* shall be

- a) safety glass of the laminated or tempered type conforming to CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass," or
- b) wired glass conforming to CAN/CGSB-12.11-M, "Wired Safety Glass."

**9.8.9. Construction****9.8.9.1. Loads on Stairs and Ramps**

**1)** Except as specified in Articles 9.8.9.4. and 9.8.9.5., stairs and ramps shall be designed for strength and rigidity under uniform loading criteria to support specified loads of

- a) 1.9 kPa for stairs and ramps serving not more than one *dwelling unit*, and
- b) 4.8 kPa for other stairs and ramps.

**9.8.9.2. Exterior Concrete Stairs**

**1)** Exterior concrete stairs with more than 2 risers and 2 treads shall be

- a) supported on unit masonry or concrete walls or piers not less than 150 mm in cross section, or
- b) cantilevered from the main *foundation wall*.

**2)** Stairs described in Sentence (1), when cantilevered from the *foundation wall*, shall be constructed and installed in conformance with Subsection 9.8.10.

**9.8.9.3.**

3) The depth below ground level for *foundations* for exterior steps shall conform to the requirements in Section 9.12.

**9.8.9.3. Exterior Wood Steps**

1) Exterior wood steps shall not be in direct contact with the ground unless suitably treated with a wood preservative.

**9.8.9.4. Wooden Stair Stringers**

1) Wooden stair stringers shall

- a) have a minimum effective depth of 90 mm, measured perpendicularly to the bottom of the stringer at the point of minimum cross-section, and an overall depth of not less than 235 mm,
- b) be supported and secured top and bottom,
- c) be not less than 25 mm actual thickness if supported along their length and 38 mm actual thickness if unsupported along their length, and
- d) except as permitted in Sentence (2), be spaced not more than 900 mm o.c. for stairs serving not more than one *dwelling unit* and 600 mm o.c. in other stairs.

2) For stairs serving not more than one *dwelling unit* where risers support the front portion of the tread, the space between stringers shall be not more than 1200 mm.

**9.8.9.5. Treads**

1) Stair treads of lumber, plywood or O-2 grade OSB within *dwelling units* shall be not less than 25 mm actual thickness, except that if open risers are used and the distance between stringers exceeds 750 mm, the treads shall be not less than 38 mm actual thickness.

2) Stair treads of plywood or OSB that are not continuously supported by the riser shall have their face grain or direction of face orientation at right angles to the stringers.

**9.8.9.6. Finish for Treads and Landings**

1) The finish for treads and landings of interior stairs in *dwelling units*, other than stairs to unfinished *basements*, shall consist of hardwood, vertical grain softwood, resilient flooring or other material providing equivalent performance.

2) Treads and landings of interior and exterior stairs and ramps, other than those within *dwelling units*, shall have a slip-resistant finish or be provided with slip-resistant strips that extend not more than 1 mm above the surface.

**9.8.10. Cantilevered Precast Concrete Steps****9.8.10.1. Design**

1) Exterior concrete steps and their anchorage system that are cantilevered from a *foundation* wall shall be designed and installed to support the loads to which they may be subjected.

**9.8.10.2. Anchorage**

1) Cantilevered concrete steps referred to in Article 9.8.10.1. shall be anchored to concrete *foundation* walls not less than 200 mm thick.

**9.8.10.3. Prevention of Damage Due to Frost**

1) Suitable precautions shall be taken during backfilling and grading operations to ensure that subsequent freezing of the *soil* will not cause uplift forces on the underside of cantilevered concrete steps to the extent that the steps or the walls to which they are attached will be damaged.

## Section 9.9. Means of Egress

### 9.9.1. General

#### 9.9.1.1. Application

1) Stairways, handrails and guards in a *means of egress* shall conform to the requirements in Section 9.8. as well as to the requirements in this Section.

#### 9.9.1.2. Fire Protection

1) In addition to the fire protection requirements provided in Subsection 9.9.4., *flame-spread ratings, fire-resistance ratings and fire-protection ratings for means of egress* shall conform to Section 9.10.

#### 9.9.1.3. Occupant Load

1) Except for *dwelling units*, the *occupant load* of a *floor area* or part of a *floor area* shall be the number of persons for which such areas are designed, but not fewer than that determined from Table 3.1.17.1., unless it can be shown that the area will be occupied by fewer persons.

2) The *occupant load* for *dwelling units* shall be based on 2 persons per bedroom or sleeping area.

### 9.9.2. Types and Purpose of Exits

#### 9.9.2.1. Types of Exits

1) Except as otherwise provided in this Section, an *exit* from any *floor area* shall be one of the following used singly or in combination:

- a) an exterior doorway,
- b) an exterior passageway,
- c) an exterior ramp,
- d) an exterior stairway,
- e) a fire escape,
- f) a *horizontal exit*,
- g) an interior passageway,
- h) an interior ramp, or
- i) an interior stairway.

2) Fire escapes shall only be used as *exits* on existing *buildings* and shall be designed and installed in conformance with Subsection 3.4.7.

3) Where a *horizontal exit* is used, it shall conform to Sentence 3.4.1.6.(1) and Article 3.4.6.9.

#### 9.9.2.2. Purpose of Exits

1) An *exit* shall be designed for no purpose other than for exiting except that an *exit* may also serve as an access to a *floor area*.

#### 9.9.2.3. Elevators, Slide Escapes and Windows as Means of Egress

1) Elevators, slide escapes and windows shall not be considered as part of a required *means of egress*.

#### 9.9.2.4. Principal Entrances

1) Except for doors serving a single *dwelling unit*, at least one door at every principal entrance to a *building* providing access from the exterior at ground level shall be designed in accordance with the requirements for *exits*.

## 9.9.3.1.

## 9.9.3. Dimensions of Means of Egress

## 9.9.3.1. Application

1) This Subsection applies to every *means of egress* except *exits* that serve not more than one *dwelling unit* and *access to exits* within *dwelling units*.

## 9.9.3.2. Exit Width

1) Except for doors and corridors, the width of every *exit* facility shall be not less than 900 mm. (See Article 9.9.6.3. for doors and Article 9.8.2.1. for stairs.)

## 9.9.3.3. Width of Corridors

1) The width of every *public corridor*, corridor used by the public, and *exit* corridor shall be not less than 1100 mm. (See also Subsection 9.9.5. for obstructions in corridors.)

## 9.9.3.4. Clear Height

1) Except for stairways, doorways and *storage garages*, the minimum clear height in *exits* and *access to exits* shall be 2.1 m. (See Article 9.8.2.2. for stairs, Article 9.8.5.3. for ramps, Article 9.8.6.4. for landings and Article 9.9.6.2. for doorways.)

2) The clear height in *exits* and *access to exits* in *storage garages* shall be not less than 2 m.

## 9.9.4. Fire Protection of Exits

## 9.9.4.1. Application

1) Except as provided in Article 9.9.4.4., this Subsection applies to the fire protection of all *exits* except *exits* serving not more than one *dwelling unit*.

## 9.9.4.2. Fire Separations for Exits

1) Except as provided in Sentence (5) and Article 9.9.8.5., every *exit* other than an exterior doorway shall be separated from each adjacent *floor area* or from another *exit* by a *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly above the *floor area*. (See Article 9.10.9.10.)

2) Where there is no floor assembly above, the *fire-resistance rating* required in Sentence (1) shall not be less than that required by Subsection 9.10.8. for the floor assembly below, but in no case shall the *fire-resistance rating* be less than 45 min.

3) A *fire separation* common to 2 *exits* shall be smoke-tight and not be pierced by doorways, duct work, piping or any other opening that may affect the continuity of the separation.

4) A *fire separation* that separates an *exit* from the remainder of the *building* shall have no openings except those for electrical wiring, *noncombustible* conduit and *noncombustible* piping that serve only the *exit*, and for standpipes, sprinkler piping, *exit* doorways and wired glass and glass block permitted in Article 9.9.4.3.

5) The requirements in Sentence (1) do not apply to an exterior *exit* passageway provided the passageway has not less than 50% of its exterior sides open to the outdoors and is served by an *exit* stair at each end of the passageway.

## 9.9.4.3. Wired Glass or Glass Block

(See A-3.1.8.17.(1) in Appendix A.)

1) This Article applies to wired glass in doors, and wired glass or glass block in sidelights, where these are installed in *fire separations* between *exit* enclosures and *floor areas*.

2) Except as provided in Sentence (3), the combined area of glazing in doors and sidelights shall not exceed 0.8 m<sup>2</sup>.

3) Where an *exit* enclosure connects with a *floor area* through an enclosed vestibule or corridor separated from the *floor area* by *fire separations* having not less than a 45 min *fire-resistance rating*, the glazed areas described in Sentence (1) need not be limited as required in Sentence (2).

#### 9.9.4.4. Openings Near Unenclosed Exit Stairs and Ramps

1) Where an unenclosed exterior *exit* stair or ramp provides the only *means of egress* from a *suite*, and is exposed to fire from openings in the exterior walls of another *fire compartment*, the openings in the exterior walls of the *building* shall be protected with wired glass in fixed steel frames or glass block conforming to Articles 9.10.13.5. and 9.10.13.7. when the openings in the exterior walls of the *building* are within 3 m horizontally and less than 10 m below or less than 5 m above the *exit* stair or ramp.

#### 9.9.4.5. Openings in Exterior Walls of Exits

1) Either openings in exterior walls of an *exit* or openings in adjacent exterior walls of the *building* the *exit* serves shall be protected with wired glass in fixed steel frames or glass block installed in accordance with Articles 9.10.13.5. and 9.10.13.7., where

- the *exit* enclosure has exterior walls that intersect the exterior walls of the *building* at an angle of less than 135° measured on the outside of the *building*, and
- the openings in the exterior walls of the *building* are within 3 m horizontally and less than 2 m above the openings in the exterior walls of the *exit*.

(See Appendix A.)

#### 9.9.4.6. Openings Near Exit Doors

1) Where an exterior *exit* door in one *fire compartment* is within 3 m horizontally of an *unprotected opening* in another *fire compartment* and the exterior walls of these *fire compartments* intersect at an exterior angle of less than 135°, the opening shall be protected with wired glass in fixed steel frames or glass block conforming to Articles 9.10.13.5. and 9.10.13.7.

#### 9.9.4.7. Stairways in 2 Storey, Group D or E Buildings

1) Where a *suite* of Group D or E *occupancy* is located partly on the *first storey* and partly on the second *storey*, stairways serving the second *storey* of that *suite* need not be constructed as *exit* stairs provided,

- the *building* is not greater than 2 *storeys* in *building height*,
- the *suite* is separated from other *occupancies* by at least a 45 min *fire separation*,
- the area occupied by the *suite* is not greater than 100 m<sup>2</sup> per *storey*,
- the maximum travel distance from any point in the *suite* to an exterior *exit* is not greater than 25 m,
- the floor assemblies have a *fire-resistance rating* of not less than 45 min or are of *noncombustible construction*, and
- the *basement* and *first storey* are separated by a *fire separation* having a *fire-resistance rating* of not less than 45 min.

### 9.9.5. Obstructions and Hazards in Means of Egress

#### 9.9.5.1. Application

1) This Subsection applies to obstructions and hazards in every *means of egress* except those within a *dwelling unit* or serving not more than one *dwelling unit*.

#### 9.9.5.2. Occupancies in Corridors

1) Where a corridor contains an *occupancy*, the *occupancy* shall not reduce the unobstructed width of the corridor to less than the required width of the corridor.

**9.9.5.3.****9.9.5.3. Obstructions in Public Corridors**

**1)** Except as permitted in Sentence (2), obstructions located within 1980 mm of the floor shall not project horizontally more than 100 mm into *exit* passageways, corridors used by the public or *public corridors* in a manner that would create a hazard for visually impaired persons travelling adjacent to walls.

**2)** The horizontal projection of an obstruction referred to in Sentence (1) is permitted to exceed 100 mm where the obstruction extends to less than 680 mm above the floor. (See A-3.3.1.9.(4) in Appendix A.)

**9.9.5.4. Obstructions in Exits**

**1)** Except as permitted in Subsection 9.9.6. and Article 9.8.7.6., no fixture, turnstile or construction shall project within the required width of an *exit*.

**9.9.5.5. Obstructions in Means of Egress**

**1)** No obstructions such as posts or turnstiles shall be placed so as to restrict the width of a required *means of egress* from a *floor area* or part of a *floor area* to less than 750 mm unless an alternate unobstructed *means of egress* is provided adjacent to and plainly visible from the restricted egress.

**2)** Except as provided in Sentence (3), no obstructions, such as counter gates, that do not meet the requirements for *exit* doors, shall be placed in a required *means of egress* from a *floor area* or part of a *floor area* unless an alternate unobstructed *means of egress* is provided adjacent to and plainly visible from the restricted egress.

**3)** Obstructions, such as counter gates, that do not satisfy Sentence (2), are permitted to be placed in a required *means of egress* from a part of a *floor area* in *mercantile occupancies* and *business and personal services occupancies*, provided that the part of the *floor area* served by the obstructed *means of egress* is not generally accessible to the public.

**9.9.5.6. Mirrors or Draperies**

**1)** No mirror shall be placed in or adjacent to any *exit* so as to confuse the direction of *exit*, and no mirror or draperies shall be placed on or over *exit* doors.

**9.9.5.7. Fuel-Fired Appliances**

**1)** Fuel-fired *appliances* shall not be installed in an *exit* or corridor serving as an *access to exit*.

**9.9.5.8. Service Rooms**

**1)** *Service rooms* containing equipment subject to possible explosion, such as *boilers* designed to operate at a pressure in excess of 100 kPa, and certain types of refrigerating and transformer equipment, shall not be located under required *exits*.

**9.9.5.9. Ancillary Rooms**

**1)** Ancillary rooms such as storage rooms, washrooms, toilet rooms, laundry rooms and *service rooms* shall not open directly into an *exit*.

**9.9.6. Doors in a Means of Egress****9.9.6.1. Obstructions by Doors**

**1)** Except as provided in Sentence (4), obstructions created by doors shall be limited in accordance with Sentences (2) and (3)

- a) at *exit* doors,
- b) at doors that open into or are located within a *public corridor*, and
- c) at doors that open into or are located within another facility that provides *access to exit* from a *suite*.

- 2) When fully open, doors described in Sentence (1) shall not decrease the required *exit* width by more than
  - a) 100 mm in *exit* corridors, and
  - b) 50 mm for other *exit* facilities.
- 3) The swing of doors described in Sentence (1) shall not reduce the width of the path of travel to less than
  - a) the required *exit* width in *exit* corridors and passageways, and
  - b) 750 mm on *exit* stairs or landings.
- 4) Doors serving a single *dwelling unit* need not comply with Sentences (2) and (3).

#### 9.9.6.2. Clear Opening Height at Doorways

- 1) Except as provided in Sentences (2) and (3), the clear opening height of doorways shall be not less than 2 030 mm high at
  - a) *exit* doors,
  - b) doors that open into or are located within a *public corridor*, and
  - c) doors that open into or are located within another facility that provides *access to exit* from a *suite*.
- 2) The clear opening height under door closers and other devices in doorways described in Sentence (1) shall be not less than 1 980 mm.
- 3) Doorways serving a single *dwelling unit* need not comply with Sentences (1) and (2).

#### 9.9.6.3. Clear Opening Width at Doorways

- 1) Except as provided in Sentence (4), the clear opening width of doorways shall comply with Sentence (2) at
  - a) *exit* doors, and
  - b) doors that open into or are located within a *public corridor* or other facility that provides *access to exit* from a *suite*.
- 2) Doorways described in Sentence (1) shall be
  - a) not less than 800 mm wide where there is only one door leaf,
  - b) not less than 800 mm wide where multiple-leaf doors are installed with only one active leaf having a latching mechanism described in Article 9.9.6.7., and
  - c) not less than 1 210 mm wide where multiple-leaf doors are installed with two active leaves.
- 3) In doorways described in Sentence (1) that have multiple-leaf doors installed,
  - a) no active leaf shall be less than 810 mm wide where only one leaf is active, and
  - b) no single leaf shall be less than 610 mm wide where two leaves are active.
- 4) Doorways serving a single *dwelling unit* need not comply with Sentence (2).

#### 9.9.6.4. Door Action

- 1) Except as provided in Sentences (4) and (5), required *exit* doors and doors in required *means of egress*, except doors in *means of egress* within *dwelling units*, shall swing on the vertical axis.
- 2) Except as provided in Sentence (5), breakaway sliding doors, installed as required *exit* doors or required doors in *means of egress*, shall be identified as swinging doors by means of a label or decal affixed to the door.
- 3) Revolving doors shall comply with Article 3.4.6.14.
- 4) Movable *partitions* used to separate a *public corridor* from an adjacent *business and personal services occupancy* or a *mercantile occupancy* need not conform to Sentence (1), provided the partitions are not located in the only *means of egress*. (See A-3.3.1.12.(3) in Appendix A.)
- 5) *Exit* doors need not conform to Sentences (1) or (2), where
  - a) the doors serve accessory *buildings* where life safety is not adversely affected,

## 9.9.6.5.

- b) the doors serve *storage garages* or other accessory *buildings* serving not more than one *dwelling unit*, or
- c) the doors
  - i) serve *storage suites* of not more than 20 m<sup>2</sup> in gross area that are in *warehousing buildings* of not more than one *storey*, and
  - ii) open directly to the exterior at ground level.

9.9.6.5. **Direction of Door Swing**

- 1) Except for doors serving a single *dwelling unit*, *exit* doors that are required to swing shall swing in the direction of *exit* travel.
- 2) Doors that open onto a corridor or other facility that provides *access to exit* from a room or *suite* having an *occupant load* of more than 60 persons shall swing on the vertical axis in the direction of *exit* travel.
- 3) Doors that divide a corridor that is not wholly contained within a *suite* shall swing in the direction of *exit* travel.
- 4) Where a pair of doors is installed in a corridor that provides *access to exit* in both directions, the doors shall
  - a) swing in opposite directions, with the door on the right-hand side swinging in the direction of *exit* travel, or
  - b) swing in both directions.

9.9.6.6. **Nearness of Doors to Stairs**

- 1) Except as provided in Sentence (2), the distance between a stair riser and the leading edge of a door during its swing, except for doors serving a single *dwelling unit*, shall be not less than 300 mm.
- 2) Where there is a danger of blockage from ice or snow, an *exit* door, including doors serving a single *dwelling unit*, may open onto not more than one step, provided the riser of such a step does not exceed 150 mm.

9.9.6.7. **Door Latching, Locking and Opening Mechanisms**

- 1) Principal entrance doors, *exit* doors and doors to *suites*, including exterior doors of *dwelling units*, and other doors in an *access to exit* shall
  - a) be openable from the inside or in travelling to an *exit* without requiring keys, special devices or specialized knowledge of the door-opening mechanism, or
  - b) in the case of *exit* doors, be controlled by electromagnetic locking mechanisms in accordance with Sentence 3.4.6.15.(4).
- 2) Except for doors serving a single *dwelling unit* and doors to accessory *buildings* and to *garages* serving a single *dwelling unit*, door release hardware on doors in a *means of egress* shall be operable with one hand and the door shall be openable with not more than one releasing operation. (See also Sentence 3.8.3.3.(3) and A-3.3.1.13.(4) in Appendix A.)
- 3) Door release hardware on doors in a *means of egress* shall be installed not more than 1 200 mm above the finished floor.
- 4) Except for hotels and motels, a door opening onto a *public corridor* that provides *access to exit* from *suites* shall be designed not to lock automatically if it is equipped with an automatic self-closing device. (See A-3.3.4.5.(1) in Appendix A.)

9.9.6.8. **Effort Required to Open**

- 1) Every *exit* door, except doors serving a single *dwelling unit*, shall be designed and installed so that when the latch is released the door will open in the direction of *exit* travel under a force of not more than 90 N applied to the door release hardware. (See Sentence 3.8.3.3.(7) for door opening forces in a *barrier-free* path of travel.)

**9.9.7. Access to Exits**

**9.9.7.1. Egress from Roof Area, Podiums, Terraces, Platforms and Contained Open Spaces**

- 1) An *access to exit* shall be provided from every roof intended for *occupancy* and from every podium, terrace, platform or contained open space.
- 2) Where a roof is intended for an *occupant load* of more than 60 persons, at least 2 separate *means of egress* shall be provided from the roof to stairs designed in conformance with the requirements for *exit* stairs and located remote from each other.
- 3) Where a podium, terrace, platform or contained open space is provided, egress requirements shall conform to the appropriate requirements for rooms or *suites* in Article 9.9.7.4.

**9.9.7.2. Means of Egress from Suites**

- 1) Except as required in Sentence 9.9.9.3.(1), each *suite* in a *floor area* occupied by more than one *suite* shall have
  - a) an exterior *exit* doorway,
  - b) a doorway to a *public corridor*, or
  - c) a doorway to an exterior passageway.
- 2) Except as provided in Sentences 9.9.7.3.(1) and 9.9.8.2.(2), from the point where a doorway described in Clauses (1)(b) or (c) enters the *public corridor* or exterior passageway, it shall be possible to go in opposite directions to each of 2 separate *exits*.

**9.9.7.3. Dead-End Corridors**

- 1) Except for a dead-end corridor that is entirely within a *suite*, a dead-end corridor is permitted provided it is not more than 3 m long.

**9.9.7.4. Number and Spacing of Egress Doors**

- 1) Except for *dwelling units*, at least 2 egress doors shall be provided when the area of a room or *suite*, or the distance measured from any point within the room or *suite* to the nearest egress door, exceeds the values in Table 9.9.7.4.
- 2) Doors required in Sentence (1) shall be spaced so that in the event that one door is made inaccessible by a fire within such room or *suite*, the other door will provide safe egress.

**Table 9.9.7.4.**  
**Maximum Areas and Travel Distances for Rooms, Suites and Mezzanines with a Single Means of Egress**  
 Forming Part of Sentences 9.9.7.4.(1) and 9.9.8.6.(2)

Occupancy of Room, Suite or Floor Area	Maximum Area of Room, Suite or Floor Area, m <sup>2</sup>	Maximum Distance to Egress Door, m
Group C (except <i>dwelling units</i> )	100	15
Group D	200	25
Group E	150	15
Group F, Division 2	150	10
Group F, Division 3	200	15

**9.9.7.5. Independent Access to Exit**

- 1) Required *access to exit* from *suites* shall not be through any other *dwelling unit*, *service room* or other *occupancy*.

## 9.9.7.6.

## 9.9.7.6. Travel Distance within Rooms and Suites

1) Except for *dwelling units*, the travel distance from any point within the room or *suite* to the nearest egress door shall not exceed the maximum travel distance in Article 9.9.8.2.

## 9.9.8. Exits from Floor Areas

## 9.9.8.1. Measurement of Travel Distance

1) Except as provided in Sentences (2) and (3), for the purposes of this Subsection, travel distance means the distance from any point in the *floor area* to an *exit* measured along the path of *exit* travel.

2) Where a room or *suite* is separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* of at least 45 min or, in a *sprinklered building*, by a *fire separation* which is not required to have a *fire-resistance rating*, the travel distance may be measured from an egress door of the room or *suite* to the nearest *exit*.

3) Where a *public corridor* is not less than 9 m wide and conforms to Subclauses 3.4.2.5.(1)(d)(i) to (d)(iv), the travel distance may be determined in accordance with those Subclauses.

## 9.9.8.2. Number of Required Exits

1) Except as provided in Sentence (2) and Subsection 9.9.9., at least 2 *exits* shall be provided from every *floor area*, spaced so that the travel distance to the nearest *exit* is not more than

- a) 40 m in the case of *business and personal services occupancies*,
- b) 45 m for all *occupancies* where the *floor area* is *sprinklered*, and
- c) 30 m for all other *occupancies*.

2) Except as provided in Subsection 9.9.9., a single *exit* is permitted from each *storey* in *buildings* of 1 and 2 *storeys* in *building height* provided the *floor area* and travel distance requirements conform to those required in Article 9.9.7.4. and the total *occupant load* served by an *exit* facility does not exceed 60 persons.

## 9.9.8.3. Contribution of Each Exit

1) Where more than one *exit* is required from a *floor area*, each *exit* shall be considered as contributing not more than half the required *exit* width.

## 9.9.8.4. Location of Exits

1) Where more than one *exit* is required from a *floor area*, at least 2 *exits* shall be independent of each other and be placed remote from each other along the path of travel between them. (See Appendix A.)

## 9.9.8.5. Exiting through a Lobby

1) Not more than one *exit* from a *floor area* above or below the *first storey* is permitted to lead through a lobby.

2) The lobby referred to in Sentence (1) shall be not more than 4.5 m above *grade*, and the path of travel through the lobby to the outdoors shall not exceed 15 m.

3) The lobby referred to in Sentence (1) shall conform in all respects to the requirements for *exits*, except that rooms other than *service rooms*, storage rooms and rooms of *residential* or *industrial occupancy* are permitted to open directly onto such lobby.

4) Where the lobby referred to in Sentence (1) and adjacent *occupancies* that are permitted to open into the lobby are *sprinklered*, the *fire separation* between such *occupancies* and the lobby need not have a *fire-resistance rating*. (See A-3.4.4.2.(2)(e) in Appendix A.)

5) Passenger elevators are permitted to open onto the lobby referred to in Sentence (1) provided the elevator doors are designed to remain closed except while loading and unloading passengers.

#### 9.9.8.6. Mezzanine Means of Egress

1) Except as permitted by Sentences (2) and (3), the space above a *mezzanine* shall be served by *means of egress* leading to *exits* accessible at the *mezzanine* level, on the same basis as *floor areas*.

- 2) The *means of egress* from a *mezzanine* need not conform to Sentence (1), provided
- a) the *mezzanine* is not required to terminate at a vertical *fire separation*, as permitted by Sentence 9.10.12.1.(2),
  - b) the *occupant load* of the *mezzanine* is not more than 60,
  - c) the area of the *mezzanine* does not exceed the area limits stated in Table 9.9.7.4., and
  - d) the distance limits stated in Table 9.9.7.4., measured along the path of travel, are not exceeded from any point on the *mezzanine* to
    - i) an egress door serving the space that the *mezzanine* overlooks if the space is served by a single egress door, or
    - ii) an egress stairway leading to an *access to exit* in the space below if that space is required to be served by 2 or more egress doorways in conformance with Sentence 9.9.7.4.(1).

3) One of the *means of egress* from a *mezzanine* that is not required to terminate at a *fire separation*, as permitted by Sentence 9.10.12.1.(2), and that exceeds the limits of Sentence (2) is permitted to lead through the room in which the *mezzanine* is located, provided all other *means of egress* from that *mezzanine* lead to *exits* accessible at the *mezzanine* level.

- 4) Except as provided in Sentence (2), the maximum travel distance from any point on a *mezzanine* to the nearest *exit* shall be not more than
- a) 40 m in a *business and personal services occupancy*,
  - b) 45 m in a *floor area* that is *sprinklered* throughout, provided it does not contain a *high-hazard industrial occupancy*, or
  - c) 30 m in any *floor area* not referred to in Clauses (a) or (b).

### 9.9.9. Egress from Dwelling Units

#### 9.9.9.1. Travel Limit to Exits or Egress Doors

1) Except as provided in Sentences (2) and (3), every *dwelling unit* containing more than 1 *storey* shall have *exits* or egress doors located so that it shall not be necessary to travel up or down more than 1 *storey* to reach a level served by

- a) an egress door to a *public corridor*, enclosed *exit* stair or exterior passageway, or
- b) an *exit* doorway not more than 1.5 m above adjacent ground level.

2) Where a *dwelling unit* is not located above or below another *suite*, the travel limit from a floor level in the *dwelling unit* to an *exit* or egress door may exceed 1 *storey* where that floor level is served by an openable window

- a) providing an unobstructed opening of not less than 1 m in height and 0.55 m in width, and
- b) located so that the sill is not more than
  - i) 1 m above the floor, and
  - ii) 7 m above adjacent ground level.

3) The travel limit from a floor level in a *dwelling unit* to an *exit* or egress door may exceed 1 *storey* where that floor level has direct access to a balcony.

**9.9.9.2.****9.9.9.2. Two Separate Exits**

1) Except as provided in Sentence 9.9.7.3.(1), where an egress door from a *dwelling unit* opens onto a *public corridor* or exterior passageway it shall be possible from the location where the egress door opens onto the corridor or exterior passageway to go in opposite directions to 2 separate *exits* unless the *dwelling unit* has a second and separate *means of egress*.

**9.9.9.3. Shared Egress Facilities**

1) A *dwelling unit* shall be provided with a second and separate *means of egress* where an egress door from the *dwelling unit* opens onto

- a) an *exit* stairway serving more than one *suite*,
- b) a *public corridor* serving more than one *suite* and served by a single *exit* stairway,
- c) an exterior passageway more than 1.5 m above adjacent ground level, serving more than one *suite* and served by a single *exit* stairway, or
- d) a balcony more than 1.5 m above adjacent ground level, serving more than one *suite* and served by a single *exit* stairway.

**9.9.9.4. Egress from Manufactured Homes**

1) Where the *flame-spread ratings* exceed 75 on the walls and ceilings, a *manufactured home* shall have not less than 2 exterior doors located remotely from each other.

**9.9.10. Signage****9.9.10.1. Application**

1) This Subsection applies to all *exits* except those serving not more than one *dwelling unit*.

**9.9.10.2. Visibility of Exits**

1) *Exits* shall be located so as to be clearly visible or their locations shall be clearly indicated.

**9.9.10.3. Required Exit Signs**

1) Every *exit* door in a *building* that is 3 *storeys* in *building height* or in a *building* having an *occupant load* greater than 150 shall have an *exit* sign over it or adjacent to it.

**9.9.10.4. Exit Direction Signs**

1) *Exit* direction signs shall be placed in corridors and passageways where necessary to indicate the direction of *exit* travel.

**9.9.10.5. Visibility of Exit Signs**

1) *Exit* signs shall be installed so as to be visible from the *exit* approach and shall be illuminated continuously while the *building* is occupied.

**9.9.10.6. Lettering**

1) *Exit* signs shall have the word EXIT in red letters on a contrasting background or a red background with contrasting letters when the sign is internally lighted, and white letters on a red background or red letters on a white background when the sign is externally lighted.

2) Lettering referred to in Sentence (1) shall be made with not less than 19 mm wide strokes and be not less than 150 mm high when the sign is externally lighted, and not less than 114 mm high when the sign is internally lighted.

**9.9.10.7. Illumination**

1) Illumination of *exit* signs required in Article 9.9.10.3. shall conform to Sentences 9.9.11.3.(2) and (3).

2) Where illumination of *exit* signs required in Article 9.9.10.3. is provided by an electrical circuit, that circuit shall serve no equipment other than emergency equipment.

#### 9.9.10.8. Signs for Stairs and Ramps at Exit Level

1) In *buildings* that are 3 storeys in *building height*, any part of an *exit* ramp or stairway that continues up or down past the lowest *exit level* shall be clearly marked to indicate that it does not lead to an *exit*, if the portion beyond the *exit level* may be mistaken as the direction of *exit* travel.

#### 9.9.10.9. Reserved

### 9.9.11. Lighting

#### 9.9.11.1. Application

1) This Subsection applies to the lighting of all *exits* except those serving not more than one *dwelling unit*.

#### 9.9.11.2. Required Lighting in Egress Facilities

1) Every *exit*, *public corridor* or corridor providing *access to exit* for the public shall be equipped to provide illumination to an average level of not less than 50 lx at floor or tread level and at all points such as angles and intersections at changes of level where there are stairs or ramps.

#### 9.9.11.3. Emergency Lighting

1) Unless it can be shown to be unnecessary, emergency lighting shall be provided in

- a) *exits*,
- b) principal routes providing *access to exit* in an open *floor area*,
- c) corridors used by the public,
- d) underground *walkways*, and
- e) *public corridors*.

(See Appendix A.)

2) Emergency lighting required in Sentence (1) shall be provided from a source of energy separate from the electrical supply for the *building*.

3) Lighting required in Sentence (1) shall be designed to be automatically actuated for a period of at least 30 min when the electric lighting in the affected area is interrupted.

4) Illumination from lighting required in Sentence (1) shall be provided to average levels of not less than 10 lx at floor or tread level.

5) Where incandescent lighting is provided, lighting equal to 1 W/m<sup>2</sup> of *floor area* shall be considered to meet the requirement in Sentence (4).

6) Where self-contained emergency lighting units are used, they shall conform to CSA C22.2 No. 141, "Unit Equipment for Emergency Lighting."

## Section 9.10. Fire Protection

### 9.10.1. Definitions and Application

#### 9.10.1.1. Sloped Roofs

1) For the purposes of this Section, roofs with slopes of 60° or more to the horizontal that are adjacent to a room or space intended for *occupancy* shall be considered as a wall.

**9.10.1.2. Items under Part 3 Jurisdiction**

- 1) Tents, *air-supported structures*, transformer vaults, *walkways*, elevators and escalators shall conform to Part 3.
- 2) Where rooms or spaces are intended for an *assembly occupancy*, such rooms or spaces shall conform to Part 3.
- 3) *Basements* containing more than 1 *storey* or exceeding 600 m<sup>2</sup> in area shall conform to Part 3.
- 4) Where rooms or spaces are intended for the storage, manufacture or use of hazardous or explosive material, such rooms or spaces shall conform to Part 3. (See A-3.3.1.2.(1) in Appendix A.)
- 5) Except as provided in Article 3.3.5.8., facilities for the dispensing of fuel shall not be installed in any *building*.
- 6) Openings through floors that are not protected by shafts or *closures* shall be protected in conformance with Subsection 3.2.8. (See also Sentence 9.9.4.7.(1).)
- 7) Chutes and shafts shall conform to Subsection 3.6.3. except where they are entirely contained within a *dwelling unit*.
- 8) Where sprinkler, standpipe and hose systems are installed, they shall be installed in conformance with the requirements in Subsection 3.2.5. that pertain to these systems. (See Appendix A.)
- 9) Where fuel-fired *appliances* are installed on a roof, such *appliances* shall be installed in conformance with Article 3.6.1.4.
- 10) Rooms or spaces that contain welding or flame cutting operations shall conform to Article 3.3.1.25.

**9.10.1.3. Items under Part 6 Jurisdiction**

- 1) In kitchens containing commercial cooking equipment used in processes producing grease-laden vapours, the equipment shall be designed and installed in conformance with Article 6.2.2.6. (See Appendix A.)

**9.10.2. Occupancy Classification**

**9.10.2.1. Occupancy Classification**

- 1) Except as provided in Article 9.10.2.2., every *building* or part thereof shall be classified according to its *major occupancy* as belonging to one of the groups or divisions described in Table 9.10.2.1.

**Table 9.10.2.1.**  
**Occupancy Classifications**  
 Forming Part of Sentence 9.10.2.1.(1)

Group	Division	Description of <i>Major Occupancies</i> <sup>(1)</sup>
C	—	<i>Residential occupancies</i>
D	—	<i>Business and personal services occupancies</i>
E	—	<i>Mercantile occupancies</i>
F	2	<i>Medium-hazard industrial occupancies</i>
F	3	<i>Low-hazard industrial occupancies</i> (Does not include <i>storage garages</i> serving individual <i>dwelling units</i> )

**Notes to Table 9.10.2.1.:**

(1) See A-3.1.2.1.(1) in Appendix A.

**9.10.2.2. Custodial and Convalescent Homes**

1) Children's custodial homes and convalescent homes for ambulatory occupants living as a single housekeeping unit in a *dwelling unit* with sleeping accommodation for not more than 10 persons are permitted to be classified as *residential occupancies* (Group C).

**9.10.2.3. Major Occupancies above Other Major Occupancies**

1) Except as permitted in Article 9.10.2.4., in any *building* containing more than one *major occupancy* in which one *major occupancy* is located entirely above another, the requirements of Article 9.10.8.1. for each portion of the *building* containing a *major occupancy* shall be applied to that portion as if the entire *building* was of that *major occupancy*.

**9.10.2.4. Buildings Containing More Than One Major Occupancy**

1) In a *building* containing more than one *major occupancy*, where the aggregate area of all *major occupancies* in a particular group or division does not exceed 10% of the *floor area* on the *storey* on which they are located, they need not be considered as *major occupancies* for the purposes of Articles 9.10.8.1. and 9.10.2.3. provided they are not classified as Group F, Division 2 *occupancies*.

**9.10.3. Ratings****9.10.3.1. Fire-Resistance and Fire-Protection Ratings**

1) Where a *fire-resistance rating* or a *fire-protection rating* is required in this Section for an element of a *building*, such rating shall be determined in conformance with the test methods described in Part 3, A-9.10.3.1. in Appendix A, or Appendix D.

**9.10.3.2. Flame-Spread Ratings**

1) Where a *flame-spread rating* is required in this Section for an element of a *building*, such rating shall be determined in accordance with the test methods described in Part 3, or in accordance with Appendix D.

2) Unless the *flame-spread rating* is referred to herein as a "surface *flame-spread rating*," it shall apply to any surface of the element being considered that would be exposed by cutting through it as well as to the exposed surface of the element.

**9.10.3.3. Fire Exposure**

1) Floor, roof and ceiling assemblies shall be rated for exposure to fire on the underside.

2) Exterior walls shall be rated for exposure to fire from inside the *building*, except that such walls need not comply with the temperature rise limitations required by the standard tests referred to in Article 9.10.3.1. if such walls have a *limiting distance* of not less than 1.2 m, and due allowance is made for the effects of heat radiation in accordance with the requirements in Part 3.

3) Interior vertical *fire separations* required to have *fire-resistance ratings* shall be rated for exposure to fire on each side.

**9.10.3.4. Suspended Membrane Ceilings**

1) Where a ceiling construction has a suspended membrane ceiling with lay-in panels or tiles which contribute to the required *fire-resistance rating*, hold down clips or other means shall be provided to prevent the lifting of such panels or tiles in the event of a fire.

**9.10.4. Building Size Determination****9.10.4.1. Mezzanines not Considered as Storeys**

**1)** Except as required by Sentences (2) and 9.10.4.2.(1), the space above a *mezzanine* is permitted to be excluded from the calculation of *building height*, provided

- a) the aggregate area of *mezzanines* that are not superimposed does not exceed 10% of the *floor area* of the *building* in which they are located, and
- b) the area of *mezzanine* in a *suite* does not exceed 10% of the area of that *suite* on the *storey* on which it is located.

**2)** Except as required by Sentence 9.10.4.2.(1), the space above a *mezzanine* is permitted to be excluded from the calculation of *building height*, provided

- a) the aggregate area of *mezzanines* that are not superimposed does not exceed 40% of the open area of the room in which they are located (see A-3.2.1.1.(3)(a) in Appendix A), and
- b) except as permitted in Sentence (3), the space above the *mezzanine* floor is used as an open area without *partitions* or subdividing walls higher than 1 070 mm above the *mezzanine* floor.

**3)** The space above a *mezzanine* conforming to Sentence (2) is permitted to include an enclosed space whose area does not exceed 10% of the open area of the room in which the *mezzanine* is located, provided the enclosed space does not obstruct visual communication between the open space above the *mezzanine* and the room in which it is located.

**4)** For the purpose of determining *occupant load*, the areas of *mezzanines* that are not considered as *storeys* shall be added to the *floor area* of the *storey* on which they are located. (See Appendix A.)

**5)** Platforms and catwalks intended solely for periodic inspection and maintenance need not be considered as floor assemblies or *mezzanines* for the purpose of calculating *building height*, provided

- a) they are not used for storage, and
- b) they are constructed with *noncombustible* materials, unless the *building* is permitted to be of *combustible construction*.

**9.10.4.2. More Than One Level of Mezzanine**

**1)** Each level of *mezzanine* that is partly or wholly superimposed above the first level of *mezzanine* shall be considered as a *storey* in calculating the *building height*.

**9.10.4.3. Basement Storage Garages**

**1)** Where a *basement* is used primarily as a *storage garage*, the *basement* is permitted to be considered as a separate *building* for the purposes of this Section provided the floor above the *basement* and the exterior walls of the *basement* above the adjoining ground level are constructed as *fire separations* of masonry or concrete having a *fire-resistance rating* of not less than 2 h.

**9.10.4.4. Roof-Top Enclosures**

**1)** Roof-top enclosures provided for elevator machinery, stairways and *service rooms*, used for no purpose other than for service to the *building*, shall not be considered as a *storey* in calculating the *building height*.

**9.10.5. Permitted Openings in Wall and Ceiling Membranes****9.10.5.1. Permitted Openings in Wall and Ceiling Membranes**

**1)** Except as permitted in Sentences (2) and (4), a membrane forming part of an assembly required to have a *fire-resistance rating* shall not be pierced by openings into the assembly unless the assembly has been tested and rated for such openings.

**2)** A wall or ceiling membrane forming part of an assembly required to have a *fire-resistance rating* is permitted to be pierced by openings for electrical and similar service outlet boxes provided such outlet boxes are tightly fitted.

**3)** Where boxes referred to in Sentence (2) are located on both sides of walls required to provide a *fire-resistance rating*, they shall be offset where necessary to maintain the integrity of the *fire separation*.

**4)** A membrane ceiling forming part of an assembly assigned a *fire-resistance rating* on the basis of Table A-9.10.3.1.B. or Appendix D, is permitted to be pierced by openings leading to ducts within the ceiling space provided the ducts, the amount of openings and their protection conform to the requirements of Appendix D.

**9.10.6. Construction Types**

**9.10.6.1. Combustible Elements in Noncombustible Construction**

**1)** Where a *building* or part of a *building* is required to be of *noncombustible construction*, *combustible* elements shall be limited in conformance with the requirements in Subsection 3.1.5.

**9.10.6.2. Heavy Timber Construction**

**1)** *Heavy timber construction* shall be considered to have a 45 min *fire-resistance rating* when it is constructed in accordance with the requirements for *heavy timber construction* in Article 3.1.4.6.

**9.10.7. Steel Members**

**9.10.7.1. Protection of Steel Members**

**1)** Except as permitted in Article 3.2.2.3., structural steel members used in construction required to have a *fire-resistance rating* shall be protected to provide the required *fire-resistance rating*.

**9.10.8. Fire Resistance and Combustibility in Relation to Occupancy, Height and Supported Elements**

**9.10.8.1. Fire-Resistance Ratings for Floors and Roofs**

**1)** Except as otherwise provided in this Subsection, the *fire-resistance ratings* of floors and roofs shall conform to Table 9.10.8.1. (See Subsection 9.10.2. for mixed *occupancies* and Part 10 for construction camps.)

**Table 9.10.8.1.**  
**Fire-Resistance Ratings for Structural Members and Assemblies**  
 Forming Part of Sentence 9.10.8.1.(1)

Major Occupancy	Maximum Building Height, storeys	Minimum Fire-Resistance Rating by Building Element, min		
		Floors Except Floors over Crawl Spaces	Mezzanine Floors	Roofs
Residential (Group C)	3	45	45	—
All other occupancies	2	45	—	—
	3	45	45	45

**9.10.8.2. Fire-Resistance Ratings in Sprinklered Buildings**

- 1) The requirements in Table 9.10.8.1. for roof assemblies to have a *fire-resistance rating* are permitted to be waived in *sprinklered buildings* where
  - a) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.9.(2), and
  - b) the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4).
- 2) The requirements in Table 9.10.8.1. for *mezzanine* floor assemblies to have a *fire-resistance rating* are permitted to be waived in *sprinklered buildings*.

**9.10.8.3. Fire-Resistance Ratings for Walls, Columns and Arches**

- 1) Except as otherwise provided in this Subsection, all *loadbearing* walls, columns and arches in the *storey* immediately below a floor or roof assembly shall have a *fire-resistance rating* of not less than that required for the supported floor or roof assembly.

**9.10.8.4. Support of Noncombustible Construction**

- 1) Where an assembly is required to be of *noncombustible construction* and to have a *fire-resistance rating*, it shall be supported by *noncombustible construction*.

**9.10.8.5. Service Rooms**

- 1) Construction supporting a *service room* need not conform to Article 9.10.8.3.

**9.10.8.6. Mezzanines**

- 1) *Mezzanines* required to be counted as *storeys* in Articles 9.10.4.1. and 9.10.4.2. shall be constructed in conformance with the requirements for "Floors Except Floors over Crawl Spaces" in Table 9.10.8.1.

**9.10.8.7. Roofs Supporting an Occupancy**

- 1) Where a portion of a roof supports an *occupancy*, that portion shall be constructed as a *fire separation* having a *fire-resistance rating* conforming to the rating for "Floors Except Floors over Crawl Spaces" in Table 9.10.8.1.

**9.10.8.8. Floors of Exterior Passageways**

- 1) Except as provided in Sentences (2) and (3), the floor assembly of every exterior passageway used as part of a *means of egress* shall have a *fire-resistance rating* of not less than 45 min or be of *noncombustible construction*.
- 2) No *fire-resistance rating* is required for floors of exterior passageways serving *buildings* of Group D, E or F *major occupancy* that are not more than 2 *storeys* in *building height*.
- 3) No *fire-resistance rating* is required for floors of exterior passageways serving a single *dwelling unit* where no *suite* is located above or below the *dwelling unit*.

**9.10.8.9. Crawl Spaces**

- 1) Where a crawl space exceeds 1.8 m in height or is used for any *occupancy* or as a *plenum* in *combustible construction* or for the passage of *flue pipes*, it shall be considered as a *basement* in applying the requirements in Article 9.10.8.1.

**9.10.8.10. Application to Houses**

- 1) Table 9.10.8.1. does not apply to a *dwelling unit* which has no other *dwelling unit* above or below it, or to a *dwelling unit* which is not above or below another *major occupancy*.

**9.10.8.11. Part 3 as an Alternative**

1) The *fire-resistance ratings* of floors, roofs, *loadbearing* walls, columns and arches need not conform to this Subsection if such assemblies conform in all respects to the appropriate requirements in Section 3.2.

**9.10.9. Fire Separations between Rooms and Spaces within Buildings****9.10.9.1. Application**

1) This Subsection applies to *fire separations* required between rooms and spaces in *buildings* except between rooms and spaces within a *dwelling unit*.

**9.10.9.2. Continuous Barrier**

1) Except as permitted in Article 9.10.9.3., a wall or floor assembly required to be a *fire separation* shall be constructed as a continuous barrier against the spread of fire.

2) The continuity of a *fire separation* shall be maintained where it abuts another *fire separation*, a floor, a ceiling, a roof, or an exterior wall assembly. (See A-3.1.8.3.(4) in Appendix A.)

**9.10.9.3. Openings to be Protected with Closures**

1) Except as permitted in Articles 9.10.9.5., 9.10.9.6. and 9.10.9.7., openings in required *fire separations* shall be protected with *closures* conforming to Subsection 9.10.13.

**9.10.9.4. Floor Assemblies**

1) Except as permitted in Sentences (2) to (4), all floor assemblies shall be constructed as *fire separations*.

2) Floor assemblies contained within *dwelling units* need not be constructed as *fire separations*.

3) Floor assemblies for which no *fire-resistance rating* is required by Subsection 9.10.8. and floors of *mezzanines* not required to be counted as *storeys* in Articles 9.10.4.1. and 9.10.4.2. need not be constructed as *fire separations*.

4) Where a crawl space is not required by Article 9.10.8.9. to be constructed as a *basement*, the floor above it need not be constructed as a *fire separation*.

**9.10.9.5. Interconnected Floor Spaces**

1) *Interconnected floor spaces* shall conform to Subsection 3.2.8.

**9.10.9.6. Service Equipment Penetrating a Fire Separation**

(See A-3.1.9. in Appendix A.)

1) Piping, tubing, ducts, *chimneys*, wiring, conduit, electrical outlet boxes and other similar service equipment that penetrate a required *fire separation* shall be tightly fitted or fire stopped to maintain the integrity of the separation. (See Appendix A.)

2) Except as provided in Sentences (3) to (9) and Article 9.10.9.7., pipes, ducts, electrical boxes, totally enclosed raceways or other similar service equipment that partly or wholly penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible* unless the assembly has been tested incorporating such equipment. (See A-3.1.9.2.(1) in Appendix A.)

3) Electrical wires or similar wiring enclosed in *noncombustible* totally enclosed raceways are permitted to partly or wholly penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2).

4) Electrical wires or cables, single or grouped, with *combustible* insulation or jacketing that is not totally enclosed in raceways of *noncombustible* material, are permitted to partly or wholly penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2), provided the overall diameter of the wiring is not more than 25 mm.

5) *Combustible* totally enclosed raceways which are embedded in a concrete floor slab are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2), where the concrete provides not less than 50 mm of cover between the raceway and the bottom of the slab.

6) *Combustible* outlet boxes are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2), provided the opening through the membrane into the box does not exceed 160 cm<sup>2</sup>.

7) *Combustible* water distribution piping that has an outside diameter not more than 30 mm is permitted to partly or wholly penetrate a vertical *fire separation* that is required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2) provided the piping is sealed in conformance with Article 3.1.9.1.

8) *Combustible* sprinkler piping is permitted to penetrate a *fire separation* provided the *fire compartments* on each side of the *fire separation* are *sprinklered*.

9) *Combustible* piping for central vacuum systems is permitted to penetrate a *fire separation* provided the installation conforms to the requirements that apply to *combustible* drain, waste and vent piping specified in Sentences 9.10.9.7.(2) to (6).

#### 9.10.9.7. Combustible Drain, Waste and Vent Piping

(See A-3.1.9. in Appendix A.)

1) Except as permitted in Sentences (2) to (6), *combustible* piping shall not be used in any part of a drain, waste and vent piping system where any part of that system partly or wholly penetrates a *fire separation* required to have a *fire-resistance rating* or penetrates a membrane that contributes to the required *fire-resistance rating* of an assembly.

2) *Combustible* drain, waste and vent piping not located in a vertical shaft is permitted to penetrate a *fire separation* required to have a *fire-resistance rating* or a membrane that forms part of an assembly required to have a *fire-resistance rating* provided the piping is sealed at the penetration by a firestop system that has an F rating not less than the *fire-resistance rating* required for the *fire separation*.

3) The rating referred to in Sentence (2) shall be based on ULC-S115, "Fire Tests of Firestop Systems," with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side.

4) *Combustible* drain piping is permitted to penetrate a horizontal *fire separation* or a membrane that contributes to the required *fire-resistance rating* of a horizontal *fire separation*, provided it leads directly from a *noncombustible* watercloset through a concrete floor slab.

5) *Combustible* drain, waste and vent piping is permitted on one side of a vertical *fire separation* provided it is not located in a vertical shaft.

6) In buildings containing 2 dwelling units only, *combustible* drain, waste and vent piping is permitted on one side of a horizontal *fire separation*.

#### 9.10.9.8. Collapse of Combustible Construction

1) *Combustible construction* that abuts on or is supported by a *noncombustible fire separation* shall be constructed so that its collapse under fire conditions will not cause collapse of the *fire separation*.

**9.10.9.9. Reduction in Thickness of Fire Separation by Beams and Joists**

1) Where pockets for the support of beams or joists are formed in a masonry or concrete *fire separation*, the remaining total thickness of solid masonry and/or grout and/or concrete shall be not less than the required equivalent thickness shown for Type S monolithic concrete in Table D-2.1.1. in Appendix D for the required *fire-resistance rating*.

**9.10.9.10. Concealed Spaces above Fire Separations**

1) Except as provided in Sentence (2), a *horizontal service space* or other concealed space located above a required vertical *fire separation* shall be divided at the *fire separation* by an equivalent *fire separation* within the space.

2) Where a *horizontal service space* or other concealed space is located above a required vertical *fire separation* other than a vertical shaft, such space need not be divided as required in Sentence (1) provided the construction between such space and the space below is constructed as a *fire separation* having a *fire-resistance rating* not less than that required for the vertical *fire separation*, except that where the vertical *fire separation* is not required to have a *fire-resistance rating* greater than 45 min, the *fire-resistance rating* of the ceiling may be reduced to 30 min.

**9.10.9.11. Separation of Residential Occupancies**

1) Except as provided in Sentence (2), *residential occupancies* shall be separated from all other *major occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

2) Except as provided in Sentence (3), a *major occupancy* classified as a *residential occupancy* shall be separated from other *major occupancies* classified as *mercantile* or *medium-hazard industrial occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

3) Where not more than 2 *dwelling units* are located in a *building* containing a *mercantile occupancy*, such *mercantile occupancy* shall be separated from the *dwelling units* by a *fire separation* having not less than 1 h *fire-resistance rating*.

**9.10.9.12. Residential Suites in Industrial Buildings**

1) Not more than one *suite of residential occupancy* shall be contained within a *building* classified as a Group F, Division 2 *major occupancy*.

**9.10.9.13. Separation of Suites**

1) Except as required in Article 9.10.9.14. and as permitted by Sentence (2), each *suite* in other than *business and personal services occupancies* shall be separated from adjoining *suites* by a *fire separation* having a *fire-resistance rating* of not less than 45 min.

2) In *sprinklered buildings*, *suites of business and personal services occupancy* and *mercantile occupancy* that are served by *public corridors* conforming with Clause 3.3.1.4.(4)(b) are not required to be separated from each other by *fire separations*.

**9.10.9.14. Separation of Residential Suites**

1) Except as provided in Sentences (2) and (3) and Part 10, *suites in residential occupancies* shall be separated from adjacent rooms and *suites* by a *fire separation* having a *fire-resistance rating* of not less than 45 min.

2) Sleeping rooms in boarding and lodging houses where sleeping accommodation is provided for not more than 8 boarders or lodgers need not be separated from the remainder of the *floor area* as required in Sentence (1) where the sleeping rooms form part of the proprietor's residence and do not contain cooking facilities.

3) *Dwelling units* that contain 2 or more *storeys* including *basements* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h. (See A-3.3.4.4.(1) in Appendix A.)

**9.10.9.15. Separation of Public Corridors**

- 1)** Except as provided in Sentences (2) and (3), *public corridors* shall be separated from the remainder of the *building* by a *fire separation* having not less than a 45 min *fire-resistance rating*.
- 2)** In other than *residential occupancies*, no *fire-resistance rating* is required for *fire separations* between a *public corridor* and the remainder of the *building* if
- the *floor area* is *sprinklered*,
  - the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.9.(2), and
  - the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4).
- 3)** In other than *residential occupancies*, no *fire separation* is required between a *public corridor* and the remainder of the *building* if
- the *floor area* is *sprinklered*,
  - the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.9.(2),
  - the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4), and
  - the corridor exceeds 5 m in width.

**9.10.9.16. Separation of Storage Garages**

- 1)** Except as provided in Sentences (2) and (3), a *storage garage* shall be separated from other *occupancies* by a *fire separation* having not less than a 1.5 h *fire-resistance rating*.
- 2)** Except as permitted in Sentence (3), *storage garages* containing 5 motor vehicles or fewer shall be separated from other *occupancies* by a *fire separation* of not less than 1 h.
- 3)** Where a *storage garage* serves only the *dwelling unit* to which it is attached or in which it is built, it shall be considered as part of that *dwelling unit* and the *fire separation* required in Sentence (2) need not be provided between the garage and the *dwelling unit*.
- 4)** Except as provided in Sentence (5), where a *storage garage* is attached to or built into a *building of residential occupancy*,
- an *air barrier system* conforming to Subsection 9.25.3. shall be installed between the garage and the remainder of the *building* to provide an effective barrier to gas and exhaust fumes, and
  - every door between the garage and the remainder of the *building* shall conform to Article 9.10.13.15.
- (See Appendix A.)
- 5)** Where membrane materials are used to provide the required airtightness in the *air barrier system*, all joints shall be sealed and structurally supported.

**9.10.9.17. Separation of Repair Garages**

- 1)** Except as provided in Sentences (2) and (3), a *repair garage* shall be separated from other *occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.
- 2)** Ancillary spaces directly serving a *repair garage*, including waiting rooms, reception rooms, tool and parts storage areas and supervisory office space, need not be separated from the *repair garage* but shall be separated from other *occupancies* as required in Sentence (1).
- 3)** The *fire separation* referred to in Sentence (1) shall have a *fire-resistance rating* of not less than 1 h, where
- the *building* is not more than one *storey* in *building height*,
  - the *building* is operated as a single *suite*, and
  - the only *occupancy* other than the *repair garage* is a *mercantile occupancy*.

4) Except as provided in Sentence (5), where a *building* containing a *repair garage* also contains a *dwelling unit*, an *air barrier system* conforming to Subsection 9.25.3. shall be installed between the *dwelling unit* and the *suite* containing the garage to provide an effective barrier to gas and exhaust fumes. (See A-9.10.9.16.(4) in Appendix A.)

5) Where membrane materials are used to provide the required airtightness in the *air barrier system*, all joints shall be sealed and structurally supported.

#### 9.10.9.18. Exhaust Ducts Serving More Than One Fire Compartment

1) Where a *vertical service space* contains an *exhaust duct* that serves more than one *fire compartment*, the duct shall have a fan located at or near the exhaust outlet to ensure that the duct is under negative pressure.

2) Individual *fire compartments* referred to in Sentence (1) shall not have fans that exhaust directly into the duct in the *vertical service space*.

#### 9.10.9.19. Central Vacuum Systems

1) A central vacuum system shall serve not more than one *suite*.

#### 9.10.9.20. Janitorial Storage Rooms

1) Except as permitted by Sentence (2), a room or space for the storage of janitorial supplies shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 45 min.

2) The *fire separation* required by Sentence (1) is not required to have a *fire-resistance rating* if the *building* is *sprinklered*.

### 9.10.10. Service Rooms

#### 9.10.10.1. Application

1) This Subsection applies to *service rooms* in all *buildings* except rooms located within a *dwelling unit*.

#### 9.10.10.2. Service Room Floors

1) The *fire-resistance rating* requirements in this Subsection do not apply to the floor assembly immediately below a *service room*.

#### 9.10.10.3. Separation of Service Rooms

1) Except as provided in Sentence (2) and Articles 9.10.10.5. and 9.10.10.6., *service rooms* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h when the *floor area* containing the *service room* is not *sprinklered*.

2) Where a room contains a limited quantity of service equipment and the service equipment does not constitute a fire hazard, the requirements in Sentence (1) shall not apply.

#### 9.10.10.4. Appliances and Equipment to be Located in a Service Room

1) Except as provided in Sentence (2) and Article 9.10.10.5., fuel-fired *appliances* other than fireplaces shall be located in a *service room* separated from the remainder of the *building* by a *fire separation* having not less than a 1 h *fire-resistance rating*.

2) Except as required in the *appliance* installation standards referenced in Sentences 6.2.1.4.(1), 9.33.5.2.(1) and 9.33.5.3.(1), fuel-fired *space-heating appliances*, *space-cooling appliances* and *service water heaters* need not be separated from the remainder of the *building* as required in Sentence (1), where the equipment serves

- a) not more than one room or *suite*, or
- b) a *building* with a *building area* of not more than 400 m<sup>2</sup> and a *building height* of not more than 2 *storeys*.

**9.10.10.5.****9.10.10.5. Incinerators**

1) *Service rooms* containing incinerators shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

2) The design, construction, installation and *alteration* of each indoor incinerator shall conform to NFPA 82, "Incinerators and Waste and Linen Handling Systems and Equipment."

3) Every incinerator shall be connected to a *chimney flue* conforming to the requirements in Section 9.21. and serving no other *appliance*.

4) An incinerator shall not be located in a room with other fuel-fired *appliances*.

**9.10.10.6. Storage Rooms**

1) Rooms for the temporary storage of *combustible* refuse in all *occupancies* or for public storage in *residential occupancies* shall be separated from the remainder of the *building* by a *fire separation* having not less than a 1 h *fire-resistance rating*, except that a 45 min *fire separation* is permitted where the *fire-resistance rating* of the floor assembly is not required to exceed 45 min, or where such rooms are *sprinklered*.

**9.10.11. Firewalls****9.10.11.1. Required Firewalls**

1) Except as provided in Article 9.10.11.2., a *party wall* on a property line shall be constructed as a *firewall*.

**9.10.11.2. Firewalls Not Required**

1) In a *building of residential occupancy* in which there is no *dwelling unit* above another *dwelling unit*, a *party wall* on a property line between *dwelling units* need not be constructed as a *firewall* provided it is constructed as a *fire separation* having not less than a 1 h *fire-resistance rating*.

2) The wall described in Sentence (1) shall provide continuous protection from the top of the footings to the underside of the roof deck.

3) Any space between the top of the wall described in Sentence (1) and the roof deck shall be tightly filled with mineral wool or *noncombustible* material.

**9.10.11.3. Construction of Firewalls**

1) Where *firewalls* are used, the requirements in Part 3 shall apply.

**9.10.12. Prevention of Fire Spread at Exterior Walls and between Storeys****9.10.12.1. Termination of Floors or Mezzanines**

1) Except as provided in Sentence (2) and in Articles 9.10.1.2. and 9.10.9.5., the portions of a *floor area* or *mezzanine* that do not terminate at an exterior wall, a *firewall* or a vertical shaft, shall terminate at a vertical *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly that terminates at the separation.

2) A *mezzanine* need not terminate at a vertical *fire separation* where the *mezzanine* is not required to be considered as a *storey* in Articles 9.10.4.1. and 9.10.4.2.

**9.10.12.2. Location of Skylights**

1) Where a wall in a *building* is exposed to a fire hazard from an adjoining roof of a separate unsprinklered *fire compartment* in the same *building*, the roof shall contain no skylights within a horizontal distance of 5 m of the windows in the exposed wall.

**9.10.12.3. Exterior Walls Meeting at an Angle**

**1)** Except as provided in Articles 9.9.4.5. and 9.10.14.5., and in *sprinklered buildings*, where exterior walls of a *building* meet at an external angle of 135° or less, the horizontal distance from an opening in one wall to an opening in the other wall shall be not less than 1.2 m, if the openings are in different *fire compartments*.

**2)** The exterior wall of each *fire compartment* referred to in Sentence (1) within the 1.2 m distance shall have a *fire-resistance rating* not less than that required for the interior vertical *fire separation* between the compartment and the remainder of the *building*.

**9.10.12.4. Protection of Soffits**

**1)** This Article applies to the portion of any soffit enclosing a projection that is

- less than 2.5 m vertically above a window or door, and
- less than 1.2 m from either side of the window or door.

(See Appendix A.)

**2)** Except as provided in Sentences (4) and (5), the construction described in Sentence (1) shall have no *unprotected openings* and shall be protected in accordance with Sentence (3), where the soffit encloses

- a common *attic or roof space* that spans more than 2 *suites of residential occupancy* and projects beyond the exterior wall of the *building*,
- a floor space where an upper *storey* projects beyond the exterior wall of a lower *storey* and a *fire separation* is required at the floor between the two, or
- a floor space where an upper *storey* projects beyond the exterior wall of a lower *storey*, and the projection is continuous across a vertical *fire separation* separating two *suites*.

**3)** Protection required by Sentence (2) shall be provided by

- noncombustible* material having a minimum thickness of 0.38 mm and a melting point not below 650°C,
- not less than 12.7 mm thick gypsum soffit board or gypsum wallboard installed according to ASTM C 840, "Application and Finishing of Gypsum Board,"
- not less than 11 mm thick plywood,
- not less than 12.5 mm thick OSB or waferboard, or
- not less than 11 mm thick lumber.

(See Appendix A.)

**4)** In the case of a soffit described in Sentence (1) that is at the edge of an *attic or roof space* and completely separated from the remainder of that *attic or roof space* by fire stopping, the requirements in Sentence (2) do not apply.

**5)** Where all *suites* spanned by a common *attic or roof space* or situated above or below the projecting floor are *sprinklered*, the requirements of Sentence (2) do not apply, provided that all rooms, including closets and bathrooms, having openings in the wall beneath the soffit are *sprinklered*, notwithstanding any exceptions in the sprinkler standards referenced in Article 3.2.5.13.

**9.10.12.5. Protection of Balconies**

(See Appendix A.)

**1)** This Article applies to *buildings* that

- contain more than 2 *suites of residential occupancy*,
- are not less than 2 *storeys* in *building height*,
- have *dwelling units* located in whole or in part above other *dwelling units*, and
- are not *sprinklered* throughout.

**2)** The protection required by Sentences (3) and (4) shall be provided by cladding that conforms to

- Subsection 9.27.8. or 9.27.12.,
- Section 9.28., or
- one of the methods described in Clause 3.2.3.7.(3)(c) or (d).

3) Balcony walls shall be protected by one of the methods mentioned in Sentence (2) from the floor level of the balcony to the underside of the balcony or roof assembly above for

- a) the full width and depth of the balcony, and
- b) 1.2 m on either side of the balcony.

4) Ceiling and roof assemblies above balconies mentioned in Sentence (3) shall be protected by one of the methods mentioned in Sentence (2).

**9.10.13. Doors, Dampers and Other Closures in Fire Separations**

**9.10.13.1. Closures**

1) Except as provided in Article 9.10.13.2., openings in required *fire separations* shall be protected with a *closure* conforming to Table 9.10.13.1. and shall be installed in conformance with Chapters 2 to 14 of NFPA 80, "Fire Doors and Fire Windows," unless otherwise specified herein. (See also Article 9.10.3.1.)

**Table 9.10.13.1.**  
**Fire-Protection Ratings for Closures**  
Forming Part of Sentence 9.10.13.1.(1)

Required <i>Fire-Resistance Rating of Fire Separation</i>	Minimum <i>Fire-Protection Rating of Closure</i>
30 or 45 min	20 min <sup>(1)</sup>
1 h	45 min <sup>(1)</sup>
1.5 h	1 h
2 h	1.5 h
3 h	2 h
4 h	3 h

**Notes to Table 9.10.13.1.:**

(1) See Article 9.10.13.2.

**9.10.13.2. Solid Core Wood Door as a Closure**

1) A 45 mm thick solid core wood door is permitted to be used where a minimum *fire-protection rating* of 20 min is permitted or between a *public corridor* and a *suite* provided that the door conforms to CAN4-S113, "Wood Core Doors Meeting the Performance Required by CAN4-S104-77 for Twenty Minute Fire Rated Closure Assemblies." (See Appendix A.)

2) Doors described in Sentence (1) shall have not more than a 6 mm clearance beneath and not more than 3 mm at the sides and top.

**9.10.13.3. Unrated Wood Door Frames**

1) Doors required to provide a 20 min *fire-protection rating* or permitted to be 45 mm solid core wood shall be mounted in a wood frame of not less than 38 mm thickness where the frame has not been tested and rated.

**9.10.13.4. Doors as a Means of Egress**

1) Doors forming part of an *exit* or a *public means of egress* shall conform to Subsection 9.9.6. in addition to this Subsection.

**9.10.13.5. Wired Glass as a Closure**

1) Wired glass conforming to Article 9.7.3.1. which has not been tested in accordance with Article 9.10.3.1. is permitted as a *closure* in a vertical *fire separation* required to have a *fire-resistance rating* of not more than 1 h provided such glass is not less than 6 mm thick and is mounted in conformance with Sentence (2).

2) Wired glass described in Sentence (1) shall be mounted in fixed steel frames having a metal thickness of not less than 1.35 mm and a glazing stop of not less than 20 mm on each side of the glass.

3) Individual panes of glass described in Sentence (1) shall not exceed 0.8 m<sup>2</sup> in area or 1.4 m in height or width, and the area of glass not structurally supported by mullions shall not exceed 7.5 m<sup>2</sup>.

#### 9.10.13.6. Steel Door Frames

1) Steel door frames forming part of a *closure* in a *fire separation*, including anchorage requirements, shall conform to CAN4-S105-M, "Fire Door Frames Meeting the Performance Required by CAN4-S104."

#### 9.10.13.7. Glass Block as a Closure

1) Glass block that has not been tested in accordance with Article 9.10.3.1. is permitted as a *closure* in a *fire separation* required to have a *fire-resistance rating* of not more than 1 h. (See Sentence 9.10.14.4.(2) and Article 9.20.9.6.)

#### 9.10.13.8. Maximum Size of Opening

1) The size of an opening in an interior *fire separation*, even where protected with a *closure*, shall not exceed 11 m<sup>2</sup>, with no dimension greater than 3.7 m, when the *fire compartments* on both sides of the *fire separation* are not *sprinklered*.

2) The size of an opening in an interior *fire separation*, even where protected with a *closure*, shall not exceed 22 m<sup>2</sup>, with no dimension greater than 6 m, when the *fire compartments* on both sides of the *fire separation* are *sprinklered*.

#### 9.10.13.9. Door Latch

1) Every swing type door in a *fire separation* shall be equipped with a latch.

#### 9.10.13.10. Self-closing Device

1) Except as described in Sentence (2), every door in a *fire separation* shall have a self-closing device.

2) Self-closing doors are not required between *public corridors* and *suites* in *business and personal services occupancies*, except in dead-end corridors.

#### 9.10.13.11. Hold-Open Devices

1) Where hold-open devices are used on doors in required *fire separations*, they shall be installed in accordance with Article 3.1.8.12.

2) Doors located in *firewalls* in *residential occupancies* shall be equipped with acceptable hold-open devices installed in accordance with Sentence (1).

#### 9.10.13.12. Service Room Doors

1) Swing-type doors shall open into *service rooms* containing fuel-fired equipment where such doors lead to *public corridors* or rooms used for assembly but shall swing outward from such rooms in all other cases.

#### 9.10.13.13. Fire Dampers

1) Except as permitted by Sentences (2) to (5) and Sentence 9.10.5.1.(4), a duct that penetrates an assembly required to be a *fire separation* with a *fire-resistance rating* shall be equipped with a *fire damper* in conformance with Articles 3.1.8.4. and 3.1.8.9.

2) A *fire damper* is not required where a *noncombustible* branch duct pierces a required *fire separation* provided the duct

- a) has a melting point not below 760°C,
- b) has a cross-sectional area less than 130 cm<sup>2</sup>, and
- c) supplies only air-conditioning units or combined air-conditioning and heating units discharging air at not more than 1.2 m above the floor.

**3)** A *fire damper* is not required where a *noncombustible* branch duct pierces a required *fire separation* around an *exhaust duct* riser in which the airflow is upward provided

- a) the melting point of the branch duct is not below 760°C,
- b) the branch duct is carried up inside the riser not less than 500 mm, and
- c) the *exhaust duct* is under negative pressure as described in Article 9.10.9.18.

**4)** *Noncombustible* ducts that penetrate a *fire separation* separating a *vertical service space* from the remainder of the *building* need not be equipped with a *fire damper* at the *fire separation* provided

- a) the ducts have a melting point above 760°C, and
- b) each individual duct exhausts directly to the outside at the top of the *vertical service space*.

**5)** A duct serving commercial cooking equipment and piercing a required *fire separation* need not be equipped with a *fire damper* at the *fire separation*. (See also Article 6.2.2.6.)

#### 9.10.13.14. Fire Stop Flaps

**1)** *Fire stop flaps* in ceiling membranes required in Sentence 9.10.5.1.(4) shall be constructed in conformance with Appendix D, Fire-Performance Ratings.

#### 9.10.13.15. Doors between Garages and Dwelling Units

**1)** A door between an attached or built-in garage and a *dwelling unit* shall be tight fitting and weather-stripped to provide an effective barrier against the passage of gas and exhaust fumes and shall be fitted with a self-closing device.

**2)** A doorway between an attached or built-in garage and a *dwelling unit* shall not be located in a room intended for sleeping.

#### 9.10.13.16. Door Stops

**1)** Where a door is installed so that it may damage the integrity of a *fire separation* if its swing is unrestricted, door stops shall be installed to prevent such damage.

### 9.10.14. Spatial Separation Between Buildings

#### 9.10.14.1. Application

**1)** This Subsection applies to *buildings* other than those to which Subsection 9.10.15. applies.

#### 9.10.14.2. Area and Location of Exposing Building Face

- 1)** The area of an *exposing building face* shall be
  - a) taken as the exterior wall area facing in one direction on any side of a *building*, and
  - b) calculated as
    - i) the total area measured from the finished ground level to the uppermost ceiling, or
    - ii) the area for each *fire compartment*, where a *building* is divided into *fire compartments* by *fire separations* with *fire-resistance ratings* not less than 45 min.

**2)** For the purpose of using Table 9.10.14.4.A. to determine the maximum aggregate area of *unprotected openings* in an irregularly shaped or skewed exterior wall, the location of the *exposing building face* shall be taken as a vertical plane located so that there are no *unprotected openings* between the vertical plane and the line to which the *limiting distance* is measured. (See A-3.2.3.1.(4) in Appendix A.)

**3)** For the purpose of using Table 9.10.14.5. to determine the required type of construction, cladding and *fire-resistance rating* for an irregularly shaped or skewed exterior wall,

- a) the location of the *exposing building face* shall be taken as a vertical plane located so that no portion of the actual *exposing building face* is between the vertical plane and the line to which the *limiting distance* is measured, and
- b) the value for the maximum area of *unprotected openings* (see second column of Table 9.10.14.5.) shall be determined using the *limiting distance* measured from the location described in Clause (a). (See A-3.2.3.1.(4) in Appendix A.)

**4)** The *limiting distance* for an *exposing building face* that includes projections such as bow windows, bay windows or *flue chases of combustible construction* shall be measured from the face of the projection nearest the line to which the *limiting distance* is measured.

### 9.10.14.3. Limiting Distance where Firefighting Facilities are Inadequate

**1)** Except for the purpose of applying Sentences 9.10.14.4.(2), (8) and (9), and Sentence 9.10.14.5.(8), a *limiting distance* equal to half the actual *limiting distance* shall be used as input to the requirements of this Subsection, where

- a) the time from receipt of notification of a fire by the fire department until the first fire department vehicle capable of beginning suppression activities arrives at the *building* is greater than 10 minutes in not less than 10% of all calls to the *building*, and
  - b) any *storey* in the *building* is not *sprinklered*.
- (See A-3.2.3.1. and A-3.2.3.1.(8) in Appendix A.)

### 9.10.14.4. Openings in Exposing Building Face

**1)** Except as provided in Sentences (6) to (9), the maximum aggregate area of *unprotected openings* in an *exposing building face* shall

- a) conform to Table 9.10.14.4.A.,
- b) conform to Subsection 3.2.3., or
- c) where the *limiting distance* is not less than 1.2 m, be equal to or less than
  - i) the *limiting distance* squared, for *residential occupancies, business and personal services occupancies* and *low-hazard industrial occupancies*, and
  - ii) half the *limiting distance* squared, for *mercantile occupancies* and *medium-hazard industrial occupancies*.

**Table 9.10.14.4.A.**  
**Maximum Aggregate Area of Unprotected Openings in Exterior Walls**  
 Forming Part of Sentence 9.10.14.4.(1)

Occupancy Classification of Building	Maximum Total Area of Exposing Building Face, m <sup>2</sup>	Maximum Aggregate Area of <i>Unprotected Openings</i> , % of <i>Exposing Building Face Area</i>											
		Limiting Distance, m											
		Less than 1.2	1.2	1.5	2.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0
<i>Residential, business and personal services, and low-hazard industrial</i>	30	0	7	9	12	39	88	100	—	—	—	—	—
	40	0	7	8	11	32	69	100	—	—	—	—	—
	50	0	7	8	10	28	57	100	—	—	—	—	—
	100	0	7	8	9	18	34	56	84	100	—	—	—
	Over 100	0	7	7	8	12	19	28	40	55	92	100	—
<i>Mercantile and medium-hazard industrial</i>	30	0	4	4	6	20	44	80	100	—	—	—	—
	40	0	4	4	6	16	34	61	97	100	—	—	—
	50	0	4	4	5	14	29	50	79	100	—	—	—
	100	0	4	4	4	9	17	28	42	60	100	—	—
	Over 100	0	4	4	4	6	10	14	20	27	46	70	100

**2)** Openings in a wall having a *limiting distance* of less than 1.2 m shall be protected by *closures*, of other than wired glass or glass block, whose *fire-protection rating* is in conformance with the *fire-resistance rating* required for the wall. (See Table 9.10.13.1.)

**3)** Individual *unprotected openings* in an *exposing building face* shall have a projected area that is not more than the value determined in accordance with Table 9.10.14.4.B., unless

- a) the *building* is *sprinklered* throughout, or
- b) the *limiting distance* is more than 2 m.

**Table 9.10.14.4.B.**  
**Maximum Concentrated Area of Unprotected Openings**  
 Forming Part of Sentence 9.10.14.4.(3)

Limiting Distance, m	Maximum Area of Individual <i>Unprotected Openings</i> , m <sup>2</sup>
Less than 1.2	0
1.2	0.35
1.5	0.78
2.0	1.88

**4)** An individual *unprotected opening* described in Sentence (3) shall be separated by not less than 2 m horizontally and 2 m vertically from any other *unprotected opening* that is located on the same *exposing building face* and within the same *fire compartment*. (See A-3.2.3.1.(6) in Appendix A.)

- 5)** For the purposes of Sentence (4),
- a) two adjacent spaces are permitted to be considered as separate *fire compartments* where there is a full-height wall extending not less than 1.5 m from the interior face of the exterior wall, finished in accordance with Subsection 9.29.4. or 9.29.5., and
  - b) two stacked spaces shall be considered to be a single room or space where the spaces are on the same *storey*.

**6)** The maximum aggregate area of *unprotected openings* shall be not more than twice the area determined according to Sentence (1), where the *unprotected openings* are glazed with

- a) wired glass in steel frames, as described in Article 9.10.13.5., or
- b) glass blocks, as described in Article 9.10.13.7.

**7)** Where the *building* is *sprinklered*, the maximum aggregate area of *unprotected openings* shall be not more than twice the area determined according to Sentence (1), provided all rooms, including closets and bathrooms, that are adjacent to the *exposing building face* and that have *unprotected openings* are *sprinklered*, notwithstanding any exemptions in the sprinkler standards referenced in Article 3.2.5.13.

**8)** The maximum aggregate area of *unprotected openings* in an *exposing building face* of a *storage garage* need not comply with Sentence (1), where

- a) all *storeys* are constructed as *open-air storeys*, and
- b) the *storage garage* has a *limiting distance* of not less than 3 m.

**9)** The maximum aggregate area of *unprotected openings* in an *exposing building face* of a *storey* that faces a *street* and is at the same level as the *street* need not comply with Sentence (1), where the *limiting distance* is not less than 9 m.

**9.10.14.5. Construction of Exposing Building Face and Walls above Exposing Building Face**

**1)** Except as permitted in Sentences (2) to (9), each *exposing building face* and any exterior wall located above an *exposing building face* that encloses an *attic* or *roof space* shall be constructed in conformance with Table 9.10.14.5. (See also Subsection 9.10.8.) (See Appendix A.)

**Table 9.10.14.5.**  
**Minimum Construction Requirements for Exposing Building Faces**  
 Forming Part of Sentence 9.10.14.5.(1)

Occupancy Classification of Building or Fire Compartment	Maximum Area of Unprotected Openings Permitted, % of Exposing Building Face Area	Minimum Required Fire-Resistance Rating	Type of Construction Required	Type of Cladding Required
<i>Residential, business and personal services, and low-hazard industrial</i>	0 - 10	1 h	<i>Noncombustible</i>	<i>Noncombustible</i>
	>10 - 25	1 h	<i>Combustible or noncombustible</i>	<i>Noncombustible</i> <sup>(1)</sup>
	> 25 - 50	45 min	<i>Combustible or noncombustible</i>	<i>Noncombustible</i> <sup>(2)</sup>
	> 50 - <100	45 min	<i>Combustible or noncombustible</i>	<i>Combustible or noncombustible</i>
<i>Mercantile, and medium-hazard industrial</i>	0 - 10	2 h	<i>Noncombustible</i>	<i>Noncombustible</i>
	>10 - 25	2 h	<i>Combustible or noncombustible</i>	<i>Noncombustible</i> <sup>(1)</sup>
	> 25 - 50	1 h	<i>Combustible or noncombustible</i>	<i>Noncombustible</i> <sup>(2)</sup>
	> 50 - <100	1 h	<i>Combustible or noncombustible</i>	<i>Combustible or noncombustible</i>

**Notes to Table 9.10.14.5.:**

- (1) See Sentence (2).
- (2) See Sentence (3).

**2)** Except as provided in Sentence (3), cladding on *exposing building faces* and any exterior wall above an *exposing building face* that encloses an *attic or roof space* for *buildings* or *fire compartments* where the maximum aggregate area of *unprotected openings* is more than 10% of the *exposing building face* need not be *noncombustible* where the wall assembly satisfies the criteria of Sentences 3.1.5.5.(2) and (3) when subjected to testing in conformance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies."

**3)** Cladding on *exposing building faces* and on any exterior wall located above an *exposing building face* that encloses an *attic or roof space* for *buildings* or *fire compartments* where the maximum aggregate area of *unprotected openings* is more than 25% but not more than 50% of the *exposing building face*, need not be *noncombustible* where

- a) the *limiting distance* is not less than 5 m,
- b) the *building* or *fire compartment* is *sprinklered* throughout, or
- c) the cladding conforms to Clause 3.2.3.7.(3)(c) or (d).

**4)** Except as provided in Sentence (6), *combustible* projections on the exterior of a wall that are more than 1 m above ground level and that could expose an adjacent *building* to fire spread shall not be permitted within

- a) 1.2 m of a property line or the centre line of a *public way*, or
- b) 2.4 m of a *combustible* projection on another *building* on the same property.

**5)** Where the *limiting distance* is not more than 0.45 m, projecting roof soffits shall not be constructed above the *exposing building face*.

**6)** Where the *limiting distance* is more than 0.45 m, the face of roof soffits above the *exposing building face* are permitted to project to not less than 0.45 m from a property line.

**7)** Where roof soffits project closer than 1.2 m from a property line, they shall

- a) have no openings, and
- b) be protected by one of the materials listed in Clause 3.2.3.6.(5)(b).

**8)** Heavy timber and steel columns need not conform to the requirements of Sentence (1), provided the *limiting distance* is not less than 3 m.

**9)** Non-loadbearing wall components need not have a minimum *fire-resistance rating*, where the *building*

- a) is 1 storey in *building height*,
- b) is of *noncombustible construction*,
- c) is classified as a *low-hazard industrial occupancy* and used only for low *fire load occupancies*, such as power-generating plants or plants for the manufacture or storage of *noncombustible materials*, and
- d) has a *limiting distance* of 3 m or more.

## 9.10.15. Spatial Separation Between Houses

### 9.10.15.1. Application

**1)** This Subsection applies to

- a) *buildings* that contain only *dwelling units* and have no *dwelling unit* above another *dwelling unit*,
- b) *buildings* that contain a detached garage or accessory *building* facing a *dwelling unit* where
  - i) the detached garage or accessory *building* serves only one *dwelling unit* or a primary *dwelling unit* with a *secondary suite*,
  - ii) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
  - iii) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property, and
- c) *buildings* that contain one *dwelling unit* located in whole or in part above another *dwelling unit*, provided the *buildings* contain
  - i) not more than 2 *dwelling units*, and
  - ii) not more than 3 *storeys*, including any *basements*.

(See Appendix A.)

**2)** This Subsection does not apply to hotels or motels.

**9.10.15.2. Area and Location of Exposing Building Face**

- 1)** The area of an *exposing building face* shall be
  - a) taken as the exterior wall area facing in one direction on any side of a *building*, and
  - b) calculated as
    - i) the total area measured from the finished ground level to the uppermost ceiling,
    - ii) the area for each *fire compartment*, where a *building* is divided into *fire compartments* by *fire separations* with *fire-resistance ratings* not less than 45 min, or
    - iii) the area of any number of individual vertical portions of the wall measured from the finished ground level to the uppermost ceiling where Table 9.10.15.4. is used to determine the maximum aggregate area of glazed openings if the *limiting distance* is 2 m or more. (See A-9.10.15.4.(2) in Appendix A.)

**2)** For the purpose of using Table 9.10.15.4. to determine the maximum permitted area of glazed openings in an irregularly shaped or skewed exterior wall, the location of the *exposing building face* shall be taken as a vertical plane located so that there are no glazed openings between the vertical plane and the line to which the *limiting distance* is measured. (See A-3.2.3.1.(4) in Appendix A.)

**3)** In determining the required cladding-sheathing assembly and *fire-resistance rating* for an irregularly shaped or skewed exterior wall, the location of the *exposing building face* shall be taken as a vertical plane located so that no portion of the actual *exposing building face* is between the vertical plane and the line to which the *limiting distance* is measured. (See Article 9.10.15.5. and A-3.2.3.1.(4) in Appendix A.)

**4)** The *limiting distance* for an *exposing building face* that includes projections such as bow windows, bay windows or *flue chases* of *combustible construction*, shall be measured from the face of the projection nearest the line to which the *limiting distance* is measured.

**9.10.15.3. Limiting Distance where Firefighting Facilities are Inadequate**

**1)** Except for the purpose of applying Sentence 9.10.15.5.(11), a *limiting distance* equal to half the actual *limiting distance* shall be used as input to the requirements of this Subsection, where

- a) the time from receipt of notification of a fire by the fire department until the first fire department vehicle capable of beginning suppression activities arrives at the *building* is greater than 10 minutes in not less than 10% of all calls to the *building*, and
- b) any *storey* in the *building* is not *sprinklered*.

(See A-3.2.3.1. and A-3.2.3.1.(8) in Appendix A.)

**9.10.15.4. Glazed Openings in Exposing Building Face**

**1)** Except as provided in Sentence (6), the maximum aggregate area of glazed openings in an *exposing building face* shall

- a) conform to Table 9.10.15.4.,
- b) conform to Subsection 3.2.3., or
- c) be equal to or less than the *limiting distance* squared, where the *limiting distance* is not less than 1.2 m.

**2)** Where the limits on the area of glazed openings are determined for individual portions of the exterior wall, as described in Subclause 9.10.15.2.(1)(b)(iii), the maximum aggregate area of glazed openings for any portion shall conform to the values in the row of Table 9.10.15.4. corresponding to the maximum total area of *exposing building face* (see column 1 of the Table) that is equal to the sum of all portions of the *exposing building face*. (See Appendix A.)

- 3) Individual glazed openings in an *exposing building face* shall have a projected area that is not more than 50% of the maximum allowable aggregate area of glazed openings determined in Sentence (1), unless
  - a) the *building* is *sprinklered* throughout, or
  - b) the *limiting distance* is more than 2 m.
- 4) An individual glazed opening described in Sentence (3) shall be separated by not less than 2 m horizontally and 2 m vertically from any other glazed opening that is located on the same *exposing building face* and within the same *fire compartment*. (See A-3.2.3.1.(6) in Appendix A.)
- 5) For the purposes of Sentence (4),
  - a) two adjacent spaces are permitted to be considered as separate *fire compartments* where there is a full-height wall extending not less than 1.5 m from the interior face of the exterior wall, finished in accordance with Subsection 9.29.4. or 9.29.5., and
  - b) two stacked spaces shall be considered to be a single room or space where the spaces are on the same *storey*.
- 6) The limits on the area of glazed openings shall not apply to the *exposing building face* of a *dwelling unit* facing a detached garage or accessory *building*, where
  - a) the detached garage or accessory *building* serves only one *dwelling unit* or a primary *dwelling unit* with a *secondary suite*,
  - b) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
  - c) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

**Table 9.10.15.4.**  
**Maximum Area of Glazed Openings in Exterior Walls**  
 Forming Part of Sentence 9.10.15.4.(1)

Maximum Total Area of Exposing Building Face, m <sup>2</sup>	Maximum Aggregate Area of Glazed Openings, % of Exposing Building Face Area											
	Limiting Distance, m											
	Less than 1.2	1.2	1.5	2.0	4.0	6.0	8.0	10.0	12.0	16.0	20.0	25.0
30	0	7	9	12	39	88	100	—	—	—	—	—
40	0	7	8	11	32	69	100	—	—	—	—	—
50	0	7	8	10	28	57	100	—	—	—	—	—
100	0	7	8	9	18	34	56	84	100	—	—	—
Over 100	0	7	7	8	12	19	28	40	55	92	100	—

**9.10.15.5. Construction of Exposing Building Face of Houses**

- 1) Except as provided in Sentences (4) and (6), each *exposing building face* and any exterior wall located above an *exposing building face* that encloses an *attic* or *roof space* shall be constructed in conformance with Sentence (2) or (3)
  - a) for the *exposing building face* as a whole, or
  - b) for any number of separate portions of the *exposing building face* (see Subclause 9.10.15.2.(1)(b)(iii), Sentence 9.10.15.4.(2), and A-9.10.15.4.(2) in Appendix A) (see also Subsection 9.10.8.).

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**2)** Except as provided in Sentences (3) and (4), where the *limiting distance* is less than 1.2 m, the *exposing building face* and any exterior wall located above the *exposing building face* that encloses an *attic or roof space* shall have a *fire-resistance rating* of not less than 45 min and

- a) where the *limiting distance* is less than 0.6 m, the cladding shall
  - i) be of a *noncombustible* material conforming to Section 9.20., 9.27. or 9.28. (see A-9.10.14.5.(1) in Appendix A), or
  - ii) conform to Clause 3.2.3.7.(3)(d),
- b) where the *limiting distance* is not less than 0.6 m and less than 1.2 m, the cladding shall
  - i) be of a *noncombustible* material conforming to Section 9.20., 9.27. or 9.28. (see A-9.10.14.5.(1) in Appendix A), or
  - ii) conform to Clause 3.2.3.7.(3)(c) or (d), or
- c) the wall assembly shall satisfy the criteria of Sentences 3.1.5.5.(2) and (3) when subjected to testing in conformance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies."

**3)** Where a garage or accessory *building* serves one *dwelling unit* only and is detached from any *building*, the *exposing building face*

- a) need not conform to the minimum required *fire-resistance rating* stated in Sentence (2) where the *limiting distance* is 0.6 m or more, and
- b) need not conform to the type of cladding or wall assembly required by Clause (2)(a), (b) or (c), regardless of the *limiting distance*.

**4)** The requirements regarding *fire-resistance rating* and type of cladding-sheathing assemblies shall not apply to an *exposing building face*, or to a projection from an *exposing building face*, where

- a) the *exposing building face* or projection is part of a *dwelling unit* and faces a detached garage or accessory *building*, or is part of a garage or accessory *building* and faces a *dwelling unit*,
- b) the detached garage or accessory *building* serves only one *dwelling unit* or a primary *dwelling unit* with a *secondary suite*,
- c) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
- d) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

**5)** Except as provided in Sentence (6), *combustible* projections on the exterior of a wall that are more than 1 m above ground level and that could expose an adjacent *building* to fire spread shall not be permitted within

- a) 1.2 m of a property line or the centre line of a *public way*, or
- b) 2.4 m of a *combustible* projection on another *building* on the same property.

**6)** Sentence (5) shall not apply to

- a) *buildings* containing 1 or 2 *dwelling units* only, and
- b) detached garages or accessory *buildings*, where
  - i) the detached garage or accessory *building* serves only one *dwelling unit* or a primary *dwelling unit* with a *secondary suite*,
  - ii) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
  - iii) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

(See Appendix A.)

**7)** Where *combustible* projections from an *exposing building face* are permitted by Sentence (6) and are totally enclosed and constructed with solid faces, such as for fireplaces and *chimneys*, and extend within 1.2 m of a property line,

- a) the construction of the face of the projection shall comply with the corresponding requirements for *exposing building faces* for *limiting distances* less than 1.2 m in Sentence (2) or (3),

- b) the construction required for the face of the projection shall also apply to the sides of the projection, and
- c) the underside of the projection shall be protected by one of the materials listed in Clause 3.2.3.6.(5)(b), if it is more than 0.6 m above finished ground level.

(See Appendix A.)

**8)** Where the *limiting distance* is not more than 0.45 m, projecting roof soffits shall not be constructed above an *exposing building face*.

**9)** Where the *limiting distance* is more than 0.45 m, the face of roof soffits above an *exposing building face* are permitted to project to not less than 0.45 m from a property line.

- 10)** Where roof soffits project closer than 1.2 m from a property line, they shall
- a) have no openings, and
  - b) be protected by one of the materials listed in Clause 3.2.3.6.(5)(b).

**11)** Heavy timber and steel columns need not conform to the requirements of Sentence (1), provided the *limiting distance* is not less than 3 m.

## 9.10.16. Fire Stops

### 9.10.16.1. Required Fire Stops in Concealed Spaces

**1)** Vertical concealed spaces in interior walls and exterior walls shall be separated by fire stops

- a) one from the other, and
- b) from horizontal concealed spaces.

**2)** Horizontal concealed spaces in attics, roof spaces, ceilings, floors, and crawl spaces shall be separated by fire stops

- a) one from the other, and
- b) from vertical concealed spaces.

**3)** Fire stops shall be provided at all interconnections between concealed vertical and horizontal spaces in interior coved ceilings, drop ceilings and soffits where the exposed construction materials within the concealed spaces have a surface *flame-spread rating* greater than 25.

**4)** Fire stops shall be provided at the top and bottom of each run of stairs where they pass through a floor containing concealed space in which the exposed construction materials within the space have a surface *flame-spread rating* greater than 25.

**5)** In unsprinklered *buildings of combustible construction*, every concealed space created by a ceiling, roof space or unoccupied attic space shall be separated by fire stops into compartments

- a) not more than 60 m in greatest dimension, and
- b) where such space contains exposed construction materials having a surface *flame-spread rating* greater than 25, not more than 300 m<sup>2</sup> in area.

**6)** No dimension of the concealed space described in Clause (5)(b) shall exceed 20 m.

**7)** Concealed spaces in mansard or gambrel style roofs, exterior cornices, balconies and canopies of *combustible construction* in which the exposed construction materials within the space have a surface *flame-spread rating* exceeding 25 shall have vertical fire stops at intervals of not more than 20 m and at points where such concealed spaces extend across the ends of required vertical *fire separations*.

### 9.10.16.2. Required Fire Stops in Wall Assemblies

**1)** Except as permitted in Sentence (2), fire stops shall be provided to block off concealed spaces within wall assemblies, including spaces created by furring,

- a) at each floor level,

- b) at each ceiling level where the ceiling contributes to part of the required *fire-resistance rating*, and
  - c) at other locations within the wall, so that the distance between fire stops does not exceed 20 m horizontally and 3 m vertically.
- 2)** Fire stops described in Sentence (1) are not required provided
- a) the width of the concealed wall space does not exceed 25 mm,
  - b) the exposed construction materials within the space are *noncombustible*,
  - c) the exposed construction materials within the space, including insulation, but not including wiring, piping or similar services, have a *flame-spread rating* of not more than 25, or
  - d) the concealed wall space is filled with insulation.

### 9.10.16.3. Fire Stop Materials

**1)** Except as permitted by Sentence (2), fire stops shall be constructed of not less than

- a) 0.38 mm sheet steel,
- b) 6 mm asbestos board conforming to Subsection 9.27.8.,
- c) 12.7 mm gypsum wallboard,
- d) 12.5 mm plywood, OSB or waferboard, with joints having continuous supports,
- e) 2 layers of 19 mm lumber with joints staggered,
- f) 38 mm lumber, or
- g) materials conforming to Sentence 3.1.11.7.(1).

**2)** In a *building* permitted to be of *combustible construction*, semi-rigid fibre insulation board produced from glass, rock or slag is permitted to be used to block the vertical space in a double-frame wall assembly formed at the intersection of the floor assembly and the walls, provided the width of the vertical space does not exceed 25 mm and the insulation board

- a) has a density not less than 45 kg/m<sup>3</sup>,
- b) is securely fastened to one set of studs,
- c) extends from below the bottom of the top plates in the lower *storey* to above the top of the bottom plate in the upper *storey*, and
- d) completely fills the portion of the vertical space between the headers and between the wall plates.

(See A-3.1.11.7.(7) in Appendix A.)

### 9.10.16.4. Penetration of Fire Stops

**1)** Where fire stops are pierced by pipes, ducts or other elements, the effectiveness of the fire stops shall be maintained around such elements.

## 9.10.17. Flame Spread Limits

### 9.10.17.1. Flame Spread Rating of Interior Surfaces

**1)** Except as otherwise provided in this Subsection, the exposed surface of every interior wall and ceiling, including skylights and glazing, shall have a surface *flame-spread rating* of not more than 150.

**2)** Except as permitted in Sentence (3), doors need not conform to Sentence (1) provided they have a surface *flame-spread rating* of not more than 200.

**3)** Doors within *dwelling units*, other than garage doors, need not conform to Sentences (1) and (2).

### 9.10.17.2. Ceilings in Exits or Public Corridors

**1)** At least 90% of the exposed surface of every ceiling in an *exit* or unsprinklered ceiling in a *public corridor* shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.17.6.)

**9.10.17.3. Walls in Exits**

1) Except as provided in Sentence (2), at least 90% of the exposed surfaces of every wall in an *exit* shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.17.6.)

2) At least 75% of the wall surface of a lobby used as an *exit* in Article 9.9.8.5. shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.17.6.)

**9.10.17.4. Exterior Exit Passageways**

1) Where an exterior *exit* passageway provides the only *means of egress* from the rooms or *suites* it serves, the wall and ceiling finishes of that passageway, including the soffit beneath and the *guard* on the passageway, shall have a surface *flame-spread rating* of not more than 25, except that up to 10% of the total wall area and 10% of the total ceiling area is permitted to have a surface *flame-spread rating* of not more than 150.

**9.10.17.5. Walls in Public Corridors**

1) At least 90% of the total wall surface in any unsprinklered *public corridor* shall have a surface *flame-spread rating* of not more than 75, or at least 90% of the upper half of such walls shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.17.6.)

**9.10.17.6. Calculation of Wall and Ceiling Areas**

1) Skylights, glazing, *combustible* doors, and *combustible* light diffusers and lenses shall not be considered in the calculation of wall and ceiling areas in this Subsection.

**9.10.17.7. Corridors Containing an Occupancy**

1) Where a *public corridor* or a corridor used by the public contains an *occupancy*, the interior finish materials used on the walls or ceiling of such *occupancy*, shall have a surface *flame-spread rating* in conformance with that required for *public corridors*.

**9.10.17.8. Light Diffusers and Lenses**

1) Light diffusers and lenses having *flame-spread ratings* that exceed those permitted for the ceiling finish, shall conform to the requirements of Sentence 3.1.13.4.(1).

**9.10.17.9. Combustible Skylights**

1) Individual *combustible* skylights in corridors required to be separated from the remainder of the *building* by *fire separations* shall not exceed 1 m<sup>2</sup> in area and shall be spaced not less than 1.2 m apart.

**9.10.17.10. Protection of Foamed Plastics**

1) Except as provided in Sentence (2), *foamed plastics* that form part of a wall or ceiling assembly in *combustible construction* shall be protected from adjacent space in the *building*, other than adjacent concealed spaces within *attic* or *roof spaces*, crawl spaces, and wall assemblies, by

- a) one of the interior finishes described in Subsections 9.29.4. to 9.29.9.,
- b) sheet metal mechanically fastened to the supporting assembly independent of the insulation and having a thickness of not less than 0.38 mm and a melting point not below 650°C, provided the *building* does not contain a Group C *major occupancy*, or
- c) any *thermal barrier* that meets the requirements of Clause 3.1.5.12.(2)(e).

2) Thermosetting *foamed plastic* insulation having a *flame-spread rating* of not more than 200 is permitted to be used in factory-assembled doors in *storage garages* serving single *dwelling units* provided that

- a) the insulation is covered on the interior with metallic foil,
- b) the assembly has a *flame-spread rating* of not more than 200, and
- c) the assembly incorporates no air spaces.

**9.10.17.11. Walls and Ceilings in Bathrooms**

1) The interior finish of walls and ceilings in bathrooms within *suites* of *residential occupancy* shall have a surface *flame-spread rating* of not more than 200.

**9.10.17.12. Coverings or Linings of Ducts**

1) Where a covering or a lining is used with a duct, such lining or covering shall have a *flame-spread rating* conforming to Article 3.6.5.4. or 9.33.6.4.

**9.10.18. Alarm and Detection Systems**

**9.10.18.1. Access Provided through a Firewall**

1) Where access is provided through a *firewall*, the requirements in this Subsection shall apply to the *floor areas* on both sides of the *firewall* as if they were in the same *building*.

**9.10.18.2. Fire Alarm System Required**

- 1) Except as provided in Sentence (2), a fire alarm system shall be installed
  - a) in every *building* that contains more than 3 *storeys*, including *storeys* below the *first storey*,
  - b) where the total *occupant load* exceeds 300, or
  - c) when the *occupant load* for any *major occupancy* in Table 9.10.18.2. is exceeded.

**Table 9.10.18.2.**  
**Maximum Occupant Load for Buildings without Fire Alarm Systems**  
 Forming Part of Sentence 9.10.18.2.(1)

<i>Major Occupancy Classification</i>	<i>Occupant Load Above which a Fire Alarm System is Required</i>
<i>Residential</i>	10 (sleeping accommodation)
<i>Business and personal services, Mercantile</i>	150 above or below the <i>first storey</i>
<i>Low- or medium-hazard industrial</i>	75 above or below the <i>first storey</i>

2) A fire alarm system is not required in a *residential occupancy* where an *exit* or *public corridor* serves not more than 4 *suites* or where each *suite* has direct access to an exterior *exit* facility leading to ground level.

**9.10.18.3. Rooms and Spaces Requiring Heat Detectors or Smoke Detectors**

1) Where a fire alarm system is required, every *public corridor* in *buildings* of *residential occupancy* and every *exit* stair shaft shall be provided with *smoke detectors*.

2) Except as provided in Sentence (3), *buildings* required to have a fire alarm system shall be equipped with *heat detectors* or *smoke detectors* in storage rooms, *service rooms*, elevator shafts, chutes, janitors' closets and any other rooms where hazardous substances are intended to be used or stored.

3) *Heat detectors* and *smoke detectors* described in Sentence (2) are not required in *dwelling units* or in *sprinklered buildings* in which the sprinkler system is electrically supervised and equipped with a water flow alarm.

**9.10.18.4. Smoke Detectors in Recirculating Air-Handling Systems**

1) Except for a recirculating air system serving not more than one *dwelling unit*, where a fire alarm system is required to be installed, every recirculating air-handling system shall be designed to prevent the circulation of smoke upon a signal from a duct-type *smoke detector* where such system supplies more than one *suite* on the same floor or serves more than 1 *storey*.

**9.10.18.5. Portions of Buildings Considered as Separate Buildings**

1) Except as provided in Sentence (2), where a vertical *fire separation* having a *fire-resistance rating* of not less than 1 h separates a portion of a *building* from the remainder of the *building* and there are no openings through the *fire separation* other than those for piping, tubing, wiring and conduit, the requirements for fire alarm and detection systems may be applied to each portion so separated as if it were a separate *building*.

2) The permission in Sentence (1) to consider separated portions of a *building* as separate *buildings* does not apply to *service rooms* and storage rooms.

**9.10.18.6. Design and Installation Requirements**

1) Except as required by this Subsection, where fire alarm, fire detection and smoke detection devices and systems are installed, these devices and systems and their installation shall conform to Subsection 3.2.4. (See Appendix A.)

**9.10.18.7. Central Vacuum Systems**

1) Central vacuum cleaning systems in *buildings* required to be equipped with a fire alarm system shall be designed to shut down upon activation of the fire alarm system.

**9.10.18.8. Open-Air Storage Garages**

1) A fire alarm system is not required in a *storage garage* conforming to Article 3.2.2.83, provided there are no other *occupancies* in the *building*.

**9.10.19. Smoke Alarms****9.10.19.1. Required Smoke Alarms**

1) *Smoke alarms* conforming to CAN/ULC-S531, "Smoke-Alarms," shall be installed in each *dwelling unit* and in each sleeping room not within a *dwelling unit*.

**9.10.19.2. Location of Smoke Alarms**

1) Within *dwelling units*, sufficient *smoke alarms* shall be installed so that

- there is at least one *smoke alarm* on each floor level, including *basements*, that is 900 mm or more above or below an adjacent floor level,
- each bedroom is protected by a *smoke alarm* either inside the bedroom or, if outside, within 5 m, measured following corridors and doorways, of the bedroom door, and
- the distance, measured following corridors and doorways, from any point on a floor level to a *smoke alarm* on the same level does not exceed 15 m.

(See Appendix A.)

2) *Smoke alarms* required in Article 9.10.19.1. and Sentence (1) shall be installed on or near the ceiling.

**9.10.19.3. Power Supply**

1) *Smoke alarms* shall be installed by permanent connections to an electrical circuit and shall have no disconnect switch between the overcurrent device and the *smoke alarm*.

2) Where the *building* is not supplied with electrical power, *smoke alarms* are permitted to be battery operated.

**9.10.19.4. Interconnection of Smoke Alarms**

1) Except as permitted in Sentence (2), where more than one *smoke alarm* is required in a *dwelling unit*, the *smoke alarms* shall be wired so that the activation of one alarm will cause all alarms within the *dwelling unit* to sound.

2) A *smoke alarm* required to be installed in an existing *dwelling unit* as a result of developing space for sleeping use need not be interconnected with existing *smoke alarms* in the *dwelling unit*, but if more than one new *smoke alarm* is required, all new *smoke alarms* shall be interconnected.

#### 9.10.19.5. Instructions for Maintenance and Care

1) Where instructions are necessary to describe the maintenance and care required for *smoke alarms* to ensure continuing satisfactory performance, they shall be posted in a location where they will be readily available to the occupants for reference.

### 9.10.20. Firefighting

#### 9.10.20.1. Windows or Access Panels Required

1) Except as provided in Sentence (3), a window or access panel providing an opening not less than 1100 mm high and 550 mm wide and having a sill height of not more than 900 mm above the floor shall be provided on the second and third *storeys* of every *building* in at least one wall facing on a *street* if such *storeys* are not *sprinklered*.

2) Access panels required in Sentence (1) shall be readily openable from both inside and outside or be glazed with plain glass.

3) Access panels required in Sentence (1) need not be provided in *buildings* containing only *dwelling units* where there is no *dwelling unit* above another *dwelling unit*.

#### 9.10.20.2. Access to Basements

1) Except in *basements* serving not more than one *dwelling unit*, each *unsprinklered basement* shall be provided with direct access to the outdoors. (See Article 9.9.7.3.)

2) Access required in Sentence (1) may be provided by a door, window or other means that provides an opening not less than 1100 mm high and 550 mm wide, the sill height of which shall not be more than 900 mm above the floor.

3) Access required in Sentence (1) may also be provided by an interior stair accessible from the outdoors.

#### 9.10.20.3. Fire Department Access to Buildings

1) Access for fire department equipment shall be provided to each *building* by means of a *street*, private roadway or yard. (See A-3.2.5.6.(1) and A-9.10.20.3.(1) in Appendix A.)

2) Where access to a *building* as required in Sentence (1) is provided by means of a roadway or yard, the design and location of such roadway or yard shall take into account connection with public thoroughfares, weight of firefighting equipment, width of roadway, radius of curves, overhead clearance, location of fire hydrants, location of fire department connections and vehicular parking.

#### 9.10.20.4. Portable Extinguishers

1) Portable extinguishers shall be installed in all *buildings*, except within *dwelling units*, in conformance with the Alberta Fire Code 2006.

#### 9.10.20.5. Freeze Protection of Fire Protection Systems

1) Equipment forming part of a fire protection system that may be adversely affected by freezing temperatures and that is located in an unheated area shall be protected from freezing.

**9.10.21. Reserved****9.10.22. Fire Protection for Gas, Propane and Electric Ranges**

(See Appendix A.)

**9.10.22.1. Installation of Ranges**

**1)** Except as required in Sentence (2), natural gas and propane *ranges* shall be installed in accordance with the gas regulations made pursuant to the Safety Codes Act. (See also Article 9.34.1.1.)

**2)** Clearances for and protection around gas, propane and electric *ranges* shall be not less than those provided in Articles 9.10.22.2. and 9.10.22.3.

**9.10.22.2. Vertical Clearances above Ranges**

**1)** Except as provided in Sentence (2), framing, finishes and cabinetry installed directly above the location of the *range* shall be not less than 750 mm above the level of *range* burners or elements.

**2)** The vertical clearance described in Sentence (1) for framing, finishes and cabinets located directly above the location of the *range* may be reduced to 600 mm above the level of the elements or burners, provided the framing, finishes and cabinets

- a) are *noncombustible*, or
- b) are protected by
  - i) asbestos millboard not less than 6 mm thick, covered with sheet metal not less than 0.33 mm thick, or
  - ii) a metal hood with a 125 mm projection beyond the framing, finishes and cabinets.

**9.10.22.3. Protection around Ranges**

**1)** Except as provided in Sentences (2) and (3), *combustible* wall framing, finishes or cabinets within 450 mm of the area where the *range* is to be located shall be protected above the level of the heating elements or burners by material providing fire resistance at least equivalent to that provided by a 9.5 mm thickness of gypsum board.

**2)** Counter-top splash boards or back plates that extend above the level of heating elements or burners need not be protected as described in Sentence (1).

**3)** Except for cabinetry described in Article 9.10.22.2., cabinetry located not less than 450 mm above the level of the heating elements or burners need not be protected as described in Sentence (1).

**Section 9.11. Sound Control****9.11.1. Sound Transmission Class Rating (Airborne Sound)****9.11.1.1. Determination of Sound Transmission Class Ratings**

**1)** Sound transmission class ratings shall be determined in accordance with ASTM E 413, "Classification for Rating Sound Insulation," using results from measurements in accordance with

- a) ASTM E 90, "Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements," or
  - b) ASTM E 336, "Measurement of Airborne Sound Insulation in Buildings."
- (See Appendix A.)

**9.11.2. Required Sound Control Locations (Airborne Sound)****9.11.2.1. Minimum Sound Transmission Class Ratings**

**1)** Except as provided in Sentence (2), every *dwelling unit* shall be separated from every other space in a *building* in which noise may be generated by a construction providing a sound transmission class rating of at least 50, measured in accordance with Subsection 9.11.1. or as listed in A-9.10.3.1. in Appendix A.

**2)** Where a *dwelling unit* is adjacent to an elevator shaft or a refuse chute, the separating construction shall have a sound transmission class rating of at least 55, measured in accordance with Subsection 9.11.1. or as listed in A-9.10.3.1. in Appendix A.

**Section 9.12. Excavation****9.12.1. General****9.12.1.1. Removal of Topsoil and Organic Matter**

**1)** The topsoil and vegetable matter in all unexcavated areas under a *building* shall be removed.

**2)** In localities where termite infestation is known to be a problem, all stumps, roots and other wood debris shall be removed from the *soil* to a depth of not less than 300 mm in unexcavated areas under a *building*.

**3)** The bottom of every *excavation* shall be free of all organic material.

**9.12.1.2. Standing Water**

**1)** *Excavations* shall be kept free of standing water.

**9.12.1.3. Protection from Freezing**

**1)** The bottom of *excavations* shall be kept from freezing throughout the entire construction period.

**9.12.2. Depth****9.12.2.1. Excavation to Undisturbed Soil**

**1)** *Excavations* for *foundations* shall extend to undisturbed *soil*.

**9.12.2.2. Minimum Depth of Foundations**

**1)** Except as provided in Sentences (4) and (5), the minimum depth of *foundations* below finished ground level shall conform to Table 9.12.2.2.

**Table 9.12.2.2.**  
**Minimum Depths of Foundations**  
 Forming Part of Sentence 9.12.2.2.(1)

Type of Soil	Minimum Depth of <i>Foundation</i> Containing Heated Basement or Crawl Space <sup>(1)</sup>		Minimum Depth of <i>Foundation</i> Containing No Heated Space <sup>(2)</sup>	
	Good <i>Soil</i> Drainage	Poor <i>Soil</i> Drainage	Good <i>Soil</i> Drainage	Poor <i>Soil</i> Drainage
Rock	No limit	No limit	No limit	No limit
Coarse grained soils	No limit	No limit	No limit	Below the depth of frost penetration
Silt	No limit	No limit	Below the depth of frost penetration <sup>(3)</sup>	Below the depth of frost penetration
Clay or soils not clearly defined <sup>(4)</sup>	1.2 m <sup>(3)</sup>	1.2 m	1.2 m but not less than the depth of frost penetration <sup>(3)</sup>	1.2 m but not less than the depth of frost penetration

**Notes to Table 9.12.2.2.:**

- (1) *Foundation* not insulated to reduce heat loss through the footings.  
 (2) Including *foundations* insulated to reduce heat loss through the footings.  
 (3) Good *soil* drainage to not less than the depth of frost penetration.  
 (4) See Appendix A.

**2)** Where a *foundation* is insulated in a manner that will reduce heat flow to the *soil* beneath the footings, the *foundation* depth shall conform to that required for *foundations* containing no heated space. (See Appendix A.)

**3)** The minimum depth of *foundations* for exterior concrete steps with more than 2 risers shall conform to Sentences (1), (2) and (5).

**4)** Concrete steps with 1 and 2 risers are permitted to be laid on ground level.

**5)** The *foundation* depths required in Sentence (1) are permitted to be decreased where experience with local *soil* conditions shows that lesser depths are satisfactory, or where the *foundation* is designed for lesser depths by a *professional engineer*.

**6)** The *foundation* depths required by Sentence (1) do not apply to *foundations* for

- a) *buildings*
  - i) that are not of masonry or masonry veneer construction, and
  - ii) whose superstructure conforms to the requirements of the deformation resistance test in CAN/CSA-Z240.2.1, "Structural Requirements for Mobile Homes," or
- b) accessory *buildings*
  - i) that are not of masonry or masonry veneer construction,
  - ii) not more than 1 *storey* in height,
  - iii) not more than 55 m<sup>2</sup> in *building area*, and
  - iv) where the distance from finished ground to the underside of the floor joists is not more than 600 mm.

**7)** The *foundation* depths required by Sentence (1) do not apply to *foundations* for decks and other accessible exterior platforms

- a) of not more than 1 *storey*,
- b) not more than 55 m<sup>2</sup> in area,
- c) where the distance from finished ground to the underside of the joists is not more than 600 mm,
- d) not supporting a roof, and
- e) not attached to another structure, unless it can be demonstrated that differential movement will not adversely affect the performance of that structure.

- 8) Where decks or other accessible exterior platforms are supported on surface *foundations* supported on other than coarse-grained *soil* with good drainage or *rock*, access to the *foundation* positions to permit re-levelling of the platform shall be provided
- a) by passageways with a clear height under the platform of not less than 600 mm and a width of not less than 600 mm, or
  - b) by installing the decking in a manner that allows easy removal.

### 9.12.3. Backfill

#### 9.12.3.1. Placement of Backfill

- 1) Backfill shall be placed to avoid damaging the *foundation* wall, the drainage tile, externally applied thermal insulation and waterproofing or dampproofing of the wall.

#### 9.12.3.2. Grading of Backfill

- 1) Backfill shall be *graded* to prevent drainage towards the *foundation* after settling.

#### 9.12.3.3. Deleterious Debris and Boulders

- 1) Backfill that is within 600 mm of the *foundation* shall be free of deleterious debris and boulders larger than 250 mm diam. (See Appendix A.)
- 2) Except as provided in Sentence (3), backfill shall not contain pyritic material or material that is susceptible to ice lensing in concentrations that will damage the *building* to a degree that would adversely affect its stability or the performance of assemblies. (See A-9.4.4.4.(1) in Appendix A.)
- 3) Backfill with material of any concentration that is susceptible to ice lensing is permitted where *foundation* walls are cast-in-place concrete, concrete block insulated on the exterior or concrete block protected from the backfill by a material that serves as a slip plane. (See A-9.4.4.4.(1) in Appendix A.)

### 9.12.4. Trenches beneath Footings

#### 9.12.4.1. Support of Footings

- 1) The *soil* in trenches beneath footings for sewers and watermain shall be compacted by tamping up to the level of the footing base, or shall be filled with concrete having a strength not less than 10 MPa to support the footing.

## Section 9.13. Dampproofing and Waterproofing

### 9.13.1. General

#### 9.13.1.1. Application

- 1) This Section applies to walls, floors, and roofs in contact with the ground, and presents measures to control moisture ingress.

### 9.13.2. Dampproofing

#### 9.13.2.1. Required Dampproofing

- 1) Except as provided in Article 9.13.3.1., where the exterior finished ground level is at a higher elevation than the ground level inside the *foundation* walls, exterior surfaces of *foundation* walls below ground level shall be dampproofed.
- 2) Except as provided in Sentence (3) and Article 9.13.3.1., floors-on-ground shall be dampproofed.
- 3) Floors in garages, floors in unenclosed portions of *buildings* and floors installed over granular *fill* in conformance with Article 9.16.2.1. need not be dampproofed.

**9.13.2.2. Material Standards**

- 1) Except as otherwise specified in this Section, materials used for exterior dampproofing shall conform to
  - a) CAN/CGSB-37.1-M, "Chemical Emulsifier Type, Emulsified Asphalt for Dampproofing,"
  - b) CAN/CGSB-37.2-M, "Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings,"
  - c) CGSB 37-GP-6Ma, "Asphalt, Cutback, Unfilled, for Dampproofing,"
  - d) CAN/CGSB-37.16-M, "Filled, Cutback Asphalt for Dampproofing and Waterproofing,"
  - e) CGSB 37-GP-18Ma, "Tar, Cutback, Unfilled, for Dampproofing,"
  - f) CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction," or
  - g) CAN/CSA-A123.4, "Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems."

**9.13.2.3. Standards for Application**

- 1) The method of application of all bituminous dampproofing materials shall conform to
  - a) CAN/CGSB-37.3-M, "Application of Emulsified Asphalts for Dampproofing or Waterproofing,"
  - b) CGSB 37-GP-12Ma, "Application of Unfilled Cutback Asphalt for Dampproofing," or
  - c) CAN/CGSB-37.22-M, "Application of Unfilled, Cutback Tar Foundation Coating for Dampproofing."

**9.13.2.4. Preparation of Surface**

- 1) Unit masonry walls that are to be dampproofed shall be
  - a) parged on the exterior face below ground level with not less than 6 mm of mortar conforming to Section 9.20., and
  - b) coved over the footing when the first course of block is laid.
- 2) Concrete walls to be dampproofed shall have holes and recesses resulting from the removal of form ties sealed with cement mortar or dampproofing material.
- 3) The surface of insulating concrete form walls that are to be dampproofed shall be repaired and free of projections and depressions that could be detrimental to the performance of the membrane to be applied.

**9.13.2.5. Application of Dampproofing Material**

- 1) Dampproofing material shall be applied over the parging or concrete below ground level.

**9.13.2.6. Interior Dampproofing of Walls**

- 1) Where a separate interior finish is applied to a concrete or unit masonry wall that is in contact with the *soil*, or where wood members are placed in contact with such walls for the installation of insulation or finish, the interior surface of the *foundation* wall below ground level shall be dampproofed.
- 2) The dampproofing required in Sentence (1) shall extend from the *basement* floor and terminate at ground level.
- 3) No membrane or coating with a permeance less than 170 ng/(Pa•s•m<sup>2</sup>) shall be applied to the interior surface of the *foundation* wall above ground level between the insulation and the *foundation* wall.

**9.13.2.7. Dampproofing of Floors-on-Ground**

- 1) Where floors are dampproofed, the dampproofing shall be installed below the floor, except that where a separate floor is provided over a slab, the dampproofing is permitted to be applied to the top of the slab.

- 2) Where installed below the floor, dampproofing membranes shall consist of polyethylene not less than 0.15 mm thick, or type S roll roofing.
- 3) Joints in dampproofing membranes described in Sentence (2) shall be lapped not less than 100 mm.
- 4) Where installed above the slab, dampproofing shall consist of not less than
  - a) 2 mopped-on coats of bitumen,
  - b) 0.05 mm polyethylene, or
  - c) other material providing equivalent performance.

#### 9.13.2.8. Barrier to Water Vapour

- 1) Masonry walls that are to be dampproofed but that are not dampproofed on their interior surface as required in Sentence 9.13.2.6.(1) shall include a course of masonry units without voids or be sealed with flashing material extending across the full width of the masonry at or below the level of the adjoining floor slab or, in the absence of a floor slab, the level of the ground cover required in Article 9.18.6.1.

### 9.13.3. Waterproofing

#### 9.13.3.1. Required Waterproofing

- 1) Where hydrostatic pressure occurs, waterproofing is required for the exterior surfaces of
  - a) floors-on-ground, and
  - b) below ground walls, where the exterior finished ground level is at a higher elevation than the ground level inside the *foundation* walls.
- 2) Roofs of underground structures shall be waterproofed to prevent the entry of water into the structure.

#### 9.13.3.2. Material Standards

- 1) Except as otherwise specified in this Section, materials used for exterior waterproofing shall conform to
  - a) CAN/CGSB-37.2-M, "Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings,"
  - b) CAN/CGSB-37.16-M, "Filled, Cutback Asphalt for Dampproofing and Waterproofing," or
  - c) CAN/CSA-A123.4, "Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems."

#### 9.13.3.3. Standards for Application

- 1) The method of application of all bituminous waterproofing materials shall conform to CAN/CGSB-37.3-M, "Application of Emulsified Asphalts for Dampproofing or Waterproofing."

#### 9.13.3.4. Preparation of Surface

- 1) Unit masonry walls that are to be waterproofed shall be parged on exterior surfaces below ground level with not less than 6 mm of mortar conforming to Section 9.20.
- 2) Concrete walls that are to be waterproofed shall have all holes and recesses resulting from the removal of form ties sealed with mortar or waterproofing material.
- 3) The surface of insulating concrete form walls that are to be waterproofed shall be repaired and free of projections and depressions that could be detrimental to the performance of the membrane to be applied.

#### 9.13.3.5. Application of Waterproofing Membranes

- 1) Concrete or unit masonry walls that are to be waterproofed shall be covered with not less than 2 layers of bitumen-saturated membrane, with each layer cemented in place with bitumen and coated overall with a heavy coating of bitumen.

**9.13.3.6. Floor Waterproofing System**

1) *Basement* floors-on-ground to be waterproofed shall have a system of membrane waterproofing provided between 2 layers of concrete, each of which shall be not less than 75 mm thick, with the floor membrane mopped to the wall membrane to form a complete seal.

**9.13.4. Reserved****Section 9.14. Drainage****9.14.1. Scope****9.14.1.1. Application**

1) This Section applies to subsurface drainage and to surface drainage.

**9.14.1.2. Crawl Spaces**

1) Drainage for crawl spaces shall conform to Section 9.18.

**9.14.1.3. Floors-on-Ground**

1) Drainage requirements beneath floors-on-ground shall conform to Section 9.16.

**9.14.2. Foundation Drainage****9.14.2.1. Foundation Wall Drainage**

1) Unless it can be shown to be unnecessary, the bottom of every exterior *foundation* wall shall be drained by drainage tile or pipe laid around the exterior of the *foundation* in conformance with Subsection 9.14.3. or by a layer of gravel or crushed *rock* in conformance with Subsection 9.14.4.

2) Where mineral fibre insulation or crushed *rock* backfill is provided adjacent to the exterior surface of a *foundation* wall,

- a) the insulation or backfill shall extend to the footing level to facilitate the drainage of ground water to the *foundation's* drainage system (see Appendix A), and
- b) any pyritic material in the crushed *rock* shall be limited to a concentration that will not damage the *building* to a degree that would adversely affect its stability or the performance of assemblies (see Sentence 9.12.3.3.(2) and A-9.4.4.4.(1) in Appendix A).

**9.14.3. Drainage Tile and Pipe****9.14.3.1. Material Standards**

- 1) Drain tile and drain pipe for *foundation* drainage shall conform to
  - a) ASTM C 4, "Clay Drain Tile and Perforated Clay Drain Tile,"
  - b) ASTM C 412M, "Concrete Drain Tile (Metric),"
  - c) ASTM C 444M, "Perforated Concrete Pipe (Metric),"
  - d) ASTM C 700, "Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated,"
  - e) CAN/CGSB-34.22, "Asbestos-Cement Drain Pipe,"
  - f) CAN/CSA-B182.1, "Plastic Drain and Sewer Pipe and Pipe Fittings,"
  - g) CSA G401, "Corrugated Steel Pipe Products," or
  - h) NQ 3624-115, "Polyethylene (PE) Pipe and Fittings – Flexible Corrugated Pipes for Drainage – Characteristics and Test Methods."

**9.14.3.2. Minimum Size**

1) Drain tile or pipe used for *foundation* drainage shall be not less than 100 mm in diam.

**9.14.3.3. Installation**

1) Drain tile or pipe shall be laid on undisturbed or well-compacted *soil* so that the top of the tile or pipe is below the bottom of the floor slab or the ground cover of the crawl space.

2) Drain tile or pipe with butt joints shall be laid with 6 mm to 10 mm open joints.

3) The top half of joints referred to in Sentence (2) shall be covered with sheathing paper, 0.10 mm polyethylene or No. 15 asphalt or tar-saturated felt.

4) The top and sides of drain pipe or tile shall be covered with not less than 150 mm of crushed stone or other coarse clean granular material containing not more than 10% of material that will pass a 4 mm sieve.

**9.14.4. Granular Drainage Layer****9.14.4.1. Type of Granular Material**

1) Granular material used to drain the bottom of a *foundation* shall consist of a continuous layer of crushed stone or other coarse clean granular material containing

- a) not more than 10% of material that will pass a 4 mm sieve, and
- b) no pyritic material in a concentration that will damage the *building* to a degree that would adversely affect its stability or the performance of assemblies (see A-9.4.4.4.(1) in Appendix A).

**9.14.4.2. Installation**

1) Granular material described in Article 9.14.4.1. shall be laid on undisturbed or compacted *soil* to a minimum depth of not less than 125 mm beneath the footing of the *building* and extend not less than 300 mm beyond the outside edge of the footings.

**9.14.4.3. Grading**

1) The bottom of an *excavation* drained by a granular layer shall be graded so that the entire area described in Article 9.14.4.2. is drained to a sump conforming to Article 9.14.5.2.

**9.14.4.4. Wet Site Conditions**

1) Where because of wet site conditions *soil* becomes mixed with the granular drainage material, sufficient additional granular material shall be provided so that the top 125 mm are kept free of *soil*.

**9.14.5. Drainage Disposal****9.14.5.1. Drainage Disposal**

1) *Foundation* drains shall drain to a sewer, drainage ditch or dry well.

**9.14.5.2. Sump Pits**

1) Where a sump pit is provided it shall be

- a) not less than 750 mm deep,
- b) not less than 0.25 m<sup>2</sup> in area, and
- c) provided with a cover.

2) Covers for sump pits shall be designed to resist removal by children.

3) Where gravity drainage is not practical, an automatic sump pump shall be provided to discharge the water from the sump pit described in Sentence (1) into a sewer, drainage ditch or dry well.

**9.14.5.3. Dry Wells**

- 1) Dry wells may be used only when located in areas where the natural *groundwater level* is below the bottom of the dry well.
- 2) Dry wells shall be not less than 5 m from the *building foundation* and located so that drainage is away from the *building*.

**9.14.6. Surface Drainage****9.14.6.1. Surface Drainage**

- 1) The *building* shall be located or the *building* site graded so that water will not accumulate at or near the *building*.

**9.14.6.2. Drainage away from Wells or Septic Disposal Beds**

- 1) Surface drainage shall be directed away from the location of a water supply well or septic tank disposal bed.

**9.14.6.3. Window Wells**

- 1) Every window well shall be drained to the footing level or other suitable location.

**9.14.6.4. Catch Basin**

- 1) Where runoff water from a driveway is likely to accumulate or enter a garage, a catch basin shall be installed to provide adequate drainage.

**9.14.6.5. Downspouts**

- 1) Downspouts shall conform to Article 9.26.18.2.

**Section 9.15. Footings and Foundations****9.15.1. Application****9.15.1.1. General**

(See Appendix A and A-9.4.4.6. and 9.15.1.1. in Appendix A.)

- 1) Except as provided in Articles 9.15.1.2. and 9.15.1.3., this Section applies to
  - a) concrete or unit masonry *foundation* walls and concrete footings not subject to surcharge
    - i) on stable *soils* with an allowable bearing pressure of 75 kPa or greater, and
    - ii) for *buildings* of wood-frame or masonry construction,
  - b) wood-frame *foundation* walls and wood or concrete footings not subject to surcharge
    - i) on stable *soils* with an allowable bearing pressure of 75 kPa or greater, and
    - ii) for *buildings* of wood-frame construction, and
  - c) flat insulating concrete form *foundation* walls and concrete footings not subject to surcharge (see A-9.15.1.1.(1)(c) and 9.20.1.1.(1)(b) in Appendix A)
    - i) on stable *soils* with an allowable bearing pressure of 100 kPa or greater, and
    - ii) for *buildings* of light-frame or flat insulating concrete form construction that are not more than 2 *storeys* in *building height*, with a maximum floor to floor height of 3 m, and containing only a single *dwelling unit*.
- 2) *Foundations* for applications other than as described in Sentence (1) shall be designed in accordance with Section 9.4.

**9.15.1.2. Permafrost**

1) *Buildings* erected on permafrost shall have *foundations* designed by a *designer* competent in this field in accordance with the appropriate requirements of Part 4.

**9.15.1.3. Foundations for Deformation-Resistant Buildings**

1) Where the superstructure of a detached *building* conforms to the requirements of the deformation resistance test in CAN/CSA-Z240.2.1, "Structural Requirements for Mobile Homes," the *foundation* shall be constructed in conformance with

- a) the remainder of this Section, or
- b) CSA Z240.10.1, "Site Preparation, Foundation, and Anchorage of Mobile Homes."

**9.15.2. General****9.15.2.1. Concrete**

1) Concrete shall conform to Section 9.3.

**9.15.2.2. Unit Masonry Construction**

1) Concrete block shall conform to CSA A165.1, "Concrete Block Masonry Units," and shall have a compressive strength over the average net cross-sectional area of the block of not less than 15 MPa.

2) Mortar, grout, mortar joints, corbelling and protection for unit masonry shall conform to Section 9.20.

- 3) For concrete block *foundation* walls required to be reinforced,
- a) mortar shall be Type S, conforming to CSA A179, "Mortar and Grout for Unit Masonry,"
  - b) grout shall be coarse, conforming to CSA A179, "Mortar and Grout for Unit Masonry," and
  - c) placement of grout shall conform to CSA A371, "Masonry Construction for Buildings."

**9.15.2.3. Pier-Type Foundations**

1) Where pier-type *foundations* are used, the piers shall be designed to support the applied loads from the superstructure.

2) Where piers are used as a *foundation* system in a *building* of 1 storey in *building height*, the piers shall be installed to support the principal framing members and shall be spaced not more than 3.5 m apart along the framing, unless the piers and their footings are designed for larger spacings.

3) The height of piers described in Sentence (2) shall not exceed 3 times their least dimension at the base of the pier.

4) Where concrete block is used for piers described in Sentence (2), they shall be laid with cores placed vertically, and where the width of the *building* is 4.3 m or less, placed with their longest dimension at right angles to the longest dimension of the *building*.

**9.15.2.4. Wood-Frame Foundations**

1) Except as required by Sentence 2.4.2.1.(8) of Division C, *foundations* of wood-frame construction shall conform to

- a) CAN/CSA-S406, "Construction of Preserved Wood Foundations," or
- b) Part 4.

(See Appendix A.)

**9.15.3.1.**

**9.15.3. Footings**

**9.15.3.1. Footings Required**

**1)** Footings shall be provided under walls, pilasters, columns, piers, fireplaces and *chimneys* that bear on *soil* or *rock*, except that footings may be omitted under piers or monolithic concrete walls if the safe *loadbearing* capacity of the *soil* or *rock* is not exceeded.

**9.15.3.2. Support of Footings**

- 1)** Footings shall rest on undisturbed *soil*, *rock* or compacted granular *fill*.
- 2)** Granular *fill* shall not contain pyritic material in a concentration that will damage the *building* to a degree that would adversely affect its stability or the performance of assemblies. (See also Article 9.4.4.4. and A-9.4.4.4.(1) in Appendix A.)

**9.15.3.3. Application of Footing Width and Area Requirements**

- 1)** Except as provided in Sentence 9.15.3.4.(2), the minimum footing width or area requirements provided in Articles 9.15.3.4. to 9.15.3.7. shall apply to footings, where
  - a) the footings support
    - i) *foundation* walls of masonry, concrete, or flat insulating concrete form walls,
    - ii) above-ground walls of masonry, flat insulating concrete form walls or light wood-frame construction, and
    - iii) floors and roofs of light wood-frame construction,
  - b) the span of supported joists does not exceed 4.9 m, and
  - c) the specified *live load* on any floor supported by the footing does not exceed 2.4 kPa (see Table 4.1.5.3.).
- 2)** Except as provided in Sentence 9.15.3.4.(2), where the span of the supported joists exceeds 4.9 m, footings shall be designed in accordance with Section 4.2.
- 3)** Where the specified *live load* exceeds 2.4 kPa, footings shall be designed in accordance with Section 4.2.

**9.15.3.4. Basic Footing Widths and Areas**

- 1)** Except as provided in Sentences (2) and (3) and in Articles 9.15.3.5. to 9.15.3.7., the minimum footing width or area shall comply with Table 9.15.3.4.
- 2)** Where the supported joist span exceeds 4.9 m in *buildings* with light wood-frame walls, floors and roofs, footing widths shall be determined according to
  - a) Section 4.2., or
  - b) the following formula

$$W = w \bullet [\Sigma s_j s / (storeys \bullet 4.9)]$$

where

- W = minimum footing width,
- w = minimum width of footings supporting joists not exceeding 4.9 m, as defined by Table 9.15.3.4.,
- Σ s<sub>j</sub> s = sum of the supported joist spans on each *storey* whose load is transferred to the footing, and
- storeys* = number of *storeys* supported by the footing.

(See Appendix A.)

- 3)** Where a *foundation* rests on gravel, sand or silt in which the water table level is less than the width of the footings below the *bearing surface*,
  - a) the footing width for walls shall be not less than twice the width required by Sentences (1) and (2), and Articles 9.15.3.5. and 9.15.3.6., and
  - b) the footing area for columns shall be not less than twice the area required by Sentences (1) and (2) and Article 9.15.3.7.

**Table 9.15.3.4.**  
**Minimum Footing Sizes**  
 Forming Part of Sentence 9.15.3.4.(1)

No. of Floors Supported	Minimum Width of Strip Footings, mm		Minimum Footing Area for Columns Spaced 3 m o.c., <sup>(1)</sup> m <sup>2</sup>
	Supporting Exterior Walls <sup>(2)</sup>	Supporting Interior Walls <sup>(3)</sup>	
1	250	200	0.4
2	350	350	0.75
3	450	500	1.0

**Notes to Table 9.15.3.4.:**

- (1) See Sentence 9.15.3.7.(1).
- (2) See Sentence 9.15.3.5.(1).
- (3) See Sentence 9.15.3.6.(1).

**9.15.3.5. Adjustments to Footing Widths for Exterior Walls**

- 1)** The strip footing widths for exterior walls shown in Table 9.15.3.4. shall be increased by
  - a) 65 mm for each *storey* of masonry veneer over wood-frame construction supported by the *foundation* wall,
  - b) 130 mm for each *storey* of masonry construction supported by the *foundation* wall, and
  - c) 150 mm for each *storey* of flat insulating concrete form wall construction supported by the *foundation* wall.

**9.15.3.6. Adjustments to Footing Widths for Interior Walls**

- 1)** The minimum strip footing widths for interior *loadbearing* masonry walls shown in Table 9.15.3.4. shall be increased by 100 mm for each *storey* of masonry construction supported by the footing.
- 2)** Footings for interior non-*loadbearing* masonry walls shall be not less than 200 mm wide for walls up to 5.5 m high and the width shall be increased by 100 mm for each additional 2.7 m of height.

**9.15.3.7. Adjustments to Footing Area for Columns**

- 1)** The footing area for column spacings other than shown in Table 9.15.3.4. shall be adjusted in proportion to the distance between columns.

**9.15.3.8. Footing Thickness**

- 1)** Footing thickness shall be not less than the greater of
  - a) 100 mm, or
  - b) the width of the projection of the footing beyond the supported element.

**9.15.3.9. Step Footings**

- 1)** Where step footings are used,
  - a) the vertical rise between horizontal portions shall not exceed 600 mm, and
  - b) the horizontal distance between risers shall not be less than 600 mm.

**9.15.4. Foundation Walls**

**9.15.4.1. Permanent Form Material**

- 1)** Insulating concrete form units shall be manufactured of polystyrene conforming to the performance requirements of CAN/ULC-S701, "Thermal Insulation, Polystyrene, Boards and Pipe Covering," for Type 2, 3 or 4 polystyrene.

**9.15.4.2. Foundation Wall Thickness and Required Lateral Support**

**1)** Except as required in Sentence (2), the thickness of *foundation* walls made of unreinforced concrete block or solid concrete and subject to lateral earth pressure shall conform to Table 9.15.4.2.A. for walls not exceeding 2.5 m in unsupported height.

**Table 9.15.4.2.A.**  
**Thickness of Solid Concrete and Unreinforced Concrete Block Foundation Walls**  
 Forming Part of Sentence 9.15.4.2.(1)

Type of <i>Foundation</i> Wall	Minimum Wall Thickness, mm	Maximum Height of Finished Ground Above <i>Basement</i> Floor or Crawl Space Ground Cover, m	
		<i>Foundation</i> Wall Laterally Unsupported at the Top <sup>(1)</sup>	<i>Foundation</i> Wall Laterally Supported at the Top <sup>(1)</sup>
Solid concrete, 15 MPa min. strength	150	0.8	1.5
	200	1.2	2.15
	250	1.4	2.3
	300	1.5	2.3
Solid concrete, 20 MPa min. strength	150	0.8	1.8
	200	1.2	2.3
	250	1.4	2.3
	300	1.5	2.3
Unreinforced Concrete Block	140	0.6	0.8
	190	0.9	1.2
	240	1.2	1.8
	290	1.4	2.2

**Notes to Table 9.15.4.2.A.:**

<sup>(1)</sup> See Article 9.15.4.3.

**2)** The thickness of concrete in flat insulating concrete form *foundation* walls shall be not less than the greater of

- a) 140 mm, or
- b) the thickness of the concrete in the wall above.

**3)** *Foundation* walls made of flat insulating concrete form units shall be laterally supported at the top and at the bottom.

**4)** Where average stable *soils* are encountered and wind loads on the exposed portion of the *foundation* are no greater than 0.70 kPa, the thickness and reinforcing of *foundation* walls made of reinforced concrete block and subject to lateral earth pressure shall conform to Table 9.15.4.2.B. and Sentences (5) to (10).

**Table 9.15.4.2.B.**  
**Reinforced Concrete Block Foundation Walls**  
 Forming Part of Sentence 9.15.4.2.(4)

Minimum Wall Thickness, mm	Maximum Height of Finished Ground Above <i>Basement</i> Floor or Crawl Space Ground Cover, m	<i>Foundation</i> Wall Laterally Unsupported at Top <sup>(1)</sup>		<i>Foundation</i> Wall Laterally Supported at Top <sup>(1)</sup>	
		Continuous Vertical Reinforcement		Continuous Vertical Reinforcement	
		Minimum Bar Size	Maximum Bar Spacing, m	Minimum Bar Size	Maximum Bar Spacing, m
190	1.0	25M	1.2	(2)	(2)
	1.2	25M	1.2	(2)	(2)
	1.4	25M	1.2	15M	1.2
	1.6	25M	0.8	15M	1.2
	1.8	25M	0.6	20M	1.2
	2.0	25M	0.4	20M	1.2
	2.2	(3)	(3)	25M	1.2
2.4	(3)	(3)	25M	1.2	
240	1.4	25M	1.0	(2)	(2)
	1.6	25M	1.0	(2)	(2)
	1.8	25M	0.8	(2)	(2)
	2.0	25M	0.8	20M	1.8
	2.2	25M	0.8	25M	1.8
	2.4	25M	0.6	25M	1.8

**Notes to Table 9.15.4.2.B.:**

- (1) See Article 9.15.4.3.
- (2) No reinforcement required.
- (3) Design to Part 4.

**5)** For concrete block walls required to be reinforced, continuous vertical reinforcement shall

- a) be provided at wall corners, wall ends, wall intersections, at changes in wall height, at the jambs of all openings and at movement joints,
- b) extend from the top of the footing to the top of the *foundation* wall,
- c) where *foundation* walls are unsupported at the top, have not less than 600 mm embedment into the footing, and
- d) where *foundation* walls are laterally supported at the top, have not less than 50 mm embedment into the footing, if the floor slab does not provide lateral support at the wall base.

**6)** Where *foundation* walls are laterally unsupported, the footing shall be designed according to Part 4 to resist overturning and sliding, if the maximum height of finished ground above the *basement* floor or crawl space ground cover exceeds 1.50 m.

**7)** At the base of concrete block walls required to be reinforced and where the height of finished ground above the *basement* floor or crawl space ground cover exceeds 2.0 m, not less than one 15M intermediate vertical bar reinforcement shall be installed midway between adjacent continuous vertical reinforcement, and shall

- a) extend to not less than 600 mm above the top of the footing, and
- b) have not less than 50 mm embedment into the footing, if the floor slab does not provide lateral support at the wall base.

**8)** For concrete block walls required to be reinforced, a continuous horizontal bond beam containing not less than one 15M bar shall be installed

- a) along the top of the wall,
- b) at the sill and head of all openings greater than 1.20 m in width, and
- c) at structurally connected floors.

**9)** In concrete block walls required to be reinforced, all vertical bar reinforcement shall be installed along the centre line of the wall.

**10)** In concrete block walls required to be reinforced, ladder- or truss-type lateral reinforcement not less than 3.8 mm in diameter (no. 9 ASWG) shall be installed in the bed joint of every second masonry course.

#### 9.15.4.3. Foundation Walls Considered to be Laterally Supported at the Top

**1)** Sentences (2) to (4) pertain to lateral support for walls described in Sentence 9.15.4.2.(1).

**2)** *Foundation* walls shall be considered to be laterally supported at the top if

- a) such walls support a solid masonry superstructure,
- b) the floor joists are embedded in the top of the *foundation* walls, or
- c) the floor system is anchored to the top of the *foundation* walls with anchor bolts, in which case the joists may run either parallel or perpendicular to the *foundation* walls.

**3)** Unless the wall around an opening is reinforced to withstand earth pressure, the portion of the *foundation* wall beneath an opening shall be considered laterally unsupported if

- a) the opening is more than 1.2 m wide, or
- b) the total width of the openings in the *foundation* wall constitutes more than 25% of the length of the wall.

**4)** For the purposes of Sentence (3), the combined width of the openings shall be considered as a single opening if the average width is greater than the width of solid wall between them.

**5)** Flat insulating concrete form *foundation* walls shall be considered to be laterally supported at the top if the floor joists are installed according to Article 9.20.17.5.

#### 9.15.4.4. Foundation Walls Considered to be Laterally Supported at the Bottom

**1)** Flat insulating concrete form *foundation* walls shall be considered to be laterally supported at the bottom where the *foundation* wall

- a) supports backfill not more than 1.2 m in height,
- b) is supported at the footing by a shear key and at the top by the ground floor framing, or
- c) is doweled to the footing with not less than 15M bars spaced not more than 1.2 m o.c.

#### 9.15.4.5. Reinforcement for Flat Insulating Concrete Form Foundation Walls

**1)** Horizontal reinforcement in flat insulating concrete form *foundation* walls shall

- a) consist of
  - i) one 10M bar placed not more than 300 mm from the top of the wall, and
  - ii) 10M bars at 600 mm o.c., and
- b) be located
  - i) in the inside half of the wall section, and
  - ii) with a minimum cover of 30 mm from the inside face of the concrete.

**2)** Vertical reinforcement in flat insulating concrete form *foundation* walls shall be

- a) provided in accordance with
  - i) Table 9.15.4.5.A. for 140 mm walls,
  - ii) Table 9.15.4.5.B. for 190 mm walls, and
  - iii) Table 9.15.4.5.C. for 240 mm walls,

- b) located in the inside half of the wall section with a minimum cover of 30 mm from the inside face of the concrete wall, and
- c) where interrupted by wall openings, placed not more than 600 mm from each side of the openings.

**3)** Cold joints in flat insulating concrete form *foundation* walls shall be reinforced with no less than one 15M bar spaced at not more than 600 mm o.c. and embedded 300 mm on both sides of the joint.

**4)** Reinforcing around openings in flat insulating concrete form *foundation* walls shall comply with Article 9.20.17.3. or 9.20.17.4.

**Table 9.15.4.5.A.**  
**Vertical Reinforcement for 140 mm Flat Insulating Concrete Form Foundation Walls**  
 Forming Part of Sentence 9.15.4.5.(2)

Max. Height of Finished Ground Above Finished Basement Floor, m	Minimum Vertical Reinforcement		
	Maximum Unsupported <i>Basement</i> Wall Height		
	2.44 m	2.75 m	3.0 m
1.35	10M at 400 mm o.c.	10M at 400 mm o.c.	10M at 400 mm o.c.
1.6	10M at 400 mm o.c.	10M at 380 mm o.c.	10M at 380 mm o.c.
2	10M at 380 mm o.c.	10M at 380 mm o.c.	10M at 380 mm o.c.
2.2	10M at 250 mm o.c.	10M at 250 mm o.c.	10M at 250 mm o.c.
2.35	n/a	10M at 250 mm o.c.	10M at 250 mm o.c.
2.6	n/a	10M at 250 mm o.c.	10M at 250 mm o.c.
3	n/a	n/a	15M at 250 mm o.c.

**Table 9.15.4.5.B.**  
**Vertical Reinforcement for 190 mm Flat Insulating Concrete Form Foundation Walls**  
 Forming Part of Sentence 9.15.4.5.(2)

Max. Height of Finished Ground Above Finished Basement Floor, m	Minimum Vertical Reinforcement		
	Maximum Unsupported <i>Basement</i> Wall Height		
	2.44 m	2.75 m	3.0 m
2.2	None required	10M at 400 mm o.c.	10M at 400 mm o.c.
2.35	n/a	10M at 300 mm o.c.	10M at 300 mm o.c.
2.6	n/a	10M at 300 mm o.c.	15M at 400 mm o.c.
3.0	n/a	n/a	15M at 400 mm o.c.

**Table 9.15.4.5.C.**  
**Vertical Reinforcement for 240 mm Flat Insulating Concrete Form Foundation Walls**  
 Forming Part of Sentence 9.15.4.5.(2)

Max. Height of Finished Ground Above Finished Basement Floor, m	Minimum Vertical Reinforcement		
	Maximum Unsupported <i>Basement</i> Wall Height		
	2.44 m	2.75 m	3.0 m
2.2	None required	None required	None required
2.6	n/a	15M at 400 mm o.c.	15M at 400 mm o.c.
3.0	n/a	n/a	15M at 400 mm o.c.

#### 9.15.4.6. Extension above Ground Level

1) Exterior *foundation* walls shall extend not less than 150 mm above finished ground level.

#### 9.15.4.7. Reduction in Thickness

1) Where the top of a *foundation* wall is reduced in thickness to permit the installation of floor joists, the reduced section shall be not more than 350 mm high and not less than 90 mm thick.

2) Where the top of a *foundation* wall is reduced in thickness to permit the installation of a masonry exterior facing, the reduced section shall be

- a) not less than 90 mm thick, and
- b) tied to the facing material with metal ties conforming to Sentence 9.20.9.4.(3) spaced not more than
  - i) 200 mm o.c. vertically, and
  - ii) 900 mm o.c. horizontally.

3) The space between wall and facing described in Sentence (2) shall be filled with mortar.

#### 9.15.4.8. Corbelling

1) Corbelling of masonry *foundation* walls supporting *cavity walls* shall conform to Article 9.20.12.2.

#### 9.15.4.9. Crack Control Joints

1) Crack control joints shall be provided in *foundation* walls more than 25 m long at intervals of not more than 15 m.

2) Joints required in Sentence (1) shall be designed to resist moisture penetration and shall be keyed to prevent relative displacement of the wall portions adjacent to the joint.

#### 9.15.4.10. Interior Masonry Walls

1) Interior masonry *foundation* walls not subject to lateral earth pressure shall conform to Section 9.20.

### 9.15.5. Support of Joists and Beams on Masonry Foundation Walls

#### 9.15.5.1. Support of Floor Joists

1) Except as permitted in Sentence (2), *foundation* walls of hollow masonry units supporting floor joists shall be capped with not less than 50 mm of solid masonry or concrete, or have the top course filled with mortar or concrete.

2) Capping required in Sentence (1) need not be provided

- a) in localities where termites are not known to occur,

- b) when the joists are supported on a wood plate not less than 38 mm by 89 mm, and
- c) when the siding overlaps the *foundation* wall not less than 12 mm.

#### 9.15.5.2. Support of Beams

- 1) Not less than 190 mm depth of solid masonry shall be provided beneath beams supported on masonry.
- 2) Where the beam referred to in Sentence (1) is supported below the top of the *foundation* walls, the ends of such beams shall be protected from the weather.

#### 9.15.5.3. Pilasters

- 1) Pilasters shall be provided under beams that frame into unit masonry *foundation* walls 140 mm or less in thickness.
- 2) Pilasters required in Sentence (1) shall be not less than 90 mm by 290 mm and shall be bonded or tied into the wall.
- 3) The top 200 mm of pilasters required in Sentence (1) shall be solid.

### 9.15.6. Parging and Finishing of Masonry Foundation Walls

#### 9.15.6.1. Foundation Walls below Ground

- 1) Concrete block *foundation* walls shall be parged on the exterior face below ground level as required in Section 9.13.

#### 9.15.6.2. Foundation Walls above Ground

- 1) Exterior surfaces of concrete block *foundation* walls above ground level shall have tooled joints, or shall be parged or otherwise suitably finished.

#### 9.15.6.3. Form Ties

- 1) All form ties shall be removed at least flush with the concrete surface.

## Section 9.16. Floors-on-Ground

### 9.16.1. Scope

#### 9.16.1.1. Application

- 1) This Section applies to floors supported on ground or on granular *fill* that do not provide structural support for the superstructure.

#### 9.16.1.2. Structural Floors

- 1) Floors-on-ground that support loads from the superstructure shall be designed in conformance with Part 4.

#### 9.16.1.3. Required Floors-on-Ground

- 1) All spaces within *dwelling units*, except crawl spaces, shall be provided with a floor-on-ground, where
  - a) access is provided to the space, and
  - b) a floor supported by the structure is not provided.

#### 9.16.1.4. Dampproofing and Waterproofing

- 1) Dampproofing and waterproofing shall conform to Section 9.13.

**9.16.2.1.****9.16.2. Material beneath Floors****9.16.2.1. Required Installation of Granular Material**

- 1) Except as provided in Sentence (2), not less than 100 mm of coarse clean granular material containing not more than 10% of material that will pass a 4 mm sieve shall be placed beneath floors-on-ground.
- 2) Granular material need not be installed under
  - a) slabs in garages, carports or accessory *buildings*,
  - b) *buildings* of *industrial occupancy* where the nature of the process contained therein permits or requires the use of large openings in the *building* envelope even during the winter, or
  - c) *buildings* constructed in areas where it can be demonstrated that *soil gas* does not constitute a hazard.

**9.16.2.2. Support of Floors**

1) Material that is susceptible to changes in volume due to variations in moisture content or chemical-microbiological oxidation shall not be used as *fill* beneath floors-on-ground in a concentration that will damage the *building* to a degree that would adversely affect its stability or the performance of assemblies. (See also Article 9.4.4.4. and A-9.4.4.4.(1) in Appendix A.)

2) Material that is susceptible to changes in volume due to freezing shall not be used as *fill* beneath floors-on-ground that will be subjected to freezing temperatures. (See also Article 9.4.4.4. and A-9.4.4.4.(1) in Appendix A.)

3) Except as provided in Sentence (4), *fill* beneath floors-on-ground shall be compacted.

4) *Fill* beneath floors-on-ground need not be compacted where the material is clean coarse aggregate containing not more than 10% of material that will pass a 4 mm sieve.

**9.16.3. Drainage****9.16.3.1. Control of Water Ingress**

1) Except as provided in Article 9.16.3.2. or where it can be shown to be unnecessary, ingress of water underneath a floor-on-ground shall be prevented by grading or drainage.

**9.16.3.2. Hydrostatic Pressure**

- 1) Where *groundwater levels* may cause hydrostatic pressure beneath a floor-on-ground, the floor-on-ground shall be
- a) a poured concrete slab, and
  - b) designed to resist such pressures.

**9.16.3.3. Floor Drains**

1) Where floor drains are required (see Section 7.2.), the floor surface shall be sloped so that no water can accumulate.

**9.16.4. Concrete****9.16.4.1. Surface Finish**

- 1) The finished surface of concrete floor slabs shall be trowelled smooth and even.
- 2) Dry cement shall not be added to the floor surfaces to absorb surplus water.

**9.16.4.2. Topping Course**

1) When a topping course is provided for a concrete floor slab, it shall consist of 1 part cement to 2.5 parts clean, well graded sand by volume, with a water/cement ratio approximately equal to that of the base slab.

- 2) When concrete topping is provided, it shall not be less than 20 mm thick.

**9.16.4.3. Thickness**

- 1) Concrete slabs shall not be less than 75 mm thick exclusive of concrete topping.

**9.16.4.4. Bond Break**

- 1) A bond-breaking material shall be placed between the slab and footings or *rock*.

**9.16.5. Wood**

**9.16.5.1. Wood-Frame Floors**

- 1) Floors-on-ground constructed of wood shall conform to CAN/CSA-S406, "Construction of Preserved Wood Foundations."

## Section 9.17. Columns

**9.17.1. Scope**

**9.17.1.1. Application**

- 1) This Section applies to columns used to support
- a) beams carrying loads from not more than 2 wood-frame floors where
    - i) the supported length of joists bearing on such beams does not exceed 5 m, and
    - ii) the *live load* on any floor does not exceed 2.4 kPa (see Table 4.1.5.3.),
  - b) beams or header joists carrying loads from not more than 2 levels of wood-frame balconies, decks or other accessible exterior platforms, or 1 level plus the roof, where
    - i) the supported length of joists bearing on such beams or joists does not exceed 5 m,
    - ii) the sum of the specified snow and *occupancy* loads does not exceed 4.8 kPa (see Sentence 9.4.2.3.(1) for the determination of load on platform-type constructions),
    - iii) the platform serves only a single *suite of residential occupancy*, and
    - iv) the platform does not serve as a required *exit*, or
  - c) carport roofs (see Section 9.35.).
- 2) Columns for applications other than as described in Sentence (1) shall be designed in accordance with Part 4.

**9.17.2. General**

**9.17.2.1. Location**

- 1) Columns shall be centrally located on a footing conforming to Section 9.15.

**9.17.2.2. Lateral Support**

- 1) Columns shall be securely fastened to the supported member to reduce the likelihood of lateral differential movement between the column and the supported member. (See also Article 9.23.6.2.)

- 2) Except as permitted by Sentence (3), columns shall be laterally supported to resist racking
- a) directly, or
  - b) by connection to the supported members.
- (See Appendix A.)

**9.17.3.1.**

- 3)** Columns need not be provided with lateral support as described in Sentence (2), where
- a) the distance from finished ground to the underside of the joists is not more than 600 mm, and
  - b) the columns support a deck with no superstructure.

**9.17.3. Steel Columns****9.17.3.1. Size and Thickness**

**1)** Except as permitted in Sentence (2), steel pipe columns shall have an outside diameter of not less than 73 mm and a wall thickness of not less than 4.76 mm.

**2)** Columns of sizes other than as specified in Sentence (1) are permitted to be used where the *loadbearing* capacities are shown to be adequate.

**9.17.3.2. End Bearing Plates**

**1)** Except as permitted in Sentence (2), steel columns shall be fitted with not less than 100 mm by 100 mm by 6.35 mm thick steel plates at each end, and where the column supports a wooden beam, the top plate shall extend across the full width of the beam.

**2)** The top plate required in Sentence (1) need not be provided where a column supports a steel beam and provision is made for the attachment of the column to the beam.

**9.17.3.3. Paint**

**1)** Exterior steel columns shall be treated on the outside surface with at least one coat of rust-inhibitive paint.

**9.17.3.4. Design of Steel Columns**

(See Appendix A.)

**1)** Where the imposed load does not exceed 36 kN, adjustable steel columns shall conform to CAN/CGSB-7.2, "Adjustable Steel Columns."

**2)** Steel columns other than those described in Sentence (1) shall be designed in accordance with Part 4.

**9.17.4. Wood Columns****9.17.4.1. Column Sizes**

**1)** The width or diameter of a wood column shall be not less than the width of the supported member.

**2)** Except as provided in Article 9.35.4.2., columns shall be not less than 184 mm for round columns and 140 mm by 140 mm for rectangular columns, unless calculations are provided to show that lesser sizes are adequate.

**9.17.4.2. Materials**

- 1)** Wood columns shall be either solid, glued-laminated or built-up.
- 2)** Built-up columns shall consist of not less than 38 mm thick full-length members
  - a) bolted together with not less than 9.52 mm diam bolts spaced not more than 450 mm o.c., or
  - b) nailed together with not less than 76 mm nails spaced not more than 300 mm o.c.
- 3)** Glued-laminated columns shall conform to Section 4.3.

**9.17.4.3. Columns in Contact with Concrete**

1) Wood columns shall be separated from concrete in contact with the ground by 0.05 mm polyethylene film or Type S roll roofing.

**9.17.5. Unit Masonry Columns****9.17.5.1. Materials**

- 1) Unit masonry columns shall be built of masonry units
  - a) conforming to CSA A165.1, "Concrete Block Masonry Units," and
  - b) having a compressive strength over the net area of the block of not less than 15 MPa.

**9.17.5.2. Sizes**

1) Unit masonry columns shall be not less than 290 mm by 290 mm or 240 mm by 380 mm in size.

**9.17.6. Solid Concrete Columns****9.17.6.1. Materials**

1) Concrete shall conform to Section 9.3.

**9.17.6.2. Sizes**

1) Concrete columns shall be not less than 200 mm by 200 mm for rectangular columns and 230 mm diam for circular columns.

**Section 9.18. Crawl Spaces****9.18.1. General****9.18.1.1. Application**

1) This Section applies to crawl spaces whose exterior walls have less than 25% of their total area above exterior ground level open to the outdoors.

**9.18.1.2. Foundations**

1) *Foundations* enclosing crawl spaces shall conform to Section 9.15.

**9.18.1.3. Heated and Unheated Crawl Spaces**

- 1) Crawl spaces shall be considered to be heated where the space
  - a) contains heating ducts that are not sealed and insulated to minimize heat loss to the space, or
  - b) is not separated from heated space in accordance with Section 9.25.
- 2) Heating of heated crawl spaces shall conform to Section 9.33.
- 3) Insulation, an *air barrier system* and a *vapour barrier* shall be installed in the walls of heated crawl spaces in accordance with Section 9.25.
- 4) A crawl space beneath a *manufactured home* need not be heated if the floor assembly of the *manufactured home* has been designed and insulated for the outside winter design temperature and if the *building services* and *foundation* are protected against frost damage.

**9.18.2.1.****9.18.2. Access****9.18.2.1. Access Openings**

1) An access opening of not less than 500 mm by 700 mm shall be provided to each crawl space where the crawl space serves a single *dwelling unit*, and not less than 550 mm by 900 mm for other crawl spaces.

2) Access openings shall be fitted with a door or hatch, except when the crawl space is heated and the access opening into the crawl space is from an adjacent heated space.

**9.18.3. Ventilation****9.18.3.1. Ventilation of Unheated Crawl Spaces**

1) Unheated crawl spaces shall be ventilated by natural or mechanical means.

2) Where an unheated crawl space is ventilated by natural means, ventilation shall be provided to the outside air by not less than 0.1 m<sup>2</sup> of unobstructed vent area for every 50 m<sup>2</sup> of *floor area*.

3) Vents shall be

- a) uniformly distributed on opposite sides of the *building*, and
- b) designed to prevent the entry of snow, rain and insects.

**9.18.3.2. Ventilation of Heated Crawl Spaces**

1) Heated crawl spaces shall be ventilated in accordance with Section 9.32.

2) Ventilation to the outside air is not required if the crawl space is vented to an adjacent *basement* with an opening conforming to Sentence 9.18.3.1.(2).

**9.18.4. Clearance**

(See also Article 9.3.2.9.)

**9.18.4.1. Access Way to Services**

1) Where equipment requiring service such as plumbing cleanouts, traps and burners is located in crawl spaces, an access way with a height and width of not less than 600 mm shall be provided from the access door to the equipment and for a distance of 900 mm on the side or sides of the equipment to be serviced.

**9.18.5. Drainage****9.18.5.1. Drainage**

1) Except where it can be shown to be unnecessary, the ingress of water into a crawl space shall be controlled by grading or drainage.

2) Drainage of *foundation* walls shall conform to Article 9.14.2.1.

3) Drainage of the ground cover or floor-on-ground in the crawl space shall conform to Subsection 9.16.3.

4) Drains shall conform to Section 9.14.

**9.18.6. Ground Cover****9.18.6.1. Ground Cover in Unheated Crawl Spaces**

1) Where a crawl space is unheated, a ground cover shall be provided consisting of not less than

- a) 50 mm of asphalt,
- b) 100 mm of 15 MPa Portland cement concrete,
- c) Type S roll roofing, or
- d) 0.10 mm polyethylene.

2) Joints in sheet-type ground cover required in Sentence (1) shall be lapped not less than 100 mm and weighted down.

#### 9.18.6.2. Ground Cover in Heated Crawl Spaces

1) Where a crawl space is heated, a ground cover consisting of not less than 0.15 mm polyethylene sheet conforming to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction," shall be provided.

2) The ground cover required in Sentence (1) shall

- a) have its joints lapped not less than 300 mm, and sealed and weighted down, or
- b) be covered with a concrete skim coat not less than 50 mm thick.

3) The perimeter of the ground cover required in Sentence (1) shall be sealed to the *foundation* wall.

#### 9.18.7. Reserved

## Section 9.19. Roof Spaces

### 9.19.1. Venting

#### 9.19.1.1. Required Venting

1) Except where it can be shown to be unnecessary, where insulation is installed between a ceiling and the underside of the roof sheathing, a space shall be provided between the insulation and the sheathing, and vents shall be installed to permit the transfer of moisture from the space to the exterior. (See Appendix A.)

#### 9.19.1.2. Vent Requirements

1) Except as provided in Sentence (2), the unobstructed vent area shall be not less than 1/300 of the insulated ceiling area.

2) Where the roof slope is less than 1 in 6 or in roofs that are constructed with roof joists, the unobstructed vent area shall be not less than 1/150 of the insulated ceiling area.

3) Required vents may be roof type, eave type, gable-end type or any combination thereof, and shall be distributed

- a) uniformly on opposite sides of the *building*,
- b) with not less than 25% of the required openings located at the top of the space, and
- c) with not less than 25% of the required openings located at the bottom of the space.

4) Except where each joist space is separately vented, roof joist spaces shall be interconnected by installing purlins not less than 38 mm by 38 mm on the top of the roof joists.

5) Vents shall comply with CAN3-A93-M, "Natural Airflow Ventilators for Buildings."

#### 9.19.1.3. Clearances

1) Except as provided in Sentence (2), not less than 63 mm of space shall be provided between the top of the insulation and the underside of the roof sheathing.

- 2) At the junction of sloped roofs and exterior walls, where preformed baffles are used to contain the insulation, the baffles shall
  - a) provide an unobstructed air space, between the insulation and the underside of the roof sheathing, that is
    - i) not less than 25 mm in dimension, and
    - ii) of sufficient cross area to meet the *attic or roof space* venting requirements of Article 9.19.1.2., and
  - b) extend vertically not less than 50 mm above the top of the insulation.
- 3) Ceiling insulation shall be installed in a manner that will not restrict the free flow of air through roof vents or through any portion of the *attic or roof space*.

#### 9.19.1.4. Mansard or Gambrel Roof

- 1) The lower portion of a mansard or gambrel style roof need not be ventilated.
- 2) The upper portion of roofs described in Sentence (1) shall be ventilated in conformance with Articles 9.19.1.1. to 9.19.1.3.

### 9.19.2. Access

#### 9.19.2.1. Access

- 1) Every *attic or roof space* shall be provided with an access hatch where the *attic or roof space* measures
  - a) not less than 3 m<sup>2</sup> in area,
  - b) not less than 1 m in length or width, and
  - c) not less than 600 mm in height over at least the area described in Clauses (a) and (b).
- 2) The hatch required in Sentence (1) shall be not less than 550 mm by 900 mm except that, where the hatch serves not more than one *dwelling unit*, the hatch may be reduced to 0.32 m<sup>2</sup> in area with no dimension less than 545 mm.
- 3) Hatchways to *attic or roof spaces* shall be fitted with doors or covers.

## Section 9.20. Masonry and Insulating Concrete Form Walls Not In Contact with the Ground

### 9.20.1. Application

#### 9.20.1.1. General

- 1) Except as provided in Article 9.20.1.2., this Section applies to
  - a) unreinforced masonry and masonry veneer walls not in contact with the ground, where
    - i) the height of the walls constructed on the *foundation* walls does not exceed 11 m, and
    - ii) the roof or floor assembly above the *first storey* is not of concrete construction, and
  - b) flat insulating concrete form walls not in contact with the ground that (see A-9.15.1.1.(1)(c) and 9.20.1.1.(1)(b) in Appendix A)
    - i) have a maximum floor-to-floor height of 3 m,
    - ii) are erected in *buildings* not more than 2 *storeys* in *building height* and containing only a single *dwelling unit*, and
    - iii) are erected in locations where the seismic spectral response acceleration,  $S_a(0.2)$ , is not greater than 0.4 (see A-9.20.1.2. in Appendix A).
- 2) For walls other than those described in Sentence (1), or where the masonry walls or insulating concrete form walls not in contact with the ground are designed for specified loads on the basis of ultimate and serviceability limit states, Subsection 4.3.2. shall apply.

**9.20.1.2. Earthquake Reinforcement**

(See Appendix A.)

**1)** In locations where the spectral response acceleration,  $S_a(0.2)$ , is greater than 0.55, *loadbearing* elements of masonry *buildings* more than 1 *storey* in *building height* shall be reinforced with not less than the minimum amount of reinforcement required by Subsection 9.20.15.

**2)** In locations where the spectral response acceleration,  $S_a(0.2)$ , is greater than 0.35 but less than or equal to 0.55, *loadbearing* elements of masonry *buildings* 3 *storeys* in *building height* shall be reinforced with not less than the minimum amount of reinforcement required by Subsection 9.20.15.

**9.20.2. Masonry Units****9.20.2.1. Masonry Unit Standards**

- 1)** Masonry units shall comply with
  - a) ASTM C 126, "Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units,"
  - b) ASTM C 212, "Structural Clay Facing Tile,"
  - c) CAN/CSA-A82.1-M, "Burned Clay Brick (Solid Masonry Units Made from Clay or Shale),"
  - d) CSA A82.3-M, "Calcium Silicate (Sand-Lime) Building Brick,"
  - e) CSA A82.4-M, "Structural Clay Load-Bearing Wall Tile,"
  - f) CSA A82.5-M, "Structural Clay Non-Load-Bearing Tile,"
  - g) CAN3-A82.8-M, "Hollow Clay Brick,"
  - h) CSA A165.1, "Concrete Block Masonry Units,"
  - i) CSA A165.2, "Concrete Brick Masonry Units,"
  - j) CSA A165.3, "Prefaced Concrete Masonry Units," or
  - k) CAN3-A165.4, "Autoclaved Cellular Units."

**9.20.2.2. Used Brick**

**1)** Used bricks shall be free of old mortar, soot or other surface coating and shall conform to Article 9.20.2.1.

**9.20.2.3. Glass Blocks**

**1)** Glass blocks shall not be used as *loadbearing* units or in the construction of fireplaces or *chimneys*.

**9.20.2.4. Cellular Concrete**

**1)** Masonry made with cellular concrete shall not be used in contact with the *soil* or exposed to the weather.

**9.20.2.5. Stone**

**1)** Stone shall be sound and durable.

**9.20.2.6. Concrete Blocks Exposed to the Weather**

**1)** Concrete blocks exposed to the weather shall have density and water absorption characteristics conforming to concrete types A, B, C, or D described in CSA A165.1, "Concrete Block Masonry Units."

**9.20.2.7. Compressive Strength**

**1)** The compressive strength of concrete blocks shall conform to Table 9.20.2.7.

**Table 9.20.2.7.**  
**Compressive Strength of Concrete Blocks**  
 Forming Part of Sentence 9.20.2.7.(1)

Type of Unit	Minimum Compressive Strength Over Net Area, MPa	
	Exposed to Weather	Not Exposed to Weather
Solid or hollow concrete blocks	15	10
Solid <i>loadbearing</i> cellular blocks	Not permitted	5
Solid non- <i>loadbearing</i> cellular blocks	Not permitted	2

### 9.20.3. Mortar

#### 9.20.3.1. Mortar Materials

- 1) Cementitious materials and aggregates for mortar and grout shall comply with CSA A179, "Mortar and Grout for Unit Masonry."
- 2) Water and aggregate shall be clean and free of significant amounts of deleterious materials.
- 3) Lime used in mortar shall be hydrated.
- 4) If lime putty is used in mortar, it shall be made by slaking quicklime in water for not less than 24 h or soaking hydrated lime in water for not less than 12 h.

#### 9.20.3.2. Mortar and Grout Mixes

- 1) Mortar types shall be in accordance with Table 9.20.3.2.A.
- 2) Mortar for glass block masonry shall be
  - a) Type S Portland cement-lime where exposed to the exterior, or
  - b) Type S or N where protected from the exterior.
- 3) Mortar shall be mixed within the proportion limits provided in Table 9.20.3.2.B., with sufficient water to bring the mixture to a consistency adequate for laying masonry units.
- 4) Grout shall be mixed within the proportion limits provided in Table 9.20.3.2.C., with sufficient water to provide a suitable flow to fill all voids completely, without excessive segregation or bleeding.
- 5) Except as provided in Sentence (6), mortar shall be used and placed in final position
  - a) within 1.5 h after mixing when the air temperature is 25°C or higher, or
  - b) within 2.5 h after mixing when the air temperature is less than 25°C.
- 6) Mortar and grout containing a set-control admixture shall be manufactured off-site in a batching plant and shall be used and placed in final position within a time not exceeding the useful life stipulated by the manufacturer.
- 7) Grout used for reinforced masonry shall be placed in accordance with the requirements of CSA A371, "Masonry Construction for Buildings."

**Table 9.20.3.2.A.**  
**Mortar Use**  
 Forming Part of Sentence 9.20.3.2.(1)

Location	Building Element	Mortar Type
Exterior, Above Ground	Loadbearing walls and columns	S
	Non-loadbearing walls and columns	N or S
	Parapets, chimneys, masonry veneer	N or S
Exterior, At or Below Ground	Foundation walls and columns	S
Interior	Loadbearing walls and columns	N
	Non-loadbearing walls and columns	N

**Table 9.20.3.2.B.**  
**Mortar Mix Proportions (by volume)**  
 Forming Part of Sentence 9.20.3.2.(3)

Mortar Type	Portland Cement	Lime	Masonry Cement Type N	Masonry Cement Type S	Fine Aggregate (damp, loose-state sand)
Type S	1	1/2	-	-	3 1/2 to 4 1/2
	-	-	-	1	2 1/4 to 3
	1/2	-	1	-	3 1/2 to 4 1/2
Type N	1	1	-	-	4 1/2 to 6
	-	-	1	-	2 1/4 to 3

**Table 9.20.3.2.C.**  
**Grout Mix Proportions (by volume)**  
 Forming Part of Sentence 9.20.3.2.(4)

Portland Cement	Lime	Fine Aggregate (sand)	Coarse Aggregate
1	0 to 1/10	2 1/4 to 3 times the sum of the cement and lime volumes	1 to 2 times the sum of the cement and lime volumes

**9.20.4. Mortar Joints**

**9.20.4.1. Thickness**

**1)** Except as provided in Sentence (2), mortar joint thickness for burned clay brick and concrete masonry units shall be 10 mm.

**2)** Permitted tolerances in head and bed joints shall be not more than ± 5 mm.

**9.20.4.2. Solid Masonry Units**

**1)** Solid masonry units shall be laid with full head and bed joints.

**9.20.4.3. Laying of Masonry Units**

**1)** Hollow masonry units shall be laid with mortar applied to head and bed joints of both inner and outer face shells.

**2)** Vertically aligned webs of hollow masonry units shall be laid in a full bed of mortar

a) under the starting course,

- b) in all courses of columns, and
- c) where adjacent to cells or cavities that are to be filled with grout.

**3)** Except for head joints left open for weep holes and ventilation, solid masonry units shall be laid with full head and bed joints.

## 9.20.5. Masonry Support

### 9.20.5.1. Masonry Support

**1)** All masonry shall be supported on masonry, concrete or steel, except that masonry veneer walls may be supported on *foundations* of wood frame constructed in conformance with Sentence 9.15.2.4.(1). (See Appendix A.)

**2)** Every masonry wall shall be at least as thick as the wall it supports, except as otherwise permitted in Article 9.20.12.2.

### 9.20.5.2. Lintels or Arches

**1)** Masonry over openings shall be supported by steel, masonry or reinforced concrete lintels, or masonry arches.

- 2)** Steel angle lintels supporting masonry veneer above openings shall
  - a) conform to Table 9.20.5.2., and
  - b) have a bearing length not less than 90 mm.

**Table 9.20.5.2.**  
**Maximum Allowable Spans for Steel Lintels Supporting Masonry Veneer**  
Forming Part of Sentence 9.20.5.2.(2)

Minimum Angle Size, mm			Maximum Allowable Spans, m		
Vertical Leg	Horizontal Leg	Thickness	Supporting 75 mm Brick	Supporting 90 mm Brick	Supporting 100 mm Stone
90	75	6	2.55	—	—
90	90	6	2.59	2.47	2.30
100	90	6	2.79	2.66	2.48
125	90	8	3.47	3.31	3.08
125	90	10	3.64	3.48	3.24

**3)** Steel angle lintels supporting masonry other than veneer, masonry and reinforced concrete lintels, and masonry arches shall be designed in accordance with Part 4 to support the imposed load.

**4)** Steel angle lintels supporting masonry shall be prime painted or otherwise protected from corrosion.

## 9.20.6. Thickness and Height

### 9.20.6.1. Thickness of Exterior Walls

**1)** Masonry exterior walls, other than *cavity walls*, in *1-storey buildings* and the top *storeys* of *2- and 3-storey buildings* shall be not less than 140 mm thick, provided the walls are not more than 2.8 m high at the eaves and 4.6 m high at the peaks of gable ends.

**2)** The exterior walls of the bottom *storeys* of *2-storey buildings*, and exterior walls of the bottom *2 storeys* of *3-storey buildings* shall be not less than 190 mm thick.

**3)** In exterior walls composed of more than one wythe, each wythe shall be not less than 90 mm thick.

**9.20.6.2. Cavity Walls**

1) *Cavity walls* shall be made with not less than 90 mm wide units if the joints are raked and not less than 75 mm wide units if the joints are not raked.

2) The width of a cavity in a *cavity wall* shall be not less than 50 mm and not greater than 150 mm.

3) The minimum thickness of *cavity walls* above the supporting base shall be 230 mm for the top 7.6 m and 330 mm for the remaining portion, except that where 75 mm wide units are used, the wall height above the top of the *foundation* wall shall not exceed 6 m.

**9.20.6.3. Thickness of Interior Walls**

1) The thickness of *loadbearing* interior walls shall be determined on the basis of the maximum lateral support spacing as provided in Sentences 9.20.10.1.(2) and (3).

- 2) The thickness of interior *non-loadbearing* walls shall be
- determined on the basis of the maximum lateral support spacing as provided in Sentences 9.20.10.1.(2) and (3), and
  - in any case, not less than 65 mm.

**9.20.6.4. Masonry Veneer**

1) Except for masonry veneer where each masonry unit is supported individually by the structural backing, masonry veneer shall be of solid units not less than 75 mm thick.

2) Veneer described in Sentence (1) over wood-frame walls shall have not less than a 25 mm air space behind the veneer.

3) Masonry veneer less than 90 mm thick shall have unraked joints.

4) Masonry veneer shall conform to Subsection 4.3.2., where the masonry units are required to be individually supported by the structural backing.

**9.20.6.5. Parapet Walls**

1) The height of parapet walls above the adjacent roof surface shall be not more than 3 times the parapet wall thickness.

2) Parapet walls shall be solid from the top of the parapet to not less than 300 mm below the adjacent roof level.

**9.20.6.6. Stone or Concrete Facings**

1) Slab and panel facings of precast concrete and natural or artificial stone shall conform to Subsection 4.3.2.

**9.20.7. Chases and Recesses****9.20.7.1. Maximum Dimensions**

1) Except as permitted in Sentence 9.20.7.2.(2) and Article 9.20.7.4., the depth of any chase or recess shall not exceed one third the thickness of the wall, and the width of the chase or recess shall not exceed 500 mm.

**9.20.7.2. Minimum Wall Thickness**

1) Except as permitted in Sentence (2) and Article 9.20.7.4., no chase or recess shall be constructed in any wall 190 mm or less in thickness.

2) Recesses may be constructed in 190 mm walls provided they do not exceed 100 mm in depth, 750 mm in height and 500 mm in width.

**9.20.7.3. Separation of Chases or Recesses**

- 1) Chases and recesses shall be not less than
  - a) 4 times the wall thickness apart, measured from centre to centre, and
  - b) 600 mm away from any pilaster, cross wall, buttress or other vertical element providing required lateral support for the wall.

**9.20.7.4. Non-Conforming Chases or Recesses**

1) Chases or recesses that do not conform to the limits specified in Articles 9.20.7.1. to 9.20.7.3. shall be considered as openings, and any masonry supported above such a chase or recess shall be supported by a lintel or arch as provided in Article 9.20.5.2.

**9.20.7.5. Chases or Recesses Cut into Walls**

1) Chases and recesses shall not be cut into walls made with hollow units after the masonry units are in place.

**9.20.8. Support of Loads****9.20.8.1. Capping of Hollow Masonry Walls**

1) Except as permitted in Sentence (2), *loadbearing* walls of hollow masonry units supporting roof or floor framing members shall be capped with not less than 50 mm of solid masonry or have the top course filled with concrete.

2) Capping required in Sentence (1) may be omitted where the roof framing is supported on a wood plate not less than 38 mm by 89 mm.

**9.20.8.2. Cavity Walls Supporting Framing Members**

1) Floor joists supported on *cavity walls* shall be supported on solid units not less than 57 mm high.

2) Floor joists described in Sentence (1) shall not project into the cavity.

3) Roof and ceiling framing members bearing on *cavity walls* shall be supported on
 

- a) not less than 57 mm of solid masonry, bridging the full thickness of the wall, or
- b) a wood plate not less than 38 mm thick, bearing not less than 50 mm on each wythe.

**9.20.8.3. Bearing of Beams and Joists**

1) The bearing area under beams and joists shall be sufficient to carry the supported load.

2) In no case shall the minimum length of end bearing of beams supported on masonry be less than 90 mm.

3) The length of end bearing of floor, roof or ceiling joists supported on masonry shall be not less than 40 mm.

**9.20.8.4. Support of Beams and Columns**

1) Beams and columns supported on masonry walls shall be supported on pilasters where the thickness of the masonry wall or wythe is less than 190 mm.

2) Not less than 190 mm depth of solid masonry or concrete shall be provided under the beam or column referred to in Sentence (1).

3) Pilasters required in Sentence (1) shall be bonded or tied to masonry walls.

4) Concrete pilasters required in Sentence (1) shall be not less than 50 mm by 300 mm.

5) Unit masonry pilasters required in Sentence (1) shall be not less than 100 mm by 290 mm.

**9.20.8.5. Distance to Edge of Supporting Members**

(See Appendix A.)

- 1)** Masonry veneer of hollow units resting on a bearing support shall not project more than
  - a) 30 mm beyond the supporting base where the veneer is not less than 90 mm thick, and
  - b) 12 mm beyond the supporting base where the veneer is less than 90 mm thick.
- 2)** Masonry veneer of solid units resting on bearing support shall not project more than one third of the width of the veneer.
- 3)** Where the masonry veneer described in Sentence (2) is rough stone masonry,
  - a) the projection shall be measured as the average projection of the units, and
  - b) the width of the veneer shall be measured as the average width of the veneer.

**9.20.9. Bonding and Tying****9.20.9.1. Joints to be Offset or Reinforced**

- 1)** Vertical joints in adjacent masonry courses shall be offset unless each wythe of masonry is reinforced with the equivalent of not less than 2 corrosion-resistant steel bars of 3.76 mm diam placed in the horizontal joints at vertical intervals not exceeding 460 mm.
- 2)** Where joints in the reinforcing referred to in Sentence (1) occur, the bars shall be lapped not less than 150 mm.

**9.20.9.2. Bonding or Tying of Other than Masonry Veneer**

- 1)** Except as provided in Article 9.20.9.5. regarding masonry veneer, masonry walls that consist of 2 or more wythes shall have the wythes bonded or tied together with masonry bonding units as described in Article 9.20.9.3. or with metal ties as described in Article 9.20.9.4.

**9.20.9.3. Bonding**

- 1)** Where wythes are bonded together with masonry units, the bonding units shall comprise not less than 4% of the wall surface area.
- 2)** Bonding units described in Sentence (1) shall be spaced not more than 600 mm vertically and horizontally in the case of brick masonry and 900 mm o.c. in the case of block or tile.
- 3)** Units described in Sentence (1) shall extend not less than 90 mm into adjacent wythes.

**9.20.9.4. Tying**

- 1)** Where 2 or more wythes are tied together with metal ties of the individual rod type, the ties shall conform to the requirements in Sentences (3) to (6).
- 2)** Other ties may be used where it can be shown that such ties provide walls that are at least as strong and as durable as those made with the individual rod type.
- 3)** Metal ties of the individual rod type shall
  - a) be corrosion-resistant,
  - b) have a minimum cross-sectional area of not less than 17.8 mm<sup>2</sup>, and
  - c) have not less than a 50 mm portion bent at right angles at each end.
- 4)** Metal ties of the individual rod type shall
  - a) extend from within 25 mm of the outer face of the wall to within 25 mm of the inner face of the wall,
  - b) be completely embedded in mortar except for the portion exposed in *cavity walls*, and
  - c) be staggered from course to course.

5) Where 2 or more wythes in walls other than *cavity walls* and masonry veneer/masonry backing walls are tied together with metal ties of the individual rod type, the space between wythes shall be completely filled with mortar.

- 6) Ties described in Sentence (5) shall be
  - a) located within 300 mm of openings and spaced not more than 900 mm apart around openings, and
  - b) spaced not more than 900 mm apart horizontally and 460 mm apart vertically at other locations.

7) Except as required in Sentences (8) and (9), where the inner and outer wythes of *cavity walls* are tied with individual wire ties, the ties shall be spaced not more than 900 mm apart horizontally and 400 mm apart vertically.

8) Within 100 mm of the bottom of each floor or roof assembly where the cavity extends below the assemblies, the ties described in Sentence (7) shall be spaced not more than 600 mm apart horizontally.

9) Within 300 mm of any openings, the ties described in Sentence (7) shall be spaced not more than 900 mm apart.

**9.20.9.5. Ties for Masonry Veneer**

- 1) Masonry veneer 75 mm or more in thickness and resting on a bearing support shall be tied to masonry backing or to wood framing members with straps that are
  - a) corrosion-resistant,
  - b) not less than 0.76 mm thick,
  - c) not less than 22 mm wide,
  - d) shaped to provide a key with the mortar, and
  - e) spaced in accordance with Table 9.20.9.5.

**Table 9.20.9.5.**  
**Veneer Tie Spacing**  
Forming Part of Sentence 9.20.9.5.(1)

Maximum Vertical Spacing, mm	Maximum Horizontal Spacing, mm
400	800
500	600
600	400

- 2) Straps described in Sentence (1) that are fastened to wood framing members shall be
  - a) bent at a right angle within 6 mm from the fastener, and
  - b) fastened with corrosion-resistant 3.18 mm diam screws or spiral nails having a wood penetration of not less than 63 mm.

3) Masonry veneer individually supported by masonry or wood-frame backing shall be secured to the backing in conformance with Subsection 4.3.2.

**9.20.9.6. Reinforcing for Glass Block**

- 1) Glass block shall have horizontal joint reinforcement of 2 corrosion-resistant bars of not less than 3.76 mm diam or expanded metal strips not less than 75 mm wide
  - a) spaced at vertical intervals of not more than 600 mm for units 200 mm or less in height, and
  - b) installed in every horizontal joint for units higher than 200 mm.
- 2) Reinforcement required in Sentence (1) shall be lapped not less than 150 mm.

**9.20.10. Lateral Support****9.20.10.1. Lateral Support Required**

- 1) Masonry walls shall be laterally supported by floor or roof construction or by intersecting masonry walls or buttresses.
- 2) The spacing of supports required in Sentence (1) shall be not more than
  - a) 20 times the wall thickness for all *loadbearing* walls and exterior *non-loadbearing* walls, and
  - b) 36 times the wall thickness for interior *non-loadbearing* walls.
- 3) In applying Sentence (2), the thickness of *cavity walls* shall be taken as the greater of
  - a) two-thirds of the sum of the thicknesses of the wythes, or
  - b) the thickness of the thicker wythe.
- 4) Floor and roof constructions providing lateral support for walls as required in Sentence (1) shall be constructed to transfer lateral loads to walls or buttresses approximately at right angles to the laterally supported walls.

**9.20.11. Anchorage of Roofs, Floors and Intersecting Walls****9.20.11.1. Anchorage to Floor or Roof Assemblies where Masonry Walls Require Lateral Support**

- 1) Where required to receive lateral support (see Subsection 9.20.10.), masonry walls shall be anchored to each floor or roof assembly at maximum intervals of 2 m, except that anchorage to floor joists not more than 1 m above *grade* may be omitted.
- 2) Anchors required in Sentence (1) shall be corrosion-resistant and be not less than the equivalent of 40 mm by 4.76 mm thick steel straps.
- 3) Anchors required in Sentence (1) shall be shaped to provide a mechanical key with the masonry and shall be securely fastened to the horizontal support to develop the full strength of the anchor.
- 4) When joists are parallel to the wall, anchors required in Sentence (1) shall extend across not less than 3 joists.

**9.20.11.2. Bonding and Tying Intersecting Masonry Walls where Walls Require Lateral Support**

- 1) Where required to provide lateral support, intersecting walls shall be bonded or tied together.
- 2) Where bonding is used to satisfy the requirements of Sentence (1), 50% of the adjacent masonry units in the intersecting wall, distributed uniformly over the height of the intersection, shall be embedded in the laterally supported wall.
- 3) Where tying is used to satisfy the requirements of Sentence (1), the ties shall be
  - a) corrosion-resistant metal,
  - b) equivalent to not less than 4.76 mm by 40 mm steel strapping,
  - c) spaced not more than 800 mm o.c. vertically, and
  - d) shaped at both ends to provide sufficient mechanical key to develop the strength of the ties.

**9.20.11.3. Anchoring Intersecting Wood-Frame Walls to Masonry Walls**

- 1) Wood-frame walls shall be anchored to masonry walls that they intersect with not less than 4.76 mm diam corrosion-resistant steel rods spaced not more than 900 mm o.c. vertically.
- 2) Anchors required in Sentence (1) shall be fastened to the wood framing at one end and shaped to provide a mechanical key at the other end to develop the strength of the anchor.

**9.20.11.4. Anchoring Wood-Frame Roof Systems to Masonry Walls**

1) Except as permitted in Sentence (2), roof systems of wood-frame construction shall be anchored to exterior masonry walls by not less than 12.7 mm diam anchor bolts,

- a) spaced not more than 2.4 m apart,
- b) embedded not less than 90 mm into the masonry, and
- c) fastened to a rafter plate of not less than 38 mm thick lumber.

2) The roof system described in Sentence (1) is permitted to be anchored by nailing the wall furring strips to the side of the rafter plate.

**9.20.11.5. Anchoring Masonry Cornices, Sills and Trim to Masonry Walls**

1) Cornices, sills or other trim of masonry material which project beyond the wall face shall have not less than 65% of their mass, but not less than 90 mm, within the wall or shall be adequately anchored to the wall with corrosion-resistant anchors.

**9.20.11.6. Anchoring to Masonry Piers**

1) Where anchor bolts are to be placed in the top of a masonry pier, the pier shall conform to the requirements of Sentence 9.15.2.3.(4) and shall be capped with concrete or reinforced masonry not less than 200 mm thick.

**9.20.12. Corbelling****9.20.12.1. Corbelling**

1) All corbelling shall consist of solid units.

2) The units referred to in Sentence (1) shall be corbelled so that the horizontal projection of any unit does not exceed 25 mm and the total projection does not exceed one third of the total wall thickness.

**9.20.12.2. Corbelling for Cavity Walls**

1) *Cavity walls* of greater thickness than the *foundation* wall on which they rest shall not be corbelled but may project 25 mm over the outer face of the *foundation* wall disregarding parging.

2) Where the *foundation* wall referred to in Sentence (1) is unit masonry, it is permitted to be corbelled to meet flush with the inner face of a *cavity wall* provided

- a) the projection of each course does not exceed half the height or one third the width of the corbelled unit, and
- b) the total corbel does not exceed one third of the *foundation* wall thickness.

(See Appendix A.)

**9.20.12.3. Corbelling for Masonry Veneer**

1) Masonry veneer resting on a bearing support shall not project more than 25 mm beyond the supporting base where the veneer is not less than 90 mm thick, and 12 mm beyond the supporting base where the veneer is less than 90 mm thick.

2) In the case of rough stone veneer, the projection, measured as the average projection of the stone units, shall not exceed one-third the bed width beyond the supporting base.

**9.20.13. Control of Rain Water Penetration****9.20.13.1. Materials for Flashing**

1) Materials used for flashing shall conform to Table 9.20.13.1.

**Table 9.20.13.1.**  
**Flashing Materials**  
 Forming Part of Sentence 9.20.13.1.(1)

Material	Minimum Thickness, mm	
	Exposed Flashing	Concealed Flashing
Aluminum	0.48	—
Copper	0.46	0.46
Copper or aluminum laminated to felt or kraft paper	—	0.05
Galvanized steel	0.33	0.33
Lead sheet	1.73	1.73
Polyethylene	—	0.50
Roll roofing, Type S	—	standard
Zinc	0.46	0.46

**2)** Aluminum flashing in contact with masonry or concrete shall be effectively coated or separated from the masonry or concrete by an impervious membrane.

**9.20.13.2. Fastening of Flashing**

**1)** Fastening devices for flashing shall be corrosion-resistant and, where metal flashing is used, shall be compatible with the flashing with respect to galvanic action.

**9.20.13.3. Location of Flashing**

- 1)** Flashing shall be installed in masonry and masonry veneer walls
  - a) beneath jointed masonry window sills,
  - b) over the back and top of parapet walls,
  - c) over the heads of glass block panels,
  - d) beneath weep holes, and
  - e) over the heads of window or door openings in exterior walls when the vertical distance between the top of a window or door frame and the bottom edge of the eave exceeds one-quarter of the horizontal eave overhang.

**9.20.13.4. Extension of Flashing**

**1)** When installed beneath jointed masonry window sills or over the heads of openings, flashing shall extend from the front edge of the masonry up behind the sill or lintel.

**9.20.13.5. Flashing for Weep Holes in Masonry/Masonry Walls**

- 1)** Flashing beneath weep holes in *cavity walls* and masonry veneer/masonry backing walls shall
  - a) be bedded not less than 25 mm in the inside wythe,
  - b) extend to not less than 5 mm beyond the outer face of the *building* element below the flashing, and
  - c) be installed with a nominally horizontal slope toward the outside wythe.

**9.20.13.6. Flashing for Weep Holes in Masonry Veneer**

**1)** Flashing beneath weep holes in masonry veneer over masonry backing walls shall conform to the flashing requirements for *cavity walls* and masonry veneer/masonry backing walls in Article 9.20.13.5.

**2)** Flashing beneath weep holes in masonry veneer over wood-frame walls shall be installed so that it extends from a point not less than 5 mm beyond the outer face of the *building* element below the flashing to a point 150 mm up the wood-frame wall.

3) Where the frame wall is sheathed with a sheathing membrane, a non-wood-based rigid exterior insulating sheathing or a semi-rigid insulating sheathing with an integral sheathing membrane, the flashing shall be installed behind the sheathing membrane or insulating sheathing.

4) Flashing described in Sentence (2) is permitted to conform to the requirements for concealed flashing in Table 9.20.13.1.

#### 9.20.13.7. Flashing Joints

1) Joints in flashing shall be made watertight.

#### 9.20.13.8. Required Weep Holes

1) Weep holes spaced not more than 800 mm apart shall be provided at the bottom of

- a) cavities in *cavity walls*, and
- b) cavities or air spaces in masonry veneer walls.

2) The cavities or air spaces described in Sentence (1) shall include those above lintels over window and door openings required to be flashed in conformance with Article 9.20.13.3.

#### 9.20.13.9. Protection of Interior Finish

1) Except as provided in Sentence (3), where the interior finish of the exterior walls of a *building* is a type that may be damaged by moisture, exterior masonry walls, other than *cavity walls* or walls that are protected for their full height by a roof of a carport or porch, shall be covered on the interior surface with sheathing membrane conforming to CAN/CGSB-51.32-M, "Sheathing, Membrane, Breather Type," lapped not less than 100 mm at the joints.

2) In situations described in Sentence (1), flashing shall be provided where water will accumulate, to lead it to the exterior.

3) Where insulation that effectively limits the passage of water is applied by a waterproof adhesive or mortar directly to parged masonry, the requirements for sheathing membrane in Sentence (1) do not apply. (See Appendix A.)

#### 9.20.13.10. Mortar Droppings

1) *Cavity walls* shall be constructed so that mortar droppings are prevented from forming a bridge to allow the passage of rain water across the cavity.

#### 9.20.13.11. Caulking at Door and Window Frames

1) The junction of door and window frames with masonry shall be caulked in conformance with Subsection 9.27.4.

#### 9.20.13.12. Drips beneath Window Sills

1) Where no flashing is installed beneath window sills, such sills shall be provided with a drip not less than 25 mm from the wall surface.

### 9.20.14. Protection during Work

#### 9.20.14.1. Laying Temperature of Mortar and Masonry

1) Mortar and masonry shall be maintained at a temperature not below 5°C during installation and for not less than 48 h after installation.

2) No frozen material shall be used in mortar mix.

#### 9.20.14.2. Protection from Weather

1) The top surface of uncompleted masonry exposed to the weather shall be completely covered with a waterproofing material when construction is not in progress.

**9.20.15. Reinforcement for Earthquake Resistance**

**9.20.15.1. Amount of Reinforcement**

1) Where reinforcement is required in this Section, masonry walls shall be reinforced horizontally and vertically with steel having a total cross-sectional area of not less than 0.002 times the horizontal cross-sectional area of the wall, so that not less than one-third of the required steel area is installed either horizontally or vertically and the remainder in the other direction.

**9.20.15.2. Installation Standard**

1) Where reinforcement for masonry is required in this Section, it shall be installed in conformance with the requirements for reinforced masonry as contained in CSA A371, "Masonry Construction for Buildings."

**9.20.16. Corrosion Resistance**

**9.20.16.1. Corrosion Resistance of Connectors**

1) Carbon steel connectors required to be corrosion-resistant shall be galvanized to at least the minimum standards in Table 9.20.16.1.

**Table 9.20.16.1.**  
**Minimum Requirements for Galvanizing**  
 Forming Part of Sentence 9.20.16.1.(1)

Connector Material	ASTM Standard	Coating Class or Thickness
Wire ties and continuous reinforcing (hot-dipped galvanizing)	A 153/A 153M	Class B2 or 458 g/m <sup>2</sup>
Hardware and bolts	A 153/A 153M	See A 153/A 153M
Strip, plate, bars and rolled sections (not less than 3.18 mm thick)	A 123/A 123M	610 g/m <sup>2</sup>
Sheet (less than 3.18 mm thick)	A 123/A 123M	305 g/m <sup>2</sup> on material 0.76 mm thick <sup>(1)</sup>

**Notes to Table 9.20.16.1.:**

(1) ASTM A 123/A 123M does not apply to metal less than 3.18 mm thick. Galvanizing coatings may be interpolated for thicknesses between 3.18 mm and 0.76 mm.

**9.20.17. Above-Ground Flat Insulating Concrete Form Walls**

**9.20.17.1. Thickness of Flat Insulating Concrete Form Walls**

1) The thickness of the concrete in flat insulating concrete form walls not in contact with the ground shall be

- a) not less than 140 mm, and
- b) constant for the entire height of the wall.

**9.20.17.2. Reinforcement for Flat Insulating Concrete Form Walls**

1) Horizontal reinforcement in above-grade flat insulating concrete form walls shall

- a) consist of
  - i) one 10M bar placed not more than 300 mm from the top of the wall, and
  - ii) 10M bars at 600 mm o.c., and
- b) be placed in the middle third of the wall section.

2) Vertical reinforcement in above-grade flat insulating concrete form walls shall

- a) consist of 10M bars at 400 mm o.c., and
- b) be placed in the middle third of the wall section.

3) Vertical reinforcement required by Sentence (2) and interrupted by wall openings shall be placed not more than 600 mm from each side of the opening.

**9.20.17.3. Openings in Non-Loadbearing Flat Insulating Concrete Form Walls**

- 1) No openings shall occur within 1 200 mm of interior and exterior corners of exterior non-*loadbearing* flat insulating concrete form walls.
- 2) Portions of walls above openings in non-*loadbearing* flat insulating concrete form walls shall have a minimum depth of concrete of no less than 200 mm across the width of the opening.
- 3) Openings that are more than 600 mm but not more than 3 000 mm in width in non-*loadbearing* flat insulating concrete form walls shall be reinforced at the top and bottom with one 10M bar.
- 4) Openings more than 3 000 mm in width in non-*loadbearing* flat insulating concrete form walls shall be reinforced on all four sides with two 10M bars.
- 5) Reinforcing bars described in Sentences (3) and (4) shall extend 600 mm beyond the edges of the opening.
- 6) The cumulative width of openings in non-*loadbearing* flat insulating concrete form walls shall not make up more than 70% of the length of any wall.

**9.20.17.4. Lintels over Openings in Loadbearing Flat Insulating Concrete Form Walls**

- 1) In *loadbearing* flat insulating concrete form walls, lintels shall be provided over all openings wider than 900 mm.
- 2) Lintels described in Sentence (1) shall be constructed in accordance with Tables A-17, A-18 or A-19.
- 3) Lintels described in Sentence (1) over openings wider than 1 200 mm shall be reinforced for shear with 10M stirrups at a maximum spacing of half the distance from the bottom reinforcing bar to the top of the lintel.

**9.20.17.5. Framing Supported on Flat Insulating Concrete Form Walls**

- 1) Floor joists supported on the side of flat insulating concrete form walls shall be supported with joist hangers secured to wood ledger boards.
- 2) The ledger boards referred to in Sentence (1) shall be not less than
  - a) 38 mm thick, and
  - b) the depth of the floor joists.
- 3) Anchor bolts shall be used to secure ledger boards to flat insulating concrete form walls and shall be
  - a) embedded in the wall to a depth not less than 100 mm, and
  - b) spaced in accordance with Table 9.20.17.5.
- 4) Floor joists and *building* frames supported on the top of flat insulating concrete form walls shall be anchored in conformance with Article 9.23.6.1.

**Table 9.20.17.5.**  
**Maximum Anchor Bolt Spacing for the Connection of Floor Ledgers to Flat Insulating Concrete Form Walls**  
 Forming Part of Sentence 9.20.17.5.(3)

Maximum Clear Floor Span, m	Maximum Anchor Bolt Spacing, mm	
	Staggered 12.7 mm Diameter Anchor Bolts	Staggered 16 mm Diameter Anchor Bolts
2.44	450	500
3.0	400	450
4.0	300	400
5.0	275	325

**9.20.17.6. Anchoring of Roof Framing to the Top of Flat Insulating Concrete Form Walls**

- 1)** Roof framing supported on the top of flat insulating concrete form walls shall be fixed to the top plates, which shall be anchored to the wall with anchor bolts
  - a) not less than 12.7 mm in diameter, and
  - b) spaced at not more than 1 200 mm o.c.
- 2)** The anchor bolts described in Sentence (1) shall be placed in the centre of the flat insulating concrete form wall and shall be embedded no less than 100 mm into the concrete.
- 3)** Attachment of roof framing to wood top plates shall be in accordance with Table 9.23.3.4.

**9.20.17.7. Protection from Precipitation and Damage**

- 1)** Above-ground flat insulating concrete form walls shall be protected from precipitation and damage in conformance with Section 9.27.

**Section 9.21. Masonry and Concrete Chimneys and Flues**

**9.21.1. General**

**9.21.1.1. Application**

- 1)** This Section applies to
  - a) rectangular *masonry or concrete chimneys* not more than 12 m in height serving fireplaces or serving *appliances* having a combined total rated heat output of 120 kW or less, and
  - b) *flue pipes* connected to such *chimneys*.
- 2)** *Chimneys*, other than those described in Sentence (1), *gas vents* and *flue pipes* serving gas-, oil- or solid-fuel-burning *appliances* and their associated equipment, including *stoves, ranges* and *space heaters*, covered by the standards referenced in Sentences 9.33.5.2.(1) and 9.33.5.3.(1), shall conform to Subsection 9.33.10.
- 3)** *Chimneys* and *flue pipes* other than those described in Sentences (1) and (2) shall conform to Section 6.3.

**9.21.1.2. Chimney or Flue Pipe Walls**

- 1)** The walls of any *chimney* or *flue pipe* shall be constructed so as to be smoke- and flame-tight.

**9.21.2.1.****9.21.2. Chimney Flues****9.21.2.1. Chimney Flue Limitations**

**1)** A *chimney flue* that serves a fireplace, incinerator or *slow burning solid fuel fired appliance* shall not serve any other *appliance*.

**2)** A *chimney flue* that serves a solid-fuel-burning *appliance* shall not be connected to an oil-burning *appliance* unless the solid-fuel-burning *appliance* is certified for such installation and the installation of both *appliances* meets the requirements of the relevant standards referenced in Article 9.33.5.2.

**9.21.2.2. Connections of More Than One Appliance**

**1)** Except as required by Article 9.21.2.1., where two or more fuel-burning *appliances* are connected to the same *chimney flue*, the connections shall be made as described in Sentences (2) to (4) and an adequate draft shall be provided for the connected *appliances* in conformance with the requirements of the relevant standards listed in Subsection 9.33.10.

**2)** Where 2 or more fuel-burning *appliances* are connected to the same *chimney flue*, the *appliances* shall be located on the same *storey*.

**3)** The connection referred to in Sentence (2) for a solid-fuel-burning *appliance* shall be made below connections for *appliances* burning other fuels.

**4)** The connection referred to in Sentence (2) for a liquid-fuel-burning *appliance* shall be made below any connections for *appliances* burning natural gas or propane.

**9.21.2.3. Inclined Chimney Flues**

**1)** *Chimney flues* shall not be inclined more than 45° to the vertical.

**9.21.2.4. Size of Chimney Flues**

**1)** Except for *chimneys* serving fireplaces, the size of a *chimney flue* shall conform to the requirements of the *appliance* installation standards referenced in Sentences 9.33.5.2.(1) and 9.33.5.3.(1).

**2)** Where a *chimney flue* serves only one *appliance*, the *flue* area shall be at least equal to that of the *flue pipe* connected to it.

**9.21.2.5. Fireplace Chimneys**

**1)** The size of a *chimney flue* serving a masonry fireplace shall conform to Table 9.21.2.5.A. or Table 9.21.2.5.B.

**Table 9.21.2.5.A.**  
**Diameter of Round Flues for Fireplace Chimneys**  
 Forming Part of Sentence 9.21.2.5.(1)

Fireplace Opening, m <sup>2</sup>	Chimney Height, m							
	3.0 to 4.5		> 4.5 to 5.9		> 5.9 to 8.9		> 8.9 to 12	
	Flue Diameter, mm							
	min.	max.	min.	max.	min.	max.	min.	max.
up to 0.150	110	170	100	160	90	150	90	150
0.151 to 0.250	150	210	130	190	130	190	120	180
0.251 to 0.350	180	240	160	220	150	210	140	200
0.351 to 0.500	220	280	200	260	190	250	170	230
0.501 to 0.650	260	320	230	290	220	280	200	260
0.651 to 0.800	290	350	260	320	240	300	220	280
0.801 to 1.00	330	390	290	350	270	330	250	310
1.01 to 1.20	360	420	320	380	300	360	270	330
1.21 to 1.40	390	450	350	410	330	390	300	360
1.41 to 1.60	420	480	380	440	350	410	320	380
1.61 to 1.80	—	—	400	460	370	430	340	400
1.81 to 2.00	—	—	—	—	400	460	360	420
2.01 to 2.20	—	—	—	—	—	—	380	440

**Table 9.21.2.5.B.**  
**Rectangular Flue Sizes for Fireplace Chimneys**  
 Forming Part of Sentence 9.21.2.5.(1)

Fireplace Opening, m <sup>2</sup>	Chimney Height, m							
	3.0 to 4.5		> 4.5 to 5.9		> 5.9 to 8.9		> 8.9 to 12	
	Flue Size, mm							
	min.	max.	min.	max.	min.	max.	min.	max.
up to 0.150	200 x 200	200 x 200	100 x 200	100 x 200	100 x 200	100 x 200	100 x 200	100 x 200
0.151 to 0.250	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200
0.251 to 0.350	200 x 300	200 x 300	200 x 200	200 x 300	200 x 200	200 x 200	200 x 200	200 x 200
0.351 to 0.500	300 x 300	300 x 300	200 x 300	200 x 300	200 x 300	200 x 300	200 x 200	200 x 300
0.501 to 0.650	300 x 300	300 x 400	300 x 300	300 x 300	300 x 300	300 x 300	200 x 300	200 x 300
0.651 to 0.800	300 x 400	300 x 400	300 x 300	300 x 400	300 x 300	300 x 300	300 x 300	300 x 300
0.801 to 1.00	400 x 400	400 x 400	300 x 400	300 x 400	300 x 400	300 x 400	300 x 300	300 x 300
1.01 to 1.20	400 x 400	400 x 400	400 x 400	400 x 400	300 x 400	300 x 400	300 x 400	300 x 400
1.21 to 1.40	—	—	400 x 400	400 x 400	400 x 400	400 x 400	300 x 400	300 x 400
1.41 to 1.60	—	—	—	—	400 x 400	400 x 400	400 x 400	400 x 400
1.61 to 1.80	—	—	—	—	—	—	400 x 400	400 x 400
1.81 to 2.00	—	—	—	—	—	—	400 x 400	400 x 400

**9.21.2.6. Oval Chimney Flues**

- 1) The width of an oval chimney flue shall be not less than two-thirds its breadth.

**9.21.3.1.****9.21.3. Chimney Lining****9.21.3.1. Lining Materials**

1) Every *masonry or concrete chimney* shall have a lining of clay, concrete, firebrick or metal.

**9.21.3.2. Joints in Chimney Liners**

1) Joints of *chimney liners* shall be sealed to provide a barrier to the passage of *flue* gases and condensate into the cavity between the liner and the surrounding masonry.

2) Joints of clay, concrete or firebrick *chimney liners* shall be struck flush to provide a straight, smooth, aligned *chimney flue*.

**9.21.3.3. Clay Liners**

1) Clay liners shall conform to CAN/CSA-A324-M, "Clay Flue Liners."

2) Liners referred to in Sentence (1) shall be not less than 15.9 mm thick and shall be capable of resisting, without softening or cracking, a temperature of 1100°C.

**9.21.3.4. Firebrick Liners**

1) Firebrick liners shall conform to ASTM C 27, "Classification of Fireclay and High-Alumina Refractory Brick."

2) Firebrick liners shall be laid with high temperature cement mortar conforming to CAN/CGSB-10.3, "Air Setting Refractory Mortar."

**9.21.3.5. Concrete Liners**

1) Concrete *flue* liners shall conform to Clause 4.2.6.4. of CAN/CSA-A405-M, "Design and Construction of Masonry Chimneys and Fireplaces."

**9.21.3.6. Metal Liners**

1) Metal liners shall be constructed of not less than 0.3 mm thick stainless steel.

2) Metal liners referred to in Sentence (1) shall only be used in *chimneys* serving gas- or oil-burning *appliances*. (See Appendix A.)

**9.21.3.7. Installation of Chimney Liners**

1) *Chimney liners* shall be installed when the surrounding masonry or concrete is placed.

**9.21.3.8. Spaces between Liners and Surrounding Masonry**

1) A space not less than 10 mm wide shall be left between a *chimney liner* and surrounding masonry.

2) The space required in Sentence (1) shall not be filled with mortar.

**9.21.3.9. Mortar for Chimney Liners**

1) *Chimney liners* used in *chimneys* for solid-fuel-burning *appliances* shall be laid in a full bed of

- a) high temperature cement mortar conforming to CAN/CGSB-10.3, "Air Setting Refractory Mortar," or
- b) mortar consisting of 1 part Portland cement to 3 parts sand by volume.

2) *Chimney liners* used in *chimneys* for oil- or gas-burning *appliances* shall be laid in a full bed of mortar consisting of 1 part Portland cement to 3 parts sand by volume.

**9.21.3.10. Extension of Chimney Liners**

1) *Chimney liners* shall extend from a point not less than 200 mm below the lowest *flue pipe* connection to a point not less than 50 mm or more than 100 mm above the *chimney* cap.

**9.21.4. Masonry and Concrete Chimney Construction****9.21.4.1. Unit Masonry**

- 1) Unit masonry shall conform to Section 9.20.

**9.21.4.2. Concrete**

- 1) Concrete shall conform to Section 9.3.

**9.21.4.3. Footings**

- 1) Footings for *masonry chimneys* and *concrete chimneys* shall conform to Section 9.15.

**9.21.4.4. Height of Chimney Flues**

- 1) A *chimney flue* shall extend not less than
  - a) 900 mm above the highest point at which the *chimney* comes in contact with the roof, and
  - b) 600 mm above the highest roof surface or structure within 3 m of the *chimney*.

(See Appendix A.)

**9.21.4.5. Lateral Stability**

- 1) Except as provided in Sentence (2), *chimneys* shall be braced in accordance with Subsection 4.3.2. to provide lateral stability under wind loads.

- 2) A *chimney* need not be laterally braced provided
  - a) no horizontal outside dimension is less than 400 mm, and
  - b) the *chimney* extends not more than 3.6 m above a roof or the masonry wall of which it forms a part.

(See Appendix A.)

**9.21.4.6. Chimney Caps**

- 1) The top of a *chimney* shall have a waterproof cap of reinforced concrete, masonry or metal.

- 2) The cap required in Sentence (1) shall slope from the lining and be provided with a drip not less than 25 mm from the *chimney* wall.

- 3) Cast-in-place concrete caps shall be separated from the *chimney liner* by a bond break and be sealed at that location.

- 4) Jointed precast concrete or masonry *chimney* caps shall have flashing installed beneath the cap extending from the liner to the drip edge.

**9.21.4.7. Cleanout**

- 1) A cleanout opening with a metal frame and a tight-fitting metal door shall be installed near the base of the *chimney flue*.

**9.21.4.8. Wall Thickness**

- 1) The walls of a masonry *chimney* shall be built of solid units not less than 75 mm thick.

**9.21.4.9. Separation of Flue Liners**

- 1) *Flue* liners in the same *chimney* shall be separated by not less than 75 mm of masonry or concrete exclusive of liners where clay liners are used, or 90 mm of firebrick where firebrick liners are used.

- 2) *Flue* liners referred to in Sentence (1) shall be installed to prevent significant lateral movement.

**9.21.4.10. Flashing**

- 1) Junctions with adjacent materials shall be adequately flashed to shed water.

**9.21.5. Clearance from Combustible Construction****9.21.5.1. Clearance from Combustible Materials**

1) The clearance between *masonry or concrete chimneys* and *combustible* framing shall be not less than

- a) 50 mm for interior *chimneys*, and
- b) 12 mm for exterior *chimneys*.

(See Appendix A.)

2) A clearance of not less than 150 mm shall be provided between a cleanout opening and *combustible* material.

3) *Combustible* flooring and subflooring shall have not less than a 12 mm clearance from *masonry or concrete chimneys*.

**9.21.5.2. Sealing of Spaces**

1) All spaces between *masonry or concrete chimneys* and *combustible* framing shall be sealed top or bottom with *noncombustible* material.

**9.21.5.3. Support of Joists or Beams**

1) Joists or beams may be supported on masonry walls which enclose *chimney flues* provided the *combustible* members are separated from the *flue* by not less than 290 mm of solid masonry.

**Section 9.22. Fireplaces****9.22.1. General****9.22.1.1. Application**

1) Except when otherwise specifically stated herein, this Section applies to masonry fireplaces constructed on-site.

**9.22.1.2. Masonry and Concrete**

1) Except as otherwise stated in this Section, unit masonry shall conform to Section 9.20. and concrete to Section 9.3.

2) Masonry above openings shall be supported by steel lintels conforming to Sentence 9.20.5.2.(2), reinforced concrete or a masonry arch.

**9.22.1.3. Footings**

- 1) Footings for masonry and concrete fireplaces shall conform to Section 9.15.

**9.22.1.4. Combustion Air**

1) Combustion air for a fireplace shall be provided and shall be introduced by an air intake other than a door or window. (See Appendix A.)

**9.22.2. Fireplace Liners****9.22.2.1. Brick or Steel Liners**

1) Except where a fireplace is equipped with a steel liner, every fireplace shall have a firebrick liner.

**9.22.2.2. Firebrick Liners**

- 1) Firebrick liners shall be not less than
  - a) 50 mm thick for the sides and back, and
  - b) 25 mm thick for the floor.
- 2) Firebrick liners shall be laid with high temperature cement mortar conforming to CAN/CGSB-10.3, "Air Setting Refractory Mortar."
- 3) Joints between a firebrick liner and the adjacent backing masonry shall be offset.

**9.22.2.3. Steel Liners**

- 1) Steel liners for fireplaces shall conform to CAN/ULC-S639-M, "Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplaces," and shall be installed in accordance with the installation instructions in that standard.

**9.22.3. Fireplace Walls****9.22.3.1. Thickness of Walls**

- 1) Except as provided in Sentence (2), the thickness of the back and sides of a fireplace, including the thickness of any firebrick liner, shall be not less than 190 mm where a metal liner or a firebrick liner less than 51 mm thick is used.
- 2) When a steel fireplace liner is used with an air circulating chamber surrounding the firebox, the back and sides of the fireplace shall consist of
  - a) solid masonry units not less than 90 mm thick, or
  - b) hollow masonry units not less than 190 mm thick.

**9.22.4. Fire Chamber****9.22.4.1. Fire Chamber Dimensions**

- 1) The distance from the back of the fire chamber to the plane of the fireplace opening shall be not less than 300 mm.

**9.22.5. Hearth****9.22.5.1. Hearth Extension**

- 1) Except as required in Sentence (2), fireplaces shall have a *noncombustible* hearth extending not less than 400 mm in front of the fireplace opening and not less than 200 mm beyond each side of the fireplace opening.
- 2) Where the fire chamber floor is elevated more than 150 mm above the hearth, the dimension of the hearth measured perpendicular to the plane of the fireplace opening shall be increased by not less than
  - a) 50 mm for an elevation above 150 mm and not more than 300 mm, and
  - b) an additional 25 mm for every 50 mm in elevation above 300 mm.

**9.22.5.2. Support of Hearth**

- 1) Except as permitted in Sentence (2), the fire chamber floor and hearth shall be supported on a reinforced concrete slab not less than 100 mm thick at its supports and, if cantilevered, not less than 50 mm thick at its unsupported edge.
- 2) A hearth for a fireplace with an opening raised not less than 200 mm from a *combustible* floor is permitted to be supported on that floor provided the requirements of Clauses 5.3.6.5. to 5.3.6.7. of CAN/CSA-A405-M, "Design and Construction of Masonry Chimneys and Fireplaces," are followed.

**9.22.6.1.****9.22.6. Damper****9.22.6.1. Required Damper and Size**

1) The throat of every fireplace shall be equipped with a metal damper sufficiently large to cover the full area of the throat opening.

**9.22.7. Smoke Chamber****9.22.7.1. Slope of Smoke Chamber**

1) The sides of the smoke chamber connecting a fireplace throat with a *flue* shall not be sloped at an angle greater than 45° to the vertical.

**9.22.7.2. Wall Thickness**

1) The thickness of masonry walls surrounding the smoke chamber shall be not less than 190 mm at the sides, front and back, except that the portions of the back exposed to the outside may be 140 mm thick.

**9.22.8. Factory-Built Fireplaces****9.22.8.1. Conformance to Standard**

1) Factory-built fireplaces and their installation shall conform to CAN/ULC-S610-M, "Factory-Built Fireplaces."

2) Heat exchanger inserts for use in a particular model of factory-built fireplace shall be specifically tested and listed as suitable for use with that fireplace model. (See Appendix A.)

**9.22.9. Clearance of Combustible Material****9.22.9.1. Clearance to the Fireplace Opening**

1) *Combustible* material shall not be placed on or near the face of a fireplace within 150 mm of the fireplace opening, except that where the *combustible* material projects more than 38 mm out from the face of the fireplace above the opening, such material shall be not less than 300 mm above the top of the opening.

**9.22.9.2. Metal Exposed to the Interior**

1) Metal exposed to the interior of a fireplace such as the damper control mechanism shall have not less than a 50 mm clearance from any *combustible* material on the face of the fireplace where such metal penetrates through the face of the fireplace.

**9.22.9.3. Clearance to Combustible Framing**

1) Not less than a 100 mm clearance shall be provided between the back and sides of a fireplace and *combustible* framing, except that a 50 mm clearance is permitted where the fireplace is located in an exterior wall.

2) Not less than a 50 mm clearance shall be provided between the back and sides of the smoke chamber of a fireplace and *combustible* framing, except that a 25 mm clearance is permitted where the fireplace is located in an exterior wall.

**9.22.9.4. Heat-Circulating Duct Outlets**

- 1) The clearance of *combustible* material above heat-circulating duct outlets from those outlets shall be not less than
- 300 mm where the *combustible* material projects not less than 38 mm from the face, and
  - 150 mm where the projection is less than 38 mm.

**9.22.10. Fireplace Inserts and Hearth-Mounted Stoves****9.22.10.1. Appliance Standard**

1) Fireplace inserts and hearth-mounted *stoves* vented through the throat of a fireplace shall conform to ULC-S628, "Fireplace Inserts."

**9.22.10.2. Installation**

1) The installation of fireplace inserts and hearth-mounted *stoves* vented through the throat of a fireplace shall conform to CAN/CSA-B365, "Installation Code for Solid-Fuel-Burning Appliances and Equipment."

**Section 9.23. Wood-Frame Construction****9.23.1. Application****9.23.1.1. Limitations**

(See Appendix A.)

1) This Section applies to constructions where wall, floor and roof planes are generally comprised of lumber frames of small repetitive structural members, or engineered components, and where

- a) roof and wall planes are clad, sheathed or braced on at least one side,
- b) the small repetitive structural members are spaced not more than 600 mm o.c.,
- c) the constructions do not serve as *foundations*,
- d) the specified *live load* on supported subfloors and floor framing does not exceed 2.4 kPa, and
- e) the span of any structural member does not exceed 12.20 m.

(See Appendix A.)

2) Where the conditions in Sentence (1) are exceeded for wood constructions, the design of the framing and fastening shall conform to Subsection 4.3.1.

**9.23.2. General****9.23.2.1. Strength and Rigidity**

1) All members shall be so framed, anchored, fastened, tied and braced to provide the necessary strength and rigidity.

**9.23.2.2. Protection from Decay**

1) Ends of wood joists, beams and other members framing into masonry or concrete shall be treated to prevent decay where the bottom of the member is at or below ground level, or a 12 mm air space shall be provided at the end and sides of the member.

2) Air spaces required in Sentence (1) shall not be blocked by insulation, *vapour barriers* or airtight materials.

**9.23.2.3. Protection from Dampness**

1) Except as permitted in Sentence (2), wood framing members that are not pressure-treated with a wood preservative and that are supported on concrete in contact with the ground or *fill* shall be separated from the concrete by not less than 0.05 mm polyethylene film or Type S roll roofing.

2) Dampproofing material referred to in Sentence (1) is not required where the wood member is at least 150 mm above the ground.

**9.23.2.4.****9.23.2.4. Lumber**

- 1) Lumber shall conform to Subsection 9.3.2.

**9.23.3. Fasteners****9.23.3.1. Standards for Nails and Screws**

- 1) Unless otherwise indicated, nails specified in this Section shall be common steel wire nails or common spiral nails, conforming to CSA B111, "Wire Nails, Spikes and Staples."
- 2) Wood screws specified in this Section shall conform to ANSI/ASME B18.6.1, "Wood Screws (Inch Series)." (See Appendix A.)

**9.23.3.2. Length of Nails**

- 1) All nails shall be long enough so that not less than half their required length penetrates into the second member.

**9.23.3.3. Prevention of Splitting**

- 1) Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from the edges. (See Appendix A.)

**9.23.3.4. Nailing of Framing**

- 1) Except as provided in Sentence (2), nailing of framing shall conform to Table 9.23.3.4.
- 2) Where the bottom wall plate or sole plate of an exterior wall is not nailed to joists or blocking in conformance with Table 9.23.3.4., the exterior wall is permitted to be fastened to the floor framing by
  - a) having plywood, OSB or waferboard sheathing extend down over floor framing and fastened to the floor framing by nails or staples conforming to Article 9.23.3.5., or
  - b) tying the wall framing to the floor framing by galvanized-metal strips
    - i) 50 mm wide,
    - ii) not less than 0.41 mm thick,
    - iii) spaced not more than 1.2 m apart, and
    - iv) fastened at each end with at least two 63 mm nails.

**Table 9.23.3.4.**  
**Nailing for Framing**  
 Forming Part of Sentence 9.23.3.4.(1)

Construction Detail	Minimum Length of Nails, mm	Minimum Number or Maximum Spacing of Nails
Floor joist to plate – toe nail	82	2
Wood or metal strapping to underside of floor joists	57	2
Cross bridging to joists	57	2 at each end
Double header or trimmer joists	76	300 mm (o.c.)
Floor joist to stud (balloon construction)	76	2
Ledger strip to wood beam	82	2 per joist
Joist to joist splice (see also Table 9.23.13.8.)	76	2 at each end
Tail joist to adjacent header joist	82	5
(end nailed) around openings	101	3
Each header joist to adjacent trimmer joist	82	5
(end nailed) around openings	101	3
Stud to wall plate (each end) toe nail	63	4
or end nail	82	2
Doubled studs at openings, or studs at walls or wall intersections and corners	76	750 mm (o.c.)
Doubled top wall plates	76	600 mm (o.c.)
Bottom wall plate or sole plate to joists or blocking (exterior walls) <sup>(1)</sup>	82	400 mm (o.c.)
Interior walls to framing or subflooring	82	600 mm (o.c.)
Horizontal member over openings in non-loadbearing walls – each end	82	2
Lintels to studs	82	2 at each end
Ceiling joist to plate – toe nail each end	82	2
Roof rafter, roof truss or roof joist to plate – toe nail	82	3
Rafter plate to each ceiling joist	101	2
Rafter to joist (with ridge supported)	76	3
Rafter to joist (with ridge unsupported)	76	see Table 9.23.13.8.
Gusset plate to each rafter at peak	57	4
Rafter to ridge board – toe nail – end nail	82	3
Collar tie to rafter – each end	76	3
Collar tie lateral support to each collar tie	57	2
Jack rafter to hip or valley rafter	82	2
Roof strut to rafter	76	3
Roof strut to loadbearing wall – toe nail	82	2
38 mm × 140 mm or less plank decking to support	82	2
Plank decking wider than 38 mm × 140 mm to support	82	3
38 mm edge laid plank decking to support (toe nail)	76	1
38 mm edge laid plank to each other	76	450 mm (o.c.)

**Notes to Table 9.23.3.4.:**

<sup>(1)</sup> See Sentence 9.23.3.4.(2).

**9.23.3.5. Fasteners for Sheathing or Subflooring**

**1)** Fastening of sheathing and subflooring shall conform to Table 9.23.3.5.

**Table 9.23.3.5.**  
**Fasteners for Sheathing and Subflooring**  
 Forming Part of Sentence 9.23.3.5.(1)

Element	Minimum Length of Fasteners, mm				Minimum Number or Maximum Spacing of Fasteners
	Common or Spiral Nails	Ring Thread Nails or Screws	Roofing Nails	Staples	
Board lumber 184 mm or less wide	51	45	n/a	51	2 per support
Board lumber more than 184 mm wide	51	45	n/a	51	3 per support
Fibreboard sheathing up to 13 mm thick	n/a	n/a	44	28	150 mm (o.c.) along edges and 300 mm (o.c.) along intermediate supports
Gypsum sheathing up to 13 mm thick	n/a	n/a	44	n/a	
Plywood, OSB or waferboard up to 10 mm thick	51	45	n/a	38	
Plywood, OSB or waferboard from 10 mm to 20 mm thick	51	45	n/a	51	
Plywood, OSB or waferboard over 20 mm thick	57	51	n/a	n/a	

**2)** Staples shall not be less than 1.6 mm in diameter or thickness, with not less than a 9.5 mm crown driven with the crown parallel to framing.

**3)** Roofing nails for the attachment of fibreboard or gypsum sheathing shall not be less than 3.2 mm in diameter with a minimum head diameter of 11.1 mm.

**4)** Flooring screws shall not be less than 3.2 mm in diameter.

## 9.23.4. Maximum Spans

(Tables A-1 to A-19 are located at the end of Part 9.)

### 9.23.4.1. Application

**1)** Spans provided in this Subsection for joists, beams and lintels supporting floors shall apply only where

- the floors serve residential areas as described in Table 4.1.5.3., or
- the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.

**2)** Spans for joists, beams and lintels supporting floors shall be determined according to Subsection 4.1.3. where the supported floors

- serve other than residential areas, or
- support a uniform *live load* in excess of that specified for residential areas.

### 9.23.4.2. Spans for Joists, Rafters and Beams

(See Appendix A.)

**1)** Except as required in Sentence (2) and Article 9.23.13.10., spans for wood joists and rafters shall conform to the spans shown in Tables A-1 to A-7 for the uniform *live loads* shown in the Tables. (See Article 9.4.2.2.)

**2)** Spans for floor joists that are not selected from Tables A-1 and A-2 and that are required to be designed for the same loading conditions, shall not exceed the design requirements for uniform loading and vibration criteria. (See Appendix A.)

**3)** Spans for built-up wood and glued-laminated timber floor beams shall conform to the spans in Tables A-8 to A-11. (See Article 9.4.2.2.)

**4)** Spans for roof ridge beams shall conform to the spans in Table A-12 for the uniform snow load shown. (See Articles 9.4.2.2. and 9.23.13.8.)

**5)** A structural glued-laminated timber beam shall be fabricated in a plant certified in accordance with CAN/CSA-O177-M, "Qualification Code for Manufacturers of Structural Glued-Laminated Timber."

**9.23.4.3. Steel Beams**

**1)** The spans for steel floor beams with laterally supported top flanges shall conform to Table 9.23.4.3. (See Appendix A.)

**Table 9.23.4.3.**  
**Maximum Spans for Steel Beams Supporting Floors in Dwelling Units<sup>(1)</sup>**  
 Forming Part of Sentence 9.23.4.3.(1)

Section	Supported Joist Length, m (half the sum of joist spans on both sides of the beam)						
	2.4	3.0	3.6	4.2	4.8	5.4	6.0
<b>One Storey Supported</b>							
W150 x 22	5.5	5.2	4.9	4.8	4.6	4.5	4.3
W200 x 21	6.5	6.2	5.9	5.7	5.4	5.1	4.9
W200 x 27	7.3	6.9	6.6	6.3	6.1	5.9	5.8
W200 x 31	7.8	7.4	7.1	6.8	6.6	6.4	6.2
W250 x 24	8.1	7.6	7.3	7.0	6.6	6.2	5.9
W250 x 33	9.2	8.7	8.3	8.0	7.7	7.5	7.3
W250 x 39	10.0	9.4	9.0	8.6	8.4	8.1	7.9
W310 x 31	10.4	9.8	9.4	8.9	8.4	8.0	7.6
W310 x 39	11.4	10.7	10.2	9.8	9.5	9.2	9.0
<b>Two Storeys Supported</b>							
W150 x 22	4.9	4.4	4.1	3.8	3.5	3.4	3.2
W200 x 21	5.6	5.1	4.6	4.3	4.1	3.8	3.7
W200 x 27	6.4	6.1	5.6	5.3	4.9	4.7	4.4
W200 x 31	6.9	6.5	6.2	5.8	5.4	5.1	4.9
W250 x 24	6.8	6.1	5.6	5.2	4.9	4.6	4.4
W250 x 33	8.2	7.7	7.0	6.5	6.1	5.8	5.5
W250 x 39	8.8	8.3	7.8	7.2	6.8	6.4	6.1
W310 x 31	8.7	7.8	7.2	6.7	6.2	5.9	5.6
W310 x 39	10.0	9.3	8.5	7.9	7.4	7.0	6.7

**Notes to Table 9.23.4.3.:**

<sup>(1)</sup> See Appendix A.

**2)** Beams described in Sentence (1) shall at least meet the requirements for Grade 350 W steel contained in CAN/CSA-G40.21, "Structural Quality Steel."

**9.23.4.4. Concrete Topping**

(See Appendix A.)

**1)** Except as permitted in Sentence (2), where a floor is required to support a concrete topping, the joist spans shown in Table A-1 or the spacing of the members shall be reduced to allow for the loads due to the topping.

**2)** Where a floor is required to support a concrete topping, joist spans are permitted to be selected from Table A-2 provided the concrete

- a) is 38 to 51 mm thick,
- b) is normal weight,
- c) is placed directly on the subflooring, and
- d) has not less than 20 MPa compressive strength after 28 days.

3) Where a floor is required to support a concrete topping not more than 51 mm thick, the allowable beam spans shown in Tables A-8 to A-11 shall be multiplied by 0.8 or the supported length of the floor joists shall be reduced to allow for the loads due to the topping.

#### 9.23.4.5. Heavy Roofing Materials

1) Where a roof is required to support an additional uniform *dead load* from roofing materials such as concrete roofing tile, or materials other than as specified in Section 9.27., such as clay roofing tiles, the additional load shall be allowed for by reducing

- a) the spans for roof joists and rafters in Tables A-4 to A-7, or the spacing of the members, and
- b) the spans for ridge beams and lintels in Tables A-12 to A-16 (see A-9.23.4.2. in Appendix A).

### 9.23.5. Notching and Drilling

#### 9.23.5.1. Holes Drilled in Framing Members

1) Holes drilled in roof, floor or ceiling framing members shall be not larger than one-quarter the depth of the member and shall be located not less than 50 mm from the edges, unless the depth of the member is increased by the size of the hole.

#### 9.23.5.2. Notching of Framing Members

1) Floor, roof and ceiling framing members are permitted to be notched provided the notch is located on the top of the member within half the joist depth from the edge of bearing and is not deeper than one-third the joist depth, unless the depth of the member is increased by the size of the notch.

#### 9.23.5.3. Wall Studs

1) Wall studs shall not be notched, drilled or otherwise damaged so that the undamaged portion of the stud is less than two-thirds the depth of the stud if the stud is *loadbearing* or 40 mm if the stud is *non-loadbearing*, unless the weakened studs are suitably reinforced.

#### 9.23.5.4. Top Plates

1) Top plates in walls shall not be notched, drilled or otherwise weakened to reduce the undamaged width to less than 50 mm unless the weakened plates are suitably reinforced.

#### 9.23.5.5. Roof Trusses

1) Roof truss members shall not be notched, drilled or otherwise weakened unless such notching or drilling is allowed for in the design of the truss.

### 9.23.6. Anchorage

#### 9.23.6.1. Anchorage of Building Frames

1) Except as required by Sentence 9.23.6.3.(1), *building* frames shall be anchored to the *foundation* unless a structural analysis of wind and earthquake pressures shows anchorage is not required.

2) Except as provided in Article 9.23.6.3., anchorage shall be provided by embedding the ends of the first floor joists in concrete, by embedding in concrete two 38 mm x 89 mm sill plates placed on edge and separated by blocking spaced 1.2 m o.c., or by fastening the sill plate to the *foundation* with not less than 12.7 mm diam anchor bolts spaced not more than 2.4 m o.c.

3) Anchor bolts referred to in Sentence (2) shall be fastened to the sill plate with nuts and washers and shall be embedded not less than 100 mm in the *foundation* and so designed that they may be tightened without withdrawing them from the *foundation*.

#### 9.23.6.2. Anchorage of Columns and Posts

1) Except as provided in Sentences (2) and (3), exterior columns and posts shall be anchored to resist uplift and lateral movement.

2) Except as provided in Sentence (3), where columns or posts support balconies, decks, verandas or other exterior platforms, and the distance from finished ground to the underside of the joists is not more than 600 mm,

- a) the columns or posts shall be anchored to the *foundation* to resist uplift and lateral movement, or
- b) the supported joists or beams shall be directly anchored to the ground to resist uplift.

3) Anchorage is not required for platforms described in Sentence (2) that

- a) are not more than 1 *storey* in height,
- b) are not more than 55 m<sup>2</sup> in area,
- c) do not support a roof, and
- d) are not attached to another structure, unless it can be demonstrated that differential movement will not adversely affect the performance of the structure to which the platform is attached.

#### 9.23.6.3. Anchorage of Smaller Buildings

1) *Buildings* not more than 4.9 m wide and not more than 1 *storey* in *building height* that are not anchored in accordance with Sentence 9.23.6.1.(1) shall be anchored in conformance with the requirements of CSA Z240.10.1, "Site Preparation, Foundation, and Anchorage of Mobile Homes."

#### 9.23.7. Sill Plates

##### 9.23.7.1. Size of Sill Plates

1) Where sill plates provide bearing for the floor system, they shall be not less than 38 mm by 89 mm material.

##### 9.23.7.2. Levelling and Sealing of Sill Plates

1) Sill plates shall be

- a) levelled by setting them on a full bed of mortar, or
- b) laid directly on the *foundation* if the top of the *foundation* is level.

(See also Article 9.23.2.3.)

2) The joint between the sill plate for exterior walls and the *foundation* shall be sealed in accordance with Subsection 9.25.3.

#### 9.23.8. Beams to Support Floors

##### 9.23.8.1. Bearing for Beams

1) Beams shall have even and level bearing and the bearing at end supports shall be not less than 89 mm long, except as stated in the notes to Tables A-8 to A-11.

##### 9.23.8.2. Priming of Steel Beams

1) Exterior steel beams shall be shop primed.

##### 9.23.8.3. Built-up Wood Beams

(See Appendix A.)

1) Where a beam is made up of individual pieces of lumber that are nailed together, the individual members shall be 38 mm or greater in thickness and installed on edge.

- 2) Except as permitted in Sentence (3), where individual members of a built-up beam are butted together to form a joint, the joint shall occur over a support.
- 3) Where a beam is continuous over more than one span, individual members are permitted to be butted together to form a joint at or within 150 mm of the end quarter points of the clear spans, provided the quarter points are not those closest to the ends of the beam.
- 4) Members joined at quarter points shall be continuous over adjacent supports.
- 5) Joints in individual members of a beam that are located at or near the end quarter points shall not occur in adjacent members at the same quarter point and shall not reduce the effective beam width by more than half.
- 6) Not more than one butt joint shall occur in any individual member of a built-up beam within any one span.
- 7) Except as provided in Sentence (8), where 38 mm members are laid on edge to form a built-up beam, individual members shall be nailed together with a double row of nails not less than 89 mm in length, spaced not more than 450 mm apart in each row with the end nails located 100 mm to 150 mm from the end of each piece.
- 8) Where 38 mm members in built-up wood beams are not nailed together as provided in Sentence (7), they shall be bolted together with not less than 12.7 mm diam bolts equipped with washers and spaced not more than 1.2 m o.c., with the end bolts located not more than 600 mm from the ends of the members.

## 9.23.9. Floor Joists

### 9.23.9.1. End Bearing for Joists

- 1) Except when supported on ribbon boards, floor joists shall have not less than 38 mm length of end bearing.
- 2) Ribbon boards referred to in Sentence (1) shall be not less than 19 mm by 89 mm lumber let into the studs.

### 9.23.9.2. Joists Supported by Beams

- 1) Floor joists may be supported on the tops of beams or may be framed into the sides of beams.
- 2) When framed into the side of a wood beam, joists referred to in Sentence (1) shall be supported on
  - a) joist hangers or other acceptable mechanical connectors, or
  - b) not less than 38 mm by 64 mm ledger strips nailed to the side of the beam, except that 38 mm by 38 mm ledger strips may be used provided each joist is nailed to the beam by not less than four 89 mm nails, in addition to the nailing for the ledger strip required in Table 9.23.3.4.
- 3) When framed into the side of a steel beam, joists referred to in Sentence (1) shall be supported on the bottom flange of the beam or on not less than 38 mm by 38 mm lumber bolted to the web with not less than 6.3 mm diam bolts spaced not more than 600 mm apart.
- 4) Joists referred to in Sentence (3) shall be spliced above the beam with not less than 38 mm by 38 mm lumber at least 600 mm long to support the flooring.
- 5) Not less than a 12 mm space shall be provided between the splice required in Sentence (4) and the beam to allow for shrinkage of the wood joists.

### 9.23.9.3. Restraint of Joist Bottoms

- 1) Except as provided in Sentence 9.23.9.4.(1), bottoms of floor joists shall be restrained from twisting at each end by toe-nailing to the supports, end-nailing to the header joists or by providing continuous strapping, blocking between the joists or cross-bridging near the supports.

**9.23.9.4. Strapping, Bridging, Furring and Ceilings in Tables A-1 and A-2**

(See A-9.23.4.2.(2) in Appendix A.)

**1)** Except as permitted by Sentence (5), where strapping is specified in Table A-1, it shall be

- a) not less than 19 mm by 64 mm, nailed to the underside of floor joists,
- b) located not more than 2100 mm from each support or other rows of strapping, and
- c) fastened at each end to a sill or header.

**2)** Where bridging is specified in Table A-1, it shall consist of not less than 19 mm by 64 mm or 38 mm by 38 mm cross bridging located not more than 2 100 mm from each support or other rows of bridging.

**3)** Where bridging and strapping are specified in Table A-1,

- a) bridging shall
  - i) comply with Sentence (2), or
  - ii) consist of 38 mm solid blocking located not more than 2 100 mm from each support or other rows of bridging and securely fastened between the joists, and
- b) except as provided in Sentence (5), strapping shall comply with Sentence (1) and be installed under the bridging.

**4)** Bridging specified in Table A-2 shall consist of

- a) bridging as described in Sentence (2), or
- b) 38 mm solid blocking located not more than 2100 mm from each support or other rows of bridging and securely fastened between the joists.

**5)** Strapping described in Sentence (1) and Clause (3)(b) is not required where

- a) furring strips complying with Table 9.29.3.1. are fastened directly to the joists, or
- b) a panel-type ceiling finish complying with Subsection 9.29.5., 9.29.6., 9.29.7., 9.29.8., or 9.29.9. is attached directly to the joists.

**6)** Where a ceiling attached to wood furring is specified in Table A-2,

- a) the ceiling finish shall consist of gypsum board, plywood or OSB not less than 12.7 mm thick, and
- b) the furring shall be
  - i) 19 mm by 89 mm wood furring spaced at not more than 600 mm o.c., or
  - ii) 19 mm by 64 mm wood furring spaced at not more than 400 mm o.c.

**9.23.9.5. Header Joists**

**1)** Header joists around floor openings shall be doubled when they exceed 1.2 m in length.

**2)** The size of header joists exceeding 3.2 m in length shall be determined by calculations.

**9.23.9.6. Trimmer Joists**

**1)** Trimmer joists around floor openings shall be doubled when the length of the header joist exceeds 800 mm.

**2)** When the header joist exceeds 2 m in length the size of the trimmer joists shall be determined by calculations.

**9.23.9.7. Support of Tail and Header Joists**

**1)** When tail joists and header joists are supported by the floor framing, they shall be supported by suitable joist hangers or nailing in accordance with Table 9.23.3.4.

**9.23.9.8. Support of Walls**

- 1) Non-*loadbearing* walls parallel to the floor joists shall be supported by joists beneath the wall or on blocking between the joists.
- 2) Blocking referred to in Sentence (1) for the support of non-*loadbearing* walls shall be not less than 38 mm by 89 mm lumber, spaced not more than 1.2 m apart.
- 3) Non-*loadbearing* interior walls at right angles to the floor joists are not restricted as to location.
- 4) *Loadbearing* interior walls parallel to floor joists shall be supported by beams or walls of sufficient strength to transfer safely the specified *live loads* to the vertical supports.
- 5) *Loadbearing* interior walls at right angles to floor joists shall be located not more than 900 mm from the joist support when the wall does not support a floor, and not more than 600 mm from the joist support when the wall supports one or more floors, unless the joist size is designed to support such loads.

**9.23.9.9. Cantilevered Floor Joists**

- 1) Floor joists supporting roof loads shall not be cantilevered more than 400 mm beyond their supports where 38 mm by 184 mm joists are used and not more than 600 mm beyond their supports where 38 mm by 235 mm or larger joists are used.
- 2) The cantilevered portions referred to in Sentence (1) shall not support floor loads from other *storeys* unless calculations are provided to show that the design resistances of the cantilevered joists are not exceeded.
- 3) Where cantilevered floor joists described in Sentences (1) and (2) are at right angles to the main floor joists, the tail joists in the cantilevered portion shall extend inward away from the cantilever support a distance equal to not less than 6 times the length of the cantilever, and shall be end nailed to an interior doubled header joist in conformance with Table 9.23.3.4.

**9.23.10. Wall Studs****9.23.10.1. Stud Size and Spacing**

- 1) The size and spacing of studs shall conform to Table 9.23.10.1.

**Table 9.23.10.1.**  
**Size and Spacing of Studs**  
 Forming Part of Sentence 9.23.10.1.(1)

Type of Wall	Supported Loads (including <i>dead loads</i> )	Minimum Stud Size, mm	Maximum Stud Spacing, mm	Maximum Unsupported Height, m
Interior	No load	38 x 38	400	2.4
		38 x 89 flat <sup>(1)</sup>	400	3.6
	Attic not accessible by a stairway	38 x 64	600	3.0
		38 x 64 flat <sup>(1)</sup>	400	2.4
		38 x 89	600	3.6
		38 x 89 flat <sup>(1)</sup>	400	2.4
	Attic accessible by a stairway plus one floor Roof load plus one floor Attic not accessible by stairway plus 2 floors	38 x 89	400	3.6
	Roof load Attic accessible by a stairway Attic not accessible by a stairway plus one floor	38 x 64	400	2.4
		38 x 89	600	3.6
	Attic accessible by a stairway plus 2 floors Roof load plus 2 floors	38 x 89	300	3.6
64 x 89		400	3.6	
38 x 140		400	4.2	
Attic accessible by a stairway plus 3 floors Roof load plus 3 floors	38 x 140	300	4.2	
Exterior	Roof with or without attic storage	38 x 64	400	2.4
		38 x 89	600	3.0
	Roof with or without attic storage plus one floor	38 x 89	400	3.0
		38 x 140	600	3.0
	Roof with or without attic storage plus 2 floors	38 x 89	300	3.0
		64 x 89	400	3.0
		38 x 140	400	3.6
Roof with or without attic storage plus 3 floors	38 x 140	300	1.8	

**Notes to Table 9.23.10.1.:**

(1) See Article 9.23.10.3.

**9.23.10.2. Bracing and Lateral Support**

(See Appendix A.)

**1)** Except as provided in Sentence (2), each exterior wall in each *storey* shall be braced with at least one diagonal brace conforming to Sentence (3).

**2)** Bracing is not required where walls

- a) have an interior finish conforming to the requirements of Section 9.29., or
- b) where the walls are
  - i) clad with panel type siding,
  - ii) diagonally sheathed with lumber, or
  - iii) sheathed with plywood, OSB, waferboard, gypsum or fibreboard sheathing.

**3)** Where bracing is required, it shall

- a) consist of not less than 19 mm by 89 mm wood members,
- b) be applied to the studs at an angle of approximately 45° to the horizontal, and
- c) extend the full height of the wall on each *storey*.

4) Bracing described in Sentence (3) shall be nailed to each stud and wall plate by at least two 63 mm nails.

5) Where *loadbearing* interior walls are not finished in accordance with Sentence (2), blocking or strapping shall be fastened to the studs at midheight to prevent sideways buckling.

#### 9.23.10.3. Orientation of Studs

1) Except as permitted in Sentences (2) and (3), all studs shall be placed at right angles to the wall face.

2) Studs on the flat are permitted to be used in gable ends of roofs that contain only unfinished space or in non-*loadbearing* interior walls within the limits described in Article 9.23.10.1.

3) Wall studs that support only a load from an attic not accessible by a stairway are permitted to be placed on the flat within the limits permitted in Article 9.23.10.1. provided

- a) the studs are clad on not less than one side with plywood, OSB or waferboard sheathing fastened to the face of the studs with a structural adhesive, and
- b) the portion of the roof supported by the studs does not exceed 2.1 m in width.

#### 9.23.10.4. Continuity of Studs

1) Wall studs shall be continuous for the full *storey* height except at openings and shall not be spliced except by fingerjoining with a structural adhesive. (See Appendix A.)

#### 9.23.10.5. Support for Cladding, Sheathing and Finishing Materials

1) Corners and intersections shall be designed to provide adequate support for the vertical edges of interior finishes, sheathing and cladding materials, and in no instance shall exterior corners be framed with less than the equivalent of 2 studs.

2) Where the vertical edges of interior finishes at wall intersections are supported at vertical intervals by blocking or furring, the vertical distance between such supports shall not exceed the maximum distance between supports specified in Section 9.29.

#### 9.23.10.6. Studs at Sides of Openings

1) Where the lintel spanning the opening is more than 3 m long, studs shall be tripled on each side of the opening so that

- a) the two inner studs on each side extend from the bottom of the supported lintel to the top of the bottom wall plate, and
- b) the outer stud on each side extends from the bottom of the top wall plate to the bottom wall plate.

2) Except as provided in Sentence (3), where the lintel spanning the opening is not more than 3 m long, studs shall be doubled on each side of the opening so that

- a) the inner studs on each side extend from the bottom of the supported lintel to the top of the bottom wall plate, and
- b) the outer stud on each side extends from the bottom of the top wall plate to the bottom wall plate.

- 3) Single studs are permitted to be used on either side of openings
  - a) in non-loadbearing interior walls not required to have *fire-resistance ratings*, provided the studs extend from the top wall plate to the bottom wall plate, or
  - b) in loadbearing or non-loadbearing interior or exterior walls, provided
    - i) the opening is less than and within the required stud spacing, and
    - ii) no 2 such openings of full stud-space width are located in adjacent stud spaces.

(See Appendix A.)

## 9.23.11. Wall Plates

### 9.23.11.1. Size of Wall Plates

- 1) Except as provided in Sentence (2), wall plates shall be
  - a) not less than 38 mm thick, and
  - b) not less than the required width of the wall studs.

2) In non-loadbearing walls and in loadbearing walls where the studs are located directly over framing members, the bottom wall plate is permitted to be 19 mm thick.

### 9.23.11.2. Bottom Wall Plates

1) A bottom wall plate shall be provided in all cases.

2) The bottom plate in exterior walls shall not project more than one-third the plate width over the support.

### 9.23.11.3. Top Plates

1) Except as permitted in Sentences (2) to (4), at least 2 top plates shall be provided in loadbearing walls.

2) A single top plate is permitted to be used in a section of a loadbearing wall containing a lintel provided the top plate forms a tie across the lintel.

3) A single top plate is permitted to be used in loadbearing walls where the concentrated loads from ceilings, floors and roofs are not more than 50 mm to one side of the supporting studs and in all non-loadbearing walls.

4) The top plates need not be provided in a section of loadbearing wall containing a lintel provided the lintel is tied to the adjacent wall section with not less than

- a) 75 mm by 150 mm by 0.91 mm thick galvanized steel, or
- b) 19 mm by 89 mm by 300 mm wood splice nailed to each wall section with at least three 63 mm nails.

### 9.23.11.4. Joints in Top Plates

1) Joints in the top plates of loadbearing walls shall be staggered not less than one stud spacing.

2) The top plates in loadbearing walls shall be lapped or otherwise tied at corners and intersecting walls in accordance with Sentence (4).

3) Joints in single top plates used with loadbearing walls shall be tied in accordance with Sentence (4).

4) Ties referred to in Sentences (2) and (3) shall be the equivalent of not less than 75 mm by 150 mm by 0.91 mm thick galvanized steel nailed to each wall with at least three 63 mm nails.

**9.23.12.1.****9.23.12. Framing over Openings****9.23.12.1. Openings in Non-Loadbearing Walls**

**1)** Except as provided in Sentence (2), openings in non-*loadbearing* walls shall be framed with not less than 38 mm material the same width as the studs, securely nailed to adjacent studs.

**2)** Openings for doors in non-*loadbearing* walls required to be *fire separations* with a *fire-resistance rating* shall be framed with the equivalent of at least two 38 mm thick members that are the same width as the wall plates.

**9.23.12.2. Openings in Loadbearing Walls**

**1)** Openings in *loadbearing* walls greater than the required stud spacing shall be framed with lintels designed to carry the superimposed loads to adjacent studs. (See A-9.23.10.6.(3) in Appendix A.)

**2)** Except as provided in Sentence 9.23.12.3.(2), where 2 or more members are used in lintels, they shall be fastened together with not less than 82 mm nails in a double row, with nails not more than 450 mm apart in each row.

**3)** Lintel members are permitted to be separated by filler pieces.

**9.23.12.3. Lintel Spans and Sizes**

**1)** Spans and sizes of wood lintels shall conform to the spans shown in Tables A-12 to A-16

- a) for *buildings of residential occupancy*,
- b) where the wall studs exceed 38 mm by 64 mm in size,
- c) where the spans of supported joists do not exceed 4.9 m, and
- d) where the spans of trusses do not exceed 9.8 m.

**2)** In *loadbearing* exterior and interior walls of 38 mm by 64 mm framing members, lintels shall consist of

- a) 64 mm thick members on edge, or
- b) 38 mm thick and 19 mm thick members fastened together with a double row of nails not less than 63 mm long and spaced not more than 450 mm apart.

**3)** Lintels referred to in Sentence (2)

- a) shall be not less than 50 mm greater in depth than those shown in Tables A-12 to A-16 for the maximum spans shown, and
- b) shall not exceed 2.24 m in length.

**9.23.13. Roof and Ceiling Framing****9.23.13.1. Continuity of Rafters and Joists**

**1)** Roof rafters and joists and ceiling joists shall be continuous or shall be spliced over vertical supports that extend to suitable bearing.

**9.23.13.2. Framing around Openings**

**1)** Roof and ceiling framing members shall be doubled on each side of openings greater than 2 rafter or joist spacings wide.

**9.23.13.3. End Bearing Length**

**1)** The length of end bearing of joists and rafters shall be not less than 38 mm.

**9.23.13.4. Location and Attachment of Rafters**

**1)** Rafters shall be located directly opposite each other and tied together at the peak, or may be offset by their own thickness if nailed to a ridge board not less than 17.5 mm thick.

**2)** Except as permitted in Sentence (3), framing members shall be connected by gusset plates or nailing at the peak in conformance with Table 9.23.3.4.

3) Where the roof framing on opposite sides of the peak is assembled separately, such as in the case of factory-built houses, the roof framing on opposite sides is permitted to be fastened together with galvanized-steel strips not less than 200 mm by 75 mm by 0.41 mm thick spaced not more than 1.2 m apart and nailed at each end to the framing by at least two 63 mm nails.

#### 9.23.13.5. Shaping of Rafters

1) Rafters shall be shaped at supports to provide even bearing surfaces and supported directly above the exterior walls.

#### 9.23.13.6. Hip and Valley Rafters

1) Hip and valley rafters shall be not less than 50 mm greater in depth than the common rafters and not less than 38 mm thick, actual dimension.

#### 9.23.13.7. Intermediate Support for Rafters and Joists

1) Ceiling joists and collar ties of not less than 38 mm by 89 mm lumber are permitted to be assumed to provide intermediate support to reduce the span for rafters and joists where the roof slope is 1 in 3 or greater.

2) Collar ties referred to in Sentence (1) more than 2.4 m long shall be laterally supported near their centres by not less than 19 mm by 89 mm continuous members at right angles to the collar ties.

3) Dwarf walls and struts are permitted to be used to provide intermediate support to reduce the span for rafters and joists.

4) When struts are used to provide intermediate support they shall be not less than 38 mm by 89 mm material extending from each rafter to a *loadbearing* wall at an angle of not less than 45° to the horizontal.

5) When dwarf walls are used for rafter support, they shall be framed in the same manner as *loadbearing* walls and securely fastened top and bottom to the roof and ceiling framing to prevent over-all movement.

6) Solid blocking shall be installed between floor joists beneath dwarf walls referred to in Sentence (5) that enclose finished rooms.

#### 9.23.13.8. Ridge Support

1) Except as provided in Sentence (4), roof rafters and joists shall be supported at the ridge of the roof by

- a) a *loadbearing* wall extending from the ridge to suitable bearing, or
- b) a ridge beam supported by not less than 89 mm length of bearing.

2) Except as provided in Sentence (3), the ridge beam referred to in Sentence (1) shall conform to the sizes and spans shown in Table A-12, provided

- a) the supported rafter or joist length does not exceed 4.9 m, and
- b) the roof does not support any concentrated loads.

3) The ridge beam referred to in Sentence (1) need not comply with Sentence (2) where

- a) the beam is of not less than 38 mm by 140 mm material, and
- b) the beam is supported at intervals not exceeding 1.2 m by not less than 38 mm by 89 mm members extending vertically from the ridge to suitable bearing.

4) When the roof slope is 1 in 3 or more, ridge support need not be provided when the lower ends of the rafters are adequately tied to prevent outward movement.

5) Ties required in Sentence (4) are permitted to consist of tie rods or ceiling joists forming a continuous tie for opposing rafters and nailed in accordance with Table 9.23.13.8.

**Table 9.23.13.8.**  
**Rafter-to-Joist Nailing (Unsupported Ridge)**  
 Forming Part of Sentences 9.23.13.8.(5) and (6)

Roof Slope	Rafter Spacing, mm	Minimum Number of Nails not less than 76 mm Long											
		Rafter Tied to every Joist						Rafter Tied to Joist every 1.2 m					
		Building Width up to 8 m			Building Width up to 9.8 m			Building Width up to 8 m			Building Width up to 9.8 m		
		Roof Snow Load, kPa			Roof Snow Load, kPa			Roof Snow Load, kPa			Roof Snow Load, kPa		
		1.0 or less	1.5	2.0 or more	1.0 or less	1.5	2.0 or more	1.0 or less	1.5	2.0 or more	1.0 or less	1.5	2.0 or more
1 in 3	400	4	5	6	5	7	8	11	—	—	—	—	—
	600	6	8	9	8	—	—	11	—	—	—	—	—
1 in 2.4	400	4	4	5	5	6	7	7	10	—	9	—	—
	600	5	7	8	7	9	11	7	10	—	—	—	—
1 in 2	400	4	4	4	4	4	5	6	8	9	8	—	—
	600	4	5	6	5	7	8	6	8	9	8	—	—
1 in 1.71	400	4	4	4	4	4	4	5	7	8	7	9	11
	600	4	4	5	5	6	7	5	7	8	7	9	11
1 in 1.33	400	4	4	4	4	4	4	4	5	6	5	6	7
	600	4	4	4	4	4	5	4	5	6	5	6	7
1 in 1	400	4	4	4	4	4	4	4	4	4	4	4	5
	600	4	4	4	4	4	4	4	4	4	4	4	5

**6)** Ceiling joists referred to in Sentence (5) shall be fastened together with at least one more nail per joist splice than required for the rafter to joist connection shown in Table 9.23.13.8.

**7)** Members referred to in Sentence (6) are permitted to be fastened together either directly or through a gusset plate.

#### 9.23.13.9. Restraint of Joist Bottoms

**1)** Roof joists supporting a finished ceiling, other than plywood, OSB or waferboard, shall be restrained from twisting along the bottom edges by means of furring, blocking, cross bridging or strapping conforming to Article 9.23.9.3.

#### 9.23.13.10. Ceiling Joists Supporting Roof Load

**1)** Except as permitted in Sentence (2), ceiling joists supporting part of the roof load from the rafters shall be not less than 25 mm greater in depth than required for ceiling joists not supporting part of the roof load.

**2)** When the roof slope is 1 in 4 or less, the ceiling joist sizes referred to in Sentence (1) shall be determined from the span tables for roof joists.

#### 9.23.13.11. Roof Trusses

- 1)** Roof trusses which are not designed in accordance with Part 4 shall
- be capable of supporting a total ceiling load (*dead load plus live load*) of 0.35 kPa plus two and two-thirds times the specified live roof load for 24 h, and
  - not exceed the deflections shown in Table 9.23.13.11. when loaded with the ceiling load plus one and one-third times the specified roof snow load for 1 h.

**Table 9.23.13.11.**  
**Maximum Roof Truss Deflections**  
 Forming Part of Sentence 9.23.13.11.(1)

Truss Span	Type of Ceiling	Maximum Deflection
4.3 m or less	Plaster or gypsum board	1/360 of the span
	Other than plaster or gypsum board	1/180 of the span
Over 4.3 m	Plaster or gypsum board	1/360 of the span
	Other than plaster or gypsum board	1/240 of the span

**2)** The joint connections used in trusses described in Sentence (1) shall be designed in conformance with the requirements in Subsection 4.3.1. (See Appendix A.)

**3)** Where the length of compression web members in roof trusses described in Sentence (1) exceeds 1.83 m, such web members shall be provided with continuous bracing to prevent buckling.

**4)** Bracing required in Sentence (3) shall consist of not less than 19 mm by 89 mm lumber nailed at right angles to the web members near their centres with at least two 63 mm nails for each member.

**5)** Where the ability of a truss design to satisfy the requirements of Sentence (1) is demonstrated by testing, it shall consist of a full scale load test carried out in conformance with CSA S307-M, "Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings."

**6)** Where the ability of a truss design to satisfy the requirements of Sentence (1) is demonstrated by analysis, it shall be carried out in accordance with good engineering practice such as described in "Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses," published by the Truss Plate Institute of Canada.

**9.23.14. Subflooring**

**9.23.14.1. Subflooring Required**

**1)** Subflooring shall be provided beneath finish flooring where the finish flooring does not have adequate strength to support the specified *live loads* (see Subsection 9.30.3.).

**9.23.14.2. Material Standards**

**1)** Except as provided in Sentence (2), wood-based panels for subfloors shall conform to

- a) CSA O121-M, "Douglas Fir Plywood,"
- b) CSA O151, "Canadian Softwood Plywood,"
- c) CSA O153-M, "Poplar Plywood,"
- d) CAN/CSA-O325.0, "Construction Sheathing," or
- e) CSA O437.0, "OSB and Waferboard."

**2)** Particleboard subflooring may be used only where a *building* is constructed in a factory so that the subfloor will not be exposed to the weather.

**3)** Subflooring described in Sentence (2) shall conform to grade D-2 or D-3 in ANSI A208.1, "Particleboard, Mat-Formed Wood."

**4)** Subflooring described in Sentence (2) shall have its upper surface and all edges treated to restrict water absorption, where the subfloor is used in bathrooms, kitchens, laundry rooms or other areas subject to periodic wetting. (See Appendix A.)

**5)** Wood-based panels for subfloors conforming to Clause (1)(e) shall be produced at mills operating a quality assurance programme conforming to CSA O325.2-M, "Quality Assurance for Construction Sheathing."

**9.23.14.3. Edge Support**

**1)** Where the edges of panel-type subflooring are required to be supported (see Sentence 9.30.2.1.(2)), such support shall consist of tongue-and-groove panel edges or not less than 38 mm by 38 mm blocking securely nailed between framing members.

**9.23.14.4. Direction of Installation**

**1)** Plywood subflooring shall be installed with the surface grain at right angles to the joists and with joints parallel to floor joists staggered.

**2)** OSB subflooring conforming to CAN/CSA-O325.0, "Construction Sheathing," or to O-1 and O-2 grades in CSA O437.0, "OSB and Waferboard," and waferboard subflooring conforming to R-1 grade in CSA O437.0 shall be installed so that the direction of face orientation is at right angles to the joists and the joints parallel to the floor joists are staggered. (See Appendix A.)

**9.23.14.5. Subfloor Thickness or Rating**

**1)** Except as provided in Sentences (2) and (3), subfloors shall conform to either Table 9.23.14.5.A. or Table 9.23.14.5.B.

**Table 9.23.14.5.A.  
Thickness of Subflooring**  
Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.7.(1)

Maximum Spacing of Supports, mm	Minimum Thickness, mm			
	Plywood and OSB, O-2 Grade	OSB, O-1 Grade, and Waferboard, R-1 Grade	Particleboard	Lumber
400	15.5	15.9	15.9	17.0
500	15.5	15.9	19.0	19.0
600	18.5	19.0	25.4	19.0

**Table 9.23.14.5.B.  
Rating for Subfloor when Applying CAN/CSA-O325.0**  
Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.7.(1)

Maximum Spacing of Supports, mm	Panel Mark	
	Subfloor	Used with Panel-Type Underlay
400	1F16	2F16
500	1F20	2F20
600	1F24	2F24

**2)** Where the finished flooring consists of not less than 19 mm matched wood strip flooring laid at right angles to joists spaced not more than 600 mm o.c., subflooring shall be permitted to consist of not less than

- a) 12.5 mm thick plywood,
- b) 12.5 mm thick OSB conforming to O-2 grade,
- c) 12.7 mm thick OSB conforming to O-1 grade,
- d) 12.7 mm thick waferboard conforming to R-1 grade, or
- e) OSB conforming to 2R32/2F16 grade.

**3)** Except where the flooring consists of ceramic tiles applied with adhesive, where a separate panel-type underlay or concrete topping is applied to a subfloor on joists spaced not more than 400 mm o.c., the subfloor is permitted to consist of not less than

- a) 12.5 mm thick plywood,
- b) 12.5 mm thick OSB conforming to O-2 grade,
- c) 12.7 mm thick OSB conforming to O-1 grade,

- d) 12.7 mm thick waferboard conforming to R-1 grade, or
- e) OSB conforming to 2R32/2F16 grade.

**9.23.14.6. Annular Grooved Nails**

1) When resilient flooring is applied directly to an OSB, waferboard, particleboard or plywood subfloor, the subfloor shall be fastened to the supports with annular grooved nails.

**9.23.14.7. Lumber Subflooring**

- 1) Lumber subflooring shall be laid at an angle of not less than 45° to the joists.
- 2) Lumber subflooring shall be fully supported at the ends on solid bearing.
- 3) Lumber for subflooring shall be of uniform thickness and not more than 184 mm wide.

**9.23.15. Roof Sheathing****9.23.15.1. Required Roof Sheathing**

1) Except as provided in Section 9.26., continuous lumber or panel-type roof sheathing shall be installed to support the roofing.

**9.23.15.2. Material Standards**

- 1) Wood-based panels used for roof sheathing shall conform to the requirements of
  - a) CSA O121-M, "Douglas Fir Plywood,"
  - b) CSA O151, "Canadian Softwood Plywood,"
  - c) CSA O153-M, "Poplar Plywood,"
  - d) CAN/CSA-O325.0, "Construction Sheathing," or
  - e) CSA O437.0, "OSB and Waferboard."
- 2) Wood-based panels used for roof sheathing conforming to Clause (1)(e) shall be produced at mills operating a quality assurance programme conforming to CSA O325.2-M, "Quality Assurance for Construction Sheathing."

**9.23.15.3. Direction of Installation**

- 1) Plywood roof sheathing shall be installed with the surface grain at right angles to the roof framing.
- 2) OSB roof sheathing conforming to CAN/CSA-O325.0, "Construction Sheathing," or to O-1 and O-2 grades as specified in CSA O437.0, "OSB and Waferboard," shall be installed with the direction of face orientation at right angles to the roof framing members. (See A-9.23.14.4.(2) in Appendix A.)

**9.23.15.4. Joints in Panel-Type Sheathing**

- 1) Panel-type sheathing board shall be applied so that joints perpendicular to the roof ridge are staggered where
  - a) the sheathing is applied with the surface grain parallel to the roof ridge, and
  - b) the thickness of the sheathing is such that the edges are required to be supported.
- 2) A gap of not less than 2 mm shall be left between sheets of plywood, OSB or waferboard.

**9.23.15.5. Lumber Roof Sheathing**

1) Lumber roof sheathing shall not be more than 286 mm wide and shall be applied so that all ends are supported with end joints staggered.

**9.23.15.6. Edge Support**

1) Where panel-type roof sheathing requires edge support, the support shall consist of metal H clips or not less than 38 mm by 38 mm blocking securely nailed between framing members.

**9.23.15.7. Thickness or Rating**

1) The thickness or rating of roof sheathing on a flat roof used as a walking deck shall conform to either Table 9.23.14.5.A. or Table 9.23.14.5.B. for subfloors.

2) The thickness or rating of roof sheathing on a roof not used as a walking deck shall conform to either Table 9.23.15.7.A. or Table 9.23.15.7.B.

3) Asphalt-coated or asphalt-impregnated fibreboard not less than 11.1 mm thick conforming to CAN/ULC-S706, "Wood Fibre Thermal Insulation for Buildings," is permitted to be used as a roof sheathing over supports spaced not more than 400 mm o.c. provided the roofing consists of

- a) a continuous sheet of galvanized steel not less than 0.33 mm in thickness, or
- b) a continuous sheet of aluminum not less than 0.61 mm in thickness.

4) All edges of sheathing described in Sentence (3) shall be supported by blocking or framing.

**Table 9.23.15.7.A.**  
**Thickness of Roof Sheathing**  
 Forming Part of Sentence 9.23.15.7.(2)

Maximum Spacing of Supports, mm	Minimum Thickness, mm				
	Plywood, and OSB, O-2 Grade		OSB, O-1 Grade, and Waferboard, R-1 Grade		Lumber
	Edges Supported	Edges Unsupported	Edges Supported	Edges Unsupported	
300	7.5	7.5	9.5	9.5	17.0
400	7.5	9.5	9.5	11.1	17.0
600	9.5	12.5	11.1	12.7	19.0

**Table 9.23.15.7.B.**  
**Rating for Roof Sheathing When Applying CAN/CSA-O325.0**  
 Forming Part of Sentence 9.23.15.7.(2)

Maximum Spacing of Supports, mm	Panel Mark	
	Edges Supported	Edges Unsupported
400	2R16	1R16
500	2R20	1R20
600	2R24	1R24

**9.23.16. Wall Sheathing**

**9.23.16.1. Required Sheathing**

1) Exterior walls and gable ends shall be sheathed when the exterior cladding requires intermediate fastening between supports or if the exterior cladding requires solid backing.

**9.23.16.2. Thickness, Rating and Material Standards**

1) Where wall sheathing is required, it shall conform to either Table 9.23.16.2.A. or 9.23.16.2.B.

**Table 9.23.16.2.A.**  
**Wall Sheathing Thickness and Specifications**  
 Forming Part of Sentence 9.23.16.2.(1)

Type of Sheathing	Minimum Thickness, mm <sup>(1)</sup>		Material Standards
	With Supports 400 mm o.c.	With Supports 600 mm o.c.	
Fibreboard (insulating)	9.5	11.1	CAN/ULC-S706
Gypsum sheathing	9.5	12.7	CAN/CSA-A82.27-M ASTM C 79 ASTM C 1177/C 1177M ASTM C 1396/C 1396M
Lumber	17.0	17.0	See Table 9.3.2.1.
Mineral Fibre, Rigid Board, Type 2	25	25	CAN/ULC-S702
OSB, O-2 Grade	6.0	7.5	CSA O437.0
OSB, O-1 Grade, and Waferboard, R-1 Grade	6.35	7.9	CSA O437.0
Phenolic, faced	25	25	CAN/CGSB-51.25-M
Plywood (exterior type)	6.0	7.5	CSA O121-M CSA O151 CSA O153-M
Polystyrene, Types 1 and 2	38	38	CAN/ULC-S701
Polystyrene, Types 3 and 4	25	25	CAN/ULC-S701
Polyurethane and Polyisocyanurate Type 1, faced	38	38	CAN/ULC-S704
Polyurethane and Polyisocyanurate Types 2 and 3, faced	25	25	CAN/ULC-S704

**Notes to Table 9.23.16.2.A.:**

<sup>(1)</sup> See also Sentences 9.27.5.1.(2) to (4).

**2)** Wood-based panels used for wall sheathing conforming to Table 9.23.16.2.B. shall be produced at mills operating a quality assurance programme conforming to CSA O325.2-M, "Quality Assurance for Construction Sheathing."

**Table 9.23.16.2.B.**  
**Rating for Wall Sheathing when Applying CAN/CSA-O325.0**  
 Forming Part of Sentence 9.23.16.2.(1)

Maximum Spacing of Supports, mm	Panel Mark
400	W16
500	W20
600	W24

**9.23.16.3. Attachment of Cladding to Sheathing**

**1)** Gypsum sheathing, rigid insulation and fibreboard shall not be used for the attachment of cladding materials.

**9.23.16.4. Lumber Sheathing**

**1)** Lumber wall sheathing shall be applied so that all ends are supported.

**2)** Where lumber wall sheathing is required to provide bracing according to Article 9.23.10.2., it shall be applied with end joints staggered.

**9.23.16.5. Joints in Panel-Type Sheathing**

1) A gap of not less than 2 mm shall be left between sheets of plywood, OSB, waferboard or fibreboard.

**9.23.16.6. Mansard Style Roofs**

1) Where the bottom portions of mansard style roofs are vented, the vertical framing members behind the sloping portions shall be considered on the same basis as exterior wall studs and shall conform to Articles 9.27.3.2. to 9.27.3.6.

**Section 9.24. Sheet Steel Stud Wall Framing****9.24.1. General****9.24.1.1. Application**

1) This Section applies to sheet steel studs for use in non-*loadbearing* exterior and interior walls.

2) Where *loadbearing* steel studs are used, they shall be designed in conformance with Part 4.

**9.24.1.2. Material Standards**

1) Steel studs and runners shall conform to CAN/CGSB-7.1, "Lightweight Steel Wall Framing Components."

**9.24.1.3. Metal Thickness**

1) Metal thickness specified in this Section shall be the minimum base steel thickness exclusive of coatings.

**9.24.1.4. Screws**

1) Screws for the application of cladding, sheathing or interior finish materials to steel studs, runners and furring channels shall conform to ASTM C 1002, "Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs."

**9.24.1.5. Cladding, Sheathing and Interior Finish Required**

1) Cladding or sheathing, and interior finish shall be installed on steel stud framing and shall be fastened with screws

- a) spaced at the appropriate spacing described in Section 9.29., and
- b) penetrating not less than 10 mm through the metal.

**9.24.2. Size of Framing****9.24.2.1. Size and Spacing of Studs in Interior Walls**

1) Except as required in Articles 9.24.2.3. and 9.24.2.4., the size and spacing of steel studs for non-*loadbearing* interior walls shall conform to Table 9.24.2.1.

**Table 9.24.2.1.**  
**Steel Studs for Non-Loadbearing Interior Walls**  
 Forming Part of Sentence 9.24.2.1.(1)

Minimum Stud Size, mm	Maximum Stud Spacing, mm	Maximum Wall Height, m
30 x 40	400	3.0
	600	2.7
30 x 63	400	4.0
	600	3.6
30 x 91	400	5.2
	600	4.9

#### 9.24.2.2. Thickness of Studs

1) Except as required in Article 9.24.2.4., steel studs in non-loadbearing interior walls shall have a metal thickness of not less than 0.46 mm.

#### 9.24.2.3. Runners

1) Runners for interior and exterior non-loadbearing walls shall have a thickness not less than the thickness of the corresponding studs and shall have not less than 30 mm flanges.

#### 9.24.2.4. Openings in Fire Separations

1) Where openings for doors in non-loadbearing fire separations required to have a fire-resistance rating do not exceed 1200 mm in width,

- a) the width of steel studs shall be not less than 63 mm, and
- b) the metal thickness shall be not less than 0.46 mm.

2) Where openings described in Sentence (1) exceed 1200 mm in width,

- a) the width of steel studs shall be not less than 91 mm, and
- b) the metal thickness shall be not less than 0.85 mm.

3) The distance to the first stud beyond the jamb of any door opening in a fire separation required to have a fire-resistance rating shall not exceed 400 mm.

4) Where the distance between the framing over the opening referred to in Sentence (3) and the top runner exceeds 400 mm in such walls, intermediate support shall be installed at intervals of not more than 400 mm above the opening.

#### 9.24.2.5. Size and Spacing of Studs in Exterior Walls

1) The size and spacing of non-loadbearing steel studs for exterior walls shall conform to Table 9.24.2.5.

**Table 9.24.2.5.**  
**Size and Spacing of Steel Studs for Non-Loadbearing Exterior Walls**  
 Forming Part of Sentence 9.24.2.5.(1)

Minimum Stud Size, mm	Minimum Metal Thickness, mm	Maximum Stud Length, m		
		Spacing of Studs		
		300 mm (o.c.)	400 mm (o.c.)	600 mm (o.c.)
30 × 91	0.53	3.0	2.4	—
30 × 91	0.69	3.3	2.7	2.4
30 × 91	0.85	3.6	3.0	2.7
30 × 91	1.0	4.0	3.3	3.0

### 9.24.3. Installation

#### 9.24.3.1. Installation of Runners

- 1) Runners shall be provided at the tops and bottoms of walls.
- 2) Runners required in Sentence (1) shall be securely attached to the *building* at approximately 50 mm from the ends, and at intervals of not more than 600 mm o.c. for interior walls and 300 mm o.c. for exterior walls.
- 3) Fasteners used for attachment described in Sentence (2) shall consist of the equivalent of 63 mm nails or 25 mm screws.
- 4) Studs at openings and which are not full wall height shall be supported by a runner at the ends of the studs, securely fastened to the full length studs at the sides of the opening.

#### 9.24.3.2. Fire-Rated Walls

- 1) Steel studs used in walls required to have a *fire-resistance rating* shall be installed so that there is not less than a 12 mm clearance between the top of the stud and the top of the runner to allow for expansion in the event of fire.
- 2) Except as provided in Article 9.24.3.6., studs in walls referred to in Sentence (1) shall not be attached to the runners in a manner that will prevent such expansion.
- 3) Framing above doors with steel door frames in *non-loadbearing fire separations* required to have a *fire-resistance rating* shall consist of 2 runners on the flat fastened back to back. (See Appendix A.)
- 4) The upper runner required in Sentence (3) shall be bent at each end to extend upwards not less than 150 mm and fastened to the adjacent studs.
- 5) A gypsum board filler piece, the width and length of the runner, shall be provided between the door frame referred to in Sentence (3) and the adjacent runner.

#### 9.24.3.3. Orientation of Studs

- 1) Steel studs shall be installed with webs at right angles to the wall face and, except at openings, shall be continuous for the full wall height.

#### 9.24.3.4. Support for Cladding Materials

- 1) Corners and intersections of walls shall be constructed to provide support for the cladding materials.

#### 9.24.3.5. Framing around Openings

- 1) Studs shall be doubled on each side of every opening where such openings involve more than one stud space, and shall be tripled where the openings in exterior walls exceed 2.4 m in width.

2) Studs described in Sentence (1) shall be fastened together by screws, crimping or welding to act as a single structural unit in resisting transverse loads.

#### 9.24.3.6. Attachment of Studs to Runners

1) Studs shall be attached to runners by screws, crimping or welding around wall openings and elsewhere where necessary to keep the studs in alignment during construction.

2) Where clearance for expansion is required in Article 9.24.3.2., attachment required in Sentence (1) shall be applied between studs and bottom runners only.

#### 9.24.3.7. Openings for Fire Dampers

1) Openings for *fire dampers* in *non-loadbearing fire separations* required to have a *fire-resistance rating* shall be framed with double studs on each side of the opening.

2) The sill and header for openings described in Sentence (1) shall consist of a runner track with right angle bends made on each end so as to extend 300 mm above the header or below the sill and fastened to the studs.

3) The openings described in Sentence (1) shall be lined with a layer of gypsum board not less than 12.7 mm thick fastened to stud and runner webs.

## Section 9.25. Heat Transfer, Air Leakage and Condensation Control

### 9.25.1. Scope

#### 9.25.1.1. Application

1) This Section applies to thermal insulation and measures to control heat transfer, air leakage and condensation.

2) Insulation and sealing of heating and ventilating ducts shall conform to Sections 9.32. and 9.33.

#### 9.25.1.2. General

(See Appendix A.)

1) Sheet and panel-type materials shall be installed in accordance with Sentence (2), if the material

- a) has an air leakage characteristic less than  $0.1 \text{ L}/(\text{s}\cdot\text{m}^2)$  at 75 Pa,
- b) has a water vapour permeance less than  $60 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$  when measured in accordance with ASTM E 96, "Water Vapor Transmission of Materials," using the desiccant method (dry cup), and
- c) is incorporated into a *building* assembly required by Article 9.25.2.1. to be insulated.

2) Sheet and panel-type material described in Sentence (1) shall be installed

- a) on the warm face of the assembly (see also Article 9.25.4.2.),
- b) except as provided in Sentences (3) to (5), at a location where the ratio between the total thermal resistance of all materials outboard of its innermost impermeable surface and the total thermal resistance of all materials inboard of that surface is not less than that required by Table 9.25.1.2., or
- c) outboard of an air space that is vented to the outdoors and, for walls, drained.

**Table 9.25.1.2.**  
**Ratio of Outboard to Inboard Thermal Resistance**  
 Forming Part of Sentence 9.25.1.2.(2)

Heating Degree-Days of <i>Building Location</i> <sup>(1)</sup> , Celsius degree-days	Minimum Ratio, Total Thermal Resistance Outboard of Material's Inner Surface to Total Thermal Resistance Inboard of Material's Inner Surface
up to 4999	0.20
5000 to 5999	0.30
6000 to 6999	0.35
7000 to 7999	0.40
8000 to 8999	0.50
9000 to 9999	0.55
10000 to 10999	0.60
11000 to 11999	0.65
12000 or higher	0.75

**Notes to Table 9.25.1.2.:**

<sup>(1)</sup> See Sentence 1.1.3.1.(1).

**3)** Wood-based sheathing materials not more than 12.5 mm thick and complying with Article 9.23.16.2. need not comply with Sentence (1).

**4)** Where the mild climate indicator, determined in accordance with Sentence (6), is greater than 6 300, the position of low air- and vapour-permeance materials within the assembly relative to the position of materials providing thermal resistance shall be determined according to Part 5, where

- a) the intended use of the interior space requires the indoor relative humidity to be maintained above 35% over the heating season and the ventilating and air-conditioning system is designed to maintain that relative humidity, or
- b) the intended use of the interior space will result in an average monthly indoor relative humidity above 35% over the heating season and the ventilating and air-conditioning system does not have the capacity to reduce the average monthly relative humidity to 35% or less over that period.

**5)** Where the mild climate indicator, determined in accordance with Sentence (6), is less than or equal to 6 300, the position of low air- and vapour-permeance materials within the assembly relative to the position of materials providing thermal resistance shall be determined according to Part 5, where

- a) the intended use of the interior space requires the indoor relative humidity to be maintained above 60% over the heating season and the ventilating and air-conditioning system is designed to maintain that relative humidity, or
- b) the intended use of the interior space will result in an average monthly indoor relative humidity above 60% over the heating season and the ventilating and air-conditioning system does not have the capacity to reduce the average monthly relative humidity to 60% over that period.

**6)** The mild climate indicator (MCI) shall be calculated according to the following formula:

$$\text{MCI} = \text{abs}(2.5\% \text{ JMT}) \bullet 200 + \text{DD}$$

where

abs(2.5% JMT) = absolute value of 2.5% January mean temperature, and

DD = degree-days

**7)** For walls, the air space described in Clause (2)(c) shall comply with Clause 9.27.2.2.(1)(a).

**9.25.2. Thermal Insulation**

**9.25.2.1. Thermal Insulation Requirements**

**1)** Except as permitted by Sentence (2), thermal insulation conforming with Table 9.25.2.1. shall be included in exterior assemblies of a heated *building of residential occupancy* and of a heated garage serving a *building of residential occupancy*.

**Table 9.25.2.1.**  
**Thermal Insulation Requirements**  
Forming Part of Sentence 9.25.2.1.(1)

Location of Assembly in Which Insulation is Placed	Minimum Thermal Resistance RSI	
Wall assembly (except <i>basements</i> )	<i>Building exterior</i>	2.1
	Between <i>building</i> and attached garage	2.1
	Exterior of heated garage	2.1
<i>Basement</i> and crawl space	Perimeter walls - top to 600 mm below grade	1.4
Floor Assembly	Perimeter	2.1
	Exposed cantilevers	3.5
Roof - ceiling assembly	<i>Building - general</i>	6.0
	Heated garage	6.0

**2)** Where alternative measures, including solar heating, are provided to meet the intent of the thermal insulation requirements of Sentence (1), the *building* need not conform to Sentence (1).

**9.25.2.2. Insulation Materials**

**1)** Except as required in Sentence (2), thermal insulation shall conform to the requirements of

- a) CAN/CGSB-51.25-M, "Thermal Insulation, Phenolic, Faced,"
- b) CGSB 51-GP-27M, "Thermal Insulation, Polystyrene, Loose Fill,"
- c) CAN/ULC-S701, "Thermal Insulation, Polystyrene, Boards and Pipe Covering,"
- d) CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings,"
- e) CAN/ULC-S703, "Cellulose Fibre Insulation (CFI) for Buildings,"
- f) CAN/ULC-S704, "Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced,"
- g) CAN/ULC-S705.1, "Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material - Specification," or
- h) CAN/ULC-S706, "Wood Fibre Thermal Insulation for Buildings."

**2)** The *flame-spread ratings* requirements contained in the standards listed in Sentence (1) shall not apply. (See Appendix A.)

**3)** Insulation in contact with the ground shall be inert to the action of *soil* and water and shall be such that its insulative properties are not significantly reduced by moisture.

**9.25.2.3. Installation of Thermal Insulation**

**1)** Insulation shall be installed so that there is a reasonably uniform insulating value over the entire face of the insulated area.

**2)** Insulation shall be applied to the full width and length of the space between furring or framing.

- 3) Except where the insulation provides the principal resistance to air leakage, thermal insulation shall be installed so that at least one face is in full and continuous contact with an element with low air permeance. (See Appendix A.)
- 4) Insulation on the interior of *foundation* walls enclosing a crawl space shall be applied so that there is not less than 50 mm clearance above the crawl space floor, if the insulation is of a type that may be damaged by water.
- 5) Insulation around concrete slabs-on-ground shall be located so that heat from the *building* is not restricted from reaching the ground beneath the perimeter, where exterior walls are not supported by footings extending below frost level.
- 6) Where insulation is exposed to the weather and subject to mechanical damage, it shall be protected with not less than
  - a) 6 mm asbestos-cement board,
  - b) 6 mm preservative-treated plywood, or
  - c) 12 mm cement parging on wire lath applied to the exposed face and edge.
- 7) Insulation located in areas where it may be subject to mechanical damage shall be protected by a covering such as gypsum board, plywood, particleboard, OSB, waferboard or hardboard.
- 8) Insulation in factory-built *buildings* shall be installed so that it will not become dislodged during transportation.
- 9) Insulation shields shall be installed around *chimneys* and *gas vents* to ensure that appropriate clearances are maintained when insulation is used in attics.
- 10) Insulation shields required in Sentence (9) shall be constructed of *noncombustible* material of sufficient thickness so that they will not be deformed during installation and shall be designed so that the appropriate clearance is maintained automatically.

#### 9.25.2.4. Installation of Loose-Fill Insulation

- 1) Except as provided in Sentences (2) to (6), loose-fill insulation shall be used on horizontal surfaces only.
- 2) Except where there is no attic space above the insulation, where loose-fill insulation is installed in an unconfined sloped space, such as an attic space over a sloped ceiling, the supporting slope shall not be more than
  - a) 4.5 in 12 for mineral fibre or cellulose fibre insulation, and
  - b) 2.5 in 12 for other types of insulation.
- 3) Loose-fill insulation is permitted to be used in wood-frame walls of existing *buildings*. (See Appendix A.)
- 4) Where blown-in insulation is installed in above-ground or below-ground wood-frame walls of new *buildings*,
  - a) the density of the installed insulation shall be sufficient to preclude settlement,
  - b) the insulation shall be installed behind a membrane that will permit visual inspection prior to the installation of the interior finish,
  - c) the insulation shall be installed in a manner that will not interfere with the installation of the interior finish, and
  - d) no water shall be added to the insulation, unless it can be shown that the added water will not adversely affect other materials in the assembly.
- 5) Water repellent loose-fill insulation is permitted to be used between the outer and inner wythes of masonry *cavity walls*. (See Appendix A.)
- 6) Where soffit venting is used, measures shall be taken
  - a) to prevent loose-fill insulation from blocking the soffit vents and to maintain an open path for circulation of air from the vents into the *attic or roof space*, and
  - b) to minimize airflow into the insulation near the soffit vents to maintain the thermal performance of the material. (See Article 9.19.1.3.)

**9.25.2.5. Installation of Spray-Applied Polyurethane**

1) Spray-applied polyurethane insulation shall be installed in accordance with CAN/ULC-S705.2, "Thermal Insulation – Spray-Applied Rigid Polyurethane Foam, Medium Density – Application."

**9.25.3. Air Barrier Systems****9.25.3.1. Required Barrier to Air Leakage**

1) Thermally insulated wall, ceiling and floor assemblies shall be constructed so as to include an *air barrier system* that will provide a continuous barrier to air leakage

- from the interior of the *building* into wall, floor, *attic* or *roof spaces*, sufficient to prevent excessive moisture condensation in such spaces during the winter, and
- from the exterior inward sufficient to prevent moisture condensation on the room side during winter and to ensure comfortable conditions for the occupants.

(See Appendix A.)

2) Where the air barrier protection consists of a material with a water vapour permeance less than the maximum permitted for Type 2 *vapour barriers* in Sentence 9.25.4.2.(4), it shall be installed in a location where the temperature will not be below the dew point of the interior air when the exterior temperature is 10°C above the 1% January design temperature.

**9.25.3.2. Air Barrier System Properties**

(See Appendix A.)

1) *Air barrier systems* shall possess the characteristics necessary to provide an effective barrier to air infiltration and exfiltration under differential air pressure due to stack effect, mechanical systems or wind.

2) Where polyethylene sheet is used to provide airtightness in the *air barrier system*, it shall conform to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction."

**9.25.3.3. Continuity of the Air Barrier System**

1) Where the *air barrier system* consists of an air-impermeable panel-type material, all joints shall be sealed to prevent air leakage.

2) Where the *air barrier system* consists of flexible sheet material, all joints shall be

- sealed, or
- lapped not less than 100 mm and clamped, such as between framing members, furring or blocking and rigid panels.

3) Where an interior wall meets an exterior wall, ceiling, floor or roof required to be provided with air barrier protection, the *air barrier system* shall extend across the intersection.

4) Where an interior wall projects through a ceiling or extends to become an exterior wall, spaces in the wall shall be blocked to provide continuity across those spaces with the *air barrier system* in the abutting walls or ceiling.

5) Where an interior floor projects through an exterior wall or extends to become an exterior floor, continuity of the *air barrier system* shall be maintained from the abutting walls across the floor assembly.

6) Penetrations of the *air barrier system*, such as those created by the installation of doors, windows, electrical wiring, electrical boxes, piping or ductwork, shall be sealed to maintain the integrity of the *air barrier system* over the entire surface.

7) Access hatches installed through assemblies constructed with an *air barrier system* shall be weatherstripped around their perimeters to prevent air leakage.

**8)** Clearances between *chimneys* or *gas vents* and the surrounding construction that would permit air leakage from within the *building* into a wall or *attic* or *roof space* shall be sealed by *noncombustible* material to prevent such leakage.

## 9.25.4. Vapour Barriers

### 9.25.4.1. Required Barrier to Vapour Diffusion

**1)** Thermally insulated wall, ceiling and floor assemblies shall be constructed with a *vapour barrier* so as to provide a barrier to diffusion of water vapour from the interior into wall spaces, floor spaces or *attic* or *roof spaces*.

### 9.25.4.2. Vapour Barrier Materials

**1)** Except as provided in Sentences (2) and (3), *vapour barriers* shall have a permeance not greater than  $60 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$  measured in accordance with ASTM E 96, "Water Vapor Transmission of Materials," using the desiccant method (dry cup).

**2)** Where the mild climate indicator, determined in accordance with Sentence 9.25.1.2.(6), is greater than 6300, *vapour barriers* shall be designed according to Part 5, where

- a) the intended use of the interior space requires the indoor relative humidity to be maintained above 35% over the heating season and the ventilating and air-conditioning system is designed to maintain that relative humidity, or
- b) the intended use of the interior space results in an average monthly indoor relative humidity above 35% over the heating season and the ventilating and air-conditioning system does not have the capacity to reduce the average monthly relative humidity to 35% or less over that period.

(See A-9.25.1.2. in Appendix A.)

**3)** Where the mild climate indicator, determined in accordance with Sentence 9.25.1.2.(6), is less than or equal to 6300, *vapour barriers* shall be designed according to Part 5, where

- a) the intended use of the interior space requires the indoor relative humidity to be maintained above 60% over the heating season and the ventilating and air-conditioning system is designed to maintain that relative humidity, or
- b) the intended use of the interior space results in an average monthly indoor relative humidity above 60% over the heating season and the ventilating and air-conditioning system does not have the capacity to reduce the average monthly relative humidity to 60% over that period.

(See A-9.25.1.2. in Appendix A.)

**4)** Where polyethylene is installed to serve only as the *vapour barrier*, it shall comply with Clause 4.4, Thermal Stability, and Clause 5.7, Oxidative Induction Time, of CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction."

**5)** Membrane-type *vapour barriers* other than polyethylene shall conform to the requirements of CAN/CGSB-51.33-M, "Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction."

**6)** Where a coating is applied to gypsum board to function as the *vapour barrier*, the permeance of the coating shall be determined in accordance with CAN/CGSB-1.501-M, "Method for Permeance of Coated Wallboard."

### 9.25.4.3. Installation of Vapour Barriers

**1)** *Vapour barriers* shall be installed to protect the entire surfaces of thermally insulated wall, ceiling and floor assemblies.

**2)** *Vapour barriers* shall be installed sufficiently close to the warm side of insulation to prevent condensation at design conditions. (See Appendix A.)

## Section 9.26. Roofing

### 9.26.1. General

#### 9.26.1.1. Purpose of Roofing

1) Roofs shall be protected with roofing, including flashing, installed to shed rain effectively and prevent water due to ice damming from entering the roof.

2) For the purpose of Sentence (1), roofs shall include platforms that effectively serve as roofs with respect to the accumulation or drainage of precipitation. (See Appendix A.)

#### 9.26.1.2. Alternate Installation Methods

1) Methods described in CAN3-A123.51-M, "Asphalt Shingle Application on Roof Slopes 1:3 and Steeper," or CAN3-A123.52-M, "Asphalt Shingle Application on Roof Slopes 1:6 to Less Than 1:3," are permitted to be used for asphalt shingle applications not described in this Section.

### 9.26.2. Roofing Materials

#### 9.26.2.1. Material Standards

- 1) Roofing materials shall conform to
  - a) CAN/CGSB-37.4-M, "Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing,"
  - b) CAN/CGSB-37.5-M, "Cutback Asphalt Plastic, Cement,"
  - c) CAN/CGSB-37.8-M, "Asphalt, Cutback, Filled, for Roof Coating,"
  - d) CGSB 37-GP-9Ma, "Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing,"
  - e) CGSB 37-GP-21M, "Tar, Cutback, Fibrated, for Roof Coating,"
  - f) CAN/CGSB-37.50-M, "Hot-Applied, Rubberized Asphalt for Roofing and Waterproofing,"
  - g) CGSB 37-GP-52M, "Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric,"
  - h) CAN/CGSB-37.54, "Polyvinyl Chloride Roofing and Waterproofing Membrane,"
  - i) CGSB 37-GP-56M, "Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing,"
  - j) CGSB 41-GP-6M, "Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced,"
  - k) CAN/CGSB-51.32-M, "Sheathing, Membrane, Breather Type,"
    - 1) CAN/CSA-A123.1, "Asphalt Shingles Made From Organic Felt and Surfaced with Mineral Granules,"
  - m) CSA A123.2, "Asphalt-Coated Roofing Sheets,"
  - n) CAN/CSA-A123.3, "Asphalt Saturated Organic Roofing Felt,"
  - o) CAN/CSA-A123.4, "Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems,"
  - p) CAN/CSA-A123.5, "Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules,"
  - q) CSA A123.17, "Asphalt Glass Felt Used in Roofing and Waterproofing,"
  - r) CAN/CSA-A220 Series-M, "Concrete Roof Tiles,"
  - s) CSA O118.1, "Western Cedars Shakes and Shingles,"
  - t) CSA O118.2-M, "Eastern White Cedar Shingles," or
  - u) CSA O118.3, "Northern Pine Tapersawn Shakes."

#### 9.26.2.2. Nails

1) Nails used for roofing shall be corrosion-resistant roofing or shingle nails conforming to CSA B111, "Wire Nails, Spikes and Staples."

**2)** Nails shall have sufficient length to penetrate through, or 12 mm into, roof sheathing.

**3)** Nails used with asphalt roofing shall have a head diameter of not less than 9.5 mm and a shank thickness of not less than 2.95 mm.

**4)** Nails used with wood shingles or shakes shall have a head diameter of not less than 4.8 mm and a shank thickness of not less than 2.0 mm and shall be stainless steel, aluminum or hot-dipped galvanized. (See Appendix A.)

### 9.26.2.3. Staples

**1)** Staples used to apply asphalt or wood shingles shall be corrosion-resistant and shall be driven with the crown parallel to the eaves.

**2)** Staples used with asphalt shingles shall be not less than 19 mm long, 1.6 mm diam or thickness, with not less than a 25 mm crown, except that an 11 mm crown may be used as provided in Sentence 9.26.7.4.(2).

**3)** Staples used with wood shingles shall be not less than 29 mm long, 1.6 mm diam or thickness, with not less than a 9.5 mm crown and shall be stainless steel or aluminum. (See A-9.26.2.2.(4) in Appendix A.)

## 9.26.3. Slope of Roofed Surfaces

### 9.26.3.1. Slope

**1)** Except as provided in Sentences (2) and (3), the slopes on which roof coverings may be applied shall conform to Table 9.26.3.1.

**2)** Asphalt and gravel or coal tar and gravel roofs may be constructed with lower slopes than required in Sentence (1) when effective drainage is provided by roof drains located at the lowest points on the roofs.

**3)** Profiled metal roof cladding systems specifically designed for low-slope applications are permitted to be installed with lower slopes than required by Sentence (1), provided they are installed in conformance with the manufacturer's written recommendations.

**4)** Except where back-slope will not adversely affect adjacent supported or supporting constructions due to water ingress, roofs and constructions that effectively serve as roofs shall be constructed with sufficient slope away from

- a) exterior walls, and
- b) *guards* that are connected to the roof, or to a construction that effectively serves as a roof, by more than pickets or posts.

(See A-9.26.1.1.(2), A-9.26.4.1. and A-9.27.3.8.(4) in Appendix A.)

**5)** The slope required by Sentence (4) shall be sufficient to maintain a positive slope

- a) after expected shrinkage of the *building* frame, where these surfaces are supported by exterior walls and exterior columns (see A-9.27.3.8.(4) in Appendix A), and
- b) once design loading is taken into consideration, where these surfaces are cantilevered from exterior walls.

**Table 9.26.3.1.**  
**Roofing Types and Slope Limits**  
 Forming Part of Sentence 9.26.3.1.(1)

Type of Roofing	Minimum Slope	Maximum Slope
Asbestos-Cement Corrugated Sheets	1 in 4	no limit
Asphalt Shingles		
Low slope application	1 in 6	no limit
Normal application	1 in 3	no limit
Built-up Roofing		
Asphalt base (without gravel)	1 in 25	1 in 2
Asphalt base (gravelled)	1 in 50 <sup>(1)</sup>	1 in 4
Coal-tar base (gravelled)	1 in 50 <sup>(1)</sup>	1 in 25
Cold process	1 in 25	1 in 1.33
Cedar Shakes	1 in 3	no limit
Clay Tile	1 in 2	no limit
Glass Fibre Reinforced Polyester Roofing Panels	1 in 4	no limit
Modified Bituminous Membranes	1 in 50	1 in 4
Profiled Metal Roofing	1 in 4 <sup>(1)</sup>	no limit
Roll Roofing		
480 mm wide selvage asphalt roofing	1 in 6	no limit
Cold application felt	1 in 50	1 in 1.33
Smooth and mineral surfaced	1 in 4	no limit
Sheet Metal Shingles	1 in 4 <sup>(1)</sup>	no limit
Slate Shingles	1 in 2	no limit
Wood Shingles	1 in 4	no limit

**Notes to Table 9.26.3.1.:**

(1) See Sentence 9.26.3.1.(3).

**9.26.4. Flashing at Intersections**

**9.26.4.1. Required Flashing at Intersections**

(See Appendix A and A-9.26.1.1.(2) in Appendix A.)

**1)** Except where the omission of flashing will not adversely affect adjacent supported or supporting constructions, flashing shall be installed at junctions between roofs and

- a) walls that rise above the roof, and
- b) *guards* that are connected to the roof by more than pickets or posts.

**2)** For the purpose of Sentence (1), roofs shall include platforms that effectively serve as roofs with respect to the accumulation or drainage of precipitation.

**9.26.4.2. Materials**

- 1)** Sheet metal flashing shall consist of not less than
- a) 1.73 mm thick sheet lead,
  - b) 0.33 mm thick galvanized steel,
  - c) 0.33 mm thick copper,
  - d) 0.35 mm thick zinc, or
  - e) 0.48 mm thick aluminum.

**9.26.4.3. Valley Flashing**

- 1) Where sloping surfaces of shingled roofs intersect to form a valley, the valley shall be flashed.
- 2) Valley flashing shall be installed over continuous sheathing.
- 3) Closed valleys shall not be used with rigid shingles on slopes of less than 1 in 1.2.
- 4) Open valleys shall be flashed with at least
  - a) one layer of sheet metal not less than 600 mm wide, or
  - b) 2 layers of roll roofing.
- 5) The bottom layer of roofing required in Sentence (4) shall consist of at least Type S smooth roll roofing or Type M mineral surface roll roofing (mineral surface down) not less than 457 mm wide, centred in the valley and fastened with nails spaced not more than 450 mm o.c. located 25 mm away from the edges.
- 6) The top layer of roofing required in Sentence (4) shall consist of at least Type M mineral surface roll roofing (mineral surface up), 914 mm wide, centred in the valley, applied over a 100 mm wide strip of cement along each edge of the bottom layer, and fastened with a sufficient number of nails to hold it in place until the shingles are applied.

**9.26.4.4. Intersection of Shingle Roofs and Masonry**

- 1) The intersection of shingle roofs and masonry walls or *chimneys* shall be protected with flashing.
- 2) Counter flashing required in Sentence (1) shall be embedded not less than 25 mm in the masonry and shall extend not less than 150 mm down the masonry and lap the lower flashing not less than 100 mm.
- 3) Flashing along the slopes of a roof described in Sentence (1) shall be stepped so that there is not less than a 75 mm head lap in both the lower flashing and counter flashing.
- 4) Where the roof described in Sentence (1) slopes upwards from the masonry, the flashing shall extend up the roof slope to a point equal in height to the flashing on the masonry, but not less than 1.5 times the shingle exposure.

**9.26.4.5. Intersection of Shingle Roofs and Walls other than Masonry**

- 1) The intersection of shingle roofs and walls clad with other than masonry shall be protected with flashing.
- 2) Flashing required in Sentence (1) shall be installed so that it extends up the wall not less than 75 mm behind the sheathing paper, and extends not less than 75 mm horizontally.
- 3) Along the slope of the roof, the flashing required in Sentence (1) shall be stepped with not less than a 75 mm head lap.

**9.26.4.6. Intersection of Built-Up Roofs and Masonry**

- 1) The intersection of built-up roofs with masonry walls or *chimneys* shall have a cant strip at the intersection, and a roofing membrane shall be mopped over the cant strip and not less than 150 mm up the wall.
- 2) Counter flashing installed over the intersection referred to in Sentence (1) shall be embedded not less than 25 mm in the masonry, and shall be of sufficient length to extend down not less than 150 mm, lapping the membrane on the masonry not less than 100 mm.

**9.26.4.7. Intersection of Built-Up Roofs and Walls other than Masonry**

- 1) The intersection of built-up roofs with walls clad with other than masonry shall have a cant strip at the intersection.

2) The roofing membrane shall be mopped over the cant strip referred to in Sentence (1).

3) Flashing plies shall extend not less than 150 mm up the wall referred to in Sentence (1) behind the sheathing paper.

#### 9.26.4.8. Chimney Saddles

1) Except as otherwise permitted in Sentence (5), *chimney* saddles shall be installed where the upper side of a *chimney* on a sloping roof is more than 750 mm wide.

2) *Chimney* saddles shall be covered with sheet metal or roofing material of weight and quality equivalent to the roofing.

3) Saddles shall be flashed where they intersect the roof.

4) The intersection of the saddle and the *chimney* shall be flashed and counterflashed as described in Article 9.26.4.4.

5) A *chimney* saddle need not be installed if the intersection between the *chimney* and roof is protected by sheet metal flashing that extends up the *chimney* to a height equal to at least one sixth the width of the *chimney*, but not less than 150 mm, and up the roof slope to a point equal in height to the flashing on the *chimney*, but not less than 1.5 times the shingle exposure.

6) Flashing described in Sentence (5) at the *chimney* shall be counterflashed as required by Article 9.26.4.4.

#### 9.26.4.9. Roof Penetrations

1) Where a pipe or duct penetrates a roof, the joint between the pipe or duct and the roof shall be flashed and be made watertight.

2) Except as required by Sentence (3), flashing for a pipe or duct shall be rectangular and shall be not less than 500 mm in length by 500 mm in width and, if sleeve flashing is used, the sleeve shall extend not less than 150 mm above the roof at every point of the pipe or duct.

3) The flashing flange for a pipe or duct shall extend

- a) not less than 125 mm beyond a pipe or duct penetrating a sloping roof, and
- b) not less than 250 mm beyond a pipe or duct penetrating a flat roof.

4) Flashing for a pipe or duct penetrating a roof shall be

- a) lead sheet with a mass of not less than 25 kg/m<sup>2</sup>,
- b) copper sheet with a mass of not less than 3 kg/m<sup>2</sup>,
- c) aluminum sheet with a mass of not less than 1.5 kg/m<sup>2</sup>,
- d) alloyed zinc sheet with a mass of not less than 2.5 kg/m<sup>2</sup>, or
- e) other flashing acceptable to the *authority having jurisdiction*.

5) If lead sheet is used as a flashing for a *plumbing system* pipe, it shall be worked over and into a hub of the increaser, which shall then be fitted with a 100 mm diameter or larger roof ring caulked into the hub of the increaser.

### 9.26.5. Eave Protection for Shingles and Shakes

#### 9.26.5.1. Required Eave Protection

1) Except as provided in Sentence (2), eave protection shall be provided on shingle, shake or tile roofs, extending from the edge of the roof a minimum of 900 mm up the roof slope to a line not less than 300 mm inside the inner face of the exterior wall.

2) Eave protection is not required

- a) over unheated garages, carports and porches,
- b) where the roof overhang exceeds 900 mm measured along the roof slope from the edge of the roof to the inner face of the exterior wall,
- c) on roofs of asphalt shingles installed in accordance with Subsection 9.26.8.,
- d) on roofs with slopes of 1 in 1.5 or greater, or
- e) in regions with 3500 or fewer degree-days.

**9.26.5.2. Materials**

- 1)** Eave protection shall be laid beneath the starter strip and shall consist of
  - a) No. 15 asphalt-saturated felt laid in two plies lapped 480 mm and cemented together with lap cement,
  - b) Type M or S roll roofing laid with not less than 100 mm head and end laps cemented together with lap cement,
  - c) glass fibre or polyester fibre coated base sheets, or
  - d) self-sealing composite membranes consisting of modified bituminous coated material.

**9.26.6. Underlay beneath Shingles****9.26.6.1. Materials**

- 1)** Except as required in Sentence (2), when underlay is used beneath shingles, it shall be
  - a) asphalt-saturated sheathing paper weighing not less than 0.195 kg/m<sup>2</sup>, or
  - b) No. 15 plain or perforated asphalt-saturated felt.
- 2)** Underlay used beneath wood shingles shall be breather type.

**9.26.6.2. Installation**

- 1)** When used with shingles, underlay shall be installed parallel to the eaves with head and end lap of not less than 50 mm.
- 2)** The top edge of each strip of underlay referred to in Sentence (1) shall be fastened with sufficient roofing nails to hold it in place until the shingles are applied.
- 3)** The underlay referred to in Sentence (1) shall overlap the eave protection by not less than 100 mm. (See Article 9.26.10.2. for underlay beneath wood shakes.)

**9.26.7. Asphalt Shingles on Slopes of 1 in 3 or Greater****9.26.7.1. Coverage**

- 1)** Coverage shall be not less than 2 thicknesses of shingle over the entire roof, disregarding cutouts.

**9.26.7.2. Starter Strip**

- 1)** A starter strip shall be installed along the lower edge of the roof so that it extends approximately 12 mm beyond the eaves and rake of the roof and fastened along the bottom edge with nails spaced not more than 300 mm o.c.
- 2)** Starter strips shall be at least Type M mineral-surfaced roll roofing not less than 300 mm wide, or shingles of the same weight and quality as those used as a roof covering with tabs facing up the roof slope.
- 3)** Starter strips need not be provided where eave protection of not less than Type M mineral-surfaced roll roofing is provided.

**9.26.7.3. Head Lap**

- 1)** Shingles shall have a head lap of not less than 50 mm.

**9.26.7.4. Fasteners**

- 1)** Except as provided in Sentence (2), shingles shall be fastened with at least 4 nails or staples for 1 m wide shingles so that no nails or staples are exposed.
- 2)** Where staples with an 11 mm crown are used, shingles shall be fastened with at least 6 staples.
- 3)** Fasteners may be reduced for narrower shingles in proportion to the width of the shingle or when shingles incorporating interlocking devices are used.

4) Fasteners referred to in Sentences (1) and (2) shall be located 25 mm to 40 mm from each end of each strip shingle with other fasteners equally spaced between them.

5) Fasteners referred to in Sentences (1) and (2) shall be located not less than 12 mm above the tops of the cutouts.

#### 9.26.7.5. Securing of Tabs

1) Shingle tabs shall be secured by a spot of plastic cement not exceeding 25 mm diam under the centre of each tab or by interlocking devices or self-sealing strips.

#### 9.26.7.6. Hips and Ridges

1) Shingles on hips and ridges shall be applied so they extend not less than 100 mm on either side of the hip or ridge, and shall be lapped not less than 150 mm.

2) Shingles referred to in Sentence (1) shall be fastened with nails or staples on each side located not more than 25 mm from the edge and 25 mm above the butt of the overlying shingle.

#### 9.26.7.7. Eave Protection

1) Eave protection shall conform to Subsection 9.26.5.

#### 9.26.7.8. Flashing

1) Flashing shall conform to Subsection 9.26.4.

### 9.26.8. Asphalt Shingles on Slopes of less than 1 in 3

#### 9.26.8.1. Coverage

1) Except for the first 2 courses, coverage shall be not less than 3 thicknesses of shingle over the entire roof, disregarding cutouts.

#### 9.26.8.2. Starter Strip

1) A starter strip shall be installed as in Article 9.26.7.2.

2) Starter strips required in Sentence (1) shall be laid in a continuous band of cement not less than 200 mm wide.

#### 9.26.8.3. Securing of Tabs

1) Shingle tabs shall be secured with cold application cement applied at the rate of not less than 0.5 L/m<sup>2</sup> of cemented area, or hot application asphalt applied at the rate of 1 kg/m<sup>2</sup> of cemented area.

#### 9.26.8.4. Securing of Shingle Courses

1) The first course of shingles shall be secured by a continuous band of cement along the eaves applied so that the width of the band equals the shingle exposure plus 100 mm.

2) The succeeding courses of shingles shall be secured by a continuous band of cement applied so that the width of the band equals the shingle exposure plus 50 mm.

3) The band required in Sentence (2) shall be located not more than 50 mm above the butt of the overlying course of shingles.

#### 9.26.8.5. Hips and Ridges

1) Shingles on hips and ridges shall be not less than 300 mm wide applied to provide triple coverage.

2) Shingles referred to in Sentence (1) shall be cemented to the roof shingles and to each other with a coat of cement and fastened with nails or staples located 40 mm above the butt of the overlying shingle and 50 mm from each edge.

**9.26.8.6.**

**9.26.8.6. Flashing**

- 1) Flashing shall conform to Subsection 9.26.4.

**9.26.8.7. Fastening**

- 1) Shingles shall be fastened in accordance with Article 9.26.7.4.

**9.26.9. Wood Roof Shingles**

**9.26.9.1. Decking**

- 1) Decking for wood shingled roofs may be continuous or spaced.

**9.26.9.2. Grade**

- 1) Western cedar shingles shall be not less than No. 2 grade.
- 2) Eastern white cedar shingles shall be not less than B (clear) grade.

**9.26.9.3. Size**

- 1) Wood shingles shall be not less than 400 mm long and not less than 75 mm or more than 350 mm wide.

**9.26.9.4. Spacing and Joints**

- 1) Shingles shall be spaced approximately 6 mm apart and offset at the joints in adjacent courses not less than 40 mm so that joints in alternate courses are staggered.

**9.26.9.5. Fastening**

- 1) Shingles shall be fastened with 2 nails or staples located approximately 20 mm from the sides of the shingle and 40 mm above the exposure line.

**9.26.9.6. Exposure**

- 1) The exposure of wood roof shingles shall conform to Table 9.26.9.6.

**Table 9.26.9.6.**  
**Exposure of Wood Roof Shingles**  
 Forming Part of Sentence 9.26.9.6.(1)

Roof Slope	Maximum Exposure, mm					
	No.1 or A Grade Length of Shingle, mm			No. 2 or B Grade Length of Shingle, mm		
	400	450	600	400	450	600
< 1 in 3	100	115	165	90	100	140
≥ 1 in 3	125	140	190	100	115	165

**9.26.9.7. Flashing**

- 1) Flashing shall conform to Subsection 9.26.4.

**9.26.9.8. Eave Protection**

- 1) Eave protection shall conform to Subsection 9.26.5.

**9.26.10. Cedar Roof Shakes**

**9.26.10.1. Size and Thickness**

- 1) Shakes shall be not less than 450 mm long and not less than 100 mm nor more than 350 mm wide with a butt thickness of not more than 32 mm and not less than 9 mm.

**9.26.10.2. Underlay**

1) Where eave protection is not provided, an underlay conforming to the requirements in Article 9.26.6.1. for wood shingles shall be laid as a strip not less than 900 mm wide along the eaves.

2) A strip of material similar to that described in Sentence (1) not less than 450 mm wide shall be interlaid between each course of shakes with the bottom edge of the strip positioned above the butt line at a distance equal to double the exposure of the shakes.

3) Interlaid strips referred to in Sentence (2) shall be lapped not less than 150 mm at hips and ridges in a manner that will prevent water from reaching the roof sheathing.

**9.26.10.3. Spacing and Joints**

1) Shakes shall be spaced 6 mm to 9 mm apart and the joints in any one course shall be separated not less than 40 mm from joints in adjacent courses.

**9.26.10.4. Fastening**

1) Shakes shall be fastened with nails located approximately 20 mm from the sides of the shakes and 40 mm above the exposure line.

**9.26.10.5. Exposure**

- 1) The exposure of wood shakes shall not exceed
  - a) 190 mm for shakes not less than 450 mm long, and
  - b) 250 mm for shakes not less than 600 mm long.

**9.26.10.6. Flashing**

1) Flashing shall conform to Subsection 9.26.4.

**9.26.10.7. Eave Protection**

1) Eave protection shall conform to Subsection 9.26.5.

**9.26.10.8. Grade**

1) Shakes shall be not less than No. 1 or Handsplit grade.

**9.26.11. Built-Up Roofs**

**9.26.11.1. Quantity of Materials**

1) The quantities of bituminous materials used on built-up roofs shall conform to Table 9.26.11.1.

**Table 9.26.11.1.**  
**Quantities of Bitumen for Built-up Roofs**  
 Forming Part of Sentence 9.26.11.1.(1)

Type of Roof	Amount of Bitumen per Square Metre of Roof Surface	
	Mopping Coats between Layers	Flood Coat
Asphalt and aggregate	1 kg	3 kg
Coal-tar and aggregate	1.2 kg	3.6 kg
Cold process roofing	0.75 L cold process cement	2 L cold process top coating

**9.26.11.2. Coal-Tar and Asphalt Products**

1) Coal-tar products and asphalt products shall not be used together in built-up roof construction.

**9.26.11.3. Roof Felts**

- 1) Bitumen roofing felts shall be at least No. 15 felt.

**9.26.11.4. Aggregate Surfacing**

- 1) Aggregate used for surfacing built-up roofs shall be clean, dry and durable and shall consist of particles of gravel, crushed stone or air-cooled blast furnace slag having a size of from 6 mm to 15 mm.
- 2) The minimum amount of aggregate surfacing per square metre of roof surface shall be 15 kg gravel or crushed stone or 10 kg crushed slag.

**9.26.11.5. Flashing**

- 1) Flashing shall conform to Subsection 9.26.4.

**9.26.11.6. Number of Layers**

- 1) Built-up roofing shall consist of not less than 3 mopped-down layers of roofing felt flood coated with bitumen.

**9.26.11.7. Installation of Layers**

- 1) In hot process applications each layer of bitumen-saturated felt shall be laid while the bitumen is hot, with each layer overlapping the previous one.
- 2) The full width under each lap referred to in Sentence (1) shall be coated with bitumen so that in no place does felt touch felt.
- 3) Felt shall be laid free of wrinkles and shall be rolled directly into the hot bitumen and broomed forward and outward from the centre to ensure complete adhesion.

**9.26.11.8. Roofing over Wood-Based Sheathing**

- 1) Except as permitted in Sentence (2), built-up roofing applied over wood, plywood, OSB or waferboard roof sheathing shall be laid over an additional base layer of felt laid dry over the entire roof deck with not less than a 50 mm headlap and a 50 mm sidelap between each sheet.
- 2) Where plywood, OSB or waferboard roof sheathing is used, the dry layer of felt required in Sentence (1) may be omitted when the joints are taped and the sheathing is primed with asphalt.

**9.26.11.9. Attachment to Decking**

- 1) Roofing shall be securely attached to the decking or where insulation is applied above the deck, the insulation shall be securely attached to the deck before the first layer of felt is fastened to the insulation.

**9.26.11.10. Cant Strips**

- 1) Except as permitted in Sentence (4), a cant strip shall be provided at the edges of roofs.
- 2) At least 2 plies of the roofing membrane shall be carried over the top of the cant strip.
- 3) Flashing shall extend over the top of the cant strip and be shaped to form a drip.
- 4) The cant strip required in Sentence (1) need not be provided where a gravel stop is installed at the edge of roofs.
- 5) The roofing membranes shall be carried over the edge of the roof before the gravel stop referred to in Sentence (4) is fastened and 2 plies of roofing membrane mopped to the top surface of the gravel stop before the flood coat is applied.
- 6) The gravel stop referred to in Sentence (4) shall extend over the edge of the roof to form a drip or shall be flashed so that the flashing extends over the edge to form a drip.

**9.26.12. Selvage Roofing****9.26.12.1. Coverage**

1) Wide selvage asphalt roofing shall provide double coverage over the entire roof surface.

**9.26.12.2. Joints**

1) Plies of selvage roofing shall be cemented together to ensure a watertight joint.

**9.26.13. Sheet Metal Roofing****9.26.13.1. Thickness**

- 1) Sheet metal roofing shall be not less than
- 0.33 mm thick galvanized steel,
  - 0.46 mm thick copper,
  - 0.46 mm thick zinc, or
  - 0.48 mm thick aluminum.

**9.26.13.2. Support**

1) Where sheet metal roofing is not supported by roof decking but spans between spaced supports, the panels shall be designed to support the specified *live loads* for roofs.

**9.26.14. Glass Reinforced Polyester Roofing****9.26.14.1. Support**

1) Where glass reinforced polyester roofing panels are not supported by roof decking but span between spaced supports, the panels shall be designed to support the specified live roof loads.

**9.26.15. Hot Applied Rubberized Asphalt Roofing****9.26.15.1. Installation**

1) Hot applied rubberized asphalt roofing shall be installed in accordance with CAN/CGSB-37.51-M, "Application for Hot-Applied Rubberized Asphalt for Roofing and Waterproofing."

**9.26.16. Polyvinyl Chloride Sheet Roofing****9.26.16.1. Installation**

1) Polyvinyl chloride sheet applied roofing membrane shall be installed in accordance with CGSB 37-GP-55M, "Application of Sheet Applied Flexible Polyvinyl Chloride Roofing Membrane."

**9.26.17. Concrete Roof Tiles****9.26.17.1. Installation**

1) Concrete roof tiles shall be installed according to CAN/CSA-A220 Series-M, "Concrete Roof Tiles." (See Appendix A.)

**9.26.18. Roof Drains and Downspouts****9.26.18.1. Roof Drains**

1) When roof drains are provided they shall conform to Part 7.

**9.26.18.2. Downspouts**

1) Where downspouts are provided and are not connected to a sewer, extensions shall be provided to carry rainwater away from the *building* in a manner which will prevent *soil* erosion.

**Section 9.27. Cladding****9.27.1. Application****9.27.1.1. General**

1) Where lumber, wood shingles, shakes, fibre-cement shingles, planks and sheets, plywood, OSB, waferboard, hardboard, vinyl, aluminum or steel, including trim and soffits, are installed as cladding on wood-frame walls exposed to precipitation, the cladding assembly shall comply with

- a) Subsections 9.27.2. to 9.27.13., or
- b) Part 5.

2) Where stucco is installed as cladding on wood-frame or masonry walls exposed to precipitation, the cladding assembly shall comply with

- a) Subsections 9.27.2. to 9.27.4., and Section 9.28., or
- b) Part 5.

3) Where masonry serves as cladding on wood-frame or masonry walls exposed to precipitation, the cladding assembly shall comply with

- a) Subsections 9.27.2. to 9.27.4., and Section 9.20., or
- b) Part 5.

4) Where asphalt shingles are installed as cladding on wood-frame walls exposed to precipitation, the cladding assembly shall comply with

- a) Subsections 9.26.7. and 9.27.2. to 9.27.4., or
- b) Part 5.

5) Where cladding materials other than those described in Sentences (1) to (4) are installed, or where the cladding materials described in Sentences (1) to (4) are installed on substrates other than those identified in Sentences (1) to (4), the materials and installation shall comply with Part 5.

**9.27.2. Required Protection from Precipitation**

(See Appendix A.)

**9.27.2.1. Minimizing and Preventing Ingress and Damage**

1) Except where exterior walls are protected from precipitation or where it can be shown that precipitation ingress will not adversely affect occupant health or safety, exterior walls shall be designed and constructed to

- a) minimize the ingress of precipitation into the assembly, and
- b) prevent the ingress of precipitation into interior space.

(See Appendix A.)

2) Except where exterior walls are protected from specific mechanisms of deterioration, such as mechanical impact and ultraviolet radiation, exterior walls shall be designed and constructed to minimize the likelihood of their required performance being reduced to an unacceptable level as a result of those mechanisms.

**9.27.2.2. Minimum Protection from Precipitation Ingress**

(See Appendix A.)

1) Except as provided in Sentence (2), a cladding assembly is deemed to have a capillary break between the cladding and the backing assembly, where

- a) there is a drained and vented air space not less than 10 mm deep behind the cladding, over the full height and width of the wall (see also Article 9.27.5.3.),

- b) an open drainage material, not less than 10 mm thick and with a cross-sectional area that is not less than 80% open, is installed between the cladding and the backing, over the full height and width of the wall,
- c) the cladding is loosely fastened to the backing and behind each cladding component there is a clear air space that is
  - i) continuous for the full width of the component,
  - ii) not less than 10 mm deep at the bottom of the component, and
  - iii) not less than 6 mm deep over not less than 90 mm for every 230 mm of exposed height of the component, or
- d) the wall is a masonry *cavity wall* or the cladding is masonry veneer constructed according to Section 9.20.

**2)** The drained and vented air space, and drainage material described in Sentence (1) may be interrupted by

- a) penetrations for windows, doors and services,
- b) flashing, and
- c) furring, provided the furring does not make up more than 20% of the furred area.

**3)** Where a construction projects over the top of the drained and vented air space described in Clause (1)(a) or over the drainage material described in Clause (1)(b), the air space or drainage material shall not be contiguous with concealed spaces in the projecting construction.

**4)** Exterior walls exposed to precipitation shall be protected against precipitation ingress by an exterior cladding assembly consisting of a first plane of protection and a second plane of protection, where such walls enclose spaces of *residential occupancy* or spaces that directly serve spaces of *residential occupancy*.

**5)** Except as provided in Sentence (6), exterior walls exposed to precipitation shall be protected against precipitation ingress by an exterior cladding assembly consisting of a first plane of protection and a second plane of protection incorporating a capillary break, where

- a) the number of degree-days is less than 3400 and the moisture index is greater than 0.90, or
- b) the number of degree-days is 3400 or more, and the moisture index is greater than 1.00.

(See Sentence 1.1.3.1.(1) and Appendix C for information on the moisture index.)

**6)** In exterior walls described in Sentence (5), the first and second planes of protection need not incorporate a capillary break, where

- a) it can be shown that omitting the capillary break will not adversely affect the performance of the *building* assemblies,
- b) the *building* is an accessory *building*, or
- c) the wall
  - i) is constructed of non-moisture-sensitive materials, and intersecting or supported floors are also constructed of non-moisture-sensitive materials, or
  - ii) is constructed as a mass wall of sufficient thickness to minimize the transfer of moisture to the interior.

### 9.27.2.3. First and Second Planes of Protection

**1)** Where walls required to provide protection from precipitation comprise cladding assemblies with first and second planes of protection,

- a) the first plane of protection shall
  - i) consist of cladding with appropriate trim, accessory pieces and fasteners, and
  - ii) be designed and constructed to minimize the passage of rain and snow into the wall by minimizing holes and managing precipitation ingress caused by the kinetic energy of raindrops, surface tension, capillarity, gravity, and air pressure differences (see Subsection 9.27.4.),

- b) the second plane of protection shall be designed and constructed to (see Subsection 9.27.3.)
  - i) intercept all rain and snow that gets past the first plane of protection, and
  - ii) effectively dissipate any rain or snow to the exterior, and
- c) the protection provided by the first and second planes of protection shall be maintained
  - i) at wall penetrations created by the installation of components and services such as windows, doors, ventilation ducts, piping, wiring and electrical outlets, and
  - ii) at the interface with other wall assemblies.

#### 9.27.2.4. Protection of Cladding from Moisture

**1)** A clearance of not less than 200 mm shall be provided between finished ground and cladding that is adversely affected by moisture, such as untreated wood, plywood, OSB, waferboard and hardboard.

**2)** A clearance of not less than 50 mm shall be provided between a roof surface and cladding that is adversely affected by moisture, such as untreated wood, plywood, OSB, waferboard and hardboard.

### 9.27.3. Second Plane of Protection

#### 9.27.3.1. Elements of the Second Plane of Protection

(See Appendix A.)

**1)** The second plane of protection shall consist of a drainage plane having an appropriate inner boundary and flashing to dissipate rainwater to the exterior.

**2)** The inner boundary of the drainage plane shall comply with Articles 9.27.3.2. to 9.27.3.6.

- 3)** The protection provided by the second plane of protection shall be maintained
- a) at wall penetrations created by the installation of components and services such as windows, doors, ventilation ducts, piping, wiring and electrical outlets, and
  - b) at the interface with other wall assemblies.

**4)** Flashing material and its installation shall comply with Articles 9.27.3.7. and 9.27.3.8.

#### 9.27.3.2. Sheathing Membrane Material Standard

**1)** Sheathing membranes shall conform to the performance requirements of CAN/CGSB-51.32-M, "Sheathing, Membrane, Breather Type."

#### 9.27.3.3. Required Sheathing Membrane and Installation

**1)** Except as provided in Articles 9.27.3.4. to 9.27.3.6., at least one layer of sheathing membrane shall be applied beneath cladding.

**2)** Sheathing membrane required in Sentence (1) shall be applied so that joints are lapped not less than 100 mm.

**3)** Where sheathing membrane required in Sentence (1) is applied horizontally, the upper sheets shall overlap the lower sheets.

#### 9.27.3.4. Insulating Sheathing in Lieu of Sheathing Membrane

**1)** Where non-wood-based rigid exterior insulating sheathing, or exterior insulating sheathing with an integral sheathing membrane is installed, a separate sheathing membrane is not required.

- 2) Where insulating sheathing is installed as provided in Sentence (1),
  - a) sheathing panels subject to moisture deterioration shall be sealed at all joints, and
  - b) the joints of sheathing panels not subject to moisture deterioration shall be
    - i) sealed at all joints, or
    - ii) lapped or tongue and groove, and detailed to ensure drainage of water to the exterior.

(See Appendix A.)

#### 9.27.3.5. Sheathing Membranes in lieu of Sheathing

1) Except as provided in Article 9.27.3.6., where no sheathing is used, at least 2 layers of sheathing membrane shall be applied beneath the cladding. (See Article 9.23.16.1. and Appendix A.)

2) All joints in the sheathing membrane required in Sentence (1) shall occur over framing, and the membrane shall be fastened to the framing with roofing nails or staples spaced not more than 150 mm along the edges of the outer layer of sheathing membrane.

3) Wall sheathing is permitted to be used in lieu of one layer of sheathing membrane required in Sentence (1), and its thickness need not conform to Table 9.23.16.2.A.

#### 9.27.3.6. Face Sealed Cladding

(See Appendix A.)

1) Sheathing membrane is permitted to be omitted beneath cladding when the joints in the cladding are formed to effectively prevent the passage of wind and rain in conformance with Sentences (2) or (3), as applicable.

2) Cladding consisting of sheets of plywood, hardboard, OSB, waferboard or fibre cement is considered to meet the requirements of Sentence (1), provided the cladding is applied so that

- a) all edges are directly supported by framing,
- b) the vertical joints between adjacent sheets are sealed and
  - i) covered with battens,
  - ii) shiplapped, or
  - iii) otherwise matched to provide weathertight joints, and
- c) the horizontal joints between adjacent sheets are sealed and
  - i) shiplapped, or
  - ii) otherwise matched to provide weathertight joints.

3) Metal siding consisting of sheets of metal is considered to meet the requirements of Sentence (1) where the joints between sheets are of the locked-seam type.

#### 9.27.3.7. Flashing Materials

- 1) Flashing shall consist of not less than
  - a) 1.73 mm thick sheet lead,
  - b) 0.33 mm thick galvanized steel,
  - c) 0.46 mm thick copper,
  - d) 0.46 mm thick zinc,
  - e) 0.48 mm thick aluminum, or
  - f) 1.02 mm thick vinyl.

#### 9.27.3.8. Flashing Installation

- 1) Except as provided in Sentence (2), flashing shall be installed at
  - a) every horizontal junction between cladding elements,

- b) every horizontal offset in the cladding, and
- c) every horizontal line where the cladding substrates change and where
  - i) the substrates differ sufficiently for stresses to be concentrated along that line, or
  - ii) the installation of the cladding on the lower substrate may compromise the drainage of moisture from behind the cladding above.

(See Appendix A.)

- 2)** Flashing need not be installed as described in Sentence (1)
  - a) where the upper cladding elements overlap the lower cladding elements by not less than 25 mm,
  - b) where
    - i) the cladding above and below the joint is installed outboard of a drained and vented air space (see Clause 9.27.2.2.(1)(a)), and
    - ii) the horizontal detail is constructed so as to minimize the ingress of precipitation into the air space, or
  - c) at horizontal construction joints in stucco, where
    - i) the joint is finished with an expansion-contraction strip, and
    - ii) the cladding is installed outboard of a drained and vented air space (see Clause 9.27.2.2.(1)(a)).

**3)** Except as provided in Sentence (6), flashing shall be installed over exterior wall openings where the vertical distance from the bottom of the eave to the top of the trim is more than one-quarter of the horizontal overhang of the eave. (See Appendix A.)

- 4)** Flashing described in Sentences (1) and (3) shall
  - a) extend not less than 50 mm upward inboard of the sheathing membrane or sheathing installed in lieu of the sheathing membrane (see Article 9.27.3.4.),
  - b) have a slope of not less than 6% toward the exterior after the expected shrinkage of the *building* frame,
  - c) terminate at each end with an end-dam
    - i) with a height in millimetres not less than 25 mm or 1/10 the value of the 1-in-5 driving rain wind pressure in Pa, and
    - ii) at the height defined in Subclause (c)(i), extending to the face of the adjacent cladding,
  - d) lap not less than 10 mm vertically over the *building* element below, and
  - e) terminate in a drip offset not less than 5 mm outward from the outer face of the *building* element below.

(See Appendix A.)

**5)** Except as provided in Sentence (6), where the sills of windows and doors installed in exterior walls are not self-flashing, flashing shall be installed between the underside of the window or door and the wall construction below. (See Appendix A.)

**6)** Where a window or exterior door is provided with an integral exterior flange and is designed to be installed on the exterior of essentially flat lock-seam metal cladding without a head or sill flashing, the flange shall be
 

- a) bedded into a non-hardening sealant material, and
- b) screwed down over the sealant through to the wall framing to form a waterproof joint.

(See Appendix A.)

## 9.27.4. Caulking

### 9.27.4.1. Required Caulking

**1)** Caulking shall be provided where required to prevent the entry of water into the structure.

**2)** Caulking shall be provided between masonry, siding or stucco and the adjacent door and window frames or trim, including sills, unless such locations are completely protected from the entry of rain.

**3)** Caulking shall be provided at vertical joints between different cladding materials unless the joint is suitably lapped or flashed to prevent the entry of rain. (See Articles 9.7.4.2., 9.20.13.12. and 9.28.1.5.)

#### 9.27.4.2. Materials

- 1)** Caulking shall be
  - a) a non-hardening type suitable for exterior use,
  - b) selected for its ability to resist the effects of weathering, and
  - c) compatible with and adhere to the substrate to which it is applied.
- 2)** Caulking shall conform to
  - a) CGSB 19-GP-5M, "Sealing Compound, One Component, Acrylic Base, Solvent Curing,"
  - b) CAN/CGSB-19.13-M, "Sealing Compound, One-Component, Elastomeric, Chemical Curing,"
  - c) CGSB 19-GP-14M, "Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing," or
  - d) CAN/CGSB-19.24-M, "Multicomponent, Chemical-Curing Sealing Compound."

### 9.27.5. Attachment of Cladding

#### 9.27.5.1. Attachment

**1)** Except as permitted by Sentences (2) to (7), cladding shall be fastened to the framing members or furring members, or to blocking between the framing members.

**2)** Vertical lumber and stucco lath or reinforcing are permitted to be attached to sheathing only where the sheathing consists of not less than

- a) 14.3 mm lumber,
- b) 12.5 mm plywood, or
- c) 12.5 mm OSB or waferboard.

**3)** Vertically applied metal siding and wood shingles and shakes are permitted to be attached to the sheathing only where the sheathing consists of not less than

- a) 14.3 mm lumber,
- b) 7.5 mm plywood, or
- c) 7.5 mm OSB or waferboard.

**4)** Asbestos-cement shingles are permitted to be attached to the sheathing only when the sheathing consists of not less than

- a) 14.3 mm lumber,
- b) 9.5 mm plywood, or
- c) 9.5 mm OSB or waferboard.

**5)** Where wood shingles or shakes are applied to sheathing which is not suitable for attaching the shingles or shakes, the shingles or shakes are permitted to be attached to a wood lath not less than 38 mm by 9.5 mm thick securely nailed to the framing and applied as described in Article 9.27.7.5.

**6)** Where asbestos-cement shingles are applied to sheathing that is not suitable for attaching the shingles, the shingles are permitted to be fastened to a wood lath not less than 89 mm by 9.5 mm thick securely nailed to the framing.

**7)** Lath referred to in Sentence (6) shall be applied so that it overlaps the preceding shingle course by not less than 20 mm.

#### 9.27.5.2. Blocking

**1)** Blocking for the attachment of cladding shall be not less than 38 mm by 38 mm lumber securely nailed to the framing and spaced not more than 600 mm o.c.

**9.27.5.3. Furring**

**1)** Except as permitted in Sentences 9.27.5.1.(5) and (6), furring for the attachment of cladding shall be not less than 19 mm by 38 mm lumber when applied over sheathing.

**2)** When applied without sheathing, furring referred to in Sentence (1) shall be not less than

- a) 19 mm by 64 mm lumber on supports spaced not more than 400 mm o.c., or
- b) 19 mm by 89 mm lumber on supports spaced not more than 600 mm o.c.

**3)** Furring referred to in Sentence (1) shall be

- a) securely fastened to the framing, and
- b) spaced not more than 600 mm o.c.

**9.27.5.4. Size and Spacing of Fasteners**

**1)** Nail or staple size and spacing for the attachment of cladding and trim shall conform to Table 9.27.5.4.

**Table 9.27.5.4.**  
**Attachment of Cladding**  
Forming Part of Sentence 9.27.5.4.(1)

Type of Cladding	Minimum Nail or Staple Length, mm	Minimum Number of Nails or Staples	Maximum Nail or Staple Spacing, mm (o.c.)
Wood trim	51	—	600
Lumber siding or horizontal siding made from sheet material	51	—	600
Metal cladding	38	—	600 (nailed to framing) 400 (nailed to sheathing only)
Wood shakes			
up to 200 mm in width	51	2	—
over 200 mm in width	51	3	—
Wood shingles			
200 mm in width	32	2	—
over 200 mm in width	32	3	—
Asbestos-cement shingles	32	2	—
Panel or sheet type cladding			
up to 7 mm thick	38	—	150 (along edges)
more than 7 mm thick	51	—	300 (along intermediate supports)

**9.27.5.5. Fastener Materials**

**1)** Nails or staples for the attachment of cladding and wood trim shall be corrosion-resistant and shall be compatible with the cladding material.

**9.27.5.6. Expansion and Contraction**

**1)** Fasteners for metal or vinyl cladding shall be positioned to permit expansion and contraction of the cladding.

**9.27.5.7. Penetration of Fasteners**

**1)** Fasteners for shakes and shingles shall penetrate through the nail-holding base or not less than 19 mm into the framing.

2) Fasteners for cladding other than that described in Sentence (1) shall penetrate through the nail-holding base or not less than 25 mm into the framing.

### 9.27.6. Lumber Siding

#### 9.27.6.1. Materials

1) Lumber siding shall be sound, free of knot holes, loose knots, through checks or splits.

#### 9.27.6.2. Thickness and Width

1) Drop, rustic, novelty, lapped board and vertical wood siding shall be not less than 14.3 mm thick and not more than 286 mm wide.

2) Bevel siding shall be

a) not less than 5 mm thick at the top, and

b) not less than

i) 12 mm thick at the butt for siding 184 mm or less in width,  
and

ii) 14.3 mm thick at the butt for siding wider than 184 mm.

3) Bevel siding shall be not more than 286 mm wide.

#### 9.27.6.3. Joints

1) Lumber siding shall prevent water from entering at the joints by the use of lapped or matched joints or by vertical wood battens.

2) Siding shall overlap not less than 1 mm per 16 mm width of lumber, but not less than

a) 9.5 mm for matched siding,

b) 25 mm for lapped bevel siding, or

c) 12 mm for vertical battens.

### 9.27.7. Wood Shingles and Shakes

#### 9.27.7.1. Materials

1) Shingles and shakes shall conform to

a) CSA O118.1, "Western Cedars Shakes and Shingles,"

b) CSA O118.2-M, "Eastern White Cedar Shingles," or

c) CSA O118.3, "Northern Pine Tapersawn Shakes."

2) Western cedar shakes shall be not less than No. 1 or Handsplit grade, and western cedar shingles not less than No. 2 grade, except that No. 3 grade may be used for undercoursing.

3) Eastern white cedar shingles shall be at least B (clear) grade, except that C grade may be used for the lower course of double course applications.

#### 9.27.7.2. Width

1) Shingles and shakes shall be not less than 65 mm or more than 350 mm wide.

#### 9.27.7.3. Fasteners

1) Shingles or shakes shall be fastened with nails or staples located approximately 20 mm from each edge and not less than 25 mm above the exposure line for single-course applications, or approximately 50 mm above the butt for double-course applications.

#### 9.27.7.4. Offsetting of Joints

1) In single-course application, joints in succeeding courses shall be offset not less than 40 mm so that joints in any 2 of 3 consecutive courses are staggered.

**2)** In double-course application, joints in the outer course shall be offset from joints in the under-course by not less than 40 mm, and joints in succeeding courses shall be offset not less than 40 mm.

#### 9.27.7.5. Fastening to Lath

**1)** When lath is used with double-course application [see Sentence 9.27.5.1.(5)], it shall be spaced according to the exposure and securely fastened to the framing.

**2)** The butts of the under-course of the application referred to in Sentence (1) shall rest on the top edge of the lath.

**3)** The outer course of the application referred to in Sentence (1) shall be fastened to the lath with nails of sufficient length to penetrate through the lath.

**4)** The butts of the shingles or shakes shall be so located that they project not less than 12 mm below the bottom edge of the lath referred to in Sentence (1).

**5)** If wood lath is not used, the butts of the under-course shingles or shakes of the application referred to in Sentence (1) shall be located 12 mm above the butts of the outer course.

#### 9.27.7.6. Exposure and Thickness

**1)** The exposure and butt thickness of shingles and shakes shall conform to Table 9.27.7.6.

**Table 9.27.7.6.**  
**Exposure and Thickness of Wood Shingles and Shakes**  
Forming Part of Sentence 9.27.7.6.(1)

Shake or Shingle Length, mm	Maximum Exposure, mm		Minimum Butt Thickness, mm
	Single Coursing	Double Coursing	
400	190	305	10
450	216	356	11
600	292	406	13

#### 9.27.8. Asbestos-Cement Shingles and Sheets

##### 9.27.8.1. Material Standards

- 1)** Asbestos-cement shingles and sheets shall conform to
  - a) CAN/CGSB-34.4-M, "Siding, Asbestos-Cement, Shingles and Clapboards,"
  - b) CAN/CGSB-34.5-M, "Sheets, Asbestos-Cement, Corrugated,"
  - c) CAN/CGSB-34.14-M, "Sheets, Asbestos-Cement, Decorative,"
  - d) CAN/CGSB-34.16-M, "Sheets, Asbestos-Cement, Flat, Fully Compressed,"
  - e) CAN/CGSB-34.17-M, "Sheets, Asbestos-Cement, Flat, Semicompressed," or
  - f) CAN/CGSB-34.21-M, "Panels, Sandwich, Asbestos-Cement with Insulating Cores."

##### 9.27.8.2. Weight and Thickness

- 1)** Asbestos-cement shingles shall weigh not less than 8.06 kg/m<sup>2</sup>.
- 2)** Asbestos-cement sheet shall be not less than
  - a) 4.75 mm thick where applied to studs spaced not more than 400 mm o.c., and
  - b) 6 mm thick where applied to studs spaced not more than 600 mm o.c.
- 3)** Where applied over sheathing, the thickness of asbestos-cement sheet shall be not less than 3.15 mm.

**9.27.8.3. Fastening of Shingles**

1) Asbestos-cement shingles shall be fastened with nails located not less than 25 mm above the exposure line.

**9.27.8.4. Joints of Shingles**

1) Asbestos-cement shingles shall be installed so that vertical joints in succeeding courses are staggered.

2) Asphalt-coated backer strips shall be installed behind each vertical joint.

3) Shingles referred to in Sentence (1) shall have not less than a 25 mm head lap.

**9.27.8.5. Joints in Panels**

1) Vertical joints of asbestos-cement panels shall be protected with batten strips, caulking or other suitable method.

2) Horizontal joints of asbestos-cement panels shall be lapped, flashed, caulked or otherwise suitably protected.

**9.27.9. Plywood**

**9.27.9.1. Material Standards**

1) Plywood cladding shall be exterior type conforming to

- a) CSA O115-M, "Hardwood and Decorative Plywood,"
- b) CSA O121-M, "Douglas Fir Plywood,"
- c) CSA O151, "Canadian Softwood Plywood," or
- d) CSA O153-M, "Poplar Plywood."

**9.27.9.2. Thickness**

1) Plywood cladding shall be not less than 6 mm thick when applied directly to sheathing.

2) When applied directly to framing or over furring strips, plywood cladding thickness shall conform to Table 9.27.9.2.

**Table 9.27.9.2.**  
**Minimum Plywood Cladding Thickness**  
 Forming Part of Sentence 9.27.9.2.(2)

Spacing of Supports, mm	Minimum Thickness, mm	
	Face Grain Parallel to Supports	Face Grain Right Angles to Supports
400	8	6
600	11	8

3) The thickness of grooved or textured plywood cladding shall be measured at the point of least thickness.

**9.27.9.3. Edge Treatment**

1) The edges of plywood cladding shall be treated with a suitable paint or sealer.

**9.27.9.4. Panel Cladding**

1) Plywood applied in panels shall have all edges supported.

2) Not less than a 2 mm gap shall be provided between panels referred to in Sentence (1).

3) Vertical joints in cladding referred to in Sentence (1) shall be protected with batten strips or caulking when the plywood joints are not matched.

4) Horizontal joints in cladding referred to in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

#### 9.27.9.5. Lapped Strip Siding

1) Plywood applied in horizontal lapped strips shall have not less than a 2 mm gap provided at the butted ends, which shall be caulked.

2) The horizontal joints of siding described in Sentence (1) shall be lapped not less than 25 mm.

3) Wedges shall be inserted under all vertical butt joints and at all corners when horizontal lapped plywood is applied without sheathing.

#### 9.27.10. Hardboard

##### 9.27.10.1. Material Standards

1) Factory-finished hardboard cladding shall conform to CAN/CGSB-11.5-M, "Hardboard, Precoated, Factory Finished, for Exterior Cladding."

2) Hardboard cladding that is not factory finished shall conform to Types 1, 2 or 5 in CAN/CGSB-11.3-M, "Hardboard."

##### 9.27.10.2. Thickness

1) Type 1 or 2 hardboard cladding shall be not less than

- a) 6 mm thick when applied over sheathing that provides continuous support, and
- b) 7.5 mm thick when applied over furring or framing members not more than 400 mm o.c.

2) Type 5 hardboard cladding shall be not less than 9 mm thick when applied over sheathing that provides continuous support or over furring or framing members spaced not more than 400 mm o.c.

3) Where hardboard cladding is grooved, the grooves shall not extend more than 1.5 mm into the minimum required thickness. (See Appendix A.)

##### 9.27.10.3. Panel Cladding

1) Hardboard cladding applied in panels shall have all edges supported with not less than a 5 mm gap provided between sheets.

2) Vertical joints in cladding described in Sentence (1) shall be protected with batten strips or caulking when the joints are not matched.

3) Horizontal joints in cladding described in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

##### 9.27.10.4. Lapped Strip Siding

1) Hardboard applied in horizontal lapped strips shall have not less than a 5 mm gap provided at the butted ends, which shall be caulked or otherwise protected with suitable mouldings.

2) The horizontal joints of siding described in Sentence (1) shall overlap not less than 1 mm per 16 mm width of siding board but not less than 9.5 mm for matched joint siding or 25 mm for lapped siding.

##### 9.27.10.5. Clearance

1) Not less than 3 mm clearance shall be provided between hardboard cladding and door or window frames.

**9.27.11. OSB and Waferboard****9.27.11.1. Material Standard**

1) OSB and waferboard cladding shall conform to CSA O437.0, "OSB and Waferboard."

**9.27.11.2. Thickness**

1) OSB conforming to O-2 grade shall be not less than 6.0 mm thick where applied directly to sheathing.

2) OSB conforming to O-2 grade applied directly to framing or over furring strips shall conform to the thickness shown for plywood in Table 9.27.9.2. (See Appendix A.)

3) OSB conforming to O-1 grade and waferboard conforming to R-1 grade shall be not less than 7.9 mm thick where applied directly to sheathing.

4) Where applied directly to framing or over furring strips, OSB conforming to O-1 grade and waferboard conforming to R-1 grade shall be not less than

- a) 9.5 mm thick on supports spaced not more than 400 mm o.c., and
- b) 12.7 mm thick on supports spaced not more than 600 mm o.c.

**9.27.11.3. Panel Cladding**

1) OSB and waferboard applied in panels shall have all edges supported and treated with a primer or sealer.

2) Not less than a 3 mm gap shall be provided between sheets in cladding described in Sentence (1).

3) Vertical joints in cladding described in Sentence (1) shall be protected with batten strips or caulking when the OSB and waferboard joints are not matched.

4) Horizontal joints in cladding described in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

**9.27.11.4. Clearance**

1) Not less than a 3 mm clearance shall be provided between OSB and waferboard cladding and door or window frames.

**9.27.12. Metal****9.27.12.1. Material Standards**

1) Horizontal and vertical strip steel siding, including flashing and trim accessories, shall conform to CAN/CGSB-93.4, "Galvanized Steel and Aluminum-Zinc Alloy Coated Steel Siding, Soffits and Fascia, Prefinished, Residential."

2) Steel sheet cladding shall have a minimum thickness of 0.3 mm and conform to CAN/CGSB-93.3-M, "Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use."

3) Horizontal and vertical strip aluminum siding, including flashing and trim accessories, shall conform to CAN/CGSB-93.2-M, "Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use." (See Appendix A.)

4) Aluminum sheet cladding shall conform to CAN/CGSB-93.1-M, "Sheet, Aluminum Alloy, Prefinished, Residential," and shall have a thickness of not less than 0.58 mm, except that siding supported by backing or sheathing shall have a thickness of not less than 0.46 mm. (See Appendix A.)

**9.27.13. Vinyl Siding****9.27.13.1. Material Standard**

1) Vinyl siding, including flashing and trim accessories, shall conform to CAN/CGSB-41.24, "Rigid Vinyl Siding, Soffits and Fascia."

**9.27.13.2. Attachment**

1) The attachment of vinyl siding shall conform to the requirements in Subsection 9.27.5. for metal siding.

**Section 9.28. Stucco****9.28.1. General****9.28.1.1. Sheathing beneath Stucco**

1) Sheathing shall be provided beneath stucco applied over wood-frame walls except as permitted in Article 9.28.4.2.

2) Where applied beneath stucco, sheathing shall conform to Subsection 9.23.16.

**9.28.1.2. Lath and Reinforcing**

1) Stucco lath or reinforcing shall be used to attach stucco to any substrate other than masonry.

- 2) Stucco lath or reinforcing shall be used to attach stucco to masonry where
- a) the masonry is soft-burned tile or brick of less strength than the stucco, or
  - b) the masonry surface is not sound, clean and sufficiently rough to provide a good key.

3) Stucco applied over masonry *chimneys* shall be reinforced.

**9.28.1.3. Concrete Masonry Units**

1) Stucco finish shall not be applied over concrete masonry units less than one month old unless the units have been cured by the autoclave process.

**9.28.1.4. Clearance over Ground Level**

1) Stucco shall be not less than 200 mm above finished ground level except when it is applied over concrete or masonry.

**9.28.1.5. Flashing and Caulking**

1) Flashing and caulking used with stucco shall conform to Subsections 9.27.3. and 9.27.4., except that if aluminum flashing is used, it shall be separated from the stucco by an impervious membrane or coating. (See Article 9.7.4.2. for caulking around window frames.)

**9.28.2. Stucco Materials****9.28.2.1. Portland Cement**

1) Portland cement shall conform to CAN/CSA-A3001, "Cementitious Materials for Use in Concrete."

**9.28.2.2. Aggregate**

1) Aggregate shall be clean, well-graded natural sand or sand manufactured from crushed stone, gravel or air-cooled blast furnace slag and shall contain no significant amounts of deleterious material.

2) Aggregate grading shall conform to Table 9.28.2.2.

**Table 9.28.2.2.**  
**Aggregate Grading for Stucco**  
 Forming Part of Sentence 9.28.2.2.(2)

Sieve Sizes, mm	% Aggregate Passing Sieve	
	Maximum	Minimum
4	—	100
2	—	90
1	90	60
0.5	60	45
0.25	30	10
0.125	5	—

**9.28.2.3. Water**

- 1) Water shall be clean and free of significant amounts of deleterious material.

**9.28.3. Fasteners**

**9.28.3.1. Materials**

- 1) Fasteners for stucco lath or reinforcing shall be corrosion-resistant and of a material other than aluminum.

**9.28.3.2. Nails and Staples**

- 1) Nails for stucco lath or reinforcing shall be not less than 3.2 mm diam with a head diameter of not less than 11.1 mm.
- 2) Staples for stucco lath or reinforcing shall be not less than 1.98 mm diam or thickness.
- 3) Staples and nails for attaching stucco lath or reinforcing to vertical surfaces shall be of sufficient length to penetrate 25 mm into framing members or to the full depth of the sheathing where the sheathing is used for attachment.
- 4) On horizontal surfaces nails for stucco lath or reinforcing shall be not less than 38 mm long.

**9.28.4. Stucco Lath**

**9.28.4.1. Materials**

- 1) Rib lath or expanded metal stucco mesh shall be
  - a) copper-alloy steel coated with rust-inhibitive paint after fabrication, or
  - b) galvanized.
- 2) Woven or welded wire mesh shall be galvanized.

**9.28.4.2. No Sheathing Required**

- 1) Sheathing need not be provided beneath stucco where not less than 1.19 mm diam galvanized wire is applied horizontally to the framing at vertical intervals of not more than 150 mm, or where paper-backed welded wire metal lath is used.

**9.28.4.3. Stucco Lath Specifications**

- 1) Stucco lath shall conform to Table 9.28.4.3.

**Table 9.28.4.3.**  
**Stucco Lath**  
 Forming Part of Sentence 9.28.4.3.(1)

Location	Type of Lath	Minimum Diam of Wire, mm	Maximum Mesh Opening	Minimum Mass, kg/m <sup>2</sup>
Vertical surfaces	Welded or woven wire	1.15	25 mm	—
		1.30	38 mm	—
		1.50	51 mm	—
Horizontal surfaces <sup>(1)</sup>	Stucco mesh reinforcing (expanded metal)	—	25.8 cm <sup>2</sup>	0.98
	9.5 mm rib lath	—	—	1.84
	Cedar lath	—	—	—

**Notes to Table 9.28.4.3.:**

(1) See Appendix A.

**9.28.4.4. Self-Furring Devices**

1) Stucco lath shall be held not less than 6 mm away from the backing by means of suitable self-furring devices.

**9.28.4.5. Application of Stucco Lath**

- 1) Stucco lath shall be applied with the long dimension horizontal.
- 2) Horizontal and vertical joints in stucco lath shall be lapped not less than 50 mm.
- 3) End joints of stucco lath shall be staggered and shall occur over framing members.
- 4) External corners of stucco lath shall be reinforced with a vertical strip of lath or reinforcing extending not less than 150 mm on both sides of the corner, or the lath or reinforcing shall extend around corners not less than 150 mm.

**9.28.4.6. Fastening**

- 1) Stucco lath shall be fastened in conformance with Subsection 9.27.5.
- 2) Fasteners on vertical surfaces shall be spaced not more than
  - a) 150 mm o.c. vertically and 400 mm o.c. horizontally, or
  - b) 100 mm o.c. vertically and 600 mm o.c. horizontally.
- 3) Nailing patterns other than those required in Sentence (2) are permitted to be used provided there are at least 20 fasteners per square metre of wall surface.
- 4) Fasteners on horizontal surfaces shall be spaced not more than
  - a) 150 mm o.c. along the framing members when members are spaced not more than 400 mm o.c., and
  - b) 100 mm o.c. along members when members are spaced not more than 600 mm o.c.

**9.28.5. Stucco Mixes**

**9.28.5.1. Mixes**

- 1) Stucco mixes shall conform to Table 9.28.5.1.

**Table 9.28.5.1.**  
**Stucco Mixes**  
 Forming Part of Sentence 9.28.5.1.(1)

Materials, volume			
Portland Cement	Masonry Cement	Lime	Aggregate
1	—	0.25 to 1	3.25 to 4 parts per part of cementitious material
1	1	—	

**9.28.5.2. Pigments**

- 1) Pigment if used shall consist of pure mineral oxides inert to the action of sun, lime and cement.
- 2) Pigment shall not exceed 6% of the Portland cement by weight.

**9.28.5.3. Mixing**

- 1) Materials shall be thoroughly mixed before and after water is added.
- 2) Stucco shall be applied not later than 3 h after the initial mixing.

**9.28.6. Stucco Application**

(See also Alternative Method in Article 9.28.6.6.)

**9.28.6.1. Low Temperature Conditions**

- 1) The base for stucco shall be maintained above freezing.
- 2) Stucco shall be maintained at a temperature of not less than 10°C during application, and for not less than 48 h afterwards.

**9.28.6.2. Number of Coats and Total Thickness**

- 1) Stucco shall be applied with at least 2 base coats and one finish coat, providing a total thickness of not less than 15 mm, measured from the face of the lath or the face of the masonry where no lath is used.

**9.28.6.3. First Coat**

- 1) The first coat shall be not less than 6 mm thick, measured from the face of the lath or masonry, fully embedding the lath.
- 2) The surface of the first coat shall be scored to provide a key with the second coat.

**9.28.6.4. Second Coat**

- 1) The second coat shall be not less than 6 mm thick.
- 2) The surface of the second coat shall be lightly roughened to provide a key with the finish coat if the finish coat is other than stone dash.

**9.28.6.5. Finish Coat**

- 1) When the finish coat is other than stone dash, the base shall be dampened but not saturated before the finish coat is applied.
- 2) The thickness of the finish coat shall be not less than 3 mm.
- 3) When a stone dash finish is used, the stone shall be partially embedded in the second coat before the second coat starts to set or stiffen.

**9.28.6.6. Alternative Method**

- 1) Stucco shall be applied in at least 2 coats to provide a total thickness of not less than 19 mm measured from the face of the sheathing paper to the face of the second coat where lath is used.

- 2) The second coat shall be continuous across the entire surface of the first coat and have no gaps or voids.
- 3) When the finish coat is other than stone dash, the base shall be dampened but not saturated with water before the finish coat is applied.
- 4) When a stone dash finish is used, the stone shall be partially embedded in the second coat before the second coat starts to set or stiffen.
- 5) Accessories used with stucco shall be in grounds of 19 mm when the total thickness of the stucco is required to be at least 19 mm.
- 6) The base coat and the finish coat shall be maintained at a temperature of not less than 5°C during the application and for not less than 48 h afterwards.

## Section 9.29. Interior Wall and Ceiling Finishes

### 9.29.1. General

#### 9.29.1.1. Fire Protection and Sound Control

- 1) A wall or ceiling finish shall also conform to the appropriate requirements in Sections 9.10. and 9.11., in addition to the requirements in this Section.

### 9.29.2. Waterproof Wall Finish

#### 9.29.2.1. Where Required

- 1) Waterproof finish shall be provided to a height of not less than
  - a) 1.8 m above the floor in shower stalls,
  - b) 1.2 m above the rims of bathtubs equipped with showers, and
  - c) 400 mm above the rims of bathtubs not equipped with showers.

#### 9.29.2.2. Materials

- 1) Waterproof finish shall consist of ceramic, plastic or metal tile, sheet vinyl, tempered hardboard, laminated thermosetting decorative sheets or linoleum.

### 9.29.3. Wood Furring

#### 9.29.3.1. Size and Spacing of Furring

- 1) Wood furring for the attachment of wall and ceiling finishes shall conform to Table 9.29.3.1.

Table 9.29.3.1.  
Size and Spacing of Furring  
Forming Part of Sentence 9.29.3.1.(1)

Maximum Spacing of Furring, mm	Minimum Size of Furring, mm		
	Maximum Spacing of Furring Supports		
	Continuous Supports	400 mm (o.c.)	600 mm (o.c.)
300	19 x 38	19 x 38	19 x 64
400	19 x 38	19 x 38	19 x 64
600	19 x 38	19 x 64	19 x 89

#### 9.29.3.2. Fastening

- 1) Furring shall be fastened to the framing or to wood blocks with not less than 51 mm nails.

**9.29.4. Plastering****9.29.4.1. Application**

1) Application of plaster wall and ceiling finishes, including installation of metal or gypsum lath, shall conform to CSA A82.30-M, "Interior Furring, Lathing and Gypsum Plastering."

**9.29.5. Gypsum Board Finish (Taped Joints)****9.29.5.1. Application**

1) The requirements for application of gypsum board in this Subsection apply to the single layer application of gypsum board to wood furring or framing using nails or screws.

2) Gypsum board applications not described in this Subsection shall conform to ASTM C 840, "Application and Finishing of Gypsum Board."

**9.29.5.2. Materials**

- 1) Gypsum products shall conform to
  - a) ASTM C 36/C 36M, "Gypsum Wallboard,"
  - b) ASTM C 37/C 37M, "Gypsum Lath,"
  - c) ASTM C 442/C 442M, "Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board,"
  - d) ASTM C 588/C 588M, "Gypsum Base for Veneer Plasters,"
  - e) ASTM C 630/C 630M, "Water-Resistant Gypsum Backing Board,"
  - f) ASTM C 931/C 931M, "Exterior Gypsum Soffit Board,"
  - g) ASTM C 960/C 960M, "Predecorated Gypsum Board,"
  - h) ASTM C 1178/C 1178M, "Glass Mat Water-Resistant Gypsum Backing Panel,"
  - i) ASTM C 1395/C 1395M, "Gypsum Ceiling Board," or
  - j) ASTM C 1396/C 1396M, "Gypsum Board."

**9.29.5.3. Maximum Spacing of Supports**

1) Maximum spacing of supports for gypsum board applied as a single layer shall conform to Table 9.29.5.3.

**Table 9.29.5.3.**  
**Spacing of Supports for Gypsum Board**  
 Forming Part of Sentence 9.29.5.3.(1)

Thickness, mm	Orientation of Board to Framing	Maximum Spacing of Supports, mm o.c.		
		Walls	Ceilings	
			Painted Finish	Water-Based Texture Finish
Gypsum board conforming to Clauses 9.29.5.2.(1)(a) to (h) and (j)				
9.5	parallel	—	—	—
	perpendicular	400	400	—
12.7	parallel	600	400	—
	perpendicular	600	600	400
15.9	parallel	600	400	—
	perpendicular	600	600	600
Gypsum ceiling board conforming to Clause 9.29.5.2.(1)(i)				
12.7	parallel	600	400	—
	perpendicular	600	600	600

#### 9.29.5.4. Support of Insulation

- 1) Gypsum board supporting insulation shall be not less than 12.7 mm thick.

#### 9.29.5.5. Length of Fasteners

- 1) The length of fasteners for gypsum board shall conform to Table 9.29.5.5., except that lesser depths of penetration are permitted for assemblies required to have a *fire-resistance rating* provided it can be shown, on the basis of fire tests, that such depths are adequate for the required rating.

**Table 9.29.5.5.**  
**Fastener Penetration into Wood Supports**  
 Forming Part of Sentence 9.29.5.5.(1)

Required <i>Fire-Resistance Rating</i> of Assembly	Minimum Penetration, mm			
	Walls		Ceilings	
	Nails	Screws	Nails	Screws
Not required	20	15	20	15
45 min	20	20	30	30
1 h	20	20	45	45
1.5 h	20	20	60	60

#### 9.29.5.6. Nails

- 1) Nails for fastening gypsum board to wood supports shall conform to CSA B111, "Wire Nails, Spikes and Staples."

**9.29.5.7. Screws**

**1)** Screws for fastening gypsum board to wood supports shall conform to ASTM C 1002, "Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs."

**9.29.5.8. Spacing of Nails**

**1)** For single-layer application on a ceiling, nails shall be spaced  
a) not more than 180 mm o.c. on ceiling supports, or  
b) every 300 mm o.c. along ceiling supports, in pairs about 50 mm apart.

**2)** Where the ceiling sheets are supported by the wall sheets around the perimeter of the ceiling, this support may be considered as equivalent to nailing at this location.

**3)** Except as required by Sentence (4), for single-layer application on walls, nails shall be spaced

a) not more than 200 mm o.c. on vertical wall supports, or  
b) every 300 mm o.c. along vertical wall supports, in pairs about 50 mm apart.

**4)** For single-layer application on walls, where gypsum board is required to provide bracing, lateral support or fire protection, nails shall be spaced not more than 200 mm o.c. on

a) vertical wall supports, and  
b) top and bottom plates.

(See Article 9.23.10.2., Section 9.10., and A-9.23.10.2. in Appendix A.)

**5)** The uppermost nails on vertical wall supports shall be not more than 200 mm below the ceiling.

**6)** Nails shall be located not less than 10 mm from the side or edge of the board.

**7)** Nails shall be driven so that the heads do not puncture the paper.

**9.29.5.9. Spacing of Screws**

**1)** For single-layer application on a ceiling, screws shall be spaced not more than 300 mm o.c. on ceiling supports.

**2)** Where the ceiling sheets are supported by the wall sheets around the perimeter of the ceiling, this support may be considered as equivalent to screwing at this location.

**3)** Except as required by Sentence (4), for single-layer application on walls, screws shall be spaced

a) not more than 300 mm o.c. on vertical wall supports where the supports are more than 400 mm o.c., or  
b) not more than 400 mm o.c. on vertical wall supports where the supports are not more than 400 mm o.c.

**4)** Except as provided in Sentence (5), for single-layer application on walls, where gypsum board is required to provide bracing, lateral support or fire protection, screws shall be spaced not more than 300 mm o.c. on

a) vertical wall supports, and  
b) top and bottom plates.

(See Article 9.23.10.2., Section 9.10., and A-9.23.10.2. in Appendix A.)

**5)** Where a *fire-resistance rating* is determined based on Table A-9.10.3.1.A. in Appendix A, Sentence (4) need not apply for the purpose of fire protection.

**6)** Screws shall be located not less than 10 mm from the edge of the board.

**7)** Screws shall be driven so that the heads do not puncture the paper.

**9.29.5.10. Low Temperature Conditions**

**1)** In cold weather, heat shall be provided to maintain a temperature not below 10°C for 48 h prior to taping and finishing and maintained for not less than 48 h thereafter.

**9.29.6.1.**

**9.29.6. Plywood Finish**

**9.29.6.1. Thickness**

1) Except as provided in Sentences (2) and (3), the minimum thickness of plywood interior finish shall conform to Table 9.29.6.1.

**Table 9.29.6.1.**  
**Thickness of Plywood Interior Finish**  
 Forming Part of Articles 9.29.6.1. and 9.29.6.2.

Maximum Spacing of Supports, mm o.c.	Minimum Thickness, mm <sup>(1)</sup>	
	On Supports with no Horizontal Blocking	On Supports with Blocking at Vertical Intervals not Exceeding 1.2 m
400	4.7	4.0
600	8.0	4.7

**Notes to Table 9.29.6.1.:**

<sup>(1)</sup> Thickness limits shall apply to the net effective thickness (NET) of grooved, striated, textured and/or embossed panels and to the actual thickness of flat panels.

2) A manufacturing tolerance of -0.4 mm may be applied to the thicknesses listed in Table 9.29.6.1.

3) No minimum thickness is required where plywood is applied over continuous backing.

**9.29.6.2. Grooved Plywood**

1) Except as permitted in Sentence (2), where plywood for interior finish is grooved, the grooves shall not extend through the face ply and into the plies below the face ply unless the groove is supported by framing or furring.

2) If the grain of the face ply is at right angles to the supporting members, the groove is permitted to extend into plies below the face ply provided the thickness of the plywood exceeds the value shown in Table 9.29.6.1. by an amount equal to not less than the depth of penetration of the grooves into the plies below the face ply.

**9.29.6.3. Nails and Staples**

1) Nails for attaching plywood finishes shall not be less than 38 mm casing or finishing nails spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports, except that staples providing equivalent lateral resistance may also be used.

**9.29.6.4. Edge Support**

1) All plywood edges shall be supported by furring, blocking or framing.

**9.29.7. Hardboard Finish**

**9.29.7.1. Material Standard**

1) Hardboard shall conform to CAN/CGSB-11.3-M, "Hardboard."

**9.29.7.2. Thickness**

- 1) Hardboard shall be not less than
  - a) 3 mm thick where applied over continuous backing,
  - b) 6 mm thick when applied over supports spaced not more than 400 mm o.c., and
  - c) 9 mm thick when applied over supports spaced not more than 600 mm o.c.

**9.29.7.3. Nails**

1) Nails for fastening hardboard shall be casing or finishing nails not less than 38 mm long, spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports.

**9.29.7.4. Edge Support**

1) All hardboard edges shall be supported by furring, blocking or framing where the backing is not continuous.

**9.29.8. Insulating Fibreboard Finish****9.29.8.1. Material Standard**

1) Insulating fibreboard shall conform to CAN/ULC-S706, "Wood Fibre Thermal Insulation for Buildings."

**9.29.8.2. Thickness**

1) Insulating fibreboard sheets shall be not less than 11.1 mm thick on supports not more than 400 mm o.c.

2) Insulating fibreboard tile shall be not less than 12.7 mm thick on supports spaced not more than 400 mm o.c.

**9.29.8.3. Nails**

1) Nails for fastening fibreboard sheets shall be not less than 2.6 mm shank diameter casing or finishing nails of sufficient length to penetrate not less than 20 mm into the supports.

2) Nails shall be spaced not more than 100 mm o.c. along edge supports and 200 mm o.c. along intermediate supports.

**9.29.8.4. Edge Support**

1) All fibreboard edges shall be supported by blocking, furring or framing.

**9.29.9. Particleboard, OSB or Waferboard Finish****9.29.9.1. Material Standard**

1) Particleboard finish shall conform to ANSI A208.1, "Particleboard, Mat-Formed Wood."

- 2) OSB or waferboard finish shall conform to
- CAN/CSA-O325.0, "Construction Sheathing," or
  - CSA O437.0, "OSB and Waferboard."

**9.29.9.2. Minimum Thickness**

1) Except as provided in Sentences (2) and (3), the minimum thickness of O-2 grade OSB used as an interior finish shall conform to that shown for plywood in Table 9.29.6.1.

2) Thicknesses listed in Table 9.29.6.1. shall permit a manufacturing tolerance of – 0.4 mm.

3) No minimum thickness is required where O-2 grade OSB is applied over continuous backing.

4) OSB conforming to O-1 grade, waferboard conforming to R-1 grade and particleboard shall be

- not less than 6.35 mm thick on supports not more than 400 mm o.c.,
- not less than 9.5 mm thick on supports not more than 600 mm o.c., and
- not less than 6.35 mm thick on supports not more than 600 mm o.c. in walls where blocking is provided at midwall height.

- 5) OSB conforming to CAN/CSA-O325.0, "Construction Sheathing," shall meet the minimum panel mark of
- W16, on supports not more than 400 mm o.c.,
  - W24, on supports not more than 600 mm o.c., and
  - W16, on supports not more than 600 mm o.c. where blocking is provided at mid-wall height.

**9.29.9.3. Nails**

- 1) Nails for fastening particleboard, OSB or waferboard shall be not less than 38 mm casing or finishing nails spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports.

**9.29.9.4. Edge Support**

- 1) All particleboard, OSB or waferboard edges shall be supported by furring, blocking or framing.

**9.29.10. Wall Tile Finish****9.29.10.1. Tile Application**

- Ceramic tile shall be set in a mortar base or applied with an adhesive.
- Plastic tile shall be applied with an adhesive.

**9.29.10.2. Mortar Base**

- When ceramic tile is applied to a mortar base the cementitious material shall consist of one part Portland cement to not more than one-quarter part lime by volume.
- The cementitious material described in Sentence (1) shall be mixed with not less than 3 nor more than 5 parts of aggregate per part of cementitious material by volume.
- Mortar shall be applied over metal lath or masonry.
- Ceramic tile applied to a mortar base shall be thoroughly soaked and pressed into place forcing the mortar into the joints while the tile is wet.

**9.29.10.3. Adhesives**

- 1) Adhesives to attach ceramic and plastic tile shall be applied to the finish coat or brown coat of plaster that has been steel-trowelled to an even surface or to gypsum board or to masonry provided the masonry has an even surface.

**9.29.10.4. Moisture-Resistant Backing**

- 1) Ceramic and plastic tile installed on walls around bathtubs or showers shall be applied over moisture-resistant backing.

**9.29.10.5. Joints between Tiles and Bathtub**

- 1) The joints between wall tiles and a bathtub shall be suitably caulked with material conforming to CAN/CGSB-19.22-M, "Mildew-Resistant Sealing Compound for Tubs and Tiles."

**Section 9.30. Flooring****9.30.1. General****9.30.1.1. Required Finished Flooring**

- 1) Finished flooring shall be provided in all *residential occupancies*.

**9.30.1.2. Water Resistance**

1) Where water permeable finished flooring in bathrooms, kitchens, public entrance halls and laundry areas is supported by a subfloor of a type that would be damaged by water, such flooring shall be installed over a membrane with a water permeance not exceeding  $18 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$  when tested in accordance with ASTM E 96, "Water Vapor Transmission of Materials." (See Appendix A.)

**9.30.1.3. Sleepers**

1) Wood sleepers supporting finished flooring over a concrete base supported on the ground shall be not less than 19 mm by 38 mm and shall be treated with a wood preservative.

**9.30.1.4. Finish Quality**

1) Finished flooring shall have a surface that is smooth, even and free from roughness or open defects.

**9.30.2. Panel-Type Underlay****9.30.2.1. Required Underlay**

1) A panel-type underlay shall be provided under resilient flooring, parquet flooring, ceramic tile, felted-synthetic-fibre floor coverings or carpeting laid over lumber subflooring. (See Sentence 9.30.3.2.(1).)

2) Panel-type underlay shall be provided under resilient flooring, parquet flooring, felted-synthetic-fibre floor coverings or carpeting on panel-type subflooring whose edges are unsupported. (See Article 9.23.14.3.)

3) Panel-type underlay shall be provided under ceramic tile applied with adhesive.

**9.30.2.2. Materials and Thickness**

1) Panel-type underlay shall be not less than 6 mm thick and shall conform to

- a) ANSI A208.1, "Particleboard, Mat-Formed Wood,"
- b) CAN/CGSB-11.3-M, "Hardboard,"
- c) CSA O115-M, "Hardwood and Decorative Plywood,"
- d) CSA O121-M, "Douglas Fir Plywood,"
- e) CSA O151, "Canadian Softwood Plywood,"
- f) CSA O153-M, "Poplar Plywood," or
- g) CSA O437.0, "OSB and Waferboard."

2) Panel-type underlay under ceramic tile applied with adhesive shall be not less than

- a) 6 mm thick where the supports are spaced up to 300 mm o.c., and
- b) 11 mm thick where the supports are spaced wider than 300 mm o.c.

**9.30.2.3. Fastening**

1) Panel-type underlay shall be fastened to the subfloor with staples, annular grooved flooring nails or spiral nails, spaced not more than 150 mm o.c. along the edges and 200 mm o.c. both ways at other locations.

2) Nails for panel-type underlay shall be not less than 19 mm long for 6 mm thick underlay and 22 mm long for 7.9 mm thick underlay.

3) Staples for panel-type underlay shall

- a) have not less than a 1.2 mm shank diameter or thickness with a 4.7 mm crown, and
- b) be not less than
  - i) 22 mm long for 6 mm underlay, and
  - ii) 28 mm long for 7.9 mm and 9.5 mm underlay.

**9.30.2.4. Joints Offset**

1) Where panel-type underlay is required to be installed over plywood, OSB or waferboard, the joints in the underlay shall be offset not less than 200 mm from the joints in the underlying subfloor.

**9.30.2.5. Surface Defects**

1) Underlay beneath resilient or ceramic floors applied with an adhesive shall have all holes or open defects on the surface patched so that the defects will not be transmitted to the finished surface.

**9.30.3. Wood Strip Flooring**

**9.30.3.1. Thickness**

1) The thickness of wood strip flooring shall conform to Table 9.30.3.1.

**Table 9.30.3.1.**  
**Thickness of Wood Strip Flooring**  
 Forming Part of Sentence 9.30.3.1.(1)

Type of Flooring	Max. Joist Spacing, mm	Minimum Thickness of Flooring, mm	
		With Subfloor	No Subfloor
Matched hardwood (interior use only)	400	7.9	19.0
	600	7.9	33.3
Matched softwood (interior or exterior use)	400	19.0	19.0
	600	19.0	31.7
Square edge softwood (exterior use only)	400	—	25.4
	600	—	38.1

**9.30.3.2. Strip Direction and End Joints**

1) Wood strip flooring shall not be laid parallel to lumber subflooring unless a separate underlay is provided.

2) If wood strip flooring is applied without a subfloor, it shall be laid at right angles to the joists so that the end joints are staggered and occur over supports or are end matched.

3) If the flooring is end matched, it shall be laid so that no 2 adjoining strips break joints in the same space between supports and each strip bears on no fewer than 2 supports.

**9.30.3.3. Nailing**

1) When nails are used, wood strip flooring shall be toe nailed or face nailed with not less than one nail per strip at the spacings shown in Table 9.30.3.3., except that face nailed strips more than 25 mm in width shall have at least 2 nails per strip.

**Table 9.30.3.3.**  
**Nailing of Wood Strip Flooring**  
 Forming Part of Sentence 9.30.3.3.(1)

Finish Floor Thickness, mm	Minimum Length of Flooring Nails, mm	Maximum Spacing of Flooring Nails, mm
7.9	38 <sup>(1)</sup>	200
11.1	51	300
19.0	57	400
25.4	63	400
31.7	70	600
38.1	83	600

**Notes to Table 9.30.3.3.:**

<sup>(1)</sup> See Article 9.30.3.4.

**2)** Face nails shall be countersunk.

**9.30.3.4. Staples**

**1)** Staples are permitted to be used to fasten wood strip flooring not more than 7.9 mm in thickness provided the staples are not less than 29 mm long with a shank diameter of 1.19 mm and with 4.7 mm crowns.

**9.30.4. Parquet Flooring**

**9.30.4.1. Adhesive**

**1)** Adhesive used to attach parquet block flooring shall be suitable for bonding wood to the applicable subfloor material.

**9.30.5. Resilient Flooring**

**9.30.5.1. Materials**

**1)** Resilient flooring used on concrete slabs supported on ground shall consist of asphalt, rubber, vinyl-asbestos, unbacked vinyl or vinyl with an inorganic type backing.

**2)** Flooring described in Sentence (1) shall be attached to the base with a suitable waterproof and alkali-resistant adhesive.

**9.30.6. Ceramic Tile**

**9.30.6.1. Substrate**

**1)** Ceramic tile shall be set in a mortar bed or applied to a sound smooth base with a suitable adhesive.

**2)** Panel-type subfloor to which ceramic tile is to be applied with adhesive shall have its edges supported according to Article 9.23.14.3.

**Section 9.31. Plumbing Facilities**

**9.31.1. Scope**

**9.31.1.1. Application**

**1)** *Plumbing systems* and plumbing facilities shall conform to Part 7.

## Section 9.32. Ventilation

### 9.32.1. General

#### 9.32.1.1. Application

- 1) This Section applies to the ventilation of rooms and spaces in *residential occupancies*.
- 2) Ventilation of all other *occupancies* shall comply with Part 6.
- 3) A *storage garage* for up to 4 motor vehicles that serves a *residential occupancy* may be considered to be part of that *occupancy*.
- 4) A space that contains a fuel-fired heating *appliance*, including on-site constructed fireplaces or factory-built fireplaces, shall be provided with combustion air in accordance with Article 9.32.3.4.
- 5) Combustion air intake inlets shall be located on the outside of the *building* and not within an *attic or roof space* or a crawl space.

#### 9.32.1.2. Required Ventilation

- 1) Every *residential occupancy* shall incorporate
  - a) provisions for non-heating-season ventilation in accordance with Subsection 9.32.2., and
  - b) except as required by Sentence (2), if supplied with electrical power and a heating system, provisions for heating-season ventilation in accordance with Part 6.
- 2) A self-contained heating-season ventilation system serving a single *dwelling unit* shall comply with Subsection 9.32.3.

#### 9.32.1.3. Roughed-in Plumbing

- 1) Where roughed-in plumbing is installed for the future installation of a bathroom or water closet room, provision shall be made for the future installation of the required ventilation.

### 9.32.2. Non-Heating-Season Ventilation

#### 9.32.2.1. Required Ventilation

- 1) The non-heating-season ventilation required by Clause 9.32.1.2.(1)(a) shall be supplied by
  - a) natural ventilation in accordance with Article 9.32.2.2., or
  - b) a mechanical ventilation system in accordance with Article 9.32.2.3.

#### 9.32.2.2. Non-Heating-Season Natural Ventilation

- 1) The unobstructed openable ventilation area to the outdoors for rooms and spaces in residential *buildings* ventilated by natural means shall conform to Table 9.32.2.2.

**Table 9.32.2.2.**  
**Natural Ventilation Area**  
 Forming Part of Sentence 9.32.2.2.(1)

Location		Minimum Unobstructed Area
Within a <i>dwelling unit</i>	Bathrooms or water-closet rooms	0.09 m <sup>2</sup>
	Unfinished <i>basement</i> space	0.2% of the <i>floor area</i>
	Dining rooms, living rooms, bedrooms, kitchens, combined rooms, dens, recreation rooms and all other finished rooms	0.28 m <sup>2</sup> per room or combination of rooms
Other than within a <i>dwelling unit</i>	Bathrooms or water-closet rooms	0.09 m <sup>2</sup> per water closet
	Sleeping areas	0.14 m <sup>2</sup> per occupant
	Laundry rooms, kitchens, recreation rooms	4% of the <i>floor area</i>
	Corridors, storage rooms and other similar public rooms or spaces	2% of the <i>floor area</i>
	Unfinished <i>basement</i> space not used on a shared basis	0.2% of the <i>floor area</i>

**2)** Where a vestibule opens directly off a living or dining room within a *dwelling unit*, ventilation to the outdoors for such rooms may be through the vestibule.

**3)** Openings for natural ventilation other than windows shall provide protection from the weather and insects.

**4)** Screening shall be of corrosion-resistant material.

**9.32.2.3. Non-Heating-Season Mechanical Ventilation**

**1)** Where a habitable room or space is not provided with natural ventilation as described in Article 9.32.2.2. and is mechanically cooled, its non-heating-season mechanical ventilation system shall

- a) have the capacity to exhaust air from inside the room or space, or to introduce outside air into that room or space, at a rate conforming with Table 9.32.2.3., or
- b) comply with Subsection 9.32.3.

**2)** In applying Clause (1)(a),

- a) at least one bedroom in each *dwelling unit* shall be designated as the master bedroom,
- b) air change rates for any combined living/dining or family/dining space shall be determined as if the spaces were individual rooms,
- c) where a *basement* incorporates rooms of the types designated in Table 9.32.2.3., the assigned air change rate for each room shall be as specified for those types of rooms,
- d) *basement* areas used for other purposes that exceed 2/3 of the total *basement floor area* shall be assigned an air change rate of 10 L/s,
- e) *basement* areas used for other purposes that are 2/3 of the total *basement floor area* or less shall be assigned an air change rate of 5 L/s, and
- f) other habitable rooms, other than spaces intended solely for access, egress, storage, or service equipment, shall be assigned an air change rate of 5 L/s.

**Table 9.32.2.3.**  
**Air Change Rate**  
 Forming Part of Clause 9.32.2.3.(1)(a)

Room or Space	Rate, L/s
Master bedroom	10
Other bedrooms	5
Living room	5
Dining room	5
Family room	5
Recreation room	5
<i>Basement</i>	10
Kitchen	5
Bathroom or water-closet room	5
Laundry room	5
Utility room	5
Other habitable rooms	5

**3)** Where a habitable room or space is not provided with natural ventilation as described in Article 9.32.2.2. and is not mechanically cooled, the non-heating-season mechanical ventilation system shall have the capacity to exhaust inside air from the room or space or to introduce outside air to that room or space at a rate of one air change per hour.

**4)** A non-heating-season mechanical ventilation system shall be designed and installed in conformance with good practice such as that described in the ASHRAE Handbooks and Standards, the HRAI Digest, the Hydronics Institute Manuals and the SMACNA manuals.

### 9.32.3. Heating-Season Mechanical Ventilation

(See Appendix A.)

#### 9.32.3.1. Required Ventilation

**1)** The heating-season ventilation required by Clause 9.32.1.2.(1)(b) shall be provided by a mechanical ventilation system complying with

- a) good practice such as that described in CAN/CSA-F326-M, "Residential Mechanical Ventilation Systems," or
  - b) for *dwelling units* with 5 or fewer bedrooms, the balance of this Subsection.
- (See Appendix A.)

**2)** Mechanical ventilation systems complying with the balance of this Subsection shall incorporate at least the following components:

- a) a principal ventilation system complying with Article 9.32.3.3.,
- b) supplemental exhaust fans complying with Article 9.32.3.7., and
- c) protection against depressurization in accordance with Article 9.32.3.8.

#### 9.32.3.2. Design and Installation

**1)** Aspects of mechanical ventilation systems not specifically described in this Subsection shall be designed, constructed and installed in accordance with good practice such as that described in the ASHRAE Handbooks and Standards, the HRAI Digest, the HRAI Residential Mechanical Ventilation Manual, the Hydronics Institute Manuals and the SMACNA manuals.

**2)** Ventilation system equipment installed to meet the requirements of this Section shall be installed in accordance with the manufacturers’ instructions and recommendations except that, where such instructions and recommendations are in conflict with the requirements of this Subsection, the requirements of this Subsection shall govern.

**3)** Except where mounted on concrete foundations, fans and heat recovery ventilators shall be isolated from structural components by resilient mountings to minimize the transmission of noise and vibration to occupied spaces.

- 4)** Where flow-regulating dampers are required,
- a) they shall be adjustable and accessible without requiring the removal of fans, motors or insulating materials, or the use of specialized tools, and
  - b) a device on the outside of the duct or device in which they are installed shall indicate the position of the damper.

**5)** Ventilation equipment shall be accessible for inspection, maintenance, repair and cleaning.

**6)** Ventilation equipment installed in unheated spaces shall be installed so as to avoid condensation of moisture on fans and motors, in accordance with the manufacturers’ instructions.

**9.32.3.3. Principal Ventilation System**

(See Appendix A.)

- 1)** The principal ventilation system shall incorporate the following components:
- a) a principal ventilation fan complying with this Article, and
  - b) except as permitted by Article 9.32.3.6., provision for the introduction of outdoor air to the *dwelling unit*, in conformance with Article 9.32.3.4. or 9.32.3.5.
- 2)** The principal ventilation fan shall be capable of operating at an exhaust capacity complying with Table 9.32.3.3., referred to hereinafter as the “normal operating exhaust capacity.” (See Appendix A.)

**Table 9.32.3.3.**  
**Normal Operating Exhaust Capacity of Principal Ventilation Fan**  
 Forming Part of Sentence 9.32.3.3.(2)

Number of Bedrooms in <i>Dwelling Unit</i>	Normal Operating Exhaust Capacity of Principal Ventilation Fan, L/s	
	Minimum	Maximum
1	16	24
2	18	28
3	22	32
4	26	38
5	30	45
More than 5	System must comply with Clause 9.32.3.1.(1)(a)	

**3)** The requirement for a principal ventilation fan may be satisfied by a single fan, by the exhaust side of a heat recovery ventilator, or by a group of fans, provided all fans in the group are controlled simultaneously by a controller complying with Sentences (5), (6) and (7). (See Appendix A.)

**4)** The components of the principal ventilation system shall be approved by their manufacturer for continuous operation.

**5)** The principal ventilation fan shall be controlled by a manual switch located within the living area of the *dwelling unit* and clearly marked “VENTILATION FAN.” (See Appendix A.)

**6)** If all controls serving the principal ventilation fan are in the “off” position, the principal ventilation system shall not operate.

**7)** The requirement for a manual switch stated in Sentence (5) can be satisfied by a manual override incorporated in a dehumidistat or other automatic control, provided

- a) the automatic control is located within the living area of the *dwelling unit*, and
- b) the manual override is clearly marked “VENTILATION FAN.”

**8)** Where the principal ventilation fan is controlled by a dehumidistat or other automatic control in addition to the manual switch required by Sentence (5), the manual switch shall be capable of activating the fan regardless of the setting of the automatic control.

**9)** Where an exhaust air intake for the principal ventilation fan is connected directly to the return side of the duct system of a forced air heating system or other forced air distribution system, it shall be connected, where applicable, not less than 1 m upstream from the connection of the outdoor air *supply duct* required by Sentence 9.32.3.4.(5).

**10)** Exhaust air intakes for principal ventilation fans located in kitchens, bathrooms and water-closet rooms shall be located in the ceiling or on the wall not less than 2 m above the floor. (See Appendix A.)

#### 9.32.3.4. Ventilation Systems Used in Conjunction with Forced Air Heating Systems

(See Appendix A.)

**1)** Where outdoor air is to be introduced to the *dwelling unit* through a forced air heating system, the provision of outdoor air shall comply with this Article.

**2)** Where the actual normal operating exhaust capacity of the fan installed to satisfy the requirement for a principal ventilation fan exceeds the maximum outdoor airflow permitted by Table 9.32.3.4. for a mixed air temperature of 15°C or exceeds the minimum acceptable return air temperature specified by the manufacturer of the *furnace*, whichever is less, then either

- a) the system shall incorporate a means for tempering outdoor air introduced to the heating system ducts so that a mixed air temperature of 15°C or the minimum acceptable return air temperature specified by the manufacturer of the *furnace*, whichever is less, is achieved when the outdoor air is at the January 2.5% temperature and the indoor air temperature is 22°C, or
- b) this Article shall be considered to be no longer applicable and the mechanical ventilation system shall comply with either Clause 9.32.3.1.(1)(a) or with Article 9.32.3.5.

**Table 9.32.3.4.**  
**Maximum Outdoor Airflow**  
 Forming Part of Sentence 9.32.3.4.(2)

January 2.5% Temperature as per Appendix C, °C	Maximum Outdoor Airflow for Indicated Mixed Temperature, L/s																	
	0	0	0	-10	-10	-10	-20	-20	-20	-30	-30	-30	-40	-40	-40	-50	-50	-50
Minimum Mixed Air Temperature, °C	15	10	5	15	10	5	15	10	5	15	10	5	15	10	5	15	10	5
<i>Furnace</i> Airflow, L/s																		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	32	55	77	22	38	53	17	29	40	13	23	33	11	19	27	10	17	24
200	64	109	155	44	75	106	33	57	81	27	46	65	23	39	55	19	33	47
300	—	—	—	66	113	159	50	86	121	40	69	98	34	58	82	29	50	71
400	—	—	—	—	—	—	—	—	—	54	92	131	45	77	110	39	67	94
500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	49	83	118

- 3)** For the purposes of Table 9.32.3.4., the *furnace* airflow shall be determined
  - a) by operating the forced air heating system’s circulation fan at the rate chosen to satisfy Clause (9)(a) when measuring the return airflow in the *furnace* return air *plenum* immediately upstream of the connection of the outdoor air *supply duct* required by Sentence (5) and then adding this return airflow measurement to the actual normal operating exhaust capacity of the fan installed to satisfy the requirement for a principal ventilation fan, or
  - b) by using the manufacturer’s rated flow for the *furnace* for 150 Pa static pressure and the wiring configuration necessary to achieve the flow specified in Clause (9)(a).
- 4)** Linear interpolation is permitted in using Table 9.32.3.4.
- 5)** An outdoor air *supply duct* shall be installed between the outdoors and the *furnace* return air *plenum* and shall be connected
  - a) not less than 3 m upstream of the *plenum* connection to the *furnace*, as measured along the length of the duct, or
  - b) through an acceptable mixing device installed in the return air *plenum*.
- 6)** The outdoor air *supply duct* required by Sentence (5) shall incorporate a flow-regulating damper.
- 7)** Where the outdoor air *supply duct* required by Sentence (5) is not connected to an outdoor air supply fan, it shall be connected downstream of all return branch connections.
- 8)** Where the outdoor air *supply duct* required by Sentence (5) is connected to an auxiliary outdoor air supply fan, the auxiliary outdoor air supply fan shall be
  - a) approved by the manufacturer for the handling of untempered outdoor air if it will be handling untempered outdoor air,
  - b) approved by the manufacturer for continuous operation, and
  - c) designed to provide an outdoor air supply flow within ±10% of the actual normal operating exhaust capacity of the exhaust fan installed to satisfy the requirement for a principal ventilation fan.
- 9)** The principal ventilation fan control required by Sentence 9.32.3.3.(5) shall be wired in such a way that
  - a) activation of the principal ventilation fan automatically activates the forced air heating system’s circulation fan to provide an airflow not greater than the space-heating airflow,

- b) where applicable, activation of the principal ventilation fan automatically activates the auxiliary outdoor air supply fan described in Sentence (8), and
- c) the auxiliary outdoor air supply fan does not operate when the principal ventilation fan is not operating.

**10)** With the principal ventilation fan operating at its normal operating exhaust capacity, the airflow in the outdoor air *supply duct* shall be measured and the flow-regulating damper required by Sentence (6) shall be adjusted and permanently fixed so that the airflow in the outdoor air *supply duct* is within  $\pm 10\%$  of the actual normal operating exhaust capacity of the principal ventilation fan.

**11)** The airflow measurements required by Sentences (3) and (10) shall be done using a method accurate to within  $\pm 15\%$  of the flow rate being measured.

**12)** All connections between the ventilation system and the heating system shall be in accordance with Articles 9.33.4.1. and 9.33.5.2.

### 9.32.3.5. Ventilation Systems Not Used in Conjunction with Forced Air Heating Systems

(See Appendix A.)

**1)** Where outdoor air is to be introduced to the *dwelling unit* through means other than a forced air heating system, the provision of outdoor air shall comply with this Article.

**2)** An outdoor air supply fan shall be installed with a rated capacity within  $\pm 10\%$  of the actual normal operating exhaust capacity of the exhaust fan installed to satisfy the requirement for a principal ventilation fan.

**3)** The principal ventilation fan control required by Sentence 9.32.3.3.(5) shall be wired in such a way that

- a) activation of the principal ventilation fan automatically activates the outdoor air supply fan required by Sentence (2), and
- b) the outdoor air supply fan does not operate when the principal ventilation fan is not operating.

**4)** The outdoor air supply fan shall be connected to the outdoors through an outdoor air *supply duct*.

**5)** The outdoor air *supply duct* required by Sentence (4) shall incorporate a flow-regulating damper.

**6)** With the principal ventilation fan operating at its normal operating exhaust capacity, the airflow in the outdoor air *supply duct* shall be measured and the flow-regulating damper required by Sentence (5) shall be adjusted and permanently fixed so that the airflow in the outdoor air *supply duct* is within  $\pm 10\%$  of the actual normal operating exhaust capacity of the principal ventilation fan.

**7)** The airflow measurements required by Sentence (6) shall be done using a method accurate to within  $\pm 15\%$  of the flow rate being measured.

**8)** Except where a heat recovery ventilator is used to supply the outdoor air, the outdoor air shall be tempered to at least  $12^{\circ}\text{C}$  before being circulated to habitable spaces.

**9)** Any tempering device installed to comply with Sentence (8) shall be installed in accordance with Articles 9.33.4.1. and 9.33.5.2.

**10)** Except as provided in Sentence (11), outdoor air shall be distributed by a system of trunk and branch *supply ducts*, from the outdoor air supply fan required by Sentence (2) to

- a) each bedroom,
- b) any *storey*, including *basements* and heated crawl spaces, without a bedroom, and
- c) the principal living area.

**11)** In a *dwelling unit* in which there is no *storey* without a bedroom, if an exhaust air intake for the principal ventilation fan is located in the principal living area and the principal ventilation fan has no more than 2 exhaust air intakes located in other rooms, distribution of outdoor air to the principal living area is not required.

**12)** All branch *supply ducts* that are not fitted with diffusers with adjustable balance stops shall be supplied with balancing dampers that

- a) can be fixed in their adjusted positions, and
- b) include devices to indicate the positions of the dampers.

**13)** The air supply outlets through which outdoor air is delivered to the rooms shall be located in the ceiling or in a wall at not less than 2 m above the floor and shall be designed and installed to promote diffusion across the ceiling.

**14)** Provision shall be made for the free flow of air to or from all rooms by leaving gaps beneath doors, using louvred doors or installing grilles in doors.

### 9.32.3.6. Reserved

### 9.32.3.7. Supplemental Exhaust

(See Appendix A.)

**1)** Except as provided in Sentences (2) and (3), a supplemental exhaust fan with a rated capacity not less than 50 L/s shall be installed in each kitchen.

**2)** A supplemental exhaust fan is not required in a kitchen where the only exhaust air intake for the principal ventilation fan is located in that kitchen.

**3)** A supplemental exhaust fan is not required in a kitchen where the principal ventilation fan draws from that kitchen and other rooms, provided

- a) the principal ventilation fan can be switched to a high exhaust rate equal to not less than 2.5 times the minimum normal operating exhaust capacity specified in Table 9.32.3.3., and
- b) the high exhaust rate of the principal ventilation fan, as described in Clause (a), is activated by a manual switch in the kitchen labelled "KITCHEN EXHAUST."

**4)** Where an exhaust air intake for the principal ventilation fan is not located in a bathroom or water-closet room, a supplemental exhaust fan with a rated capacity not less than 25 L/s shall be installed in that bathroom or water-closet room.

**5)** Where the intake for a supplemental exhaust fan other than a *range hood* or *range-top fan* is installed in a kitchen, it shall be installed in the ceiling or on the wall at not less than 2 m above the floor.

**6)** A supplemental exhaust fan required by this Article shall be controlled by a manual switch located in the room served by the fan.

**7)** Where a kitchen or bathroom is exempted from the requirement to install a supplemental exhaust fan by virtue of Sentences (2) or (3), the principal ventilation fan shall be controlled by a manual switch located in the kitchen or bathroom and wired in parallel with the manual switch required by Sentence 9.32.3.3.(5).

**8)** Where a supplemental exhaust fan required by this Article is controlled by a dehumidistat or other automatic control in addition to the manual switch required by Sentence (6), the manual switch shall be capable of activating the fan regardless of the setting of the automatic control.

### 9.32.3.8. Protection Against Depressurization

(See Appendix A.)

**1)** This Article applies to any *dwelling unit* that

- a) contains a fuel-fired space- or water-heating *appliance* of other than *direct-vented* or *mechanically vented* types, or
- b) is located in an area where *soil gas* is deemed to be a problem and does not incorporate an active *soil gas* mitigation system.

**2)** Except as provided in Sentences (8) and (9), any mechanical air exhausting device, other than the principal ventilation fan operating at a rate not greater than the maximum permitted by Table 9.32.3.3., shall be provided with outdoor makeup air supplied by a fan rated to deliver outdoor air to the *dwelling unit* at a rate

- a) not less than the exhaust capacity of the device, and
- b) not greater than that exhaust capacity plus 10%.

**3)** An outdoor makeup air supply fan required by Sentence (2) shall be wired so that it is activated whenever the device for which it supplies outdoor makeup air is activated.

**4)** The outdoor makeup air required by Sentence (2) shall be

- a) introduced to a normally unoccupied area in the *dwelling unit*, or
- b) tempered to at least 12°C before being introduced to occupied areas or to a *supply duct* system.

**5)** If the outdoor makeup air required by Sentence (2) is not tempered upstream of the supply fan, the supply fan required by Sentence (2) shall be approved by the manufacturer for the handling of untempered outdoor air.

**6)** A carbon monoxide alarm conforming to CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices," shall be mechanically fixed on or near the ceiling in each room containing a solid-fuel-burning *appliance*. (See also Article 9.32.3.9.)

**7)** Where a carbon monoxide alarm required by Sentence (6) is powered by the *dwelling unit's* electrical system, there shall be no disconnect switch between the overcurrent device and the carbon monoxide alarm.

**8)** The provision of makeup air as described in Sentence (2) is not required in a *dwelling unit* with solid-fuel-burning *appliances*, where

- a) all other fuel-fired *appliances* are *direct-vented* or *mechanically vented*, and
- b) the *dwelling unit* is located in an area where *soil* gas is deemed not to be a problem or it incorporates an active *soil* gas mitigation system.

**9)** The provision of makeup air as described in Sentence (2) is not required if it can be shown using the test procedures in CAN/CGSB-51.71, "The Spillage Test: Method to Determine the Potential for Pressure-Induced Spillage from Vented, Fuel-Fired, Space Heating Appliances, Water Heaters and Fireplaces," that the maximum depressurization levels to which fuel-fired space- or water-heating *appliances* and their venting systems will be exposed will not exceed the limits set out in CAN/CGSB-51.71 for the categories of fuel-fired *appliances* and venting systems installed in the *dwelling unit*.

### 9.32.3.9. Carbon Monoxide Alarms

(See Appendix A.)

**1)** This Article applies to every *building* that contains a *residential occupancy* and that also contains

- a) a fuel-burning *appliance*, or
- b) a *storage garage*.

**2)** Carbon monoxide alarms required by this Article shall

- a) conform to CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"
- b) be equipped with an integral alarm that satisfies the audibility requirements of CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"
- c) have no disconnect switch between the overcurrent device and the carbon monoxide alarm, where the carbon monoxide alarm is powered by the *dwelling unit's* electrical system, and
- d) be mechanically fixed at a height recommended by the manufacturer.

**3)** Where a fuel-burning *appliance* is installed in a *suite of residential occupancy*, a carbon monoxide alarm shall be installed

- a) inside each bedroom, or
- b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

- 4)** Where a fuel-burning *appliance* is installed in a *service room* that is not in a *suite of residential occupancy*, a carbon monoxide alarm shall be installed
  - a) either inside each bedroom, or if outside, within 5 m of each bedroom door, measured following corridors and doorways, in every *suite of residential occupancy* that shares a wall or floor/ceiling assembly with the *service room*, and
  - b) in the *service room*.
- 5)** For each *suite of residential occupancy* that shares a wall or floor/ceiling assembly with a *storage garage* or that is adjacent to an attic or crawl space to which the *storage garage* is also adjacent, a carbon monoxide alarm shall be installed
  - a) inside each bedroom, or
  - b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

**9.32.3.10. Fans**

(See Appendix A.)

- 1)** Except as provided in Sentence (4), capacity ratings for required fans shall be determined in accordance with
  - a) CAN/CSA-C260-M, "Rating the Performance of Residential Mechanical Ventilating Equipment," or
  - b) HVI 916, "Airflow Test Standard."
- 2)** Sound ratings for fans shall be determined in accordance with
  - a) CAN/CSA-C260-M, "Rating the Performance of Residential Mechanical Ventilating Equipment," or
  - b) HVI 915, "Procedure for Loudness Rating of Residential Fan Products."
- 3)** Capacity ratings for fans shall be measured at the external static pressure differentials shown in Table 9.32.3.10.A.
- 4)** Fans in heat recovery ventilators used to provide one or more required fans shall have their airflow at normal temperature rated in accordance with CAN/CSA-C439, "Rating the Performance of Heat/Energy-Recovery Ventilators."

**Table 9.32.3.10.A.**  
**Minimum External Static Pressure Differential for Rating of Fans**  
 Forming Part of Sentence 9.32.3.10.(3)

Fan Configuration or Application	Minimum External Static Pressure Differential to be Used in Determining Rated Capacity
Fans installed with ducts connected on both sides, any application	100 Pa (0.4 inch water column)
Fans installed with ducts on one side only, used as the principal ventilation fan in exhaust-only systems	62 Pa (0.25 inch water column)
Other required fans	25 Pa (0.1 inch water column)

- 5)** Where a heat recovery ventilator is used to provide one or more required fans, it shall have a low-temperature ventilation reduction factor of not less than 50% when tested in accordance with CAN/CSA-C439, "Rating the Performance of Heat/Energy-Recovery Ventilators," at an outdoor temperature at least as low as the outdoor design temperature for the location where the ventilation system is to be installed, but the outdoor design temperature need not be lower than -25°C.
- 6)** Fans, including makeup air supply fans, installed to satisfy Articles 9.32.3.3. to 9.32.3.8. with less than 1 m of duct between themselves and the visible interior surfaces of rooms other than unfinished *basements*, furnace rooms, utility rooms and attics, shall have a sound rating complying with Table 9.32.3.10.B. when operating at the required flow rate.

**Table 9.32.3.10.B.**  
**Maximum Sound Rating for Fans**  
 Forming Part of Sentence 9.32.3.10.(6)

Fan Application	Maximum Sound Rating, sones	
	Rated according to CAN/CSA-C260-M	Rated according to HVI 915
Principal ventilation fan	2.0	2.5
Supplemental fans installed in bathrooms and their makeup air fans	2.5	3.5
Supplemental fans installed in kitchens and their makeup air fans	No rating required	No rating required

**7)** Mechanical ventilation devices shall conform to CSA C22.2 No. 113-M, "Fans and Ventilators."

### 9.32.3.11. Ducts

(See Appendix A.)

**1)** Except as provided in Sentence (6), ventilation ducts and their fittings shall conform to the requirements of Article 9.33.6.2., except that *exhaust ducts* serving only a bathroom or water-closet room are permitted to be of *combustible* material, provided they are reasonably airtight and constructed of a material impervious to water.

**2)** *Exhaust ducts* shall not discharge into heated or unheated enclosed spaces.

**3)** Where an *exhaust duct* passes through an unheated space or is not separated from an unheated space by an insulated *building* assembly, the duct shall be insulated to not less than RSI 0.5.

**4)** Where a duct carrying outdoor air that is not tempered and not mixed with indoor air passes through heated space, it shall be insulated to not less than RSI 0.5.

**5)** All exhaust intakes located within 3 m horizontally of a *range* shall be equipped with a grease filter at the intake end.

**6)** Ductwork for *range* hoods and *range-top* fans shall

- a) be of *noncombustible*, corrosion-resistant material,
- b) lead directly to the outdoors with no connections to other exhaust fans or ducts, and
- c) be equipped with a grease filter at the intake end.

**7)** All ductwork shall be installed to avoid crushing and shall be permanently supported to prevent sagging.

**8)** Joints in all ventilation system ducting shall be sealed with mastic, metal foil duct tape or the manufacturers' specified sealants.

**9)** Except where the size of a duct can be determined using Table 9.32.3.11.A. or Table 9.32.3.11.B., duct sizes shall be determined according to Subsection 9.33.4.

**Table 9.32.3.11.A.**  
**Equivalent Duct Sizes**  
 Forming Part of Sentence 9.32.3.11.(9)

Fan's External Static Pressure, Pa	Duct Diameter, mm	Maximum Airflow in Duct, L/s						
		7	15	25	35	50	75	100
		Maximum Length of Duct, m						
25	75	6	1	0	0	0	0	0
	100	25	6	2	1	0	0	0
	125	60	17	6	3	1	0	0
	150	60	42	16	8	4	2	1
	175	60	60	34	18	9	4	2
	200	60	60	60	35	18	8	5
50	75	16	4	1	0	0	0	0
	100	60	16	6	3	1	0	0
	125	60	47	18	9	5	2	1
	150	60	60	44	23	12	5	3
	175	60	60	60	49	25	12	7
	200	60	60	60	60	48	22	13
62.5	75	22	5	2	1	0	0	0
	100	60	21	8	4	2	1	0
	125	60	60	24	12	6	3	1
	150	60	60	58	31	15	7	4
	175	60	60	60	60	33	15	9
	200	60	60	60	60	60	29	17
100	75	38	9	3	1	0	0	0
	100	60	36	14	7	3	1	1
	125	60	60	41	22	11	5	3
	150	60	60	60	53	27	12	7
	175	60	60	60	60	57	27	15
	200	60	60	60	60	60	51	30
150	75	59	14	5	2	1	0	0
	100	60	57	22	11	6	2	1
	125	60	60	60	34	17	8	4
	150	60	60	60	60	42	20	11
	175	60	60	60	60	60	42	24
	200	60	60	60	60	60	60	46

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- 10) In using Table 9.32.3.11.A.,
  - a) when sizing branch ducts, “maximum length of duct” refers to the physical length of the duct from the interior grille served by that branch duct to the exterior hood,
  - b) when sizing a trunk duct, “maximum length of duct” refers to the physical length of the duct from the interior grille of the longest branch served by that trunk to the exterior hood,
  - c) outdoor air supply ducts shall be sized as trunk ducts,
  - d) “maximum airflow in duct” refers to the maximum airflow rate that a given section of duct (branch or trunk) must provide to satisfy the ventilation system design, and
  - e) “fan’s external static pressure” refers to the external static pressure at which the fan is rated to achieve the maximum airflow rate that the fan is required or intended to provide.
  
- 11) Where flexible duct is used, it may be sized by choosing the next higher diameter in Table 9.32.3.11.A. or by choosing the diameter for a duct twice as long as the actual length.
  
- 12) Where rectangular duct is used in place of round duct, it shall be selected according to Table 9.32.3.11.B.

**Table 9.32.3.11.B.**  
**Equivalent Duct Sizes**  
 Forming Part of Sentences 9.32.3.11.(9) and (12)

Required Round Duct Size, mm	Permitted Equivalent Rectangular Duct Size, mm			
	Stack duct	100 mm depth	125 mm depth	150 mm depth
75	75 x 150	50 x 100	—	—
100	75 x 250	75 x 100	75 x 125	75 x 150
125	75 x 250	125 x 100	100 x 125	100 x 150
150	75 x 300	200 x 100	150 x 125	125 x 150
175	75 x 350	275 x 100	200 x 125	175 x 150
> 175	design to Subsection 9.33.4.			

**9.32.3.12. Heat Recovery Ventilators**

(See Appendix A.)

- 1) This Article shall apply to heat recovery ventilators installed to provide one or more of the fans required by this Subsection.
  
- 2) Two or more heat recovery ventilators shall not be connected in parallel airflow to a common air *supply duct*, unless specifically permitted by the manufacturer.
  
- 3) Two or more heat recovery ventilators shall not be connected in parallel airflow to a common downstream *exhaust duct*.
  
- 4) All start-up procedures recommended by the manufacturer, including air balancing and airflow determination, shall be followed.
  
- 5) A means for the free flow of condensate shall be provided in accordance with the manufacturer’s recommendations or, in their absence, a condensate drain of at least 1/2 inch nominal pipe size pitched in the direction of flow and complete with a trap or condensate pump of sufficient capacity shall be installed and connected to the *dwelling unit’s* drain, waste and vent system.
  
- 6) The heat recovery ventilator and all condensate lines shall be installed in a space where the ambient temperature will not adversely affect the operation of the system.

**9.32.3.13. Outdoor Intake and Exhaust Openings**

- 1)** Intake openings shall be located so as to avoid contamination of the ventilation air from other local sources such as automobile exhaust and exhaust from the *building* or adjacent *buildings*.
- 2)** The distance from the bottom of an air intake opening to finished ground or to any nearer and lower permanent horizontal surface shall be not less than 450 mm or the depth of expected snow accumulation, whichever is greater.
- 3)** The distance separating air intakes from *building* envelope penetrations that are potential sources of contaminants, such as *gas vents* or oil fill pipes, shall be not less than 900 mm.
- 4)** Air intakes shall be clearly labeled as such for identification from locations outside the *dwelling unit*.
- 5)** The distance from the bottom of an exhaust outlet to finished ground or to any nearer and lower permanent horizontal surface shall be not less than 100 mm.
- 6)** Where air intake and exhaust openings are in exposed locations, provision shall be made to protect them from the entry of precipitation by the use of louvres, weather cowls or other suitable protection.
- 7)** Air intake openings shall incorporate screens or grilles to protect against the entry of animals and insects.
- 8)** Except for exhaust outlets serving heat recovery ventilators, exhaust outlets shall incorporate backdraft dampers.
- 9)** An exhaust outlet that does not incorporate a backdraft damper located at the *building* envelope shall incorporate a screen located at the *building* envelope to protect against the entry of animals.
- 10)** Screens, grilles and filters installed in air intake and exhaust openings shall be easily removable for cleaning purposes, without the need for special tools.
- 11)** Where screens or grilles are installed in air intake and exhaust openings, the net free area of the air intake or exhaust opening shall be equal to or greater than the required cross-sectional area of the duct served or such openings shall comply with Table 9.32.3.13.
- 12)** Screens and grilles shall be of corrosion-resistant material.

**Table 9.32.3.13.**  
**Area of Openings with Screens or Grilles**  
 Forming Part of Sentence 9.32.3.13.(11)

Mesh Size of Screen or Grille, mm	Area of Opening
Less than 4	3 times required area of duct served
4 to 6	2 times required area of duct served
Larger than 6	Required area of duct served

- 13)** An outdoor air intake opening 0.008 m<sup>2</sup> or less in area in a return air system shall not be dampered.
- 14)** An outdoor air intake opening more than 0.008 m<sup>2</sup> in area but less than 0.033 m<sup>2</sup> in area in a return air system shall be equipped with a manually operated 50% damper.
- 15)** An outdoor air intake opening not less than 0.033 m<sup>2</sup> in area in a return air system shall be equipped with an automatic damper.

- 16)** Clothes dryer vents
- a) in a *residential occupancy*, shall be ducted to the outside, and if clothes dryers are collectively vented, a sheet metal duct shall be provided and a continuously operating fan shall be positioned downstream from all dryer-vent outlets to positively exhaust all moisture and lint,
  - b) are not permitted to have a screen,
  - c) except in single family *dwelling units*, shall be installed with suitable access doors for cleaning purposes,
  - d) shall not be secured with screws protruding into the vent, and
  - e) shall not be connected to any other exhaust system, *gas vent* or *chimney*.

## Section 9.33. Heating and Air-conditioning

### 9.33.1. General

#### 9.33.1.1. Application

- 1) This Section applies to the design and installation of heating systems, including requirements for combustion air, and air-conditioning systems serving only one *dwelling unit*.
- 2) The design and installation of heating systems, including requirements for combustion air, and air-conditioning systems other than those serving individual *dwelling units* shall conform to Part 6. (See Appendix A and Subsection 9.10.10.)

#### 9.33.1.2. Roof Access

- 1) Provisions for access to roof-mounted heating, ventilating and air-conditioning equipment shall conform to the requirements of Article 3.6.4.7.

### 9.33.2. Required Heating Systems

#### 9.33.2.1. Required Heating Systems

- 1) Residential *buildings* intended for use in the winter months on a continuing basis shall be equipped with heating facilities conforming to this Section.

### 9.33.3. Design Temperatures

#### 9.33.3.1. Indoor Design Temperatures

- 1) At the outside winter design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than
  - a) 22°C in all living spaces,
  - b) 18°C in unfinished *basements*, and
  - c) 15°C in heated crawl spaces.
- 2) Winter design temperature shall be determined in conformance with Subsection 1.1.3.

#### 9.33.3.2. Outdoor Design Temperatures

- 1) The outdoor conditions to be used in designing heating and air-conditioning systems shall be determined in conformance with Article 1.1.3.1.

### 9.33.4. General Requirements for Heating and Air-conditioning Systems

#### 9.33.4.1. Design of Heating and Air-conditioning Systems

1) Heating and air-conditioning systems, including ducting, and mechanical heating and refrigeration equipment, shall be designed, constructed and installed to conform with good practice such as that described in

- a) the ASHRAE Handbooks and Standards,
- b) the HRAI Digest,
- c) the Hydronics Institute Manuals, and
- d) the SMACNA Manuals.

(See also Subsection 9.32.3. for the design of systems that also provide ventilation.)

#### 9.33.4.2. Access

1) Equipment forming part of a heating or air-conditioning system, with the exception of embedded pipes or ducts, shall be installed with provision for access for inspection, maintenance, repair and cleaning.

#### 9.33.4.3. Protection from Freezing

1) Equipment forming part of a heating or air-conditioning system that may be adversely affected by freezing temperatures and that is located in an unheated area shall be protected from freezing.

#### 9.33.4.4. Expansion, Contraction and System Pressure

1) Heating and cooling systems shall be designed to allow for expansion and contraction of the heat transfer fluid and to maintain the system pressure within the rated working pressure limits of all components of the system.

#### 9.33.4.5. Structural Movement

1) Mechanical systems and equipment shall be designed and installed to accommodate the maximum amount of structural movement provided for in the construction of the *building*.

2) Where the *building* is in a location where the spectral response acceleration,  $S_a(0.2)$ , is greater than 0.55, heating and air-conditioning equipment with fuel or power connections shall be secured to the structure to resist overturning and displacement. (See A-7.2.6.3.(2) in Appendix A.)

#### 9.33.4.6. Reserved

#### 9.33.4.7. Contaminant Transfer

1) Systems serving garages, and systems serving other occupied parts of a *dwelling unit* but located in or running through a garage, shall be designed and constructed in a manner such that means are not provided for the transfer of contaminants from the garage into other spaces in the *dwelling unit*.

### 9.33.5. Heating and Air-conditioning Appliances

#### 9.33.5.1. Capacity of Heating Appliances

1) The required capacity of heating *appliances* located in a *dwelling unit* and serving only that *dwelling unit*, shall be determined in accordance with CAN/CSA-F280-M, "Determining the Required Capacity of Residential Space Heating and Cooling Appliances," except that the design temperatures shall conform to Subsection 9.33.3.

**9.33.5.2. Appliance Installation Standards**

**1)** Except as provided in Articles 9.33.5.3. and 9.33.5.4., the installation of heating and air-conditioning equipment, including mechanical refrigeration equipment, and including provisions for mounting, clearances and air supply, shall conform to

- a) boiler and pressure vessel regulations made pursuant to the Safety Codes Act,
- b) CSA B52, "Mechanical Refrigeration Code,"
- c) CAN/CSA-B139, "Installation Code for Oil-Burning Equipment,"
- d) gas regulations made pursuant to the Safety Codes Act,
- e) electrical regulations made pursuant to the Safety Codes Act,
- f) CAN/CSA-C448 Series, "Design and Installation of Earth Energy Systems,"  
or
- g) CSA Z240.5, "Oil Requirements for Mobile Housing and Recreational Vehicles."

(See also Sentence 9.33.5.3.(1).)

**9.33.5.3. Design, Construction and Installation Standard for Solid-Fuel-Burning Appliances**

(See Appendix A.)

**1)** The design, construction and installation, including the provision of combustion air, of solid-fuel-burning *appliances* and equipment, including *stoves, ranges* and *space heaters*, shall conform to CAN/CSA-B365, "Installation Code for Solid-Fuel-Burning Appliances and Equipment."

**2)** A solid-fuel-burning *appliance* shall not be installed in a location where there is a corrosive or an explosive atmosphere.

**9.33.5.4. Fireplaces**

**1)** Fireplaces shall conform to Section 9.22.

**9.33.6. Air Duct Systems****9.33.6.1. Application**

**1)** The design, construction and installation of air duct distribution systems serving heating systems in which the rated heat input does not exceed 120 kW shall conform to this Subsection.

**2)** Air duct distribution systems in which the rated heat input exceeds 120 kW shall conform to Part 6 and Subsection 3.6.5.

**9.33.6.2. Materials in Air Duct Systems**

**1)** Except as provided in Sentences (2) to (6) and in Article 3.6.4.3., all ducts, duct connectors, associated fittings and *plenums* used in air duct systems shall be constructed of steel, aluminum alloy, copper, clay, asbestos-cement or similar *noncombustible* material.

**2)** Ducts, associated fittings and *plenums* are permitted to contain *combustible* material provided they

- a) conform to the appropriate requirements for Class 1 duct materials in CAN/ULC-S110-M, "Test for Air Ducts,"
- b) conform to Article 3.1.5.15. and Subsection 3.1.9.,
- c) are not used in vertical runs serving more than 2 *storeys*, and
- d) are not used in air duct systems in which the air temperature may exceed 120°C.

**3)** Duct sealants shall have a *flame-spread rating* of not more than 25 and a smoke developed classification of not more than 50.

**4)** Duct connectors that contain *combustible* materials and that are used between ducts and air outlet units shall

- a) conform to the appropriate requirements for Class 1 air duct materials in CAN/ULC-S110-M, "Test for Air Ducts,"
- b) be limited to 4 m in length,
- c) be used only in horizontal runs, and
- d) not penetrate required *fire separations*.

**5)** *Combustible* ducts that are part of a duct system carrying only ventilation air and that are contained entirely within a *dwelling unit* need not comply with the requirements of Sentences (1) to (4).

**6)** Except as provided in Sentences 9.33.6.14.(2) and (3), ducts that are part of a return-air duct system and that are contained entirely within a *dwelling unit* need not comply with the requirements of Sentences (1) to (4).

**7)** Materials referred to in Sentences (1) to (6), when used in a location where they may be subjected to excessive moisture, shall

- a) have no appreciable loss of strength when wet, and
- b) be corrosion-resistant.

### 9.33.6.3. Tape

**1)** Tape used for sealing duct joints in air ducts, *plenums* and other parts of air duct systems shall meet the flame-resistance requirements for fabric in CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films."

### 9.33.6.4. Coverings, Linings, Adhesives and Insulation

**1)** Coverings, linings and associated adhesives and insulation of air ducts, *plenums* and other parts of air duct systems shall be of *noncombustible* material when exposed to heated air or radiation from heat sources that would result in the exposed surface exceeding a temperature of 120°C.

**2)** Except as provided in Sentence (3), when *combustible* coverings and linings, including associated adhesives and insulation, are used, they shall have

- a) a *flame-spread rating* of not more than 25 on any exposed surface or any surface that would be exposed by cutting through the material in any direction, and
- b) a smoke developed classification of not more than 50.

**3)** The outer covering of ducts, *plenums* and other parts of air duct systems used within an assembly of *combustible construction* are permitted to have

- a) an exposed surface *flame-spread rating* of not more than 75, and
- b) a smoke developed classification greater than 50.

**4)** *Combustible* coverings and linings described in Sentences (2) and (3) shall not flame, glow, smoulder or smoke when tested in accordance with the method of test in ASTM C 411, "Hot-Surface Performance of High-Temperature Thermal Insulation," at the maximum temperature to which the coverings and linings are to be exposed in service.

**5)** Except as provided in Sentence (6), *foamed plastic* insulation shall not be used as part of an air duct or for insulating an air duct.

**6)** *Foamed plastic* insulation is permitted to be used in a ceiling space that acts as a return air *plenum* provided the *foamed plastic* insulation is protected from exposure to the *plenum* in accordance with Sentence 3.1.5.12.(2).

**7)** *Combustible* coverings and linings of ducts, including associated adhesives and insulation, shall be interrupted

- a) at the immediate area of operation of heat sources in a duct system, such as electric resistance heaters or fuel-burning heaters or *furnaces*, and
- b) where the duct penetrates a *fire separation*.

8) Linings of ducts shall be installed so that they will not interfere with the operation of volume or balancing dampers or of *fire dampers, fire stop flaps* and other  *closures*.

#### 9.33.6.5. Galvanized Steel or Aluminum Supply Ducts

- 1) Galvanized steel or aluminum *supply ducts* shall conform to Table 9.33.6.5.
- 2) The design of fittings for ducts shall conform to SMACNA, "HVAC Duct Construction Standards – Metal and Flexible," except that metal thicknesses shall conform to Table 9.33.6.5.

**Table 9.33.6.5.**  
**Minimum Metal Thickness of Ducts**  
Forming Part of Article 9.33.6.5.

Type of Duct	Maximum Diameter, mm	Maximum Width or Depth, mm	Minimum metal thickness, mm	
			Duct Material	
			Galvanized Steel	Aluminum
Round ducts serving single <i>dwelling units</i>	125 or less	—	0.254	0.30
Round	350	—	0.33	0.30
	Over 350	—	0.41	0.41
Rectangular, enclosed	—	350	0.33	0.30
	—	Over 350	0.41	0.41
Rectangular, not enclosed, for single <i>dwelling units</i> , with required clearance up to 12 mm	—	350	0.33	0.41
	—	Over 350	0.41	0.48
Rectangular, not enclosed, with required clearance of more than 12 mm	—	350	0.41	0.41
	—	Over 350	0.48	0.48

#### 9.33.6.6. Construction of Ducts and Plenums

- 1) Where the installation of heating *supply ducts* in walls and floors creates a space between the duct and construction material, the space shall be fire stopped with *noncombustible* material at each end.
- 2) Ducts shall be securely supported by metal hangers, straps, lugs or brackets, except that, where zero clearance is permitted, wooden brackets are permitted to be used.
- 3) All round duct joints shall be tight-fitting and lapped not less than 25 mm.
- 4) Rectangular duct connections shall be made with S and drive cleats or equivalent mechanical connections.
- 5) Duct systems shall have no openings other than those required for the proper operation and maintenance of the system.

#### 9.33.6.7. Installation of Ducts and Plenums

- 1) Air duct systems serving garages shall not be interconnected with other parts of the *dwelling unit*.
- 2) Trunk *supply ducts* shall not be nailed directly to wood members.
- 3) Branch ducts shall be supported at suitable spacings to maintain alignment and prevent sagging.
- 4) Ducts passing through unheated spaces shall have all joints taped or otherwise sealed to ensure that the ducts are airtight throughout their length.

5) *Combustible* ducts in concrete slabs-on-ground that are connected to a *furnace* supply *plenum* shall be located not closer than 600 mm to that *plenum* and not less than 600 mm from its connection to a riser or register.

6) Ducts in or beneath concrete slabs-on-ground shall be watertight and corrosion-, decay-, and mildew-resistant.

7) Underground ducts shall

- a) be constructed to provide interior drainage from and access to all low points, and
- b) not be connected directly to a sewer.

#### 9.33.6.8. Clearances of Ducts and Plenums

1) The clearance of *furnace plenums* from *combustible* material shall conform to the appropriate standards in Sentence 9.33.5.2.(1).

2) Where the *plenum* clearance required in Sentence (1) is 75 mm or less, the clearance between a *supply duct* and *combustible* material shall

- a) be equal to the required *plenum* clearance within 450 mm of the *plenum*, and
- b) be not less than 12 mm at a distance of 450 mm or more from the *plenum*, except that this clearance may be reduced to zero beyond a bend or offset in the duct sufficiently large to shield the remainder of the *supply duct* from direct radiation from the *furnace* heat exchanger. (See A-3.6.5.6.(2) in Appendix A.)

3) Where the *plenum* clearance required in Sentence (1) is more than 75 mm but not more than 150 mm, the clearance between a *supply duct* and *combustible* material shall be

- a) equal to the required *plenum* clearance within a horizontal distance of 1.8 m of the *plenum*, and
- b) not less than 12 mm at a horizontal distance of 1.8 m or more from the *plenum*, except that this distance may be reduced to zero beyond a bend or offset in the duct sufficiently large to shield the remainder of the duct from direct radiation from the *furnace* heat exchanger. (See A-3.6.5.6.(3) in Appendix A.)

4) Where the *plenum* clearance required in Sentence (1) is more than 150 mm, the clearance between a *supply duct* and *combustible* material shall be

- a) equal to the required *plenum* clearance within a horizontal distance of 1 m of the *plenum*,
- b) not less than 150 mm within a horizontal distance between 1 m and 1.8 m from the *plenum*, and
- c) not less than 25 mm at a horizontal distance of 1.8 m or more from the *plenum*, except that this distance may be reduced to 8 mm beyond a bend or offset in the duct sufficiently large to shield the remainder of the *supply duct* from direct radiation from the *furnace* heat exchanger. (See A-3.6.5.6.(4) in Appendix A.)

5) Where a register is installed in a floor directly over a pipeless *furnace*, a double-walled register box with not less than 100 mm between walls, or a register box with the warm-air passage completely surrounded by the cold-air passage, shall be permitted in lieu of the clearances listed in Sentences (2), (3) and (4).

#### 9.33.6.9. Ducting in or beneath Slabs-on-Ground

1) Warm-air supply systems for residential *buildings* built on concrete slabs-on-ground shall be installed in or beneath the slab and shall be of the perimeter loop type or radial perimeter type.

#### 9.33.6.10. Adjustable Dampers and Balance Stops

1) All branch *supply ducts* that are not fitted with diffusers with adjustable balance stops shall be supplied with adjustable dampers and fitted with devices to indicate the positions of the dampers.

**9.33.6.11. Warm-Air Supply Outlets and Return Inlets — General**

- 1) Supply outlets and return openings in the *dwelling unit*, when located less than 2 m above the floor, shall be protected by grilles having openings of a size that will not allow the passage of a 15 mm diam sphere.
- 2) *Combustible* grilles, diffusers and other devices for the supply and return air openings installed in walls and ceilings shall have a *flame-spread rating* of
  - a) not more than 200 in bathrooms, and
  - b) not more than 150 in rooms or spaces other than bathrooms.

**9.33.6.12. Warm-Air Supply Outlets**

- 1) In a *dwelling unit*, a warm-air supply outlet shall be provided in each finished room that is located adjacent to unheated space.
- 2) Except as provided in Sentence (3), when a room described in Sentence (1) is located adjacent to exterior walls, such outlet shall be located so as to bathe at least one exterior wall or window with warm air, except in bathrooms, utility rooms or kitchens, where this may not be practical.
- 3) Where the heating system is also designed to provide ventilation air, ceiling outlets or outlets located high on interior walls are permitted to be installed, provided the outlets are designed for this purpose and are installed with diffusers.
- 4) At least one warm-air supply outlet shall be provided for each 40 m<sup>2</sup> of floor surface area in unfinished *basements* serving *dwelling units*, and it shall be located so as to provide adequate distribution of warm air throughout the *basement*.
- 5) At least one warm-air supply outlet shall be provided for each 80 m<sup>2</sup> of floor surface area in heated crawl spaces serving *dwelling units*, and it shall be located so as to provide adequate distribution of warm air throughout the crawl space.
- 6) Except for pipeless *furnaces*, the capacity of warm-air supply outlets serving *dwelling units* shall be not less than the design heat loss from the area served and shall not exceed 3 kW per outlet.
- 7) In *basements* and heated crawl spaces, the calculated heat gain from the *supply ducts* and *plenum* surfaces is permitted to be considered in calculating the design heat loss.
- 8) The temperature of supply air at warm-air supply outlets shall not exceed 70°C.
- 9) Warm-air supply outlets located in finished areas shall be provided with diffusers and adjustable openings and shall not be located on a *furnace plenum*.
- 10) A crawl space shall not be used as a warm air *plenum*.

**9.33.6.13. Return-Air Inlets**

- 1) Return-air inlets shall not be installed in an enclosed room or crawl space that provides combustion air to a *furnace*.
- 2) Except for unfinished areas and floor levels which are less than 900 mm above or below an adjacent floor level which is provided with a return-air inlet, at least one return-air inlet shall be provided in each floor level in a *dwelling unit*.
- 3) Provision shall be made for the return of air from all rooms by leaving gaps beneath doors, using louvred doors or installing *return duct* inlets.

**9.33.6.14. Return-Air System**

(See Appendix A.)

- 1) The return-air system shall be designed to handle the entire air supply.
- 2) Where any part of a *return duct* will be exposed to radiation from the *furnace* heat exchanger or other radiating part within the *furnace*, such part of a *return duct* directly above or within 600 mm of the outside *furnace* casing shall be *noncombustible*.
- 3) *Return ducts* serving solid-fuel-burning *furnaces* shall be constructed of *noncombustible* material.

- 4) *Combustible return ducts* shall be lined with *noncombustible* material
  - a) below floor registers,
  - b) at the bottom of vertical ducts, and
  - c) under *furnaces* having a bottom return.
- 5) Spaces between studs or joists used as *return ducts* shall be separated from the unused portions of such spaces by tight-fitting metal stops or wood blocking.
- 6) A vertical *return duct* shall have openings to return air on not more than one floor.
- 7) The return-air system shall be designed so that the negative pressure from the circulating fan cannot
  - a) affect the *furnace* combustion air supply, nor
  - b) draw combustion products from joints or openings in the *furnace* or *flue pipe*.
- 8) If more than one *furnace* system serves a *dwelling unit*, the return-air system for each *furnace* shall be independent.

#### 9.33.6.15. Filters and Odour Removal Equipment

- 1) Air filters for air duct systems shall conform to the requirements for Class 2 air filter units as described in ULC-S111, "Fire Tests for Air Filter Units."
- 2) When electrostatic-type filters are used, they shall be installed so as to ensure that the electric circuit is automatically de-energized when filter access doors are opened or, in *dwelling units*, when the *furnace* circulation fan is not operating.
- 3) When odour removal equipment of the adsorption type is used it shall be
  - a) installed to provide access so that adsorption material can be reactivated or renewed, and
  - b) protected from dust accumulation by air filters installed on the inlet side.

#### 9.33.7. Radiators and Convectors

##### 9.33.7.1. Recessed Radiators and Convectors

- 1) Every steam or hot water radiator and convector located in a recess or concealed space or attached to the face of a wall of *combustible construction* shall be provided with a *noncombustible* lining or backing.

##### 9.33.7.2. Surface Temperature

- 1) The exposed surface temperature of a steam or hot water radiator shall not exceed 70°C unless precautions are taken to prevent human contact.

#### 9.33.8. Piping for Heating and Cooling Systems

##### 9.33.8.1. Piping Materials and Installation

- 1) Piping shall be made from materials designed to withstand the effects of temperatures and pressures that may occur in the system. (See Articles 3.1.5.16., 3.1.9.1. and 9.10.9.6. for fire safety requirements.)
- 2) Every pipe used in a heating or air-conditioning system shall be installed to allow for expansion and contraction due to temperature changes.
- 3) Supports and anchors for piping in a heating or air-conditioning system shall be designed and installed to ensure that undue stress is not placed on the supporting structure.

##### 9.33.8.2. Insulation and Coverings

- 1) Insulation and coverings on pipes shall be composed of material suitable for the operating temperature of the system to withstand deterioration from softening, melting, mildew and mould.

- 2) Insulation and coverings on pipes in which the temperature of the fluid exceeds 120°C
  - a) shall be made of *noncombustible* material, or
  - b) shall not flame, glow, smoulder or smoke when tested in accordance with ASTM C 411, "Hot-Surface Performance of High-Temperature Thermal Insulation," at the maximum temperature to which such insulation or covering is to be exposed in service.
- 3) Except as provided in Sentence (6), where *combustible* insulation is used on piping in a horizontal or *vertical service space*, the insulation and coverings on such pipes shall have a *flame-spread rating* throughout the material of not more than
  - a) 25 in *buildings of noncombustible construction*, and
  - b) 75 in *buildings of combustible construction*.
- 4) Except as provided in Sentence (6), insulation and coverings on piping located in rooms and spaces other than the *service spaces* described in Sentence (3) shall have a *flame-spread rating* not more than that required for the interior finish for the ceiling of the room or space.
- 5) Pipes that are exposed to human contact shall be insulated so that the exposed surface does not exceed 70°C. (See A-6.2.9.2.(2) in Appendix A.)
- 6) No *flame-spread rating* or smoke developed classification limitations are required where *combustible* insulation and coverings are used on piping when such piping is
  - a) located within a concealed space in a wall,
  - b) located in a floor slab, or
  - c) enclosed in a *noncombustible* raceway or conduit.

**9.33.8.3. Clearances**

- 1) Clearances between *combustible* material and bare pipes carrying steam or hot water shall conform to Table 9.33.8.3.

**Table 9.33.8.3.**  
**Clearance between Steam or Hot Water Pipes and Combustible Material**  
 Forming Part of Sentence 9.33.8.3.(1)

Steam or Water Temperature (T), °C	Minimum Clearance, mm
T ≤ 95	no clearance required
95 < T ≤ 120	15
T > 120	25

**9.33.8.4. Protection**

- 1) Where a pipe carrying steam or hot water at a temperature above 120°C passes through a *combustible* floor, ceiling or wall, the construction shall be protected by a sleeve of metal or other *noncombustible* material not less than 50 mm larger in diameter than the pipe.
- 2) Unprotected steam or hot water pipes that pass through a storage space shall be covered with not less than 25 mm thickness of *noncombustible* insulation to prevent direct contact with the material stored.

**9.33.9. Refrigerating Systems and Equipment for Air-conditioning**

**9.33.9.1. Cooling Units**

- 1) Where a cooling unit is combined with a fuel-fired *furnace* in the same duct system, the cooling unit shall be installed
  - a) in parallel with the heating *furnace*,

- b) upstream of the *furnace*, provided the *furnace* is designed for such application, or
- c) downstream of the *furnace*, provided the cooling unit is designed to prevent excessive temperature or pressure in the refrigeration system.

### 9.33.10. Chimneys and Venting Equipment

#### 9.33.10.1. Requirement for Venting

1) Except as provided in Articles 9.33.10.2. and 9.33.10.3., the products of combustion from oil-, gas- and solid-fuel-burning *appliances*, including *stoves*, *ranges* and *space heaters*, shall be vented in conformance with the applicable *appliance* installation standard listed in Sentences 9.33.5.2.(1) and 9.33.5.3.(1).

#### 9.33.10.2. Factory-Built Chimneys

1) *Factory-built chimneys* serving solid-fuel-burning *appliances*, and their installation, shall conform to CAN/ULC-S629-M, "650°C Factory-Built Chimneys." (See Appendix A.)

#### 9.33.10.3. Masonry or Concrete Chimneys

1) *Masonry or concrete chimneys* shall conform to Section 9.21.

## Section 9.34. Electrical Facilities

### 9.34.1. General

#### 9.34.1.1. Standard for Electrical Installations

1) Electrical installations, including the service capacity of the installation and the number and distribution of circuits and receptacles, shall conform to the electrical regulations made pursuant to the Safety Codes Act.

#### 9.34.1.2. Required Facilities

1) Where electrical services are available, electrical facilities shall be provided for every *building* in conformance with this Section.

#### 9.34.1.3. Location of Equipment in Public Areas

1) Entrance switches, meters, panel boxes, splitter boxes, time clocks and other similar equipment shall not be located in any public area unless adequate precautions are taken to prevent interference with the equipment.

#### 9.34.1.4. Recessed Lighting Fixtures

1) Recessed lighting fixtures shall not be located in insulated ceilings unless the fixtures are designed for such installations.

#### 9.34.1.5. Wiring and Cables

1) Electrical wiring and cables shall conform to Sentences 3.1.4.3.(1), 3.1.5.18.(1) and 3.6.4.3.(1), where appropriate.

#### 9.34.1.6. Public Corridors and Stairs

1) Except as provided in the electrical regulations made pursuant to the Safety Codes Act for *residential occupancies*, *public corridors* and public stairs shall have at least one duplex receptacle for each 10 m length or fraction thereof.

**9.34.2.1.****9.34.2. Lighting Outlets**

(See Appendix A.)

**9.34.2.1. Lighting of Entrances**

**1)** An exterior lighting outlet with fixture controlled by a wall switch located within the *building* shall be provided at every entrance to *buildings of residential occupancy*.

**9.34.2.2. Outlets in Dwelling Units**

**1)** Except as provided in Sentence (2), a lighting outlet with fixture controlled by a wall switch shall be provided in kitchens, bedrooms, living rooms, utility rooms, laundry rooms, dining rooms, bathrooms, water-closet rooms, vestibules and hallways in *dwelling units*.

**2)** Where a receptacle controlled by a wall switch is provided in bedrooms or living rooms, such rooms need not conform to the requirements in Sentence (1).

**9.34.2.3. Stairways**

**1)** Every stairway shall be lighted.

**2)** Except as provided in Sentence (3), 3-way wall switches located at the head and foot of every stairway shall be provided to control at least one lighting outlet with fixture for stairways with 4 or more risers in *dwelling units*.

**3)** The stairway lighting for *basements* that do not contain finished space or lead to an outside entrance or built-in garage and which serve not more than one *dwelling unit* is permitted to be controlled by a single switch located at the head of the stairs.

**9.34.2.4. Basements**

**1)** A lighting outlet with fixture shall be provided for each 30 m<sup>2</sup> or fraction thereof of *floor area* in unfinished *basements*.

**2)** The outlet required in Sentence (1) nearest the stairs shall be controlled by a wall switch located at the head of the stairs.

**9.34.2.5. Storage Rooms**

**1)** A lighting outlet with fixture shall be provided in storage rooms.

**9.34.2.6. Garages and Carports**

**1)** A lighting outlet with fixture shall be provided for an attached, built-in or detached garage or carport.

**2)** Except as provided in Sentence (3), outlets required in Sentence (1) shall be controlled by a wall switch near the doorway.

**3)** Where the outlet and fixture required in Sentence (1) are ceiling mounted above an area not normally occupied by a parked car, or are wall mounted, a fixture with a built-in switch accessible to an adult of average height is permitted to be used.

**4)** Where a carport is lighted by a light at the entrance to a *dwelling unit*, additional carport lighting is not required.

**9.34.2.7. Public and Service Areas**

**1)** Every public or service area in *buildings* shall be provided with lighting outlets with fixtures controlled by a wall switch or panel to illuminate every portion of such areas.

**2)** When provided by incandescent lighting, illumination required in Sentence (1) shall conform to Table 9.34.2.7. (See Article 9.9.11.2. for lighting in *means of egress*.)

**3)** When other types of lighting are used, illumination equivalent to that shown in Table 9.34.2.7. shall be provided.

**Table 9.34.2.7.**  
**Lighting for Public Areas**  
 Forming Part of Sentences 9.34.2.7.(2) and (3)

Room or Space	Minimum Illumination, lx	Minimum Lighting Power Density, W/m <sup>2</sup> of floor area (incandescent lighting)
Storage rooms	50	5
Service rooms and laundry areas	200	20
Garages	50	5
Public water closet rooms	100	10
Service hallways and stairways	50	5
Recreation rooms	100	10

**9.34.3. Emergency Lighting**

**9.34.3.1. Criteria for Emergency Lighting**

- 1) Emergency lighting shall conform to Subsection 9.9.11.

**Section 9.35. Garages and Carports**

**9.35.1. Scope**

**9.35.1.1. Application**

- 1) This Section applies to garages and carports serving not more than one *dwelling unit* or a primary *dwelling unit* with a *secondary suite*.

**9.35.1.2. Construction Requirements**

- 1) The construction of a garage or carport shall conform to the requirements for other *buildings* in this Part except as provided in this Section.

**9.35.2. General**

**9.35.2.1. Carport Considered to be Garage**

- 1) Where a roofed enclosure used for the storage or parking of motor vehicles has more than 60% of the total perimeter enclosed by walls, doors or windows, the enclosure shall be considered a garage.

**9.35.2.2. Garage Floor**

- 1) Where an attached or built-in garage is provided, the garage floor shall be sloped to the outdoors.

**9.35.3. Foundations**

**9.35.3.1. Foundation Required**

- 1) Except as permitted in this Subsection, *foundations* conforming to Sections 9.12. and 9.15. shall be provided for the support of carport and garage super-structures, including that portion beneath garage doors.

**9.35.3.2.****9.35.3.2. Protection from Damage due to Soil Movement**

**1)** In clay-type *soils* subject to significant movement with a change in *soil* moisture content, the *foundation* depth of carports or garages connected to a *dwelling unit* directly or by a breezeway shall be approximately the same depth as the main *building foundation*.

**2)** Where slab-on-ground construction is used, a construction joint shall be provided between the main *building* slab and a slab serving an attached garage, breezeway or carport.

**3)** Except as provided in Section 9.12., *foundations* for attached unheated garages or carports shall be below frost level.

**9.35.3.3. Small Garages**

**1)** Detached garages of less than 55 m<sup>2</sup> *floor area* and not more than 1 *storey* in height are permitted to be supported on wood mud sills or a 100 mm thick concrete floor slab provided the garage is not of masonry or masonry veneer construction.

**9.35.3.4. Column Piers**

**1)** Piers for the support of carport columns shall extend not less than 150 mm above ground level.

**2)** Piers referred to in Sentence (1) shall project not less than 25 mm beyond the base of the column but in no case be less than 190 mm by 190 mm in size.

**9.35.4. Walls, Columns and Ceilings****9.35.4.1. Interior Finish**

**1)** Except as required by Sentence (2), interior finish need not be applied to garage and carport walls.

**2)** The walls and ceilings of an attached garage shall have an interior finish consisting of

- a) not less than 12.7 mm thick gypsum board conforming to Subsection 9.29.5.,
- b) lath and plaster conforming to Subsection 9.29.4., or
- c) any material that can be shown to remain in place and prevent the passage of flames for not less than 15 min when subjected to the standard fire exposure in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

**9.35.4.2. Columns**

**1)** Columns for garages and carports shall conform to Section 9.17., except that 89 mm by 89 mm wood columns may be used.

**9.35.4.3. Anchorage**

**1)** Garage or carport walls and columns shall be anchored to the *foundation* to resist wind uplift in conformance with Subsection 9.23.6., except that where a garage is supported on the surface of the ground, ground anchors shall be provided to resist wind uplift.

**9.35.4.4. Thermal Insulation**

**1)** The walls and ceilings of an attached garage shall be provided with thermal insulation that conforms to Subsection 9.25.2.

## Section 9.36. Log Construction

### 9.36.1. General

#### 9.36.1.1. Design Standards

- 1) Full log, interlocking, scribe-fit construction shall be designed on the basis of
  - a) structural analysis,
  - b) accepted tests, or
  - c) standards such as
    - i) ILBA, "Log Building Standards for Residential, Handcrafted Interlocking, Scribe-fit Construction," and
    - ii) ILBA, "Log Span Tables for Floor Joists, Beams, and Roof Support Systems."
- 2) Manufactured log *building* systems shall be constructed in accordance with the manufacturer's instructions and recommendations.

#### 9.36.1.2. Materials

- 1) Logs used in log construction shall be sound and free of rot or other such defects.
- 2) The portion of any log coming into contact with masonry or concrete at or below ground level, or with *soil*, shall be treated with preservative.
- 3) Logs shall be seasoned to a moisture content not exceeding 19% before installation.

### 9.36.2. Walls

#### 9.36.2.1. Horizontal Log Walls

- 1) Walls made of logs placed horizontally shall
  - a) have interlocking intersections that will prevent the collection of water in the joints, or
  - b) butt against and be firmly attached to a vertical corner post.
- 2) Joints in exterior horizontal log walls shall be constructed to be
  - a) self draining or gasketed, and
  - b) resistant to water, air or insect infiltration.

#### 9.36.2.2. Fastening to Bearer

- 1) Each horizontal log shall be scribed to fit as closely as possible to its bearer and fastened to the bearer in at least 3 places throughout its length, by dowels, continuous machined joints, vertical framing members or interlocking sections, or any combination of these, and the distance between fastenings shall not exceed 1.8 m.

#### 9.36.2.3. Vertical Log Walls

- 1) Each log in a wall built of vertical logs shall be scribed to fit as closely as possible to the adjacent logs.

#### 9.36.2.4. End Plates

- 1) Logs used in a vertical position shall have plates at the top and at the bottom that are at least as wide as the largest end diameter of any of the logs.

## Section 9.37. Secondary Suites

(See Appendix A.)

### 9.37.1. Application

#### 9.37.1.1. General

- 1) This Section applies to
  - a) the construction of a *secondary suite* in a *dwelling unit* that will result in a total of not more than two *dwelling units*, and
  - b) the *alteration* of an existing *dwelling unit* to accommodate a new *secondary suite*.

### 9.37.2. Construction

#### 9.37.2.1. Height of Rooms and Spaces

1) The height of rooms or spaces in a *secondary suite* over the required minimum area in accordance with Table 9.5.3.1. shall be not less than 1.95 m.

#### 9.37.2.2. Door Heights

1) Except where the height of rooms or spaces in a *secondary suite* is less than the minimum height listed in Table 9.6.3.1., doors within *dwelling units* shall conform to Subsection 9.6.3.

#### 9.37.2.3. Bedroom Windows

1) Except as permitted in Sentence 9.7.1.2.(1), each bedroom within a *secondary suite* shall have at least one outside window that meets the requirements of Articles 9.7.1.2. and 9.7.1.3.

#### 9.37.2.4. Exit Stairs

1) *Exit* stairs shall have a clear width of not less than 860 mm.

#### 9.37.2.5. Landings

1) Landings for stairs shall be at least as wide as the stairs and not less than 900 mm in length.

#### 9.37.2.6. Handrails and Guards

1) Handrails and *guards* shall conform to the requirements of Subsections 9.8.7. and 9.8.8.

#### 9.37.2.7. Public and Exit Corridor Width

1) The clear width of every *public corridor* and *exit* corridor shall be not less than 860 mm.

#### 9.37.2.8. Unenclosed Exterior Stair or Ramp

1) Where an unenclosed exterior *exit* stair or ramp provides the only *means of egress* from a *secondary suite* and is exposed to the hazards of fire from *unprotected openings* in the exterior wall of the primary *dwelling unit*, the openings shall be protected in conformance with Articles 9.10.13.5. and 9.10.13.7.

#### 9.37.2.9. Exit Doors

- 1) Every *exit* door or door that provides *access to exit* from a *secondary suite* shall be
  - a) not less than 1 980 mm high,
  - b) not less than 810 mm wide, and
  - c) permitted to swing inward.

**9.37.2.10. Travel Limit**

1) The travel limit from a floor level in a *dwelling unit* to an *exit* or egress door may exceed 1 *storey* where that floor level is served by an openable window conforming to Sentence 9.9.9.1.(2).

**9.37.2.11. Means of Egress**

1) Except as permitted in Sentence (2), each *dwelling unit* shall be provided with at least one *exit* that leads directly to the outside.

2) *Dwelling units* may share a common *exit* meeting the requirements of Article 9.37.2.13.

**9.37.2.12. Shared Egress Facilities**

1) A *dwelling unit* need not be provided with a second and separate *means of egress* referred to in Article 9.9.9.3. where the *dwelling unit* is provided with not less than one *exit* as required by Article 9.37.2.11.

**9.37.2.13. Protection of Exits**

1) Every *exit*, other than an *exit* doorway, shall be separated from adjacent *floor areas* by not less than one layer of 12.7 mm thick gypsum wallboard or equivalent material on each side of the walls. (See Appendix A.)

**9.37.2.14. Exit Signs**

1) *Exit signs* referred to in Subsection 9.9.10. are not required within a *building* that contains a *secondary suite*.

**9.37.2.15. Emergency Lighting**

1) Emergency lighting referred to in Subsection 9.9.11. is not required within a *building* that contains a *secondary suite*.

**9.37.2.16. Dwelling Unit Separations**

1) *Dwelling units* shall be separated from each other by not less than one layer of 12.7 mm thick gypsum wallboard or equivalent material on the ceiling and on each side of the walls. (See A-9.37.2.13.(1) in Appendix A.)

2) Table 9.10.8.1. does not apply to a *dwelling unit* within a *building* that contains a *secondary suite*.

**9.37.2.17. Protection of Public Corridors**

1) A *public corridor* shall be separated from the remainder of the *building* by not less than one layer of 12.7 mm thick gypsum wallboard or equivalent material on each side of the walls. (See A-9.37.2.13.(1) in Appendix A.)

**9.37.2.18. Furnace Room Separations**

1) A *furnace room* shall be separated from the remainder of the *building* by not less than one layer of 12.7 mm thick gypsum wallboard or equivalent material on the ceiling and on each side of the walls. (See A-9.37.2.13.(1) in Appendix A.)

2) A door shall be provided to each furnace room.

**9.37.2.19. Heating and Ventilation Systems**

1) Each *dwelling unit* shall have an independent heating and ventilation system complying with Sections 9.32. and 9.33. (See Appendix A.)

**9.37.2.20. Smoke Alarms**

1) *Smoke alarms* conforming to CAN/ULC-S531, "Smoke Alarms," installed in accordance with Subsection 9.10.19. shall be provided in each *dwelling unit*.

2) *Smoke alarms* shall be installed by permanent connections to an electrical circuit and wired so that activation of one *smoke alarm* will cause all alarms within both *dwelling units* to sound.

3) *Smoke alarms* shall be installed in areas that are common to both *dwelling units* and connected in conformance with Sentence (2).

#### 9.37.2.21. Solid Blocking

1) Solid blocking may be omitted for doors described in Sentence 9.6.8.9.(1), where the interior wall finish adjacent to the door is in place prior to the construction of the *secondary suite*.

#### 9.37.2.22. Sound Control

1) Section 9.11. does not apply to a *building* that contains a *secondary suite*.

#### 9.37.2.23. Garages and Carports

1) Section 9.35. applies to garages and carports serving a *building* that contains a *secondary suite*.

2) The requirements regarding *fire-resistance rating*, type of construction and type of cladding shall not apply to the *exposing building face* of a *building* that contains a *secondary suite* facing a detached garage or accessory *building*, where

- a) the detached garage or accessory *building* is located on the same property as that *building*, and
- b) the *building* served by the detached garage or accessory *building* is the only other *building* on the property.

## Section 9.38. Objectives and Functional Statements

### 9.38.1. Objectives and Functional Statements

#### 9.38.1.1. Attribution to Acceptable Solutions

1) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.7. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)



# Span Tables

# Span Tables

**Table A-1**  
**Maximum Spans for Floor Joists – General Cases<sup>(1)</sup>**  
 Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m									
			With Strapping <sup>(2)</sup>			With Bridging			With Strapping <sup>(2)</sup> and Bridging			
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm			
			300	400	600	300	400	600	300	400	600	
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.13	1.97	1.73	2.19	1.99	1.73	2.19	1.99	1.73	
		38 x 140	3.23	3.07	2.73	3.44	3.12	2.73	3.44	3.12	2.73	
		38 x 184	3.88	3.69	3.51	4.18	3.92	3.59	4.37	4.07	3.59	
		38 x 235	4.57	4.34	4.13	4.86	4.57	4.29	5.05	4.70	4.39	
		38 x 286	5.21	4.95	4.71	5.49	5.16	4.85	5.66	5.28	4.92	
	No. 1 and No. 2	38 x 89	2.00	1.85	1.66	2.09	1.90	1.66	2.09	1.90	1.66	
		38 x 140	3.09	2.91	2.62	3.29	2.99	2.62	3.29	2.99	2.62	
		38 x 184	3.71	3.53	3.36	4.00	3.76	3.44	4.19	3.90	3.44	
		38 x 235	4.38	4.16	3.96	4.66	4.38	4.11	4.84	4.51	4.20	
		38 x 286	4.99	4.75	4.52	5.26	4.94	4.65	5.43	5.06	4.72	
	No. 3	38 x 89	1.90	1.69	1.38	1.95	1.69	1.38	1.95	1.69	1.38	
		38 x 140	2.78	2.41	1.97	2.78	2.41	1.97	2.78	2.41	1.97	
		38 x 184	3.38	2.93	2.39	3.38	2.93	2.39	3.38	2.93	2.39	
		38 x 235	4.14	3.58	2.93	4.14	3.58	2.93	4.14	3.58	2.93	
		38 x 286	4.80	4.16	3.39	4.80	4.16	3.39	4.80	4.16	3.39	
	Construction	38 x 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61	
	Standard	38 x 89	1.81	1.63	1.33	1.88	1.63	1.33	1.88	1.63	1.33	
	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.08	1.93	1.71	2.16	1.96	1.71	2.16	1.96	1.71
			38 x 140	3.18	3.03	2.69	3.39	3.08	2.69	3.39	3.08	2.69
			38 x 184	3.82	3.64	3.46	4.12	3.87	3.54	4.31	4.02	3.54
38 x 235			4.50	4.28	4.08	4.80	4.51	4.23	4.98	4.64	4.33	
38 x 286			5.14	4.89	4.65	5.42	5.09	4.78	5.59	5.21	4.86	
No. 1 and No. 2		38 x 89	2.00	1.85	1.66	2.09	1.90	1.66	2.09	1.90	1.66	
		38 x 140	3.09	2.91	2.62	3.29	2.99	2.62	3.29	2.99	2.62	
		38 x 184	3.71	3.53	3.36	4.00	3.76	3.44	4.19	3.90	3.44	
		38 x 235	4.38	4.16	3.96	4.66	4.38	4.11	4.84	4.51	4.20	
		38 x 286	4.99	4.75	4.52	5.26	4.94	4.65	5.43	5.06	4.72	
No. 3		38 x 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61	
		38 x 140	2.99	2.78	2.43	3.19	2.90	2.43	3.19	2.90	2.43	
		38 x 184	3.60	3.42	2.95	3.88	3.61	2.95	4.06	3.61	2.95	
		38 x 235	4.24	4.03	3.61	4.51	4.24	3.61	4.68	4.37	3.61	
		38 x 286	4.84	4.60	4.19	5.10	4.79	4.19	5.26	4.90	4.19	
Construction		38 x 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61	
Standard		38 x 89	1.81	1.68	1.39	1.96	1.71	1.39	1.96	1.71	1.39	

**Table A-1 (Continued)**

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m									
			With Strapping <sup>(2)</sup>			With Bridging			With Strapping <sup>(2)</sup> and Bridging			
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm			
			300	400	600	300	400	600	300	400	600	
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	1.95	1.81	1.64	2.06	1.87	1.64	2.06	1.87	1.64	
		38 x 140	3.05	2.85	2.57	3.24	2.95	2.57	3.24	2.95	2.57	
		38 x 184	3.66	3.48	3.31	3.94	3.70	3.38	4.12	3.84	3.38	
		38 x 235	4.31	4.10	3.90	4.59	4.31	4.05	4.76	4.44	4.14	
		38 x 286	4.91	4.67	4.45	5.18	4.87	4.57	5.34	4.98	4.64	
	No. 1 and No. 2	38 x 89	1.86	1.72	1.58	1.99	1.81	1.58	1.99	1.81	1.58	
		38 x 140	2.92	2.71	2.49	3.14	2.85	2.49	3.14	2.85	2.49	
		38 x 184	3.54	3.36	3.20	3.81	3.58	3.27	3.99	3.72	3.27	
		38 x 235	4.17	3.96	3.77	4.44	4.17	3.92	4.60	4.29	4.00	
		38 x 286	4.75	4.52	4.30	5.01	4.71	4.42	5.17	4.82	4.49	
	No. 3	38 x 89	1.81	1.68	1.55	1.96	1.78	1.55	1.96	1.78	1.55	
		38 x 140	2.84	2.64	2.43	3.08	2.80	2.43	3.08	2.80	2.43	
		38 x 184	3.47	3.30	2.95	3.74	3.52	2.95	3.92	3.61	2.95	
		38 x 235	4.09	3.89	3.61	4.36	4.09	3.61	4.52	4.22	3.61	
		38 x 286	4.67	4.44	4.19	4.92	4.62	4.19	5.08	4.73	4.19	
	Construction	38 x 89	1.81	1.68	1.55	1.96	1.78	1.55	1.96	1.78	1.55	
	Standard	38 x 89	1.70	1.58	1.44	1.88	1.71	1.44	1.88	1.71	1.44	
	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	1.65	1.53	1.42	1.84	1.68	1.46	1.84	1.68	1.46
			38 x 140	2.59	2.41	2.24	2.90	2.63	2.30	2.90	2.63	2.30
			38 x 184	3.27	3.11	2.94	3.52	3.31	3.03	3.69	3.44	3.03
38 x 235			3.85	3.66	3.48	4.10	3.85	3.62	4.26	3.97	3.70	
38 x 286			4.39	4.18	3.97	4.63	4.35	4.09	4.78	4.45	4.15	
No. 1 and No. 2		38 x 89	1.59	1.48	1.37	1.80	1.64	1.43	1.80	1.64	1.43	
		38 x 140	2.51	2.33	2.16	2.83	2.57	2.25	2.83	2.57	2.25	
		38 x 184	3.19	3.04	2.84	3.44	3.23	2.96	3.60	3.36	2.96	
		38 x 235	3.76	3.58	3.41	4.01	3.77	3.54	4.16	3.88	3.62	
		38 x 286	4.29	4.08	3.88	4.53	4.25	4.00	4.67	4.35	4.06	
No. 3		38 x 89	1.54	1.43	1.32	1.74	1.57	1.36	1.76	1.60	1.36	
		38 x 140	2.42	2.24	1.94	2.74	2.38	1.94	2.75	2.38	1.94	
		38 x 184	3.12	2.90	2.37	3.35	2.90	2.37	3.35	2.90	2.37	
		38 x 235	3.67	3.49	2.89	3.91	3.54	2.89	4.06	3.54	2.89	
		38 x 286	4.19	3.98	3.36	4.42	4.11	3.36	4.55	4.11	3.36	
Construction		38 x 89	1.54	1.43	1.32	1.74	1.57	1.40	1.76	1.60	1.40	
Standard		38 x 89	1.48	1.37	1.15	1.63	1.41	1.15	1.63	1.41	1.15	

**Notes to Table A-1:**

- (1) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) See Sentence 9.23.9.4.(5) for alternatives to strapping.

# Span Tables

**Table A-2**  
**Maximum Spans for Floor Joists – Special Cases<sup>(1)</sup>**  
 Forming Part of Sentences 9.23.4.2.(1) and 9.23.4.4.(2)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m									
			Joists with Ceilings Attached to Wood Furring						Joists with Concrete Topping			
			Without Bridging			With Bridging			With or Without Bridging <sup>(2)</sup>			
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm			
300	400	600	300	400	600	300	400	600				
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.19	1.99	1.73	2.19	1.99	1.73	2.19	1.99	1.73	
		38 x 140	3.44	3.12	2.73	3.44	3.12	2.73	3.44	3.12	2.73	
		38 x 184	4.24	3.99	3.59	4.52	4.11	3.59	4.52	4.11	3.59	
		38 x 235	4.98	4.69	4.29	5.47	5.20	4.58	5.77	5.24	4.58	
		38 x 286	5.67	5.34	4.88	6.19	5.89	5.54	6.83	6.37	5.58	
	No. 1 and No. 2	38 x 89	2.09	1.90	1.66	2.09	1.90	1.66	2.09	1.90	1.66	
		38 x 140	3.29	2.99	2.62	3.29	2.99	2.62	3.29	2.99	2.55	
		38 x 184	4.06	3.83	3.44	4.33	3.93	3.44	4.33	3.81	3.11	
		38 x 235	4.78	4.50	4.11	5.24	4.98	4.31	5.37	4.65	3.80	
		38 x 286	5.44	5.12	4.68	5.93	5.64	5.00	6.24	5.40	4.41	
	No. 3	38 x 89	1.95	1.69	1.38	1.95	1.69	1.38	1.72	1.49	1.21	
		38 x 140	2.78	2.41	1.97	2.78	2.41	1.97	2.45	2.12	1.73	
		38 x 184	3.38	2.93	2.39	3.38	2.93	2.39	2.98	2.58	2.11	
		38 x 235	4.14	3.58	2.93	4.14	3.58	2.93	3.65	3.16	2.58	
		38 x 286	4.80	4.16	3.39	4.80	4.16	3.39	4.23	3.66	2.99	
	Construction	38 x 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.84	1.61	
	Standard	38 x 89	1.88	1.63	1.33	1.88	1.63	1.33	1.66	1.44	1.17	
	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.16	1.96	1.71	2.16	1.96	1.71	2.16	1.96	1.71
			38 x 140	3.39	3.08	2.69	3.39	3.08	2.69	3.39	3.08	2.69
			38 x 184	4.18	3.94	3.54	4.46	4.05	3.54	4.46	4.05	3.54
38 x 235			4.92	4.63	4.23	5.39	5.13	4.52	5.69	5.17	4.52	
38 x 286			5.60	5.27	4.82	6.10	5.81	5.47	6.74	6.28	5.50	
No. 1 and No. 2		38 x 89	2.09	1.90	1.66	2.09	1.90	1.66	2.09	1.90	1.66	
		38 x 140	3.29	2.99	2.62	3.29	2.99	2.62	3.29	2.99	2.62	
		38 x 184	4.06	3.83	3.44	4.33	3.93	3.44	4.33	3.93	3.26	
		38 x 235	4.78	4.50	4.11	5.24	4.98	4.39	5.53	4.88	3.99	
		38 x 286	5.44	5.12	4.68	5.93	5.64	5.25	6.54	5.66	4.63	
No. 3		38 x 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.83	1.50	
		38 x 140	3.19	2.90	2.43	3.19	2.90	2.43	3.02	2.62	2.14	
		38 x 184	3.94	3.61	2.95	4.17	3.61	2.95	3.68	3.18	2.60	
		38 x 235	4.63	4.36	3.61	5.08	4.42	3.61	4.50	3.89	3.18	
		38 x 286	5.27	4.96	4.19	5.74	5.13	4.19	5.22	4.52	3.69	
Construction		38 x 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.84	1.61	
Standard		38 x 89	1.96	1.71	1.39	1.96	1.71	1.39	1.74	1.50	1.23	

**Table A-2 (Continued)**

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m									
			Joists with Ceilings Attached to Wood Furring						Joists with Concrete Topping			
			Without Bridging			With Bridging			With or Without Bridging <sup>(2)</sup>			
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm			
			300	400	600	300	400	600	300	400	600	
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	2.06	1.87	1.64	2.06	1.87	1.64	2.06	1.87	1.64	
		38 x 140	3.24	2.95	2.57	3.24	2.95	2.57	3.24	2.95	2.57	
		38 x 184	4.00	3.77	3.38	4.26	3.87	3.38	4.26	3.87	3.38	
		38 x 235	4.70	4.43	4.05	5.16	4.91	4.32	5.45	4.95	4.32	
		38 x 286	5.35	5.04	4.61	5.84	5.55	5.23	6.45	6.01	5.26	
	No. 1 and No. 2	38 x 89	1.99	1.81	1.58	1.99	1.81	1.58	1.99	1.81	1.58	
		38 x 140	3.14	2.85	2.49	3.14	2.85	2.49	3.14	2.85	2.49	
		38 x 184	3.87	3.64	3.27	4.12	3.75	3.27	4.12	3.75	3.27	
		38 x 235	4.55	4.28	3.91	4.99	4.75	4.18	5.27	4.79	4.13	
		38 x 286	5.18	4.88	4.46	5.65	5.37	5.06	6.23	5.81	4.79	
	No. 3	38 x 89	1.96	1.78	1.55	1.96	1.78	1.55	1.96	1.78	1.50	
		38 x 140	3.08	2.80	2.43	3.08	2.80	2.43	3.02	2.62	2.14	
		38 x 184	3.80	3.58	2.95	4.05	3.61	2.95	3.68	3.18	2.60	
		38 x 235	4.47	4.21	3.61	4.90	4.42	3.61	4.50	3.89	3.18	
		38 x 286	5.09	4.79	4.19	5.55	5.13	4.19	5.22	4.52	3.69	
	Construction	38 x 89	1.96	1.78	1.55	1.96	1.78	1.55	1.96	1.78	1.55	
	Standard	38 x 89	1.88	1.71	1.44	1.88	1.71	1.44	1.80	1.56	1.27	
	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	1.84	1.68	1.46	1.84	1.68	1.46	1.84	1.68	1.46
			38 x 140	2.90	2.63	2.30	2.90	2.63	2.30	2.90	2.63	2.30
			38 x 184	3.58	3.37	3.03	3.81	3.46	3.03	3.81	3.46	3.03
38 x 235			4.20	3.96	3.62	4.61	4.39	3.86	4.87	4.42	3.86	
38 x 286			4.79	4.51	4.12	5.22	4.96	4.68	5.76	5.37	4.54	
No. 1 and No. 2		38 x 89	1.80	1.64	1.43	1.80	1.64	1.43	1.80	1.64	1.43	
		38 x 140	2.83	2.57	2.25	2.83	2.57	2.25	2.83	2.57	2.23	
		38 x 184	3.50	3.29	2.96	3.72	3.38	2.96	3.72	3.32	2.71	
		38 x 235	4.11	3.87	3.54	4.51	4.29	3.76	4.69	4.06	3.31	
		38 x 286	4.68	4.40	4.03	5.10	4.85	4.36	5.44	4.71	3.84	
No. 3		38 x 89	1.76	1.60	1.36	1.76	1.60	1.36	1.70	1.47	1.20	
		38 x 140	2.75	2.38	1.94	2.75	2.38	1.94	2.42	2.10	1.71	
		38 x 184	3.35	2.90	2.37	3.35	2.90	2.37	2.95	2.55	2.08	
		38 x 235	4.01	3.54	2.89	4.09	3.54	2.89	3.61	3.12	2.55	
		38 x 286	4.56	4.11	3.36	4.75	4.11	3.36	4.18	3.62	2.96	
Construction		38 x 89	1.76	1.60	1.40	1.76	1.60	1.40	1.76	1.60	1.37	
Standard		38 x 89	1.63	1.41	1.15	1.63	1.41	1.15	1.44	1.25	1.02	

**Notes to Table A-2:**

- (1) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) No bridging is assumed for spans for floor joists with concrete topping.

# Span Tables

**Table A-3**  
**Maximum Spans for Ceiling Joists – Attic not Accessible by a Stairway**  
 Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m		
			Joist Spacing, mm		
			300	400	600
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	3.41	3.10	2.71
		38 x 140	5.37	4.88	4.26
		38 x 184	7.05	6.41	5.60
		38 x 235	9.01	8.18	7.15
		38 x 286	10.96	9.96	8.70
	No. 1 and No. 2	38 x 89	3.27	2.97	2.59
		38 x 140	5.14	4.67	4.08
		38 x 184	6.76	6.14	5.36
		38 x 235	8.63	7.84	6.85
		38 x 286	10.50	9.54	8.34
	No. 3	38 x 89	3.17	2.88	2.42
		38 x 140	4.89	4.23	3.46
		38 x 184	5.95	5.15	4.20
		38 x 235	7.27	6.30	5.14
		38 x 286	8.44	7.31	5.97
	Construction	38 x 89	3.17	2.88	2.51
	Standard	38 x 89	3.06	2.78	2.34
	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	3.36	3.06
38 x 140			5.29	4.81	4.20
38 x 184			6.96	6.32	5.52
38 x 235			8.88	8.07	7.05
38 x 286			10.81	9.82	8.58
No. 1 and No. 2		38 x 89	3.27	2.97	2.59
		38 x 140	5.14	4.67	4.08
		38 x 184	6.76	6.14	5.36
		38 x 235	8.63	7.84	6.85
		38 x 286	10.50	9.54	8.34
No. 3		38 x 89	3.17	2.88	2.51
		38 x 140	4.98	4.53	3.95
		38 x 184	6.55	5.95	5.19
		38 x 235	8.36	7.60	6.34
		38 x 286	10.18	9.01	7.36
Construction		38 x 89	3.17	2.88	2.50
Standard		38 x 89	3.06	2.78	2.43

**Table A-3 (Continued)**

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m		
			Joist Spacing, mm		
			300	400	600
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	3.22	2.92	2.55
		38 x 140	5.06	4.60	4.02
		38 x 184	6.65	6.05	5.28
		38 x 235	8.50	7.72	6.74
		38 x 286	10.34	9.40	8.21
	No. 1 and No. 2	38 x 89	3.11	2.83	2.47
		38 x 140	4.90	4.45	3.89
		38 x 184	6.44	5.85	5.11
		38 x 235	8.22	7.47	6.52
		38 x 286	10.00	9.09	7.94
	No. 3	38 x 89	3.06	2.78	2.43
		38 x 140	4.81	4.37	3.82
		38 x 184	6.32	5.74	5.02
		38 x 235	8.07	7.33	6.34
		38 x 286	9.82	8.93	7.36
	Construction	38 x 89	3.06	2.78	2.43
	Standard	38 x 89	2.94	2.67	2.33
	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	2.88	2.61
38 x 140			4.53	4.11	3.59
38 x 184			5.95	5.40	4.72
38 x 235			7.60	6.90	6.03
38 x 286			9.25	8.40	7.34
No. 1 and No. 2		38 x 89	2.81	2.55	2.23
		38 x 140	4.42	4.02	3.51
		38 x 184	5.81	5.28	4.61
		38 x 235	7.42	6.74	5.89
		38 x 286	9.03	8.21	7.17
No. 3		38 x 89	2.74	2.49	2.18
		38 x 140	4.31	3.92	3.42
		38 x 184	5.67	5.09	4.16
		38 x 235	7.19	6.23	5.08
		38 x 286	8.34	7.23	5.90
Construction		38 x 89	2.74	2.49	2.18
Standard		38 x 89	2.67	2.43	2.03

# Span Tables

**Table A-4**  
**Maximum Spans for Roof Joists – Specified Roof Snow Loads 1.0 to 2.0 kPa**  
 Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m									
			Specified Snow Load, kPa									
			1.0			1.5			2.0			
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm			
			300	400	600	300	400	600	300	400	600	
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.71	2.46	2.15	2.37	2.15	1.88	2.15	1.95	1.71	
		38 x 140	4.26	3.87	3.38	3.72	3.38	2.95	3.38	3.07	2.68	
		38 x 184	5.60	5.09	4.44	4.89	4.44	3.88	4.44	4.04	3.53	
		38 x 235	7.15	6.49	5.67	6.24	5.67	4.96	5.67	5.15	4.50	
		38 x 286	8.70	7.90	6.91	7.60	6.91	6.03	6.91	6.27	5.48	
	No. 1 and No. 2	38 x 89	2.59	2.36	2.06	2.27	2.06	1.80	2.06	1.87	1.63	
		38 x 140	4.08	3.71	3.24	3.57	3.24	2.83	3.24	2.94	2.57	
		38 x 184	5.36	4.87	4.26	4.69	4.26	3.72	4.26	3.87	3.38	
		38 x 235	6.85	6.22	5.44	5.98	5.44	4.74	5.44	4.94	4.22	
		38 x 286	8.34	7.57	6.40	7.28	6.62	5.50	6.62	6.00	4.90	
	No. 3	38 x 89	2.49	2.16	1.76	2.14	1.85	1.51	1.91	1.65	1.35	
		38 x 140	3.56	3.08	2.51	3.06	2.65	2.16	2.72	2.36	1.92	
		38 x 184	4.33	3.75	3.06	3.72	3.22	2.63	3.31	2.87	2.34	
		38 x 235	5.29	4.58	3.74	4.55	3.94	3.22	4.05	3.51	2.86	
	Construction	38 x 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58	
		Standard	38 x 89	2.41	2.08	1.70	2.07	1.79	1.46	1.84	1.60	1.30
	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.67	2.43	2.12	2.33	2.12	1.85	2.12	1.93	1.68
			38 x 140	4.20	3.82	3.33	3.67	3.33	2.91	3.33	3.03	2.65
			38 x 184	5.52	5.02	4.38	4.82	4.38	3.83	4.38	3.98	3.48
			38 x 235	7.05	6.41	5.60	6.16	5.60	4.89	5.60	5.09	4.44
			38 x 286	8.58	7.80	6.81	7.50	6.81	5.95	6.81	6.19	5.41
No. 1 and No. 2		38 x 89	2.59	2.36	2.06	2.27	2.06	1.80	2.06	1.87	1.63	
		38 x 140	4.08	3.71	3.24	3.57	3.24	2.83	3.24	2.94	2.57	
		38 x 184	5.36	4.87	4.26	4.69	4.26	3.72	4.26	3.87	3.38	
		38 x 235	6.85	6.22	5.44	5.98	5.44	4.75	5.44	4.94	4.32	
		38 x 286	8.34	7.57	6.62	7.28	6.62	5.77	6.62	6.01	5.25	
No. 3		38 x 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58	
		38 x 140	3.95	3.59	3.10	3.45	3.14	2.67	3.14	2.85	2.37	
		38 x 184	5.20	4.62	3.77	4.54	3.97	3.24	4.09	3.54	2.89	
		38 x 235	6.53	5.65	4.61	5.61	4.86	3.97	5.00	4.33	3.53	
Construction		38 x 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58	
		Standard	38 x 89	2.43	2.18	1.78	2.12	1.88	1.53	1.93	1.67	1.36

**Table A-4 (Continued)**

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m									
			Specified Snow Load, kPa									
			1.0			1.5			2.0			
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm			
			300	400	600	300	400	600	300	400	600	
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	2.55	2.32	2.03	2.23	2.03	1.77	2.03	1.84	1.61	
		38 x 140	4.02	3.65	3.19	3.51	3.19	2.79	3.19	2.90	2.53	
		38 x 184	5.28	4.80	4.19	4.61	4.19	3.66	4.19	3.81	3.33	
		38 x 235	6.74	6.13	5.35	5.89	5.35	4.68	5.35	4.86	4.25	
		38 x 286	8.21	7.46	6.52	7.17	6.52	5.69	6.52	5.92	5.17	
	No. 1 and No. 2	38 x 89	2.47	2.24	1.96	2.16	1.96	1.71	1.96	1.78	1.56	
		38 x 140	3.89	3.53	3.08	3.40	3.08	2.69	3.08	2.80	2.45	
		38 x 184	5.11	4.64	4.05	4.46	4.05	3.54	4.05	3.68	3.22	
		38 x 235	6.52	5.93	5.18	5.70	5.18	4.52	5.18	4.70	4.11	
		38 x 286	7.94	7.21	6.30	6.94	6.30	5.50	6.30	5.73	5.00	
	No. 3	38 x 89	2.43	2.20	1.93	2.12	1.93	1.68	1.93	1.75	1.53	
		38 x 140	3.82	3.47	3.03	3.33	3.03	2.65	3.03	2.75	2.37	
		38 x 184	5.02	4.56	3.77	4.38	3.97	3.24	3.98	3.54	2.89	
		38 x 235	6.41	5.65	4.61	5.60	4.86	3.97	5.00	4.33	3.53	
		38 x 286	7.57	6.56	5.35	6.51	5.64	4.60	5.80	5.02	4.10	
	Construction	38 x 89	2.43	2.20	1.93	2.12	1.93	1.68	1.93	1.75	1.53	
	Standard	38 x 89	2.33	2.12	1.85	2.04	1.85	1.59	1.85	1.68	1.41	
	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	2.28	2.07	1.81	1.99	1.81	1.58	1.81	1.65	1.44
			38 x 140	3.59	3.26	2.85	3.14	2.85	2.49	2.85	2.59	2.26
			38 x 184	4.72	4.29	3.75	4.12	3.75	3.27	3.75	3.40	2.97
38 x 235			6.03	5.48	4.79	5.27	4.79	4.18	4.79	4.35	3.80	
38 x 286			7.34	6.67	5.82	6.41	5.82	5.09	5.82	5.29	4.62	
No. 1 and No. 2		38 x 89	2.23	2.03	1.77	1.95	1.77	1.55	1.77	1.61	1.41	
		38 x 140	3.51	3.19	2.79	3.07	2.79	2.43	2.79	2.53	2.21	
		38 x 184	4.61	4.19	3.66	4.03	3.66	3.20	3.66	3.33	2.91	
		38 x 235	5.89	5.35	4.68	5.15	4.68	4.09	4.68	4.25	3.68	
		38 x 286	7.17	6.52	5.58	6.26	5.69	4.80	5.69	5.17	4.27	
No. 3		38 x 89	2.18	1.98	1.73	1.90	1.73	1.50	1.73	1.57	1.33	
		38 x 140	3.42	3.05	2.49	2.99	2.62	2.14	2.69	2.33	1.90	
		38 x 184	4.28	3.71	3.03	3.68	3.19	2.60	3.28	2.84	2.32	
		38 x 235	5.23	4.53	3.70	4.50	3.90	3.18	4.01	3.47	2.83	
		38 x 286	6.07	5.26	4.29	5.22	4.52	3.69	4.65	4.03	3.29	
Construction		38 x 89	2.18	1.98	1.73	1.90	1.73	1.51	1.73	1.57	1.37	
Standard		38 x 89	2.09	1.81	1.48	1.80	1.56	1.27	1.60	1.38	1.13	

# Span Tables

**Table A-5**  
**Maximum Spans for Roof Joists – Specified Roof Snow Loads 2.5 and 3.0 kPa**  
 Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m					
			Specified Snow Load, kPa					
			2.5			3.0		
			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	1.99	1.81	1.58	1.88	1.71	1.49
		38 x 140	3.14	2.85	2.49	2.95	2.68	2.34
		38 x 184	4.12	3.75	3.27	3.88	3.53	3.08
		38 x 235	5.27	4.79	4.18	4.96	4.50	3.93
		38 x 286	6.41	5.82	5.09	6.03	5.48	4.79
	No. 1 and No. 2	38 x 89	1.91	1.74	1.52	1.80	1.63	1.43
		38 x 140	3.01	2.73	2.39	2.83	2.57	2.25
		38 x 184	3.95	3.59	3.14	3.72	3.38	2.90
		38 x 235	5.05	4.59	3.84	4.75	4.32	3.55
		38 x 286	6.14	5.46	4.46	5.78	5.05	4.12
	No. 3	38 x 89	1.74	1.50	1.23	1.60	1.39	1.13
		38 x 140	2.48	2.15	1.75	2.29	1.98	1.62
		38 x 184	3.01	2.61	2.13	2.79	2.41	1.97
		38 x 235	3.69	3.19	2.61	3.41	2.95	2.41
		38 x 286	4.28	3.70	3.03	3.95	3.42	2.79
	Construction	38 x 89	1.85	1.68	1.47	1.74	1.58	1.38
	Standard	38 x 89	1.68	1.45	1.19	1.55	1.34	1.10
	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	1.97	1.79	1.56	1.85	1.68
38 x 140			3.10	2.81	2.46	2.91	2.65	2.31
38 x 184			4.07	3.70	3.23	3.83	3.48	3.04
38 x 235			5.20	4.72	4.12	4.89	4.44	3.88
38 x 286			6.32	5.75	5.02	5.95	5.41	4.72
No. 1 and No. 2		38 x 89	1.91	1.74	1.52	1.80	1.63	1.43
		38 x 140	3.01	2.73	2.39	2.83	2.57	2.25
		38 x 184	3.95	3.59	3.14	3.72	3.38	2.95
		38 x 235	5.05	4.59	4.01	4.75	4.32	3.72
		38 x 286	6.14	5.58	4.68	5.78	5.25	4.32
No. 3		38 x 89	1.85	1.68	1.47	1.74	1.58	1.38
		38 x 140	2.91	2.65	2.16	2.74	2.45	2.00
		38 x 184	3.72	3.22	2.63	3.44	2.98	2.43
		38 x 235	4.55	3.94	3.22	4.20	3.64	2.97
		38 x 286	5.28	4.57	3.73	4.88	4.22	3.45
Construction		38 x 89	1.85	1.68	1.47	1.74	1.58	1.38
Standard		38 x 89	1.76	1.52	1.24	1.62	1.40	1.15

**Table A-5 (Continued)**

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m						
			Specified Snow Load, kPa						
			2.5			3.0			
			Joist Spacing, mm			Joist Spacing, mm			
			300	400	600	300	400	600	
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	1.88	1.71	1.49	1.77	1.61	1.41	
		38 x 140	2.96	2.69	2.35	2.79	2.53	2.21	
		38 x 184	3.89	3.54	3.09	3.66	3.33	2.91	
		38 x 235	4.97	4.52	3.94	4.68	4.25	3.71	
		38 x 286	6.05	5.50	4.80	5.69	5.17	4.52	
	No. 1 and No. 2	38 x 89	1.82	1.65	1.44	1.71	1.56	1.36	
		38 x 140	2.86	2.60	2.27	2.69	2.45	2.14	
		38 x 184	3.76	3.42	2.99	3.54	3.22	2.81	
		38 x 235	4.81	4.37	3.82	4.52	4.11	3.59	
		38 x 286	5.85	5.31	4.64	5.50	5.00	4.37	
	No. 3	38 x 89	1.79	1.62	1.42	1.68	1.53	1.34	
		38 x 140	2.81	2.56	2.16	2.65	2.40	2.00	
		38 x 184	3.70	3.22	2.63	3.44	2.98	2.43	
		38 x 235	4.55	3.94	3.22	4.20	3.64	2.97	
	Construction	38 x 89	1.79	1.62	1.42	1.68	1.53	1.34	
		Standard	38 x 89	1.72	1.56	1.29	1.62	1.46	1.19
	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	1.68	1.53	1.34	1.58	1.44	1.26
			38 x 140	2.65	2.40	2.10	2.49	2.26	1.98
			38 x 184	3.48	3.16	2.76	3.27	2.97	2.60
			38 x 235	4.44	4.04	3.53	4.18	3.80	3.32
			38 x 286	5.41	4.91	4.29	5.09	4.62	4.04
No. 1 and No. 2		38 x 89	1.64	1.49	1.31	1.55	1.41	1.23	
		38 x 140	2.59	2.35	2.05	2.43	2.21	1.93	
		38 x 184	3.40	3.09	2.70	3.20	2.91	2.53	
		38 x 235	4.34	3.94	3.35	4.09	3.71	3.10	
No. 3		38 x 286	5.28	4.76	3.89	4.97	4.40	3.59	
		38 x 89	1.60	1.46	1.21	1.51	1.37	1.12	
		38 x 140	2.45	2.12	1.73	2.26	1.96	1.60	
		38 x 184	2.98	2.58	2.11	2.76	2.39	1.95	
Construction		38 x 235	3.65	3.16	2.58	3.37	2.92	2.38	
		38 x 286	4.23	3.66	2.99	3.91	3.39	2.76	
		38 x 89	1.60	1.46	1.27	1.51	1.37	1.20	
Standard		38 x 89	1.46	1.26	1.03	1.34	1.16	0.95	

# Span Tables

**Table A-6**  
**Maximum Spans for Roof Rafters – Specified Roof Snow Loads 1.0 to 2.0 kPa**  
 Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m									
			Specified Snow Load, kPa									
			1.0			1.5			2.0			
			Rafter Spacing, mm			Rafter Spacing, mm			Rafter Spacing, mm			
			300	400	600	300	400	600	300	400	600	
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	3.41	3.10	2.71	2.98	2.71	2.37	2.71	2.46	2.15	
		38 x 140	5.37	4.88	4.26	4.69	4.26	3.72	4.26	3.87	3.38	
		38 x 184	7.05	6.41	5.60	6.16	5.60	4.89	5.60	5.09	4.44	
		38 x 235	9.01	8.18	7.15	7.87	7.15	6.24	7.15	6.49	5.62	
		38 x 286	10.96	9.96	8.70	9.58	8.70	7.40	8.70	7.90	6.52	
	No. 1 and No. 2	38 x 89	3.27	2.97	2.59	2.86	2.59	2.27	2.59	2.36	2.06	
		38 x 140	5.14	4.67	3.95	4.49	4.08	3.34	4.08	3.60	2.94	
		38 x 184	6.76	5.88	4.80	5.74	4.97	4.06	5.06	4.38	3.58	
		38 x 235	8.30	7.19	5.87	7.02	6.08	4.96	6.19	5.36	4.38	
		38 x 286	9.63	8.34	6.81	8.14	7.05	5.76	7.18	6.22	5.08	
	No. 3	38 x 89	2.65	2.30	1.87	2.24	1.94	1.58	1.98	1.71	1.40	
		38 x 140	3.78	3.28	2.68	3.20	2.77	2.26	2.82	2.44	1.99	
		38 x 184	4.61	3.99	3.26	3.89	3.37	2.75	3.43	2.97	2.43	
		38 x 235	5.63	4.88	3.98	4.76	4.12	3.37	4.20	3.64	2.97	
		38 x 286	6.53	5.66	4.62	5.52	4.78	3.91	4.87	4.22	3.44	
	Construction	38 x 89	3.17	2.88	2.42	2.77	2.50	2.04	2.51	2.21	1.80	
	Standard	38 x 89	2.56	2.22	1.81	2.17	1.88	1.53	1.91	1.65	1.35	
	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	3.36	3.06	2.67	2.94	2.67	2.33	2.67	2.43	2.12
			38 x 140	5.29	4.81	4.20	4.62	4.20	3.67	4.20	3.82	3.33
			38 x 184	6.96	6.32	5.52	6.08	5.52	4.82	5.52	5.02	4.38
38 x 235			8.88	8.07	7.05	7.76	7.05	6.16	7.05	6.41	5.54	
38 x 286			10.81	9.82	8.58	9.45	8.58	7.28	8.58	7.80	6.42	
No. 1 and No. 2		38 x 89	3.27	2.97	2.59	2.86	2.59	2.27	2.59	2.36	2.06	
		38 x 140	5.14	4.67	4.08	4.49	4.08	3.50	4.08	3.71	3.08	
		38 x 184	6.76	6.14	5.04	5.90	5.21	4.26	5.31	4.60	3.75	
		38 x 235	8.63	7.54	6.16	7.36	6.37	5.20	6.49	5.62	4.59	
		38 x 286	10.11	8.75	7.15	8.54	7.40	6.04	7.53	6.52	5.33	
No. 3		38 x 89	3.17	2.83	2.31	2.76	2.39	1.95	2.44	2.11	1.72	
		38 x 140	4.67	4.04	3.30	3.95	3.42	2.79	3.48	3.01	2.46	
		38 x 184	5.68	4.92	4.02	4.80	4.16	3.40	4.23	3.67	2.99	
		38 x 235	6.95	6.02	4.91	5.87	5.08	4.15	5.18	4.48	3.66	
		38 x 286	8.06	6.98	5.70	6.81	5.90	4.82	6.01	5.20	4.25	
Construction		38 x 89	3.17	2.88	2.51	2.77	2.51	2.14	2.51	2.28	1.89	
Standard		38 x 89	2.68	2.32	1.90	2.27	1.96	1.60	2.00	1.73	1.41	

**Table A-6 (Continued)**

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m									
			Specified Snow Load, kPa									
			1.0			1.5			2.0			
			Rafter Spacing, mm			Rafter Spacing, mm			Rafter Spacing, mm			
			300	400	600	300	400	600	300	400	600	
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	3.22	2.92	2.55	2.81	2.55	2.23	2.55	2.32	2.03	
		38 x 140	5.06	4.60	4.02	4.42	4.02	3.51	4.02	3.65	3.19	
		38 x 184	6.65	6.05	5.28	5.81	5.28	4.61	5.28	4.80	4.19	
		38 x 235	8.50	7.72	6.74	7.42	6.74	5.89	6.74	6.13	5.35	
		38 x 286	10.34	9.40	8.21	9.03	8.21	7.17	8.21	7.46	6.52	
	No. 1 and No. 2	38 x 89	3.11	2.83	2.47	2.72	2.47	2.16	2.47	2.24	1.96	
		38 x 140	4.90	4.45	3.89	4.28	3.89	3.40	3.89	3.53	3.08	
		38 x 184	6.44	5.85	5.11	5.62	5.11	4.41	5.11	4.64	3.89	
		38 x 235	8.22	7.47	6.38	7.18	6.52	5.39	6.52	5.82	4.75	
		38 x 286	10.00	9.06	7.40	8.74	7.66	6.25	7.80	6.76	5.52	
	No. 3	38 x 89	3.06	2.78	2.31	2.67	2.39	1.95	2.43	2.11	1.72	
		38 x 140	4.67	4.04	3.30	3.95	3.42	2.79	3.48	3.01	2.46	
		38 x 184	5.68	4.92	4.02	4.80	4.16	3.40	4.23	3.67	2.99	
		38 x 235	6.95	6.02	4.91	5.87	5.08	4.15	5.18	4.48	3.66	
		38 x 286	8.06	6.98	5.70	6.81	5.90	4.82	6.01	5.20	4.25	
	Construction	38 x 89	3.06	2.78	2.43	2.67	2.43	2.12	2.43	2.20	1.93	
	Standard	38 x 89	2.78	2.41	1.97	2.35	2.04	1.66	2.07	1.79	1.47	
	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	2.88	2.61	2.28	2.51	2.28	1.99	2.28	2.07	1.81
			38 x 140	4.53	4.11	3.59	3.95	3.59	3.14	3.59	3.26	2.85
			38 x 184	5.95	5.40	4.72	5.20	4.72	4.12	4.72	4.29	3.68
38 x 235			7.60	6.90	6.03	6.64	6.03	5.11	6.03	5.48	4.51	
38 x 286			9.25	8.40	7.01	8.08	7.26	5.93	7.34	6.40	5.23	
No. 1 and No. 2		38 x 89	2.81	2.55	2.23	2.46	2.23	1.95	2.23	2.03	1.77	
		38 x 140	4.42	4.02	3.44	3.86	3.51	2.91	3.51	3.14	2.56	
		38 x 184	5.81	5.13	4.19	5.00	4.33	3.54	4.41	3.82	3.12	
		38 x 235	7.24	6.27	5.12	6.12	5.30	4.33	5.40	4.67	3.82	
		38 x 286	8.40	7.27	5.94	7.10	6.15	5.02	6.26	5.42	4.43	
No. 3		38 x 89	2.62	2.27	1.85	2.22	1.92	1.57	1.95	1.69	1.38	
		38 x 140	3.74	3.24	2.65	3.16	2.74	2.24	2.79	2.42	1.97	
		38 x 184	4.56	3.94	3.22	3.85	3.33	2.72	3.40	2.94	2.40	
		38 x 235	5.57	4.82	3.94	4.71	4.08	3.33	4.15	3.60	2.94	
		38 x 286	6.46	5.60	4.57	5.46	4.73	3.86	4.82	4.17	3.41	
Construction		38 x 89	2.74	2.49	2.11	2.40	2.18	1.90	2.18	1.93	1.57	
Standard		38 x 89	2.22	1.93	1.57	1.88	1.63	1.33	1.66	1.44	1.17	

# Span Tables

**Table A-7**  
**Maximum Spans for Roof Rafters – Specified Roof Snow Loads 2.5 and 3.0 kPa**  
 Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m					
			Specified Snow Load, kPa					
			2.5			3.0		
			Rafter Spacing, mm			Rafter Spacing, mm		
			300	400	600	300	400	600
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.51	2.28	1.99	2.37	2.15	1.88
		38 x 140	3.95	3.59	3.14	3.72	3.38	2.95
		38 x 184	5.20	4.72	4.12	4.89	4.44	3.83
		38 x 235	6.64	6.03	5.08	6.24	5.67	4.68
		38 x 286	8.08	7.23	5.90	7.60	6.65	5.43
	No. 1 and No. 2	38 x 89	2.41	2.19	1.86	2.27	2.06	1.71
		38 x 140	3.76	3.26	2.66	3.46	3.00	2.45
		38 x 184	4.58	3.96	3.24	4.21	3.65	2.98
		38 x 235	5.60	4.85	3.96	5.15	4.46	3.64
		38 x 286	6.50	5.63	4.59	5.98	5.17	4.23
	No. 3	38 x 89	1.79	1.55	1.26	1.64	1.42	1.16
		38 x 140	2.55	2.21	1.80	2.35	2.03	1.66
		38 x 184	3.10	2.69	2.20	2.86	2.47	2.02
		38 x 235	3.80	3.29	2.68	3.49	3.02	2.47
		38 x 286	4.41	3.82	3.12	4.05	3.51	2.87
	Construction	38 x 89	2.30	2.00	1.63	2.12	1.84	1.50
	Standard	38 x 89	1.73	1.50	1.22	1.59	1.38	1.12
	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.48	2.25	1.97	2.33	2.12
38 x 140			3.90	3.54	3.10	3.67	3.33	2.91
38 x 184			5.13	4.66	4.07	4.82	4.38	3.77
38 x 235			6.55	5.95	5.01	6.16	5.60	4.61
38 x 286			7.97	7.12	5.81	7.50	6.55	5.34
No. 1 and No. 2		38 x 89	2.41	2.19	1.91	2.27	2.06	1.80
		38 x 140	3.79	3.42	2.79	3.57	3.14	2.57
		38 x 184	4.80	4.16	3.40	4.42	3.83	3.12
		38 x 235	5.87	5.08	4.15	5.40	4.68	3.82
		38 x 286	6.81	5.90	4.82	6.27	5.43	4.43
No. 3		38 x 89	2.21	1.91	1.56	2.03	1.76	1.43
		38 x 140	3.15	2.73	2.23	2.90	2.51	2.05
		38 x 184	3.83	3.32	2.71	3.52	3.05	2.49
		38 x 235	4.68	4.06	3.31	4.31	3.73	3.05
		38 x 286	5.43	4.71	3.84	5.00	4.33	3.54
Construction		38 x 89	2.33	2.09	1.71	2.20	1.93	1.57
Standard		38 x 89	1.81	1.57	1.28	1.66	1.44	1.18

**Table A-7 (Continued)**

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m						
			Specified Snow Load, kPa						
			2.5			3.0			
			Rafter Spacing, mm			Rafter Spacing, mm			
			300	400	600	300	400	600	
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	2.37	2.15	1.88	2.23	2.03	1.77	
		38 x 140	3.73	3.39	2.96	3.51	3.19	2.79	
		38 x 184	4.90	4.45	3.89	4.61	4.19	3.66	
		38 x 235	6.26	5.69	4.97	5.89	5.35	4.68	
		38 x 286	7.62	6.92	5.90	7.17	6.52	5.43	
	No. 1 and No. 2	38 x 89	2.29	2.08	1.82	2.16	1.96	1.71	
		38 x 140	3.61	3.28	2.86	3.40	3.08	2.66	
		38 x 184	4.74	4.31	3.52	4.46	3.96	3.23	
		38 x 235	6.06	5.27	4.30	5.59	4.84	3.96	
		38 x 286	7.06	6.11	4.99	6.49	5.62	4.59	
	No. 3	38 x 89	2.21	1.91	1.56	2.03	1.76	1.43	
		38 x 140	3.15	2.73	2.23	2.90	2.51	2.05	
		38 x 184	3.83	3.32	2.71	3.52	3.05	2.49	
		38 x 235	4.68	4.06	3.31	4.31	3.73	3.05	
		38 x 286	5.43	4.71	3.84	5.00	4.33	3.54	
	Construction	38 x 89	2.25	2.05	1.77	2.12	1.93	1.63	
	Standard	38 x 89	1.87	1.62	1.33	1.72	1.49	1.22	
	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	2.12	1.93	1.68	1.99	1.81	1.58
			38 x 140	3.33	3.03	2.65	3.14	2.85	2.49
			38 x 184	4.38	3.98	3.33	4.12	3.75	3.07
38 x 235			5.60	4.99	4.08	5.27	4.59	3.75	
38 x 286			6.69	5.79	4.73	6.15	5.33	4.35	
No. 1 and No. 2		38 x 89	2.07	1.88	1.62	1.95	1.77	1.49	
		38 x 140	3.26	2.84	2.32	3.02	2.61	2.13	
		38 x 184	3.99	3.46	2.82	3.67	3.18	2.60	
		38 x 235	4.88	4.23	3.45	4.49	3.89	3.17	
		38 x 286	5.66	4.90	4.00	5.21	4.51	3.68	
No. 3		38 x 89	1.77	1.53	1.25	1.63	1.41	1.15	
		38 x 140	2.52	2.19	1.78	2.32	2.01	1.64	
		38 x 184	3.07	2.66	2.17	2.82	2.45	2.00	
		38 x 235	3.76	3.25	2.66	3.45	2.99	2.44	
		38 x 286	4.36	3.77	3.08	4.01	3.47	2.83	
Construction		38 x 89	2.01	1.74	1.42	1.85	1.60	1.31	
Standard		38 x 89	1.50	1.30	1.06	1.38	1.19	0.98	

# Span Tables

**Table A-8**  
**Maximum Spans for Built-up Floor Beams Supporting not more than One Floor<sup>(1)(2)</sup>**  
 Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, m <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
			Size of Built-up Beam, mm								
			3-38x184	4-38x184	5-38x184	3-38x235	4-38x235	5-38x235	3-38x286	4-38x286	5-38x286
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	2.4	3.36	3.70	3.99	4.30	4.73	5.09	5.23	5.66	5.99
		3.0	3.12	3.44	3.70	3.99	4.39	4.73	4.84	5.34	5.66
		3.6	2.94	3.23	3.48	3.75	4.13	4.45	4.41	5.03	5.41
		4.2	2.79	3.07	3.31	3.52	3.92	4.23	4.09	4.72	5.14
		4.8	2.67	2.94	3.17	3.29	3.75	4.04	3.82	4.41	4.92
		5.4	2.54	2.83	3.04	3.11	3.59	3.89	3.60	4.16	4.65
		6.0	2.41	2.73	2.94	2.95	3.40	3.75	3.42	3.95	4.41
	No. 1 and No. 2	2.4	2.97	3.42	3.82	3.63	4.19	4.68	4.21	4.86	5.43
		3.0	2.65	3.06	3.42	3.24	3.75	4.19	3.76	4.35	4.86
		3.6	2.42	2.80	3.13	2.96	3.42	3.82	3.44	3.97	4.44
		4.2	2.24	2.59	2.89	2.74	3.17	3.54	3.18	3.67	4.11
		4.8	2.10	2.42	2.71	2.56	2.96	3.31	2.98	3.44	3.84
		5.4	1.98	2.28	2.55	2.42	2.79	3.12	2.81	3.24	3.62
		6.0	1.88	2.17	2.42	2.29	2.65	2.96	2.66	3.07	3.44
Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	3.32	3.65	3.93	4.24	4.66	5.03	5.16	5.61	5.93
		3.0	3.08	3.39	3.65	3.93	4.33	4.66	4.76	5.27	5.61
		3.6	2.90	3.19	3.44	3.70	4.08	4.39	4.35	4.96	5.34
		4.2	2.75	3.03	3.27	3.47	3.87	4.17	4.02	4.65	5.07
		4.8	2.63	2.90	3.12	3.24	3.70	3.99	3.66	4.35	4.85
		5.4	2.49	2.79	3.00	2.95	3.53	3.83	3.32	4.10	4.58
		6.0	2.28	2.69	2.90	2.70	3.35	3.70	3.04	3.87	4.35
	No. 1 and No. 2	2.4	3.11	3.55	3.82	3.80	4.39	4.88	4.41	5.10	5.70
		3.0	2.78	3.21	3.55	3.40	3.93	4.39	3.95	4.56	5.10
		3.6	2.54	2.93	3.28	3.11	3.59	4.01	3.60	4.16	4.65
		4.2	2.35	2.72	3.04	2.88	3.32	3.71	3.34	3.85	4.31
		4.8	2.20	2.54	2.84	2.69	3.11	3.47	3.12	3.60	4.03
		5.4	2.07	2.39	2.68	2.54	2.93	3.27	2.94	3.40	3.80
		6.0	1.97	2.27	2.54	2.41	2.78	3.11	2.79	3.22	3.60

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**Table A-8 (Continued)**

Commercial Designation	Grade	Supported Length, m <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
			Size of Built-up Beam, mm								
			3-38x184	4-38x184	5-38x184	3-38x235	4-38x235	5-38x235	3-38x286	4-38x286	5-38x286
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	3.17	3.49	3.76	4.05	4.46	4.81	4.93	5.42	5.73
		3.0	2.95	3.24	3.49	3.76	4.14	4.46	4.58	5.04	5.42
		3.6	2.77	3.05	3.29	3.54	3.90	4.20	4.31	4.74	5.11
		4.2	2.63	2.90	3.12	3.36	3.70	3.99	4.09	4.51	4.85
		4.8	2.52	2.77	2.99	3.22	3.54	3.81	3.82	4.31	4.64
		5.4	2.42	2.67	2.87	3.09	3.41	3.67	3.60	4.14	4.46
		6.0	2.34	2.57	2.77	2.95	3.29	3.54	3.32	3.95	4.31
	No. 1 and No. 2	2.4	3.07	3.38	3.64	3.92	4.32	4.65	4.57	5.25	5.59
		3.0	2.85	3.14	3.38	3.52	4.01	4.32	4.09	4.72	5.25
		3.6	2.63	2.95	3.18	3.22	3.71	4.06	3.73	4.31	4.82
		4.2	2.44	2.80	3.02	2.98	3.44	3.84	3.46	3.99	4.46
		4.8	2.28	2.63	2.89	2.79	3.22	3.60	3.23	3.73	4.17
		5.4	2.15	2.48	2.77	2.63	3.03	3.39	3.05	3.52	3.93
		6.0	2.04	2.35	2.63	2.49	2.88	3.22	2.89	3.34	3.73
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	2.84	3.12	3.36	3.62	3.99	4.30	4.33	4.85	5.23
		3.0	2.63	2.90	3.12	3.34	3.70	3.99	3.88	4.47	4.85
		3.6	2.48	2.73	2.94	3.05	3.48	3.75	3.54	4.08	4.57
		4.2	2.31	2.59	2.79	2.82	3.26	3.57	3.28	3.78	4.23
		4.8	2.16	2.48	2.67	2.64	3.05	3.41	3.06	3.54	3.96
		5.4	2.04	2.35	2.57	2.49	2.87	3.21	2.89	3.34	3.73
		6.0	1.93	2.23	2.48	2.36	2.73	3.05	2.74	3.16	3.54
	No. 1 and No. 2	2.4	2.59	2.99	3.29	3.16	3.65	4.08	3.67	4.24	4.74
		3.0	2.31	2.67	2.99	2.83	3.27	3.65	3.28	3.79	4.24
		3.6	2.11	2.44	2.73	2.58	2.98	3.33	3.00	3.46	3.87
		4.2	1.95	2.26	2.52	2.39	2.76	3.09	2.77	3.20	3.58
		4.8	1.83	2.11	2.36	2.24	2.58	2.89	2.59	3.00	3.35
		5.4	1.72	1.99	2.23	2.11	2.43	2.72	2.45	2.82	3.16
		6.0	1.64	1.89	2.11	2.00	2.31	2.58	2.32	2.68	3.00

**Notes to Table A-8:**

- (1) Beam spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) When the floors have a concrete topping of not more than 51 mm, the spans must be multiplied by 0.8.
- (3) Supported length means half the sum of the joist spans on both sides of the beam.
- (4) Straight interpolation may be used for other supported lengths.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) 3-ply beams with supported lengths greater than 4.2 m require 114 mm bearing. All other beams require 76 mm bearing.

# Span Tables

**Table A-9**  
**Maximum Spans for Built-up Floor Beams Supporting not more than Two Floors<sup>(1)(2)</sup>**  
 Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, m <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
			Size of Built-up Beam, mm								
			3-38x184	4-38x184	5-38x184	3-38x235	4-38x235	5-38x235	3-38x286	4-38x286	5-38x286
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	2.4	2.80	3.08	3.32	3.49	3.93	4.24	4.05	4.67	5.16
		3.0	2.55	2.86	3.08	3.12	3.60	3.93	3.62	4.18	4.67
		3.6	2.33	2.69	2.90	2.85	3.29	3.68	3.30	3.82	4.27
		4.2	2.16	2.49	2.75	2.64	3.04	3.40	2.99	3.53	3.95
		4.8	2.00	2.33	2.60	2.38	2.85	3.18	2.69	3.30	3.69
		5.4	1.82	2.20	2.45	2.17	2.68	3.00	2.45	3.08	3.48
		6.0	1.67	2.08	2.33	2.00	2.51	2.85	2.26	2.83	3.30
	No. 1 and No. 2	2.4	2.22	2.56	2.87	2.72	3.14	3.51	3.15	3.64	4.07
		3.0	1.99	2.29	2.56	2.43	2.80	3.14	2.82	3.25	3.64
		3.6	1.81	2.09	2.34	2.22	2.56	2.86	2.57	2.97	3.32
		4.2	1.68	1.94	2.17	2.05	2.37	2.65	2.38	2.75	3.07
		4.8	1.57	1.81	2.03	1.92	2.22	2.48	2.23	2.57	2.88
		5.4	1.48	1.71	1.91	1.81	2.09	2.34	2.10	2.43	2.71
		6.0	1.40	1.62	1.81	1.72	1.98	2.22	1.99	2.30	2.57
Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	2.76	3.04	3.27	3.43	3.88	4.18	3.99	4.60	5.09
		3.0	2.51	2.82	3.04	2.97	3.55	3.88	3.34	4.12	4.60
		3.6	2.15	2.65	2.86	2.56	3.24	3.62	2.88	3.65	4.20
		4.2	1.90	2.40	2.72	2.26	2.85	3.35	2.55	3.21	3.87
		4.8	1.70	2.15	2.56	2.03	2.56	3.08	2.30	2.88	3.46
		5.4	1.56	1.95	2.35	1.86	2.32	2.79	2.11	2.62	3.14
		6.0	1.44	1.79	2.15	1.72	2.14	2.56	1.96	2.42	2.88
	No. 1 and No. 2	2.4	2.33	2.69	3.01	2.85	3.29	3.68	3.30	3.82	4.27
		3.0	2.08	2.41	2.69	2.55	2.94	3.29	2.96	3.41	3.82
		3.6	1.90	2.20	2.45	2.33	2.68	3.00	2.70	3.12	3.48
		4.2	1.76	2.03	2.27	2.15	2.49	2.78	2.50	2.88	3.22
		4.8	1.65	1.90	2.13	2.01	2.33	2.60	2.30	2.70	3.02
		5.4	1.55	1.79	2.00	1.86	2.19	2.45	2.11	2.54	2.84
		6.0	1.44	1.70	1.90	1.72	2.08	2.33	1.96	2.41	2.70

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**Table A-9 (Continued)**

Commercial Designation	Grade	Supported Length, m <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
			Size of Built-up Beam, mm								
			3-38x184	4-38x184	5-38x184	3-38x235	4-38x235	5-38x235	3-38x286	4-38x286	5-38x286
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	2.64	2.91	3.13	3.37	3.71	4.00	4.05	4.52	4.87
		3.0	2.45	2.70	2.91	3.12	3.45	3.71	3.62	4.18	4.52
		3.6	2.31	2.54	2.73	2.79	3.24	3.49	3.14	3.82	4.25
		4.2	2.07	2.41	2.60	2.46	3.04	3.32	2.77	3.50	3.95
		4.8	1.85	2.31	2.48	2.21	2.79	3.17	2.50	3.14	3.69
		5.4	1.69	2.13	2.39	2.02	2.53	3.00	2.28	2.85	3.42
		6.0	1.56	1.95	2.31	1.86	2.32	2.79	2.11	2.62	3.14
	No. 1 and No. 2	2.4	2.41	2.79	3.03	2.95	3.41	3.81	3.42	3.95	4.42
		3.0	2.16	2.49	2.79	2.64	3.05	3.41	3.06	3.53	3.95
		3.6	1.97	2.27	2.54	2.41	2.78	3.11	2.79	3.23	3.61
		4.2	1.82	2.11	2.35	2.23	2.57	2.88	2.59	2.99	3.34
		4.8	1.71	1.97	2.20	2.09	2.41	2.69	2.42	2.79	3.12
		5.4	1.61	1.86	2.08	1.97	2.27	2.54	2.28	2.63	2.95
		6.0	1.53	1.76	1.97	1.86	2.15	2.41	2.11	2.50	2.79
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	2.29	2.60	2.80	2.80	3.23	3.57	3.24	3.75	4.19
		3.0	2.04	2.36	2.60	2.50	2.89	3.23	2.90	3.35	3.75
		3.6	1.87	2.16	2.41	2.28	2.64	2.95	2.65	3.06	3.42
		4.2	1.73	2.00	2.23	2.11	2.44	2.73	2.45	2.83	3.17
		4.8	1.62	1.87	2.09	1.98	2.28	2.55	2.29	2.65	2.96
		5.4	1.52	1.76	1.97	1.86	2.15	2.41	2.11	2.50	2.79
		6.0	1.44	1.67	1.87	1.72	2.04	2.28	1.96	2.37	2.65
	No. 1 and No. 2	2.4	1.94	2.24	2.50	2.37	2.73	3.06	2.75	3.17	3.55
		3.0	1.73	2.00	2.24	2.12	2.44	2.73	2.46	2.84	3.17
		3.6	1.58	1.83	2.04	1.93	2.23	2.50	2.24	2.59	2.90
		4.2	1.46	1.69	1.89	1.79	2.07	2.31	2.08	2.40	2.68
		4.8	1.37	1.58	1.77	1.67	1.93	2.16	1.94	2.24	2.51
		5.4	1.29	1.49	1.67	1.58	1.82	2.04	1.83	2.11	2.36
		6.0	1.22	1.41	1.58	1.50	1.73	1.93	1.74	2.01	2.24

**Notes to Table A-9:**

- (1) Beam spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) When the floors have a concrete topping of not more than 51 mm, the spans must be multiplied by 0.8.
- (3) Supported length means half the sum of the joist spans on both sides of the beam.
- (4) Straight interpolation may be used for other supported lengths.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) 3-ply beams require 114 mm bearing. 4-ply and 5-ply beams with supported lengths greater than 3 m require 114 mm bearing. All other beams require 76 mm bearing.

# Span Tables

**Table A-10**  
**Maximum Spans for Built-up Floor Beams Supporting not more than Three Floors<sup>(1)(2)</sup>**  
 Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, m <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
			Size of Built-up Beam, mm								
			3- 38x184	4- 38x184	5- 38x184	3- 38x235	4- 38x235	5- 38x235	3- 38x286	4- 38x286	5- 38x286
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	2.4	2.38	2.74	2.95	2.91	3.36	3.75	3.37	3.89	4.35
		3.0	2.13	2.46	2.74	2.60	3.00	3.36	2.92	3.48	3.89
		3.6	1.88	2.24	2.51	2.24	2.74	3.06	2.53	3.18	3.56
		4.2	1.66	2.08	2.32	1.99	2.49	2.84	2.25	2.81	3.29
		4.8	1.50	1.88	2.17	1.80	2.24	2.65	2.04	2.53	3.02
		5.4	1.38	1.71	2.05	1.65	2.04	2.44	1.88	2.31	2.75
		6.0	1.28	1.58	1.88	1.53	1.89	2.24	1.75	2.14	2.53
	No. 1 and No. 2	2.4	1.85	2.14	2.39	2.26	2.61	2.92	2.63	3.03	3.39
		3.0	1.66	1.91	2.14	2.02	2.34	2.61	2.35	2.71	3.03
		3.6	1.51	1.74	1.95	1.85	2.13	2.39	2.14	2.48	2.77
		4.2	1.40	1.62	1.81	1.71	1.98	2.21	1.99	2.29	2.56
		4.8	1.31	1.51	1.69	1.60	1.85	2.07	1.86	2.14	2.40
		5.4	1.23	1.42	1.59	1.51	1.74	1.95	1.75	2.02	2.26
		6.0	1.17	1.35	1.51	1.43	1.65	1.85	1.66	1.92	2.14
Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	2.22	2.70	2.91	2.64	3.31	3.70	2.98	3.78	4.29
		3.0	1.85	2.35	2.70	2.21	2.79	3.31	2.50	3.14	3.78
		3.6	1.61	2.02	2.43	1.92	2.40	2.89	2.18	2.71	3.24
		4.2	1.43	1.78	2.14	1.71	2.13	2.54	1.95	2.40	2.86
		4.8	1.30	1.61	1.92	1.56	1.92	2.28	1.77	2.18	2.58
		5.4	1.19	1.47	1.74	1.44	1.76	2.08	1.64	2.00	2.35
		6.0	1.11	1.36	1.61	1.34	1.63	1.92	1.53	1.85	2.18
	No. 1 and No. 2	2.4	1.94	2.24	2.51	2.37	2.74	3.06	2.75	3.18	3.56
		3.0	1.74	2.00	2.24	2.12	2.45	2.74	2.46	2.84	3.18
		3.6	1.58	1.83	2.05	1.92	2.24	2.50	2.18	2.60	2.90
		4.2	1.43	1.69	1.89	1.71	2.07	2.32	1.95	2.40	2.69
		4.8	1.30	1.58	1.77	1.56	1.92	2.17	1.77	2.18	2.51
		5.4	1.19	1.47	1.67	1.44	1.76	2.04	1.64	2.00	2.35
		6.0	1.11	1.36	1.58	1.34	1.63	1.92	1.53	1.85	2.18

**Table A-10 (Continued)**

Commercial Designation	Grade	Supported Length, m <sup>(3)</sup> (4)	Maximum Span, m <sup>(5)</sup> (6)								
			Size of Built-up Beam, mm								
			3-38x184	4-38x184	5-38x184	3-38x235	4-38x235	5-38x235	3-38x286	4-38x286	5-38x286
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	2.35	2.58	2.78	2.89	3.30	3.55	3.24	3.89	4.33
		3.0	2.02	2.40	2.58	2.40	3.00	3.30	2.71	3.42	3.89
		3.6	1.74	2.20	2.43	2.08	2.62	3.06	2.35	2.95	3.54
		4.2	1.55	1.94	2.31	1.85	2.31	2.77	2.10	2.61	3.12
		4.8	1.40	1.74	2.09	1.68	2.08	2.48	1.91	2.35	2.80
		5.4	1.28	1.59	1.90	1.54	1.90	2.26	1.76	2.16	2.55
		6.0	1.19	1.47	1.74	1.44	1.76	2.08	1.64	2.00	2.35
	No. 1 and No. 2	2.4	2.01	2.32	2.60	2.46	2.84	3.17	2.85	3.29	3.68
		3.0	1.80	2.08	2.32	2.20	2.54	2.84	2.55	2.95	3.29
		3.6	1.64	1.90	2.12	2.01	2.32	2.59	2.33	2.69	3.01
		4.2	1.52	1.75	1.96	1.85	2.15	2.40	2.10	2.49	2.78
		4.8	1.40	1.64	1.84	1.68	2.01	2.24	1.91	2.33	2.60
		5.4	1.28	1.55	1.73	1.54	1.89	2.12	1.76	2.16	2.46
		6.0	1.19	1.47	1.64	1.44	1.76	2.01	1.64	2.00	2.33
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	1.91	2.20	2.46	2.33	2.69	3.01	2.70	3.12	3.49
		3.0	1.70	1.97	2.20	2.08	2.41	2.69	2.42	2.79	3.12
		3.6	1.56	1.80	2.01	1.90	2.20	2.46	2.18	2.55	2.85
		4.2	1.43	1.66	1.86	1.71	2.03	2.27	1.95	2.36	2.64
		4.8	1.30	1.56	1.74	1.56	1.90	2.13	1.77	2.18	2.47
		5.4	1.19	1.47	1.64	1.44	1.76	2.01	1.64	2.00	2.33
		6.0	1.11	1.36	1.56	1.34	1.63	1.90	1.53	1.85	2.18
	No. 1 and No. 2	2.4	1.61	1.86	2.08	1.97	2.28	2.55	2.29	2.64	2.96
		3.0	1.44	1.67	1.86	1.76	2.04	2.28	2.05	2.36	2.64
		3.6	1.32	1.52	1.70	1.61	1.86	2.08	1.87	2.16	2.41
		4.2	1.22	1.41	1.57	1.49	1.72	1.93	1.73	2.00	2.23
		4.8	1.14	1.32	1.47	1.40	1.61	1.80	1.62	1.87	2.09
		5.4	1.08	1.24	1.39	1.32	1.52	1.70	1.53	1.76	1.97
		6.0	1.02	1.18	1.32	1.25	1.44	1.61	1.45	1.67	1.87

**Notes to Table A-10:**

- (1) Beam spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) When the floors have a concrete topping of not more than 51 mm, the spans must be multiplied by 0.8.
- (3) Supported length means half the sum of the joist spans on both sides of the beam.
- (4) Straight interpolation may be used for other supported lengths.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) 3-ply beams with supported lengths greater than 4.2 m require 152 mm bearing. All other beams require 114 mm bearing.

# Span Tables

**Table A-11**  
**Maximum Spans for Glued-Laminated Floor Beams – 20f-E Grade<sup>(1)</sup>**  
 Forming Part of Sentence 9.23.4.2.(3)

Number of Storeys Supported	Beam Width, mm	Supported Length, m <sup>(2)(3)</sup>	Maximum Span, m <sup>(4)(5)(6)(7)</sup>						
			Beam Depth, mm						
			228	266	304	342	380	418	456
1	80	2.4	4.32	5.04	5.76	6.48	7.20	7.92	8.64
		3.0	3.87	4.51	5.15	5.80	6.44	7.09	7.73
		3.6	3.53	4.12	4.70	5.29	5.88	6.47	7.06
		4.2	3.27	3.81	4.36	4.90	5.44	5.99	6.53
		4.8	3.06	3.57	4.07	4.58	5.09	5.60	6.11
		5.4	2.88	3.36	3.84	4.32	4.80	5.28	5.76
		6.0	2.73	3.19	3.64	4.10	4.56	5.01	5.47
	130	2.4	5.51	6.43	7.35	8.26	9.18	10.10	11.02
		3.0	4.93	5.75	6.57	7.39	8.21	9.03	9.86
		3.6	4.50	5.25	6.00	6.75	7.50	8.25	9.00
		4.2	4.16	4.86	5.55	6.25	6.94	7.64	8.33
		4.8	3.90	4.54	5.19	5.84	6.49	7.14	7.79
		5.4	3.67	4.28	4.90	5.51	6.12	6.73	7.35
		6.0	3.48	4.07	4.65	5.23	5.81	6.39	6.97
2	80	2.4	3.28	3.83	4.37	4.92	5.47	6.01	6.56
		3.0	2.93	3.42	3.91	4.40	4.89	5.38	5.87
		3.6	2.68	3.12	3.57	4.02	4.46	4.91	5.36
		4.2	2.48	2.89	3.31	3.72	4.13	4.54	4.96
		4.8	2.32	2.71	3.09	3.48	3.86	4.25	4.64
		5.4	2.19	2.55	2.91	3.28	3.64	4.01	4.37
		6.0	2.07	2.42	2.77	3.11	3.46	3.80	4.15
	130	2.4	4.18	4.88	5.57	6.27	6.97	7.66	8.36
		3.0	3.74	4.36	4.99	5.61	6.23	6.85	7.48
		3.6	3.41	3.98	4.55	5.12	5.69	6.26	6.83
		4.2	3.16	3.69	4.21	4.74	5.27	5.79	6.32
		4.8	2.96	3.45	3.94	4.43	4.93	5.42	5.91
		5.4	2.79	3.25	3.72	4.18	4.64	5.11	5.57
		6.0	2.64	3.08	3.53	3.97	4.41	4.85	5.29

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**Table A-11 (Continued)**

Number of Storeys Supported	Beam Width, mm	Supported Length, m <sup>(2)(3)</sup>	Maximum Span, m <sup>(4)(5)(6)(7)</sup>						
			Beam Depth, mm						
			228	266	304	342	380	418	456
3	80	2.4	2.75	3.21	3.66	4.12	4.58	5.04	5.50
		3.0	2.46	2.87	3.28	3.69	4.10	4.51	4.92
		3.6	2.24	2.62	2.99	3.37	3.74	4.11	4.49
		4.2	2.08	2.42	2.77	3.12	3.46	3.81	4.15
		4.8	1.94	2.27	2.59	2.91	3.24	3.56	3.89
		5.4	1.83	2.14	2.44	2.75	3.05	3.36	3.66
		6.0	1.74	2.03	2.32	2.61	2.90	3.19	3.48
	130	2.4	3.50	4.09	4.67	5.25	5.84	6.42	7.01
		3.0	3.13	3.66	4.18	4.70	5.22	5.74	6.27
		3.6	2.86	3.34	3.81	4.29	4.77	5.24	5.72
		4.2	2.65	3.09	3.53	3.97	4.41	4.85	5.30
		4.8	2.48	2.89	3.30	3.72	4.13	4.54	4.95
		5.4	2.34	2.72	3.11	3.50	3.89	4.28	4.67
		6.0	2.22	2.58	2.95	3.32	3.69	4.06	4.43

**Notes to Table A-11:**

- (1) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) Supported length means half the sum of the joist spans on both sides of the beam.
- (3) Straight interpolation may be used for other supported lengths.
- (4) Spans are valid for glued-laminated timber conforming to CAN/CSA-O122-M and CAN/CSA-O177-M.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) Provide a minimum bearing length of 89 mm. (Alternatively, the bearing length may be designed in accordance with Part 4.)
- (7) Top edge of beam assumed to be fully laterally supported by joists.

# Span Tables

**Table A-12**  
**Maximum Spans for Built-up Ridge Beams and Lintels Supporting the Roof and Ceiling Only, No. 1 or No. 2 Grade**  
 Forming Part of Sentences 9.23.4.2.(4) and 9.23.12.3.(1)

Commercial Designation	Beam or Lintel Size, mm	Maximum Span, m <sup>(1)(2)(3)</sup>				
		Specified Snow Load, kPa				
		1.0	1.5	2.0	2.5	3.0
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	3-38x184	2.65	2.28	2.03	1.85	1.71
	4-38x184	3.06	2.64	2.35	2.14	1.97
	5-38x184	3.43	2.95	2.62	2.39	2.21
	3-38x235	3.25	2.79	2.49	2.26	2.09
	4-38x235	3.75	3.22	2.87	2.61	2.41
	5-38x235	4.19	3.60	3.21	2.92	2.70
	3-38x286	3.77	3.24	2.88	2.62	2.43
	4-38x286	4.35	3.74	3.33	3.03	2.80
	5-38x286	4.86	4.18	3.72	3.39	3.13
Hem – Fir (includes Western Hemlock and Amabilis Fir)	3-38x184	2.78	2.39	2.13	1.94	1.79
	4-38x184	3.21	2.76	2.46	2.24	2.07
	5-38x184	3.59	3.09	2.75	2.50	2.31
	3-38x235	3.40	2.93	2.61	2.37	2.19
	4-38x235	3.93	3.38	3.01	2.74	2.53
	5-38x235	4.39	3.78	3.36	3.06	2.83
	3-38x286	3.95	3.40	3.02	2.75	2.54
	4-38x286	4.56	3.92	3.49	3.18	2.94
	5-38x286	5.10	4.38	3.90	3.55	3.28
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	3-38x184	2.88	2.48	2.21	2.01	1.86
	4-38x184	3.30	2.86	2.55	2.32	2.14
	5-38x184	3.55	3.10	2.82	2.59	2.40
	3-38x235	3.53	3.03	2.70	2.46	2.27
	4-38x235	4.07	3.50	3.12	2.84	2.62
	5-38x235	4.54	3.91	3.49	3.17	2.93
	3-38x286	4.09	3.52	3.13	2.85	2.63
	4-38x286	4.72	4.06	3.62	3.29	3.04
	5-38x286	5.28	4.54	4.04	3.68	3.40

**Notes to Table A-12:**

- (1) Beam and lintel spans are calculated based on a maximum supported length of 4.9 m. Spans may be increased by 5% for supported lengths of not more than 4.3 m, by 10% for supported lengths of not more than 3.7 m, and by 25% for supported lengths of not more than 2.4 m.
- (2) For ridge beams, supported length means half the sum of the rafter, joist or truss spans on both sides of the beam. For lintels, supported length means half the sum of truss, roof joist or rafter spans supported by the lintel plus the length of the overhang beyond the lintel.
- (3) Provide minimum 76 mm bearing.

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**Table A-13**  
**Maximum Spans for Douglas Fir – Larch Lintels – No. 1 or No. 2 Grade – Non-structural Sheathing<sup>(1)</sup>**  
 Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, <sup>(2)</sup> mm	Maximum Span, m <sup>(3)(4)</sup>						Interior Walls
		Exterior Walls						
		Specified Snow Load, kPa						
		1.0	1.5	2.0	2.5	3.0		
Limited attic storage and ceiling	2-38x89	This Area Intentionally Left Blank					1.25	
	2-38x140						1.78	
	2-38x184						2.17	
	2-38x235						2.65	
	2-38x286						3.08	
Roof and ceiling only (tributary width of 0.6 m maximum) <sup>(5)</sup>	2-38x89	2.68	2.34	2.13	1.97	1.86	1.97	
	2-38x140	4.21	3.68	3.34	3.10	2.92	3.10	
	2-38x184	5.50	4.84	4.39	4.08	3.84	4.08	
	2-38x235	6.61	5.97	5.56	5.21	4.88	5.21	
	2-38x286	7.66	6.92	6.44	6.09	5.66	6.09	
Roof and ceiling only (tributary width of 4.9 m maximum) <sup>(6)</sup>	2-38x89	1.25	1.07	0.96	0.87	0.80	0.87	
	2-38x140	1.78	1.53	1.36	1.24	1.15	1.24	
	2-38x184	2.17	1.86	1.66	1.51	1.40	1.51	
	2-38x235	2.65	2.28	2.03	1.85	1.71	1.85	
	2-38x286	3.08	2.64	2.35	2.14	1.98	2.14	
Roof, ceiling and 1 storey <sup>(3)(6)(7)</sup>	2-38x89	0.96	0.88	0.82	0.77	0.73	0.68	
	2-38x140	1.37	1.26	1.17	1.10	1.04	0.97	
	2-38x184	1.67	1.53	1.42	1.34	1.26	1.18	
	2-38x235	2.04	1.88	1.74	1.63	1.54	1.44	
	2-38x286	2.37	2.18	2.02	1.90	1.79	1.67	
Roof, ceiling and 2 storeys <sup>(3)(6)(7)</sup>	2-38x89	0.86	0.81	0.77	0.73	0.70	0.61	
	2-38x140	1.23	1.16	1.09	1.04	0.99	0.87	
	2-38x184	1.50	1.41	1.33	1.27	1.21	1.06	
	2-38x235	1.84	1.72	1.63	1.55	1.48	1.30	
	2-38x286	2.13	2.00	1.89	1.80	1.72	1.51	
Roof, ceiling and 3 storeys <sup>(3)(6)(7)</sup>	2-38x89	0.81	0.77	0.73	0.71	0.68	0.57	
	2-38x140	1.15	1.10	1.05	1.01	0.97	0.82	
	2-38x184	1.40	1.33	1.28	1.22	1.18	1.00	
	2-38x235	1.71	1.63	1.56	1.50	1.44	1.22	
	2-38x286	1.99	1.89	1.81	1.74	1.67	1.41	

**Notes to Table A-13:**

- (1) Where structural sheathing is used, lintel spans may be increased by 15%. Structural sheathing consists of a minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151, CAN/CSA-O325.0 or CSA O437.0 fastened with at least two rows of fasteners to the exterior face of the lintel, and a single row to the top plates and studs. Fasteners shall conform to Table 9.23.3.5.
- (2) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.
- (3) If floor joists span the full width of the *building* without support, lintel spans shall be reduced by 15% for “roof, ceiling and 1 storey,” by 20% for “roof, ceiling and 2 storeys,” and by 25% for “roof, ceiling and 3 storeys.”
- (4) For ends of lintels fully supported by walls, provide minimum 38 mm bearing for lintel spans up to 3 m, or minimum 76 mm bearing for lintel spans greater than 3 m.

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## Span Tables

Table A-13 (Continued)

- (5) Spans for 0.6 m tributary width are calculated for lintels in end walls that support only a 0.6 m width of roof and ceiling, but do not support roof joists, roof rafters or roof trusses.
- (6) Lintel spans are calculated based on a maximum floor joist, roof joist or rafter span of 4.9 m and a maximum roof truss span of 9.8 m. Lintel spans may be increased by 5% if rafter and joist spans are no greater than 4.3 m and roof truss spans are no greater than 8.6 m. Spans may be increased by 10% if rafter and joist spans are no greater than 3.7 m and roof truss spans are no greater than 7.4 m.
- (7) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* does not exceed that specified for residential areas as described in Table 4.1.5.3.

**Table A-14**  
**Maximum Spans for Hem – Fir Lintels – No. 1 or No. 2 Grade – Non-structural Sheathing<sup>(1)</sup>**  
 Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, <sup>(2)</sup> mm	Maximum Span, m <sup>(3)(4)</sup>						Interior Walls
		Exterior Walls						
		Specified Snow Load, kPa						
		1.0	1.5	2.0	2.5	3.0		
Limited attic storage and ceiling	2-38x89	This Area Intentionally Left Blank					1.31	
	2-38x140						1.87	
	2-38x184						2.27	
	2-38x235						2.78	
	2-38x286						3.23	
Roof and ceiling only (tributary width of 0.6 m maximum) <sup>(5)</sup>	2-38x89	2.68	2.34	2.13	1.97	1.86	1.97	
	2-38x140	4.21	3.68	3.34	3.10	2.92	3.10	
	2-38x184	5.50	4.84	4.39	4.08	3.84	4.08	
	2-38x235	6.61	5.97	5.56	5.21	4.90	5.21	
	2-38x286	7.66	6.92	6.44	6.09	5.82	6.09	
Roof and ceiling only (tributary width of 4.9 m maximum) <sup>(6)</sup>	2-38x89	1.31	1.13	1.00	0.91	0.84	0.91	
	2-38x140	1.87	1.61	1.43	1.30	1.20	1.30	
	2-38x184	2.27	1.95	1.74	1.58	1.42	1.58	
	2-38x235	2.78	2.39	2.13	1.92	1.71	1.92	
	2-38x286	3.23	2.77	2.47	2.17	1.94	2.17	
Roof, ceiling and 1 storey <sup>(3)(6)(7)</sup>	2-38x89	1.01	0.93	0.86	0.81	0.76	0.69	
	2-38x140	1.44	1.32	1.23	1.14	1.05	0.95	
	2-38x184	1.75	1.61	1.47	1.34	1.23	1.12	
	2-38x235	2.14	1.96	1.76	1.60	1.48	1.35	
	2-38x286	2.49	2.22	2.00	1.82	1.69	1.55	
Roof, ceiling and 2 storeys <sup>(3)(6)(7)</sup>	2-38x89	0.91	0.85	0.80	0.76	0.72	0.60	
	2-38x140	1.29	1.21	1.13	1.05	0.98	0.82	
	2-38x184	1.57	1.44	1.33	1.24	1.16	0.98	
	2-38x235	1.90	1.73	1.60	1.49	1.40	1.19	
	2-38x286	2.15	1.97	1.82	1.70	1.60	1.37	
Roof, ceiling and 3 storeys <sup>(3)(6)(7)</sup>	2-38x89	0.85	0.81	0.77	0.74	0.69	0.55	
	2-38x140	1.21	1.14	1.06	1.00	0.95	0.76	
	2-38x184	1.43	1.33	1.25	1.18	1.12	0.91	
	2-38x235	1.72	1.60	1.50	1.42	1.35	1.10	
	2-38x286	1.95	1.82	1.72	1.63	1.55	1.27	

**Notes to Table A-14:**

- (1) Where structural sheathing is used, lintel spans may be increased by 15%. Structural sheathing consists of a minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151, CAN/CSA-O325.0 or CSA O437.0 fastened with at least two rows of fasteners to the exterior face of the lintel, and a single row to the top plates and studs. Fasteners shall conform to Table 9.23.3.5.
- (2) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.
- (3) If floor joists span the full width of the *building* without support, lintel spans shall be reduced by 15% for “roof, ceiling and 1 storey,” by 20% for “roof, ceiling and 2 storeys,” and by 25% for “roof, ceiling and 3 storeys.”
- (4) For ends of lintels fully supported by walls, provide minimum 38 mm bearing for lintel spans up to 3 m, or minimum 76 mm bearing for lintel spans greater than 3 m.

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## Span Tables

Table A-14 (Continued)

- (5) Spans for 0.6 m tributary width are calculated for lintels in end walls that support only a 0.6 m width of roof and ceiling, but do not support roof joists, roof rafters or roof trusses.
- (6) Lintel spans are calculated based on a maximum floor joist, roof joist or rafter span of 4.9 m and a maximum roof truss span of 9.8 m. Lintel spans may be increased by 5% if rafter and joist spans are no greater than 4.3 m and roof truss spans are no greater than 8.6 m. Spans may be increased by 10% if rafter and joist spans are no greater than 3.7 m and roof truss spans are no greater than 7.4 m.
- (7) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* does not exceed that specified for residential areas as described in Table 4.1.5.3.

**Table A-15**  
**Maximum Spans for Spruce – Pine – Fir Lintels – No. 1 or No. 2 Grade – Non-structural Sheathing<sup>(1)</sup>**  
 Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, <sup>(2)</sup> mm	Maximum Span, m <sup>(3)(4)</sup>						Interior Walls
		Exterior Walls						
		Specified Snow Load, kPa						
		1.0	1.5	2.0	2.5	3.0		
Limited attic storage and ceiling	2-38x89	This Area Intentionally Left Blank					1.27	
	2-38x140						1.93	
	2-38x184						2.35	
	2-38x235						2.88	
	2-38x286						3.34	
Roof and ceiling only (tributary width of 0.6 m maximum) <sup>(5)</sup>	2-38x89	2.55	2.23	2.02	1.88	1.77	1.88	
	2-38x140	4.01	3.50	3.18	2.96	2.78	2.96	
	2-38x184	5.27	4.61	4.18	3.88	3.66	3.88	
	2-38x235	6.37	5.76	5.34	4.96	4.67	4.96	
	2-38x286	7.38	6.67	6.21	5.87	5.61	5.87	
Roof and ceiling only (tributary width of 4.9 m maximum) <sup>(6)</sup>	2-38x89	1.27	1.11	1.01	0.93	0.87	0.93	
	2-38x140	1.93	1.66	1.48	1.35	1.25	1.35	
	2-38x184	2.35	2.02	1.80	1.64	1.52	1.64	
	2-38x235	2.88	2.47	2.20	2.01	1.84	2.01	
	2-38x286	3.34	2.87	2.56	2.33	2.09	2.33	
Roof, ceiling and 1 storey <sup>(3)(6)(7)</sup>	2-38x89	1.05	0.96	0.89	0.84	0.79	0.74	
	2-38x140	1.49	1.37	1.27	1.19	1.13	1.02	
	2-38x184	1.82	1.67	1.55	1.44	1.33	1.20	
	2-38x235	2.22	2.04	1.89	1.73	1.59	1.45	
	2-38x286	2.58	2.36	2.15	1.96	1.81	1.66	
Roof, ceiling and 2 storeys <sup>(3)(6)(7)</sup>	2-38x89	0.94	0.88	0.83	0.79	0.76	0.64	
	2-38x140	1.34	1.26	1.19	1.13	1.06	0.88	
	2-38x184	1.63	1.53	1.44	1.33	1.25	1.05	
	2-38x235	1.99	1.87	1.72	1.60	1.50	1.27	
	2-38x286	2.31	2.12	1.96	1.82	1.71	1.45	
Roof, ceiling and 3 storeys <sup>(3)(6)(7)</sup>	2-38x89	0.88	0.83	0.80	0.77	0.74	0.59	
	2-38x140	1.25	1.19	1.14	1.08	1.02	0.81	
	2-38x184	1.52	1.44	1.35	1.27	1.21	0.97	
	2-38x235	1.86	1.73	1.62	1.53	1.45	1.17	
	2-38x286	2.11	1.96	1.84	1.74	1.66	1.35	

**Notes to Table A-15:**

- (1) Where structural sheathing is used, lintel spans may be increased by 15%. Structural sheathing consists of a minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151, CAN/CSA-O325.0 or CSA O437.0 fastened with at least two rows of fasteners to the exterior face of the lintel, and a single row to the top plates and studs. Fasteners shall conform to Table 9.23.3.5.
- (2) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.
- (3) If floor joists span the full width of the *building* without support, lintel spans shall be reduced by 15% for “roof, ceiling and 1 storey,” by 20% for “roof, ceiling and 2 storeys,” and by 25% for “roof, ceiling and 3 storeys.”
- (4) For ends of lintels fully supported by walls, provide minimum 38 mm bearing for lintel spans up to 3 m, or minimum 76 mm bearing for lintel spans greater than 3 m.

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## Span Tables

Table A-15 (Continued)

- (5) Spans for 0.6 m tributary width are calculated for lintels in end walls that support only a 0.6 m width of roof and ceiling, but do not support roof joists, roof rafters or roof trusses.
- (6) Lintel spans are calculated based on a maximum floor joist, roof joist or rafter span of 4.9 m and a maximum roof truss span of 9.8 m. Lintel spans may be increased by 5% if rafter and joist spans are no greater than 4.3 m and roof truss spans are no greater than 8.6 m. Spans may be increased by 10% if rafter and joist spans are no greater than 3.7 m and roof truss spans are no greater than 7.4 m.
- (7) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* does not exceed that specified for residential areas as described in Table 4.1.5.3.

**Table A-16**  
**Maximum Spans for Glued-Laminated Timber Lintels – 20f-E Stress Grade – Exterior Walls – Roof and Ceiling Load Only**  
 Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Size, mm	Maximum Span, m <sup>(1)(2)(3)</sup>														
	Specified Snow Load, kPa														
	1.0			1.5			2.0			2.5			3.0		
	Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>		
	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8
130 x 304	6.23	5.63	5.24	5.63	5.09	4.73	5.24	4.73	4.40	4.95	4.48	4.17	4.73	4.28	3.87
80 x 380	6.52	5.89	5.48	5.89	5.32	4.96	5.48	4.96	4.52	5.19	4.69	4.11	4.96	4.39	3.80
130 x 342	6.80	6.15	5.72	6.15	5.56	5.17	5.72	5.17	4.81	5.41	4.89	4.55	5.17	4.67	4.35
80 x 418	7.00	6.33	5.89	6.33	5.72	5.32	5.89	5.32	4.96	5.57	5.03	4.52	5.32	4.81	4.18
130 x 380	7.36	6.65	6.19	6.65	6.01	5.59	6.19	5.59	5.21	5.86	5.29	4.92	5.59	5.06	4.70
80 x 456	7.48	6.76	6.29	6.76	6.10	5.68	6.29	5.68	5.29	5.95	5.37	4.93	5.68	5.13	4.56
130 x 418	7.91	7.15	6.65	7.15	6.46	6.01	6.65	6.01	5.59	6.29	5.68	5.29	6.01	5.43	5.05
80 x 494	7.94	7.17	6.68	7.17	6.48	6.03	6.68	6.03	5.61	6.31	5.71	5.31	6.03	5.45	4.94
80 x 532	8.39	7.58	7.06	7.58	6.85	6.38	7.06	6.38	5.93	6.67	6.03	5.61	6.38	5.76	5.32
130 x 456	8.44	7.63	7.10	7.63	6.89	6.41	7.10	6.41	5.97	6.71	6.07	5.65	6.41	5.80	5.39

**Notes to Table A-16:**

- (1) Spans are valid for glued-laminated timber conforming to CAN/CSA-O122-M and CAN/CSA-O177-M.
- (2) Provide minimum 89 mm bearing. (Alternatively, the bearing length may be calculated in accordance with Part 4.)
- (3) Top edge of lintel assumed to be fully laterally supported.
- (4) Supported length means half the length of trusses or rafters, plus the length of the overhang beyond the wall.
- (5) For intermediate supported lengths, straight interpolation may be used.

# Span Tables

**Table A-17**

**Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls<sup>(1)(2)(3)</sup> (1-10M Bottom Bar)**  
Forming Part of Sentence 9.20.17.4.(2)

Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
		Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
		Maximum Ground Snow Load, kN/m <sup>2</sup>			
		1.50	3.33	1.50	3.33
140	200	1.41	1.18	1.03	0.93
	300	1.78	1.50	1.30	1.18
	400	2.08	1.75	1.53	1.38
	500	2.33	1.97	1.72	1.56
	600	2.55	2.16	1.89	1.71
150	200	1.41	1.18	1.02	0.92
	300	1.78	1.50	1.29	1.17
	400	2.08	1.75	1.51	1.37
	500	2.33	1.97	1.70	1.54
	600	2.54	2.15	1.87	1.70
160	200	1.41	1.18	1.01	0.91
	300	1.78	1.50	1.28	1.16
	400	2.07	1.75	1.50	1.36
	500	2.32	1.96	1.68	1.53
	600	2.53	2.15	1.85	1.68
190	200	1.41	1.19	0.98	0.89
	300	1.78	1.50	1.24	1.13
	400	2.06	1.74	1.45	1.32
	500	2.30	1.95	1.63	1.49
	600	2.51	2.13	1.78	1.63
200	200	1.41	1.19	0.97	0.89
	300	1.77	1.49	1.23	1.12
	400	2.06	1.74	1.43	1.31
	500	2.30	1.95	1.61	1.48
	600	2.50	2.13	1.77	1.62
240	200	1.41	1.19	0.94	0.86
	300	1.76	1.49	1.18	1.09
	400	2.04	1.73	1.38	1.27
	500	2.27	1.93	1.55	1.43
	600	2.47	2.11	1.70	1.56

**Notes to Table A-17:**

- (1) Deflection criterion is  $L/240$ , where "L" is the clear span of the lintel.
- (2) Linear interpolation is permitted between ground snow loads and between lintel depths.
- (3) 10M stirrups are required at a maximum  $d/2$  spacing for spans greater than 1 200 mm, where "d" is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

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**Table A-18**  
**Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls<sup>(1)(2)(3)</sup> (1-15M Bottom Bar)**  
 Forming Part of Sentence 9.20.17.4.(2)

Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
		Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
		Maximum Ground Snow Load, kN/m <sup>2</sup>			
		1.50	3.33	1.50	3.33
140	200	1.63	1.46	1.31	1.23
	300	2.43	2.08	1.81	1.64
	400	2.90	2.44	2.13	1.93
	500	3.26	2.75	2.41	2.18
	600	3.58	3.03	2.65	2.4
150	200	1.67	1.49	1.33	1.25
	300	2.48	2.08	1.79	1.62
	400	2.90	2.44	2.11	1.91
	500	3.26	2.75	2.38	2.16
	600	3.57	3.02	2.62	2.38
160	200	1.70	1.53	1.35	1.26
	300	2.48	2.08	1.78	1.61
	400	2.90	2.44	2.09	1.90
	500	3.25	2.75	2.36	2.14
	600	3.56	3.02	2.59	2.36
190	200	1.80	1.61	1.36	1.24
	300	2.48	2.09	1.73	1.58
	400	2.89	2.44	2.03	1.85
	500	3.23	2.74	2.29	2.09
	600	3.53	3.00	2.51	2.30
200	200	1.83	1.64	1.35	1.23
	300	2.48	2.09	1.71	1.57
	400	2.88	2.44	2.01	1.84
	500	3.22	2.74	2.26	2.07
	600	3.52	2.99	2.48	2.28
240	200	1.93	1.65	1.30	1.20
	300	2.47	2.08	1.66	1.52
	400	2.86	2.43	1.94	1.78
	500	3.19	2.72	2.18	2.01
	600	3.47	2.97	2.39	2.20

**Notes to Table A-18:**

- (1) Deflection criterion is  $L/240$ , where "L" is the clear span of the lintel.
- (2) Linear interpolation is permitted between ground snow loads and between lintel depths.
- (3) 10M stirrups are required at a maximum  $d/2$  spacing for spans greater than 1 200 mm, where "d" is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

# Span Tables

**Table A-19**  
**Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls<sup>(1)(2)(3)</sup> (2-15M Bottom Bar)**  
 Forming Part of Sentence 9.20.17.4.(2)

Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
		Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
		Maximum Ground Snow Load, kN/m <sup>2</sup>			
		1.50	3.33	1.50	3.33
140	200	1.63	1.46	1.31	1.23
	300	2.43	2.18	1.96	1.84
	400	3.22	2.90	2.60	2.42
	500	4.00	3.60	3.25	2.70
	600	4.71	4.20	3.61	2.97
150	200	1.67	1.49	1.33	1.25
	300	2.48	2.23	1.99	1.87
	400	3.29	2.96	2.64	2.45
	500	4.80	3.68	3.29	2.74
	600	4.87	4.20	3.64	3.02
160	200	1.70	1.53	1.35	1.27
	300	2.53	2.28	2.02	1.90
	400	3.36	3.02	2.68	2.48
	500	4.16	3.76	3.27	2.78
	600	4.95	4.20	3.61	3.08
190	200	1.80	1.61	1.39	1.32
	300	2.67	2.40	2.09	1.97
	400	3.53	3.19	2.77	2.56
	500	4.38	3.81	3.18	2.90
	600	4.92	4.19	3.50	3.21
200	200	1.83	1.64	1.41	1.33
	300	2.87	2.44	2.11	2.00
	400	3.78	3.24	2.79	2.55
	500	4.46	3.81	3.15	2.89
	600	4.86	4.18	3.47	3.18
240	200	2.07	1.74	1.46	1.38
	300	3.07	2.59	2.18	2.07
	400	3.95	3.38	2.70	2.48
	500	4.40	3.80	3.04	2.80
	600	4.78	4.16	3.34	3.08

**Notes to Table A-19:**

- (1) Deflection criterion is  $L/240$ , where "L" is the clear span of the lintel.
- (2) Linear interpolation is permitted between ground snow loads and between lintel depths.
- (3) 10M stirrups are required at a maximum  $d/2$  spacing for spans greater than 1 200 mm, where "d" is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

# Part 10

## Relocatable Industrial Accommodation

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# Part 10

## Relocatable Industrial Accommodation

### Section 10.1. Application

#### 10.1.1. General

##### 10.1.1.1. Responsibility for Compliance

- 1) The *owner* of a *building* regulated by this Part is jointly responsible with any operator or lessor for the *building's* compliance with this Code.
- 2) During construction of a *building* regulated by this Part, the *constructor* is jointly responsible with the *owner* for compliance with this Code.

##### 10.1.1.2. Application

- 1) Except as specifically varied in this Part, Parts 1 to 9 apply to a *building* regulated by this Part.
- 2) Except as provided in Sentence (3), this Part applies to a *building* providing accommodation for an industrial work force living and working in a temporary location, but does not apply to *manufactured homes*, prefabricated single family *dwelling units*, or other types of prefabricated or manufactured *buildings*.
- 3) This Part also applies to Group D and Group F Division 3 *occupancies* for a work force working in a temporary location.

##### 10.1.1.3. Scope

- 1) This Part applies to
  - a) a one *storey building*
    - i) without sleeping accommodation, that is not more than 1 200 m<sup>2</sup> in *building area*, and if *sprinklered*, is not more than 2400 m<sup>2</sup> in *building area*, and
    - ii) with sleeping accommodation, that is not more than 600 m<sup>2</sup> in *building area*, and if *sprinklered*, is not more than 1200 m<sup>2</sup> in *building area*, and
  - b) a two *storey building*
    - i) without sleeping accommodation, that is not more than 600 m<sup>2</sup> in *building area*, and if *sprinklered*, is not more than 1200 m<sup>2</sup> in *building area*, and
    - ii) with sleeping accommodation, that is not more than 300 m<sup>2</sup> in *building area*, and if *sprinklered*, is not more than 600 m<sup>2</sup> in *building area*.
- 2) A *building* described in Sentence (1) is permitted to consist of one or more transportable modules specifically designed to be readily relocatable and usable without permanent *foundations*.

##### 10.1.1.4. Renovation Requirement of Existing Units

- 1) Sections 10.6. and 10.7. apply to
  - a) a *building* constructed on or after 02 September 2007, and
  - b) except as varied by Sentence (2), a *building* constructed before 02 September 2007 at the time of relocation.

2) Units built between 01 March 1977 and 02 September 2007 shall comply with the requirements of Part 10 of the Code in effect at the time of construction and to Sections 10.6. and 10.7. of this Code upon relocation.

3) A *building* referred to in Sentences (1) and (2) must be constructed or renovated by a *constructor* certified by the *Chief Building Administrator* and must carry the appropriate Alberta label.

4) A *building* regulated by this Part that is constructed in or relocated into Alberta after 02 September 2007 shall conform in all respects to this Code.

#### 10.1.1.5. Temporary Facilities

1) A *building* to which this Part applies shall not stay at one site for more than 5 years, except as permitted by the *authority having jurisdiction*.

#### 10.1.1.6. Combined Activities

1) A *building* containing sleeping accommodation is permitted to include spaces for other uses not exceeding 100 m<sup>2</sup> each in area, and if more than 50 m<sup>2</sup> in area, each space shall be separated from the remainder of the *building* by doors and a wall conforming to Sentence 10.4.1.3.(3) and Article 10.4.5.1.

## Section 10.2. Structural Requirements

### 10.2.1. General

#### 10.2.1.1. Structural Design

1) Structural design shall be in accordance with Part 4 and, in addition, the design criteria shall allow for the effects of forces due to transportation and frequent relocation.

2) Structural design of *loadbearing* assemblies shall be done by a *professional engineer*.

#### 10.2.1.2. Foundations

1) A *building* referred to in this Part is permitted to have a permanent or temporary *foundation*.

### 10.2.2. Design Loads

#### 10.2.2.1. Snow Loads

1) Roof *live load* shall be ground snow load and associated rain load, and is permitted to be modified by a coefficient but shall be not less than 2 kPa.

2) Roof design shall allow for the effects of drifting snow.

#### 10.2.2.2. Wind Loads

1) Design *live load* due to wind shall be based on a reference velocity wind pressure not less than 0.7 kPa.

#### 10.2.2.3. Floor loads

1) Design floor loads in Group D *occupancies* shall be not less than 2.4 kPa.

**10.2.3. Stability****10.2.3.1. Design**

1) If the resistance to overturning, calculated as the sum of the stabilizing moment of *dead load* only, is less than twice the overturning moment due to the *live loads* acting on the *building*, provision for the attachment of tie-down devices shall be made in the construction of the modules.

**10.2.3.2. Tie-Down Devices**

1) If tie-down devices are required, the manufacturer shall provide tie-down instructions with each module specifying the location, required capacity and anchoring of recommended tie-down devices.

2) If special fittings, fixtures or provisions are needed to comply with the tie-down instructions, they shall be supplied with the module.

3) The tie-down instructions shall be provided for a specific site only and shall be printed on a label and affixed to the module in a visible location.

**Section 10.3. Heights and Areas****10.3.1. Size Requirements****10.3.1.1. Heights**

1) Except as permitted by Sentence (2), the clear ceiling height shall be not less than 2.1 m.

2) In a module specifically produced to be transported by aircraft, the clear ceiling height shall be not less than 2 m over at least 90% of the *floor area* and shall be not less than 1.9 m over the remaining *floor area*.

**Section 10.4. Fire Safety****10.4.1. Fire-Resistance Rating and Fire Separations****10.4.1.1. Fire-Resistance Rating**

1) The *fire-resistance rating* required for a wall by other Parts of this Code is waived if the membranes on the wall contribute to the *fire-resistance rating* of the wall a membrane protection value not less than those specified in Articles 10.4.1.3. to 10.4.1.5.

- a) when rated in accordance with Appendix D, or
- b) when tested in accordance with Section 15 of CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

**10.4.1.2. Membrane Protection**

1) The values of membrane protection in Articles 10.4.1.3. to 10.4.1.5. apply only if the wall or ceiling is framed with wood members not less than 38 x 64 mm spaced not more than 400 mm o.c.

2) If a wall framing system with stud dimensions less than those specified in Sentence (1) is used, the membrane values required in Articles 10.4.1.3. to 10.4.1.5. shall be increased by 10 min.

3) Prefinished wall panelling not less than 4.2 mm thick applied over plywood panelling, waferboard or oriented strandboard not less than 7.5 mm thick shall be considered to provide a 5 min membrane protection.

**10.4.1.3. Sleeping Rooms**

- 1) Each face of a wall separating a sleeping room from another room shall have not less than a 5 min membrane protection.
- 2) Except as required by Sentence (3), a corridor shall be separated from the remainder of the *building* by a wall having not less than a 5 min membrane protection on each face.
- 3) Except as permitted by Sentence (4), the face on the sleeping room side of a wall separating a sleeping room from a corridor or from a space referred to in Article 10.1.1.6. shall have not less than a 10 min membrane protection.
- 4) The rating of the membrane protection required by Sentence (3) need not be more than 5 min if the wall cavity is filled with mineral wool produced from glass, slag or *rock*
  - a) having a density not less than 14 kg/m<sup>3</sup>,
  - b) compressed to 75% of its nominal thickness, and
  - c) completely filling the cavity.

**10.4.1.4. Service Rooms**

- 1) Wall faces in a *service room* shall have not less than a 30 min membrane protection.
- 2) The ceiling of a *service room* shall have not less than a 30 min membrane protection.

**10.4.1.5. Exterior Wall Requirements**

- 1) Except as permitted by Sentences (2) and (3), exterior walls shall have not less than a 5 min membrane protection on the inner face and shall have *noncombustible* exterior cladding.
- 2) A single module placed more than 15 m from trees, shrubs or other modules may have *combustible* cladding.
- 3) The membrane protection value in Sentence (1) does not apply in a single module if the *occupant load* is not more than 10 and the module is placed not less than 10 m from any other *building*.

**10.4.1.6. Fire Separations**

- 1) In a two *storey building*
  - a) the floor assembly of the second *storey* shall be a *fire separation* having a 45 min *fire-resistance rating*,
  - b) the *exit* stairways from the second *storey* shall be separated from the remainder of the *building* by a *fire separation* having a 45 min *fire-resistance rating*, and
  - c) the *loadbearing* walls, columns and arches supporting the floor assembly of the second *storey* shall have a 45 min *fire-resistance rating*.

**10.4.2. Service Spaces****10.4.2.1. Service Room**

- 1) A fuel-fired *appliance* placed in a *building* containing sleeping accommodation shall be placed in a *service room*.

**10.4.2.2. Fire Dampers**

- 1) An opening through the wall of a *service room* for the passage of a duct shall be protected with a *fire damper* having not less than a 45 min *fire-protection rating*.

**10.4.2.3. Fire Stopping**

- 1) An opening through the ceiling of a *service room* for the passage of a *chimney flue* shall be protected with fire stopping.

2) The joist space through which a *chimney flue* penetrates must have solid blocking not less than 38 mm thick on each side of the *chimney flue* and not less than 25 mm from the *flue* separating the *flue* space from the joist space.

### 10.4.3. Flame-Spread Rating

#### 10.4.3.1. Flame-Spread Rating

1) Except as otherwise required by this Subsection, the *flame-spread rating* of interior wall and ceiling finishes, including 90% of the surface area of cupboards and built-in furniture, shall be not more than 150.

2) The *flame-spread rating* in a corridor and in an *exit* stairway from a second *storey* shall be not more than 25 on

- a) 90% of the ceiling surface area, and
- b) 90% of the wall surface area.

3) The *flame-spread rating* on the floor shall be not more than

- a) 300 in a corridor, and
- b) 150 in an *exit* stairway from a second *storey*.

### 10.4.4. Windows and Means of Egress

#### 10.4.4.1. Windows

1) For each sleeping room, a window capable of serving as an emergency *means of egress* shall be provided, with an unobstructed openable area not less than 0.35 m<sup>2</sup> with no dimension less than 380 mm, and with a sill height not more than 1 150 mm above the inside floor.

2) A window with non-breakable glazing or that is not openable shall not be used in a sleeping area unless the window is designed and permanently marked as being of a knock-out type.

### 10.4.5. Doors

#### 10.4.5.1. Fire-Protection Rating

1) Doors listed and labelled as having not less than a 20 min *fire-protection rating* or as conforming to CAN4-S113, "Wood Core Doors Meeting the Performance Required by CAN4-S104-77 for Twenty Minute Fire Rated Closure Assemblies," shall be used

- a) as smoke doors, and
- b) between any part of a *building* and
  - i) a corridor,
  - ii) an *exit* stair, or
  - iii) a *service room*.

2) A door frame that has not been tested and labelled by a testing agency may be used for a door required to have a 20 min *fire-protection rating* if the frame is rabbetted from solid wood stock and the final thickness is not less than 32 mm.

3) A door referred to in Sentence (1) shall be equipped with a latching mechanism.

#### 10.4.5.2. Closers

1) A door equipped with an automatic closer shall be used between any part of a *building* and

- a) a *service room*,
- b) an *exit* stair, or
- c) a washroom facility.

#### 10.4.5.3. Service Room Doors

1) A door to a *service room* may open outward from the *service room*.

**10.4.5.4. Smoke Doors**

- 1) Every corridor more than 55 m in length shall be subdivided by smoke doors.
- 2) A smoke door shall be equipped with an automatic closer actuated by *smoke detectors*, and shall be designed and installed to retard the passage of smoke.

**10.4.6. Exits****10.4.6.1. Number of Exits and Travel Distance**

- 1) Except as permitted by Sentence (2), every *floor area* shall be served by not less than 2 *exits*.
- 2) A module is permitted to be served by one *exit* provided
  - a) the module is free standing and placed not less than 10 m from another *building*, and
  - b) the travel distance from any point in the module to the *exit* does not exceed 15 m.

**10.4.6.2. Travel Distance**

- 1) *Exits* shall be located so that the travel distance from any part of the *building* to at least one *exit* is not more than
  - a) 25 m if the *building* is not *sprinklered*, or
  - b) 40 m if the *building* is *sprinklered*.

**10.4.7. Fire Suppression****10.4.7.1. Standpipe and Hose System**

- 1) If a *building*, or aggregate of *buildings*, containing sleeping accommodation at one site, serves 60 or more persons and is not *sprinklered*, each *building* shall be provided with a standpipe and hose system conforming to Sentences (2) to (7).
- 2) A firefighting water supply of not less than 13.5 m<sup>3</sup> for each *building* shall be supplied, but the total water supply at one site need not be more than 27 m<sup>3</sup>.
- 3) At least one hose cabinet shall be provided that contains a 38 mm diam hose not more than 30 m in length, capable of reaching all parts of the *building* with a water stream.
- 4) In determining the location of a hose cabinet, allowance for spray shall be made only from the door of a bedroom to the back corner of the bedroom.
- 5) A hose shall be equipped with a nozzle that is adjustable from fog to a straight stream.
- 6) The minimum residual pressure at the hydraulically most remote hose station shall be 300 kPa, with a flow rate not less than 5 L/s.
- 7) The firefighting water system is permitted to be combined with the domestic system, however the water storage required for firefighting shall not be depleted by the domestic system.
- 8) Requirements for a *building* that has separate water lines for hose and standpipe systems are permitted to be established by the *authority having jurisdiction*.
- 9) An aggregate of *buildings* as referred to in Sentence (1) shall be considered as being a group of *buildings* that
  - a) function as one unit and are not more than 10 m from each other, or
  - b) are physically connected to each other by corridors, *walkways* or other facilities through which fire or smoke could spread.

**10.4.7.2. Sprinkler System**

1) If a sprinkler system is installed, it shall be designed by a *professional engineer* in conformance with NFPA 13, "Installation of Sprinkler Systems," or NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."

**10.4.7.3. Portable Extinguishers**

1) Portable extinguishers shall be installed in conformance with the Alberta Fire Code 2006.

**10.4.8. Electrical****10.4.8.1. Specific Electrical Requirements**

1) Not less than 2 duplex receptacles shall be installed in each sleeping room.

**10.4.9. Foamed Plastic****10.4.9.1. Foamed Plastic**

1) *Foamed plastic* shall not be exposed in any part of a *building*.

2) Sentence (1) applies to the space beneath the module and to a roof space in addition to other parts of the *building*.

3) *Foamed plastic* shall have a *flame-spread rating* not more than 25.

4) The surface of *foamed plastic* shall be protected from interior spaces in the *building* by 12.7 mm gypsum board or by a *thermal barrier* complying with CAN4-S124-M, "Test for the Evaluation of Protective Coverings for Foamed Plastic," Classification A.

**Section 10.5. Health Requirements****10.5.1. Heating and Ventilation****10.5.1.1. Design**

1) Heating equipment shall be capable of maintaining a temperature of 20°C within a *building* when the outside temperature is -45°C and the wind velocity is 25 km/h.

**10.5.1.2. Insulation**

1) All exterior wall and roof cavities shall be completely filled with insulation having a resistance to heat flow not less than that provided by glass fibre batts but the resistance need not be more than RSI 2.1.

2) A floor assembly above an unheated space shall include thermal insulation with a thermal resistance not less than RSI 2.1.

3) Installation and fastening of insulation shall ensure that it cannot be displaced during transportation.

**10.5.1.3. Ventilation**

1) Ventilation requirements shall be in accordance with ANSI/ASHRAE 62, "Ventilation for Acceptable Indoor Air Quality."

**10.5.1.4.****10.5.1.4. Circulation**

- 1) In a *building* to which this Part applies, air may be circulated provided
  - a) supply and return air systems are ducted, and
  - b) 100% of the supply air is exhausted and not returned from
    - i) washroom facilities,
    - ii) clothes drying areas, and
    - iii) kitchens and other areas containing cooking facilities.

**10.5.1.5. Forced Air System**

- 1) A forced air heating system shall be provided with air filters.

**10.5.1.6. Ducts**

- 1) All ducts for a heating system and for a ventilation system shall be constructed of galvanized steel.
- 2) Except as required by Article 10.4.2.2. for a wall of a *service room*, an air duct is permitted to penetrate a wall with membrane protection without installing a *fire damper* at the penetration.

**10.5.1.7. Vapour Barrier**

- 1) If a *vapour barrier* is cut for openings for items such as electrical outlet and junction boxes, ducts, windows or doors, the integrity of the *vapour barrier* around the opening shall be maintained.

**10.5.1.8. Screens**

- 1) A *building* used for eating, cooking or sleeping shall have screens over all doors, windows and other openings to the exterior to prevent the entrance of flies and other insects.

**10.5.2. Plumbing Facilities****10.5.2.1. Number of Fixtures**

- 1) The fixtures in each washroom shall be based on the number of persons using that washroom, shall conform to Sentences (2) and (3) and, if persons of each sex are to be accommodated, a separate washroom shall be provided for each sex.
- 2) A *building* with sleeping accommodation shall be provided with
  - a) water closets on the basis of 1 unit for every 5 persons or part thereof up to 15 persons and 1 unit for every 15 persons or part thereof in excess of 15 persons,
  - b) lavatories on the basis of 1 unit for every 5 persons or part thereof,
  - c) showers or tub baths on the basis of 1 unit for every 11 persons or part thereof,
  - d) urinals in washrooms for males on the basis of 1 unit for every 25 persons or part thereof, and
  - e) laundry facilities.
- 3) Water closets and lavatories in a *building* not covered by Sentence (2) shall conform to Part 7.

**10.5.2.2. Piping**

- 1) Piping in corridor walls and in walls separating sleeping rooms shall be *noncombustible*.

**10.5.2.3. Heat Tape**

1) If heat tape is used on *combustible* drain, waste and vent pipes, it shall be provided with devices to ensure that it will not exceed temperatures recommended by the *combustible* pipe manufacturer and it shall be installed in accordance with the manufacturer's recommendations and instructions, except that a heat tape shall be not closer than 50 mm to any other *combustible* material.

**10.5.2.4. Sewage Disposal**

1) Waste water from plumbing fixtures shall be discharged to a public sewage system if a system is available, otherwise it shall be discharged to a *private sewage disposal system* or to a sewage holding tank in accordance with the plumbing and drainage regulations made pursuant to the Safety Codes Act.

**Section 10.6. General Safety****10.6.1. Spatial Separation****10.6.1.1. Spatial Separation**

1) Except as permitted by Article 10.6.1.2. and Subsection 3.2.3., the spatial separation between *buildings* shall be not less than 10 m.

**10.6.1.2. Walkways or Corridors**

1) The spatial separation between the end walls of modules containing sleeping accommodation may be less than 10 m if the end walls adjoin a *walkway* or corridor that

- is not less than 3 m in width,
- is *sprinklered*,
- is separated from any adjoining module or *building* by a *fire separation* with a *fire-resistance rating* not less than 45 min that extends through any crawl space to the ground, and
- contains no *combustible* piping.

**10.6.1.3. Proximity to Vegetation**

1) A *building* shall be located not closer than 15 m to any bushes, trees or similar vegetation.

**10.6.2. Skirting****10.6.2.1. Skirting**

1) Except as permitted by Sentence (2), skirting on a module, if installed, shall be *noncombustible* or have *noncombustible* cladding.

2) When a single module is 15 m or more from trees or shrubs or similar vegetation, the skirting, if installed, is permitted to be *combustible*.

3) Skirting shall be installed if the wall of a module is less than 15 m from the wall of another module or from another wall of the same module that forms an included angle of less than 135°.

4) Skirting shall be installed on that portion of the space beneath the module that is more than 750 mm in height measured at the exterior face of the module and measured between the ground surface and the underside of the module.

**10.6.3.1.****10.6.3. Fire Alarms****10.6.3.1. Fire Alarm Systems**

- 1)** A fire alarm system shall be installed in accordance with CAN/ULC-S524, "Installation of Fire Alarm Systems," in a *building*
- providing sleeping accommodation for more than 10 persons,
  - providing dining facilities for more than 100 persons,
  - providing recreational facilities for more than 150 persons, or
  - if required by other Parts of this Code, except as varied by Clauses (a), (b) and (c).
- 2)** The fire alarm system required by Sentence (1) shall be tested to ensure satisfactory operation in conformance with CAN/ULC-S537, "Verification of Fire Alarm Systems," except that the verification may be done by an electrician qualified in the maintenance of fire alarm and detection systems.

**10.6.3.2. Manual Stations**

- 1)** If a fire alarm system is required by Sentence 10.6.3.1.(1), a manual station conforming to CAN/ULC-S528-M, "Manual Pull Stations for Fire Alarm Systems," shall be located adjacent to each *exit* so that no person can leave the *building* through an *exit* without passing a manual station.

**10.6.3.3. Heat Detectors**

- 1)** If a fire alarm system is required by Sentence 10.6.3.1.(1), *heat detectors* conforming to CAN/ULC-S530, "Heat Actuated Fire Detectors," shall be placed in each *service room*, storage room, kitchen and clothes drying area.

**10.6.3.4. Smoke Detectors**

- 1)** If a fire alarm system is required by Sentence 10.6.3.1.(1), *smoke detectors* conforming to CAN/ULC-S529, "Smoke Detectors for Fire Alarm Systems," shall be installed in every corridor serving rooms containing sleeping accommodation.

**10.6.3.5. Smoke Alarms**

- 1)** A *smoke alarm* conforming to CAN/ULC-S531, "Smoke Alarms," shall be installed on the ceiling of every room providing sleeping accommodation.
- 2)** The *smoke alarm* in Sentence (1)
- shall be installed by permanent connection to an electrical circuit,
  - shall be equipped to show that it is in operating condition,
  - shall have no disconnect switches between the overcurrent device and the *smoke alarm*, and
  - is permitted to be tied into the *building* fire alarm system.

**10.6.4. Kitchen Ventilation****10.6.4.1. Cooking Equipment Ventilation System**

- 1)** Except as provided in Article 10.6.4.2., every kitchen containing commercial cooking equipment used in processes producing smoke or grease-laden vapours shall be equipped with a mechanical exhaust system conforming to NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."

**10.6.4.2. Kitchen Hoods, Canopies and Exposed Exhaust Ducts**

- 1)** Ducts for a kitchen exhaust system shall be constructed of 0.84 mm minimum thickness stainless steel.
- 2)** A demountable exhaust extension may be used if the connection is exposed and is grease-tight.

3) The airflow in and around a canopy or hood shall be in accordance with good engineering practice and each design shall be submitted to the *authority having jurisdiction* for review.

4) The required clearance from the *exhaust duct* to *combustible* material may be waived if a 25 mm air space, having no materials in it, separates the *exhaust duct* from a *noncombustible* material backed by not less than 25 mm of mineral wool insulation which protects the *combustible* material.

5) The required clearance from the hood or canopy to *combustible* material may be waived if a 50 mm air space, having no materials in it, separates the hood from a *noncombustible* material backed by not less than 25 mm of mineral wool insulation which protects the *combustible* material.

6) A sidewall fan may be used.

7) A fan shall be rated for continuous use as a commercial exhaust fan.

#### 10.6.4.3. Exception for Existing Modules

1) A canopy or hood installed before June 30, 1985, is permitted to have other than welded joints and seams.

2) In modules constructed before June 30, 1985, the kitchen mechanical exhaust and fire suppression system is considered acceptable provided

- a) the canopy completely covers all commercial cooking *appliances* and is complete with filters,
- b) an automatic fire suppression system is located in the canopy, and
- c) the system provides mechanical exhaust sufficient to remove grease-laden vapours.

#### 10.6.5. Lighting

##### 10.6.5.1. Emergency Lighting

1) Emergency lighting shall be provided to average levels of not less than 10 lx at floor or tread level in all corridors and in areas serving as *access to exit* from *buildings* having an *occupant load* more than 20.

##### 10.6.5.2. Exit Signs

1) An illuminated *exit* sign shall be installed at each *exit* location serving a *building* having an *occupant load* more than 20.

#### 10.6.6. Doors

##### 10.6.6.1. Exit Door Hardware

1) Every *exit* door from a *building* containing sleeping, dining or recreational facilities shall be equipped with plunger type hardware or hardware listed and labelled by a testing agency, that will release and allow the door to swing open if a force not exceeding 90 N is applied to the hardware in the direction of *exit* travel.

## Section 10.7. Identification

### 10.7.1. Labelling

#### 10.7.1.1. Identification Plate

1) Each *building* module conforming to this Part shall be clearly and permanently identified with a plate showing

- a) the date of construction,
- b) the name of the *constructor*,
- c) the address of the *constructor*,

- d) the Model Number and Serial Number, and
- e) the structural and mechanical design parameters.

**2)** The identification plate shall be fixed to the module in a location that is visible when the unit is complexed or standing alone.

**3)** In the case of a *building* module constructed after 02 September 2007, the identification plate required by Sentence (1) shall be affixed at the time of construction.

**4)** In the case of a *building* module constructed before 02 September 2007, the identification plate required by Sentence (1) shall be affixed before relocation to a new site.

## **Section 10.8. Objectives and Functional Statements**

### **10.8.1. Objectives and Functional Statements**

#### **10.8.1.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.8. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)

# **Part 11**

## **Exterior Acoustic Insulation**

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# Part 11

## Exterior Acoustic Insulation

### Section 11.1. Application

#### 11.1.1. Scope

##### 11.1.1.1. Scope

1) This Part applies to *buildings* that are allowed to be constructed subject to acoustic insulation requirements, within an airport vicinity protection area established by an Airport Vicinity Protection Area regulation under the Municipal Government Act.

### Section 11.2. Design

#### 11.2.1. General

##### 11.2.1.1. Design

1) In the application of Tables 11.2.1.2.A. to 11.2.1.2.D. and Table 11.2.1.3., each component includes the total of all elements or assemblies of the exterior envelope of the room or space that are of the same type, and the combined area of those elements or assemblies is to be used as the component area.

##### 11.2.1.2. Acoustic Insulation Factor

1) The *building* shall be designed and constructed so that the *acoustic insulation factor* is not less than the value derived from Table 11.2.1.2.A. for each component of the exterior envelope of every room or space used for sleeping in

- a) *care or detention occupancies*, and
- b) *residential occupancies*.

**Table 11.2.1.2.A.**  
**Acoustic Insulation Factor for Each Component of the Exterior Envelope of Rooms and Spaces Used for Sleeping**  
 Forming Part of Sentence 11.2.1.2.(1)

Number of Components Forming Exterior Portion of Room or Space Envelope	Noise Contour at <i>Building Site</i>																
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Over 40
1	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	43
2	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	46
3	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	48
4	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	49
5	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	50
6	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	51

- 2) The *building* shall be designed and constructed so that the *acoustic insulation factor* is not less than the value derived from Table 11.2.1.2.B. for each component of the exterior envelope of
- a) every living room, dining room, recreational room, and all other rooms of a similar nature, in *residential occupancies*, and
  - b) every classroom and all other rooms of a similar nature.

**Table 11.2.1.2.B.**  
**Acoustic Insulation Factor for the Exterior Envelope of Living Rooms, Dining Rooms, Recreational Rooms, Classrooms, etc.**  
 Forming Part of Sentence 11.2.1.2.(2)

Number of Components Forming Exterior Portion of Room or Space Envelope	Noise Contour at <i>Building Site</i>																
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Over 40
1	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	38
2	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	41
3	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	43
4	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	44
5	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	45
6	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	46

- 3) The *building* shall be designed and constructed so that the *acoustic insulation factor* is not less than the value derived from Table 11.2.1.2.C. for each component of the exterior envelope of
- a) every kitchen, bathroom, laundry room, and all other rooms of a similar nature, in *residential occupancies*, and
  - b) every private office, conference room, meeting room and all other rooms of a similar nature.

**Table 11.2.1.2.C.**  
**Acoustic Insulation Factor for the Exterior Envelope of Kitchens, Bathrooms, Laundry Rooms, etc. and Private Offices, Conference Rooms, Meeting Rooms, etc.**  
 Forming Part of Sentence 11.2.1.2.(3)

Number of Components Forming Exterior Portion of Room or Space Envelope	Noise Contour at <i>Building Site</i>																
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Over 40
1	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	33
2	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	36
3	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	38
4	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	39
5	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	40
6	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	41

- 4) The *building* shall be designed and constructed so that the *acoustic insulation factor* is not less than the value derived from Table 11.2.1.2.D. for each component of the exterior envelope of general office areas, reception areas and all other rooms and spaces not included in Sentences (1) to (3).

**Table 11.2.1.2.D.**  
**Acoustic Insulation Factor for the Exterior Envelope of General Offices, Reception Areas and Other Rooms and Spaces not Included under Tables 11.2.1.2.A. to 11.2.1.2.C.**  
 Forming Part of Sentence 11.2.1.2.(4)

Number of Components Forming Exterior Portion of Room or Space Envelope	Noise Contour at <i>Building Site</i>																
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	Over 40
1	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	28
2	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	31
3	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	33
4	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	34
5	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	35
6	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	36

**11.2.1.3. Multiple Factors**

- 1)** If one or more components of the exterior envelope of a *building* have an *acoustic insulation factor* that is more than the value required by Sentences 11.2.1.2.(1) to (4), the *acoustic insulation factor* for one or more other components of the exterior envelope of the *building* is permitted to be less than the value required by Sentences 11.2.1.2.(1) to (4) provided
- a) the algebraic increase in transmitted sound power is not positive, and
  - b) Table 11.2.1.3. is used to redistribute the *acoustic insulation factor* requirements for components whose *acoustic insulation factor* deviates from the value required by Sentences 11.2.1.2.(1) to (4).

**Table 11.2.1.3.**  
**Redistribution of Acoustic Insulation Factors**  
 Forming Part of Sentence 11.2.1.3.(1)

Component Acoustic Insulation Factor from Tables 11.2.3.1.A. to 11.2.3.1.D. minus Acoustic Insulation Factor Derived from Tables 11.2.1.2.A. to 11.2.1.2.D.	Percentage Change in Total Transmitted Sound				
	Total Number of Components				
	2	3	4	5	6
10 or more	-45	-30	-22	-18	-15
9	-44	-29	-22	-18	-15
8	-42	-28	-21	-17	-14
7	-40	-27	-20	-16	-13
6	-37	-25	-19	-15	-12
5	-34	-23	-17	-14	-10
4	-30	-20	-15	-12	-11
3	-25	-17	-12	-10	-8
2	-18	-12	-9	-7	-6
1	-10	-7	-5	-4	-3
0	0	0	0	0	0
-1	13	9	6	5	4
-2	29	20	15	12	10
-3	50	33	25	20	17

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Table 11.2.1.3. (Continued)

Component Acoustic Insulation Factor from Tables 11.2.3.1.A. to 11.2.3.1.D. minus Acoustic Insulation Factor Derived from Tables 11.2.1.2.A. to 11.2.1.2.D.	Percentage Change in Total Transmitted Sound				
	Total Number of Components				
	2	3	4	5	6
-4	76	50	38	30	25
-5	108	72	54	43	36

## 11.2.2. Ventilation

### 11.2.2.1. Mechanical Ventilation

**1)** In *buildings* located on a site at which the *noise contour* value is 25 or more, *dwelling units* and *suites* used for *residential occupancy* shall be ventilated with a mechanical ventilation system that includes a fresh air inlet duct that

- a) has a minimum diameter of 150 mm,
- b) is insulated,
- c) has a regulating damper that does not conflict with the requirements of Subsection 9.32.3., and
- d) conducts outside air to the *return duct*.

**2)** If the *noise contour* value at a *building* site is more than 30, the mechanical ventilation system required by Sentence (1) shall be designed and installed in such a way that an *owner* or occupant of a *dwelling unit*, or *suite* used for *residential occupancy* need not make changes to the structure or dimensional changes to the ventilation system in order to install an air-conditioning system.

## 11.2.3. Typical Assemblies

### 11.2.3.1. Values for Building Components

**1)** Tables 11.2.3.1.A. to 11.2.3.1.D. may be used to determine the *acoustic insulation factor* for some typical construction materials and assemblies, including windows, doors, exterior walls and roofs.

**Table 11.2.3.1.A.**  
**Acoustic Insulation Factor for Various Types of Window Glazing**  
 Forming Part of Sentence 11.2.3.1.(1)

Acoustic Insulation Factor <sup>(1)(2)</sup>														Single Glazing Thick- ness, mm	Interpane Spacing, mm							
															Double Glazing <sup>(3)(4)</sup>						Triple Glazing <sup>(5)</sup>	
Window Area as a Percentage of Total Floor Area of Room or Space <sup>(6)</sup>															2 mm and 2 mm glass	3 mm and 3 mm glass	4 mm and 4 mm glass	3 mm and 6 mm glass	6 mm and 6 mm glass	3 mm, 3 mm and 3 mm glass	3 mm, 3 mm and 6 mm glass	
4	5	6	8	10	13	16	20	25	32	40	50	63	80	2	6							
35	34	33	32	31	30	29	28	27	26	25	24	23	22		13							
37	36	35	34	33	32	31	30	29	28	27	26	25	24	3	15	6						
38	37	36	35	34	33	32	31	30	29	28	27	26	25	4, 6	18	13	6					
39	38	37	36	35	34	33	32	31	30	29	28	27	26		22	16	13	6	6	6, 6		
40	39	38	37	36	35	34	33	32	31	30	29	28	27	9 <sup>(7)</sup>	28	20	16	13	13	6, 10	6, 6	
41	40	39	38	37	36	35	34	33	32	31	30	29	28		35	25	20	16	16	6, 15	6, 10	
42	41	40	39	38	37	36	35	34	33	32	31	30	29	12 <sup>(7)</sup>	42	32	25	20	20	6, 20	6, 15	
43	42	41	40	39	38	37	36	35	34	33	32	31	30		50	40	32	25	24	6, 30	6, 20	
44	43	42	41	40	39	38	37	36	35	34	33	32	31		63	50	40	32	30	6, 40	6, 30	
45	44	43	42	41	40	39	38	37	36	35	34	33	32		80	63	50	40	37	6, 50	6, 40	
46	45	44	43	42	41	40	39	38	37	36	35	34	33		100	80	63	55	50	6, 65	6, 50	
47	46	45	44	43	42	41	40	39	38	37	36	35	34		125	100	80	75	70	6, 80	6, 65	
48	47	46	45	44	43	42	41	40	39	38	37	36	35		150	125	100	95	90	6, 100	6, 80	
49	48	47	46	45	44	43	42	41	40	39	38	37	36			150	125	110	100		6, 100	
50	49	48	47	46	45	44	43	42	41	40	39	38	37				150	135	125			

**Notes to Table 11.2.3.1.A.:**

- (1) *Acoustic insulation factor* data listed in the Table are for well-fitted weatherstripped units that can be opened. The *acoustic insulation factor* values apply only when the windows are closed. For windows fixed and sealed to the frame, add 3 to the *acoustic insulation factor* given in the Table.
- (2) The *acoustic insulation factor* data listed in the Table are for typical windows, but details of glass mounting, window seals, etc. may result in slightly different performance for some manufacturers' products. If laboratory sound transmission loss data (conforming to ASTM test method E-90) are available, these may be used to calculate the *acoustic insulation factor*.
- (3) If the interpane spacing or glass thickness for a specified double-glazed window is not listed in the Table, the nearest listed values should be used.
- (4) For easy reference, glazing dimensions may be written in the form 2(100) to denote 2 mm glass (100 mm space) 2 mm glass.
- (5) If the interpane spacings for a specified triple-glazed window are not listed in the Table, use the listed case whose combined spacings are nearest to the actual combined spacing.
- (6) If the calculated percentage window area is not presented as a column heading, the nearest higher percentage column in the Table values should be used.
- (7) The *acoustic insulation factor* ratings for 9 mm and 12 mm glass are for laminated glass only; for solid glass subtract 2 from the *acoustic insulation factor* values listed in the Table.

**Table 11.2.3.1.B.**  
**Acoustic Insulation Factor for Exterior Wall Assemblies**  
 Forming Part of Sentence 11.2.3.1.(1)

Type of Exterior Wall <sup>(1)(2)</sup>	Percentage of Exterior Wall Area to Total Floor Area of Room or Space <sup>(3)</sup>										
	16	20	25	32	40	50	63	80	100	125	160
EW1 <sup>(4)</sup>	39	38	37	36	35	34	33	32	31	30	29
EW2	41	40	39	38	37	36	35	34	33	32	31
EW3	44	43	42	41	40	39	38	37	36	35	34
EW4	47	46	45	44	43	42	41	40	39	38	37
EW1R <sup>(5)</sup>	48	47	46	45	44	43	42	41	40	39	38
EW2R <sup>(5)</sup>	49	48	47	46	45	44	43	42	41	40	39
EW3R <sup>(5)</sup>	50	49	48	47	46	45	44	43	42	41	40
EW5	55	54	53	52	51	50	49	48	47	46	45
EW4R <sup>(5)</sup>	56	55	54	53	52	51	50	49	48	47	46
EW6 <sup>(6)</sup>	58	57	56	55	54	53	52	51	50	49	48
EW7 or EW5R <sup>(5)</sup>	59	58	57	56	55	54	53	52	51	50	49
EW8	63	62	61	60	59	58	57	56	55	54	53

**Notes to Table 11.2.3.1.B.:**

- (1) The common structure of walls EW1 to EW5 is composed of 12.7 mm gypsum board, vapour barrier, and 38 × 89 mm studs with 50 mm (or thicker) mineral wool or glass fibre batts in the inter-stud cavities.
- (2) EW1 denotes exterior wall as in Note (1), plus sheathing, plus wood siding or metal siding and fiber backer board.  
 EW2 denotes exterior wall as in Note (1), plus rigid insulation (25–50 mm), and wood siding or metal siding and fiber backer board.  
 EW3 denotes simulated mansard with structure as in Note (1), plus sheathing, 38 × 89 mm framing, sheathing, and asphalt roofing material.  
 EW4 denotes exterior wall as in Note (1), plus sheathing and 20 mm stucco.  
 EW5 denotes exterior wall as in Note (1), plus sheathing, 25 mm air space, 100 mm brick veneer.  
 EW6 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25–50 mm), 100 mm back-up block, 100 mm face brick.  
 EW7 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25–50 mm), 140 mm back-up block, 100 mm face brick.  
 EW8 denotes exterior wall composed of 12.7 mm gypsum board, rigid insulation (25–50 mm), 200 mm concrete.
- (3) If the calculated percentage of wall area is not presented as a column heading, the nearest higher percentage column in the Table should be used.
- (4) An exterior wall described in EW1 with the addition of rigid insulation (25–50 mm) between the sheathing and the external finish has the same *acoustic insulation factor* as EW2.
- (5) R signifies the mounting of the interior gypsum board on resilient clips.
- (6) An exterior wall conforming to rainscreen design principles and composed of 12.7 mm gypsum board, 100 mm concrete block, rigid insulation (25–50 mm), 25 mm air space, and 100 mm brick veneer has the same *acoustic insulation factor* as EW6.

**Table 11.2.3.1.C.**  
**Acoustic Insulation Factor for Roof-Ceiling Assemblies**  
 Forming Part of Sentence 11.2.3.1.(1)

Roof-Ceiling Combination <sup>(1)(2)(3)</sup>	Acoustic Insulation Factor
C1	41
C1R or C1D	44
C2 or C1DR	47
C3	49
C2D	50
C2DR	52

**Table 11.2.3.1.C. (Continued)**

**Notes to Table 11.2.3.1.C.:**

- (1) C1 denotes 12.7 mm gypsum board, 75 mm (or thicker) insulation batts, flat roof joist and beam construction, built-up roofing.  
C2 denotes 12.7 mm gypsum board, 75 mm (or thicker) insulation batts, typical wood roof truss with ventilated attic, sheathing and asphalt roofing.  
C3 denotes paint finish, 150 mm concrete slab, 50 mm (or thicker) rigid insulation, built-up roofing.
- (2) D signifies the addition of a second layer of 12.7 mm gypsum board.  
R signifies mounting the gypsum board on wood strapping or resilient clips.  
DR signifies the addition of a second layer of 12.7 mm gypsum board mounted on resilient clips.
- (3) Wherever possible, ventilation openings to attic spaces should be in locations not directly exposed to aircraft noise.

**Table 11.2.3.1.D.  
Acoustic Insulation Factor for Exterior Doors  
Forming Part of Sentence 11.2.3.1.(1)**

Type of Exterior Door <sup>(1)(2)(3)(4)</sup>	Percentage of Total Exterior Door Area to Total Floor Area of Room or Space <sup>(5)</sup>								
	4	5	6.3	8	10	12.5	16	20	25
D1	30	29	28	27	26	25	24	23	22
D2	34	33	32	31	30	29	28	27	26
D3	36	35	34	33	32	31	30	29	28
D4	37	36	35	34	33	32	31	30	29
DR or D1 - sd	38	37	36	35	34	33	32	31	30
D2 - sd	41	40	39	38	37	36	35	34	33
D3 - sd	43	42	41	40	39	38	37	36	35
D4 - sd	44	43	42	41	40	39	38	37	36
D5 - sd	45	44	43	42	41	40	39	38	37
D3 - D3	48	47	46	45	44	43	42	41	40
D5 - D5	50	49	48	47	46	45	44	43	42

**Notes to Table 11.2.3.1.D.:**

- (1) All exterior doors must be fully weatherstripped.
- (2) D1 denotes 44 mm hollow-core wood door (up to 20% of area glazed).  
D2 denotes 44 mm glass-fibre reinforced plastic door with foam or glass-fibre insulated core (up to 20% of area glazed).  
D3 denotes 35 mm solid slab wood door.  
D4 denotes 44 mm steel door with foam or glass-fibre insulated core.  
D5 denotes 44 mm solid slab door.
- (3) sd denotes storm door of wood or aluminum with openable glazed sections. The *acoustic insulation factor* values apply when the glazed sections are closed.
- (4) Except as noted specifically above, doors shall not have inset glazing.
- (5) If the calculated door area is not presented as a column heading, the nearest higher percentage in the column in the Table should be used.

## **Section 11.3. Objectives and Functional Statements**

### **11.3.1. Objectives and Functional Statements**

#### **11.3.1.1. Attribution to Acceptable Solutions**

**1)** For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b) of Division A, the objectives and functional statements attributed to the acceptable solutions in this Part shall be the objectives and functional statements listed in Subsection 4.2.9. of Division A. (See A-4.1.2.1.(1) in Appendix A of Division A.)



# Appendix A

## Explanatory Material

**A-1.1.3.1.(1) Climatic and Seismic Values.** Climatic values for municipalities not listed in Appendix C may be obtained by writing to the Meteorological Service of Canada, Environment Canada, 4905 Dufferin Street, Toronto, Ontario M3H 5T4.

Seismic values for municipalities not listed in Appendix C may be obtained through the Natural Resources Canada Web site at [www.EarthquakesCanada.ca](http://www.EarthquakesCanada.ca), or by writing to the Geological Survey of Canada at 7 Observatory Crescent, Ottawa, Ontario K1A 0Y3, or at P.O. Box 6000, Sidney, B.C. V8L 4B2.

**A-1.1.3.1.(2) Winter Design Temperatures.** The 2.5% values referred to in Sentence 1.1.3.1.(2) are the least restrictive temperatures that can be used. A designer may choose to use the 1% values given in Appendix C, which are in excess of the Code minimums but are considered acceptable.

**A-1.3.1.2.(1) Applicable Editions.** Where documents are referenced in Appendices A, B and C of this Code, they shall be the editions designated in Table A-1.3.1.2.(1).

**Table A-1.3.1.2.(1)**  
**Documents Referenced in Appendices A, B and C of the Alberta Building Code 2006**

Issuing Agency	Document Number	Title of Document	Code Reference
ANSI/ ASCE	8-03	Design of Cold Formed Stainless Steel Structural Members	A-4.3.4.2.(1)
ANSI/ ASHRAE	62-2001	Ventilation for Acceptable Indoor Air Quality	A-9.25.1.2.
ANSI/ ASME	B18.6.1-1981 (R2002)	Wood Screws (Inch Series)	A-9.23.3.1.(2)
ASTM	C 516-02	Vermiculite Loose Fill Thermal Insulation	A-9.25.2.4.(5)
ASTM	D 1037-99	Evaluating Properties of Wood-Base Fiber and Particle Panel Materials	A-9.23.14.2.(4)
ASTM	D 1143-81e1	Piles Under Static Axial Compressive Load	A-4.2.7.2.(2)
ASTM	E 336-05	Measurement of Airborne Sound Insulation in Buildings	A-9.11.1.1.(1)
ASTM	E 492-04	Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using The Tapping Machine	A-9.11.1.1.(1)
ASTM	E 597-95	Determining a Single Number Rating of Airborne Sound Insulation for Use in Multi-Unit Building Specifications	A-9.11.1.1.(1)
ASTM	E 1007-04e1	Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures	A-9.11.1.1.(1)
ASTM	F 476-84 (2002)	Security of Swinging Door Assemblies	A-9.6.8.10.(1)
CCBFC	NRCC 30629	Supplement to the National Building Code of Canada 1990	Appendix C

This Appendix is included for explanatory purposes only and does not form part of the requirements. The numbers that introduce each Appendix Note correspond to the applicable requirements in this Division.

**Table A-1.3.1.2.(1) (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
CCBFC	NRCC 35951	Guidelines for Application of Part 3 of the National Building Code of Canada to Existing Buildings	A-1.1.1.2.(1)
CCBFC	NRCC 48674	Alberta Fire Code 2006	A-1.1.1.2.(1) A-3.2.4.6.(2) A-3.2.7.8.(3) A-3.3. A-3.3.1.2.(1) A-3.3.1.7.(1) A-3.3.3.1.(1) B-3.2.6.
CCBFC	NRCC 47668	National Plumbing Code of Canada 2005	Appendix C
CCBFC	NRCC 38732	National Farm Building Code of Canada 1995	A-1.1.1.1.(5)(a) <sup>(1)</sup> A-Table 4.1.2.1.
CCBFC	NRCC 40383	User's Guide – NBC 1995, Fire Protection, Occupant Safety and Accessibility (Part 3)	A-1.1.1.2.(1)
CCBFC	NRCC 43963	User's Guide – NBC 1995, Application of Part 9 to Existing Buildings	A-1.1.1.2.(1)
CCBFC	NRCC 48192	User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B)	A-1.1.1.2.(1) A-4.1.1.3.(1) A-4.1.1.3.(2) A-4.1.2.1. A-4.1.2.1.(1) A-4.1.3. A-4.1.3.2.(2) A-4.1.3.2.(3) A-4.1.3.2.(4) A-4.1.3.3.(2) A-4.1.3.4.(1) A-4.1.3.5.(1) A-4.1.3.5.(3) A-4.1.3.6.(1) A-4.1.3.6.(2) A-4.1.3.6.(3) A-4.1.5.9. A-4.1.5.18. A-4.1.6.2. A-4.1.6.2.(4)(b) A-4.1.6.3.(2) A-4.1.6.4.(1) A-4.1.7.1.(1) to (3) A-4.1.7.1.(5)(a) to (c) A-4.1.7.1.(5)(d)

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**Table A-1.3.1.2.(1) (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
CCBFC	NRCC 48192 (continued)	User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B)	A-4.1.7.1.(6)(a) A-4.1.7.1.(6)(c) A-4.1.7.1.(6)(d) and 4.1.7.2.(1)(b) A-4.1.7.3.(1) A-4.1.8.2.(1) A-4.1.8.3.(4) A-4.1.8.3.(6) A-4.1.8.3.(7)(b) and (c) A-4.1.8.3.(8) A-4.1.8.4.(3) and Table 4.1.8.4.A. A-Table 4.1.8.5. A-Table 4.1.8.6. A-4.1.8.7.(1) A-4.1.8.9.(4) A-4.1.8.9.(5) A-4.1.8.11.(3) A-4.1.8.12.(1)(a) A-4.1.8.12.(1)(b) A-4.1.8.12.(3) A-4.1.8.12.(4)(a) A-4.1.8.13.(4) A-4.1.8.15.(1) A-4.1.8.15.(2) A-4.1.8.15.(3) A-4.1.8.15.(4) A-4.1.8.15.(5) A-4.1.8.16.(1) A-4.1.8.16.(3)(a) A-4.1.8.16.(4) A-4.1.8.16.(5)(a) A-4.1.8.16.(7) A-4.1.8.17.(8)(f) A-4.2.4.1.(3) A-4.2.4.1.(5) A-4.2.5.1.(1) A-4.2.6.1.(1) A-4.2.7.2.(1) A-5.1.4.2. Appendix C
CGSB	CAN/CGSB-7.2-94	Adjustable Steel Columns	A-9.17.3.4.
CGSB	CAN/CGSB-12.20-M89	Structural Design of Glass for Buildings	A-9.7.3.2.(1)
CGSB	CAN/CGSB-71.26-M88	Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems	Table A-9.23.4.2.(2)C.
CGSB	CAN/CGSB-93.1-M85	Sheet, Aluminum Alloy, Prefinished, Residential	A-9.27.12.1.(3) and (4)
CGSB	CAN/CGSB-93.2-M91	Prefinished Aluminum Siding, Soffits and Fascia for Residential Use	A-9.27.12.1.(3) and (4)
CMHC	1993	Testing of Fresh Air Mixing Devices	A-9.32.3.4.
CMHC	1988	Air Permeance of Building Materials	A-5.4.1.2.(1) and (2) Table A-9.25.1.2.B.
CSA	CAN/CSA-A23.1-04	Concrete Materials and Methods of Concrete Construction	A-9.3.1.7.

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**Table A-1.3.1.2.(1) (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
CSA	A23.3-04	Design of Concrete Structures	A-4.1.3.2.(3) A-4.3.3.1.(1)
CSA	CAN/CSA-A23.4-00	Precast Concrete – Materials and Construction	A-4.3.3.1.(1)
CSA	A82.31-M1980	Gypsum Board Application	Table A-9.10.3.1.A. Table A-9.10.3.1.B.
CSA	CAN/CSA-A277-01	Procedure for Certification of Factory-Built Houses	A-1.1.1.1.(2) <sup>(1)</sup>
CSA	A370-04	Connectors for Masonry	A-9.21.4.5.(2)
CSA	CAN/CSA-A440-00	Windows	A-9.7.2.1.(1)
CSA	CAN/CSA-A440.1-00	User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows	A-9.7.2.1.(1)
CSA	CAN/CSA-B365-01	Installation Code for Solid-Fuel-Burning Appliances and Equipment	A-9.33.1.1.(2) A-9.33.5.3.
CSA	C22.1-02	Canadian Electrical Code, Part I	A-3.1.4.3.(1)(b)(i)
CSA	CAN/CSA-C282-05	Emergency Electrical Power Supply for Buildings	A-3.2.7.6.(1)
CSA	CAN/CSA-F326-M91 (R2005)	Residential Mechanical Ventilation Systems	A-6.2.2.2.(1) A-9.32.3.1.(1) A-9.32.3.5. A-9.32.3.7. A-9.32.3.8. A-9.33.6.14.
CSA	CAN/CSA-O86-01 (Including Supplement CAN/CSA-O86S1-05)	Engineering Design in Wood	A-9.15.2.4.(1) A-9.23.4.2.
CSA	CAN/CSA-O141-05	Softwood Lumber	A-9.3.2.1.(1)
CSA	O437.0-93	OSB and Waferboard	A-9.23.14.4.(2)
CSA	CAN/CSA-S6-00	Canadian Highway Bridge Design Code	A-Table 4.1.5.10.
CSA	CAN/CSA-S16-01 (Including Supplement CAN/CSA-S16S1-05)	Limit States Design of Steel Structures	A-4.1.5.12. A-4.3.4.1.(1)
CSA	S304.1-04	Design of Masonry Structures	A-5.1.4.1.(5)(b) and (c)
CSA	CAN/CSA-S406-92 (R2003)	Construction of Preserved Wood Foundations	A-9.15.2.4.(1)
CSA	CAN/CSA-Z32-04	Electrical Safety and Essential Electrical Systems in Health Care Facilities	A-3.2.7.6.(1)
CSA	CAN/CSA-Z240 MH Series-92 (R2001)	Mobile Homes	A-1.1.1.1.(2) <sup>(1)</sup>
CWC	2004	The Span Book	A-9.23.4.2.
CWC	2004	Engineering Guide for Wood Frame Construction	A-9.4.1.1. A-9.4.1.1.(3)
FCC	Project 43-10C-024 (1988)	Deflection Serviceability Criteria for Residential Floors	A-9.23.4.2.(2)
FM Global	Data Sheet 2-2 (2002)	Installation Rules for Suppression Mode Automatic Sprinklers	A-3.2.5.13.(7)
HC	H46-2/90-156E	Exposure Guidelines for Residential Indoor Air Quality	Table A-9.25.1.2.B.

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**Table A-1.3.1.2.(1) (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
HC	2004	Fungal Contamination in Public Buildings: A Guide to Recognition and Management	A-5.5.1.1.
IRC	BPN 61	Shear Resistance of Wood Frame Walls	A-9.23.10.2.
IRC	CBD 222	Airtight Houses and Carbon Monoxide Poisoning	A-9.33.1.1.(2)
IRC	CBD 230	Applying Building Codes to Existing Buildings	A-1.1.1.2.(1)
IRC	CBD 231	Moisture Problems in Houses	A-9.25.3.1.(1)
IRC	1988	Performance and Acceptability of Wood Floors – Forintek Studies	A-9.23.4.2.(2)
ISO	7731:2003 (E)	Ergonomics – Danger signals for public and work areas – Auditory danger signals	A-3.2.4.21.(1)(b)
ISO	8201:1987 (E)	Acoustics – Audible emergency evacuation signal	A-3.2.4.18.(2)
NFPA	2001	Fire Protection Guide to Hazardous Materials	A-6.2.2.5.(1)
NFPA	2003	Fire Protection Handbook, Nineteenth Edition	A-3.2.2.2.(1) A-3.6.2.7.(5)
NFPA	13-2002	Installation of Sprinkler Systems	A-3.2.4.9.(2)(f) A-3.2.5.13.(1) A-3.2.5.13.(6) A-3.2.5.13.(7) A-3.2.5.14.(1) A-3.2.8.2.(3)
NFPA	13D-2002	Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes	A-3.2.5.13.(6) A-3.2.5.13.(7) A-3.2.5.14.(1)
NFPA	13R-2002	Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height	A-3.2.5.13.(6) A-3.2.5.13.(7) A-3.2.5.14.(1)
NFPA	20-2003	Installation of Stationary Pumps for Fire Protection	A-3.2.4.9.(2)(f) A-3.2.5.19.(1)
NFPA	30-2003	Flammable and Combustible Liquids Code	A-6.2.2.5.(1)
NFPA	30A-2003	Motor Fuel Dispensing Facilities and Repair Garages	A-6.2.2.5.(1)
NFPA	32-2004	Drycleaning Plants	A-6.2.2.5.(1)
NFPA	33-2003	Spray Application Using Flammable or Combustible Materials	A-6.2.2.5.(1)
NFPA	34-2003	Dipping and Coating Processes Using Flammable or Combustible Liquids	A-6.2.2.5.(1)
NFPA	35-2005	Manufacture of Organic Coatings	A-6.2.2.5.(1)
NFPA	36-2004	Solvent Extraction Plants	A-6.2.2.5.(1)
NFPA	40-2001	Storage and Handling of Cellulose Nitrate Film	A-6.2.2.5.(1)
NFPA	50A-1999	Gaseous Hydrogen Systems at Consumer Sites	A-6.2.2.5.(1)
NFPA	50B-1999	Liquefied Hydrogen Systems at Consumer Sites	A-6.2.2.5.(1)
NFPA	51-2002	Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes	A-6.2.2.5.(1)
NFPA	51A-2001	Acetylene Cylinder Charging Plants	A-6.2.2.5.(1)

Table A-1.3.1.2.(1) (Continued)

Issuing Agency	Document Number	Title of Document	Code Reference
NFPA	61-2002	Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities	A-3.3.5.19.(2) A-6.2.2.5.(1)
NFPA	65-1993	Processing and Finishing of Aluminum	A-3.3.5.19.(2)
NFPA	68-2002	Venting of Deflagrations	A-3.6.2.7.(5) A-6.2.2.5.(1)
NFPA	69-2002	Explosion Prevention Systems	A-3.6.2.7.(5) A-6.2.2.5.(1)
NFPA	80-1999	Fire Doors and Fire Windows	A-3.1.8.1.(2) A-3.2.8.2.(3)
NFPA	80A-2001	Protection of Buildings from Exterior Fire Exposures	A-3
NFPA	81-1995	Fur Storage, Fumigation and Cleaning	A-6.2.2.5.(1)
NFPA	85-2004	Boiler and Combustion Systems Hazards Code	A-6.2.2.5.(1)
NFPA	86-2003	Ovens and Furnaces	A-6.2.2.5.(1)
NFPA	88A-2002	Parking Structures	A-6.2.2.5.(1)
NFPA	91-2004	Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids	A-3.3.5.19.(2) A-6.2.2.5.(1)
NFPA	96-2004	Ventilation Control and Fire Protection of Commercial Cooking Operations	A-3.3.1.2.(2) A-6.2.2.5.(1) A-9.10.1.3.(1)
NFPA	120-2004	Coal Preparation Plants	A-3.3.5.19.(2)
NFPA	204-2002	Smoke and Heat Venting	A-6.2.2.5.(1)
NFPA	303-2000	Marinas and Boatyards	A-6.2.2.5.(1)
NFPA	307-2000	Construction and Fire Protection of Marine Terminals, Piers, and Wharfs	A-6.2.2.5.(1)
NFPA	409-2004	Aircraft Hangars	A-6.2.2.5.(1)
NFPA	415-2002	Airport Terminal Buildings, Fueling, Ramp Drainage, Loading Walkways	A-6.2.2.5.(1)
NFPA	480-1998	Storage, Handling and Processing of Magnesium	A-3.3.5.19.(2)
NFPA	481-2000	Production, Processing, Handling and Storage of Titanium	A-3.3.5.19.(2)
NFPA	482-1996	Production, Processing, Handling and Storage of Zirconium	A-3.3.5.19.(2)
NFPA	484-2002	Combustible Metals, Metal Powders, and Metal Dusts	A-6.2.2.5.(1)
NFPA	650-1998	Pneumatic Conveying Systems for Handling Combustible Materials	A-3.3.5.19.(2)
NFPA	651-1998	Manufacture of Aluminum or Magnesium Powder	A-3.3.5.19.(2)
NFPA	654-2000	Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical and Plastics Industries	A-3.3.5.19.(2) A-6.2.2.5.(1)
NFPA	655-2001	Prevention of Sulfur Fires and Explosions	A-3.3.5.19.(2) A-6.2.2.5.(1)
NFPA	664-2002	Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities	A-3.3.5.19.(2) A-6.2.2.5.(1)
NFPA	1142-2001	Water Supplies for Suburban and Rural Fire Fighting	A-3.2.5.7.

**Table A-1.3.1.2.(1) (Continued)**

Issuing Agency	Document Number	Title of Document	Code Reference
NFPA	1710-2004	Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments	A-3.2.3.1.(8)
NLGA	2004	Standard Grading Rules for Canadian Lumber (Interpretation Included)	A-9.3.2.1.(1) Table A-9.3.2.1.(1)A. A-9.3.2.8.(1) A-9.23.10.4.(1)
NLGA	SPS-1-2004	Fingerjoined Structural Lumber	A-9.23.10.4.(1)
NLGA	SPS-3-2004	Fingerjoined "Vertical Stud Use Only" Lumber	A-9.23.10.4.(1)
NRCA	5th Edition	Roofing and Waterproofing Manual	A-5.6.2.1.
OMMAH		Supplementary Guidelines to the 1997 Ontario Building Code	A-9.8.8.2.
ONHWP	1993	Details of Air Barrier Systems for Houses	Table A-9.25.1.2.B.
ONHWP	1995	High-Rise Residential Construction Guide	A-5.6.2.1.
SMACNA	6th Edition	Architectural Sheet Metal Manual	A-5.6.2.1.
TC		Transportation of Dangerous Goods Act and its Regulations	A-3.3.1.2.(1)
UL	ANSI/UL-199 (2003)	Automatic Sprinklers for Fire-Protection Service	A-3.2.5.13.(7)
UL	ANSI/UL-1626 (2003)	Residential Sprinklers for Fire-Protection Service	A-3.2.5.13.(7)
ULC	CAN/ULC-S101-04	Fire Endurance Tests of Building Construction and Materials	A-3.1.5.12.(2)(e) B-3.2.6.5.(6)(b)
ULC	CAN/ULC-S112-M90 (R2001)	Fire Test of Fire-Damper Assemblies	Table B-3.2.6.6.C.
ULC	CAN4-S113-79 (R2000)	Wood Core Doors Meeting the Performance Required by CAN4-S104-77 for Twenty Minute Fire Rated Closure Assemblies	A-9.10.13.2.(1)
ULC	CAN4-S124-M85 (R2000)	Test for the Evaluation of Protective Coverings for Foamed Plastic	A-3.1.5.12.(2)(e)
ULC	ULC-S332-93 (R1998)	Burglary Resisting Glazing Material	A-9.6.8.1.
ULC	CAN/ULC-S524-01	Installation of Fire Alarm Systems	A-3.2.4.18.(10)
ULC	ULC-S526-02	Visible Signal Devices for Fire Alarm Systems	A-3.2.4.19.(1)
ULC	CAN/ULC-S702-97	Mineral Fibre Thermal Insulation for Buildings	A-5.10.1.1.(1)
WCLIB	No. 17 (2004)	Standard Grading Rules	A-Table 9.3.2.1.
WWPA	2004	Western Lumber Grading Rules	A-Table 9.3.2.1.

**Notes to Table A-1.3.1.2.(1):**

(1) Code reference is in Division A.

**A-3 Application of Part 3.** In applying the requirements of this Part, it is intended that they be applied with discretion to buildings of unusual configuration that do not clearly conform to the specific requirements, or to buildings in which processes are carried out which make compliance with particular requirements in this Part impracticable. The definition of “building” as it applies to this Code is general and encompasses most structures, including those which would not normally be considered as buildings in the layman’s sense. This occurs more often in industrial uses, particularly those involving manufacturing facilities and equipment that require specialized design that may make it impracticable to follow the specific requirements of this Part. Steel mills, aluminum plants, refining, power generation and liquid storage facilities are examples. A water tank or an oil refinery, for example, has no floor area, so it is obvious that requirements for exits from floor areas would not apply. Requirements for structural fire protection in large steel mills and pulp and paper mills, particularly in certain portions, may not be practicable to achieve in terms of the construction normally used and the operations for which the space is to be used. In other portions of the same building, however, it may be quite reasonable to require that the provisions of this Part be applied (e.g., the office portions). Similarly, areas of industrial occupancy which may be occupied only periodically by service staff, such as equipment penthouses, normally would not need to have the same type of exit facility as floor areas occupied on a continuing basis. It is expected that judgment will be exercised in evaluating the application of a requirement in those cases when extenuating circumstances require special consideration, provided the occupants’ safety is not endangered.

The provisions in this Part for fire protection features installed in buildings are intended to provide a minimum acceptable level of public safety. It is intended that all fire protection features of a building, whether required or not, will be designed in conformance with good fire protection engineering practice and will meet the appropriate installation requirements in relevant standards. Good design is necessary to ensure that the level of public safety established by the Code requirements will not be reduced by a voluntary installation.

### Firefighting Assumptions

The requirements of this Part are based on the assumption that firefighting capabilities are available in the event of a fire emergency. These firefighting capabilities may take the form of a paid or volunteer public fire department or in some cases a private fire brigade. If these firefighting capabilities are not available, additional fire safety measures may be required.

Firefighting capability can vary from municipality to municipality. Generally, larger municipalities have greater firefighting capability than smaller ones. Similarly, older, well established municipalities may have better firefighting facilities than newly formed or rapidly growing ones. The level of municipal fire protection considered to be adequate will normally depend on both the size of the municipality (i.e., the number of buildings to be protected) and the size of buildings within that municipality. Since larger buildings tend to be located in larger municipalities, they are generally, but not always, favoured with a higher level of municipal protection.

Although it is reasonable to consider that some level of municipal firefighting capability was assumed in developing the fire safety provisions in Part 3, this was not done on a consistent or defined basis. The requirements in the Code, while developed in the light of commonly prevailing municipal fire protection levels, do not attempt to relate the size of building to the level of municipal protection. The responsibility for controlling the maximum size of building to be permitted in a municipality in relation to local firefighting capability rests with the municipality. If a proposed building is too large, either in terms of floor area or building height, to receive reasonable protection from the municipal fire department, fire protection requirements in addition to those prescribed in this Code, may be necessary to compensate for this deficiency. Automatic sprinkler protection may be one option to be considered.

Alternatively, the municipality may, in light of its firefighting capability, elect to introduce zoning restrictions to ensure that the maximum building size is related to available municipal fire protection facilities. This is, by necessity, a somewhat arbitrary decision and should be made in consultation with the local firefighting service, who should have an appreciation of their capability to fight fires.

The requirements of Subsection 3.2.3. are intended to prevent fire spread from thermal radiation assuming there is adequate firefighting available. It has been found that periods of from 10 to 30 minutes usually elapse between the outbreak of fire in a building that is not protected with an automatic sprinkler system and the attainment of high radiation levels. During this period, the specified spatial separations should prove adequate to inhibit ignition of an exposed building face or the interior of an adjacent building by radiation. Subsequently, however, reduction of the fire intensity by firefighting and the protective wetting of the exposed building face will often be necessary as supplementary measures to inhibit fire spread.

In the case of a building that is sprinklered throughout, the automatic sprinkler system should control the fire to an extent that radiation to neighbouring buildings should be minimal. Although there will be some radiation effect on a sprinklered building from a fire in a neighbouring building, the internal sprinkler system should control any fires that might be ignited in the building and thereby minimize the possibility of the fire spreading into the exposed building. NFPA 80A, "Protection of Buildings from Exterior Fire Exposures," provides additional information on the possibility of fire spread at building exteriors.

The water supply requirements for fire protection installations depend on the requirements of any automatic sprinkler installations and also on the number of fire streams that may be needed at any fire, having regard to the length of time the streams will have to be used. Both these factors are largely influenced by the conditions at the building to be equipped, and the quantity and pressure of water needed for the protection of both the interior and exterior of the building must be ascertained before the water supply is decided upon. Acceptable water supplies may be a public waterworks system that has adequate pressure and discharge capacity, automatic fire pumps, pressure tanks, manually controlled fire pumps in combination with pressure tanks, gravity tanks, and manually controlled fire pumps operated by remote control devices at each hose station.

**A-3.1.2. Use Classification.** The purpose of classification is to determine which requirements apply. This Code requires classification in accordance with every major occupancy for which the building is used or intended to be used. Where necessary, an application clause has been inserted in this Part to explain how to choose between the alternative requirements which multiple occupancy classification may present.

**A-3.1.2.1.(1) Major Occupancy Classification.** The following are examples of the major occupancy classifications described in Table 3.1.2.1.:

**Group A, Division 1**

- Motion picture theatres
- Opera houses
- Television studios admitting a viewing audience
- Theatres, including experimental theatres

**Group A, Division 2**

- Art galleries
- Auditoria
- Bowling alleys
- Churches and similar places of worship
- Clubs, non-residential
- Community halls
- Courtrooms
- Dance halls
- Exhibition halls (other than classified in Group E)
- Gymnasias
- Lecture halls
- Libraries
- Licensed beverage establishments
- Museums
- Passenger stations and depots
- Recreational piers
- Restaurants
- Schools and colleges, non-residential
- Undertaking premises

**Group A, Division 3**

- Arenas
- Indoor swimming pools, with or without spectator seating
- Rinks

**Group A, Division 4**

- Amusement park structures (not elsewhere classified)
- Bleachers
- Grandstands
- Reviewing stands
- Stadia

**Group B, Division 1**

- Jails
- Penitentiaries
- Police stations with detention quarters
- Prisons
- Psychiatric hospitals with detention quarters
- Reformatories with detention quarters

**Group B, Division 2**

- Children's custodial homes
- Convalescent homes
- Hospitals
- Infirmaries
- Nursing homes
- Orphanages
- Psychiatric hospitals without detention quarters
- Reformatories without detention quarters
- Sanitoria without detention quarters

**Group C**

- Apartments
- Boarding houses
- Clubs, residential
- Colleges, residential
- Convents
- Dormitories
- Hotels
- Houses
- Lodging houses
- Monasteries
- Motels
- Schools, residential

**Group D**

- Banks
- Barber and hairdressing shops
- Beauty parlours
- Dental offices
- Dry cleaning establishments, self-service, not using flammable or explosive solvents or cleaners
- Laundries, self-service
- Medical offices
- Offices
- Police stations without detention quarters
- Radio stations
- Small tool and appliance rental and service establishments

**Group E**

- Department stores
- Exhibition halls
- Markets
- Shops
- Stores
- Supermarkets

**Group F, Division 1**

- Bulk plants for flammable liquids
- Bulk storage warehouses for hazardous substances
- Cereal mills
- Chemical manufacturing or processing plants
- Distilleries
- Dry cleaning plants
- Feed mills
- Flour mills
- Grain elevators

- Lacquer factories
- Mattress factories
- Paint, varnish and pyroxylin product factories
- Rubber processing plants
- Spray painting operations
- Waste paper processing plants

**Group F, Division 2**

- Aircraft hangars
- Box factories
- Candy plants
- Cold storage plants
- Dry cleaning establishments not using flammable or explosive solvents or cleaners
- Electrical substations
- Factories
- Freight depots
- Helicopter landing areas on roofs
- Laboratories
- Laundries, except self-service
- Mattress factories
- Planing mills
- Pre-packaged Agricultural Chemical Warehouses
- Printing plants
- Repair garages
- Salesrooms
- Service stations
- Storage rooms
- Television studios not admitting a viewing audience
- Warehouses
- Wholesale rooms
- Woodworking factories
- Workshops

**Group F, Division 3**

- Creameries
- Factories
- Laboratories
- Power plants
- Salesrooms
- Sample display rooms
- Storage garages, including open air parking garages
- Storage rooms
- Warehouses
- Workshops

**A-3.1.2.3.(1) Arenas.** An arena-type building intended for occasional use for trade shows and similar exhibition purposes shall be classified as a Group A, Division 3 occupancy and where the building area of such building exceeds 1 500 m<sup>2</sup>, the building shall be sprinklered. To be considered as “occasional use,” more than two but fewer than ten trade shows or similar type exhibitions are to be held in the arena-type building during one calendar year.

**A-3.1.4.2.(1)(c) Thermal Barrier in Combustible Construction.** Any thermal barrier that is accepted under the requirements of Sentence 3.1.5.12.(2) for noncombustible construction is also acceptable for combustible construction.

**A-3.1.4.3.(1)(b)(i) Raceway Definition.** The term raceway is defined in CSA C22.1, “Canadian Electrical Code, Part I,” and includes both rigid and flexible conduit.

**A-3.1.4.3.(1) Wire and Cable Equivalence.** Electrical wires and cables that conform to the requirements of Sentence 3.1.5.18.(1) are deemed to satisfy the requirements of Sentence 3.1.4.3.(1).

**A-3.1.5.4.(1) Skylight Spacing.** The minimum spacing dimensions for skylight assemblies are based on the distance that flame must travel along a flat ceiling surface. If ceilings have projecting beams or other features that would increase the distance the flame would have to travel along the surface, the distances specified may be measured accordingly.

**A-3.1.5.5.(1) Combustible Cladding.** These requirements allow for exterior wall assemblies incorporating combustible cladding elements on buildings of noncombustible construction. Since the tested assemblies must be representative of actual construction, the performance of the entire assembly is assessed with regard to its ability to resist flame propagation up the outside of a building. The thermal barrier protection limits the impact of an interior fire on the wall assembly.

These requirements, in combination, thus allow for wall assemblies containing both combustible cladding elements and non-loadbearing combustible framing members. These wall assemblies can be used as infill or panel type walls between structural elements, or attached directly to a loadbearing noncombustible structural system. These requirements, however, do not waive others specifically intended for the protection of combustible insulation in buildings of noncombustible construction.

These requirements are predicated upon the assumption that the manufacturing process and field installation procedure are both carried out under an independent quality assurance program designed to confirm that the product and its application are consistent with the system as tested.

**A-3.1.5.5.(2) Flame-Spread Distance.** The maximum flame-spread distance refers to the distance between the top of the opening and the highest observable instance of flaming along the wall assembly and thus allows intermittent flaming to a height of 5 m above the opening.

**A-3.1.5.5.(3) Heat Flux Measurement.** The heat flux to the assembly referred to in Sentence 3.1.5.5.(3) is the maximum one-minute averaged heat flux measured by transducers located 3.5 m above the top of the opening. The intent of this criterion is to limit the spread of fire on the wall assembly to a height of 3.5 m above the opening. Since the exact location of flaming on the exterior surface of a wall assembly can be influenced by the presence of furring strips, cavities, etc., in the assembly, which could channel the flame away from a heat flux transducer, sufficient transducers should be located at any given height to intercept any flaming that could occur along the assembly. The exact position of the transducers will depend on the location of cavities, joints, studs or furring strips in the assembly.

**A-3.1.5.12.(2)(e) Foamed Plastic Insulation Protection.** The standard fire exposure temperature in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," is the same as in CAN4-S124-M, "Test for the Evaluation of Protective Coverings for Foamed Plastic." A thermal barrier that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," will not exceed an average temperature rise of 140°C on its unexposed face after a period of 10 min satisfies this requirement.

**A-3.1.5.18.(1) Wire and Cable Flammability.** In regulating the flammability characteristics of electrical wires and cables installed in a building, it is intended that the requirements of this Sentence and of other similar Sentences in the Code apply to wires and cables that are essentially a part of the distribution systems for power or communications. These distribution systems will normally include branch circuits that terminate at an outlet box in the space to be served and at that location cable terminators or plugs for individual items of equipment will be plugged in.

**A-3.1.6. Tents and Air-Supported Structures.** The requirements in this Subsection are intended to be limited to certain types of structure. For instance, the word "tent" as used in the Code is intended to refer to a temporary shelter which is used at an open air event such as a fair or an exhibition. A tent will normally be constructed of a fabric held up by poles and attached to the ground by ties. The requirements for tents, however, are not intended to be applied to fabric structures located on buildings.

The term "air-supported structure," as used in the Code, refers to an envelope which is held up by air pressure alone and which is erected on the ground or above a basement. The structure will usually require ballast or a positive ground anchorage system around the entire perimeter to secure it to the ground or basement. To reinforce this intent, the Code prohibits the location of an air-supported structure above the first storey of any building.

The requirements of Subsection 3.1.6. are not intended to apply to air-supported roof assemblies on buildings, such as domed stadia, or to other types of air-supported structures, such as those over swimming pools situated on the roofs of buildings, which would not be anchored at or near ground level. These assemblies or structures are normally designed and evaluated on the basis of equivalents as permitted by Article 1.2.1.1. of Division A.

**A-3.1.8.1.(1)(b) Barrier to Control Smoke Spread.** Although a fire separation is not always required to have a fire-resistance rating, the fire separation should act as a barrier to the spread of smoke and fire until some response is initiated. If the fire-resistance rating of a fire separation is waived on the basis of the presence of an automatic sprinkler system, it is intended that the fire separation will be constructed so that it will remain in place and act as a barrier against the spread of smoke for a period of time until the sprinklers have actuated and controlled the fire.

**A-3.1.8.1.(2) Installation of Closures.** Although there is no explicit performance statement in the Alberta Building Code that means of egress should be free of smoke, it is the intent that during the period when occupants are using a means of egress to evacuate from a floor area, the smoke contamination should not reach levels that would inhibit movement to the exit. This is particularly critical for persons with disabilities, who may not move at the same rate as other persons and who could be more susceptible to the effects of smoke contamination. NFPA 80, "Fire Doors and Fire Windows," requires that a fire door protecting a means of egress be designed to minimize the possibility of smoke passing through the opening.

Although self-closing devices are not required for all doors in a fire separation (see Article 3.1.8.11.), it is assumed that in a fire situation every door in a fire separation is closed. Article 3.3.3.5. prohibits grilles and similar openings for certain doors in hospitals and nursing homes.

Although fire dampers that release on the fusion of a fusible link will help to control the spread of fire, a substantial quantity of smoke could have passed through the opening before that event. They are frequently located below the upper levels of a room and so the release of the fusible link of the fire damper that protects an opening will be delayed until the temperature at the level of the opening becomes high enough to fuse the link.

Similar concern has to be considered for other closure devices that are permitted to remain open on fusible links, and their location should be restricted in accordance with NFPA 80, "Fire Doors and Fire Windows," and the Alberta Building Code, except where their installation in another location will not allow the products of combustion to spread into means of egress.

**A-3.1.8.3.(4) Fire Separation Continuity.** The continuity of a fire separation where it abuts against another fire separation, a floor, a ceiling or an exterior wall assembly is maintained by filling all openings at the juncture of the assemblies with a material that will ensure the integrity of the fire separation at that location.

**A-3.1.8.9.(5) Fire Damper Access.** It is intended that an access door be provided in the duct and, if the duct is enclosed with an architectural finish, that a second access door be provided through that finish.

**A-3.1.8.16.(1) Wired Glass and Glass Block.** The permission to include wired glass and glass block in doors and fire separations between an exit and the adjacent floor area does not permit the inclusion of those items in fire separations between exits and other parts of the building that are not included in the floor area. Examples include other exit facilities and vertical service spaces, including those used for building services and elevator hoistways.

**A-3.1.8.17.(1) Fire-Protection Rating for Doors.** The provisions in Articles 3.1.8.15., 3.1.8.16. and 3.1.8.17. do not waive a requirement for a door to have a fire-protection rating. To achieve this rating in a door test, it may be necessary to limit the area of glass in the door. If this area is less than the area limits of Article 3.1.8.16., it is the governing criterion. Conversely, if the area limits of Article 3.1.8.16. are less than the area required to achieve a fire-protection rating, then the area limits of this Article govern.

**A-3.1.9. Service Penetrations.** In the application of Subsection 3.1.9., a building service is considered to penetrate an assembly if it passes into or through the assembly. In some situations a service item enters an assembly through a membrane at one location, runs within the assembly, and then leaves the assembly through a membrane at another location.

**A-3.1.9.1.(1)(b) Service Penetration.** The intention behind the use of the term "cast in place" is to reinforce that there are to be no gaps between the building service and the membrane it penetrates. The term "cast in place" describes a typical means of fire stopping for a service penetration through a concrete slab or wall.

**A-3.1.9.2.(1) Penetration of Fire Separations by Electrical Boxes.** The provisions dealing with outlet boxes assume size, quantities and concentrations of partial depth penetrations that would not significantly affect the fire resistance of the assembly, including the temperature rise on the unexposed side of a wall. Sentence 3.1.9.2.(1) is not intended to allow large electrical distribution and control boxes to be recessed into an assembly required to have a fire-resistance rating unless they were incorporated in the assembly at the time of testing.

**A-3.1.10.2.(4) Firewall Construction.** Inherent in the use of a firewall is the intent that this specialized wall construction provide the required fire-resistance rating while also being designed to resist physical damage—arising out of normal use—that would compromise the rating of the assembly. Traditionally, this has been accomplished by prescribing the use of noncombustible materials, which was in fact restricted to concrete or masonry. Sentences 3.1.10.2.(3) and (4) are intended to retain both of the characteristics of firewalls, while permitting greater flexibility in the use of materials and designs. The fire-resistance rating and damage protection attributes of a firewall may be provided by a single fire- and damage-resistant material such as concrete or masonry, by a fire- and damage-resistant membrane on a structural frame, or by separate components—one that provides the fire-resistance rating and another one that protects the firewall against damage.

If the firewall is composed of separate components, the fire-resistance rating of the fire-resistive component needs to be determined for this assembly on its own. In addition, if the damage protection component is physically attached to the fire-resistive component (for example, as a sacrificial layer), then for the purposes of determining the overall performance of the assembly, it is also necessary to determine through testing whether failure of the damage protection component during a fire affects the performance of the fire-resistive component.

**A-3.1.11.5.(1) Fire Stopping in Combustible Construction.** Combustible construction referred to in Sentence 3.1.11.5.(1) includes all types of construction that do not comply with the requirements for noncombustible construction. All the elements within the concealed space can be combustible, unless required to be of noncombustible materials (e.g., certain categories of pipework and ducts), but the value of the flame-spread rating of the combustible materials determines the permitted extent of the concealed space between fire stops. The materials to be considered include all construction materials regulated by this Code, including the framing and building services that are located in the concealed space.

**A-3.1.11.7.(7) Fire Stopping.** Figure A-3.1.11.7.(7) shows the location of the semi-rigid fibre insulation board at the intersection between walls and floors in wood-frame construction. The figure is intended to illustrate the fire stopping detail and not a design of a fire separation.

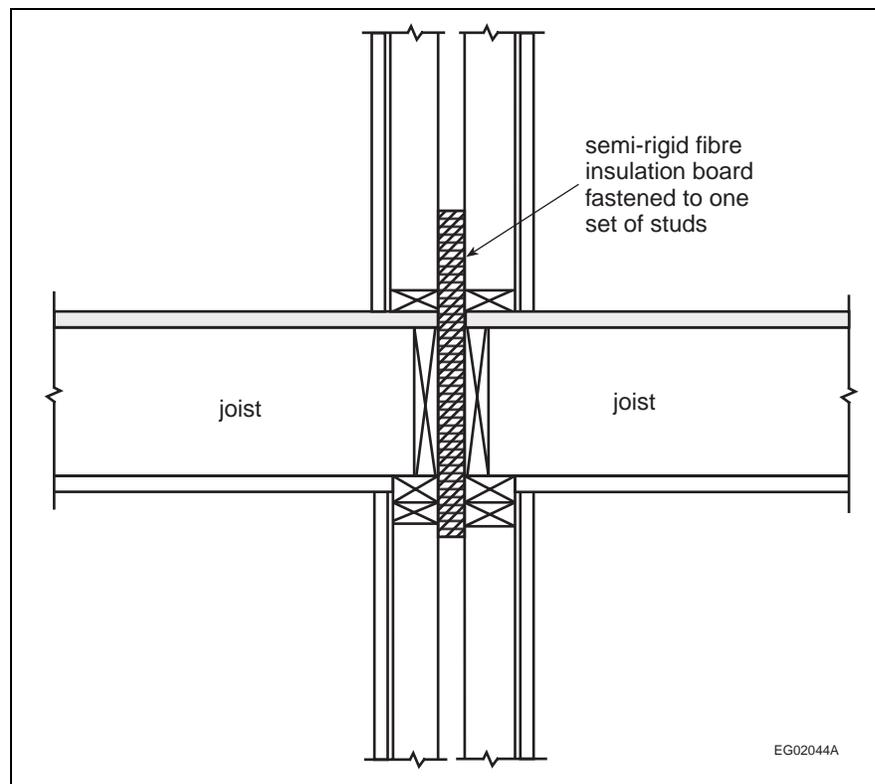


Figure A-3.1.11.7.(7)  
Fire stopping

**A-3.1.13.2.(2) Folding Partition.** Folding partitions used to divide a space into separate rooms are not considered as doors for the purposes of this Sentence.

**A-3.2.1.1.(3)(a) Mezzanine Area.** The permitted area of the mezzanine for the purposes of determining the allowable percentage is to be based on the open area of the floor of the space in which the mezzanine is located. The Code does not restrict the enclosing of space below the mezzanine but the enclosed area must be deducted from the area of the overall space before applying the percentage allowance.

**A-3.2.1.1.(8) Accessible Service Space.** These service spaces are often referred to as interstitial spaces and are designed to allow service personnel to enter and undertake maintenance or installation within the space. Catwalks or flooring are usually included to provide a walking or access surface. Even when flooring is included, it is not intended that the interstitial space should be considered as a storey for the purposes of the Code unless the space is used for purposes other than servicing or the storage of materials and equipment to be used for building services within that space.

**A-3.2.2.2.(1) Special and Unusual Structures.** Examples of structures which cannot be identified with the descriptions of buildings in Articles 3.2.2.20. to 3.2.2.83. include grain elevators, refineries and towers. Publications that may be consulted to establish good engineering practice for the purposes of Article 3.2.2.2. include the NFPA Fire Protection Handbook, Factory Mutual Data Sheets, and publications of the Society for Fire Protection Engineering.

**A-3.2.2.18.(2) Sprinkler Extent.** A literal interpretation of Article 3.2.2.6. and Sentences 3.2.2.4.(1) and (2) could require installation of an automatic sprinkler system throughout all storeys of a building regardless of options in Articles 3.2.2.20. to 3.2.2.83. to construct one or more storeys without installation of sprinklers. It is the intent of the Code that all storeys below a storey in which an automatic sprinkler system is installed should also be protected by an automatic sprinkler system to ensure that a fire in a lower storey does not incapacitate the automatic sprinkler system or overwhelm an automatic sprinkler system in an upper storey. Persons in an upper storey in which waivers or reductions of other fire safety systems are permitted would be exposed to an increased risk from a fire on a lower storey. This concept also applies to situations in which an automatic sprinkler system has been installed within a floor area in order to modify other safety requirements applying within the floor area. If the uppermost storey or storeys of a building can be constructed without the installation of an automatic sprinkler system it is not necessary that an automatic sprinkler system required in a lower storey be extended into the upper storey or storeys.

**A-3.2.2.35.(4) Sprinkler Requirements.** Spaces in a building of Group A, Division 4 occupancy that are intended to be equipped with sprinklers include, but are not limited to, dressing and changing rooms, concession stands and areas, toilet rooms, locker rooms, storage areas, service rooms, offices and other spaces that provide service to the building. The enclosure of seating areas with glazing needs special consideration in determining the requirements for sprinklers. For example, if the enclosed area is used for the consumption of food and beverages, it should be classified as Group A, Division 2 and the appropriate requirements of that classification applied. Enclosure of limited spaces above seating areas for press and media purposes is not considered to require the installation of sprinklers.

**A-3.2.3.1. Fire Protection Related to Limiting Distance versus Separation Between Buildings.** Requirements in the Code for protection against fire spread from building to building are related to the limiting distance for a building, measured to a property line, the centre line of a street or an imaginary line between buildings, rather than the distance between adjacent buildings. (See definition for limiting distance.)

The Code does not provide requirements based on the distance between buildings, for buildings on separate properties, since this would result in situations where the design and construction of a building on one property would affect the design and construction of a building on an adjacent property.

The Code requirements for reducing the probability of building-to-building fire spread were originally developed based on an assumption that the exposing building faces of adjacent buildings are of similar size and configuration, and are placed equidistant from the property line. Where buildings are different sizes, the smaller building may be subject to higher heat flux in the case of a fire compared to the larger building. Where buildings are closely spaced and not equidistant from property lines, the construction of the building with the greater limiting distance does not recognize the proximity of the building with the lesser limiting distance.

At lesser limiting distances, the Code has more stringent requirements for maximum area and spacing of unprotected openings, and for construction, cladding and fire resistance of walls. This recognizes that fire hazard is greater where buildings are closer together and that adjacent buildings may have exposing building faces of different sizes, configurations or limiting distances, which could further increase the hazard.

Limiting distances may also be addressed by the authority having jurisdiction through legal agreements where the parties agree that the limiting distance be measured to a line that is not the property line. Such agreements would normally be registered with the titles of both properties.

**A-3.2.3.1.(4) Spatial Separation Design.** In the application of Sentences 3.2.3.1.(3) and (4) it is intended that Sentence (3) be used first to establish the basic requirements for the exterior wall in terms of fire-resistance rating, type of construction and type of cladding. The percentage of unprotected openings determined from the application of Sentence (3) would be unnecessarily restrictive if the actual unprotected openings occur in a plane that is set back from the front of the building face.

Sentence (4) applies to the calculation of the allowable percentage of unprotected openings based upon projection onto a plane that is in front of all unprotected openings. The application of these two Sentences is shown in Figure A-3.2.3.1.(4). The modifications permitted by Article 3.2.3.12. would be applied, if applicable, to the area of unprotected openings derived from Sentence (4).

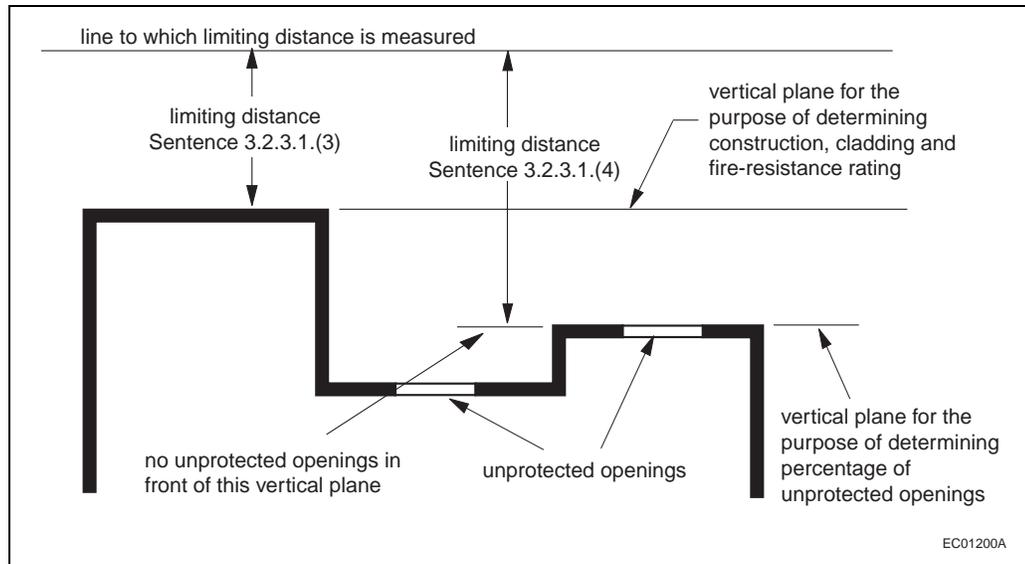


Figure A-3.2.3.1.(4)  
Spatial separation design

**A-3.2.3.1.(6) Spacing between Individual Unprotected Openings.** The spacing values of 2 m horizontally and 2 m vertically given in Sentences 3.2.3.1.(6), 9.10.14.4(4) and 9.10.15.4(4) are not meant to apply at distances from the unprotected openings greater than 2 m. Figure A-3.2.3.1.(6) illustrates the area around an individual unprotected opening that would be considered “off-limits” for another unprotected opening. Other individual unprotected openings would be permitted, for example, directly above the window shown, provided the second window is more than 2 m above the first window.

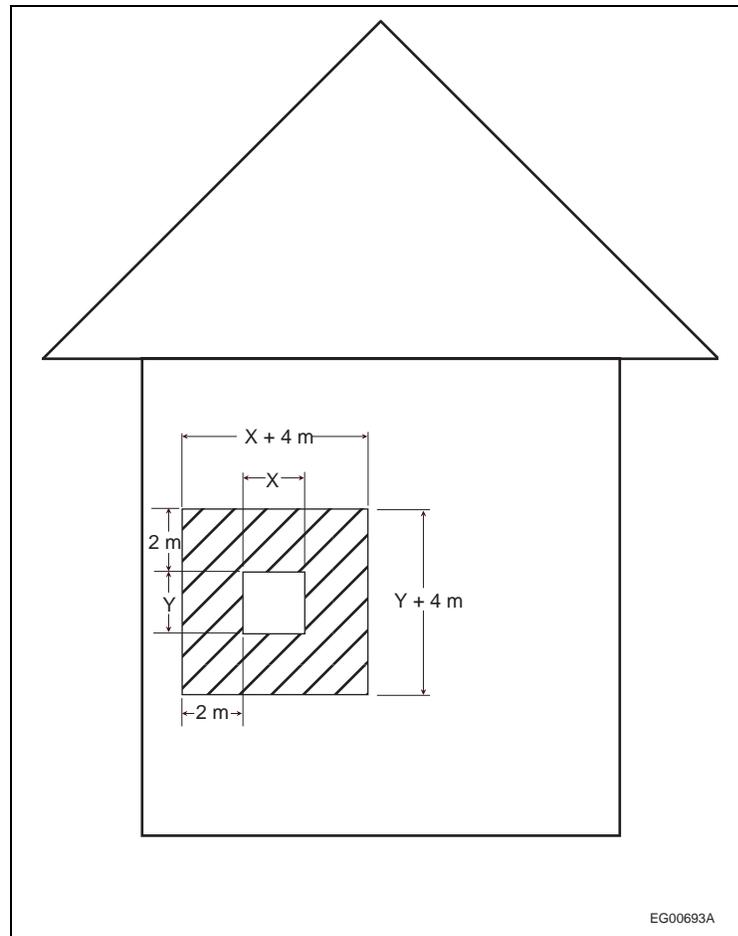


Figure A-3.2.3.1.(6)  
Spacing between individual unprotected openings

**A-3.2.3.1.(8) Intervention Time and Limiting Distance.** The total time from the start of a fire until fire suppression by the fire department begins depends on the times taken for a series of actions. Sentence 3.2.3.1.(8) is concerned only with the time from receipt of notification of a fire by the fire department until the first fire department vehicle arrives at the building. Sentence 3.2.3.1.(8) specifies a 10 minute time limit that must be met in at least 90% of the calls to the building served by the fire department.

This reliability rate and provision for flexibility is essentially consistent with NFPA 1710, "Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments." While providing some guidance, NFPA 1710 does not cover all situations.

NFPA 1710 establishes "time objectives" for fire incidents as follows:

- 1 minute (60 seconds) for turn-out of responders after receipt of notification of a fire, and
- 4 minutes (240 seconds) or less for arrival of the first arriving engine company at a fire suppression incident and/or 8 minutes (480 seconds) or less for the deployment of a full first alarm assignment at a fire suppression incident.<sup>(1)</sup>

The standard requires that the fire department establish a "performance objective" of not less than 90% for each response time objective. This reliability level is referred to in NFPA 1710 as a "performance objective."

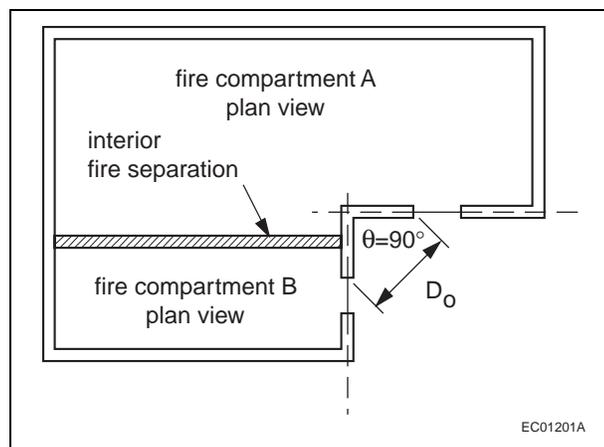
Where the 10 minute limit cannot be met by the fire department at least 90% of the time, Sentence 3.2.3.1.(8) specifies that requirements that depend on limiting distance to define other criteria are to use a value that is half of the actual limiting distance.

(1) Reference: Clause 4.1.2.1. of NFPA 1710, "Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments," 2004.

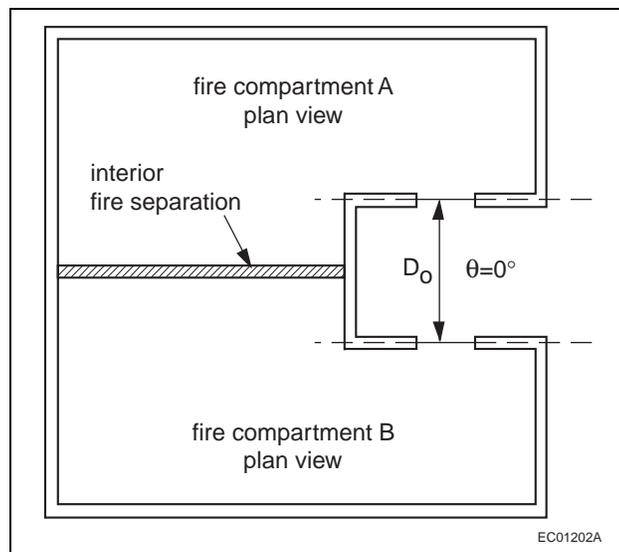
The same applies in Part 9 as stated in Sentences 9.10.14.3.(1) and 9.10.15.3.(1).

**A-3.2.3.8.(3) Noncombustible Cladding.** The requirement for the exterior protection of foamed plastic insulation in an exposing building face is intended to limit the exposure of the insulation to flames, thereby reducing the possibility of increased radiation to an exposed building. The permission to use combustible cladding systems conforming to Article 3.1.5.5. does not waive the requirements for noncombustible construction or noncombustible cladding in Sentence 3.2.3.7.(1).

**A-3.2.3.14.(1) Wall Exposed to Another Wall.** The requirements of this Article are to ensure that the control of fire spread by the interior fire separations between fire compartments is not defeated through the spread of fire by thermal radiation outside the building. Minimum spatial separations are specified between the openings in separate fire compartments where the exterior faces of these compartments are deemed to expose each other to a thermal radiation hazard. This situation may arise where the angle,  $\theta$ , between the intersecting planes of the exposing building faces is  $135^\circ$  or less. Examples are shown in Figures A-3.2.3.14.(1)-A, A-3.2.3.14.(1)-B and A-3.2.3.14.(1)-C of situations which would be addressed by this Article.



**Figure A-3.2.3.14.(1)-A**  
**Openings in walls at a right-angle corner**



**Figure A-3.2.3.14.(1)-B**  
**Openings in walls that are parallel to one another**

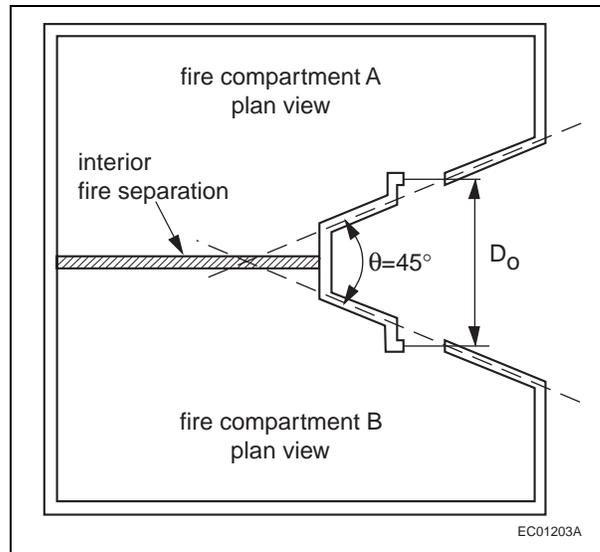


Figure A-3.2.3.14.(1)-C  
Openings in walls with an included angle of  $45^\circ$

**A-3.2.4. Fire Alarm System.** The term “fire alarm system” used in this Subsection applies to fire alarm systems with or without voice communication capability.

**A-3.2.4.1.(1) Determination of Requirement for a Fire Alarm System.** The intent for requiring a fire alarm system to be installed whenever a sprinkler system is installed is related in part to Article 3.2.4.7. That Article requires that a sprinkler system have some method of detecting water flow and transmitting a signal to the fire department notifying them of the potential of a fire and the possibility of water damage due to sustained flow if no action is taken.

Sentences 3.2.4.1.(3) to (5) exempt small residential buildings from the need to install a fire alarm system. Sentence 3.2.4.2.(4) allows small subdivided buildings to be considered as individual portions in the application of Subsection 3.2.4. For most of these types of buildings, a complete fire alarm system is often impracticable, and to install a system solely based on the presence of an automatic sprinkler system is not considered to be necessary. Small apartment buildings, row housing complexes and small strip malls are examples of typical buildings to which this applies.

Sprinkler systems can be designed to accommodate notification of the fire department without the need to install a complete fire alarm system in the building. This type of design and technology is readily available and cost effective for building owners.

**A-3.2.4.4.(1) Single Stage Fire Alarm System.** This requirement, in combination with Article 3.2.4.21., is intended to allow for the provision of voice communication capability as an integral part of a single stage fire alarm system.

**A-3.2.4.4.(2)(c) Fire Alarm Alert Signal.** In a 2 stage fire alarm system described in Sentence 3.2.4.4.(2), the alert signal may be transmitted to audible signal devices in designated locations or to audible signal devices throughout the building. If actuated, the second stage alarm signal in a 2 stage fire alarm system may sound throughout all zones in the building. All manual station key switches would typically initiate the alarm signal.

Sentence 3.2.4.4.(2) also allows the implementation of a “zoned 2-stage” sequence of operation, whereby the alarm signal sounds in the zone of key switch actuation (and perhaps in the adjacent zones, which may be the storey above and the storey below) and the alert signal sounds throughout the rest of the building. This sequencing would be created automatically by the fire alarm control unit.

The key or special device referred to in Clause 3.2.4.4.(2)(c) should be immediately available to all persons on duty who have been given authority to sound an alarm signal.

**A-3.2.4.4.(2) Two Stage Fire Alarm System.** Sentence 3.2.4.4.(2), in combination with Article 3.2.4.21., is intended to allow for the provision of voice communication capability as an integral part of a 2 stage fire alarm system.

**A-3.2.4.6.(2) Access to Silencing Switches.** This requirement is intended to prevent easy access to silencing switches. The satisfactory operation of a fire alarm system to alert the occupants of a building to an emergency is predicated on the assumption that the alarm signal will be silenced only after responsible staff have verified that no emergency exists. Details on the emergency procedures to be used in case of fire are contained in the Alberta Fire Code.

**A-3.2.4.7.(4) Fire Department Notification.** In some jurisdictions, the fire department may utilize, or have available, a municipal fire alarm system or equipment intended for receiving notification by means of a direct connection. If used, it is expected that these systems and installations conform to the requirements of Sentence (4) so as to achieve and provide a uniform and reliable level of service. It is also intended that a proprietary central station as well as a fire brigade used by a large corporation, university campus or similar site comply with Sentence (4).

**A-3.2.4.7.(5)(b) Emergency Telephone Number.** In many municipalities an emergency telephone number, for example 911, is used for all emergency services and it is preferable to post that number.

**A-3.2.4.8.(2) Fire Alarm Zones.** Alarm initiating devices referred to in this Sentence include fire detectors, waterflow switches and manual stations. If a room or space in a building extends through more than one storey of the building, as in the case of multi-level dwelling units and machinery rooms, judgment must be exercised in the zoning and annunciation of the fire detectors in that room or space. In general, the lowest storey on which access is provided into the room or space should be indicated on the annunciator to avoid unnecessary delays for the responding firefighters. Consideration should also be given to the use of numbers or letters on the annunciator that correspond to those used in the building elevators.

**A-3.2.4.9.(2)(f) Supervision for Fire Pumps.** Specific electrical supervision for fire pumps is stated in NFPA 20, "Installation of Stationary Pumps for Fire Protection," which is referenced in NFPA 13, "Installation of Sprinkler Systems."

**A-3.2.4.11.(1) Smoke Detector Location.** In the design and installation of the smoke detection system, consideration must be given to all features which could have a bearing on the location and sensitivity of the detectors, including ceiling height, sloped ceilings, diffusion from air conditioning and ventilating currents, obstructions, baffles, and other pertinent physical configurations that might interfere with the proper operation of the system.

**A-3.2.4.11.(2) Visible Signals.** If staff located in each zone or compartment can see each sleeping room door, visible signals may be located above each door. If staff cannot see every door, it is intended that the visible signals be provided at the location where the staff are normally in attendance. The audible signal is intended to alert staff of the need to check the visible signals.

**A-3.2.4.16.(1) Manual Station.** Only one manual station need be provided near a group of doors serving as a principal entrance or as a single exit facility.

**A-3.2.4.18. Acoustic Measurement and Terminology.** The following notes on acoustic measurement and terminology are intended to assist in the application of the requirements for audibility of fire alarm system sounding devices.

The background or ambient measurement should be a spatial averaged A-weighted equivalent sound level measured for 60 s. This can be obtained using an integrating sound level meter with the integration time set to 60 s. During the measurement period the meter should be slowly moved about so as to sample the space uniformly but coming no closer than 0.5 m from any solid wall, floor or ceiling. Alternatively, measurements can be made at 3 or more positions throughout the space and an energy average calculated.

The measurement of the alarm level depends on the type of alarm signal. If the signal is a continuous signal from a bell or siren, the spatial averaged A-weighted equivalent sound level should be obtained. The integration time should be long enough to obtain a reasonable spatial average of the space, but not less than 10 s.

If the alarm has a temporal pattern, then the A-weighted sound level should be measured using the 'fast' time constant during the 'on' part of the cycle. In this situation it is not appropriate to use an integrating sound level meter. Since the duty cycle of the alarm is only 37.5% at best, that type of meter would give a reading that is 4 or more decibels lower than the level while the alarm is 'on.' A number of measurements should be made about the space in question and the average value used to obtain a good spatial representation. Strictly speaking, the

energy average of the measurements should be used; however, the frequency spectrum associated with most alarms is of a type that should give little variation about the space. If the measured levels don't vary by more than 2 to 3 dB, then an arithmetic average rather than an energy average can be used.

### **Effect of Furnishings**

The final inspection of a fire alarm system is seldom made when the building is furnished and ready for occupancy. This results in measured levels which may be several decibels higher than will be found in the occupied building. The importance of this difference depends on the situation.

If the building is complete except for furnishings, so that the sources of ambient noise are present, then the amount by which the alarm signal exceeds the ambient level will not change appreciably with the introduction of furnishings. In this case both levels will be reduced by about the same amount.

If the primary source of ambient noise will be office equipment and workers, as would be expected in an open plan office, then measurements made prior to occupancy may differ substantially from those made afterwards. This may be true for both the absolute sound levels and the difference between the alarm level and the ambient.

A problem arises in trying to estimate what the absolute sound levels will be after the building is occupied.

In general, if the measurement is made in a totally bare room then the level will be about 3 dB higher than if the room were carpeted, assuming a reasonable carpet with an underlay. In most cases this will account for most of the absorption in the room and no further correction will be necessary. Adding heavy drapes and absorptive furnishings to a carpeted room can reduce the sound level by a further 2 to 3 dB.

Commercial buildings are more problematic. For example, if an open plan office is measured before any office screens are installed, there could be a substantial difference in the before and after levels, depending on the distance to the nearest alarm device.

### **Glossary of Acoustical Terms**

**Audible:** A signal is usually considered to be clearly audible if the A-weighted sound level exceeds the level of ambient noise by 15 dB or more.

**Awakening threshold:** The level of sound that will awaken a sleeping subject 50% of the time.

**A-weighted:** A frequency weighting network which emphasizes the middle frequency components similar to the response of the human ear. The A-weighted sound level correlates well with subjective assessment of the disturbing effects of sounds. The quantity is expressed in dBA.

**Masked threshold:** The level of sound at which a signal is just audible in ambient noise.

**Sound level:** A sound pressure level obtained using a signal to which a standard frequency-weighting has been applied.

**Sound pressure:** A fluctuating pressure superimposed on the static pressure by the presence of sound. The unqualified term means the root-mean-square sound pressure. In air, the static pressure is barometric pressure.

**Sound pressure level:** Ten times the common logarithm of the ratio of the square of the sound pressure under consideration to the square of the standard reference pressure of 20 mPa. The quantity obtained is expressed in decibels.

**A-3.2.4.18.(1) Alert and Alarm Signals.** Alert signals are part of a 2 stage fire alarm system. The intent of the first, alert, stage is to notify persons in authority of a potential threat to building occupants. If a continuously staffed location is available, the alert signal can be restricted to that location.

**A-3.2.4.18.(2) Alarm Signal Temporal Pattern.** The temporal pattern of an alarm signal relates to the time during which the signal is produced and the intervals between the individual signal pulses. The international standard ISO 8201, "Acoustics – Audible emergency evacuation signal," includes a pattern that is becoming widely used in different countries and it is appropriate for this pattern to be adopted in Canada. The temporal pattern can be produced on most signalling devices. Most existing alarm systems can be modified, and this pattern could be phased in when the systems require modification. The characteristic of the pattern is a 3-pulse phase followed by an off phase. The 3 pulses each consist of an on phase lasting for  $0.5 \pm 0.05$  s followed by an off phase lasting for  $0.5 \pm 0.05$  s sounded for 3 successive on periods and then followed by an off phase lasting for  $1.5 \pm 0.15$  s. Figure A-3.2.4.18.(2)-A indicates the pattern that is intended.

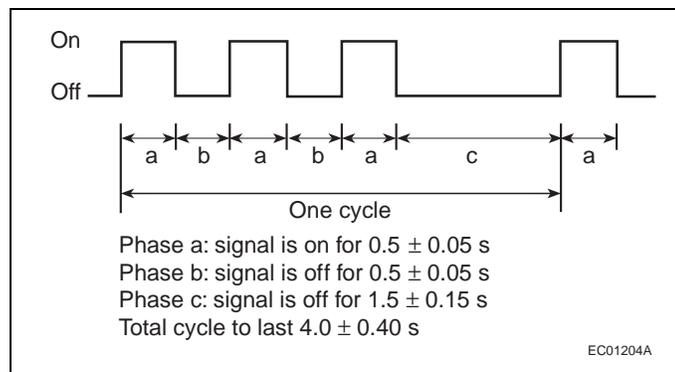


Figure A-3.2.4.18.(2)-A  
Temporal pattern for fire alarm signal

Although the diagram shows a square wave form, the wave can have other shapes that produce a similar effect.

If single stroke bells are to be used, the temporal pattern can be produced by having the bell struck three times at a rate of one stroke per second followed by an interval of 2 s of silence. Figure A-3.2.4.18.(2)-B shows the pattern that results.

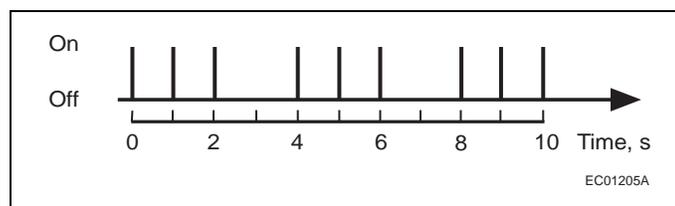


Figure A-3.2.4.18.(2)-B  
Temporal pattern imposed on a single stroke bell or chime

Note to Figure A-3.2.4.18.(2)-B:

- (1) The on phase represents the time that the striker mechanism is actuated. The sound produced by the bell or chime will continue at a level that decreases until the striker mechanism is re-actuated.

**A-3.2.4.18.(3) Audibility of Alarm Systems.** It is very difficult to specify exactly what types of sound patterns are considered to be “significantly different” from one another. The intent is to ensure that there is a noticeable or measurable difference between the alert signals and the alarm signals such that it reduces the possibility of confusion.

**A-3.2.4.18.(4) Sound Pressure Level.** For the purposes of this requirement, an audible signalling device should not produce a sound pressure level more than 110 dBA when measured at a distance of 3 m.

**A-3.2.4.18.(5) Residential Sound Level.** In a building in which corridors or hallways serve more than one suite or dwelling unit, there will be situations in which an audible signal device cannot be placed in the corridor or hallway to alert persons sleeping in suites and dwelling units, because the sound level in the vicinity of the device would exceed that permitted by Sentence 3.2.4.18.(4). In these situations it will be necessary to supplement the building fire alarm system with an audible signal device in the suite or dwelling unit. These devices could be piezoelectric devices similar to the sounding units in many smoke alarms, subject to the device emitting the appropriate temporal pattern required by Sentence 3.2.4.18.(2).

**A-3.2.4.18.(9) Disconnect Device for Dwelling Units.** In order to minimize the annoyance caused by false and unwanted alarms, the disconnect will permit a person to silence the local audible device within the dwelling unit. At that time the person would be aware of sounds from devices in common spaces and could plan appropriate action. The disconnect will reduce the possibility of tampering with the audible devices.

**A-3.2.4.18.(10) Signal Circuits.** Clause 3.2.4.18.(10)(a) permits Class A wiring, or Class B wiring with signal circuit isolators located outside of the suites, to serve audible signal devices within residential suites.

Clause 3.2.4.18.(10)(b) permits a separate signal circuit to serve each suite without the need for signal circuit isolators or Class A wiring.

Open circuits and Class A and Class B wiring circuits are terms defined in CAN/ULC-S524, "Installation of Fire Alarm Systems."

**A-3.2.4.19.(1) Visual Alarm Signal.** ULC-S526, "Visible Signal Devices for Fire Alarm Systems," published by Underwriters' Laboratories of Canada, applies to visual signalling units. This document is referenced by the most recent standard for the installation of fire alarm systems and would automatically apply. Current Canadian technology does not integrate visual and audible alarms to have the same temporal pattern. Visual and audible alarms should have as close a temporal pattern as possible but without interference beats that might have a deleterious effect on some persons. Visual signalling devices with the same temporal pattern as required for audible devices are available from some sources and they should become available in Canada. Not all units that comply with the ULC standard will have sufficient power to adequately cover large areas; care will have to be taken to specify units with adequate power when large spaces are being designed.

**A-3.2.4.20.(5) Smoke Alarm Installation.** The Canadian Electrical Code permits a smoke alarm to be installed on most residential circuits that carry lighting outlets and receptacles. It is the intent of the Alberta Building Code that any other item on a circuit with a smoke alarm should be unlikely to be overloaded and trip the breaker with a resultant loss of power that is not sufficiently annoying for the breaker to be restored to the on position. It is considered that an interior bathroom light or a kitchen light fulfills this intent, but that circuits restricted to receptacles do not fulfill this intent.

**A-3.2.4.21.(1)(b) Voice Messages.** The concept of intelligibility expressed in Clause 3.2.4.21.(1)(b) is intended to mean that a person with average hearing and cognitive abilities is able to understand the messages that are transmitted into the space occupied by the person. There is no absolute measure to predetermine the effect of loudspeakers and it may be necessary, once the building has been furnished and occupied, to increase the number of loudspeakers to improve the quality of the messages.

The intelligibility of the message depends on the speech level, the background level, and the reverberation time of the space. ISO 7731, "Ergonomics – Danger signals for public and work areas – Auditory danger signals," addresses audibility. The standard suggests that an A-weighted sound level at least 15 dBA above the ambient is required for audibility, but allows for more precise calculations using octave or 1/3 octave band frequencies to tailor the alarm signal for particular ambient noise conditions. Design of the alarm system is limited to ensuring that all areas receive an adequately loud alarm signal.

If a public address system is to be used to convey instructions during an emergency, then the requirements of the system are less straightforward. In general, however, a larger number of speakers operating at lower sound levels would be required.

**A-3.2.5.4.(1) Fire Department Access for Detention Buildings.** Buildings of Group B, Division 1 used for housing persons who are under restraint include security measures that would prevent normal access by local fire departments. These security measures include fencing around the building site, exterior walls without openings or openings which are either very small or fitted with bars, and doors that are equipped with security hardware that would prevent easy entry. These buildings would have firefighting equipment installed and the staff would be trained to handle any small incipient fires. It is expected that appropriate fire safety planning would be undertaken in conjunction with local fire departments in order that special emergencies could be handled in a cooperative manner.

**A-3.2.5.6.(1) Fire Department Access Route.** The design and construction of fire department access routes involves the consideration of many variables, some of which are specified in the requirements in the Code. All these variables should be considered in relation to the type and size of fire department vehicles available in the municipality or area where the building will be constructed. It is appropriate, therefore, that the local fire department be consulted prior to the design and construction of access routes.

**A-3.2.5.7. Water Supply.** The intent of Article 3.2.5.7. is that an adequate water supply for firefighting be readily available and of sufficient volume and pressure to enable emergency response personnel to control fire growth so as to enable the safe evacuation of occupants and the conduct of search and rescue operations, prevent the fire from spreading to adjacent buildings, and provide a limited measure of property protection.

Sentences 3.2.5.7.(1) and (2) define the minimum water and flow requirements for buildings exceeding 3 storeys in building height or 600 m<sup>2</sup> in building area. NFPA 1142, "Water Supplies for Suburban and Rural Fire Fighting," and Fire Underwriters Survey, "Water Supply for Public Fire Protection - A Guide to Recommended Practice 1996," should be consulted to determine optimum values.

For a building with no internal fire suppression system, the determination of the minimum requirements applicable to the water supply for firefighting is relevant mainly to building sites not serviced by municipal water supply systems. For building sites serviced by municipal water supply systems, where the water supply duration is not a concern, water supply flow rates at minimum pressures is the main focus of this provision. However, where municipal water supply capacities are limited, it may be necessary for buildings to have supplemental water supplies on site or readily available.

The water supply requirements for buildings containing internal fire suppression systems, including sprinkler systems and standpipe systems, are contained in specific standards referenced in Sentences (3) and (4). Compliance with the referenced standard, including any variations made by this Code, is deemed to satisfy the intent of Article 3.2.5.7. However, it will be necessary to verify that an adequate source of water is available at the building site to meet the required quantities and pressures.

The sources of water supply for firefighting purposes may be natural or developed. Natural sources may include ponds, lakes, rivers, streams, bays, creeks, and springs. Developed sources may include aboveground tanks, elevated gravity tanks, cisterns, swimming pools, wells, reservoirs, aqueducts, artesian wells, tankers, hydrants served by a public or private water system, and canals. Consideration should be given to ensuring that water sources will be accessible to fire department equipment under all climatic conditions.

The volume of on-site water supply is dependent on the building size, construction, occupancy, exposure and environmental impact potential, and should be sufficient to allow at least 30 minutes of fire department hose stream use.

**A-3.2.5.9.(5)(c) Fire Department Pumping Equipment.** Availability of appropriate pumping equipment from the local fire department or, in the case of industrial plants or complexes, from their fire brigade, is considered sufficient to meet the intent of this requirement.

**A-3.2.5.11.(2) Hose Stations.** A building that is partially sprinklered may have some floor areas where local sprinklers are installed that do not cover the entire floor area. It is intended that hose stations be provided in these floor areas to allow emergency responders to fight fires that cannot be controlled by local sprinklers.

**A-3.2.5.13.(1) Sprinkler System Design.** In NFPA 13, "Installation of Sprinkler Systems," reference is made to other NFPA standards that contain additional sprinkler design criteria. These criteria apply to industrial occupancies with high fire loads, including warehouses with high piled storage, and industrial occupancies intended for the use, manufacture or storage of highly flammable materials. Therefore, while only NFPA 13 is called up directly by Sentence 3.2.5.13.(1), the additional criteria in the other NFPA standards are included automatically.

In some NFPA standards, certain aspects of sprinkler protection are dependent on the fire-resistance rating of the vertical structural members. In these cases, the sprinkler system design options can be affected by the fire-resistance rating of these elements. For example, in buildings used for the storage of rubber tires, sprinklers directed at the sides of a column are required if the column does not have the required fire-resistance rating.

Other NFPA standards may require that certain occupancies be sprinklered in conformance with NFPA 13, as in the case of some garages. These requirements do not supersede the requirements in the Code. An occupancy is required to be sprinklered only when this is specified in the Code, but when it is so required, it must be sprinklered in conformance with NFPA 13 and its referenced standards.

**A-3.2.5.13.(6) Sprinklering of Roof Assemblies.** Sprinkler protection for roof assemblies in lieu of fire resistance is based on the assumption that the sprinklers will protect the roof assembly from the effects of fire in spaces below the roof. If a ceiling membrane is installed, the sprinklers would have to be located below the membrane in order to react quickly to the fire. In certain instances, however, sprinklers may be required within the concealed spaces as well as below the membrane. NFPA 13, "Installation of Sprinkler Systems," requires sprinklers in certain concealed spaces.

According to NFPA 13 and 13R, rooms and closets in the storey immediately below the roof assembly do not require sprinklers. However, the Alberta Building Code requires sprinkler protection within all rooms and closets immediately below the roof so as to control any fire that might start in that space and thereby limit the probability of the fire spreading into the roof assembly.

Moreover, NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," also allows the omission of sprinklers in such rooms and closets under certain circumstances, provided the building is sprinklered in conformance with this standard. In this case, the Alberta Building Code concurs with the provisions of the NFPA 13D standard.

**A-3.2.5.13.(7) Fast Response Sprinklers.** Several types of sprinkler will respond to a fire faster than a conventional standard response sprinkler. The Response Time Index (RTI) is used to quantify the sensitivity of the sprinkler link for any given sprinkler. The RTI for the group of fast response sprinklers described below will on average range from  $22 s^{0.5} \cdot m^{0.5}$  to  $33 s^{0.5} \cdot m^{0.5}$ . RTI values for standard response sprinklers will typically be in the range of  $83 s^{0.5} \cdot m^{0.5}$  to  $110 s^{0.5} \cdot m^{0.5}$ .

Any confusion as to the appropriate type of fast response sprinkler for different types of building should be alleviated by considering the testing criteria described below and the reference to the appropriate NFPA installation standards.

Although the Code specifies where fast response sprinklers are required it does not prevent the appropriate use of fast response sprinklers in other occupancies.

Residential sprinklers are tested in accordance with ANSI/UL-1626, "Residential Sprinklers for Fire-Protection Service." They are installed in accordance with NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," with NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," and with Section 5-4.5 of NFPA 13, "Installation of Sprinkler Systems," for residential occupancies and for dwelling units.

Quick-response sprinklers are tested in accordance with ANSI/UL-199, "Automatic Sprinklers for Fire-Protection Service." They are installed in accordance with NFPA 13, "Installation of Sprinkler Systems," for spacing, density and location. They are acceptable for limited use as described in NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," but are not permitted for use under NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

Early suppression fast response sprinklers are tested in accordance with FM 2008, "Early Suppression - Fast Response Sprinklers." They are installed in accordance with NFPA 13, "Installation of Sprinkler Systems," but are not accepted for use under either NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," or NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

Quick response extended coverage sprinklers are tested in accordance with ANSI/UL 199, "Automatic Sprinklers for Fire-Protection Service." They are installed in accordance with NFPA 13, "Installation of Sprinkler Systems," for spacing, density and location. They are acceptable for limited use as permitted by NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," but are not permitted for use under NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

**A-3.2.5.13.(8) Sprinkler Rating.** The requirements of this Sentence can be met by using sprinklers with a rating of 79°C to 107°C.

**A-3.2.5.14.(1) Hazard Classification for Sprinkler Selection.** The reference to light hazard occupancies is based on the descriptions of these occupancies given in NFPA 13, "Installation of Sprinkler Systems," and is intended only for use in the design of sprinkler systems. These descriptions should not be confused with the occupancy classifications in the Code.

In NFPA 13 a light hazard occupancy is one in which the quantity or combustibility of contents is low and fires with relatively low rates of heat release are expected. Typical buildings or parts of buildings include: churches; clubs; eaves and overhangs, if of combustible construction with no combustibles beneath; educational buildings; hospitals; institutional buildings; libraries, except very large stack rooms; museums; nursing or convalescent homes; offices, including data processing rooms; residential buildings; restaurant seating areas; theatres and auditoria, excluding stages and proscenias; and unused attics.

Although NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," and NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," as referenced by NFPA 13, are concerned with specific types of residential occupancy,

namely apartment buildings up to four storeys, one and two family dwellings, and mobile homes, for the purpose of acceptance of combustible sprinkler piping these occupancies are considered to be included in the category of residential buildings under light hazard occupancies.

**A-3.2.5.19.(1) Fire Pumps.** In order to ensure an adequate water supply, it may be necessary to install a fire pump for a building that has either a standpipe system or an automatic sprinkler system installed. Reference to NFPA 20, "Installation of Stationary Pumps for Fire Protection," provides the necessary guidance to designers.

**A-3.2.7.3.(3) Emergency Lighting.** The minimum value referred to is very low and is not intended to be measured.

**A-3.2.7.4.(1) Emergency Power Reliability.** In some areas power outages are frequent and may be of long duration. These local conditions should be taken into account in determining the type of system for supplying emergency power for lighting. This should be studied at the planning stage of a building project in conjunction with the local fire safety and building officials.

**A-3.2.7.6.(1) Emergency Power for Hospitals.** CAN/CSA-Z32, "Electrical Safety and Essential Electrical Systems in Health Care Facilities," contains requirements other than those that relate specifically to the installation of emergency equipment. Compliance with these other requirements is not intended by the reference in Article 3.2.7.6. The standard refers to three classes of health care facilities—Class A, Class B and Class C—and states that the standard applies to Class A and Class C health care facilities but not to Class B health care facilities. Since the standard CAN/CSA-Z32 does not apply to facilities in which residents, as a result of physical or mental disabilities, are unable to function independently and require daily care by health care professionals, the standard applicable to these facilities is CAN/CSA-C282, "Emergency Electrical Power Supply for Buildings."

**A-3.2.7.8.(3) Emergency Power Duration.** The times indicated in this Sentence are the durations for which emergency power must be available for a building under fire emergency conditions. Additional fuel for generators or additional battery capacity is required to handle normal testing of the equipment, as indicated in the Alberta Fire Code. If the operation of emergency generators or batteries is intended for other than fire emergency conditions, such as power failures, fuel supplies or battery capacity must be increased to compensate for that use.

**A-3.2.7.9.(1) Emergency Power Reliability.** In some areas power outages are frequent and may be of long duration. These local conditions should be taken into account in determining the type of system for supplying emergency power for building services. This should be studied at the planning stage of a building project in conjunction with the local fire safety and building officials.

**A-3.2.8.2.(3) Special Protection of Opening.** In manufacturing operations involving the use of conveyor systems to transport material through fire separations, it may not be possible to use standard closure devices. NFPA 80, "Fire Doors and Fire Windows," includes appendix information concerning protection of openings through vertical fire separations. NFPA 13, "Installation of Sprinkler Systems," includes methods of protecting openings through floor assemblies, however, it is assumed by that standard that the remainder of the building would be sprinklered. Combinations of methods may be required to ensure that the level of safety inherent in the requirements of the Code is maintained.

**A-3.2.8.2.(6)(b) Stairway Opening.** The phrase "used only for stairways, escalators or moving walks" is intended to restrict a floor opening to the size that is necessary to accommodate the stairway, escalator or moving walk.

**A-3.2.8.2.(6)(c) Waiver of Occupancy Separation Continuity.** The typical application of this Sentence is to buildings with a mixture of occupancies that are randomly located throughout the building. Examples include shopping centres, podia of large commercial and business complexes, and recreational buildings that are combined with mercantile and business operations. A shopping mall with two interconnected storeys is an example that is frequently encountered in many jurisdictions. The permission to breach the floor assembly between the storeys does not override requirements for separation of specific suites or occupancies. For instance, although storage garages are Group F, Division 3 occupancies, the requirement in Article 3.3.5.6. for the storage garage to be separated from other occupancies by a fire separation with at least a 1.5 h fire-resistance rating must be observed. In a similar manner, a theatre or cinema (Group A, Division 1 occupancy) must be separated from other occupancies in accordance with Sentence 3.3.2.2.(1) and seats in an arena-type building (Group A, Division 3) must be separated from space below in accordance with Sentence 3.3.2.2.(3).

**A-3.2.8.8.(1) Smoke Exhaust System.** The mechanical exhaust system is intended as an aid to firefighters in removing smoke and is to be designed to be actuated manually by the responding fire department. Although smoke is normally removed from the top of the interconnected floor space, exhaust outlets at other locations may be satisfactory.

**A-3.3. Safety Within Floor Areas.** Section 3.3. regulates safety within floor areas including rooms and other spaces within a building, with the exception of service rooms and service spaces, which are regulated by Section 3.6. The requirements are grouped according to the occupancy of the floor area, room or space, which is not necessarily the same as the major occupancy for which the building is classified. For example, a building may be classified by major occupancy as an office building; therefore, the provisions for structural fire protection and fire protection equipment for office buildings prescribed in Section 3.2. apply. However, within that building, a room or floor area may be used for mercantile, care or detention, business, residential, industrial or other occupancy.

Life safety for the occupants of any floor area depends in the first instance on the use or occupancy of that floor area. The risks to the occupants occur in the early stages of a fire. These special life risks differ from one occupancy to another and, consequently, must be regulated differently. Section 3.3. regulates risks within floor areas: these requirements apply regardless of the major occupancy of the building that contains the floor areas. For example, an assembly room must comply with the requirements for assembly occupancy whether it is contained in an office building, hospital, hotel, theatre, industrial building or other major occupancy.

Since this Code regulates new construction, alterations and changes of occupancy, the construction of kiosks and similar structures in public corridors must take into consideration all the requirements that apply to the remainder of the building, including structural fire protection, construction type, finish materials, egress widths and sprinkler installations. Special activities of an occasional nature that were not contemplated in the original design of a public corridor and that represent only a temporary change in occupancy are regulated by the Alberta Fire Code. These regulations include maintaining egress paths clear of obstructions, controlling combustible contents and providing measures to ensure quick response for firefighting.

**A-3.3.1.2.(1) Hazardous Substances.** Dangerous goods, as defined in the Alberta Fire Code and regulated by the "Transportation of Dangerous Goods Act" and its Regulations, constitute one type of hazardous substance in the sense of the Alberta Building Code. They include gases and radioactive, corrosive, poisonous, oxidizing, reactive, explosive and flammable substances. The term "hazardous substance" in the Alberta Building Code also means materials and products that are not regulated by the Transportation of Dangerous Goods Regulations but that pose a fire or explosion hazard due to their own properties or because of the manner in which they are stored, handled or used. These include combustible products, rubber tires, combustible fibres, combustible dusts, products producing flammable vapours or gases, etc.

**A-3.3.1.2.(2) Cooking Equipment Ventilation.** Cooking equipment manufactured for use in dwelling units and other residential suites is often installed in buildings used for assembly and care or detention purposes. It is not obvious from the Code requirements or those of NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," whether a ventilation and grease removal system is required in all assembly and care or detention uses. If the equipment is to be used in a manner that will produce grease-laden vapours that are substantially more than would be produced in a normal household environment, then it would be appropriate to apply the requirements of NFPA 96. If the equipment is used primarily for reheating food prepared elsewhere or is used occasionally for demonstration or educational purposes, there would be no expectation of applying the requirements of NFPA 96. In all cases the circumstances should be reviewed with the authority having jurisdiction.

**A-3.3.1.7.(1) Temporary Refuge for Persons with Disabilities.** These measures are intended to provide temporary refuge for persons with disabilities. It is acknowledged, however, that the measures cannot provide absolute safety for all occupants in the fire area. It may, therefore, be necessary to develop special arrangements in the fire safety plan to evacuate persons with disabilities from these areas. Details for a suitable plan are contained in the Alberta Fire Code.

The protected elevator referred to in Clause 3.3.1.7.(1)(a) is intended to be used by firefighters as a means for evacuating persons with disabilities. It is not intended that this elevator be used by persons with disabilities as a means of egress without the assistance of firefighters.

If an estimate is to be made of the number of persons with disabilities in a floor area who can be accommodated in each zone in Clause 3.3.1.7.(1)(b), this estimate may be based on Table 3.8.2.1., which is used to determine the minimum number of spaces to be provided for wheelchair occupants in fixed seating areas. If more precise information is available, it should be used for sizing the zones.

**A-3.3.1.9.(4) Obstruction in Corridor.** The sweep of a cane used by blind or visually impaired persons normally detects obstructions that are within 680 mm of the floor. Any obstruction above this height would not normally be detected and can, therefore, create a hazard if it projects more than 100 mm into the path of travel.

**A-3.3.1.12.(3) Movable Partitions.** Should an emergency situation arise outside of normal working hours but when occupants are still in the space, they could be left without a clear way out. This could occur during inventory or after closing time when all occupants have not yet left, but staff close the door to prevent other persons from entering. In many small tenant areas, the movable partitions (store fronts) provide the only way out. There should always be a second way out or a swinging door within or adjacent to the sliding partitions.

**A-3.3.1.13.(4) Door Hardware.** The permission to have additional door releasing devices is intended to allow the use of a security chain, night latch or dead bolt to supplement the normal door latching device. These are permitted for dwelling units and locations where guests in a hotel or motel require additional security. The height of these items is also governed by the maximum height stipulated in Sentence 3.3.1.13.(5) to ensure that they can be operated by persons with physical disabilities. This additional hardware should not require appreciable dexterity by the user and the general requirements on the ability to operate the device without the use of keys, special tools or specialized knowledge still apply.

**A-3.3.1.13.(6) Controlled Egress Doors.** It is intended that Sentence 3.3.1.13.(6) apply to doors used at the perimeter of a contained use area or an impeded egress zone. If the contained use area consists of a single room, the requirements would apply to that room. In the case of individual cells within a contained use area, exterior keyed locks could be used on the cell doors consistent with the fire safety plan and continuous supervision by staff who can release the doors in an emergency.

**A-3.3.1.23.(1) Obstructions in Means of Egress.** Obstructions including posts, counters or turnstiles should not be located in a manner that would restrict the width of a normal means of egress from a floor area or part of a floor area unless an alternative means of egress is provided adjacent to and plainly visible from the restricted means of egress.

**A-3.3.2.4.(2) Tablet Arms.** Although it is intended that the motion to raise the tablet arm be essentially a single fluid motion, it is acceptable that the motion be a compound motion of raising the tablet arm and including an articulation to allow the tablet to fall back alongside the arm rest.

**A-3.3.3.1.(1) Safety in a Care or Detention Occupancy.** Fire safety for patients in bedroom areas in hospitals and nursing homes is predicated on the ability of staff to carry out at all times essential life safety functions in accordance with the fire safety plan. Details for a plan are contained in the Alberta Fire Code.

Many factors may affect the ability of staff to carry out life safety functions, including the mobility of patients who cannot fend for themselves and the built-in protection for patients who cannot be moved except under exceptional circumstances.

Should a patient area in a hospital or nursing home contain factors which would increase the time normally required for staff to evacuate patients or to undertake other life safety measures, consideration should be given to providing additional fire protection measures to ensure that equivalent safety is available.

**A-3.3.3.4.(1)**

**A-3.3.3.4.(1) Doorway Width.** The 1050 mm minimum clear width of doorways accounts for door stops and, thus, is intended to allow for the use of 1100 mm doors.

**A-3.3.3.5.(1) Hospitals and Nursing Homes.** The basis for the requirements in this Article is that staff will be in attendance at all times on the same storey, either in each fire compartment or in a fire compartment immediately adjacent.

A nursing home occupancy is intended to include nursing and convalescent homes, skilled nursing facilities, intermediate care facilities and some homes for the aged. Occupants of nursing homes are assumed to be, for the most part, non-ambulatory. The use of physical restraints and tranquilizing drugs which may render occupants immobile are also factors which should be considered.

Although the age of patients by itself is not sufficient justification for a floor area to be included in a nursing home occupancy, it should be recognized that many homes for the aged are in fact nursing homes. The factor that determines whether or not a home for the aged is a nursing home and, therefore, a care or detention occupancy as opposed to a residential occupancy, is whether or not continuous nursing care is required for the occupants. If it is not required, then the occupancy would normally be classified as residential rather than care or detention.

**A-3.3.3.5.(6) Weatherstripping.** "Weatherstripped or otherwise" is intended to provide for adequate draft resistant sealing material to retard the passage of smoke through closure assemblies used in fire separations.

**A-3.3.3.5.(10) Intercommunicating Rooms.** Rooms that are interconnected can include more than one sleeping room, together with ensuite toilet rooms, shower rooms, and storage closets used for the storage of personal items of the persons occupying the sleeping rooms. It is not intended that storage rooms for other purposes be included within the group of interconnected rooms.

**A-3.3.3.5.(13) Grilles and Louvres.** In order to permit the supply of make-up air to compensate for the removal of exhaust air from these toilet rooms, shower rooms and similar spaces, it is permitted to incorporate grilles and louvres for the transfer of air provided the air movement cannot allow smoke to pass through these spaces to other parts of the building. It is considered that in normal designs the air is exhausted directly to the exterior and is not circulated. If air is to be circulated back to other parts of the building, smoke operated dampers should be included in the air circulating system.

**A-3.3.4.4.(1) Landing in Egress Stairway.** A landing level used in an egress stairway from a dwelling unit is not considered to be a storey of that dwelling unit if the landing is used only for pedestrian travel purposes.

**A-3.3.4.5.(1) Automatic Locking Prohibited.** Doors that must be manually reset to lock them when they are opened from the inside meet the intent of this requirement.

**A-3.3.5. Industrial Occupancy.** Many industrial processes are hazardous and subject to specific requirements under the Occupational Health and Safety Act and regulations made pursuant to that Act. These may have an effect on the design of industrial facilities.

**A-3.3.5.2.(1) Fire Extinguishing Systems.** Where the Code requires sprinklers to be used and water is not considered the best agent for suppressing a potential hazard, then another type of automated fire suppression system should be used.

**A-3.3.5.2.(2) Fire Extinguishing Systems.** Where a process involves a fire hazard, then a suppression system must be built into the process to deal with the hazard.

**A-3.3.5.11.(2) Volume of Tire Storage.** The volume of tires in a storage area can be determined by measuring to the nearest 0.1 m the length, width and height of the piles or racks intended to contain the tires. In racks, the top shelf is assumed to be loaded to maximum possible height, while observing required clearances between structural elements and sprinklers.

**A-3.3.5.19.(2) NFPA Standards.** National Fire Protection Association Standards on dust explosions include

NFPA 61, "Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities,"

NFPA 65, "Processing and Finishing of Aluminum,"  
 NFPA 91, "Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids,"  
 NFPA 120, "Coal Preparation Plants,"  
 NFPA 480, "Storage, Handling and Processing of Magnesium,"  
 NFPA 481, "Production, Processing, Handling and Storage of Titanium,"  
 NFPA 482, "Production, Processing, Handling and Storage of Zirconium,"  
 NFPA 650, "Pneumatic Conveying Systems for Handling Combustible Materials,"  
 NFPA 651, "Manufacture of Aluminum or Magnesium Powder,"  
 NFPA 654, "Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical and Plastics Industries,"  
 NFPA 655, "Prevention of Sulfur Fires and Explosions,"  
 NFPA 664, "Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities."

**A-3.4.1.1.(1) Type of Exit Facility.** The requirements for exits in Section 3.4. were developed for new construction. If alterations are made to an existing building or changes of occupancy occur, other design solutions than those in Section 3.4. may have to be developed to maintain an acceptable level of safety if it is not practicable to fully conform to the requirements of this Section. In some cases the use of fire escapes to supplement the existing exit facilities may be the only practicable solution. Because of the variety of conditions that may be encountered in existing buildings, it is difficult to standardize or codify such requirements. Alternative means of providing acceptable levels of safety may have to be tailored to the particular building design. In all cases, however, the requirements described in Section 3.4. are intended to provide the level of safety to be achieved. If alternative measures are used, they should develop the level of safety implied in these requirements.

**A-3.4.1.6.(2) Sleeping Area.** Areas serving patients' sleeping rooms include sleeping areas and areas where patients are taken for treatment.

**A-3.4.2.3.(1) Least Distance Between Exits.** The least distance measurement does not apply to each combination of exits on a multi-exit storey. It only applies to at least 2 of the required exits from that storey.

**A-3.4.3.2.(6) Evacuation of Interconnected Floor Space.** This Sentence ensures that egress facilities allow for the simultaneous evacuation of all portions of an interconnected floor space. It does not contemplate the phased evacuation of occupants; thus in buildings where that type of evacuation is intended, fire protection requirements in addition to those prescribed in the Code may be necessary.

In the first instance, this Sentence provides for cumulative exiting that can accommodate the efficient movement of all occupants in the exit stairs. Clause 3.4.3.2.(6)(a) permits an alternative approach that will accommodate all the occupants in the stairs but will restrict the egress flow rate. Clause 3.4.3.2.(6)(b) provides a second alternative that assumes the occupants must queue before entering the stair. A "protected floor space" conforming to Article 3.2.8.6. is intended to provide an intermediate area of safety that is protected from the hazards of the interconnected floor space. It does not provide a holding or refuge area for all occupants of a floor area for an extended period of time.

To ensure that evacuation is not unduly delayed and that queuing of the occupants in the protected floor space can be accommodated, requires careful consideration in the design of the interface between the interconnected floor space/protected floor space/exit.

It is not appropriate, for example, to share a common vestibule in complying with Sentences 3.2.8.5.(1) and 3.2.8.6.(1). Under evacuation conditions, occupants entering the vestibule would flow towards the exit, as opposed to the protected floor space, thus resulting in queuing outside the vestibule and potential exposure to fire. To comply with the intent, it is necessary to design the egress path such that the occupants enter the protected floor space through a vestibule, then in turn enter the exit stair from the protected floor space. In addition, sufficient space should be provided between the vestibule and the exit to allow for the queuing of occupants in the protected floor space.

**A-3.4.3.2.(6)(a) Temporary Safety Area.** The objective of Clause 3.4.3.2.(6)(a) is to provide an area of temporary safety in the exit stair shafts for the occupants of the interconnected floor space. This requirement is considered to be met if 0.3 m<sup>2</sup> per person is provided in the stair shaft between the floor level served and the floor level immediately beneath it.

**A-3.4.4.2.(2)(e) Requirements for Lobby.** If an exit is permitted to lead through a lobby, the lobby must provide a level of protection approaching that of the exit. As well as meeting the width and height requirements for exits, the lobby must be separated from the remainder of the building by a fire separation having a fire-resistance rating at least equal to that required for the exit, unless one of the exceptions in this Clause is applied.

**A-3.4.6. Application to Means of Egress.** The requirements in Subsection 3.4.6. apply to interior and exterior exits, as well as to ramps, stairways and passageways used by the public as access to exit. The treads, risers, landings, handrails and guards for the latter access to exit facilities must thus be provided in conformance with the appropriate requirements for exit facilities.

**A-3.4.6.4.(5) Continuity of Handrail.** Blind or visually-impaired persons rely on handrails to guide them on stairways. A continuous handrail will assist them in negotiating stairs at changes in direction. The extended handrail is useful to persons with physical disabilities to steady themselves before using the stairs. Handrails should, however, return to the wall, floor or post, so as not to constitute a hazard to blind or visually-impaired persons.

**A-3.4.6.7.(3) Stair Tolerances.** The term “uniform run and rise” assumes normal construction tolerances.

**A-3.4.6.9.(5) Door Swing.** Although it is required that the door on the right hand side of a pair of doors shall swing in the direction of travel through the exit, the direction of swing of the door on the left side will depend on the function of the horizontal exit. If the horizontal exit provides for movement from one building to the adjacent building but does not require movement in the reverse direction, both doors must swing in the direction of travel to the adjacent building. If the design is based upon both buildings providing complementary movement in either direction, then the doors must swing in opposite directions. Location of a required exit sign directly above a door that swings in the direction of travel is deemed to meet the intent of Clause 3.4.6.9.(5)(b).

**A-3.4.6.10.(3) Exit Concealment.** Hangings or draperies placed over exit doors may conceal or obscure them.

**A-3.4.6.15.(1) Fastening Device.** Turnpieces of a type which must be rotated through an angle of more than 90° before releasing a locking bolt are not considered to be readily openable. The release of a locking bolt should allow the door to open without having to operate other devices on the door.

**A-3.4.6.15.(4) Electromagnetic Lock.** Electromagnetic locks are intended for use where there is a need for security additional to that provided by traditional exit hardware. They are not intended for indiscriminate use as alternative locking devices. The design of these devices requires evaluation to ensure that their operation will be fail-safe in allowing exiting in the event of foreseeable emergencies. If more than one locking device is used in a building, it is expected that one switch will release and reset all devices simultaneously.

**A-3.4.6.16.(1) Special Security for Doors.** The need for security in banks and in mercantile occupancies requires the ability to use positive locking devices on doors that may not readily be opened from inside the building. In a fully sprinklered building, the risk to persons inside the building is substantially reduced. The provisions of Sentences 3.4.6.16.(2) to (9) assume that the area is illuminated and that a means of communication is available to any occupant during times that the doors are locked.

**A-3.4.6.18.(1)(d) Colour Contrast.** The identification of floor and other signs intended to facilitate orientation for visually-impaired persons should offer maximum colour contrast to be effective. For this reason, it is recommended that white on black or black on white be used, as this combination produces the best legibility. It is also recommended that the sign surfaces be processed to prevent glare.

**A-3.5.2.1.(1) Elevator Design.** The reference to the elevating devices regulations in this Sentence implies conformance with all requirements of those regulations for elevator cars, hoistways, pits and machine rooms, including restrictions on other services in these areas and detailed design criteria.

**A-3.5.4.1.(1) Elevator Car Dimensions.** In some circumstances it is necessary to maintain a patient on a stretcher in the prone position during transit to a hospital or to treatment facilities. Inclining the stretcher to load it into an elevator could be fatal or at the very least detrimental to the patient’s health. Many ambulance services use a mobile patient stretcher whose size is 2010 mm long and 610 mm wide. As well as space for the stretcher in the elevator, there should be sufficient additional space for at least two attendants who may also be providing treatment during transit. Common elevator units that can satisfy this requirement include:

- a 1134 kg elevator car with minimum interior dimensions of 2032 mm wide and 1295 mm deep with a right or left hand access door. The minimum access door width is 1067 mm and it must be on the 2032 mm side of the car.
- a 1134 kg elevator car with minimum interior dimensions of 2032 mm deep and 1295 mm wide with a minimum 915 mm wide access door located on the 1295 mm side.

**A-3.6.2.5.(1) Combustible Refuse Storage.** Storage of refuse consisting of combustible materials including waste paper, cardboard and plastic, and noncombustible materials such as glass and metallic containers can be accumulated in these rooms for the purpose of recycling. This storage is allowed in consideration of a less stringent collection schedule when compared to that of garbage or refuse, which is collected regularly.

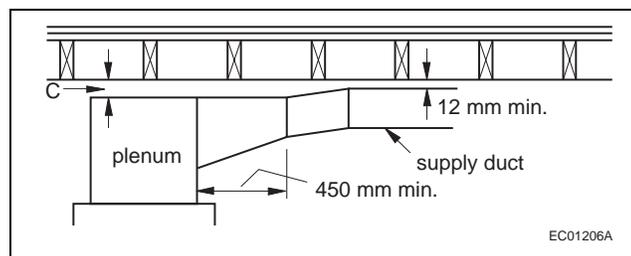
**A-3.6.2.7.(5) Explosion Relief.** Examples of good engineering practice for this application can be found in NFPA 68, “Venting of Deflagrations,” NFPA 69, “Explosion Prevention Systems,” and the NFPA Fire Protection Handbook.

**A-3.6.3.1.(1) Vertical Service Spaces.** Sentence 3.6.3.1.(1) does not prohibit the internal subdivision of a vertical service space to allow different building services to be installed in physically separated spaces unless other requirements apply (see, for example, Article 3.2.6.9.). Fire separation requirements apply to the perimeter of the group of service spaces. Article 3.6.3.3. has special requirements for linen chutes and refuse chutes.

**A-3.6.4.2.(2) Ceiling Membrane Rating.** In construction assemblies that utilize membrane ceiling protection and have been assigned a fire-resistance rating on the basis of a fire test, the membrane is only one of the elements that contribute to the performance of the assembly and does not in itself provide the protection implied by the rating. For the fire-resistance rating of membrane materials used in this form of construction, reference should be made to the results of fire tests which have been conducted to specifically evaluate the performance of this element.

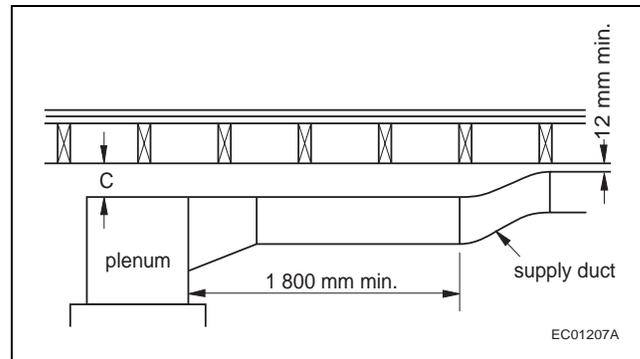
**A-3.6.4.7.(2) Roof Access.** Roof access is provided for two reasons: firefighting and maintenance of service equipment. Article 3.2.5.3. deals with the requirement for firefighting access.

**A-3.6.5.6.(2) Clearance for Warm-Air Supply Ducts.** Applicable to forced-air furnaces where permissible clearance C above plenum is 75 mm or less.



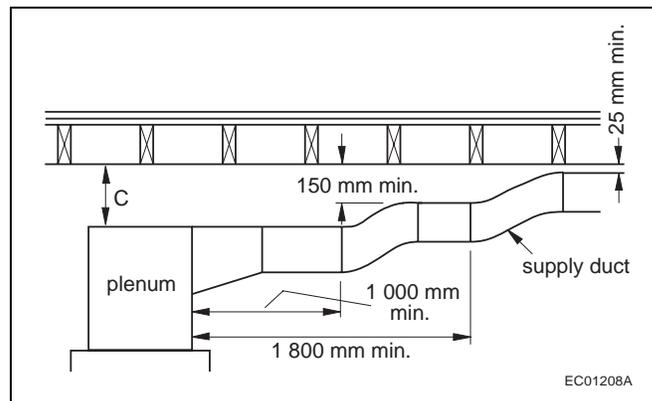
**Figure A-3.6.5.6.(2)**  
Clearance for warm-air supply ducts

**A-3.6.5.6.(3) Clearance for Warm-Air Supply Ducts.** Applicable to forced-air furnaces where permissible clearance C above plenum is more than 75 mm but not more than 150 mm.



**Figure A-3.6.5.6.(3)**  
**Clearance for warm-air supply ducts**

**A-3.6.5.6.(4) Clearance for Warm-Air Supply Ducts.** Applicable to forced-air furnaces where permissible clearance C above plenum is more than 150 mm.



**Figure A-3.6.5.6.(4)**  
**Clearance for warm-air supply ducts**

**A-3.8. Barrier-Free Design Assumptions.** This Section contains minimum provisions to accommodate a person using a typical manual wheelchair or other manual mobility assistance devices such as walking aids, including canes, crutches, braces and artificial limbs.

**A-3.8.1.1.(1) Application.** Barrier-free design principles should be applied in all buildings and in all areas other than the exceptions mentioned in this Article. However, certain industrial buildings, by nature of their operation, may pose risks to their occupants due to the use of hazardous materials and/or processes. Some buildings classified as Group F, Division 2 or 3, including special purpose buildings in heavy industries such as forestry or metallurgy, often require grade separations and other features essential to their functioning, but not compatible with the concept of barrier-free accessibility. In such exceptional situations, relaxation of barrier-free requirements may be granted when no practical alternative can be found. However, even in such buildings, barrier-free accessibility complying with this Section must be provided to and within all areas with non-hazardous subsidiary occupancies.

**A-3.8.1.1.(3) Adaptable Dwelling Units.** Providing adaptable dwelling units which could be made to meet barrier-free design principles needs further clarification. In designing dwelling units, it is difficult to anticipate the specific needs of individuals. If a dwelling unit is inhabited by an able-bodied person as well as a person confined to a wheelchair, the height at which the kitchen counters are to be installed becomes an issue. Flexibility must allow the height of different work stations to be raised or lowered. Adaptable means that the dwelling unit can be adjusted to suit all occupants' needs. For this to happen, each occupant's physical limitations must be understood. As a general rule, the pathway from the street to the entrance of the dwelling unit must be well marked and free of curbs or steps. A person in a wheelchair must be able to turn into and turn around in any room. Work stations for persons in wheelchairs must be capable of being lowered to the person's height with allowance for their feet beneath. For persons who are blind or deaf, a common electric circuit must interconnect all rooms and be able to be connected to the fire alarm, intrusion alarm, intercom or phone system.

**A-3.8.1.2. Entrances.** An accessible route should exist from the sidewalk or roadway and parking area to an accessible building entrance. This route should be located so that persons with physical disabilities do not have to pass behind parked cars.

To provide more general access to buildings, not less than 50% of the pedestrian entrances are required to be barrier-free. This should include a principal entrance. If the 50% calculation results in a fraction, the number of barrier-free entrances should be the next higher unit value. For the purpose of determining the number of entrances to a building, several adjacent doors in a bank of doors are considered to be a single entrance.

**A-3.8.1.4.(1) Access to Storeys Served by Escalators and Moving Walks.** In some buildings, escalators and inclined moving walks are installed to provide transportation from one floor level to another floor level so as to increase the capacity to move large numbers of persons. Some buildings located on a sloping site are accessible from street level on more than one storey and an escalator or inclined moving walk is provided for internal movement from floor to floor. In both these situations, a person with a physical disability must be provided with an equally convenient means of moving between the same floor levels within the building. This can be accomplished by providing elevators or a platform-equipped passenger-elevating device.

**A-3.8.2.1. Access to Rooms and Facilities.** If barrier-free access is required into suites or rooms in Subsection 3.8.2., it is intended that access be provided, with some exceptions identified in Sentence 3.8.2.1.(2), throughout each room or suite. Some examples of where barrier-free access is required are as follows:

- within each suite (subject to Clauses 3.8.2.1.(2)(j) to (l),
- within rooms or areas that serve the public or are designated for use by visitors, including areas in assembly occupancies with fixed seats, display areas and merchandising departments,
- within rooms or areas for student use in assembly occupancies,
- within general work areas, including office areas,
- within general use or general service areas, including shared laundry areas in residential occupancies, recreational areas, cafeterias, lounge rooms, lunch rooms and infirmaries,
- within sleeping rooms in hospitals and nursing homes,
- (if installed), into at least one passenger elevator or elevating device conforming to Articles 3.5.2.1. and 3.8.3.5.,
- into washrooms described in Article 3.8.2.3.,
- to any facility required by this Section to be designed to accommodate persons with physical disabilities,
- onto every balcony provided in conformance with Clause 3.3.1.7.(1)(c), and
- to service counters used by the general public (examples include ticket counters, refreshment stands, drinking fountains, cafeteria counters, checkout counters and bank service counters).

The permission to waive a barrier-free path of travel for wheelchair access to certain specified areas of a building is not intended to waive accessibility requirements for persons whose physical disabilities do not require special provision for access to raised or sunken levels. Persons with visual or hearing disabilities that do not require the use of a wheelchair can be expected to move throughout a building.

The concept of providing similar amenities and facilities applies, among other things, to food, beverage, and entertainment facilities within restaurants, to smoking and non-smoking areas permitted in accordance with local regulations, and to window areas providing a view of an exterior attraction.

Availability of specific spaces depends on reservation policy and the sequence in which patrons arrive at a restaurant or other facility, and therefore is beyond the scope of this Code.

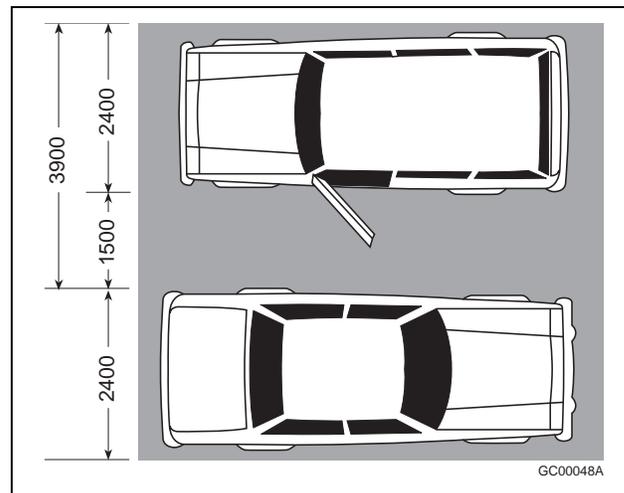
Accessibility "within" a floor area means that in general all normally occupied spaces are to be accessible, except those areas which are deemed not to require barrier-free access. Examples of excluded floor areas are small raised office areas in retail and industrial premises and storage platforms in industrial and other occupancies.

The concept of wheelchair accessibility does not extend to building service facilities, nor to all floor levels within a storey, e.g., mezzanines not served by an elevator. Mezzanines that are accessible by an elevator are therefore not excluded.

**A-3.8.2.2. Access to Parking Areas.** The Municipal Government Act provides a mechanism for determining the characteristics of our communities. Where local bylaws require that parking be available, the Code requires that a percentage of parking spaces be designed to allow persons using wheelchairs sufficient room to get in and out of a vehicle. A barrier-free path of travel must also be provided from the parking area to the building.

The designer must provide a properly identified and unobstructed path of travel from the parking area to the entrance that is accessible. The entrance chosen should, in any case, be one normally used by the occupants of the building. Long paths of travel are not recommended.

**A-3.8.2.2.(4) Parking.** Many wheelchair users who drive enter their vehicles on the passenger side (right-hand side) of the vehicle; many use a lift. It is possible to place two stalls side by side and make use of a common access aisle. Figure A-3.8.2.2.(4)-A provides suggested dimensions. Marking the access aisle with white or blue lines and marking the stalls with a large blue dot has been an effective way of designating the parking area for wheelchair users; however, such painted surfaces can become a slip hazard and unless they can be made slip-resistant must be avoided. A sign indicating that a permit is required to use the designated stall must also be posted (see Figure A-3.8.2.2.(4)-B).



**Figure A-3.8.2.2.(4)-A**  
**Common Access Aisle**



Figure A-3.8.2.2.(4)-B  
“Permit Required” sign

**A-3.8.2.3. Washrooms.** The primary intent of this requirement is that all regular washrooms be made accessible to all persons, including persons with disabilities, primarily those who use a wheelchair. Well-designed washrooms that can accommodate such persons need not be much larger than conventional washrooms.

Clause 3.8.2.3.(2)(b) is intended to address “strip malls” (a shopping mall with no public corridor). Part 7, which requires plumbing facilities, does not address the concept of suite and could permit, for instance, a shopping mall containing only Group E occupancies (assuming the mall is more than 100 m<sup>2</sup>) to have only one washroom for each sex located in any one of the suites. It is desirable, however, that washrooms be located so as to be accessible at all times, since the owner or tenant of one suite has no control over the activities of another. These buildings may have either public barrier-free washrooms in a central location or washrooms that can accommodate persons with physical disabilities in each suite. This arrangement relieves any one tenant from having to provide “public” washrooms. Hence, the exception for suites of less than 500 m<sup>2</sup> is meant as a relaxation to avoid an unnecessary burden on small facilities but should not be construed as meaning that these buildings need not provide accessible washrooms.

Sentence 3.8.2.3.(4) clarifies that universal toilet rooms (“unisex”) should not be used as a substitute for making regular washrooms accessible. These washrooms are an alternative which the authority having jurisdiction could require in the course of renovations to an existing building to satisfy the requirements of Sentence 3.8.2.3.(1), in cases where modifying existing washrooms proves impracticable or where Part 7 permits the use of a single washroom for both sexes. This does not preclude the provision of special washrooms in addition to barrier-free regular washrooms; “unisex” washrooms are desirable in large shopping complexes and multiple-use complexes, as well as transportation terminals, in cases where persons must be accompanied by an attendant because of their degree of disability. These facilities are convenient because they may be used regardless of the gender of the person with disabilities or the attendant.

**A-3.8.3.1.(1) and (2) Accessibility Signs.** The official symbol, shown in Figure A-3.8.3.1.(1) and (2), indicates to persons with physical disabilities that they will have reasonable freedom of movement within a building so signed. The symbol is usually white on a blue background; where these colours do not stand out, the sign can be set on a white background. An arrow can be added to indicate direction or the location of an accessible space or facility.



Figure A-3.8.3.1.(1) and (2)  
Signs indicating accessible facilities

**A-3.8.3.1.(3) Accessibility Signs.** The location of special facilities or services for persons with a specific disability should be indicated by an internationally recognized sign: facilities for the hard of hearing are identified by a stylized ear; telecommunication devices for the deaf are identified by a stylized keyboard; the location facilities and services for persons with vision impairments or persons who are blind are denoted by a stylized person walking with a cane.

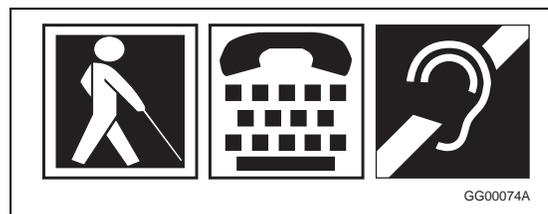


Figure A-3.8.3.1.(3)  
Signs indicating accessible facilities

**A-3.8.3.3.(1) Doorway Width.** Standard wheelchair width specifications indicate a range of sizes from 584 mm overall to 685 mm overall. Every doorway that is located in a barrier-free path of travel must have a clear width of not less than 800 mm when the door is in the open position and therefore it is important that this dimension be measured correctly. Figure A-3.8.3.3.(1) shows a door opened to 90°. It is clear that the door, and to a lesser extent the stop, impinges on the space within the door frame. The clear width of not less than 800 mm is measured from the face of the door to the outside edge of the stop on the door frame. It is not sufficient just to measure the inside width of the door frame. Other factors, including location of door stops other than on the door frame, and the installation of door closers and exit devices, should be taken into account. The intrusion of a door handle into the space is of lesser importance. It is recognized that there are many types of door frame and door mounts but the overall objective is to maintain a clear width of not less than 800 mm. The diagram depicts a somewhat restrictive scenario, as many doors can open wider than 90°, however, a door smaller than 864 mm would not be wide enough to ensure the minimum clear width of 800 mm that is required.

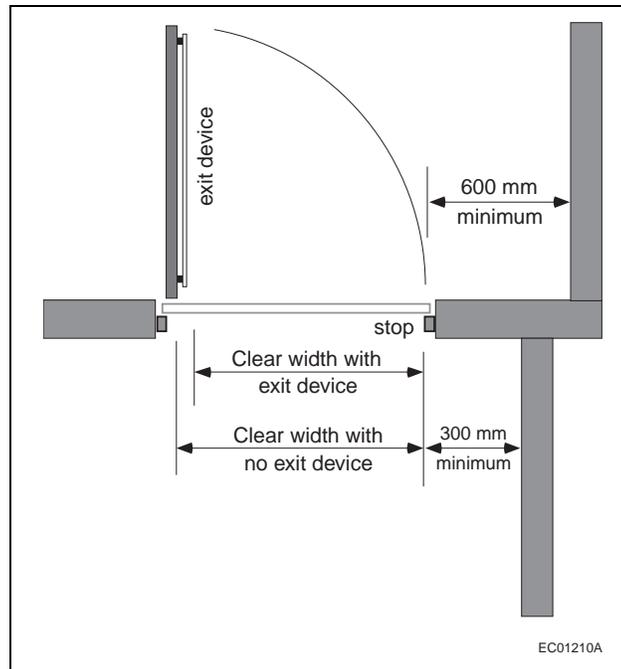


Figure A-3.8.3.3.(1)  
Clear doorway width

**A-3.8.3.3.(2) Residential Occupancies.** This requirement ensures that the doorways in larger residential complexes, such as apartments, hotels, care facilities and facilities housing social programs, are at least large enough to accommodate someone using a wheelchair. Residential suites must allow reasonable accessibility for persons in wheelchairs. Where a suite has more than one washroom, only one may need to be designed to be barrier-free. It is relatively simple to make washrooms accessible through careful planning and positioning of fixtures and this can be achieved in an area not much larger than that of conventional washrooms.

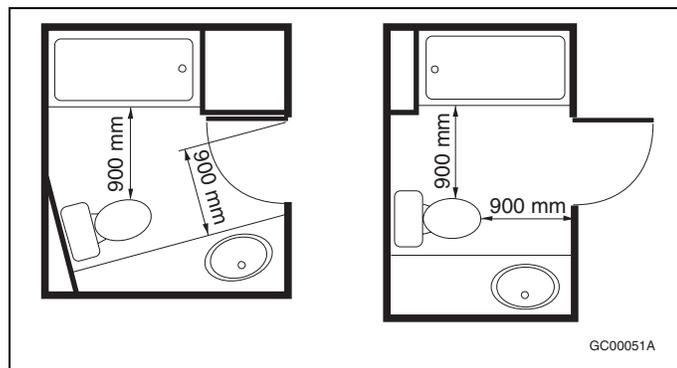


Figure A-3.8.3.3.(2)  
Residential washrooms

**A-3.8.3.3.(3) Lever Handles.** Lever handles are usable by most persons with limited hand mobility and will meet the intent of this requirement. Lever handles with an end return towards the door are less prone to catch the clothing of someone passing through the doorway.

**A-3.8.3.3.(5) Doors with Power Operators.** Doors equipped with a power operator actuated by a pressure plate identified with the international symbol for accessibility or, where security is required, by a key, card or radio transmitter, and that can otherwise be opened manually, meet the intent of the requirement. The location of these actuating devices should ensure that a wheelchair will not interfere with the operation of the door once it is actuated. Swinging doors equipped with power operators which are actuated automatically and open into passing pedestrian traffic should be provided with a guard or other device designed to prevent pedestrians from stepping in the swing area of the door. These guards or devices should be detectable by blind persons. For example, inverted U-shaped guards should have an additional rail at a height not more than 680 mm so that it is detectable by the long cane. These doors should also have a device (mat or other sensor) on the swing side to prevent the door from opening if someone is standing in the swing area.

**A-3.8.3.3.(8) Air Pressure Differences.** Differences in air pressure on opposite sides of a door may be due to the operation of mechanical systems such as those associated with smoke control. So-called "stack action" in buildings in winter can also cause differential pressures due to the buoyancy of warm air. Stack action is usually most noticeable between stairwells and the remainder of the building, and at the entrances to buildings; the taller the building, the greater the effect. Doors with automatic closers have to operate with sufficient opening force to allow the return action to overcome the differential pressure.

**A-3.8.3.3.(9) Delayed Action on Door Closers.** In some circumstances, closers with a delay feature which keeps the door open for several seconds before it begins to close might be desirable. However, closers with this feature have limited back-check, a feature of a normal door closer where resistance to opening increases as the door reaches the full arc of swing. Doors equipped with a delayed action closer are therefore more susceptible to damage should the door be opened with too much force or should someone try to force it closed, thinking the closer has failed to operate. Delayed action closers are not recommended for such occupancies as schools.

**A-3.8.3.3.(10) Clearance at Doorways.** Sufficient clearance must be provided on the latch side of doors for a user to operate the door-opening mechanism and open the door without interference from the wheelchair. This is particularly important for a door swinging towards the approach side. See Figure A-3.8.3.3.(10).

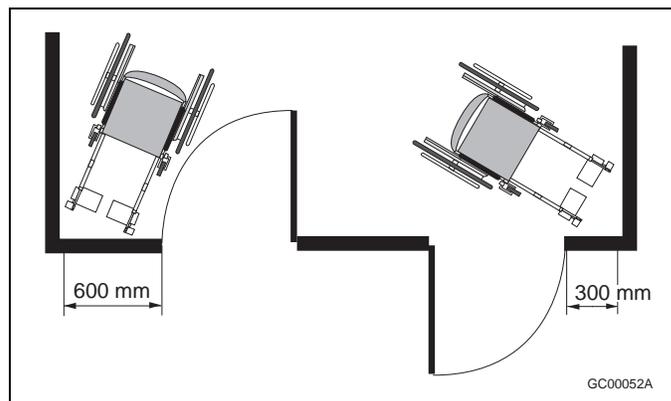
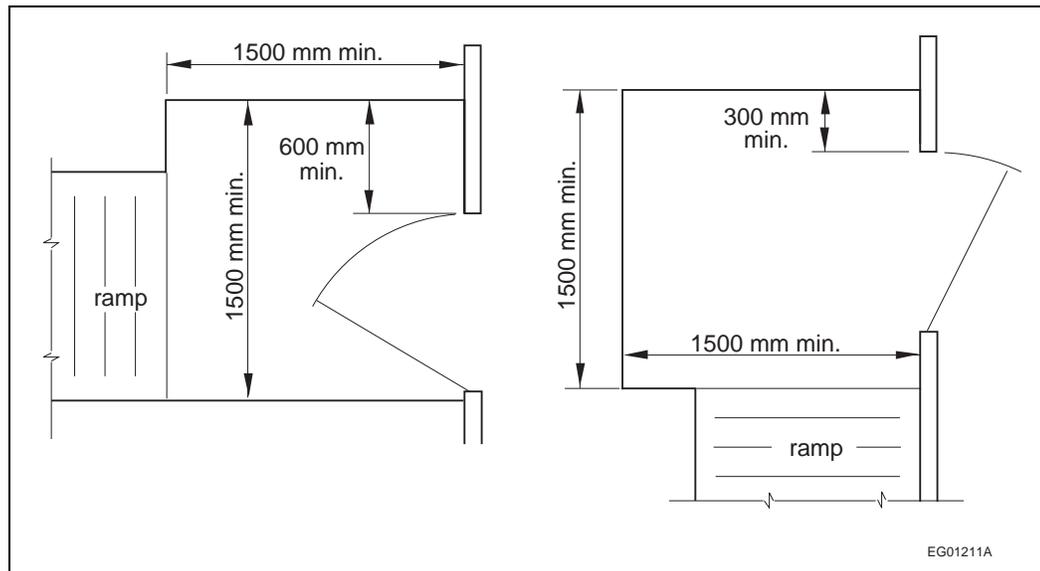


Figure A-3.8.3.3.(10)  
Doorway clearance

**A-3.8.3.4.(1)(b) Ramp Slopes.** Ramps with a slope of more than 1 in 16 can be very difficult for persons with physical disabilities to negotiate. Although Article 3.8.3.4. permits slopes on ramps as great as 1 in 12 for distances of up to 9 m, slopes of 1 in 20 are safer and less strenuous. Ramps with a slope of 1 in 12 should be restricted to lengths not exceeding 3 m whenever possible. A tactile warning strip, contrasting in colour, should be used at the top of ramps to warn blind and visually impaired persons of the change in elevation.

**A-3.8.3.4.(1)(c) Landing Design at Doorways Leading to Ramps.**



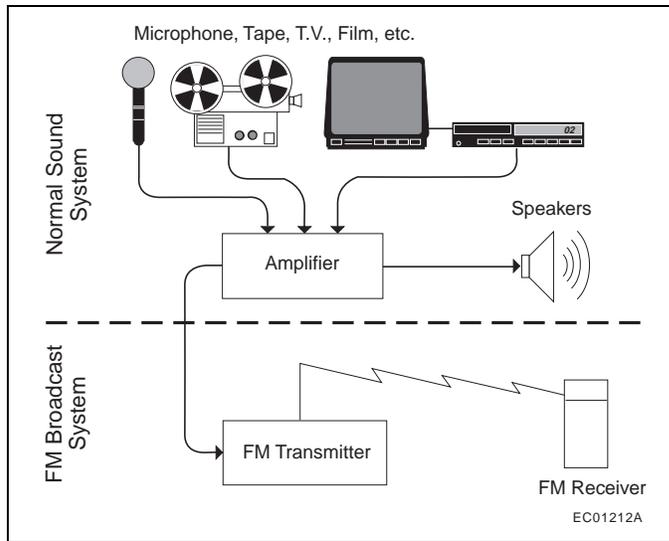
**Figure A-3.8.3.4.(1)(c)**  
Landing design at doorways leading to ramps

**A-3.8.3.7. Assistive Listening Devices.** Although the Alberta Building Code does not regulate the purchase of appliances, televisions used for public notices should be designed for closed captioning. Where the public relies on information for directions or on public announcements, provisions should be made to broadcast these both audibly and visually. For instance, public announcements at sports events could be displayed visually on the scoreboard. Schedules for trains and planes should be available audibly as well as visually.

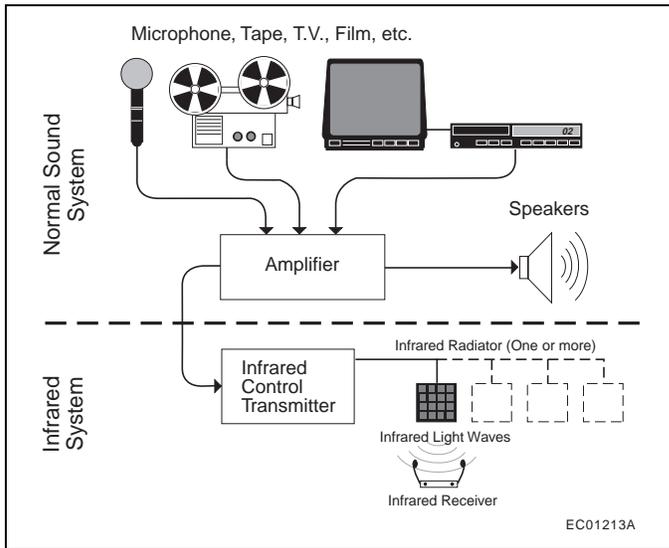
Wireless sound transmission systems, including FM, infrared or magnetic induction loop systems, improve sound reception for persons with hearing disabilities by providing amplification which can be adjusted by each user while blocking out unwanted background noise. These systems transmit a signal that is picked up by a special receiver available for use by a person with a hearing disability, whether or not a hearing aid is used. Neither system interferes with the listening enjoyment of others.

The transmitter can be jacked into an existing P.A. system amplifier or used independently with microphones. The induction loop system requires users to sit in the area circumscribed by the loop; though installation of the loop is relatively simple, the installer should be knowledgeable about these systems if proper functioning is to be achieved. FM or infrared systems can be designed to broadcast signals which cover the entire room and thus do not restrict seating to any one area. Figures A-3.8.3.7.-A and A-3.8.3.7.-B show the general configuration of FM and infrared systems. Although portable systems (FM in particular) are available, these are best suited to small audiences. Generally, the systems installed in church halls, auditoria, theatres and similar places of assembly are not easily portable, as they are installed in a fixed location by a sound technician and form an integral part of the P.A. system of the room or building.

Hard-wired systems (where a jack is provided at a particular seat) will not meet this requirement unless adequate provisions are made to accommodate persons with hearing aids. In choosing the most appropriate system, a number of factors must be taken into account including cost, installation and maintenance, suitability to the audience, ease of operation and the need for privacy. Information on designers and suppliers of these systems may be obtained from the Canadian Hearing Society.



**Figure A-3.8.3.7-A**  
**FM sound transmission system**



**Figure A-3.8.3.7-B**  
**Infrared sound transmission system**

**A-3.8.3.8.(1)(b)(iii) Water Closet Stalls.** Doors to water closet stalls for persons with physical disabilities should swing outward, preferably against a side wall.

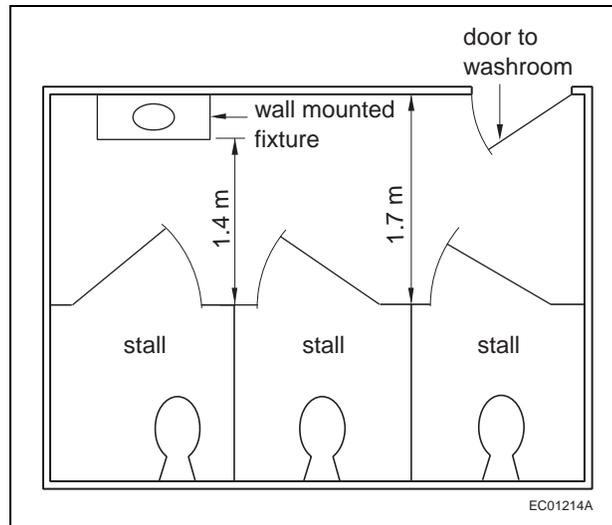


Figure A-3.8.3.8.(1)(b)(iii)  
Water-closet stalls

**A-3.8.3.8.(1)(b)(iv) Door Pulls.** The door pull should consist of a D-shaped handle mounted either horizontally or vertically. The centerlines are the lines drawn through the long axis and the short axis of the handle. If the handle is installed in the horizontal position, the short or transverse axis is the centerline which must be located at between 200 and 300 mm from the hinged side of the door, and the long or longitudinal axis is the one which is located between 900 and 1000 mm from the floor. If the handle is installed in the vertical position, the distance is measured from the longitudinal axis to the hinged side of the door, while the distance from the floor is measured to the transverse axis.

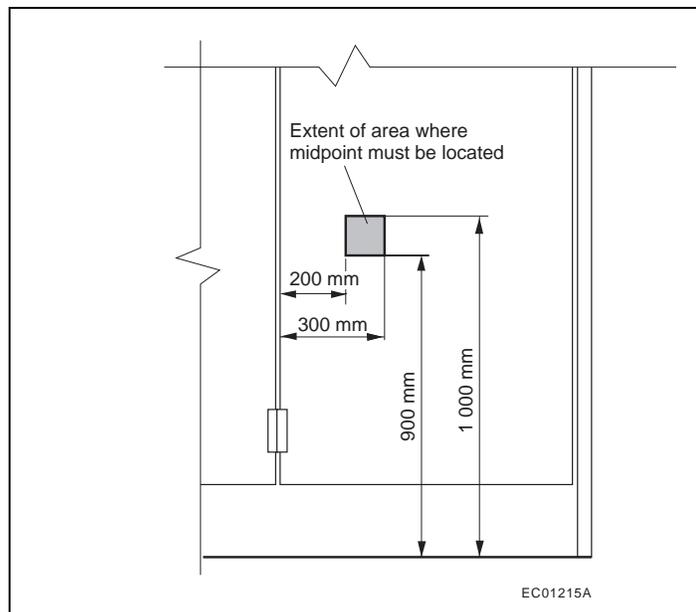


Figure A-3.8.3.8.(1)(b)(iv)-A  
Door pull location

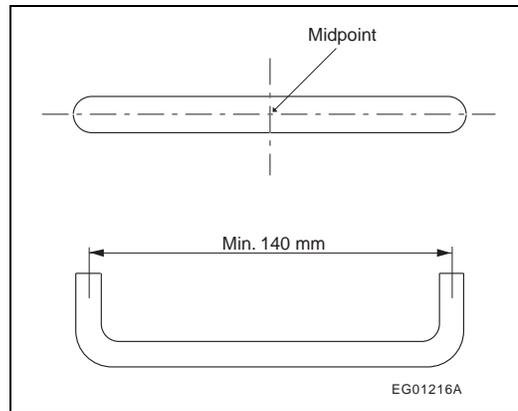


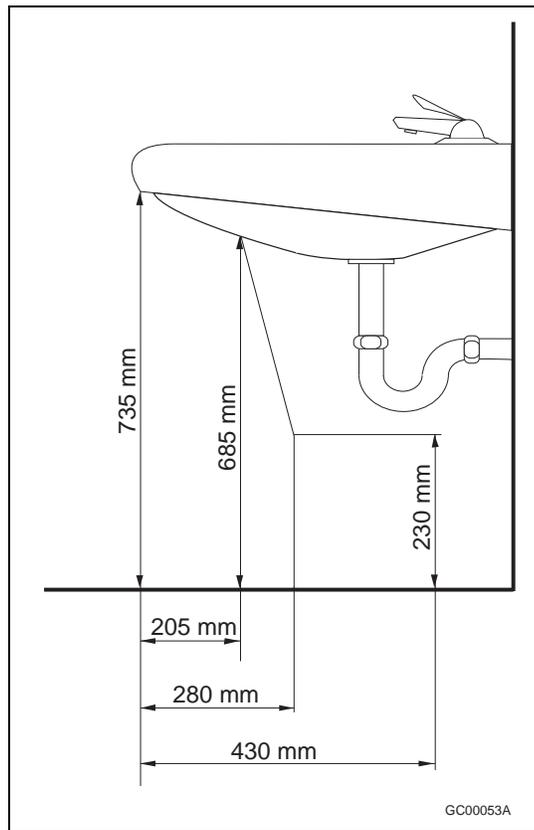
Figure A-3.8.3.8.(1)(b)(iv)-B  
Door pull details

**A-3.8.3.8.(2) Grab Bars.** The required grab bars referred to in Clause 3.8.3.8.(1)(d) must be mounted horizontally. It is the designer's prerogative to exceed the minimum requirements found in this Code and specify the installation of additional grab bars in other locations. These additional grab bars may be of different configurations and can be installed in other orientations.

**A-3.8.3.9.(1) Water Closets.** Wall-mounted water closets or floor models with receding bases are preferable because they provide the least amount of obstruction.

**A-3.8.3.10.(2) Urinals.** Men with physical disabilities are often able to use the urinal in a public washroom. Grab bars, on both sides of the urinal, are essential for those who are able to support themselves in a standing position. Grab bars are also very useful for the elderly, men who have had a stroke, and those who use a cane. In addition, some men using wheelchairs use a leg storage bag and require a draining location. The draining is often electronically controlled from a valve near the ground. It is best that the bottom of the urinal be flush with the floor to facilitate the draining of the leg bag. In no case should it be more than 20 mm above the floor.

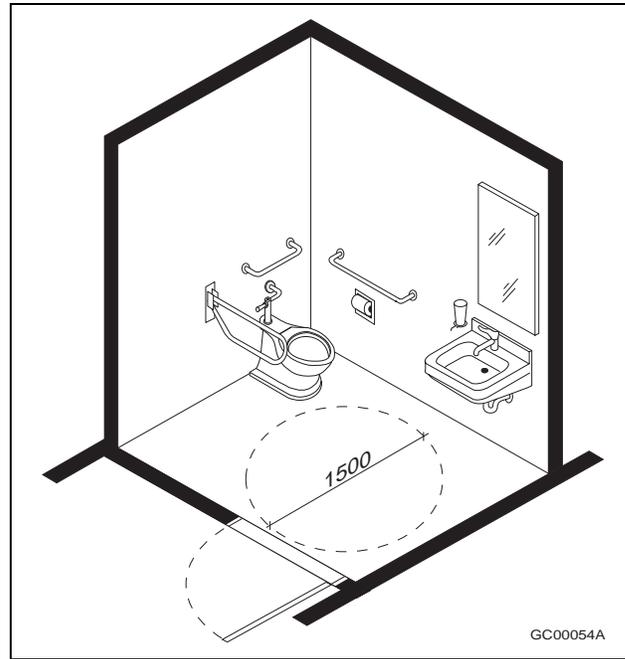
**A-3.8.3.11.(1)(c) Clearances Beneath a Lavatory.**



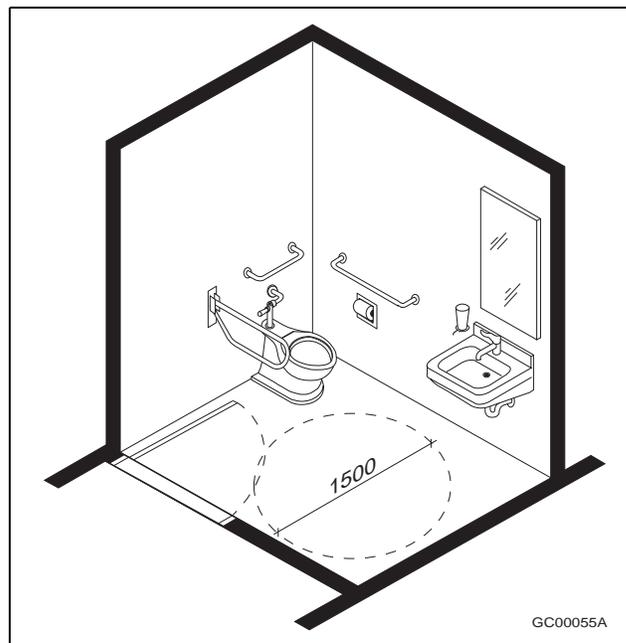
**Figure A-3.8.3.11.(1)(c)**  
Clearances beneath a lavatory

**A-3.8.3.11.(1)(d) Pipe Protection.** Persons who have lost the sense of touch in their limbs cannot feel hot or cold and are susceptible to burns without knowing. The pipes referred to in Clause 3.8.3.11.(1)(d) include both supply and waste pipes. The hazard can be prevented by insulating the pipes, by locating the pipes in enclosures, or avoided by limiting the temperature of the hot water to a maximum of 45°C.

**A-3.8.3.12. Universal Toilet Rooms.** Unobstructed areas in front of the lavatory, in front of the water closet and on one side of the water closet are necessary for manoeuvrability of a person using a wheelchair. Although outward swinging doors are preferable for accessibility, inward swinging doors are also permitted. Figures A-3.8.3.12.-A and A-3.8.3.12.-B show design options that meet the intent of Article 3.8.3.12.



**Figure A-3.8.3.12.-A**  
 Universal toilet room with outward swinging door



**Figure A-3.8.3.12.-B**  
 Universal toilet room with inward swinging door

**A-3.8.3.13.(1)(b) Clear Space at Entrances to Showers.** The clear space at the entrance to a shower may be encroached upon by fixtures such as a wall hung sink which does not interfere with the leg rests of the wheelchair. However, this sink could restrict movement for persons who need to make a lateral transfer if it were installed at the seat end of the shower.

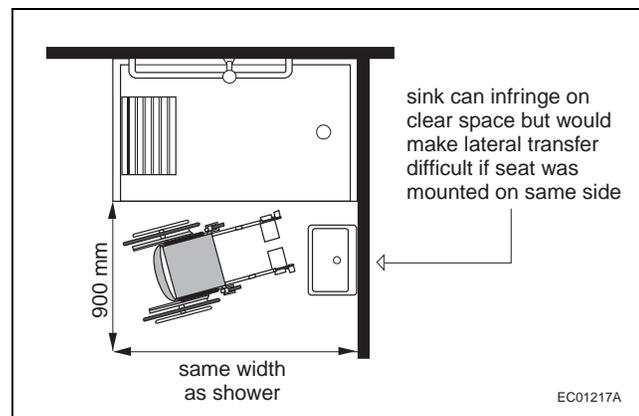


Figure A-3.8.3.13.(1)(b)  
Shower design

**A-3.8.3.13.(1)(f) Grab Bars.** One horizontal grab bar is required to be installed on the wall next to the seat. A grab bar behind the seat would prevent the user from leaning back against the wall, while one located on the wall opposite the seat cannot be reached from the seated position. The seat itself may be used in conjunction with the bar for transfer. If design flexibility is required, fold away grab bars can be used as an alternative.

**A-3.8.3.14.(1) Counters with Work Surfaces.** It is not intended that all counters be barrier-free, but that sufficient barrier-free counter space be available. Examples of counters that should be barrier-free include check-in counters and those in financial institutions and reception areas as well as any counter at which processing and signing of documents takes place. The provision is not intended to apply to work surfaces in industrial occupancies.

**A-3.8.3.15. Telephone Equipment, Shelves or Counters.** Generally, pay phone booths are pre-manufactured by a limited number of suppliers. There is often little choice in regard to the dimensions. The intent of the various dimension requirements of Article 3.8.3.15. is to ensure that persons using wheelchairs will be able to conveniently use the pay phones. The height of the coin slot (1 370 mm) reflects the current industry standard; however 1 200 mm would be the preferred height. The shelf dimensions ensure that there is a convenient usable shelf for all persons that will also accommodate a portable TDD for persons who are deaf or hard of hearing. A typical portable TDD is approximately 265 mm by 265 mm. The pay phone can be mounted to the side of the booth to allow for the open area above the shelf.

**A-4.1.1.3.(1) Structural Integrity.** The requirements of Part 4, including the CSA design standards, generally provide a satisfactory level of structural integrity. Additional considerations may, however, be required for building systems made of components of different materials, whose interconnection is not covered by existing CSA design standards, buildings outside the scope of existing CSA design standards, and buildings exposed to severe accidental loads such as vehicle impact or explosion. Further guidance can be found in the Commentary entitled Structural Integrity in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.1.3.(2) Serviceability.** Information on serviceability can be found in the Commentary entitled Deflection and Vibration Criteria for Serviceability and Fatigue Limit States in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.1.5.(2) Structural Equivalents.** Sentence 4.1.1.5.(2) provides for the use of design methods not specified in Part 4, including full-scale testing and model analogues. This provision is usually used to permit the acceptance of new and innovative structures or to permit the acceptance of model tests such as those used to determine structural behaviour, or snow or wind loads. Sentence 4.1.1.5.(2) specifically requires that the level of safety and performance be at least equivalent to that provided by design to Part 4 and requires that loads and designs conform to Section 4.1.

Sentence 4.1.1.5.(2) and the provision for alternative solutions stated in Clause 1.2.1.1.(1)(b) of Division A are not intended to allow structural design using design standards other than those listed in Part 4. The acceptance of structures that have been designed to other design standards would require the designer to prove to the appropriate authority that the structure provides the level of safety and performance required

**A-4.1.2.1.**

by Clause 1.2.1.1.(1)(b) of Division A. The equivalence of safety and performance can only be established by analyzing the structure for the loads and load factors set out in Section 4.1. and by demonstrating that the structure at least meets the requirements of the design standards listed in Sections 4.3. and 4.4.

**A-4.1.2.1. Loads and Effects.** Information on the definitions can be found in the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.2.1.(1) Temperature Changes.** Information on effects due to temperature changes can be found in the Commentary entitled Effects of Deformations in Building Components in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.2.1.(3) Major Occupancies.** In a building containing more than one major occupancy and classified in more than one Importance Category, the classification of each independent structural system shall be the same as for any part of the building that is dependent on that structural system and for the highest usage group according to Table 4.1.2.1.

**A-Table 4.1.2.1. Importance Categories for Buildings.****Low Importance Category Buildings**

Low human-occupancy farm buildings are defined in the National Farm Building Code of Canada 1995 as having an occupant load of 1 person or less per 40 m<sup>2</sup> of floor area. Minor storage buildings include only those storage buildings that represent a low direct or indirect hazard to human life in the event of structural failure, either because people are unlikely to be affected by structural failure, or because structural failure causing damage to materials or equipment does not present a direct threat to human life.

**Buildings Containing Hazardous Materials**

The following buildings contain sufficient quantities of toxic, explosive or other hazardous substances to be classified in the High Importance Category of use and occupancy:

- petrochemical facilities,
- fuel storage facilities (other than those required for post-disaster use), and
- manufacturing or storage facilities for dangerous goods.

The following types of buildings may be classified in the Normal Importance Category: buildings that are equipped with secondary containment of toxic, explosive or other hazardous substances, including but not limited to, double-wall tanks, dikes of sufficient size to contain a spill, or other means to contain a spill or a blast within the property boundary of the facility and prevent the release of harmful quantities of contaminants to the air, soil, groundwater, surface water or atmosphere, as the case may be.

**A-4.1.3. Limit States Design.** Information on limit states design can be found in the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-Table 4.1.3.2. Load Combinations.** One of the combinations that must be considered is the principal load acting alone.

**A-4.1.3.2.(2) Load Combinations.** The load combinations in Table 4.1.3.2. apply to most situations for loadbearing building structures. Guidance on special situations such as load combinations for fire resistance and building envelopes is given in the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.2.(3) Effects of Lateral Earth Pressure, H, Pre-stress, P, and Imposed Deformation, T, in Design Calculations.**

**Effects of Lateral Earth Pressure, H, in Design Calculations**

For common building structures below ground level, such as walls, columns and frames, 1.5 H is added to load combinations 2 to 4. For cantilever retaining wall structures, see the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**Effects of Pre-stress, P, and Imposed Deformation, T, in Design Calculations**

For structures and building envelopes designed in accordance with the requirements specified in the standards listed in Section 4.3., with the exception of Clauses 8 and 18 of CSA A23.3, P and T need not be included in the load combinations of Table 4.1.3.2. For structures not within the scope of the standards listed in Section 4.3., including building envelopes, P and T must be taken into account in the design calculations. For recommended load combinations including T, see the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.2.(4) Overturning, Uplift or Sliding.** Information on overturning, uplift and sliding can be found in the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.3.(1) Failure due to Fatigue.** Failure due to fatigue of building structures referred to in Section 4.3. and designed for serviceability in accordance with Article 4.1.3.6. is, in general, unlikely except for girders supporting heavily used cranes, on which Article 4.1.5.12. provides guidance.

**A-4.1.3.3.(2) Vibration Effects.** Guidance on vibration effects can be found in the Commentary entitled Deflection and Vibration Criteria for Serviceability and Fatigue Limit States in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.4.(1) Loads and Load Combinations for Serviceability.** The loads and load combinations for serviceability depend on the serviceability limit states and on the properties of the structural materials. Information on loads and load combinations for the serviceability limit states, other than those controlled by deflection, can be found in the Commentary entitled Deflection and Vibration Criteria for Serviceability and Fatigue Limit States in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.5.(1) Deflections.** Serviceability criteria for deflections that cause damage to non-structural building components can be found in the standards listed in Section 4.3. Information on deflections can be found in the Commentary entitled Deflection and Vibration Criteria for Serviceability and Fatigue Limit States in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B). Information on loads and load combinations for calculating deflection can be found in the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.5.(3) Lateral Deflection of Buildings.** The limitation of 1/500 drift per storey may be exceeded if it can be established that the drift as calculated will not result in damage to non-structural elements. Information on lateral deflection can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.6.(1) Floor Vibration.** Information on floor vibration can be found in the Commentary entitled Deflection and Vibration Criteria for Serviceability and Fatigue Limit States in the User's Guide - NBC 2005, Structural Commentaries (Part 4 of Division B). Information on loads and load combinations for the calculation of vibration can be found in the Commentary entitled Limit States Design in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.6.(2) Dynamic Analyses of Floor Vibrations.** Information on a dynamic analysis of floor vibrations from rhythmic activities can be found in the Commentary entitled Deflection and Vibration Criteria for Serviceability and Fatigue Limit States in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.3.6.(3) Lateral Vibration Under Wind Load.** Information on lateral vibrations and accelerations under dynamic wind loads can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.4.1.(6) Counteracting Dead Load Due to Soil.** Examples of structures that traditionally employ the dead load of soil to resist loadings are pylon signs, tower structures, retaining walls, and deadmen, which resist wind uplift and overturning in light structures.

**A-Table 4.1.5.3. Considerations for Live Loads.****Attics - Limited Accessibility**

Attic live loading is not required when the ceiling below the attic consists of removable panels that permit access to the ceiling space without loading the ceiling supporting members. Attic live loading is not required in any area of the attic where the least dimension of the attic space is less than 500 mm.

**Floor Areas That Could Be Used As Viewing Areas**

Some interior balconies, mezzanines, corridors, lobbies and aisles that are not intended to be used by an assembly of people as viewing areas are sometimes used as such; consequently, they are subject to loadings much higher than those for the occupancies they serve. Floor areas that may be subject to such higher loads must, therefore, be designed for a loading of 4.8 kPa.

**A-4.1.5.9. Tributary Area.** Information on tributary area can be found in the Commentary entitled Tributary Area in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-Table 4.1.5.10. Loads Due to Concentrations.** Special study is required to determine concentrated loads for the design of floors and areas used by vehicles exceeding 9000 kg gross weight, and of driveways and sidewalks over areaways and basements. Where appropriate the designer should refer to CAN/CSA-S6, "Canadian Highway Bridge Design Code."

**A-4.1.5.12. Crane-Supporting Structures.** Guidance on crane-supporting structures can be found in CAN/CSA-S16, "Limit States Design of Steel Structures."

**A-4.1.5.15. and 4.1.5.16.(1) Design of Guards.** In the design of guards, due consideration should be given to the durability of the members and their connections.

**A-4.1.5.18. Loads on Firewalls.** Information on loads on firewalls can be found in the Commentary entitled Structural Integrity of Firewalls in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.6.2. Coefficients for Snow Loads on Roofs.** Information on coefficients for snow loads on roofs can be found in the Commentary entitled Snow Loads in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.6.2.(4)(b) Unit Weight of Snow.** Information on the unit weight of snow can be found in the Commentary entitled Snow Loads in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.6.3.(2) Full and Partial Loading under Snow Loads.** Information on full and partial snow loading on roofs can be found in the Commentary entitled Snow Loads in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.6.4.(1) Rain Loads.** Information on rain loads can be found in the Commentary entitled Rain Loads in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.6.4.(3) Flow Control Drains.** The plumbing and drainage regulations made pursuant to the Safety Codes Act contain requirements regarding the use of flow control roof drains. The designer must ensure that the building complies with both the regulations and the Alberta Building Code.

**A-4.1.7.1.(1) to (3) Pressure Coefficients for Wind Loads.** Information on pressure coefficients can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.7.1.(5)(a) to (c) Simple Procedure for Calculating  $C_e$ .** Information on the simple procedure for calculating  $C_e$  can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.7.1.(5)(d) Dynamic Approach for Wind Loads.** Information on a dynamic approach can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.7.1.(6)(a) Gust Effect Factor for the Building as a Whole and Main Structural Members.** Information on the gust effect factor for the building as a whole and for the main structural members can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.7.1.(6)(c) Gust Factors for Calculation of Internal Pressures.** Information on gust factors for the calculation of internal pressures can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.7.1.(6)(d) and 4.1.7.2.(1)(b) Dynamic Approach to the Action of Wind Gusts.** Information on a dynamic approach to the action of wind gusts can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.7.3.(1) Full and Partial Loading under Wind Loads.** Information on full and partial loading under wind loads can be found in the Commentary entitled Wind Load and Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

#### **A-4.1.8.2.(1) Notation.**

##### **Definition of $e_x$**

Information on the calculation of torsional moments can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

##### **Definition of $W$**

Information on the definition of dead load,  $W$ , can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.3.(4) General Design of the SFRS.** Information on the general design requirements for the SFRS can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.3.(6) General Design of Stiff Elements.** Information on the general design requirements for stiff elements can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.3.(7)(b) and (c) Stiffness Imparted to the Structure from Elements Not Part of the SFRS.** Information on stiffness imparted to the structure from elements not part of the SFRS can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.3.(8) Structural Modelling.** Information on structural modelling can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.4.(3) and Table 4.1.8.4.A. Site Class.** Information on Site Class can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-Table 4.1.8.5. Serviceability Limit States for Earthquake.** Information on serviceability limit states for earthquake can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-Table 4.1.8.6. Structural Irregularities.** Information on structural irregularities can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.7.(1) Dynamic Analysis Procedures.** Information on dynamic analysis procedures can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.9.(4) Vertical Variations in  $R_dR_o$ .** Information on vertical variations in  $R_dR_o$  can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.9.(5)  $R_dR_o$  and Equivalent Systems.** Information on the  $R_dR_o$  of equivalent systems can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.11.(3) Determination of the Fundamental Period,  $T_a$ .** Information on the determination of the fundamental period,  $T_a$ , can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.12.(1)(a) Linear Dynamic Analysis.** Information on Linear Dynamic Analysis can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.12.(1)(b) Non-linear Dynamic Analysis.** Information on Non-linear Dynamic Analysis can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.12.(3) Ground Motion Histories.** Information on ground motion histories can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.12.(4)(a) Accidental Torsional Moments.** Information on accidental torsional moments can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.13.(4) Deflections and Sway Effects.** Information on deflections and sway effects can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.15.(1) Diaphragms and their Connections.** Information on diaphragms and their connections can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.15.(2) Discontinuities.** Information on elements supporting discontinuities can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.15.(3) Vertical Variations in  $R_dR_o$ .** Information on elements of the SFRS below the variation in  $R_dR_o$  can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.15.(4) Concurrent Yielding.** Information on the effects of concurrent yielding of elements can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.15.(5) Design Force in Elements.** Information on the design force in elements can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.16.(1) Rocking Foundations.** Information on foundations that are allowed to rock can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.16.(3)(a) Interconnection of Foundation Elements.** Information on the interconnection of piles or pile caps, drilled piers, and caissons can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.16.(4) Earthquake Lateral Pressures from Backfill or Natural Ground.** Information on methods of computing the seismic lateral pressures from backfill or natural ground can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.16.(5)(a) Cyclic Inelastic Behaviour of Foundation Elements.** Information on the cyclic inelastic behaviour of piles or pile caps, drilled piers, and caissons can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.16.(6) Alternative Foundation Ties.** Alternative methods of tying foundations together, such as a properly reinforced floor slab capable of resisting the required tension and compression forces, may be used. Passive soil pressure against buried pile caps may not be used to resist these forces.

**A-4.1.8.16.(7) Liquefaction.** Information on liquefaction can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.1.8.17.(8)(f) Ductile Connections.** Information on ductile connections can be found in the Commentary entitled Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.2.2.1.(1) Subsurface Investigation.** Where acceptable information on subsurface conditions already exists, the investigation may not require further physical subsurface exploration or testing.

**A-4.2.2.3.(1) Responsibilities of the Designer as Defined in Part 4.** In certain situations, such as when the design is highly technical, it may be necessary for the "other suitably qualified person" to be someone responsible to the designer. In such cases the authority having jurisdiction may wish to order that the review be done by the designer.

**A-4.2.4.1.(1) Innovative Designs.** It is important that innovative approaches to foundation design be carried out by a person especially qualified in the specific method applied and that the design provide a level of safety and performance at least equivalent to that provided for or implicit in the design carried out by the methods referred to in Part 4. Provision must be made for monitoring the subsequent performance of such structures so that the long-term sufficiency of the design can be evaluated.

**A-4.2.4.1.(3) Ultimate Limit States for Foundations.** Information on ultimate limit states for foundations, including terminology and resistance factors, can be found in the Commentary entitled Foundations in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.2.4.1.(5) Design of Foundations for Differential Movements.** Information on the design of foundations for differential movements can be found in the Commentary entitled Foundations in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.2.4.4.(1) Depth of Foundations.** When adfreeze has occurred and subsequent freezing results in soil expansion beneath this area, the resulting uplift effect is sometimes referred to as frost jacking.

A heated building that is insulated to prevent heat loss through the foundation walls should be considered as an unheated structure unless the effect of the insulation is taken into account in determining the maximum depth of frost penetration.

**A-4.2.5.1.(1) Excavations.** Information on excavations can be found in the Commentary entitled Foundations in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.2.6.1.(1) Shallow Foundations.** Information on shallow foundations can be found in the Commentary entitled Foundations in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.2.7.1.(1) Deep Foundation Units.** A deep foundation unit can be pre-manufactured or cast-in-place; it can be driven, jacked, jetted, screwed, bored or excavated; it can be of wood, concrete or steel or a combination thereof.

**A-4.2.7.2.(1) Deep Foundations.** Information on deep foundations can be found in the Commentary entitled Foundations in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**A-4.2.7.2.(2) Load Testing of Piles.** ASTM D 1143, "Piles Under Static Axial Compressive Load," defines routine load test procedures that have been extensively used.

**A-4.3.3.1.(1) Precast Concrete.** CSA A23.3, "Design of Concrete Structures," requires precast concrete members to conform to CAN/CSA-A23.4, "Precast Concrete – Materials and Construction."

**A-4.3.4.1.(1) Welded Construction.** Qualification for fabricators and erectors of welded construction is found in Clause 24.3 of CAN/CSA-S16, "Limit States Design of Steel Structures."

**A-4.3.4.2.(1) Cold-Formed Stainless Steel Members.** There is currently no Canadian standard for the design of cold-formed stainless steel structural members. As an interim measure, design may be carried out using the limit states design provisions of ANSI/ASCE 8, "Design of Cold Formed Stainless Steel Structural Members," except that load factors, load combinations and load combination factors shall be in accordance with Subsection 4.1.3.

**A-5 Environmental Separation.** The requirements provided in Part 5 pertain to the separation of environmentally dissimilar spaces. Most obvious is the need to separate indoor conditioned spaces from unconditioned spaces, the outdoors or the ground. There are also cases where separation is needed between interior spaces which are intended to provide different environments. (See also Appendix Notes A-5.1.1.1.(1) and A-5.1.2.1.(1).)

**A-5.1.1.1.(1) Scope.** Subsection 1.3.3. of Division A specifies that Part 5 applies to all buildings except those within the scope of Part 9. Because of their intended use, many buildings need only provide a limited degree of separation from the outdoor environment, the ground, or between interior spaces. The provisions in Part 5 are written to allow exemptions for these buildings.

**A-5.1.2.1.(1) Application.** Part 5 applies to building elements that separate dissimilar environments and to site conditions that may affect environmental loading on the building envelope.

The provisions address

- the design and construction, or selection, of building components, such as windows and doors,
- the design and construction of building assemblies, such as walls, floors and roofs,
- the design and construction of the interfaces between the above-mentioned elements, and
- the design or selection, and installation, of site materials, components and assemblies, such as backfill and drainage, and grading.

Part 5 applies not only to building elements that separate indoor space from outdoor space, but also to those elements that separate indoor space from the ground and that separate adjacent indoor spaces having significantly different environments.

Indoor spaces that require separation include interior conditioned spaces adjacent to indoor unconditioned spaces, and adjacent interior conditioned spaces that are intended to provide different environments. An extreme example of the last would be a wall that separates an indoor ice rink from a swimming pool.

Some building elements are exposed to exterior environmental loads but do not separate dissimilar environments. Solid guards on exterior walkways are one example. Such constructions are subject to the application of Part 5.

**A-5.1.4.1. Application of Structural Design to Other Building Elements.** Part 4, as currently written, applies primarily to buildings as a whole and to structural members. Requirements defining structural loads and design to accommodate or resist those loads, however, apply not only to buildings as a whole and components that are traditionally recognized as structural members, but also apply to other elements of the building that are subject to structural loading. This is addressed to some extent in Part 4 by the requirements that pertain, for example, to wind loads on cladding. A range of structural loads and effects, as defined in Subsection 4.1.2., may be imposed on non-loadbearing elements such as backing walls, roofing, interior partitions and their connections. These must generally be addressed using the same load determination and structural design procedures as used for structural members.

Responsibility for the structural design of buildings as a whole and their structural members is commonly assigned to the engineer of record. The application of Part 4 reflects this, and as such, “non-structural” elements are not explicitly identified in the Part 4 provisions. Rather the application of Part 4 to these elements is specified in cross-references from other Parts of the Code, e.g. Part 5, which recognizes the fact that the structural design of these elements is often carried out by engineers other than the engineer of record.

Part 4 does not generally apply to the structural design of building services, such as heating, ventilating, air-conditioning, plumbing, electrical, electronic or fire safety systems, though these may be subject to structural loads. It does, however, apply to the design of the connections of building services to address earthquake loads (see Article 4.1.8.17.).

**A-5.1.4.1.(4) Past Performance as Basis for Compliance with Respect to Structural Loads.** As discussed in Appendix Note A-5.1.4.1., a range of structural loads and effects can be imposed on materials, components and assemblies in environmental separators and assemblies exposed to the exterior. In many instances, compliance with Sentence 5.1.4.1.(1) for structural loads must be determined based on the loads and calculation methods described in Part 4 as specified in Sentence 5.1.4.1.(2) and the referenced Subsection 5.2.2., e.g. for cladding. In practice, compliance for some materials, components or assemblies of environmental separators and assemblies exposed to the exterior is determined by relying on provisions governing the use of alternative solutions (such as Clause 1.2.1.1.(1)(b) of Division A and formerly Section 2.5. in the Alberta Building Code 1997).

For some very common building elements and installations, however, there is a very large body of evidence of proven performance over a long period of time. In these cases, imposing the degree of analysis, or documentation of performance, required by Part 4 or Section 2.3. of Division C would be unnecessary and onerous. Clause 5.1.4.1.(4)(b) is intended to address these particular cases. Because the constructions are so widely accepted throughout the industry and the body of evidence is so substantial (though not necessarily documented in an organized fashion), there should be no question that detailed analysis or documentation is unnecessary.

Whether compliance of a particular material, component or assembly may be determined based on past performance depends not only on the type of material, component or assembly, but also on its intended function, the particular loads to which it will be subject and the magnitude of those loads. Because the possible combinations and permutations are infinite, only guidelines can be provided as to when past performance is a reasonable basis for determining compliance.

In determining compliance based on past performance, the period of past performance considered should be a substantial number of years. For example, 30 years is often used to do life-cycle cost analysis of the viability of investments in building improvements. This period is more than long enough for most deficiencies to show up. There should be no question as to the structural adequacy of a material, component or assembly that has been successfully used in a given application for such a period.

The determination of compliance may be based on past performance only where the function of the material, component or assembly is identical to that of the materials, components or assemblies used as a reference, and where the expected loads do not exceed those imposed on the reference materials, components or assemblies. For example, the acceptance of gypsum board, and its fastening, to serve as part of the backing wall supporting cladding cannot be based on the performance of gypsum board that has served only as an interior finish.

The determination of compliance may be based on past performance only where the properties of the material, component or assembly are identical or superior to those of the materials, components or assemblies used as a reference. For example, where a component of a certain gauge of a particular metal has provided acceptable performance, the same component made of the same metal or a stronger one would be acceptable.

Compliance with respect to various loads may be determined individually. A particular material may have to be designed to Part 4 to establish acceptable resistance to wind or earthquake loads, for example, but past performance may be adequate to determine that the material and normal fastening will support the material's dead load and will resist loads imposed by thermal and moisture-related expansion and contraction.

Past performance is a reasonable basis for determining compliance for lighter materials, components or assemblies not subject to wind load; for example, semi-rigid thermal insulation installed in wall assemblies where other materials, components or assemblies are installed to resist air pressure loads.

Past performance is an appropriate basis for determining compliance for some smaller elements that will be subject to wind loads but are continually supported or fastened behind elements that are designed for wind loads, for example, standard flashing over wall penetrations.

It should be noted that this particular approach to demonstrating compliance pertains only to the resistance or accommodation of structural loads described in Part 4. The resistance or accommodation of environmental loads, resistance to deterioration, and material compatibility must still be addressed in accordance with Part 5.

**A-5.1.4.1.(5)(b) and (c) Deflection.** It is well understood that the deflection of the backing assembly in a wall can have significant effects on the performance of the cladding. For example, Clauses 9.14.3 and 10.14.3 of CSA S304.1, "Design of Masonry Structures," specifies the maximum deflection criteria for backing assemblies to masonry veneer. Clauses 5.1.4.1.(5)(b) and (c) are written in very general terms in recognition of the fact that not only can the deflection of cladding affect the performance of the backing assembly, but that the excessive deflection of any element has the potential to adversely affect the performance of any adjacent element. Such effects must be avoided or accommodated.

**A-5.1.4.2. Deterioration.** Environmental loads that must be considered include but are not limited to: sound, light and other types of radiation, temperature, moisture, air pressure, acids and alkalis.

Mechanisms of deterioration include:

- structural (impact, air pressure)
- hygrothermal (freeze-thaw, differential movement due to thermal expansion and contraction, ice lensing)
- electrochemical (oxidation, electrolytic action, galvanic action, solar deterioration)
- biochemical (biological attack, intrusion by insects and rodents).

Information on the effects of deformations in building elements can be found in the Commentary entitled Effects of Deformations in Building Components in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

Resistance to deterioration may be determined based on field performance, accelerated testing or compliance with guidelines provided by evaluation agencies recognized by the authority having jurisdiction.

Building components must be designed with some understanding of the length of time over which they will effectively perform their intended function. Actual service life will depend on the materials used and the environment to which they are exposed. The design should take into consideration these factors, the particular function of the component and the implications of premature failure, the ease of access for maintenance, repair or replacement, and the cost of repair or replacement.

Many buildings are designed such that access for maintenance, repair or replacement is not possible without damaging—or seriously risking damaging—other building elements. This can become a considerable deterrent to proper maintenance thus compromising the performance of the subject materials, components and assemblies, or other elements of the building. In cases where it is known or expected that maintenance, repair or replacement is likely to be required for certain elements before such time as the building undergoes a major retrofit, special consideration should be given to providing easy access to those elements.

Where the use of a building or space, or the services for a building or space, are changed significantly, an assessment of the impact of the changes on the environmental separators should be conducted to preclude premature failures that could create hazardous conditions.

**A-5.2.1.1.(3) Soil Temperatures.** In theory, soil temperatures are needed to determine the conformance of a design to the requirements related to heat transfer and vapour diffusion. In practice, standard construction in a particular area may have proven to perform quite adequately and detailed calculations of soil temperature are unnecessary. (See also Sentence 5.2.1.3.(2).)

**A-5.2.1.2.(1) Interior Environmental Loads.** The interior environmental conditions required depend on the intended use of the spaces in the building as defined in the building program. Spaces in different types of buildings and different spaces within a single building may impose different loads on the separators between interior and exterior spaces and between adjacent interior spaces. The separators must be designed to withstand the expected loads.

**A-5.2.2.2. Resistance to Wind and Other Air Pressure Loads.** The wind load provisions apply to roofing and other materials subject to wind-uplift loads.

Note that, although Article 5.2.2.2. is specifically concerned with wind loads and directly references only two Sentences from Part 4, Sentence 5.2.2.1.(1) references all of Part 4 and would invoke Article 4.1.7.4. for example, which is concerned with air pressure loads on interior walls and partitions.

**A-5.3. Heat Transfer.** In addressing issues related to health and safety, Section 5.3. calls up levels of thermal resistance needed to minimize condensation on or within environmental separators, and to ensure thermal conditions appropriate for the building use. Energy regulations, where they exist, specify levels of thermal resistance required for energy efficiency or call up energy performance levels, which relate to levels of thermal resistance. Where Part 5 calls for levels of thermal resistance higher than those required by the energy regulations, the requirements of Part 5 take precedence.

**A-5.3.1.1. Required Resistance to Heat Transfer.** The control of heat flow is required wherever there is an intended temperature difference across the building assembly. The use of the term “intended” is important since, whenever interior space is separated from exterior space, temperature differences will occur.

The interior of an unheated warehouse, for example, will often be at a different temperature from the exterior due to solar radiation, radiation from the building to the night sky and the time lag in temperature change due to the thermal mass of the building and its contents. If this temperature difference is not “intended,” no special consideration need be given to the control of heat flow.

If the warehouse is heated or cooled, thus making the temperature difference “intended,” some consideration would have to be given to the control of heat flow.

It should be noted, however, that in many cases, such as with adjacent interior spaces, there will be an intended temperature difference but the difference will not be great. In these cases, the provisions to control heat flow may be little or no more than would be provided by any standard interior separator. That is, materials typically used in the construction of partitions may provide the separation needed to meet the requirements of Section 5.3. without adding what are generally considered to be “insulating” materials.

**A-5.3.1.2. Material and Component Properties and Condensation.** Total prevention of condensation is generally unnecessary and its achievement is rarely a certainty at design conditions. Part 5, therefore, requires that condensation be minimized. The occurrence of condensation should be sufficiently rare, or the quantities accumulated should be sufficiently small and dry rapidly enough, to avoid material deterioration and the growth of mould and fungi.

**A-5.3.1.2.(1) Use of Thermal Insulation or Mechanical Systems for Environmental Control.** The level of thermal resistance required to avoid condensation on the warm side of an assembly or within an assembly (at the vapour barrier), and to permit the maintenance of indoor conditions appropriate for the occupancy depends on

- the occupancy
- the exterior design air temperature
- the interior design air temperature and relative humidity
- the capacity of the heating system, and
- the means of delivering heat.

To control condensation on the interior surface of an exterior wall, for example, the interior surface must not fall below the dew point of the interior air. If, for instance, the interior air is 20°C and 35% RH, the dew point will be 4°C. If the interior air is 20°C and 55% RH, the dew point will be 11°C.

Where the exterior design temperature is mild, such as in south coastal British Columbia, the interior RH during the heating season may well be around 55%. With an exterior temperature of -7°C, the materials in the environmental separator would have to provide a mere RSI 0.082 to avoid condensation on the interior surface.

Depending on the specific properties of the material, this RSI might be provided by 10-mm plywood. Therefore, materials generally recognized as thermal insulation would not be required only to limit condensation on the warmer side of the building envelope.

For most of the country, however, exterior design temperatures are much lower; for example, -20°C in Toronto and Charlottetown, and -50°C in Dawson. In these cases, maintaining temperatures inboard of the vapour barrier above the dew point will require insulation or increased heat delivery to the environmental separator. Direct delivery of heat over the entire surface of the environmental separator is generally impractical. Indirect heat delivery may not be possible without raising the interior air temperatures above the comfort level. In any case, increased heat delivery would often entail excessive energy costs.

In addition to controlling condensation, interior surface temperatures must be warm enough to avoid occupant discomfort due to excessive heat loss by radiation. Depending on the occupancy of the subject spaces, this may require the installation of insulation even where it is not needed to control condensation.

**A-5.3.1.2.(3) Heat Transfer through Fire-Rated Glazed Assemblies.** Thermal bridging through fire-rated glazed assemblies should not be ignored; measures should be taken to minimize condensation consistent with the intent of Sentence 5.3.1.2.(2).

**A-5.3.1.3.(2) Position of Materials Providing Thermal Resistance.** For a material providing thermal resistance to be effective, it must not be short-circuited by convective airflow through or around the material. The material must therefore be either

- the component of the air barrier system providing principal resistance to air leakage, or
- installed in full and continuous contact with a continuous low air permeance component.

**A-5.4.1.1. Resistance to Air Leakage.** An air barrier system in above-grade building components and assemblies separating conditioned space from the exterior will reduce the likelihood of condensation due to air leakage, discomfort from drafts, the infiltration of dust and other pollutants, and interference in the performance of building services, such as HVAC and plumbing. These problems can all lead to serious health or safety hazards.

Currently, the most obvious and significant problems are due to moisture-related material deterioration, such as rot and corrosion, which can lead to the failure of component connections. The infiltration of dust and other pollutants can lead to a wide range of health problems. Where the separator is subject to high moisture levels, the pollutants may include fungus spores. Interference with the performance of building services can lead to unhealthy conditions and potentially hazardous conditions during the heating season in many regions of the country.

There are few buildings intended for human occupancy where the interior space is conditioned but where an air barrier system is not required. Some industrial buildings, for example, may be exempt. This would depend, however, on the particular levels of interior conditioning provided, ventilation levels, protection provided for the workers, and the tolerance of the building's construction to the accumulation of condensation and potential precipitation ingress.

Some industrial buildings are provided with only limited conditioning, for example radiant heating, and ventilation levels are sufficient to reduce relative humidity to a level at which condensation will not accumulate to a degree that is problematic. Conversely, some industrial buildings, due to the processes they contain, operate at very high temperatures and high ventilation levels. In these cases, the building envelope will be maintained at temperatures that will avoid condensation. In both examples above, either the ventilation rates or protective gear required in the work environment would protect the occupants from unacceptable levels of pollutants.

Where adjacent interior environments are sufficiently different, controlling airflow between those spaces is necessary to maintain conditions. Referring again to the industrial building examples above, assemblies separating office space from the work floor would likely require an air barrier system.

An air barrier system may be required in components and assemblies in contact with the ground to control the transfer of soil gases such as radon and methane.

The word "minimize" is used in Sentence 5.4.1.1.(1) because not all moisture accumulation in an assembly need be of concern. Incidental condensation is normal but should be sufficiently rare and in sufficiently limited quantities, and should dry rapidly enough, to avoid material deterioration and the growth of mould or fungi.

**A-5.4.1.2.(1) and (2) Air Leakage through the Air Barrier System.**

**Material Requirements**

The current requirements specify only a maximum air leakage rate for the material in the air barrier system that provides the principal resistance to air leakage.

The report, "Air Permeance of Building Materials," prepared by AIR-INS Inc. for CMHC (1988) identifies, from 36 common building materials, 19 that would comply with the leakage limit of 0.02 L/(s • m<sup>2</sup>) at 75 Pa. Air leakage characteristics greater than the maximum of 0.02 L/(s • m<sup>2</sup>) at 75 Pa may be acceptable where

- exterior temperatures are mild,
- the moisture content of the indoor air is low,
- the assembly is resistant to moisture-related deterioration,
- higher vapour permeance materials are installed toward the cold side of the assembly, or
- the air barrier system separates two interior spaces that are not intended to provide significantly different environments.

**System Requirements**

Ideally, a maximum air leakage rate for the complete air barrier system would be specified. The maximum acceptable rate will ultimately depend on warm and cold side temperatures and humidity conditions, and on the susceptibility of the environmental separator to moisture-related deterioration. Recommended maximum leakage rates for the air barrier system in an exterior envelope in most locations in Canada are shown in Table A-5.4.1.2.(1) and (2). These values are for air barrier systems in opaque, insulated portions of the building envelope. They are not for whole buildings, as windows, doors and other openings are not included. The Table is provided for guidance when testing air barrier systems as portions of an envelope.

**Table A-5.4.1.2.(1) and (2)  
Recommended Maximum Air Leakage Rates**

Warm Side Relative Humidity at 21°C	Recommended Maximum System Air Leakage Rate, L/(s•m <sup>2</sup> ) at 75 Pa
< 27%	0.15
27 to 55%	0.10
> 55%	0.05

Determining the leakage rate of a particular assembly, however, is problematic. There is little information available on the airtightness of the many air barrier systems used in building construction, and testing requires specialized equipment and expertise. Depending on the type of test,

- testing may not represent the performance of the complete installed system,
- the location of deficiencies may be difficult to identify, and
- rectification of deficiencies may not be feasible.

Despite the difficulties, when using a system whose performance is not known, it is recommended that tests be conducted. Testing options include:

- laboratory tests of small sections of the air barrier system, including the joints and intersections of different assemblies
- laboratory tests of large wall sections
- in-situ tests of characteristic envelope areas.

**A-5.5.1.1. Required Resistance to Vapour Diffusion.** Resistance to vapour diffusion is required to reduce the likelihood of condensation within building assemblies, and the consequent potential for material deterioration and fungal growth. Deterioration such as rot and corrosion can lead to the failure of building components and connections, and interfere with the performance of building services. Some fungi can have very serious effects on health.

In Canada, relatively few buildings that are subject to temperature and vapour pressure differences would be constructed or operated in such a manner that the control of vapour diffusion would not need to be addressed in their design. Assemblies enclosing certain industrial spaces, as described in Appendix Note A-5.4.1.1. for example, may be exempt.

For residential spaces, and most other spaces that are conditioned for human occupancy, a means of vapour diffusion control is generally agreed to be necessary, even in the milder climates of the country. The questions in those cases pertain to the degree of control needed.

The word “minimize” is used in Sentence 5.5.1.1.(1) because not all moisture accumulation in an assembly need be of concern. Incidental condensation is normal but should be sufficiently rare and in sufficiently limited quantities, and should dry rapidly enough, to avoid material deterioration and the growth of mould or fungi.

Here are some references regarding the effects of fungi on health:

- Fungal Contamination in Public Buildings: A Guide to Recognition and Management. Federal Provincial Committee on Environmental and Occupational Health, Health Canada, Ottawa, 1995
- Guidelines on Assessment and Remediation of Fungi in Indoor Environments. New York City Department of Health, 2000.

**A-5.5.1.2.(1) Vapour Barrier Materials and Installation.** In the summer, many buildings are subject to conditions where the interior temperature is lower than the exterior temperature. Vapour transfer during these periods is from the exterior to the interior. In general, in Canada, the duration of these periods is sufficiently short, the driving forces are sufficiently low, and assemblies are constructed such that any accumulated moisture will dissipate before deterioration will occur.

Buildings such as freezer plants, however, may operate for much of the year at temperatures that are below the ambient exterior temperature. In these cases, the “warm” side of the assembly would be the exterior and a detailed analysis on an annual basis is required.

Steady state heat transfer and vapour diffusion calculations may be used to determine acceptable permeance levels for the vapour barrier and to identify appropriate positions for the vapour barrier within the building assembly.

**A-5.6.1.1. Required Protection from Precipitation.** Windows, cast-in-place concrete walls, and metal and glass curtain wall systems are examples of components and assemblies that, when properly designed and constructed, are expected to prevent the ingress of precipitation into a building. Assemblies such as roofs and veneer walls consist of materials specifically intended to screen precipitation.

Components and assemblies separating interior conditioned space from the exterior are generally required to provide protection from the ingress of precipitation. Components and assemblies separating interior unconditioned space from the exterior may or may not be required to provide protection from the ingress of precipitation. Buildings such as stadia, parking garages and some seasonally occupied buildings, for example, may not require complete protection from the ingress of precipitation. The degree of protection will depend to a large extent on the materials selected for the building elements that will be exposed to precipitation.

The word “minimize” is used in Sentence 5.6.1.1.(1) because not all moisture ingress or accumulation in an assembly need be of concern. The penetration of wind-driven rain past the cladding may not affect the long-term performance of the assembly, provided the moisture dries out or is drained away before it initiates any deterioration of building materials. When the design service life of a material or component is longer than the design service life of the overall assembly, taking into account the expected exposure to moisture, initiating deterioration of the material should not be of concern. That is to say, provided the material or component continues to provide the necessary level of performance for its intended service life and does not adversely affect the service life of the assembly of which it is a part, the deterioration of the material or component is not an issue.

**A-5.6.1.3.(3) Ice Damming.** Water leakage through sloped roofs is often due to the formation of ice dams at the eaves, which can be limited by controlling the transfer of heat to the roof through a combination of insulation and venting to dissipate heat. See Clause 5.3.1.2.(1)(d).

**A-5.6.2.1. Sealing and Drainage.** Providing a surface-sealed, durable, watertight cover on the outside of a building is difficult. Where there is a likelihood of some penetration by precipitation into a component or assembly, drainage is generally required to direct the moisture to the exterior.

The degree of protection against precipitation ingress needed in any particular case and the approach taken to provide that protection will depend on

- the exterior loads imposed on the assembly
- the materials selected for the backing assembly,
- the use of the enclosed space, and
- the level of maintenance that will be acceptable to the owners.

Where exterior loads are greater, it may be prudent to select a precipitation protection system whose small failures will not be as likely to have an immediate impact on the building or its occupants. Basic rainscreen assemblies, for example, are typical for low-rise residential buildings. Open rainscreen assemblies are generally used for high-rise buildings where the cost of maintenance and repair could be high.

Where materials with a greater resistance to moisture are used in the assembly, a less rugged precipitation protection system or a less rigorous maintenance schedule may be acceptable. This might be the case, for example, where the wall or backing wall is concrete or masonry.

For spaces that are not intended for on-going human occupancy, some rainwater leakage may not be of particular concern. This may be the case for certain warehouse spaces for example, depending on how the spaces are used and conditioned.

Information on the installation of flashing to drain water to the exterior of roof and wall assemblies may be found in a number of publications including, but not limited to:

- "Architectural Sheet Metal Manual," Sheet Metal and Air-Conditioning Contractors National Association, Inc.
- "High-Rise Residential Construction Guide," Ontario New Home Warranty Program
- Technical Notes, National Concrete Masonry Association
- Roofing Specifications, Canadian Roofing Contractors' Association
- "Roofing and Waterproofing Manual," National Roofing Contractors Association
- Technical Notes on Brick Construction, Brick Industry Association

**A-5.8.1.1.(1) Required Drainage.** A wall or floor located below the water table or in the path of a watercourse will be subject to continuous hydrostatic pressure. In such cases, the provision of drainage will be ineffective and the wall or floor must be made waterproof to prevent water ingress.

Where a wall or floor is subject to intermittent hydrostatic pressure, as may result from seasonal flooding, proper drainage will facilitate the drying out of the soil. In some cases, reducing exposure to high moisture levels will extend the life of the moisture protection.

Where a wall or floor is not subject to hydrostatic pressure, drainage again reduces the exposure to high moisture levels and allows less than waterproof treatment of the wall or floor.

**A-5.8.2. Moisture Protection.** Moisture protection for building elements in contact with the ground is generally categorized as either waterproofing or dampproofing. Waterproofing provides a continuous protection against water ingress and is intended to resist hydrostatic load. Dampproofing, on the other hand, does not provide a seal against water ingress and cannot withstand hydrostatic pressure.

In general, Part 5 requires walls, floors and roofs in contact with the ground to be waterproofed. Properties of waterproofing are specified in Sentences 5.8.2.2.(2) to (5), and waterproofing material standards are referenced in Table 5.10.1.1. Materials intended to be used as dampproofing rather than waterproofing are generally not permitted [Sentence 5.8.2.2.(6)]. Standards for installing waterproofing are also specified [Sentence 5.8.2.3.(1)].

Part 5 does permit the use of dampproofing in lieu of waterproofing where the substrate is cast-in-place concrete, a drainage layer is installed and where the assembly will not be exposed to hydrostatic pressure. Material standards are referenced in Clause 5.8.2.2.(7)(b) and installation methods in Sentence 5.8.2.3.(2).

**A-5.8.2.1. Required Moisture Protection.** The control of the ingress of moisture from the ground into interior space is not related to the type of building, the use of the space, or whether or not the space is conditioned. This recognizes the potential adverse effects of high humidity levels, with or without standing water, on both the health of the building occupants and the durability of the building structure.

Although a subject interior space may not be occupied, the assembly separating this space from occupied space often cannot be relied upon to provide adequate protection for the building occupants. Depending on the construction of the separating assembly, it may also be subject to moisture-related deterioration.

The exceptions to this requirement stated in Sentence 5.8.2.1.(2) recognize only those cases where the subject interior space is not occupied and where the assembly separating this space from occupied space will provide the required protection and be resistant to a high humidity environment, or where the moisture loads are sufficiently limited as to not adversely affect the building or its occupants.

**A-5.8.2.2.(7) Drainage Layers.** Drainage layers reduce both structural and moisture loading on the building envelope by breaking capillary flow and allowing water to percolate quickly to the drainage system. A drainage layer may consist of permeable materials including granular backfill, geosynthetic drainage products or mineral fibreboard with oriented fibres to facilitate drainage. Where a granular material is used, it should be protected from contamination by fines from the adjacent native soil or additional material should be installed to ensure that an adequate thickness of the granular material remains free of fines.

**A-5.9. Required Protection from Noise.** Sentence 5.9.1.2.(1) applies to the separation of dwelling units from other dwelling units with regard to sound transmission irrespective of Clause 5.1.2.1.(1)(b), which deals with the separation of dissimilar environments. It is understood that, at any time, there is the potential for sound levels to be quite different in adjoining dwelling units.

**A-5.9.1.1.(1) Sound Transmission.** The Tables in Appendix Note A-9.10.3.1. provide information on the typical sound transmission class ratings of a number of building assemblies. In the absence of test information or results for a specific assembly of materials, the values given in Tables A-9.10.3.1.A. and A-9.10.3.1.B. are considered to satisfy the intent of Sentence 5.9.1.1.(1).

**A-5.10.1.1.(1) Selection of Materials and Components and Compliance with Referenced Standards.** It is important to note that Sentence 5.10.1.1.(1) is stated in such a way that the selection of materials and components is not limited to those traditionally recognized as serving particular functions or those for which a standard is identified in Table 5.10.1.1. This approach permits more flexibility than is provided by similar requirements in Part 9. As long as the selected material meets the performance requirements stated elsewhere in Part 5, the material may be used to serve the required function.

However, where the selected material or component, or its installation, falls within the scope of any of the standards listed in Table 5.10.1.1., the material, component or installation must comply with that standard. For example, if some resistance to heat transfer is required between two interior spaces and standard partition construction will provide the necessary resistance, the installation of one of the “thermal insulation” materials identified in the standard list is not required. If, on the other hand, one decides to install glass fibre insulation, the material must conform to CAN/ULC-S702, “Mineral Fibre Thermal Insulation for Buildings.”

**A-5.10.1.1.(3) Airtightness and Watertightness of Wired Glass Windows.** Fixed wired glass assemblies are sometimes permitted as closures in vertical fire separations. The airtightness and watertightness requirements are waived for these windows when used in such an application, in recognition of the fact that the availability of assemblies that meet both the requirements of the window standards and the requirements for fire resistance may be limited. However, control of air and water leakage should not be ignored: measures should be taken to attempt to comply with applicable requirements.

**A-6.2.1.1. Building Pressurization.** New buildings tend to be considerably more airtight than older ones. Consequently, these buildings may have a reduced pressurization requirement compared to the normal requirement in order to limit drafts and provide a reasonable level of comfort.

The humidification and relative pressurization of buildings and individual spaces in buildings can be significant factors in compromising the on-going performance of the building envelope and other environmental separators.

In new construction, HVAC designers should take this issue into consideration and confer with those responsible for the design of the environmental separators so as to limit stress where these building elements are not intended to resist or accommodate such loads. In existing buildings, the ability of the environmental separators to resist or accommodate increases in pressure differential or moisture loading should be considered before changes are made to the HVAC system.

**A-6.2.1.3. Structural Movement.** This Article is intended to remind designers and installers of mechanical systems of one aspect of the “good engineering practice” referred to in Article 6.2.1.1.

In determining how to accommodate structural movement, there are two important principles to bear in mind:

- The prime concern of the Alberta Building Code is the safety of people in and around the building, as opposed to protection of the mechanical systems and equipment.
- The nature of the accommodation will vary with the type of movement being considered, taking into account particularly how often the movement is likely to be encountered over the life of the building.

For example, a gas line supported on columns that also support a crane must be installed in such a way that the movement of the columns, which occurs many times daily, does not cause the lines to break, thus creating a hazard. Even if the gas line installation could somehow be designed to break in a non-hazardous manner, it would hardly be recognized as good engineering practice if movement that occurs so frequently could disrupt the operation of the mechanical system.

On the other hand, earthquakes occur far less frequently and it would not be surprising to have a non-critical mechanical system fail as a result of an earthquake. However, even in this situation, the failure must occur in a manner that does not create a hazard to building occupants. For example, heavy mechanical equipment should be properly anchored so that it does not topple on building occupants during an earthquake. The design of the anchors should take into account accelerations consistent with the seismic data given in Appendix C for the location of the building. Part 4 provides guidance on the calculation of the loads such equipment would exert on the building structure during an earthquake; these same loads can be used in designing the anchors.

Some mechanical equipment can be an important component of post-disaster life safety systems. In these cases, the measures needed to accommodate the movements caused by an earthquake become even more critical since failure of the equipment would not be acceptable.

Clearly, complying with this requirement will, in most cases, necessitate close coordination between the mechanical designer and the structural designer.

**A-6.2.1.8.(1) Installation General.** Ducts or pipes without dampers or valves are generally not considered to constitute “equipment” and are therefore not subject to this requirement.

**A-6.2.2.2.(1) Ventilation and Multi-Unit Residential Buildings.** This provision requires that the individual apartments within multi-unit residential buildings be ventilated by mechanical means. To meet this requirement, it has been typical for corridor ventilation systems to be installed to deliver outdoor air to corridors and to rely on air infiltration under apartment-corridor doors to deliver ventilation air to adjacent apartments. Research has shown that such approaches are neither efficient nor effective in the provision of ventilation air to apartments. Such systems are susceptible to stack and wind effects, door gaskets installed by occupants, the leakage of supplied air to vertical shafts and stairwells, and air contamination within the corridor due to occupant activities, cooking and smoking odours. It is difficult, if not impossible, to ensure that each apartment will receive adequate amounts of uncontaminated outdoor air for ventilation purposes.

Air transfer ducts between corridors and adjacent apartments have been proposed to ensure that the leakage area between apartments and an adjacent corridor supplied with outdoor air is adequate to ensure ventilation. Apart from noise, corridor odours and the potential for smoke contamination during fire emergencies, in order for transfer ducts to function properly, knowledge of the corridor/apartment pressure regimes and available corridor leakage areas to other zones is required, but such knowledge is not readily available or predictable.

Ducts to deliver air from the central corridor’s ventilation system directly to each apartment can be effective. Alternatively, outdoor air can be mechanically introduced directly into each apartment by an ensuite ventilation system.

Within each apartment, all rooms and spaces must be mechanically ventilated. Effective ventilation may be achieved by making use of fan-coil systems to deliver ventilation air via the forced-air space conditioning system. Alternatively, ventilation air may be ducted independently to each room via a dedicated ventilation system. In bathrooms and kitchens, it has not been considered necessary to both supply and exhaust ventilation air; typically, air is exhausted from these rooms.

For more guidance on the design of mechanical ventilation systems for residential spaces, refer to CAN/CSA-F326-M, “Residential Mechanical Ventilation Systems.”

Mechanical ventilation systems designed and installed in accordance with Section 9.32. comply with the requirements of Article 6.2.2.2., provided that they serve only one dwelling unit (apartment or suite).

**A-6.2.2.3.(2) Ventilation of Storage Garages.** Storage garages are ventilated to protect occupants from exposure to carbon monoxide and other vehicular exhaust fumes. In certain cases, such as small two- or three-bay storage garages that are used for occasional vehicle storage, and where occupants are not present, carbon monoxide or nitrogen dioxide monitoring devices may be omitted if the ventilation system is interlocked with a local light switch or other controls to ensure continuous system operation whenever the area is occupied. In any event, the ventilation system capacity must be designed to limit the concentrations of carbon monoxide or nitrogen dioxide at or below the prescribed values.

**A-6.2.2.4.(3) Minimizing Growth of Micro-organisms.** Sources for microbial growth causing hypersensitivity, pneumonitis and humidifier fever include drain pans, spray-water air-washers, contaminated filters, poorly maintained cooling coils, water incursion into ductwork, cafeteria dishwasher drainage leaks, high humidity and stagnant water. Some of the control measures are as follows:

- (a) Drain pans should be pitched toward the drain outlet and the outlet bottom should be flush with the drain pan bottom, otherwise there will be standing water in the pan, exposed to the supply air passing through the cooling section of the air-handling unit.
- (b) Access into air-handling equipment should be provided for maintenance of filters, cooling coils and condensate drain pans located below the cooling coils. Access doors should be large and easy to open to facilitate thorough and regular maintenance. Hinged access doors are preferable to bolted access panels.
- (c) If moisture is added to commercial building ventilation air (such as in hospital operating rooms and dedicated computer rooms) to maintain humidity levels in a designated range (for example, 40% to 50% relative humidity), humidifiers that inject steam or water vapour into central air-handling units or main supply ducts are normally used. Injection nozzles should not be located in air-handling unit plenums or ductwork that is insulated with internal fibrous lining. If the lining becomes wet, conditions conducive to microbial growth will result.

The above only addresses built-in features of an HVAC system that can help to minimize growth of micro-organisms. Even more important than the built-in features is a program of regular maintenance and cleaning of those portions of the system where such growth is likely to occur.

**A-6.2.2.5.(1) NFPA Publications Pertaining to the Heating, Ventilating and Air-Conditioning of Spaces Containing Hazardous Gases, Dusts or Liquids.**

NFPA 30, "Flammable and Combustible Liquids Code"  
 NFPA 30A, "Motor Fuel Dispensing Facilities and Repair Garages"  
 NFPA 32, "Drycleaning Plants"  
 NFPA 33, "Spray Application Using Flammable or Combustible Materials"  
 NFPA 34, "Dipping and Coating Processes Using Flammable or Combustible Liquids"  
 NFPA 35, "Manufacture of Organic Coatings"  
 NFPA 36, "Solvent Extraction Plants"  
 NFPA 40, "Storage and Handling of Cellulose Nitrate Film"  
 NFPA 50A, "Gaseous Hydrogen Systems at Consumer Sites"  
 NFPA 50B, "Liquefied Hydrogen Systems at Consumer Sites"  
 NFPA 51, "Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes"  
 NFPA 51A, "Acetylene Cylinder Charging Plants"  
 NFPA 61, "Prevention of Fires and Dust Explosions in Agricultural and Food Products Facilities"  
 NFPA 68, "Venting of Deflagrations"  
 NFPA 69, "Explosion Prevention Systems"  
 NFPA 81, "Fur Storage, Fumigation and Cleaning"  
 NFPA 85, "Boiler and Combustion Systems Hazards Code"  
 NFPA 86, "Ovens and Furnaces"  
 NFPA 88A, "Parking Structures"  
 NFPA 91, "Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids"  
 NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations"  
 NFPA 204, "Smoke and Heat Venting"  
 NFPA 303, "Marinas and Boatyards"  
 NFPA 307, "Construction and Fire Protection of Marine Terminals, Piers, and Wharfs"  
 NFPA 409, "Aircraft Hangars"  
 NFPA 415, "Airport Terminal Buildings, Fueling, Ramp Drainage, Loading Walkways"  
 NFPA 484, "Combustible Metals, Metal Powders, and Metal Dusts"  
 NFPA 654, "Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids"  
 NFPA 655, "Prevention of Sulfur Fires and Explosions"  
 NFPA 664, "Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities"  
 NFPA 2001, "Fire Protection Guide to Hazardous Materials"

**A-6.2.2.7.(1) Ventilation and Venting of Crawl Spaces and Attic or Roof Spaces.** The cross-reference to Part 5 pertains to unconditioned and unoccupied crawl spaces, and attic or roof spaces, which are effectively within the building envelope. That is, unconditioned and unoccupied attic or roof spaces are located between the roof deck and roofing above, and the insulation, air barrier system and vapour barrier below. Unconditioned and unoccupied crawl spaces are located between the ground cover below and the insulation, air barrier system and vapour barrier above. Venting of these spaces has implications for the performance of the building envelope rather than having direct effects on indoor conditions. The ventilation of conditioned or occupied crawl spaces and attic or roof spaces must comply with Part 6.

The requirements in Part 5 are stated in terms of loads that must be resisted rather than in terms of building elements. Thus, the Code user will not find explicit references in Part 5 to crawl spaces, or attic or roof spaces. Part 5 makes reference to the need for venting environmental separators, i.e., the dissipation of heat or moisture.

Sentence 6.2.2.7.(1) requires that crawl spaces be ventilated either by natural (above-grade only) or mechanical means. High moisture levels within the crawl space can lead to problems such as the formation of mould, lifting of flooring or long-term damage to structural components.

Crawl space ventilation cannot be expected to correct moisture-related problems caused by other factors like inadequate surface drainage from the foundation walls or improper protection against moisture from the ground. These conditions must be properly addressed so that crawl space ventilation can meet its intended objectives.

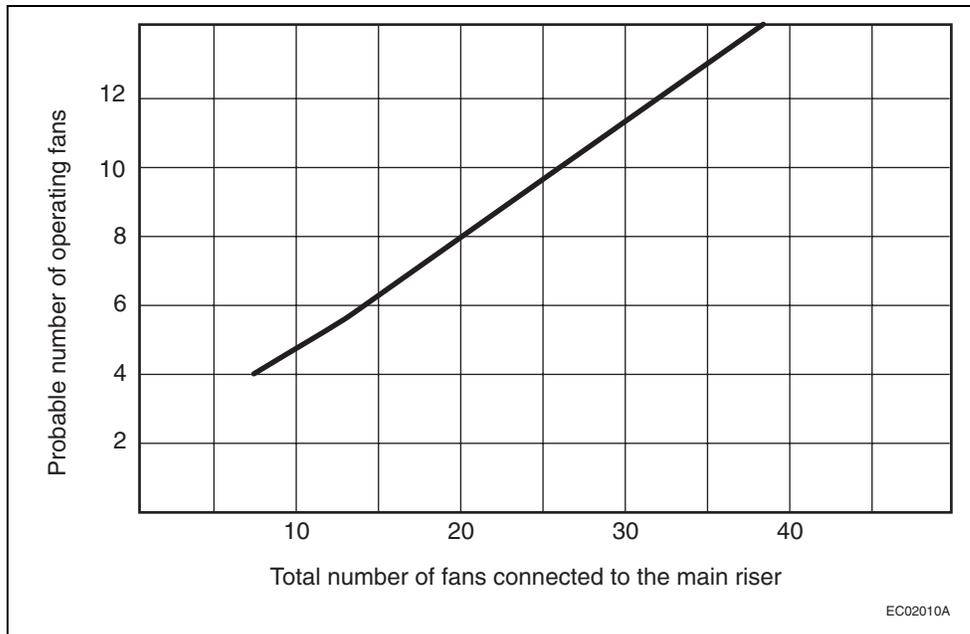
Several factors favour the use of mechanical ventilation rather than reliance on natural drafts. Local conditions, such as areas with high water tables, may dictate the need for mechanical ventilation to remove excessive moisture.

Crawl spaces should be maintained at a negative pressure relative to the conditioned area above to prevent the migration of moisture into occupied areas. This can be achieved through the use of an exhaust fan and relying on air transfer through floor penetrations, such as pipes.

**A-6.2.3.8.(5) and (6) Exhausting to Garages.** A frequent practice in the design of ventilation systems serving buildings which have associated parking garages is to discharge exhaust air from the building to the garage in order to reduce the cost of heating the garage or reduce the length of the exhaust ducts. However, this practice entails a certain amount of risk since, when the exhaust system is not running, stack effect may turn the exhaust outlets into intakes and exhaust fumes (including carbon monoxide) can be drawn from the garage into the building. Incorporating a backdraft damper at the exhaust outlet provides some additional protection but backdraft dampers are generally not regarded as being very reliable. Therefore this practice is only permitted in very limited circumstances.

**A-6.2.3.8.(6)(b) Air Contaminants.** For the purpose of Clause 6.2.3.8.(6)(b), washroom exhaust air is not considered to contain contaminants that would adversely affect the air quality in the storage garage.

**A-6.2.3.8.(10)(b) Operation Diversity Factor.** The operation diversity factor has to be assessed for each specific application. Good engineering practice (see Article 6.2.1.1.) design guidelines can provide information on the subject. Figure A-6.2.3.8.(10)(b), which originates from ASHRAE handbooks, provides an example of factors that can be used for general applications.



**Figure A-6.2.3.8.(10)(b)**  
**Operation diversity factor**

**A-6.2.4.1.(2)(c) Carbon Monoxide Alarms.** Battery-powered carbon monoxide alarms are acceptable provided that they are mechanically fastened in place.

**A-6.2.9.2.(2) Temperature of Exposed Piping.** Normally piping carrying steam or high-temperature hot water at pressures above atmospheric (corresponding temperature 100°C or above) will be insulated to reduce heat losses as an economy measure. Above a temperature of approximately 70°C, however, a bare pipe can cause a burn to human flesh coming in contact with the pipe. If pipes above this temperature are normally out of reach of all persons other than maintenance personnel or are properly guarded, it would be expected that no insulation would be needed for public safety.

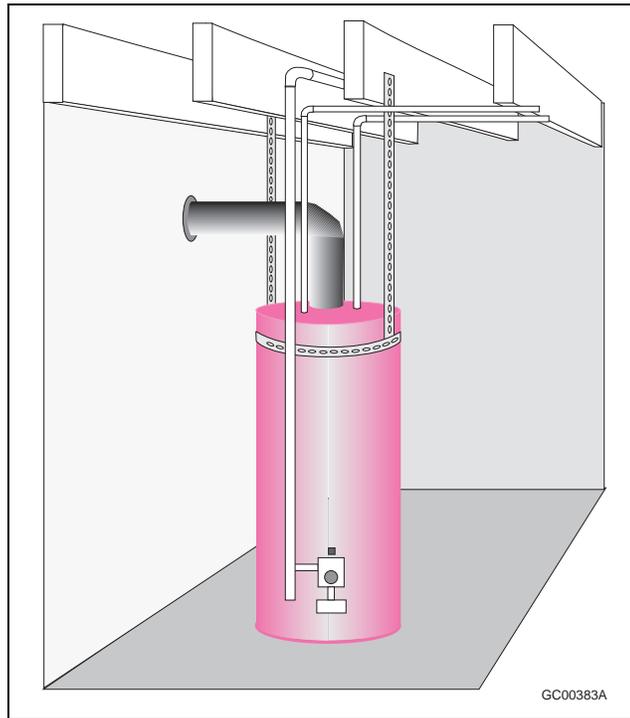
**A-7.2.1.2.(6) Low Human Occupancy.** Buildings of low human occupancy are buildings that represent a low direct or indirect hazard to human life in the event of structural failure, either because people are unlikely to be affected by structural failure, or because structural failure causing damage to materials or equipment does not present a direct threat to human life.

Examples of buildings that would be classed low human occupancy include pump houses, equipment storage shacks, etc.

It is possible to have areas of both high and low human occupancy in the same building provided that the structural safety and fire separation requirements for high human occupancy are met in such areas.

**A-7.2.2.1.(2) Water Closets.** Sentence 7.2.2.1.(2) assumes that there will be a sufficient number of persons in the building to justify the provision of separate water closet facilities for both males and females. In some circumstances overall low occupant loads would not require more than one water closet for males and one water closet for females but the building has more than one storey. It is deemed that rooms each containing a single water closet available for both males and females would satisfy the intent of the Code. The total number of water closets must be adequate for the total number of occupants. Requirements for barrier-free accessibility also need to be considered. If the entrance storey is accessible and the upper storeys are not required to be accessible, a room in the accessible storey must meet the requirements of Section 3.8. and can serve both males and females. If provided, a non-accessible room, designed to serve both males and females, in each non-accessible upper storey would be acceptable. Sentence 7.2.2.1.(3) permits a single water closet to serve both males and females if the total occupant load is low.

**A-7.2.6.3.(2) Securement of Service Water Heaters.**



**Figure A-7.2.6.3.(2)**  
**Securement of service water heater using strapping fastened to floor joists overhead**

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A-7.3.3.13.(6) Diving Board Standards for Public Swimming Pools.

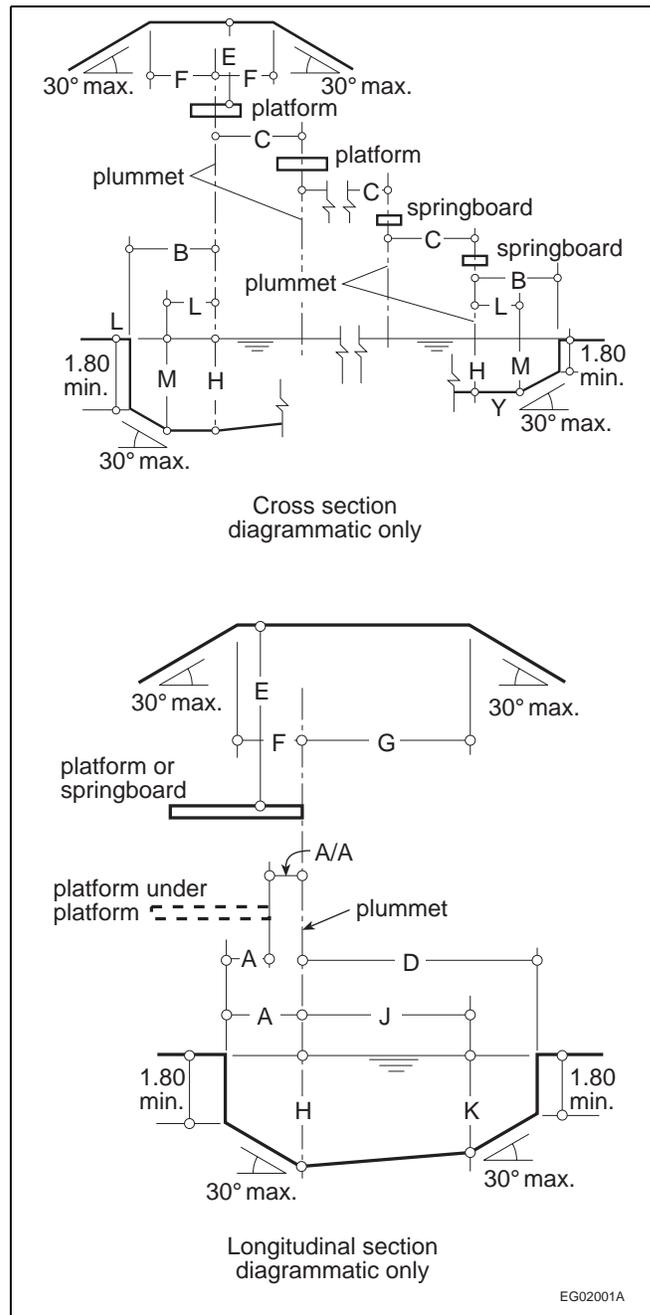


Figure A-7.3.3.13.(6)  
Diving board standards for public swimming pools

Table A-7.3.3.13.(6)  
Diving Board Standards for Public Swimming Pools

	Springboard						Platform						
	1 metre	3 metres	Horiz.	Vert.	Horiz.	Vert.	1 metre	3 metres	5 metres	7.5 metres	10 metres	Horiz.	Vert.
Length	4.80	4.80					5.00	5.00	6.00	6.00	6.00		
	0.50	0.50					0.60	0.60 <sup>(1)</sup>	1.50 <sup>(2)</sup>	1.50	1.50		
	1.00	3.00					0.60 - 1.00	2.60 - 3.00	5.00	7.50	10.00		
A	Designation	A-1	A-3				A-1pl		A-5			A-10	
	Preferred	1.80	1.80				0.75	1.25	1.25			1.50	
A/A	Designation							A/A5/1				a/A10/5.3.1	
	Preferred								1.25			1.25	
B	Designation	B-1	B-3				B-1pl		B-5			B-10	
	Preferred	2.50	3.50				2.30	2.90	3.75			4.50	
C	Designation	C-1/1										C 10-7.5.5.3.1	
	Preferred	2.40	2.50				1.95	2.10	2.50			2.75	
D	Designation	D-1	D-3				D-1pl		D-5			D-10	
	Preferred	9.00	10.25				8.00	9.50	10.25			13.50	
E	Designation		E-3				E-1pl		E-3pl			E-7.5	E-10
	Preferred						5.00	5.00	3.50			3.50	5.00
F	Designation	F-1	F-3				F-1pl		F-3pl			F-7.5	E-10
	Preferred	2.50	2.50				2.75	2.75	2.75			2.75	5.00
G	Designation	G-1	G-3				G-1pl		G-3pl			G-7.5	E-10
	Preferred	5.00	5.00				5.00	5.00	5.00			5.00	5.00
H	Designation		H-3				H-1pl		H-3pl			H-7.5	H-10
	Preferred						3.50	3.60	3.80			4.50	5.00
J, K	Designation	J-1	J-3				J-1pl		J-3pl			J-7.5	K-10
	Preferred	5.00	6.00				4.50	5.50	6.00			8.00	4.75

**Table A-7.3.3.13.(6) (Continued)**

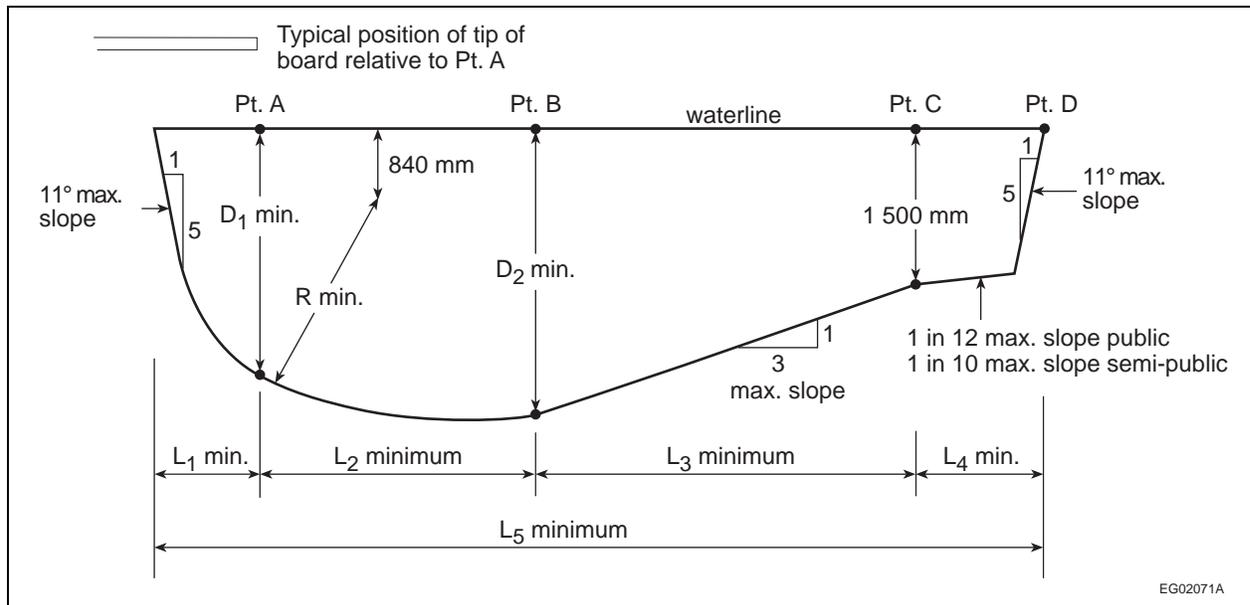
	Springboard				Platform								
	1 metre	3 metres	1 metre	3 metres	5 metres	7.5 metres	10 metres	5 metres	7.5 metres	10 metres	5 metres	7.5 metres	10 metres
Length	4.80	4.80	5.00	5.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
	0.50	0.50	0.60	0.60 <sup>(1)</sup>	1.50 <sup>(2)</sup>	1.50	2.00	1.50	1.50	2.00	1.50	1.50	2.00
	1.00	3.00	0.60 - 1.00	2.60 - 3.00	5.00	7.50	10.00	5.00	7.50	10.00	5.00	7.50	10.00
L <sub>i</sub> M	Designation	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.	Horiz. Vert.
	Preferred	L-1 M-1 2.00 3.40	L-3 M-3 2.50 3.70	L-1pl M-1pl 1.90 3.20	L-3pl M-3pl 2.30 3.50	L-5 M-5 3.50 3.70	L-7.5 M-7.5 4.50 4.40	L-10 M-10 5.25 4.75	L-3pl M-3pl 2.30 3.50	L-5 M-5 3.50 3.70	L-7.5 M-7.5 4.50 4.40	L-10 M-10 5.25 4.75	L-10 M-10 5.25 4.75
N	MAXIMUM SLOPE TO REDUCE DIMENSIONS beyond full requirements	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees
	Pool Depth	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees
	Ceiling Height	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees	30 degrees

**Notes to Table A-7.3.3.13.(6):**

- (1) Minimum
- (2) Preferred
- (3) Dimensions C (plummet to adjacent plummet) apply to platforms with widths as detailed. If platform widths are increased then C is to be increased by half the additional width(s).

**A-7.3.3.13.(7) and (8) Diving Board Standards for Public and Semi-Public Swimming Pools.**

For deck level diving boards, 4 m of head room provides adequate clearance. Requirements 5.8, Minimum Standards for Public Swimming Pools, published by National Spa and Pool Institute, states: There shall be a completely unobstructed clear vertical distance of 13 ft. (3.96 m) above any diving board measured from the centre of the front end of the board. This area shall extend horizontally at least 8 ft. (2.44 m) behind, 8 ft. (2.44 m) to each side and 16 ft. (4.88 m) ahead of point A.



**Figure A-7.3.3.13.(7) and (8)**  
**Diving board standards for public and semi-public swimming pools**

**Table A-7.3.3.13.(7) and (8)**  
**Diving Board Standards for Semi-Public Swimming Pools**

Pool Type <sup>(1)</sup>	Related Diving Equipment (m)		Minimum Dimensions (m) <sup>(2)</sup>								Minimum Width (in m) of Pool at:		
	Max. Diving Board Length	Max. Board Height Over Water	D <sub>1</sub>	D <sub>2</sub>	R	L <sub>1</sub>	L <sub>2</sub> <sup>(3)</sup>	L <sub>3</sub> <sup>(3)</sup>	L <sub>4</sub> <sup>(3)</sup>	L <sub>5</sub>	PT. A	PT. B	PT. C
VI	3	0.66	2.13	2.59	1.66	0.76	2.44	3.20	2.13	8.53	4.88	5.49	5.49
VII	3.7	0.75	2.29	2.74	1.83	0.91	2.74	3.66	1.22	8.53	5.49	6.10	6.10
VIII	4.9	1	2.59	3.05	2.13	1.22	3.05	4.57	0.61	9.45	6.10	6.71	6.71
IX	4.9	3	3.35	3.66	2.59	1.83	3.20	6.40	0	11.43	6.70	7.32	7.32

**Notes to Table A-7.3.3.13.(7) and (8):**

- (1) Pool Type refers to industry standards for equipment.
- (2) Placement of boards shall observe the following minimum dimensions. With multiple board installations minimum pool widths must be increased accordingly.
  - Deck Level Board to Pool side, 2.44 m
  - 1 Meter Board to Pool Side, 2.74 m
  - 3 Meter Board to Pool Side, 3.35 m
  - 1 Meter or Deck Level Board to 3 Meter Board, 3.05 m
  - 1 Meter or Deck Level to another 1 Meter or Deck Level Board, 2.44 m
  - 3 Meter to another 3 Meter Board, 3.05 m
- (3) L<sub>2</sub>, L<sub>3</sub>, L<sub>4</sub> combined represent the minimum distance from the tip of the board to pool wall opposite diving equipment.

**A-7.3.3.15.(6) Decks.** Slip resistance is a complex issue. It depends on many variables and can change with time, surface wear and conditions. Therefore, this is an ongoing issue for a building owner. The American Disabilities Act deals with this issue and can be used as a guide for designers, suppliers of materials, and owners of buildings. There are ASTM standards that can be used to measure the static coefficient of friction of a surface. The static coefficient of friction is normally between 0 and 1.0, however it can exceed 1.0 for some rubber against rubber materials. Higher numbers do not ensure safety, as surfaces with a very high static coefficient of friction can be tripping hazards. The designer and the supplier of flooring materials can do their part by selecting materials that have a history of providing the performance wanted. The owner of the building needs to deal with the ongoing issue of maintenance of all floor surfaces.

**A-7.3.3.57.(1) Oxidation Reduction Potential (ORP).** The ORP is a measure of the disinfection capability of the pool water, which needs to be monitored. It measures the oxidizing or reducing nature of the water using electrodes. The resulting measurement reflects the concentration of disinfectant, pH, TDS, alkalinity and turbidity. An ORP meter is installed on the recirculation line and must be verified manually every day by the operator using a readout and sometimes a paper printout. Though not a perfect technology—some pools have had some trouble with it—it works very well for most installations.

**A-7.3.6.2. Whirlpools.** Hot tubs are included in the definition of “whirlpool.”

**A-7.3.6.2.(7) Filters.** Cartridge-type filters that use internal bypasses shall not be used. The effectiveness of the filtering process cannot be monitored in a practical way.

**A-7.3.9.3.(1) Protection at Storm Water Retention Ponds.** Inlets and outlets to storm water retention ponds are usually associated with sizeable changes in elevation. Water attracts attention and care must be taken to fence off hazardous areas and avoid accidents.

**A-7.8.2.4.(1) Ventilation.** If condensation becomes a problem in the areas mentioned in Sentence 7.8.2.4.(1), the ventilation rate should be increased to eliminate the condensation problem.

**A-8.1.2.1.(1) Application.** The use of streets or public property and vehicular traffic during construction or demolition is normally controlled by regulations of authorities other than the building department (e.g., police department).

**A-9.1.1.1.(1) Application of Part 9 to Seasonally and Intermittently Occupied Buildings.** The Alberta Building Code does not provide separate requirements which would apply to seasonally or intermittently occupied buildings. Without compromising the basic health and safety provisions, however, various requirements in Part 9 recognize that leniency may be appropriate in some circumstances. With greater use of “cottages” through the winter months, the proliferation of seasonally occupied multiple-dwelling buildings and the increasing installation of modern conveniences in these buildings, the number and extent of possible exceptions is reduced.

#### **Thermal Insulation**

Article 9.25.2.1. specifies that insulation is to be installed in walls, ceilings and floors which separate heated space from unheated space. Cottages intended for use only in the summer and which, therefore, have no space heating appliances, would not be required to be insulated. Should a heating system be installed at some later date, insulation should also be installed at that time. In the case of row units intended for intermittent winter use, the walls between the dwelling units may at times separate heated space from unheated space. In this case, the installation of insulation might be considered.

#### **Air Barrier Systems and Vapour Barriers**

Articles 9.25.3.1. and 9.25.4.1. require the installation of air barrier systems and vapour barriers only where insulation is installed. Dwellings with no heating system would thus be exempt from these requirements.

#### **Interior Wall and Ceiling Finishes**

The choice of interior wall and ceiling finishes has implications for fire safety. Where a dwelling is a detached building, there are no fire resistance requirements for the walls or ceilings within the dwelling. The exposed surfaces of walls and ceilings are required to have a flame-spread rating not greater than 150 (Subsection 9.10.17.). There is, therefore, considerable flexibility, even in continuously occupied dwellings, with respect to the materials used to finish these walls. Except where waterproof finishes are

required (Subsection 9.29.2.), ceilings and walls may be left unfinished. Where two units adjoin, however, additional fire resistance requirements may apply to interior loadbearing walls, floors and the shared wall (Article 9.10.8.3., and Subsections 9.10.9. and 9.10.11.).

**Plumbing and Electrical Facilities**

Plumbing fixtures are required only where a piped water supply is available (Part 7), and electrical facilities only where electrical services are available (Article 9.34.1.2.).

**A-9.3.1.6.(2) Compressive Strength.** Air-entrained concrete should not be steel or hard trowelled. A light broom or a float finish should be applied.

**A-9.3.1.7. Concrete Mixes.** The slump of concrete mixes should be the following:

- (a) 80 mm ± 30 mm for footings, walls, fireplaces, chimneys, foundation walls, grade beams and piers. A high range water-reducing admixture (superplasticizer) may be used to further increase the workability to 140 mm ± 40 mm.
- (b) 80 mm ± 30 mm for slab on grade.

For further information on workability, reference can be made to CSA A23.1, section 18.4.3, "Control of Slumps and Air Content."

**A-9.3.2.1.(1) Grade Marking of Lumber.** Lumber is generally grouped for marketing into the species combinations contained in Table A-9.3.2.1.(1)A. The maximum allowable spans for those combinations are listed in the span tables for joists, rafters and beams. Some species of lumber are also marketed individually. Since the allowable span for the northern species combination is based on the weakest species in the combination, the use of the span for this combination is permitted for any individual species not included in the Spruce-Pine-Fir, Douglas Fir-Larch and Hemlock-Fir combinations.

Facsimiles of typical grade marks of lumber associations and grading agencies accredited by the Canadian Lumber Standards (CLS) Accreditation Board to grade mark lumber in Canada are shown in Table A-9.3.2.1.(1)B. Accreditation by the CLS Accreditation Board applies to the inspection, grading and grade marking of lumber, including mill supervisory service, in accordance with CAN/CSA-O141, "Softwood Lumber."

The grade mark of a CLS accredited agency on a piece of lumber indicates its assigned grade, species or species combination, moisture condition at the time of surfacing, the responsible grader or mill of origin and the CLS accredited agency under whose supervision the grading and marking was done.

**Table A-9.3.2.1.(1)A.  
Species Designations and Abbreviations**

Commercial Designation of Species or Species Combination	Abbreviation Permitted on Grade Stamps	Species Included
Douglas Fir – Larch	D Fir – L (N)	Douglas Fir, Western Larch
Hemlock – Fir	Hem – Fir (N)	Western Hemlock, Amabilis Fir
Spruce – Pine – Fir	S – P – F or Spruce – Pine – Fir	White Spruce, Engelmann Spruce, Black Spruce, Red Spruce, Lodgepole Pine, Jack Pine, Alpine Fir, Balsam Fir
Northern Species	North Species	Any Canadian softwood covered by the NLGA Standard Grading Rules

Canadian lumber is graded to the NLGA "Standard Grading Rules for Canadian Lumber (Interpretation Included)," published by the National Lumber Grades Authority. The NLGA rules specify standard grade names and grade name abbreviations for use in grade marks to provide positive identification of lumber grades. In a similar fashion, standard species names or standard species abbreviations, symbols or marks are provided in the rules for use in grade marks.

Grade marks denote the moisture content of lumber at the time of surfacing. "S-Dry" in the mark indicates the lumber was surfaced at a moisture content not exceeding 19%. "MC 15" indicates a moisture content not exceeding 15%. "S-GRN" in the grade mark signifies that the lumber was surfaced at a moisture content higher than 19% at a size to allow for natural shrinkage during seasoning.

Each mill or grader is assigned a permanent number. The point of origin of lumber is identified in the grade mark by use of a mill or grader number or by the mill name or abbreviation. The CLS certified agency under whose supervision the lumber was grade marked is identified in the mark by the registered symbol of the agency.

**Table A-9.3.2.1.(1)B.**

**Facsimiles of Grade Marks Used by Canadian Lumber Manufacturing Associations and Agencies Authorized to Grade Mark Lumber in Canada**

Facsimiles of Grade Mark	Association or Agency
<p style="text-align: center;"> <b>A.F.P.A.<sup>®</sup> 00</b>  <b>S-P-F NLGA</b>  <b>KD-HT</b>  <span style="font-size: 2em; vertical-align: middle;">1</span>  <small>GG00056B</small> </p>	<p>Alberta Forest Products Association                      500-10709 Jasper Avenue                      Edmonton, Alberta T5J 3N3</p>
<p style="text-align: center;"> <span style="font-size: 2em;">CL<sup>®</sup>A</span> <span style="font-size: 2em;">100</span>  <span style="font-size: 3em;">1</span> NLGA <span style="font-size: 1.5em;">S-P-F</span>  <span style="font-size: 1.5em;">KD-HT</span>  <small>GG00059B</small> </p>	<p>Canadian Lumbermen's Association                      30 Concourse Gate                      Suite 200                      Ottawa, Ontario K2E 7V7</p>
<p style="text-align: center;">   <span style="font-size: 2em;">100</span> <span style="font-size: 1.5em;">No 1</span>  <span style="font-size: 1.5em;">KD-HT</span>  <span style="font-size: 1.5em;">NLGA</span>  <span style="font-size: 1.5em;">S-P-F</span>  <small>GG00062B</small> </p>	<p>Canadian Mill Services Association                      #200, 601-6th Street                      New Westminster, British Columbia V2G 1Z5</p>
<p style="text-align: center;"> <span style="font-size: 2.5em;">CSI<sup>®</sup></span> <span style="font-size: 2em;">No.1</span>  <span style="font-size: 2em;">00</span> <span style="font-size: 1.5em;">KD-HT</span>  <span style="font-size: 1.5em;">NLGA</span> <span style="font-size: 1.5em;">D FIR-L (N)</span>  <small>GG00098A</small> </p>	<p>Canadian Softwood Inspection Agency Inc.                      1047-250A Street                      Aldergrove, British Columbia V4W 2S8</p>

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Table A-9.3.2.1.(1)B. (Continued)

Facsimiles of Grade Mark	Association or Agency		
<p>(FPA)<sup>®</sup> 00 S-P-F KD-HT CONST</p> <p style="text-align: center;"><small>GG00058B</small></p>	<p>Central Forest Products Association Inc. PO Box 1169 Hudson Bay, Saskatchewan S0E 0Y0</p>		
<p> KD-HT 91 1 NLGA S-P-F</p> <p> KD-HT 25 1 NLGA D FIR - L(N)</p> <p style="text-align: center;"><small>GG00057B</small></p>	<p>Council of Forest Industries 360-1855 Kirschner Road Kelowna, British Columbia V1Y 4N7</p>		
<p>00  No 1 KD-HT D FIR (N)</p> <p style="text-align: center;"><small>GG00064B</small></p>	<p>MacDonald Inspection Services Ltd. 842 Eland Drive Campbell River, British Columbia V9W 6Y8</p>		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center; vertical-align: middle;">M L<sup>®</sup> B</td> <td style="width: 50%; text-align: center; vertical-align: middle;">SPF No.1 KD-HT 99 NLGA</td> </tr> </table> <p style="text-align: center;"><small>GG00065B</small></p>	M L <sup>®</sup> B	SPF No.1 KD-HT 99 NLGA	<p>Maritime Lumber Bureau PO Box 459 Amherst, Nova Scotia B4H 4A1</p>
M L <sup>®</sup> B	SPF No.1 KD-HT 99 NLGA		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center; vertical-align: middle;">N L P A<sup>®</sup></td> <td style="width: 50%; text-align: center; vertical-align: middle;">NLGA S-P-F NO.1 000 KD HT</td> </tr> </table> <p style="text-align: center;"><small>GG00066B</small></p>	N L P A <sup>®</sup>	NLGA S-P-F NO.1 000 KD HT	<p>Newfoundland &amp; Labrador Lumber Producers Association PO Box 8 Glovertown, Newfoundland A0G 2L0</p>
N L P A <sup>®</sup>	NLGA S-P-F NO.1 000 KD HT		

Table A-9.3.2.1.(1)B. (Continued)

Facsimiles of Grade Mark	Association or Agency
 <p style="text-align: center;"><b>10</b> <b>CONST S-P-F</b> <b>S-GRN</b> <b>NLGA</b></p> <p style="text-align: center;"><small>GG00067B</small></p>	<p>N.W.T. Forest Industries Association PO Box 220 Fort Smith, Northwest Territories X0E 0P0</p>
<p><b>O.L.M.A.® 09</b> <b>1 KD-HT</b> <b>NLGA S-P-F</b></p> <p style="text-align: center;"><small>GG00068B</small></p>	<p>Ontario Lumber Manufacturers' Association 210-65 Queen Street West Toronto, Ontario M5H 2M5</p>
 <p style="text-align: center;"><b>NO. 1</b> <b>KD - HT</b> <b>S-P-F</b> <b>00 NLGA RULES</b></p> <p style="text-align: center;"><small>GG00069B</small></p>	<p>Pacific Lumber Inspection Bureau 33442 First Way South Suite 300 Federal Way, Washington 98003 USA British Columbia Division: PO Box 19118 Fourth Avenue Postal Outlet Vancouver, British Columbia V6K 4R8</p>
 <p style="text-align: center;"><b>S-P-F</b> <b>S-DRY</b> <b>1</b> <b>NLGA</b></p> <p style="text-align: center;"><small>GG00070B</small></p>	<p>Quebec Forest Industry Council (Conseil de l'industrie forestière du Québec) 1175, avenue Lavigerie Bureau 200 Sainte-Foy (Québec) G1V 4P1</p>

**A-Table 9.3.2.1. Lumber Grading.** To identify board grades, the paragraph number of the NLGA rules under which the lumber is graded must be shown in the grade mark. Paragraph 113 is equivalent to WWPA rules and paragraph 114 is equivalent to WCLIB rules. When graded in accordance with WWPA or WCLIB rules, the grade mark will not contain a paragraph number.

**A-9.3.2.8.(1) Non-Standard Lumber.** The NLGA "Standard Grading Rules for Canadian Lumber (Interpretation Included)" permit lumber to be dressed to sizes below the standard sizes (38 × 89, 38 × 140, 38 × 184, etc.) provided the grade stamp shows the reduced size. This Sentence permits the use of the span tables for such lumber, provided the size indicated on the stamp is not less than 95% of the corresponding standard size. Allowable spans in the tables must be reduced a full 5% even if the undersize is less than the 5% permitted.

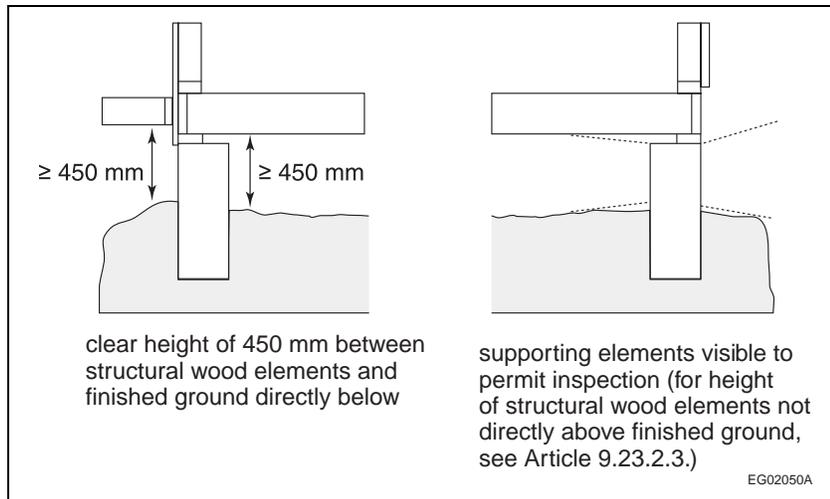
A-9.3.2.9.(1) Protection from Termites.



Figure A-9.3.2.9.(1)-A  
Known termite locations

Note to Figure A-9.3.2.9.(1)-A:

(1) Reference: J.K. Mauldin (1982), N.Y. Su (1995), T. Myles (1997).

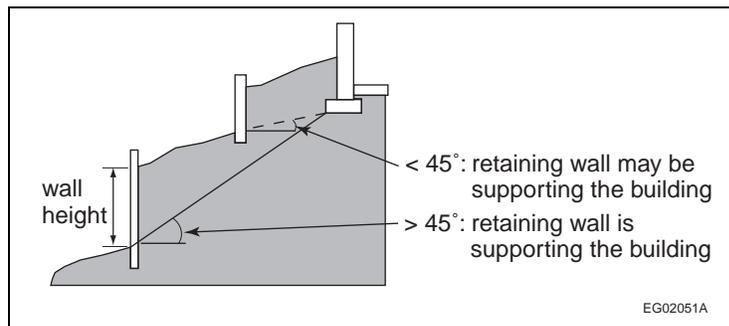


**Figure A-9.3.2.9.(1)-B**

**Clearances under structural wood elements and visibility of supporting elements where required to permit inspection for termite infestation**

**A-9.3.2.9.(3) Protection of Structural Wood Elements from Moisture and Decay.** There are many above-ground, structural wood systems where precipitation is readily trapped or drying is slow, creating conditions conducive to decay. Beams extending beyond roof decks, junctions between deck members, and connections between balcony guards and walls are three examples.

**A-9.3.2.9.(4) Protection of Retaining Walls and Cribbing from Decay.** Retaining walls supporting soil are considered to be structural elements of the building if a line drawn from the outer edge of the footing to the bottom of the exposed face of the retaining wall is greater than 45° to the horizontal. Retaining walls supporting soil may be structural elements of the building if the line described above has a lower slope.



**Figure A-9.3.2.9.(4)**

**Identifying retaining walls that require preservative treatment**

Retaining walls that are not critical to the support of building foundations but are greater than 1.2 m in height may pose a danger of sudden collapse to persons adjacent to the wall if the wood is not adequately protected from decay. The height of the retaining wall or cribbing is measured as the vertical difference between the ground levels on each side of the wall.

**A-9.4.1.1. Structural Design.** Article 9.4.1.1. establishes the principle that the structural members of Part 9 buildings must

- comply with the prescriptive requirements provided in Part 9,
- be designed in accordance with accepted good practice, or
- be designed in accordance with Part 4 using the loads and limits on deflection and vibration specified in Part 9 or Part 4.

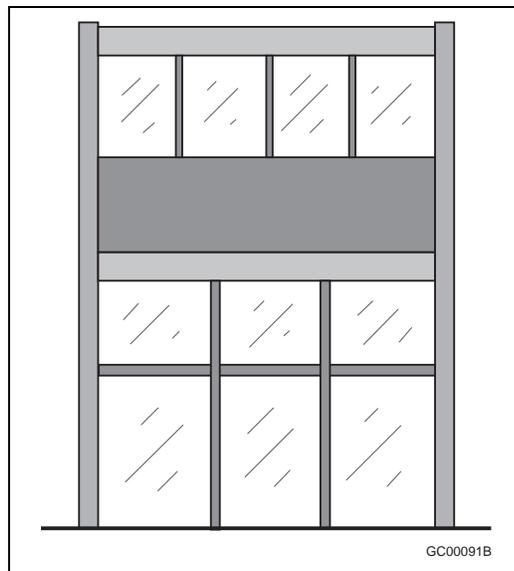
Usually a combination of approaches is used. For example, even if the snow load calculation on a wood roof truss is based on Subsection 9.4.2., the joints must be designed in accordance with Part 4. Wall framing may comply with the prescriptive requirements in Subsections 9.23.3., 9.23.10., 9.23.11. and 9.23.12., while the floor framing may be engineered.

Design according to Part 4 or accepted good engineering practice, such as that described in the “Engineering Guide for Wood Frame Construction” (CWC Guide), published by the Canadian Wood Council, requires engineering expertise. The CWC Guide contains alternative solutions and provides information on the applicability of the Part 9 prescriptive structural requirements to further assist designers and building officials to identify the appropriate design approach. The need for professional involvement in the structural design of a building, whether to Part 4 or Part 9 requirements or accepted good practice, is detailed in Section 2.4. of Division C.

**A-9.4.1.1.(3) Structural Design for Lateral Wind and Earthquake Loads.** The only explicit treatment of structural loads in Section 9.4. is for gravity; wind and earthquake loads are dealt with implicitly in Part 9. There is, therefore, a tendency to assume that wind and earthquake loads do not need any particular consideration in the design of Part 9 buildings.

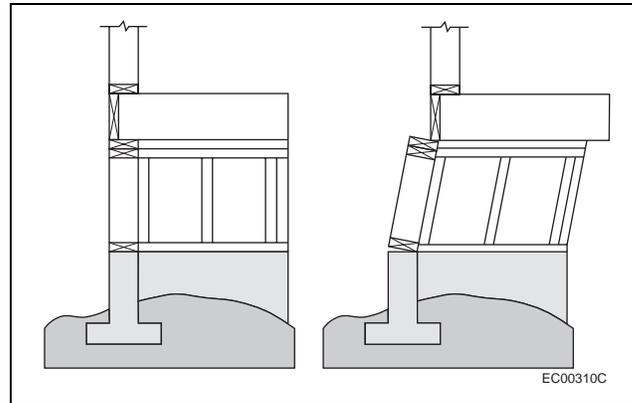
In most cases this is true: the majority of low-rise, wood-frame buildings have a great deal of structural redundancy and continuity and have more than enough capacity to resist lateral loads due to wind and earthquake. For example, in a traditional house configuration, even if there are a few large openings in the exterior walls for windows and sliding doors, the many interior partitions act as braced or sheathed wall panels and provide adequate lateral stability.

However, not all Part 9 buildings have configurations or details that will provide adequate resistance to lateral loads. For example, newer houses may have few interior partitions and very large openings in the exterior walls. Mercantile buildings might be long and narrow with almost entirely windowed walls on the ends and few structurally attached interior partitions. In such cases, wind and earthquake loads do have to be taken into consideration.



**Figure A-9.4.1.1.(3)-A**  
**Mercantile building with little resistance to lateral loading**

Many buildings have been constructed, and some still are, with the lowest level exterior walls as short, wood-frame knee- or pony-walls. In the past, these were often constructed with no lateral bracing and with no interior partitions. See Figure A-9.4.1.1.(3)-B. These walls must be braced or sheathed to resist lateral loads from earthquakes. In higher load regions, they should be sheathed. In all regions, storeys with knee-walls should be considered as storeys for the purpose of determining building height and the application of the Part 9 structural requirements.



**Figure A-9.4.1.1.(3)-B**  
Crawl space knee-wall with little resistance to lateral loading

### Design Required

In cases where lateral load design is required, the “Engineering Guide for Wood Frame Construction” (CWC Guide) provides acceptable engineering solutions as an alternative to Part 4. The CWC Guide also contains alternative solutions and provides information on the applicability of the Part 9 prescriptive structural requirements to further assist designers and building officials to identify the appropriate design approach.

**A-9.4.2.1.(1) Application of Simplified Part 9 Snow Loads.** The simplified specified snow loads described in Article 9.4.2.2. may be used where the structure is of the configuration that is typical of traditional wood-frame residential construction and its performance. This places limits on the spacing of joists, rafters and trusses, the spans of these members and supporting members, deflection under load, overall dimensions of the roof and the configuration of the roof. It assumes considerable redundancy in the structure.

Because very large buildings may be constructed under Part 9 by constructing firewalls to break up the building area, it is possible to have Part 9 buildings with very large roofs. The simplified specified snow loads may not be used when the total roof area of the overall structure exceeds 4 550 m<sup>2</sup>. Thus, the simplified specified snow load calculation may be used for typical townhouse construction but would not be appropriate for much larger commercial or industrial buildings, for example.

The simplified specified snow loads are also not designed to take into account roof configurations that seriously exacerbate snow accumulation. This does not pertain to typical projections above a sloped roof, such as dormers, nor does it pertain to buildings with higher and lower roofs. Although two-level roofs generally lead to drift loading, smaller light-frame buildings constructed according to Part 9 have not failed under these loads. Consequently, the simplified calculation may be used in these cases. Rather, this limitation on application of the simplified calculation pertains to roofs with high parapets or significant other projections above the roof, such as elevator penthouses, mechanical rooms or larger equipment that would effectively collect snow and preclude its blowing off the roof.

The reference to Article 9.4.3.1. invokes, for roof assemblies other than common lumber trusses, the same performance criteria for deflection.

The unit weight of snow on roofs,  $\gamma$ , obtained from measurements at a number of weather stations across Canada varied from about 1.0 to 4.5 kN/m<sup>3</sup>. An average value for use in design in lieu of better local data is  $\gamma = 3.0$  kN/m<sup>3</sup>. In some locations the unit weight of snow may be considerably greater than 3.0 kN/m<sup>3</sup>. Such locations include regions where the maximum snow load on the roof is reached only after contributions from many snowstorms, coastal regions, and regions where winter rains are considerable and where a unit weight as high as 4.0 kN/m<sup>3</sup> may be appropriate.

**A-9.4.2.3.(1) Accessible Platforms Subject to Snow and Occupancy Loads.** Many platforms are subject to both occupancy loads and snow loads. These include balconies, decks, verandas, flat roofs over garages and carports. Where such a platform, or a segregated area of such a platform, serves a single dwelling unit, it must be designed for the greater of either the specified snow load or an occupancy load of 1.9 kPa. Where the platform serves more than one single dwelling unit or an occupancy other than a residential occupancy, higher occupancy loads will apply as specified in Table 4.1.5.3.

**A-9.4.2.4.(1) Specified Loads for Attics or Roof Spaces with Limited Accessibility.** Typical residential roofs are framed with roof trusses and the ceiling is insulated.

Residential trusses are placed at 600 mm on centre with web members joining top and bottom chords. Lateral web bracing is installed perpendicular to the span of the trusses. As a result, there is limited room for movement inside the attic or roof space or for storage of material. Access hatches are generally built to the minimum acceptable dimensions, further limiting the size of material that can be moved into the attic or roof space.

With exposed insulation in the attic or roof space, access is not recommended unless protective clothing and breathing apparatus are worn.

Thus the attic or roof space is recognized as uninhabitable and loading can be based on actual dead load. In emergency situations or for the purpose of inspection, it is possible for a person to access the attic or roof space without over-stressing the truss or causing damaging deflections.

**A-Table 9.4.4.1. Classification of Soils.** Sand or gravel may be classified by means of a picket test in which a 38 mm by 38 mm picket bevelled at the end at 45° to a point is pushed into the soil. Such material is classified as “dense or compact” if a man of average weight cannot push the picket more than 200 mm into the soil and “loose” if the picket penetrates 200 mm or more.

Clay and silt may be classified as “stiff” if it is difficult to indent by thumb pressure, “firm” if it can be indented by moderate thumb pressure, “soft” if it can be easily penetrated by thumb pressure, where this test is carried out on undisturbed soil in the wall of a test pit.

**A-9.4.4.4.(1) Soil Movement.** In susceptible soils, changes in temperature or moisture content can cause significant expansion and contraction. Soils containing pyrites can expand simply on exposure to air.

#### Expansion and Contraction due to Moisture

Clay soils are most prone to expansion and contraction due to moisture. Particularly wet seasons can sufficiently increase the volume of the soil under and around the structure to cause heaving of foundations and floors-on-ground, or cracking of foundation walls. Particularly dry seasons or draw-down of water by fast-growing trees can decrease the volume of the soil supporting foundations and floors-on-ground, thus causing settling.

#### Frost Heave

Frost heave is probably the most commonly recognized phenomenon related to freezing soil. Frost heave results when moisture in frost-susceptible soil (clay and silt) under the footings freezes and expands. This mechanism is addressed by requirements in Section 9.12. regarding the depth of excavations.

#### Ice Lenses

When moisture in frost-susceptible soils freezes, it forms an ice lens and reduces the vapour pressure in the soil in the area immediately around the lens. Moisture in the ground redistributes to rebalance the vapour pressures providing more moisture in the area of the ice lens. This moisture freezes to the lens and the cycle repeats itself. As the ice lens grows, it exerts pressure in the direction of heat flow. When lenses form close to foundations and heat flow is toward the foundation—as may be the case with unheated crawl spaces or open concrete block foundations insulated on the interior—the forces may be sufficient to crack the foundation.

#### Adfreezing

Ice lenses can adhere themselves to cold foundations. Where heat flow is essentially upward, parallel to the foundation, the pressures exerted will tend to lift the foundation. This may cause differential movement or cracking of the foundation. Heat loss through basement foundations of cast-in-place concrete or concrete block insulated on the exterior appears to be sufficient to prevent adfreezing. Care must be taken where the foundation does not enclose heated space or where open block foundations are insulated on the interior. The installation of semi-rigid glass fibre insulation has demonstrated some effectiveness as a separation layer to absorb the adfreezing forces.

### Pyrites

Pyrite is the most common iron disulphide mineral in rock and has been identified in rock of all types and ages. It is most commonly found in metamorphic and sedimentary rock, and especially in coal and shale deposits.

Weathering of pyritic shale is a chemical-microbiological oxidation process that results in volume increases that can heave foundations and floors-on-ground. Concentrations of as little as 0.1% by weight have caused heaving. Weathering can be initiated simply by exposing the pyritic material to air. Thus, building on soils that contain pyrites in concentrations that will cause damage to the building should be avoided, or measures should be taken to remove the material or seal it. Material containing pyrites should not be used for backfill at foundations or for supporting foundations or floors-on-ground.

Where it is not known if the soil or backfill contains pyritic material in a deleterious concentration, a test is available to identify its presence and concentration.

### References:

- (1) Legget, R.F. and Crawford, C.B. Trees and Buildings. Canadian Building Digest 62, Division of Building Research, National Research Council Canada, Ottawa, 1965.
- (2) Hamilton, J.J. Swelling and Shrinking Subsoils. Canadian Building Digest 84, Division of Building Research, National Research Council Canada, Ottawa, 1966.
- (3) Hamilton, J.J. Foundations on Swelling and Shrinking Subsoils. Canadian Building Digest 184, Division of Building Research, National Research Council Canada, Ottawa, 1977.
- (4) Penner, W., Eden, W.J., and Gratten-Bellew, P.E. Expansion of Pyritic Shales. Canadian Building Digest 152, Division of Building Research, National Research Council Canada, Ottawa, 1975.
- (5) Swinton, M.C., Brown, W.C., and Chown, G.A. Controlling the Transfer of Heat, Air and Moisture through the Building Envelope. Small Buildings - Technology in Transition, Building Science Insight '90, Institute for Research in Construction, National Research Council Canada, Ottawa, 1990.

**A-9.4.4.6. and 9.15.1.1. Loads on Foundations.** The prescriptive solutions provided in Part 9 relating to footings and foundation walls only account for the loads imposed by drained earth. Drained earth is assumed to exert a load equivalent to the load that would be exerted by a fluid with a density of 480 kg/m<sup>3</sup>. The prescriptive solutions do not account for surcharges from saturated soil or additional loads from heavy objects located adjacent to the building. Where such surcharges are expected, the footings and foundation walls must be designed and constructed according to Part 4.

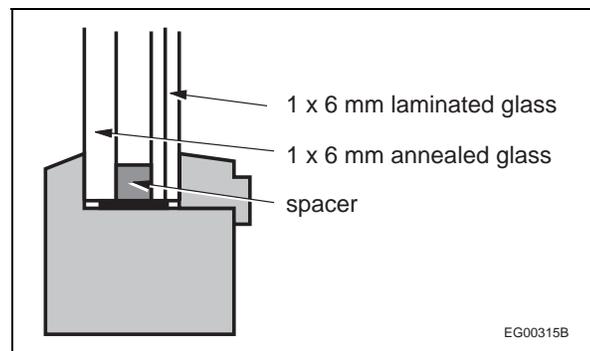
**A-9.5.1.2. Combination Rooms.** If a room draws natural light and natural ventilation from another area, the opening between the two areas must be large enough to effectively provide sufficient light and air. This is why a minimum opening of 3 m<sup>2</sup> is required, or the equivalent of a set of double doors. The effectiveness of the transfer of light and air also depends on the size of the transfer opening in relation to the size of the dependent room; in measuring the area of the wall separating the two areas, the whole wall on the side of the dependent room should be considered, not taking into account offsets that may be in the surface of the wall.

The opening does not necessarily have to be in the form of a doorway; it may be an opening at eye level. However, if the dependent area is a bedroom, provision must be made for the escape window required by Article 9.7.1.2. to fulfill its safety function. This is why a direct passage is required between the bedroom and the other area; the equivalent of at least a doorway is therefore required for direct passage between the two areas.

**A-Table 9.6.6.1. Glass in Doors.** Maximum areas in Table 9.6.6.1. for other than fully tempered glazing are cut off at 1.50 m<sup>2</sup>, as this would be the practical limit after which safety glass would be required by Sentence 9.6.6.2.(3).

**A-9.6.6.6.(1) Double Glazing for Glass Doors and Glass in Doors.** Where a door consists of a large area of glass held in a frame, for example, sliding patio doors, the glass is considered to be glass in a door and would be required to be double glazed. Only where a door is solid glass and has no frame would the glass not be required to be double glazed.

**A-9.6.8.1. Forced Entry Via Glazing in Doors and Sidelights.** There is no mandatory requirement that special glass be used in doors or sidelights, primarily because of cost. It is, however, a common method of forced entry to break glass in doors and sidelights to gain access to door hardware and unlock the door from the inside. Although insulated glass provides increased resistance over single glazing, the highest resistance is provided by laminated glass. Tempered glass, while stronger against static loads, is prone to shattering under high, concentrated impact loads.



**Figure A-9.6.8.1.**  
**Combined laminated/annealed glazing**

Laminated glass is more expensive than annealed glass and must be used in greater thicknesses. Figure A-9.6.8.1. shows an insulated sidelight made of one pane of laminated glass and one pane of annealed glass. This method reduces the cost premium that would result if both panes were laminated.

Consideration should be given to using laminated glazing in doors and accompanying sidelights regulated by Article 9.6.6.1., in windows located within 900 mm of locks in such doors, and in basement windows.

Underwriters' Laboratories of Canada have produced a document ULC-S332, "Burglary Resisting Glazing Material," which provides a test procedure to evaluate the resistance of glazing to attacks by thieves. While it is principally intended for plate glass show windows, it may be of value for residential purposes.

**A-9.6.8.5.(1) Door Fasteners.** The purpose of the requirement for 30 mm screw penetration into solid wood is to prevent the door from being dislodged from the jamb due to impact forces. It is not the intent to prohibit other types of hinges or strikeplates that are specially designed to provide equal or greater protection.

**A-9.6.8.7.(1) Hinged Doors.** Methods of satisfying this Sentence include either using non-removable pin hinges or modifying standard hinges by screw fastening a metal pin in a screw hole in one half of the top and bottom hinges. When the door is closed, the projecting portion of the pin engages in the corresponding screw hole in the other half of the hinge and then, even if the hinge pin is taken out, the door cannot be removed.

**A-9.6.8.10.(1) Resistance of Doors To Forced Entry.** This Sentence designates standard ASTM F 476, "Security of Swinging Door Assemblies," as an alternate to compliance with the prescriptive requirements for doors and hardware. The annex to the standard provides four security classifications, with acceptance criteria, depending on the type of building and the crime rate of the area in which it is located. The Alberta Building Code has only specified Grade 10, the minimum level. The annex suggests the following guidelines be followed when selecting security levels for door assemblies:

Grade 10: This is the minimum security level and is quite adequate for single-family residential buildings located in stable, low-crime areas.

Grade 20: This is the low-medium security level and is designed to provide security for residential buildings located in average crime-rate areas and for apartments in both low and average crime-rate areas.

Grade 30: This is the medium-high security level and is designed to provide security for residential buildings located in higher than average crime-rate areas or for small commercial buildings in average or low crime-rate areas.

Grade 40: This is the high security level and is designed for small commercial buildings located in high crime-rate areas. This level could also be used for residential buildings having an exceptionally high incidence of semi-skilled burglary attacks.

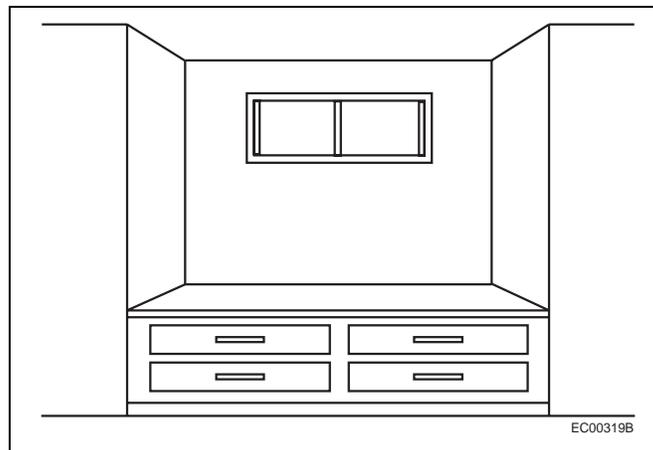
All these grades satisfy the Code and can be considered for use where a higher level of security is desired or warranted.

**A-9.7.1.2.(1) Escape Windows from Bedrooms.** Sentence 9.7.1.2.(1) generally requires every bedroom to have at least one window or door opening to the outside that is large enough and easy enough to open so that it can be used as an exit in the event that a fire prevents use of the building's normal exits. The minimum unobstructed opening specified for escape windows must be achievable using only the normal window operating procedure. The escape path must not go through nor open onto another room, floor or space.

Where a bedroom is located in a basement, an escape window or door must be located in the bedroom. It is not sufficient to rely on egress through other basement space to another escape window or door.

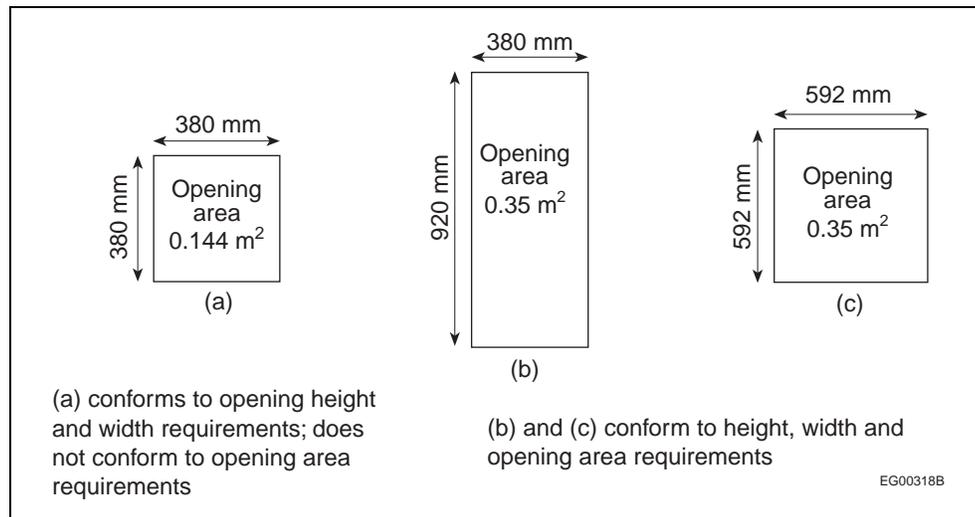
### Window Height

The Article does not set a maximum sill height for escape windows; it is therefore possible to install a window or skylight that satisfies the requirements of the Article but defeats the Article's intent by virtue of being so high that it cannot be reached for exit purposes. It is recommended that the sills of windows intended for use as emergency exits be not higher than 1.5 m above the floor. However, it is sometimes difficult to avoid having a higher sill: on skylights and windows in basement bedrooms for example. In these cases, it is recommended that access to the window be improved by some means such as built-in furniture installed below the window.



**Figure A-9.7.1.2.(1)**  
**Built-in furniture to improve access to a window**

**A-9.7.1.2.(2) Bedroom Window Opening Areas and Dimensions.** Although the minimum opening dimensions required for height and width are 380 mm, a window opening that is 380 mm by 380 mm would not comply with the minimum area requirements. (See Figure A-9.7.1.2.(2))



**Figure A-9.7.1.2.(2)**  
Window opening areas and dimensions

**A-9.7.1.4.(1) Double Glazing.** In a cold climate such as Canada’s, windows which separate heated space from unheated space or the exterior must be at least double glazed to prevent the accumulation of significant amounts of condensation on the inside surface of the glazing. Although glazing materials are generally unharmed by such condensation, the water can run down and damage the materials in the window frame and in the wall below the window. Water accumulating in these materials can also lead to the growth of moulds.

Because of the potential for damage to the structure, this measure is required in any heated building, whether or not there is normally human occupancy.

**A-9.7.1.5. Height of Window Sills above Floors or Ground.** The primary intent of the requirement is to minimize the likelihood of small children falling significant heights from open windows. Reflecting reported cases, the requirement applies only to dwelling units and generally those located on the second floor or higher of residential or mixed use buildings where the windows are essentially free-swinging or free-sliding.

Free-swinging or free-sliding means that a window that has been cracked open can be opened further by simply pushing on the operable part of the window. Care must be taken in selecting windows, as some with special operating hardware can still be opened further by simply pushing on the window.

Casement windows with crank operators would be considered to conform to Clause (1)(b). To provide additional safety, where slightly older children are involved, occupants can easily remove the crank handles from these windows. Awning windows with scissor hardware, however, may not keep the window from swinging open once it is unlatched. Hopper windows would be affected only if an opening is created at the bottom as well as at the top of the window. The requirement will impact primarily on the use of sliding windows which do not incorporate devices in their construction that can be used to limit the openable area of the window.

The 100 mm opening limit is consistent with widths of openings that small children can fall through. It is only invoked, however, where the other dimension of the opening is more than 380 mm. Again, care must be taken in selecting a window. At some position, scissor hardware on an awning window may break up the open area such that there is no unobstructed opening with dimensions greater than 380 mm and 100 mm. At another position, however, though the window is not open much more, the hardware may not adequately break up the opening. The 450 mm height off the floor recognizes that furniture is often placed under windows and small children are often good climbers.

**A-9.7.2.1.(1) Window Standard.** CSA Standard CAN/CSA-A440, “Windows,” includes a window classification system that rates the assembly according to airtightness, watertightness and wind load resistance. The ratings achieved by each window are marked on the window and indicate the level of performance that can be expected. Sentence 9.7.2.1.(1) references this standard and its companion document entitled CAN/CSA-A440.1, “User Selection Guide to CSA Standard CAN/CSA-A440-00, Windows,” to assist specifiers, manufacturers and general users in identifying the window ratings appropriate for a particular building, based on its geographic location and height.

**A-9.7.3.2.(1) Maximum Glass Area.** Tables A-9.7.3.2.(1)A., A-9.7.3.2.(1)B. and A-9.7.3.2.(1)C. may be used to select glass thickness for windows subject to the following restrictions:

- The building has essentially uniform distribution of openings, i.e., no large opening, such as a loading door.
- The building height is 12 m or less from grade to the uppermost roof.
- The building is not in an exposed location such as a hilltop or the shore of a large body of water.

These tables are based on standard CAN/CGSB-12.20-M. In many cases, glass design based on these tables will be conservative due to conservative assumptions on which the tables are based. More exact design using the standard directly could result in reduced glass thickness.

**Table A-9.7.3.2.(1)A.**  
**Maximum Glass Area for Windows in Areas for which the 1-in-10 Wind Pressure ( $Q_{10}$ ) is less than 0.40 kPa<sup>(1)</sup>**

Type of Glass	Maximum Glass Area, m <sup>2</sup>							
	Glass Thickness, mm							
	2.5	3	4	5	6	8	10	12
Annealed	0.67	1.09	1.65	2.25	3.09	4.91	6.78	9.87
Factory-sealed IG units	1.20	1.98	2.97	4.05	5.56	8.04	10.06	13.96
Heat strengthened or tempered	1.47	2.08	2.73	3.34	4.13	5.69	7.12	9.87
Wired	0.31	0.49	0.76	1.04	1.44	2.26	3.13	5.00

**Notes to Table A-9.7.3.2.(1)A.:**

<sup>(1)</sup> The maximum hourly wind pressure with one chance in ten of being exceeded in any one year, as provided in Appendix C.

**Table A-9.7.3.2.(1)B.**  
**Maximum Glass Area for Windows in Areas for which the 1-in-10 Wind Pressure ( $Q_{10}$ ) is less than 0.60 kPa<sup>(1)</sup>**

Type of Glass	Maximum Glass Area, m <sup>2</sup>							
	Glass Thickness, mm							
	2.5	3	4	5	6	8	10	12
Annealed	0.42	0.66	1.02	1.40	1.93	3.05	4.20	6.65
Factory-sealed IG units	0.75	1.22	1.86	2.52	3.49	5.52	7.61	11.40
Heat strengthened	0.86	1.40	2.13	2.73	3.37	4.65	5.81	8.06
Tempered	1.20	1.70	2.24	2.73	3.37	4.65	5.81	9.06
Wired	0.20	0.32	0.50	0.68	0.95	1.50	2.06	3.32

**Notes to Table A-9.7.3.2.(1)B.:**

<sup>(1)</sup> The maximum hourly wind pressure with one chance in ten of being exceeded in any one year, as provided in Appendix C.

**Table A-9.7.3.2.(1)C.**  
**Maximum Glass Area for Windows in Areas for which the 1-in-10 Wind Pressure ( $Q_{10}$ ) is less than 0.80 kPa<sup>(1)</sup>**

Type of Glass	Maximum Glass Area, m <sup>2</sup>							
	Glass Thickness, mm							
	2.5	3	4	5	6	8	10	12
Annealed	0.30	0.50	0.76	1.05	1.45	2.32	3.21	5.11
Factory-sealed IG units	0.54	0.88	1.35	1.82	2.51	4.04	5.54	8.77
Heat strengthened	0.67	1.08	1.65	2.25	2.92	4.02	5.03	6.98
Tempered	1.04	1.47	1.93	2.37	2.92	4.02	5.03	9.06
Wired	0.14	0.24	0.37	0.51	0.70	1.14	1.57	2.53

**Notes to Table A-9.7.3.2.(1)C.:**

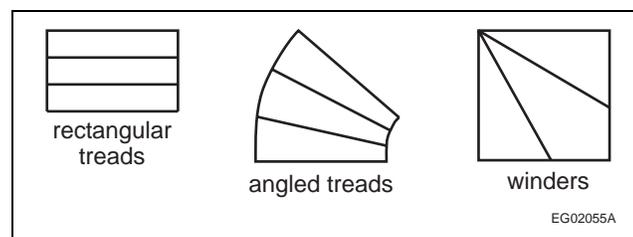
(1) The maximum hourly wind pressure with one chance in ten of being exceeded in any one year, as provided in Appendix C.

**A-9.7.6.1.(1) Resistance of Windows to Forced Entry.** Although this Sentence only applies to windows within 2 m of adjacent ground level, certain house and site features, such as balconies or canopy roofs, allow for easy access to windows at higher elevations. Consideration should be given to specifying break-in resistant windows in such locations.

This Sentence does not apply to windows that do not serve the interior of the dwelling unit, such as windows to garages, sun rooms or greenhouses, provided connections between these spaces and the dwelling unit are secure.

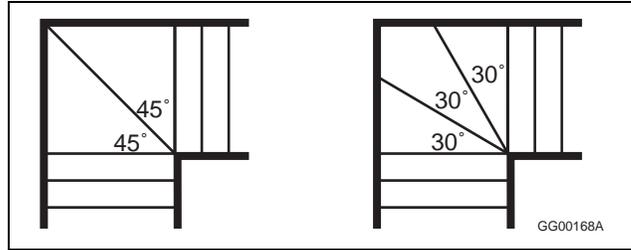
One method that is often used to improve the resistance of windows to forced entry is the installation of metal “security bars.” However, while many such installations are effective in increasing resistance to forced entry, they may also reduce or eliminate the usefulness of the window as an exit in case of fire or other emergency that prevents use of the normal building exits. Indeed, unless such devices are easily openable from the inside, their installation in some cases would contravene the requirements of Article 9.7.1.2., which requires every bedroom that does not have an exterior door to have at least one window that is large enough and easy enough to open that it can be used as an exit in case of emergency. Thus an acceptable security bar system should be easy to open from the inside while still providing increased resistance to entry from the outside.

**A-9.8.4. Step Dimensions.** The Code distinguishes three principal types of stair treads and uses the following terminology to describe them: rectangular treads are found in straight-run flights; angled treads are found in curved flights; winders are a special type of angled tread described in Appendix Note A-9.8.4.5. See Figure A-9.8.4.



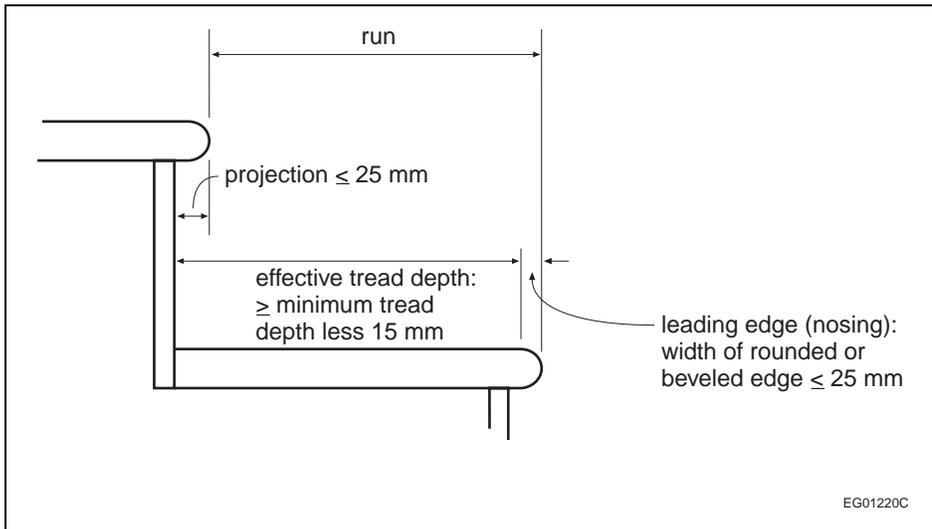
**Figure A-9.8.4.**  
**Types of treads**

**A-9.8.4.5. Winders.** Where a stair must turn, the safest method of incorporating the turn is to use a landing. Within a dwelling unit, however, where occupants are familiar with their environment, winders are an acceptable method of reducing the amount of floor area devoted to the stair and have not been shown to be more hazardous than a straight run of steps. Nevertheless, care is required to ensure that winders are as safe as possible. Experience has shown that 30° winders are the best compromise and require the least change in the natural gait of the stair user; 45° winders are also acceptable, as they are wider. The Code permits only these two angles. Although it is normal Code practice to specify upper and lower limits, in this case it is necessary to limit the winders to specific angles with no tolerance above or below these angles other than normal construction tolerances. One result of this requirement is that winder-type turns in stairs are limited to 30° or 45° (1 winder), 60° (2 winders), or 90° (2 or 3 winders). See Figure A-9.8.4.5.



**Figure A-9.8.4.5.**  
**Winders**

**A-9.8.4.6. Tread Projection and Leading Edge of Steps.** A sloped or beveled edge on nosings or leading edges of steps will make the tread more visible through light modeling. The sloped portion of the leading edge must not be too wide so as to reduce the risk of slipping of the foot. To reduce the risk of tripping, the leading edge must not reduce the effective tread depth to less than the required minimum tread depth less 15 mm. Similarly, the projection of the tread behind the nosing can also cause tripping, particularly during a person's ascent. Figure A-9.8.4.6. illustrates the various dimensional requirements stated in Sentences 9.8.4.6.(1) and 9.8.4.3.(2).



**Figure A-9.8.4.6.**  
**Tread depth and treatment of leading edge**

A-9.8.6.3.(1) Dimensions of Landings. Figure A-9.8.6.3.(1) illustrates various landing configurations.

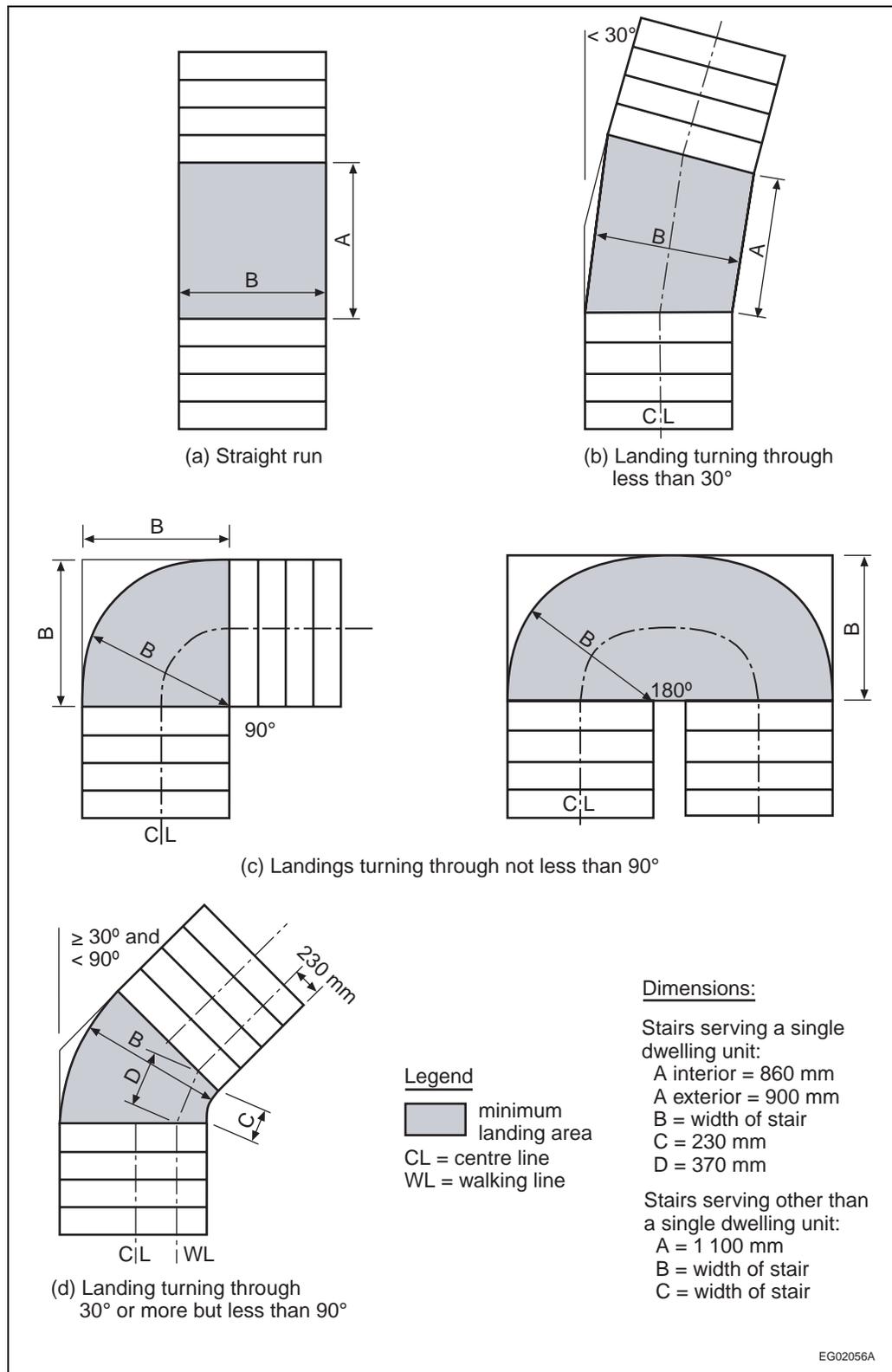


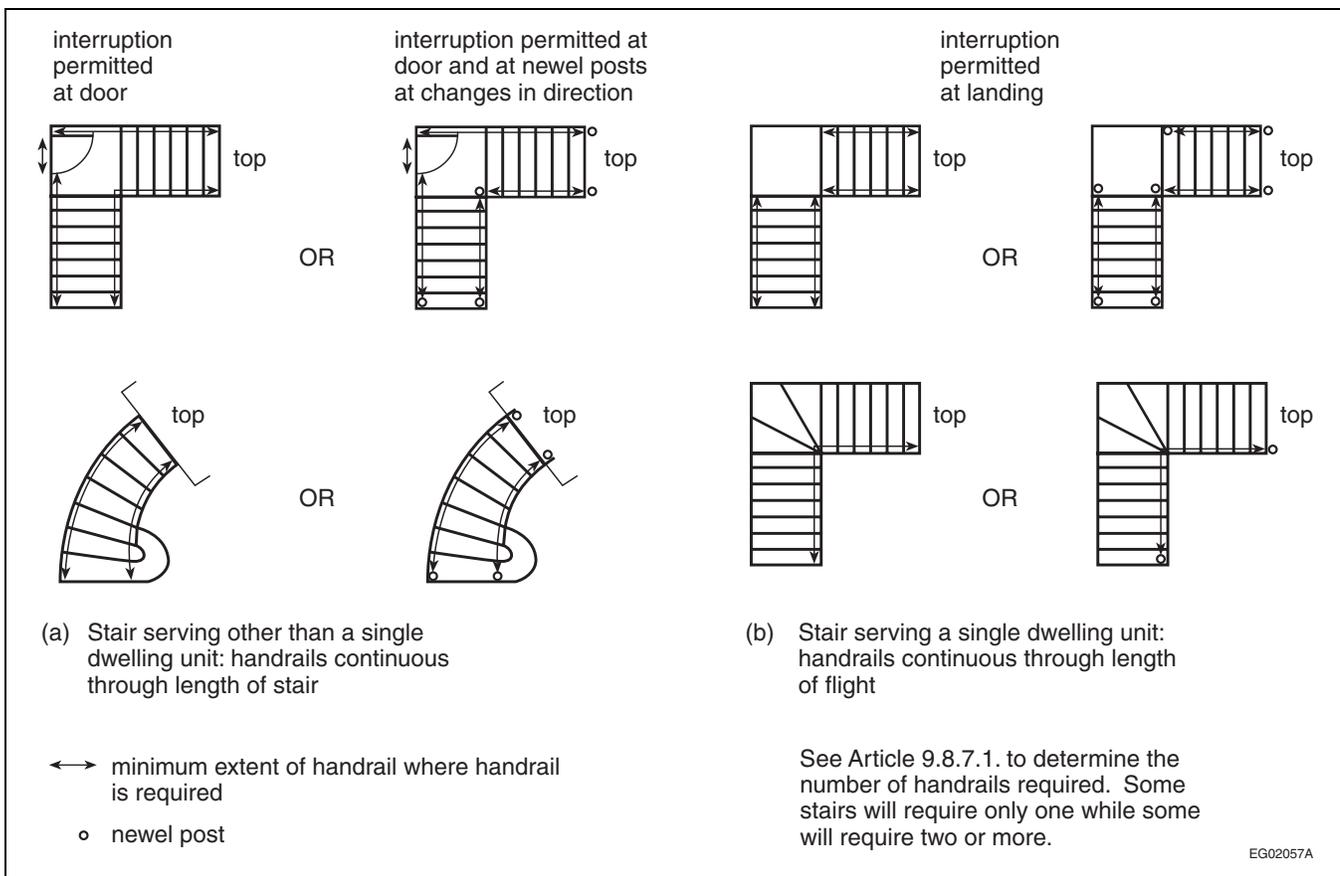
Figure A-9.8.6.3.(1)  
Landing configurations

**A-9.8.7.2. Continuity of Handrails.** The guidance and support provided by handrails is particularly important at the beginning and end of ramps and flights of stairs and at changes in direction such as at landings and winders.

The intent of the requirement in Sentence (1) for handrails to be continuous throughout the length of the stair is that the handrail be continuous from the bottom riser to the top riser of the stair. The required handrail may start back from the bottom riser only if it is supported by a newel post installed on the bottom tread. (See Figure A-9.8.7.2.)

For stairs or ramps serving a single dwelling unit, the intent of the requirement in Sentence (2) for handrails to be continuous throughout the length of the flight is that the handrail be continuous from the bottom riser to the top riser of the flight. Once again, the required handrail may start back from the bottom riser only if it is supported by a newel post installed on this line. (See Figure A-9.8.7.2.) With regard to stairs serving a single dwelling unit, the handrail may terminate at landings.

In the case of stairs within dwelling units that incorporate winders, the handrail should be configured so that it will in fact provide guidance and support to the stair user throughout the turn through the winder.



**Figure A-9.8.7.2.**  
**Continuity of handrails at the top and bottom of stairs and flights**

**A-9.8.7.3.(1) Termination of Handrails.** Handrails are required to be installed so as not to obstruct pedestrian travel. To achieve this end, the rail should not extend so far into a hallway as to reduce the clear width of the hallway to less than the required width. Where the stair terminates in a room or other space, likely paths of travel through that room or space should be assessed to ensure that any projection of the handrail beyond the end of the stair will not interfere with pedestrian travel. As extensions of handrails beyond the first and last riser are not required in dwelling units (see Sentence 9.8.7.3.(2)) and as occupants of dwellings are generally familiar with their surroundings, the design of dwellings would not generally be affected by this requirement.

Handrails are also required to terminate in a manner that will not create a safety hazard to blind or visually impaired persons, children whose heads may be at the same height as the end of the rail, or persons wearing loose clothing or carrying items that might catch on the end of the rail. One approach to reducing potential hazards is returning the handrail to a wall, floor or post. Again, within dwelling units, where occupants are generally familiar with their surroundings, returning the handrail to a wall, floor or post may not be necessary. For example, where the handrail is fastened to a wall and does not project past the wall into a hallway or other space, a reasonable degree of safety is assumed to be provided; other alternatives may provide an equivalent level of protection.

**A-9.8.7.3.(2) Handrail Extensions.** As noted in Appendix Note A-9.8.7.2., the guidance and support provided by handrails is particularly important at the beginning and end of ramps and flights of stairs and at changes in direction. The extended handrail provides guidance and allows users to steady themselves upon entering or leaving a ramp or flight of stairs. Such extensions are particularly useful to visually-impaired persons, and persons with physical disabilities or who are encumbered in their use of the stairs or ramp.

**A-9.8.7.4. Height of Handrails.** Handrails that do not meet the height criteria for required handrails may be installed, provided they are in addition to the required handrails.

**A-9.8.7.5.(2) Handrail Sections.** Handrails are intended to provide guidance and support to stair users. To fulfil this intent, handrails must be “graspable.” Acceptable handrail sections include, but are not limited to, those shown below.

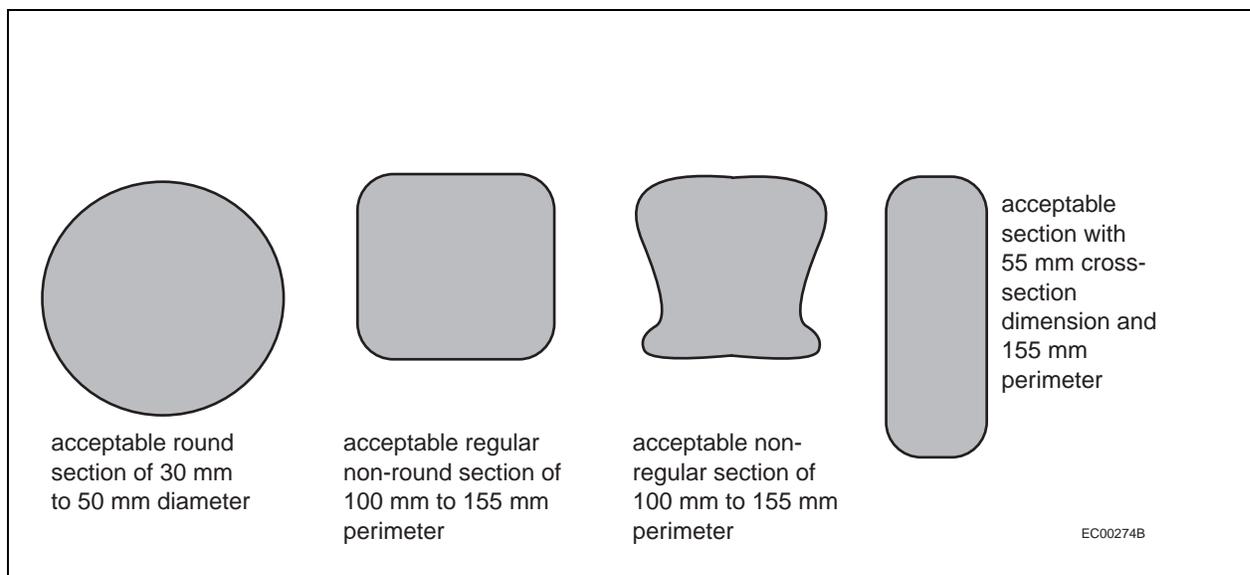
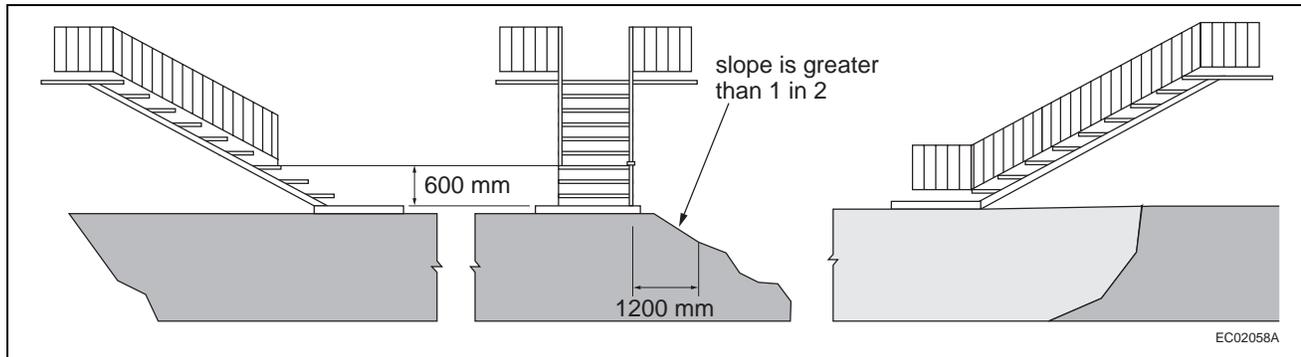


Figure A-9.8.7.5.(2)  
Handrail sections

**A-9.8.7.7. Attachment of Handrails.** Handrails are intended to provide guidance and support to the stair user and to arrest falls. The loads on handrails may therefore be considerable. The attachment of handrails serving a single dwelling unit may be accepted on the basis of experience or structural design.

**A-9.8.8.1. Required Guards.** The requirements relating to guards stated in Part 9 are based on the premise that, wherever there is a difference in elevation of 600 mm or more between two floors, or between a floor or other surface to which access is provided for other than maintenance purposes and the next lower surface, the risk of injury in a fall from the higher surface is sufficient to warrant the installation of some kind of barrier to reduce the chances of such a fall. A wall along the edge of the higher surface will obviously prevent such a fall, provided the wall is sufficiently strong that a person cannot fall through it. Where there is no wall, a guard must be installed. Because guards clearly provide less protection than walls, additional requirements apply to guards to ensure that a minimum level of protection is provided. These relate to the characteristics described in A-9.8.8.3., A-9.8.8.5.(1) and (2), A-9.8.8.5.(3) and A-9.8.8.6.

Examples of such surfaces where the difference in elevation could exceed 600 mm and consequently where guards would be required include, but are not limited to, landings, porches, balconies, mezzanines, galleries, and raised walkways. Especially in exterior settings, surfaces adjacent to walking surfaces, stairs or ramps often are not parallel to the walking surface or the surface of the treads or ramps. Consequently, the walking surface, stair or ramp may need protection in some locations but not in others. (See Figure A-9.8.8.1.) In some instances, grades are artificially raised close to walking surfaces, stairs or ramps to avoid installing guards. This provides little or no protection for the users. That is why the requirements specify differences in elevation not only immediately adjacent to the construction but also for a distance of 1 200 mm from it by requiring that the slope of the ground be within certain limits. (See Figure A-9.8.8.1.)



**Figure A-9.8.8.1.**  
Required locations of guards

**A-9.8.8.2. Loads on Guards.** Guards must be constructed so as to be strong enough to protect persons from falling under normal use. Many guards installed in dwelling units or on exterior stairs serving one or two dwelling units have demonstrated acceptable performance over time. The loading described in the first row of Table 9.8.8.2. is intended to be consistent with the performance provided by these guards. Examples of guard construction presented in Chapter SG7 of the Supplementary Guidelines to the 1997 Ontario Building Code meet the criteria set in the Alberta Building Code for loads on guards, including the more stringent requirements of Sentences 9.8.8.2.(1) and (2).

The load on guards within dwelling units, or on exterior guards serving not more than two dwelling units, is to be imposed over an area of the guard such that, where standard balusters are used and installed at the maximum 100 mm spacing permitted for required guards, 3 balusters will be engaged. Where the balusters are wider, only two may be engaged unless they are spaced closer together. Where the guard is not required, and balusters are installed more than 100 mm apart, fewer balusters may be required to carry the imposed load.

**A-9.8.8.3. Minimum Heights.** Guard heights are generally based on the waist heights of average persons. Generally, lower heights are permitted in dwelling units because the occupants become familiar with the potential hazards, and situations which lead to pushing and jostling under crowded conditions are less likely to arise.

**A-9.8.8.5.(1) and (2) Risk of Falling through Guards.** The risk of falling through a guard is especially prevalent for children. Therefore the requirements are stringent for guards in all buildings except industrial buildings, where children are unlikely to be present except under strict supervision.

**A-9.8.8.5.(3) Risk of Children Getting Their Heads Stuck between Balusters.** The requirements to prevent children falling through guards also serve to provide adequate protection against this problem. However, guards are often installed where they are not required by the Code; i.e., in places where the difference in elevation is less than 600 mm. In these cases, there is no need to require the openings between balusters to be less than 100 mm. However, there is a range of openings between 100 mm and 200 mm in which children can get their heads stuck. Therefore, openings in this range are not permitted except in buildings of industrial occupancy, where children are unlikely to be present except under strict supervision.

**A-9.8.8.6. Risk of Children Climbing Over Guards.** Guards are sometimes constructed with horizontal or near-horizontal members between balusters such that a ladder effect is achieved; this can be very tempting for young children to climb, thus exposing themselves to risk of falling over the guard. Such construction is not permitted for required guards in buildings of residential occupancy.

**A-9.9.4.5.(1) Openings in Exterior Walls of Exits.**

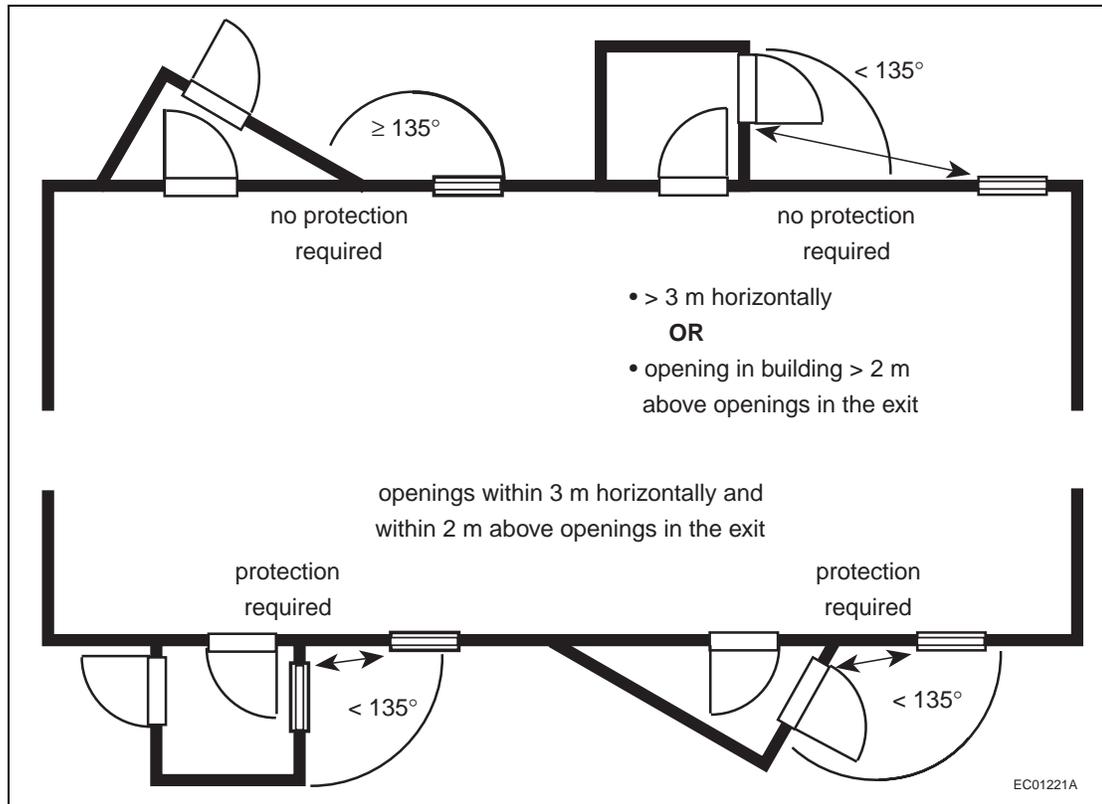


Figure A-9.9.4.5.(1)  
Protection of openings in exterior walls of exits

**A-9.9.8.4.(1) Independent and Remote Exits.** Subsection 9.9.8. requires that some floor areas have more than one exit. The intent is to ensure that, if one exit is made untenable or inaccessible by a fire, one or more other exits will be available to permit the occupants to escape. However, if the exits are close together, all exits might be made untenable or inaccessible by the same fire. Sentence 9.9.8.4.(1) therefore requires at least two of the exits to be located remotely from each other. This is not a problem in many buildings falling under Part 9. For instance, apartment buildings usually have exits located at either end of long corridors. However, in other types of buildings (e.g. dormitory and college residence buildings) this is often difficult to accomplish and problems arise in interpreting the meaning of the word “remote.” Article 3.4.2.3. is more specific, generally requiring the distance between exits to be one half the diagonal dimension of the floor area or at least 9 m. However, it is felt that such criteria would be too restrictive to impose on the design of all the smaller buildings which come under Part 9. Nevertheless, the exits should be placed as far apart as possible and the Part 3 criteria should be used as a target. Designs in which the exits are so close together that they will obviously both become contaminated in the event of a fire are not acceptable.

**A-9.9.11.3.(1) Emergency Lighting.** For small buildings, such as a car wash, industrial shop, service station kiosk, shed, or greenhouse, a self-contained emergency lighting system is deemed, in most situations, to be unnecessary.

**A-9.10.1.2.(8) Installation of Sprinkler, Standpipe and Hose Systems.** Some provisions captured by the cross-reference to Subsection 3.2.5. go beyond the intended application of the cross-reference. Provisions in Subsection 3.2.5. that apply to other than sprinkler, standpipe or hose systems—for example, the provisions regarding access for firefighting purposes—do not apply to Part 9 buildings.

Similarly, in the context of the cross-reference, Subsection 3.2.5. applies only where sprinkler, standpipe or hose systems are installed in a Part 9 building, whether the installation is voluntary or for the purpose of complying with the provisions in Part 9. Provisions in Subsection 3.2.5. that identify buildings or spaces in which these systems are to be installed do not apply: for example, Article 3.2.5.9. on standpipes.

**A-9.10.1.3.(1) Commercial Cooking Equipment.** Part 6 refers to NFPA 96, “Ventilation Control and Fire Protection of Commercial Cooking Operations,” which in turn references “Commercial Cooking Equipment.” However, the deciding factor as to whether or not NFPA 96 applies is the potential for production of grease-laden vapours and smoke, rather than the type of equipment used. While NFPA 96 does not apply to domestic equipment for normal residential family use, it should apply to domestic equipment used in commercial, industrial, institutional and similar cooking applications where the potential for the production of smoke and grease-laden vapours exceeds that for normal residential family use.

**A-9.10.3.1. Fire and Sound Resistance of Building Assemblies.** The following tables may be used to select building assemblies for compliance with Article 9.10.3.1. and Subsection 9.11.2.

Tables A-9.10.3.1.A. and A-9.10.3.1.B. have been developed from information gathered from tests. While a large number of the assemblies listed were tested, the fire-resistance and acoustical ratings for others were assigned on the basis of extrapolation of information from tests of similar assemblies. Where there was enough confidence relative to the fire performance of an assembly, the fire-resistance ratings were assigned relative to the commonly used minimum ratings of 30 min, 45 min and 1 h, including a designation of “< 30 min” for assemblies that are known not to meet the minimum 30-minute rating. Where there was not enough comparative information on an assembly to assign to it a rating with confidence, its value in the tables has been left blank (hyphen), indicating that its rating remains to be assessed through another means. Future work is planned to develop much of this additional information.

These tables are provided only for the convenience of Code users and do not limit the number of assemblies permitted to those in the tables. Assemblies not listed or not given a rating in these tables are equally acceptable provided their fire and sound resistance can be demonstrated to meet the above-noted requirements either on the basis of tests referred to in Article 9.10.3.1. and Subsection 9.11.1. or by using the data in Appendix D, Fire-Performance Ratings. It should be noted, however, that Tables A-9.10.3.1.A. and A-9.10.3.1.B. are not based on the same assumptions as those used in Appendix D. Assemblies in Tables A-9.10.3.1.A. and A-9.10.3.1.B. are described through their generic descriptions and variants and include details given in the notes to the tables. Assumptions for Appendix D include different construction details that must be followed rigorously for the calculated ratings to be expected. These are two different methods of choosing assemblies that meet required fire ratings.

**Table A-9.10.3.1.A.  
Fire and Sound Resistance of Walls**

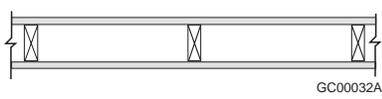
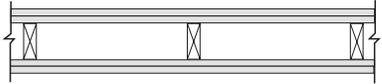
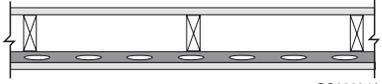
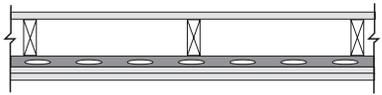
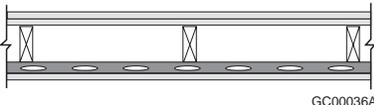
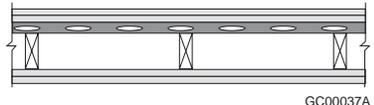
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
• Wood Studs	W1	<ul style="list-style-type: none"> <li>• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on each side</li> </ul>			
• Single Row	W1a	W1 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1 h	1 h	36
• Loadbearing or Non-Loadbearing	W1b	W1 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	45 min [1 h <sup>(6)</sup> ]	45 min [1 h <sup>(6)</sup> ]	34
	W1c	W1 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)(7)</sup></li> </ul>	30 min	30 min [45 min <sup>(6)</sup> ]	32
	W1d	W1 with <ul style="list-style-type: none"> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1 h	1 h	32

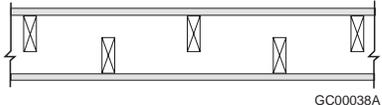
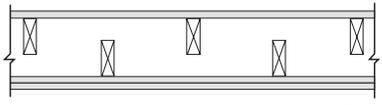
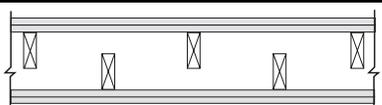
Table A-9.10.3.1.A. (Continued)

Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	W1e	W1 with • no absorptive material • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	45 min	32
	W2	• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • 2 layers of gypsum board on each side			GC00033A
	W2a	W2 with • 89 mm thick absorptive material <sup>(4)</sup> • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	38
	W2b	W2 with • 89 mm thick absorptive material <sup>(4)</sup> • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	38
	W2c	W2 with • 89 mm thick absorptive material <sup>(4)</sup> • 12.7 mm regular gypsum board <sup>(5)</sup>	45 min	1 h	36
	W2d	W2 with • no absorptive material • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	36
	W2e	W2 with • no absorptive material • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	35
	W2f	W2 with • no absorptive material • 12.7 mm regular gypsum board <sup>(5)</sup>	45 min	1 h	34
	W3	• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on each side			GC00034A
	W3a	W3 with • studs spaced 400 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	45
	W3b	W3 with • studs spaced 600 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	48
	W3c	W3 with • studs spaced 400 mm or 600 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	45 min	43
	W4	• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 2 layers of gypsum board on resilient metal channel side • 1 layer of gypsum board on other side			GC00035A
	W4a	W4 with • studs spaced 400 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h [1.5 h <sup>(6)</sup> ]	51
	W4b	W4 with • studs spaced 600 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h [1.5 h <sup>(6)</sup> ]	54

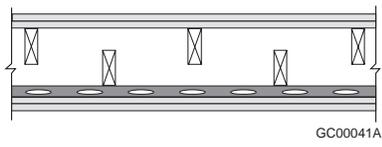
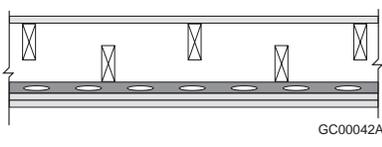
**Table A-9.10.3.1.A. (Continued)**

Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	W4c	W4 with • studs spaced 400 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min [1 h <sup>(6)</sup> ]	1 h	49
	W4d	W4 with • studs spaced 600 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min [1 h <sup>(6)</sup> ]	1 h	53
	W5	• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels on one side spaced 400 mm or 600 mm o.c. • 1 layer of gypsum board on resilient metal channel side • 2 layers of gypsum board on other side	 GC00036A		
	W5a	W5 with • studs spaced 400 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	51
	W5b	W5 with • studs spaced 600 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	54
	W5c	W5 with • studs spaced 400 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	49
	W5d	W5 with • studs spaced 600 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	53
	W6	• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c. • with or without absorptive material • resilient metal channels on one side • 2 layers of gypsum board on each side	 GC00037A		
	W6a	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	55
	W6b	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	58
	W6c	W6 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	53
	W6d	W6 with • studs spaced 400 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	1.5 h	55
	W6e	W6 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	55

**Table A-9.10.3.1.A. (Continued)**

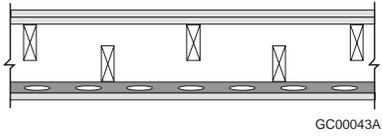
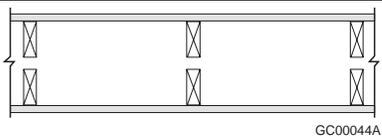
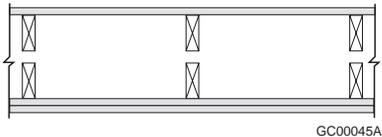
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	W6f	W6 with • studs spaced 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	58
	W6g	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 400 mm o.c. • 12.7 mm regular gypsum board <sup>(5)</sup>	45 min	1 h	50
	W6h	W6 with • studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(4)</sup> • resilient metal channels spaced 600 mm o.c. • 12.7 mm regular gypsum board <sup>(5)</sup>	45 min	1 h	52
	W6i	W6 with • studs spaced 400 mm or 600 mm o.c. • no absorptive material • resilient metal channels spaced 400 mm or 600 mm o.c. • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	47
	W6j	W6 with • studs spaced 400 mm or 600 mm o.c. • no absorptive material • resilient metal channels spaced 400 mm or 600 mm o.c. • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	46
<ul style="list-style-type: none"> <li>• Wood Studs</li> <li>• Two Rows Staggered on 38 mm x 140 mm Plate</li> <li>• Loadbearing or Non-Loadbearing</li> </ul>	W7	<ul style="list-style-type: none"> <li>• two rows 38 mm x 89 mm studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate</li> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• 1 layer of gypsum board on each side</li> </ul>	 GC00038A		
	W7a	W7 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h	47
	W7b	W7 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min [1 h <sup>(6)</sup> ]	45 min [1 h <sup>(6)</sup> ]	45
	W7c	W7 with • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	30 min	30 min [45 min <sup>(6)</sup> ]	42
	W8	<ul style="list-style-type: none"> <li>• Two rows 38 mm x 89 mm studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate</li> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• 2 layers of gypsum board on one side</li> <li>• 1 layer of gypsum board on other side</li> </ul>	 GC00039A		
	W8a	W8 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	52
	W8b	W8 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	50
	W9	<ul style="list-style-type: none"> <li>• two rows 38 mm x 89 mm studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate</li> <li>• with or without absorptive material</li> <li>• 2 layers of gypsum board on each side</li> </ul>	 GC00040A		

**Table A-9.10.3.1.A. (Continued)**

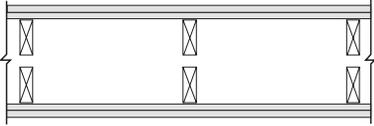
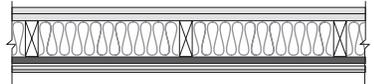
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	W9a	W9 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1.5 h	2 h	56
	W9b	W9 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1 h	1.5 h	55
	W9c	W9 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	45 min	1 h	53
	W9d	W9 with <ul style="list-style-type: none"> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1.5 h	2 h	48
	W10	<ul style="list-style-type: none"> <li>• two rows 38 mm x 89 mm studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate</li> <li>• with or without absorptive material</li> <li>• resilient metal channels on one side spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on each side</li> </ul>  <p style="text-align: right; font-size: small;">GC00041A</p>			
	W10a	W10 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1.5 h	2 h	62
	W10b	W10 with <ul style="list-style-type: none"> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1 h	1.5 h	60
	W10c	W10 with <ul style="list-style-type: none"> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1.5 h	2 h	50
	W10d	W10 with <ul style="list-style-type: none"> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1 h	1.5 h	48
	W11	<ul style="list-style-type: none"> <li>• two rows 38 mm x 89 mm studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate</li> <li>• 89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>• resilient metal channels on one side spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on resilient channel side</li> <li>• 1 layer of gypsum board on other side</li> </ul>  <p style="text-align: right; font-size: small;">GC00042A</p>			
	W11a	W11 with <ul style="list-style-type: none"> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	1 h	1 h	56
	W11b	W11 with <ul style="list-style-type: none"> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	45 min [1 h <sup>(6)</sup> ]	1 h	54

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Table A-9.10.3.1.A. (Continued)

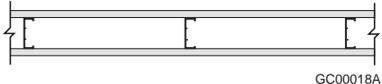
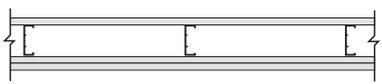
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	W12	<ul style="list-style-type: none"> <li>two rows 38 mm x 89 mm studs each spaced 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate</li> <li>89 mm thick absorptive material on one side or 65 mm thick on each side<sup>(4)</sup></li> <li>resilient metal channels on one side spaced 400 mm or 600 mm o.c.</li> <li>1 layer of gypsum board on resilient metal channel side</li> <li>2 layers of gypsum board on other side</li> </ul>	 <p style="text-align: right;">GC00043A</p>		
	W12a	W12 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	56
	W12b	W12 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	54
<ul style="list-style-type: none"> <li>Wood Studs</li> <li>Two Rows on Separate Plates</li> <li>Loadbearing or Non-Loadbearing</li> </ul>	W13	<ul style="list-style-type: none"> <li>two rows 38 mm x 89 mm studs, each spaced 400 mm or 600 mm o.c. on separate 38 mm x 89 mm plates set 25 mm apart</li> <li>with or without absorptive material</li> <li>1 layer of gypsum board on each side</li> </ul>	 <p style="text-align: right;">GC00044A</p>		
	W13a	W13 with • 89 mm thick absorptive material on each side <sup>(4)(8)</sup> • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h	57
	W13b	W13 with • 89 mm thick absorptive material on each side <sup>(4)(8)</sup> • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min [1 h <sup>(6)</sup> ]	45 min [1 h <sup>(6)</sup> ]	57
	W13c	W13 with • 89 mm thick absorptive material on one side only <sup>(4)(8)</sup> • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h	54
	W13d	W13 with • 89 mm thick absorptive material on one side only <sup>(4)(8)</sup> • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	45 min	53
	W13e	W13 with • no absorptive material • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h	45
	W13f	W13 with • no absorptive material • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	45 min	45
	W14	<ul style="list-style-type: none"> <li>two rows 38 mm x 89 mm studs, each spaced 400 mm or 600 mm o.c. on separate 38 mm x 89 mm plates set 25 mm apart</li> <li>with or without absorptive material</li> <li>2 layers of gypsum board on one side</li> <li>1 layer of gypsum board on other side</li> </ul>	 <p style="text-align: right;">GC00045A</p>		
	W14a	W14 with • 89 mm thick absorptive material on each side <sup>(4)(8)</sup> • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h [1.5 h <sup>(6)</sup> ]	61
	W14b	W14 with • 89 mm thick absorptive material on each side <sup>(4)(8)</sup> • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	61
W14c	W14 with • 89 mm thick absorptive material on one side only <sup>(4)(8)</sup> • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h	57	

**Table A-9.10.3.1.A. (Continued)**

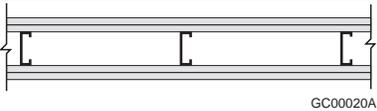
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	W14d	W14 with • 89 mm thick absorptive material on one side only <sup>(4)(8)</sup> • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	57
	W14e	W14 with • no absorptive material • 15.9 mm Type X gypsum board <sup>(5)</sup>	1 h	1 h	51
	W14f	W14 with • no absorptive material • 12.7 mm Type X gypsum board <sup>(5)</sup>	45 min	1 h	51
	W15	• two rows 38 mm x 89 mm studs, each spaced 400 mm or 600 mm o.c. on separate 38 mm x 89 mm plates set 25 mm apart • with or without absorptive material • 2 layers of gypsum board on each side	 GC00046A		
	W15a	W15 with • 89 mm thick absorptive material on each side <sup>(4)(8)</sup> • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	66
	W15b	W15 with • 89 mm thick absorptive material on each side <sup>(4)(8)</sup> • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	65
	W15c	W15 with • 89 mm thick absorptive material on each side <sup>(4)(8)</sup> • 12.7 mm regular gypsum board <sup>(5)</sup>	45 min	1 h	61
	W15d	W15 with • 89 mm thick absorptive material on one side only <sup>(4)(8)</sup> • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	62
	W15e	W15 with • 89 mm thick absorptive material on one side only <sup>(4)(8)</sup> • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	60
	W15f	W15 with • 89 mm thick absorptive material on one side only <sup>(4)(8)</sup> • 12.7 mm regular gypsum board <sup>(5)</sup>	45 min	1 h	57
	W15g	W15 with • no absorptive material • 15.9 mm Type X gypsum board <sup>(5)</sup>	1.5 h	2 h	56
	W15h	W15 with • no absorptive material • 12.7 mm Type X gypsum board <sup>(5)</sup>	1 h	1.5 h	55
	W15i	W15 with • no absorptive material • 12.7 mm regular gypsum board <sup>(5)</sup>	45 min	1 h	51
• Exterior Wood Studs • Single Row	EW1	• 38 mm x 89 mm studs spaced 400 mm or 600 mm o.c. • 89 mm thick absorptive material <sup>(6)</sup> • 1 or 2 layers of gypsum board on inside • exterior sheathing and siding	 GC00011A		
• Loadbearing and Non-Loadbearing	EW1a	EW1 with • 15.9 mm Type X gypsum board <sup>(5)(9)</sup>	1 h	1 h	n/a

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Table A-9.10.3.1.A. (Continued)

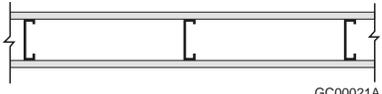
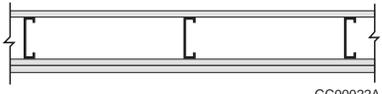
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	EW1b	EW1 with • 12.7 mm Type X gypsum board <sup>(5)(9)</sup>	45 min	45 min	n/a
	EW1c	EW1 with • 2 layers of 12.7 mm regular gypsum board <sup>(5)(9)</sup>	45 min	45 min	n/a
<ul style="list-style-type: none"> <li>• Non-Loadbearing Steel Studs</li> <li>• 0.46 mm (25 Gauge)</li> </ul>	S1	<ul style="list-style-type: none"> <li>• 31 mm x 64 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on each side</li> </ul>			
	S1a	<ul style="list-style-type: none"> <li>• S1 with studs spaced 600 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min [1 h <sup>(6)</sup> ]	43
	S1b	<ul style="list-style-type: none"> <li>• S1 with studs spaced 400 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min [1 h <sup>(6)</sup> ]	39
	S1c	<ul style="list-style-type: none"> <li>• S1 with studs spaced 400 mm or 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min	35
	S2	<ul style="list-style-type: none"> <li>• 31 mm x 64 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on one side</li> <li>• 2 layers of gypsum board on other side</li> </ul>			
	S2a	<ul style="list-style-type: none"> <li>• S2 with studs spaced 600 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	50
	S2b	<ul style="list-style-type: none"> <li>• S2 with studs spaced 400 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	44
	S2c	<ul style="list-style-type: none"> <li>• S2 with studs spaced 600 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	50
	S2d	<ul style="list-style-type: none"> <li>• S2 with studs spaced 400 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	42
	S2e	<ul style="list-style-type: none"> <li>• S2 with studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	41
	S2f	<ul style="list-style-type: none"> <li>• S2 with studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	37
	S2g	<ul style="list-style-type: none"> <li>• S2 with studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	40

**Table A-9.10.3.1.A. (Continued)**

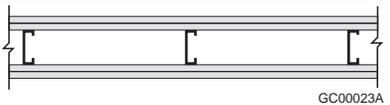
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	S2h	S2 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1 h	35
	S3	<ul style="list-style-type: none"> <li>• 31 mm x 64 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 2 layers of gypsum board on each side</li> </ul>			
	S3a	S3 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	54
	S3b	S3 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	51
	S3c	S3 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	53
	S3d	S3 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	47
	S3e	S3 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	49
	S3f	S3 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• 65 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	41
	S3g	S3 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	45
	S3h	S3 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	42
	S3i	S3 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	44
	S3j	S3 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	39
	S3k	S3 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	40
	S3l	S3 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	37

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Table A-9.10.3.1.A. (Continued)

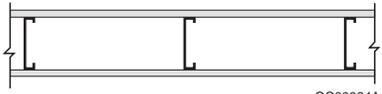
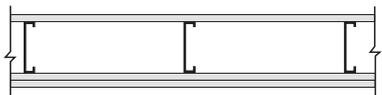
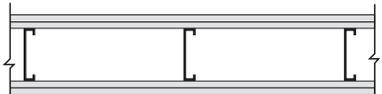
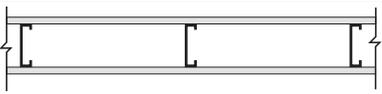
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	S4	<ul style="list-style-type: none"> <li>• 31 mm x 92 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on each side</li> </ul>			
	S4a	<ul style="list-style-type: none"> <li>• S4 with studs spaced 600 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min [1 h <sup>(6)</sup> ]	48
	S4b	<ul style="list-style-type: none"> <li>• S4 with studs spaced 400 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min [1 h <sup>(6)</sup> ]	47
	S4c	<ul style="list-style-type: none"> <li>• S4 with studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min	38
	S4d	<ul style="list-style-type: none"> <li>• S4 with studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min	38
	S5	<ul style="list-style-type: none"> <li>• 31 mm x 92 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on one side</li> <li>• 2 layers of gypsum board on other side</li> </ul>			
	S5a	<ul style="list-style-type: none"> <li>• S5 with studs spaced 600 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h [1.5 h <sup>(6)</sup> ]	53
	S5b	<ul style="list-style-type: none"> <li>• S5 with studs spaced 400 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h [1.5 h <sup>(6)</sup> ]	52
	S5c	<ul style="list-style-type: none"> <li>• S5 with studs spaced 600 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h [1.5 h <sup>(6)</sup> ]	51
	S5d	<ul style="list-style-type: none"> <li>• S5 with studs spaced 400 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h [1.5 h <sup>(6)</sup> ]	50
	S5e	<ul style="list-style-type: none"> <li>• S5 with studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	43
	S5f	<ul style="list-style-type: none"> <li>• S5 with studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	42
	S5g	<ul style="list-style-type: none"> <li>• S5 with studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	41

**Table A-9.10.3.1.A. (Continued)**

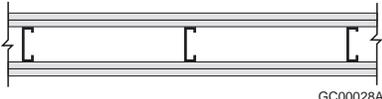
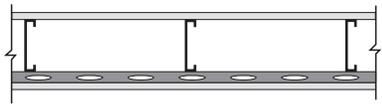
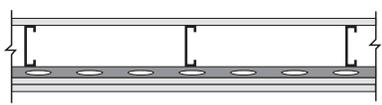
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	S5h	S5 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1 h	40
	S6	<ul style="list-style-type: none"> <li>• 31 mm x 92 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 2 layers of gypsum board on each side</li> </ul>			
	S6a	S6 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	56
	S6b	S6 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	55
	S6c	S6 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	55
	S6d	S6 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	54
	S6e	S6 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	50
	S6f	S6 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	48
	S6g	S6 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	47
	S6h	S6 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	2 h	45
	S6i	S6 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	45
	S6j	S6 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	–	1.5 h	44
	S6k	S6 with <ul style="list-style-type: none"> <li>• studs spaced 600 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	41
	S6l	S6 with <ul style="list-style-type: none"> <li>• studs spaced 400 mm o.c.</li> <li>• no absorptive material</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	–	1 h	39

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Table A-9.10.3.1.A. (Continued)

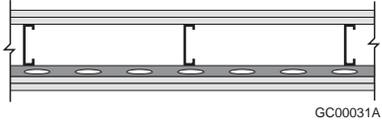
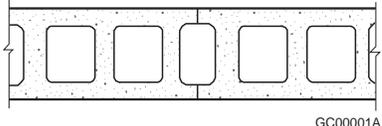
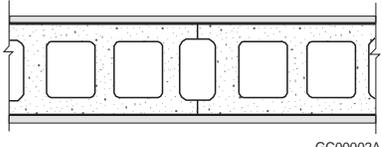
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	S7	<ul style="list-style-type: none"> <li>• 31 mm x 152 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00024A</p>		
	S7a	<ul style="list-style-type: none"> <li>• S7 with</li> <li>• 150 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min [1 h <sup>(6)</sup> ]	51
	S7b	<ul style="list-style-type: none"> <li>• S7 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	45 min	41
	S8	<ul style="list-style-type: none"> <li>• 31 mm x 152 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer of gypsum board on one side</li> <li>• 2 layers of gypsum board on other side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00025A</p>		
	S8a	<ul style="list-style-type: none"> <li>• S8 with</li> <li>• 150 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h [1.5 h <sup>(6)</sup> ]	55
	S8b	<ul style="list-style-type: none"> <li>• S8 with</li> <li>• 150 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h [1.5 h <sup>(6)</sup> ]	54
	S8c	<ul style="list-style-type: none"> <li>• S8 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	45
	S8d	<ul style="list-style-type: none"> <li>• S8 with</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1 h	44
	S9	<ul style="list-style-type: none"> <li>• 31 mm x 152 mm steel studs spaced 400 mm or 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 2 layers of gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00026A</p>		
	S9a	<ul style="list-style-type: none"> <li>• S9 with</li> <li>• 150 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	2 h	59
	S9b	<ul style="list-style-type: none"> <li>• S9 with</li> <li>• 150 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1.5 h	57
	S9c	<ul style="list-style-type: none"> <li>• S9 with</li> <li>• 150 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	-	1 h	53
	S9d	<ul style="list-style-type: none"> <li>• S9 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	2 h	49
	S9e	<ul style="list-style-type: none"> <li>• S9 with</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	1.5 h	47
	S9f	<ul style="list-style-type: none"> <li>• S9 with</li> <li>• no absorptive material</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	-	1 h	43
• Loadbearing Steel Studs	S10	<ul style="list-style-type: none"> <li>• 92 mm loadbearing steel studs spaced 400 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00027A</p>		

**Table A-9.10.3.1.A. (Continued)**

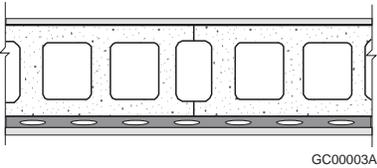
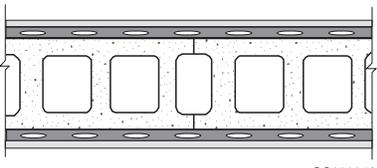
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
<ul style="list-style-type: none"> <li>• 0.91 mm or 1.22 mm Thickness (18 or 20 Gauge)</li> </ul>	S10a	<ul style="list-style-type: none"> <li>• S10 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	34
	S10b	<ul style="list-style-type: none"> <li>• S10 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	32
	S11	<ul style="list-style-type: none"> <li>• 92 mm loadbearing steel studs spaced 400 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 2 layers gypsum board on each side</li> </ul>			GC00028A
	S11a	<ul style="list-style-type: none"> <li>• S11 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	38
	S11b	<ul style="list-style-type: none"> <li>• S11 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	38
	S11c	<ul style="list-style-type: none"> <li>• S11 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	-	-	36
	S11d	<ul style="list-style-type: none"> <li>• S11 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	36
	S11e	<ul style="list-style-type: none"> <li>• S11 with</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	35
	S11f	<ul style="list-style-type: none"> <li>• S11 with</li> <li>• no absorptive material</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	-	-	34
	S12	<ul style="list-style-type: none"> <li>• 92 mm loadbearing steel studs spaced 400 mm o.c.</li> <li>• with or without absorptive material</li> <li>• resilient metal channels on one side spaced at 600 mm o.c.</li> <li>• 1 layer gypsum board on each side</li> </ul>			GC00029A
	S12a	<ul style="list-style-type: none"> <li>• S12 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	49
	S12b	<ul style="list-style-type: none"> <li>• S12 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	39
	S13	<ul style="list-style-type: none"> <li>• 92 mm loadbearing steel studs spaced 400 mm o.c.</li> <li>• with or without absorptive material</li> <li>• resilient metal channels on one side spaced at 600 mm o.c.</li> <li>• 2 layers gypsum board on resilient channel side</li> <li>• 1 layer gypsum board on other side</li> </ul>			GC00030A
	S13a	<ul style="list-style-type: none"> <li>• S13 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	54
	S13b	<ul style="list-style-type: none"> <li>• S13 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	44

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Table A-9.10.3.1.A. (Continued)

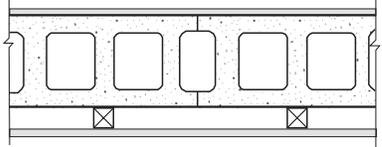
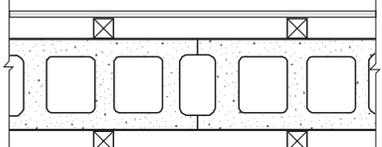
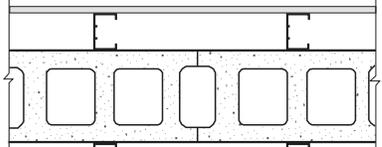
Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	S14	<ul style="list-style-type: none"> <li>• 92 mm loadbearing steel studs spaced 400 mm o.c.</li> <li>• with or without absorptive material</li> <li>• resilient metal channels on one side spaced at 600 mm o.c.</li> <li>• 2 layers gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00031A</p>		
	S14a	<ul style="list-style-type: none"> <li>• S14 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	61
	S14b	<ul style="list-style-type: none"> <li>• S14 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	59
	S14c	<ul style="list-style-type: none"> <li>• S14 with</li> <li>• 89 mm thick absorptive material<sup>(4)</sup></li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	-	-	54
	S14d	<ul style="list-style-type: none"> <li>• S14 with</li> <li>• no absorptive material</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	51
	S14e	<ul style="list-style-type: none"> <li>• S14 with</li> <li>• no absorptive material</li> <li>• 12.7 mm Type X gypsum board<sup>(5)</sup></li> </ul>	-	-	49
	S14f	<ul style="list-style-type: none"> <li>• S14 with</li> <li>• no absorptive material</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	-	-	45
<ul style="list-style-type: none"> <li>• Hollow Concrete Block (Normal Weight Aggregate)</li> </ul>	B1	<ul style="list-style-type: none"> <li>• 140 mm or 190 mm concrete block</li> </ul>	 <p style="text-align: right; font-size: small;">GC00001A</p>		
	B1a	<ul style="list-style-type: none"> <li>• 140 mm bare concrete block<sup>(3)</sup></li> </ul>	1 h	1 h	48
	B1b	<ul style="list-style-type: none"> <li>• 190 mm bare concrete block<sup>(3)</sup></li> </ul>	1.5 h	1.5 h	50
	B2	<ul style="list-style-type: none"> <li>• 140 mm or 190 mm concrete block</li> <li>• no absorptive material</li> <li>• 1 layer gypsum-sand plaster or gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00002A</p>		
	B2a	<ul style="list-style-type: none"> <li>• B2 with</li> <li>• 140 mm concrete block</li> <li>• 12.7 mm gypsum-sand plaster</li> </ul>	2 h	2 h	50
	B2b	<ul style="list-style-type: none"> <li>• B2 with</li> <li>• 140 mm concrete block</li> <li>• 12.7 mm Type X gypsum board or 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	2 h	2 h	47
	B2c	<ul style="list-style-type: none"> <li>• B2 with</li> <li>• 140 mm concrete block</li> <li>• 12.7 mm regular gypsum board<sup>(5)</sup></li> </ul>	1.5 h	1.5 h	46
	B2d	<ul style="list-style-type: none"> <li>• B2 with</li> <li>• 190 mm concrete block</li> <li>• 12.7 mm gypsum-sand plaster</li> </ul>	2.5 h	2.5 h	51
	B2e	<ul style="list-style-type: none"> <li>• B2 with</li> <li>• 190 mm concrete block</li> <li>• 15.9 mm Type X gypsum board<sup>(5)</sup></li> </ul>	3 h	3 h	50

**Table A-9.10.3.1.A. (Continued)**

Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	B2f	B2 with • 190 mm concrete block • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	49
	B2g	B2 with • 190 mm concrete block • 12.7 mm regular gypsum board <sup>(5)</sup>	2 h	2 h	48
	B3	• 140 mm or 190 mm concrete block • resilient metal channels on one side spaced at 400 mm or 600 mm o.c. • absorptive material filling resilient metal channel space <sup>(4)</sup> • 1 layer gypsum board on each side			
	B3a	B3 with • 140 mm concrete block • 12.7 mm Type X gypsum board or 15.9 mm Type X gypsum board <sup>(5)</sup>	2 h	2 h	51
	B3b	B3 with • 140 mm concrete block • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	1.5 h	1.5 h	48
	B3c	B3 with • 190 mm concrete block • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	54
	B3d	B3 with • 190 mm concrete block • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	53
	B3e	B3 with • 190 mm concrete block • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	2 h	2 h	51
	B4	• 140 mm or 190 mm concrete block • resilient metal channels on each side spaced at 400 mm or 600 mm o.c. • with or without absorptive material • 1 layer gypsum board on each side			
	B4a	B4 with • 140 mm concrete block • 12.7 mm Type X gypsum board <sup>(5)</sup> , or 15.9 mm Type X gypsum board <sup>(5)</sup>	2 h	2 h	47
	B4b	B4 with • 140 mm concrete block • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	1.5 h	1.5 h	42
	B4c	B4 with • 190 mm concrete block • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	50
	B4d	B4 with • 190 mm concrete block • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	49
	B4e	B4 with • 190 mm concrete block • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	2 h	2 h	45

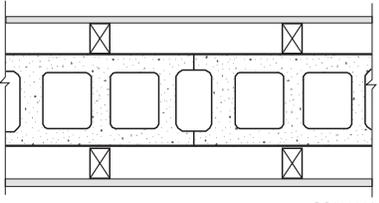
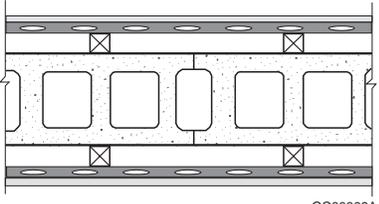
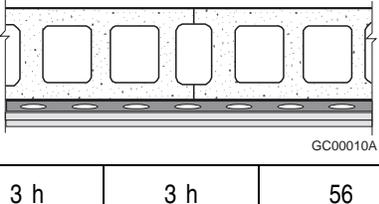
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**Table A-9.10.3.1.A. (Continued)**

Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	B5	<ul style="list-style-type: none"> <li>• 190 mm concrete block</li> <li>• 38 mm x 38 mm horizontal or vertical wood strapping on one side spaced at 600 mm o.c.</li> <li>• with or without absorptive material</li> <li>• 1 layer gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00005A</p>		
	B5a	B5 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	54
	B5b	B5 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	53
	B5c	B5 with • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	2 h	2 h	51
	B6	<ul style="list-style-type: none"> <li>• 140 mm or 190 mm concrete block</li> <li>• 38 mm x 38 mm horizontal or vertical wood strapping on each side spaced at 600 mm o.c.</li> <li>• absorptive material filling strapping space on each side<sup>(4)</sup></li> <li>• 1 layer gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00006A</p>		
	B6a	B6 with • 140 mm concrete block • 12.7 mm Type X gypsum board or 15.9 mm Type X gypsum board <sup>(5)</sup>	2 h	2 h	57
	B6b	B6 with • 140 mm concrete block • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	1.5 h	1.5 h	56
	B6c	B6 with • 190 mm concrete block • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	60
	B6d	B6 with • 190 mm concrete block • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	59
	B6e	B6 with • 190 mm concrete block • 12.7 regular gypsum board <sup>(5)(7)</sup>	2 h	2 h	57
	B7	<ul style="list-style-type: none"> <li>• 190 mm concrete block</li> <li>• 65 mm steel studs each side spaced at 600 mm o.c.</li> <li>• absorptive material filling stud space on each side<sup>(4)</sup></li> <li>• 1 layer gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00007A</p>		
	B7a	B7 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	71
	B7b	B7 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	70
	B7c	B7 with • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	2 h	2 h	69

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**Table A-9.10.3.1.A. (Continued)**

Type of Wall	Wall Number	Description	Fire-Resistance Rating <sup>(1)</sup>		Typical Sound Transmission Class <sup>(1)(2)(3)</sup>
			Loadbearing	Non-Loadbearing	
	B8	<ul style="list-style-type: none"> <li>• 190 mm concrete block</li> <li>• 38 mm x 64 mm wood studs on each side spaced at 600 mm o.c.</li> <li>• absorptive material filling stud space on each side<sup>(4)</sup></li> <li>• 1 layer gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00008A</p>		
	B8a	B8 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	71
	B8b	B8 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	70
	B8c	B8 with • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	2 h	2 h	69
	B9	<ul style="list-style-type: none"> <li>• 190 mm concrete block</li> <li>• 50 mm metal Z-bars on each side spaced at 600 mm o.c. (or 38 mm x 38 mm horizontal or vertical wood strapping plus resilient metal channels)</li> <li>• absorptive material filling Z-bar space on each side<sup>(4)</sup></li> <li>• 1 layer gypsum board on each side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00009A</p>		
	B9a	B9 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	65
	B9b	B9 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	64
	B9c	B9 with • 12.7 mm regular gypsum board <sup>(5)(7)</sup>	2 h	2 h	63
	B10	<ul style="list-style-type: none"> <li>• 190 mm concrete block</li> <li>• resilient metal channels on one side spaced at 600 mm o.c.</li> <li>• absorptive material filling resilient metal channel space<sup>(4)</sup></li> <li>• 2 layers gypsum board on one side only</li> </ul>	 <p style="text-align: right; font-size: small;">GC00010A</p>		
	B10a	B10 with • 15.9 mm Type X gypsum board <sup>(5)</sup>	3 h	3 h	56
	B10b	B10 with • 12.7 mm Type X gypsum board <sup>(5)</sup>	2.5 h	2.5 h	55
	B10c	B10 with • 12.7 mm regular gypsum board <sup>(5)</sup>	2 h	2 h	54

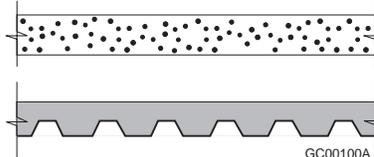
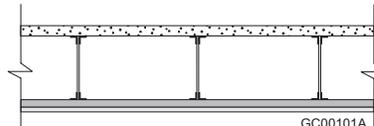
**Notes to Table A-9.10.3.1.A.:**

- (1) Fire-resistance and STC ratings of wood-frame construction were evaluated only for 38 mm x 89 mm constructions. The fire-resistance ratings and STC ratings provided for 38 mm x 89 mm wood-frame construction, however, may be applied to 38 mm x 140 mm wood-frame construction; in some cases the ratings may be conservative. Where 38 mm x 140 mm framing is used and absorptive material is called for, the absorptive material must be 140 mm thick. See D-1.2.1.(2) in Appendix D for the significance of fire-resistance ratings.
- (2) Sound ratings listed are based on the most reliable laboratory test data available for specimens conforming to installation details required by CSA A82.31-M, "Gypsum Board Application." Results of specific tests may differ slightly because of measurement precision and minor variations in construction details. These results should only be used where the actual construction details, including spacing of fasteners and supporting framing, correspond exactly to the details of the test specimens on which the ratings are based. Assemblies with sound transmission class ratings of 50 or more require acoustical sealant applied around electrical boxes and other openings, and at the junction of intersecting walls and floors, except intersection of walls constructed of concrete or solid brick.
- (3) Sound ratings are only valid where there are no discernible cracks or voids in the visible surfaces. For concrete blocks, surfaces must be sealed by at least 2 coats of paint or other surface finish described in Section 9.29. to prevent sound leakage.

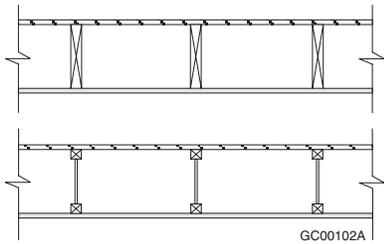
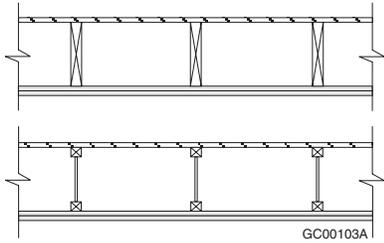
Table A-9.10.3.1.A. (Continued)

- (4) Sound absorptive material includes fibre processed from rock, slag, glass or cellulose fibre. It must fill at least 90% of the cavity thickness for the wall to have the listed STC value. The absorptive material should not overfill the cavity to the point of producing significant outward pressure on the finishes; such an assembly will not achieve the STC rating. Where the absorptive material used with steel stud assemblies is in batt form, "steel stud batts," which are wide enough to fill the cavity from the web of one stud to the web of the adjacent stud, must be used.
- (5) The complete descriptions of indicated finishes are as follows:
  - 12.7 mm regular gypsum board – 12.7 mm regular gypsum board conforming to Article 9.29.5.2.
  - 12.7 mm Type X gypsum board – 12.7 mm special fire-resistant Type X gypsum board conforming to Article 9.29.5.2.
  - 15.9 mm Type X gypsum board – 15.9 mm special fire-resistant Type X gypsum board conforming to Article 9.29.5.2.
  - Except for exterior walls (see Note 9), the outer layer of finish on both sides of the wall must have its joints taped and finished.
  - Fastener types and spacing must conform to CSA A82.31-M, "Gypsum Board Application."
- (6) Absorptive material required for the higher fire-resistance rating is mineral fibre processed from rock or slag with a mass of at least 4.8 kg/m<sup>2</sup> for 150 mm thickness, 2.8 kg/m<sup>2</sup> for 89 mm thickness and 2.0 kg/m<sup>2</sup> for 65 mm thickness and completely filling the wall cavity. For assemblies with double wood studs on separate plates, absorptive material is required in the stud cavities on both sides.
- (7) Regular gypsum board used in single layer assemblies must be installed so all edges are supported.
- (8) Where bracing material, such as diagonal lumber or plywood, OSB, gypsum board or fibreboard sheathing is installed on the inner face of one row of studs in double stud assemblies, the STC rating will be reduced by 3 for any assemblies containing absorptive material in both rows of studs or in the row of studs opposite to that to which the bracing material is attached. Attaching such layers on both inner faces of the studs may drastically reduce the STC value but enough data to permit assignment of STC ratings for this situation is not available. The fire-resistance rating is not affected by the inclusion of such bracing.
- (9) For exterior walls, the finish joints must be taped and finished for the outer layer of the interior side only. The gypsum board on the exterior side may be replaced with gypsum sheathing of the same thickness and type (regular or Type X).

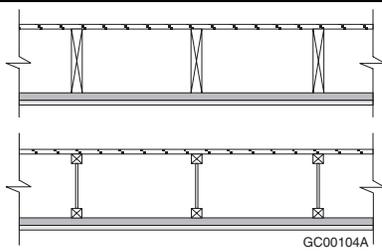
Table A-9.10.3.1.B.  
Fire and Sound Resistance of Floors, Ceilings and Roofs

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
Floors and Ceilings					
Concrete Slabs	F1	• concrete floors			
	F1a	• 90 mm reinforced concrete with 20 mm minimum cover over reinforcing steel	1 h	48	23
	F1b	• 130 mm reinforced concrete with 25 mm minimum cover over reinforcing steel	2 h	52	27
	F1c	• pre-stressed hollow core slab 200 mm deep with 25 mm minimum cover over reinforcing steel	1 h	50	28
	F1d	• 150 mm composite slab on 75 mm steel deck with 152 x 152 x MW3.8 x MW3.8 wire mesh	-	51	21
	F1e	• 150 mm composite slab on 75 mm steel deck with 152 x 152 x MW3.8 x MW3.8 wire mesh • resilient metal channels 400 mm or 600 mm o.c. • 2 layers of 12.7 mm Type X gypsum board or 2 layers of 15.9 mm Type X gypsum board	1.5 h	57	36
Open Web Steel Joists	F2	• open web steel joists with concrete floor			

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F2a	<ul style="list-style-type: none"> <li>• 50 mm thick concrete deck</li> <li>• on open web steel joists spaced 400 mm o.c.</li> <li>• furring channels spaced not more than 600 mm o.c. wired to underside of joists</li> <li>• 1 layer of 15.9 mm Type X gypsum board on ceiling side</li> </ul>	45 min	53	27
	F2b	<ul style="list-style-type: none"> <li>• 65 mm regular concrete minimum 155 kg/m<sup>2</sup></li> <li>• on composite steel joists spaced 1250 mm o.c.</li> <li>• furring channels spaced not more than 600 mm o.c. wired to underside of joists</li> <li>• 1 layer of 12.7 mm or 15.9 mm Type X gypsum board on ceiling side</li> </ul>	1.5 h	53	28
Wood Floor Joists (Wood Joists minimum 38 x 235 mm, Wood I-Joists minimum 38 x 38 mm flange 9.5 mm OSB or plywood web, minimum 241 mm deep)	F3	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F3a	F3 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	33	28
	F3b	F3 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	34	30
	F3c	F3 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	32	27
	F3d	F3 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	33	29
	F3e	F3 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	31	26
	F3f	F3 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	32	28
	F4	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F4a	F4 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	36	31

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F4b	F4 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	37	33
	F4c	F4 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	35	30
	F4d	F4 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	36	32
	F4e	F4 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	34	29
	F4f	F4 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	35	31
	<b>F5</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F5a	F5 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum</li> </ul>	-	38	31
	F5b	F5 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	39	32
	F5c	F5 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	41	34
	F5d	F5 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	42	35
	F5e	F5 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	37	30
	F5f	F5 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	38	31
	F5g	F5 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	40	33

**Table A-9.10.3.1.B. (Continued)**

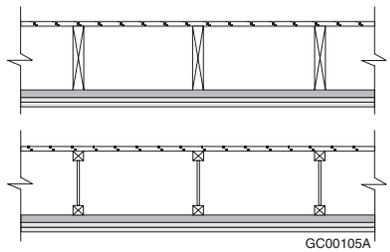
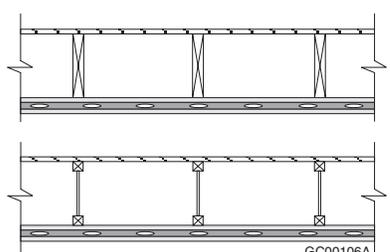
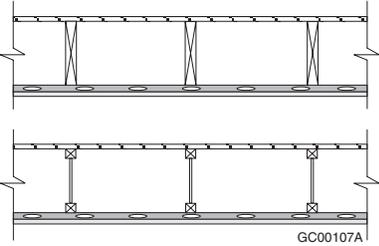
Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F5h	F5 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	41	34
	F5i	F5 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	36	29
	F5j	F5 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	37	30
	F5k	F5 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	39	32
	F5l	F5 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	40	33
	<b>F6</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F6a	F6 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	41	34
	F6b	F6 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	42	35
	F6c	F6 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	44	37
	F6d	F6 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	45	38
	F6e	F6 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	40	33
	F6f	F6 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	41	34

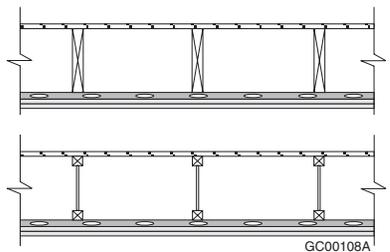
Table A-9.10.3.1.B. (Continued)

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F6g	F6 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	43	36
	F6h	F6 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	44	37
	F6i	F6 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	39	32
	F6j	F6 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	33
	F6k	F6 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	42	35
	F6l	F6 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	43	36
	<b>F7</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board attached directly to joists on ceiling side</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c. attached to joists through gypsum board</li> <li>• 1 layer of gypsum board attached to resilient channel</li> </ul>			
	F7a	F7 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	35	27
	F7b	F7 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	37	30
	F7c	F7 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	35	27

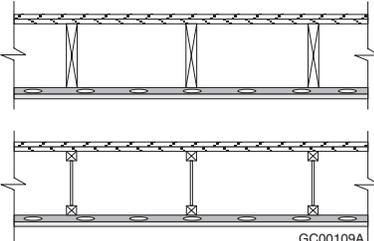
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F7d	F7 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	37	30
	F7e	F7 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	32	26
	F7f	F7 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	35	28
	<b>F8</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F8a	F8 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	39	32
	F8b	F8 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	41	34
	F8c	F8 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	48 <sup>(9)</sup>	40
	F8d	F8 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	49 <sup>(9)</sup>	42
	F8e	F8 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min	39	32
	F8f	F8 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min	41	34
	F8g	F8 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	48 <sup>(9)</sup>	39

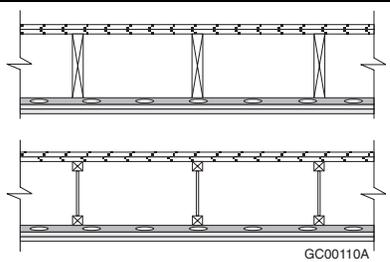
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F8h	F8 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)</sup>	49 <sup>(9)</sup>	42
	F8i	F8 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	37	31
	F8j	F8 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	39	33
	F8k	F8 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	45	37
	F8l	F8 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	47	40
	F9	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F9a	F9 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	47	38
	F9b	F9 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	48 <sup>(9)</sup>	40
	F9c	F9 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	54	47
	F9d	F9 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	55	49
	F9e	F9 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	47	38
	F9f	F9 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	48 <sup>(9)</sup>	40

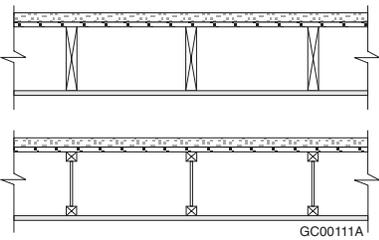
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F9g	F9 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	54	47
	F9h	F9 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	55	49
	F9i	F9 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	45	36
	F9j	F9 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	46	37
	F9k	F9 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	52	45
	F9l	F9 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	46
	<b>F10</b>	<ul style="list-style-type: none"> <li>• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard</li> <li>• one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F10a	F10 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	41	34
	F10b	F10 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	42	35
	F10c	F10 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)(12)</sup>	50	43
	F10d	F10 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	51	44
	F10e	F10 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	41	34

**Table A-9.10.3.1.B. (Continued)**

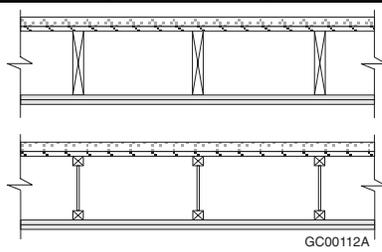
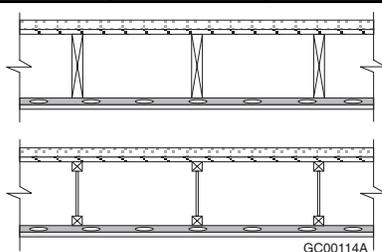
Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F10f	F10 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	42	35
	F10g	F10 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	50	43
	F10h	F10 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	51	44
	F10i	F10 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	32
	F10j	F10 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	41	33
	F10k	F10 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	48 <sup>(9)</sup>	40
	F10l	F10 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	49 <sup>(9)</sup>	41
	F11	<ul style="list-style-type: none"> <li>• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard</li> <li>• one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F11a	F11 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	50	41
	F11b	F11 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	51	42
	F11c	F11 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	57	50
	F11d	F11 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	58	51

**Table A-9.10.3.1.B. (Continued)**

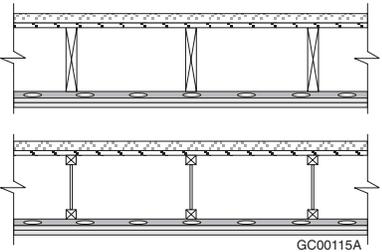
Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F11e	F11 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	50	41
	F11f	F11 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	51	42
	F11g	F11 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	57	50
	F11h	F11 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	58	51
	F11i	F11 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	46	39
	F11j	F11 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	47	41
	F11k	F11 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	46
	F11l	F11 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	54	47
	<b>F12</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00111A</p>		
	F12a	F12 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	39	26
	F12b	F12 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	40	28
	F12c	F12 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	39	26
	F12d	F12 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	40	28

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Table A-9.10.3.1.B. (Continued)

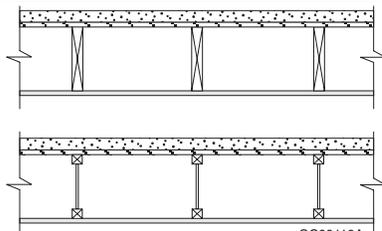
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F12e	F12 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> </ul>	-	36	25
	F12f	F12 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> </ul>	-	38	26
	<b>F13</b>	<ul style="list-style-type: none"> <li>25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>on wood joists spaced not more than 600 mm o.c.</li> <li>with or without absorptive material in cavity</li> <li>2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00112A</p>		
	F13a	F13 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	41	30
	F13b	F13 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	43	32
	F13c	F13 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	41	30
	F13d	F13 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	43	32
	F13e	F13 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> </ul>	-	38	29
	F13f	F13 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> </ul>	-	40	30
	<b>F14</b>	<ul style="list-style-type: none"> <li>25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>on wood joists spaced not more than 600 mm o.c.</li> <li>with or without absorptive material in cavity</li> <li>resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00114A</p>		
	F14a	F14 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>resilient metal channels spaced 400 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	51	20
	F14b	F14 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>resilient metal channels spaced 600 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	53	22

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F14c	F14 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)(12)</sup>	57	24
	F14d	F14 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	58	26
	F14e	F14 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	51	20
	F14f	F14 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	53	22
	F14g	F14 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	24
	F14h	F14 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	58	26
	F14i	F14 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	49 <sup>(9)</sup>	19
	F14j	F14 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	51	21
	F14k	F14 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	54	22
	F14l	F14 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	24
	<b>F15</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00115A</p>		
	F15a	F15 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h <sup>(12)</sup>	55	26

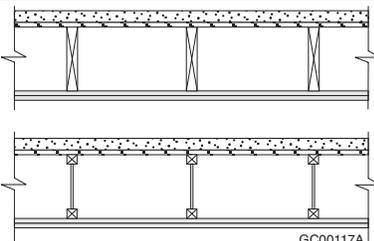
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**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F15b	F15 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	57	28
	F15c	F15 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	61	30
	F15d	F15 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	62	32
	F15e	F15 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h <sup>(12)</sup>	55	26
	F15f	F15 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	28
	F15g	F15 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	61	30
	F15h	F15 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	62	32
	F15i	F15 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	25
	F15j	F15 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	27
	F15k	F15 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	58	28
	F15l	F15 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	59	30
	<b>F16</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			 <p style="text-align: right; font-size: small;">GC00116A</p>

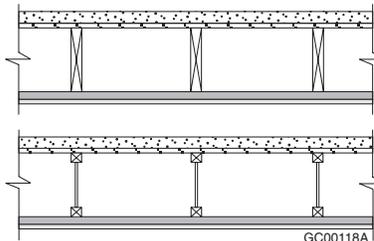
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**Table A-9.10.3.1.B. (Continued)**

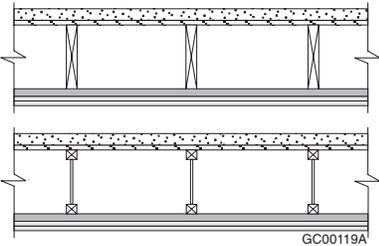
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F16a	F 16 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	-	46	25
	F16b	F16 with • absorptive material in cavity • 15.9 mm Type X gypsum board	-	48 <sup>(9)</sup>	28
	F16c	F16 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	-	46	25
	F16d	F16 with • absorptive material in cavity • 12.7 mm Type X gypsum board	-	48 <sup>(9)</sup>	28
	F16e	F16 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	42	24
	F16f	F16 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	44	25
	<b>F17</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00117A</p>		
	F17a	F17 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	-	47	30
	F17b	F17 with • absorptive material in cavity • 15.9 mm Type X gypsum board	-	49 <sup>(9)</sup>	32
	F17c	F17 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	-	47	30
	F17d	F17 with • absorptive material in cavity • 12.7 mm Type X gypsum board	-	49 <sup>(9)</sup>	32
	F17e	F17 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	43	29
	F17f	F17 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	45	30

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**Table A-9.10.3.1.B. (Continued)**

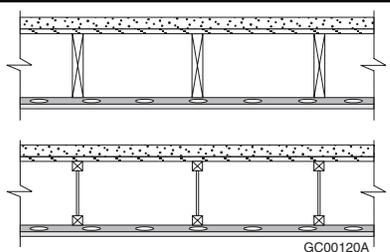
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	<b>F18</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00118A</p>		
	F18a	F18 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	51	27
	F18b	F18 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	52	27
	F18c	F18 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	53	30
	F18d	F18 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	54	30
	F18e	F18 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	51	27
	F18f	F18 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	52	27
	F18g	F18 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	53	30
	F18h	F18 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	54	30
	F18i	F18 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	47	25
	F18j	F18 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	48 <sup>(9)</sup>	25
	F18k	F18 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	49 <sup>(9)</sup>	29

**Table A-9.10.3.1.B. (Continued)**

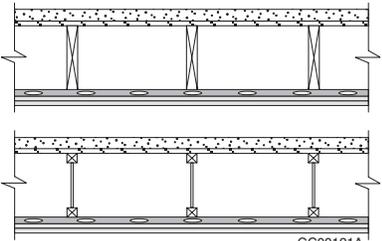
Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F18l	F18 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	50	29
	F19	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00119A</p>		
	F19a	F19 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	52	31
	F19b	F19 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	53	32
	F19c	F19 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	54	34
	F19d	F19 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	55	35
	F19e	F19 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	52	31
	F19f	F19 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	53	32
	F19g	F19 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	54	34
	F19h	F19 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	55	35
	F19i	F19 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	50	30
	F19j	F19 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	51	31

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**Table A-9.10.3.1.B. (Continued)**

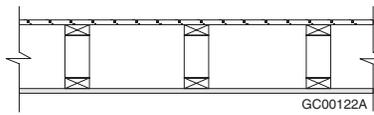
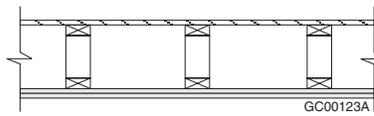
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F19k	F19 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	52	33
	F19l	F19 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	34
	F20	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00120A</p>		
	F20a	F20 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	45 min <sup>(12)</sup>	57	28
	F20b	F20 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	59	30
	F20c	F20 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(11)(12)</sup>	64	35
	F20d	F20 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	65	38
	F20e	F20 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	28
	F20f	F20 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	59	30
	F20g	F20 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	64	35
	F20h	F20 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	65	38
	F20i	F20 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	27

**Table A-9.10.3.1.B. (Continued)**

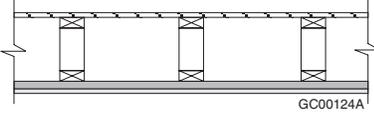
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F20j	F20 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	57	29
	F20k	F20 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	62	34
	F20l	F20 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	63	37
	<b>F21</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00121A</p>		
	F21a	F21 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	64	36
	F21b	F21 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	65	38
	F21c	F21 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	69	44
	F21d	F21 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	70	46
	F21e	F21 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	64	36
	F21f	F21 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	65	38
	F21g	F21 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	69	44
	F21h	F21 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	70	46

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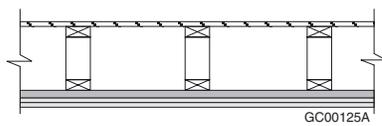
Table A-9.10.3.1.B. (Continued)

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)	
	F21i	F21 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	62	34	
	F21j	F21 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	63	35	
	F21k	F21 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	67	42	
	F21l	F21 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	68	43	
Wood Floor Trusses (wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length – minimum 235 mm depth)	F22	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer gypsum board on ceiling side</li> </ul>				 <p style="text-align: right; font-size: small;">GC00122A</p>
	F22a	F22 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	33	28	
	F22b	F22 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	34	30	
	F22c	F22 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	32	27	
	F22d	F22 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	33	29	
	F22e	F22 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	31	26	
	F22f	F22 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	32	28	
	F23	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>				 <p style="text-align: right; font-size: small;">GC00123A</p>

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F23a	F23 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	36	31
	F23b	F23 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	37	33
	F23c	F23 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	35	30
	F23d	F23 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	36	32
	F23e	F23 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	34	29
	F23f	F23 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	35	31
	<b>F24</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F24a	F24 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	38	31
	F24b	F24 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	39	32
	F24c	F24 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	41	34
	F24d	F24 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	42	35
	F24e	F24 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	37	30
	F24f	F24 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	38	31

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F24g	F24 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	40	33
	F24h	F24 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	41	34
	F24i	F24 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	36	29
	F24j	F24 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	37	30
	F24k	F24 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	39	32
	F24l	F24 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	33
	<b>F25</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00125A</p>		
	F25a	F25 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	41	34
	F25b	F25 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	42	35
	F25c	F25 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	44	37
	F25d	F25 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	45	38
	F25e	F25 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	40	33

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F25f	F25 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	41	34
	F25g	F25 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	43	36
	F25h	F25 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	44	37
	F25i	F25 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	39	32
	F25j	F25 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	33
	F25k	F25 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	42	35
	F25l	F25 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	43	36
	<b>F26</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board attached directly to trusses on ceiling side</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c. attached to trusses through the gypsum board</li> <li>• 1 layer of gypsum board attached to resilient channel</li> </ul>			
	F26a	F26 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	35	27
	F26b	F26 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	37	30

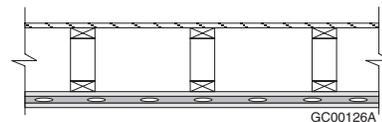
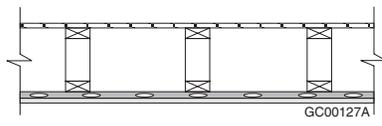
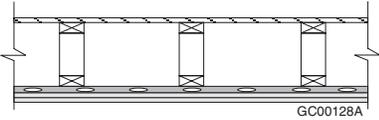


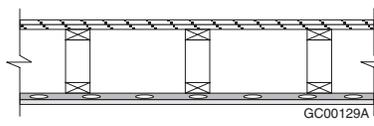
Table A-9.10.3.1.B. (Continued)

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F26c	F26 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>12.7 mm Type X gypsum board</li> <li>resilient metal channels</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	35	27
	F26d	F26 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>12.7 mm Type X gypsum board</li> <li>resilient metal channels</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	37	30
	F26e	F26 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> <li>resilient metal channels</li> <li>12.7 mm regular gypsum board</li> </ul>	-	32	26
	F26f	F26 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> <li>resilient metal channels</li> <li>12.7 mm regular gypsum board</li> </ul>	-	35	28
	F27	<ul style="list-style-type: none"> <li>subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>on wood trusses spaced not more than 600 mm o.c.</li> <li>with or without absorptive material in cavity</li> <li>resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>1 layer of gypsum board on ceiling side</li> </ul>			
	F27a	F27 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>resilient metal channels spaced 400 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	39	32
	F27b	F27 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>resilient metal channels spaced 600 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	41	34
	F27c	F27 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>resilient metal channels spaced 400 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	48 <sup>(9)</sup>	39
	F27d	F27 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>resilient metal channels spaced 600 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	42
	F27e	F27 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>resilient metal channels spaced 400 mm o.c.</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	40	34
	F27f	F27 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>resilient metal channels spaced 600 mm o.c.</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	41	34

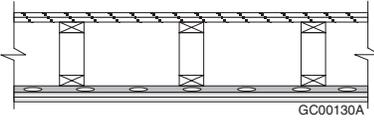
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F27g	F27 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	39
	F27h	F27 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	42
	F27i	F27 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	37	31
	F27j	F27 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	39	33
	F27k	F27 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	45	37
	F27l	F27 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	47	40
	<b>F28</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00128A</p>		
	F28a	F28 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	47	38
	F28b	F28 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	40
	F28c	F28 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	54	47
	F28d	F28 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	55	49
	F28e	F28 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	47	38

**Table A-9.10.3.1.B. (Continued)**

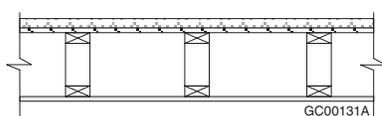
Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F28f	F28 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	40
	F28g	F28 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	54	47
	F28h	F28 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	55	49
	F28i	F28 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	45	36
	F28j	F28 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	46	37
	F28k	F28 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	52	45
	F28l	F28 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	46
	<b>F29</b>	<ul style="list-style-type: none"> <li>• one subfloor layer 11 mm sanded plywood, or OSB or waferboard</li> <li>• one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00129A</p>		
	F29a	F29 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	42	34
	F29b	F29 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	43	35
	F29c	F29 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	50	43

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F29d	F29 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	51	44
	F29e	F29 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	42	34
	F29f	F29 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	43	35
	F29g	F29 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	50	43
	F29h	F29 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	51	44
	F29i	F29 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	32
	F29j	F29 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	41	33
	F29k	F29 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	48 <sup>(9)</sup>	40
	F29l	F29 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	49 <sup>(9)</sup>	41
	<b>F30</b>	<ul style="list-style-type: none"> <li>• one subfloor layer 11 mm sanded plywood, or OSB or waferboard</li> <li>• one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F30a	F30 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	40

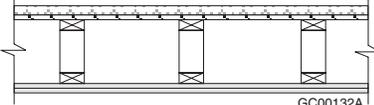
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**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F30b	F30 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	50	43
	F30c	F30 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	57	50
	F30d	F30 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	58	51
	F30e	F30 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	50	41
	F30f	F30 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	50	41
	F30g	F30 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	50
	F30h	F30 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	58	51
	F30i	F30 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	46	39
	F30j	F30 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	47	41
	F30k	F30 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	46
	F30l	F30 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	54	47
	F31	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			 <p style="text-align: right; font-size: small;">GC00131A</p>

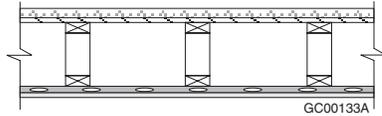
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**Table A-9.10.3.1.B. (Continued)**

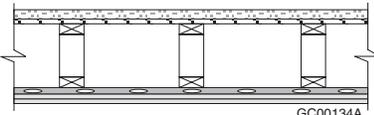
Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F31a	F31 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	39	26
	F31b	F31 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	40	28
	F31c	F31 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	39	26
	F31d	F31 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	40	28
	F31e	F31 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	36	25
	F31f	F31 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	38	26
	<b>F32</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00132A</p>		
	F32a	F32 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	41	30
	F32b	F32 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	43	32
	F32c	F32 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	41	30
	F32d	F32 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	43	32
	F32e	F32 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	38	29
	F32f	F32 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	30

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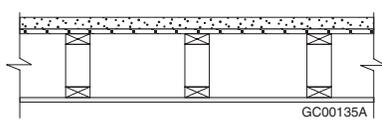
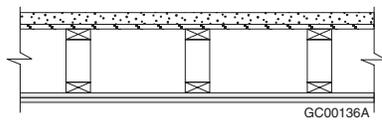
Table A-9.10.3.1.B. (Continued)

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	<b>F33</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F33a	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	51	20
	F33b	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	53	22
	F33c	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	57	24
	F33d	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	58	26
	F33e	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	51	20
	F33f	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	53	22
	F33g	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	24
	F33h	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	58	26
	F33i	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	49 <sup>(9)</sup>	19
	F33j	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	51	21
	F33k	<ul style="list-style-type: none"> <li>• F33 with</li> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	54	22

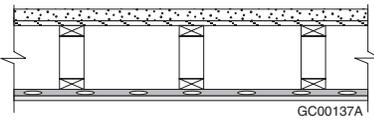
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F33i	F33 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	24
	F34	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F34a	F34 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	55	26
	F34b	F34 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	57	28
	F34c	F34 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	61	30
	F34d	F34 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	62	32
	F34e	F34 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	45 min	55	26
	F34f	F34 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	28
	F34g	F34 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	61	30
	F34h	F34 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	62	32
	F34i	F34 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	25
	F34j	F34 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	27

**Table A-9.10.3.1.B. (Continued)**

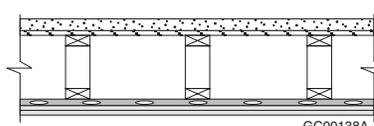
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F34k	F34 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	58	28
	F34l	F34 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	59	30
	<b>F35</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 GC00135A		
	F35a	F35 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	46	25
	F35b	F35 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	28
	F35c	F35 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	46	25
	F35d	F35 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	28
	F35e	F35 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	42	24
	F35f	F35 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	44	25
	<b>F36</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 GC00136A		
	F36a	F36 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	47	30
	F36b	F36 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	32
	F36c	F36 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	47	30
	F36d	F36 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	32

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F36e	F36 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	43	29
	F36f	F36 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	45	30
	<b>F37</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F37a	F37 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	45 min	57	28
	F37b	F37 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	59	30
	F37c	F37 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	64	35
	F37d	F37 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	65	38
	F37e	F37 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	28
	F37f	F37 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	59	30
	F37g	F37 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	64	35
	F37h	F37 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	65	38
	F37i	F37 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	27

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**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F37j	F37 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	57	29
	F37k	F37 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	62	34
	F37l	F37 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	63	37
	<b>F38</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on wood trusses spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00138A</p>		
	F38a	F38 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	64	36
	F38b	F38 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	65	38
	F38c	F38 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	69	44
	F38d	F38 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	70	46
	F38e	F38 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	45 min	64	36
	F38f	F38 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	65	38
	F38g	F38 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	69	44
	F38h	F38 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	70	46

**Table A-9.10.3.1.B. (Continued)**

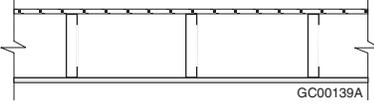
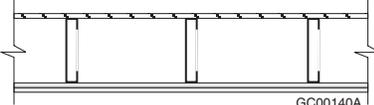
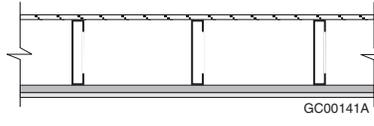
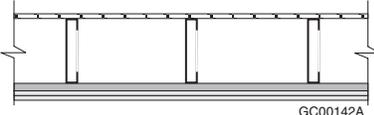
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F38i	F38 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	62	34
	F38j	F38 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	63	35
	F38k	F38 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	67	42
	F38l	F38 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	68	43
Cold Formed Steel Floor Joists (minimum 41 mm x 203 mm x 1.22 mm)	<b>F39</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F39a	F39 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	33	28
	F39b	F39 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	34	30
	F39c	F39 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	32	27
	F39d	F39 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	33	29
	F39e	F39 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	31	26
	F39f	F39 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	32	28
	<b>F40</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F40a	F40 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	36	31
	F40b	F40 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	37	33

Table A-9.10.3.1.B. (Continued)

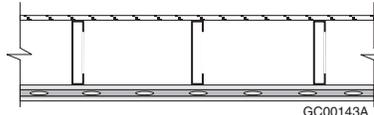
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F40c	F40 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	35	30
	F40d	F40 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	36	32
	F40e	F40 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> </ul>	-	34	29
	F40f	F40 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>12.7 mm regular gypsum board</li> </ul>	-	35	31
	<b>F41</b>	<ul style="list-style-type: none"> <li>subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>on steel joists spaced not more than 600 mm o.c.</li> <li>with or without absorptive material in cavity</li> <li>metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>1 layer of gypsum board on ceiling side</li> </ul>			
	F41a	F41 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>metal furring channels spaced 400 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	38	31
	F41b	F41 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>metal furring channels spaced 600 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	-	39	32
	F41c	F41 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>metal furring channels spaced 400 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	41	34
	F41d	F41 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>metal furring channels spaced 600 mm o.c.</li> <li>15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	42	35
	F41e	F41 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>metal furring channels spaced 400 mm o.c.</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	37	30
	F41f	F41 with <ul style="list-style-type: none"> <li>no absorptive material in cavity</li> <li>metal furring channels spaced 600 mm o.c.</li> <li>12.7 mm Type X gypsum board</li> </ul>	-	38	31
	F41g	F41 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>metal furring channels spaced 400 mm o.c.</li> <li>12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	40	33
	F41h	F41 with <ul style="list-style-type: none"> <li>absorptive material in cavity</li> <li>metal furring channels spaced 600 mm o.c.</li> <li>12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	41	34

**Table A-9.10.3.1.B. (Continued)**

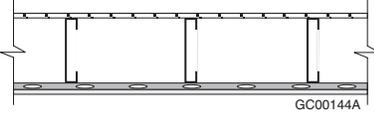
Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F41i	F41 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	36	29
	F41j	F41 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	37	30
	F41k	F41 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	39	32
	F41l	F41 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	40	33
	<b>F42</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00142A</p>		
	F42a	F42 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	41	34
	F42b	F42 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	42	35
	F42c	F42 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	44	37
	F42d	F42 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	45	38
	F42e	F42 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	40	33
	F42f	F42 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	41	34
	F42g	F42 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	43	36

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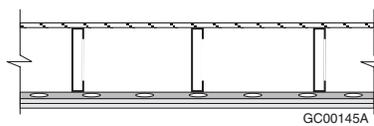
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F42h	F42 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	44	37
	F42i	F42 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	39	32
	F42j	F42 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	33
	F42k	F42 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	42	35
	F42l	F42 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• metal furring channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	43	36
	<b>F43</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board attached directly to joists on ceiling side</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c. attached to joists through the gypsum board</li> <li>• 1 layer of gypsum board attached to resilient channels</li> </ul>	 <p style="text-align: right; font-size: small;">GC00143A</p>		
	F43a	F43 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	35	27
	F43b	F43 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	37	30
	F43c	F43 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	35	27
	F43d	F43 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	37	30

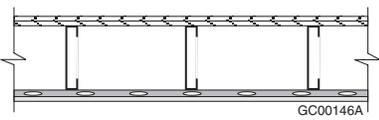
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F43e	F43 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	32	26
	F43f	F43 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> <li>• resilient metal channels</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	35	28
	<b>F44</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F44a	F44 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	39	32
	F44b	F44 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	41	34
	F44c	F44 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	48 <sup>(9)</sup>	40
	F44d	F44 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	49 <sup>(9)</sup>	42
	F44e	F44 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	39	32
	F44f	F44 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	41	34
	F44g	F44 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	48 <sup>(9)</sup>	39
	F44h	F44 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	30 min [45 min] <sup>(13)</sup>	49 <sup>(9)</sup>	42
	F44i	F44 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	37	31

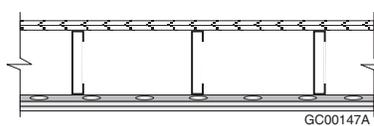
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F44j	F44 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	39	33
	F44k	F44 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	45	37
	F44l	F44 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	< 30 min	47	40
	<b>F45</b>	<ul style="list-style-type: none"> <li>• subfloor of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00145A</p>		
	F45a	F45 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	47	38
	F45b	F45 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	48 <sup>(9)</sup>	40
	F45c	F45 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	54	47
	F45d	F45 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	55	49
	F45e	F45 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	47	38
	F45f	F45 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	48 <sup>(9)</sup>	40
	F45g	F45 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	54	47
	F45h	F45 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	55	49

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F45i	F45 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	45	36
	F45j	F45 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	46	37
	F45k	F45 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	52	45
	F45l	F45 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	46
	<b>F46</b>	<ul style="list-style-type: none"> <li>• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard</li> <li>• one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F46a	F46 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	41	34
	F46b	F46 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	42	35
	F46c	F46 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	50	43
	F46d	F46 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	51	44
	F46e	F46 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	41	34
	F46f	F46 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	42	35
	F46g	F46 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	50	43

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F46h	F46 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	51	44
	F46i	F46 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	40	32
	F46j	F46 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	41	33
	F46k	F46 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	48 <sup>(9)</sup>	40
	F46l	F46 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	49 <sup>(9)</sup>	41
	<b>F47</b>	<ul style="list-style-type: none"> <li>• one subfloor layer of 11 mm sanded plywood, or OSB or waferboard</li> <li>• one subfloor layer of 15.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F47a	F47 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	50	41
	F47b	F47 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	51	42
	F47c	F47 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	57	50
	F47d	F47 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	58	51
	F47e	F47 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	50	41
	F47f	F47 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	51	42

**Table A-9.10.3.1.B. (Continued)**

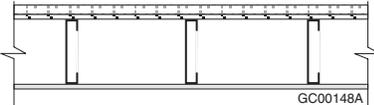
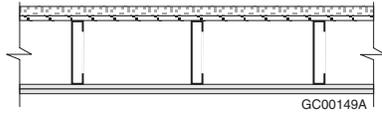
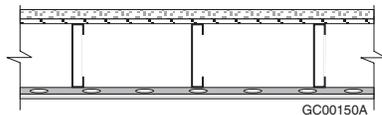
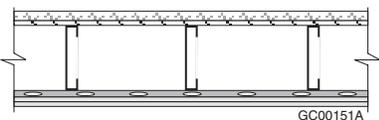
Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F47g	F47 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	57	50
	F47h	F47 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	58	51
	F47i	F47 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	46	39
	F47j	F47 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	47	41
	F47k	F47 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	46
	F47l	F47 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	54	47
	<b>F48</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F48a	F48 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	39	26
	F48b	F48 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	40	28
	F48c	F48 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	39	26
	F48d	F48 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	40	28
	F48e	F48 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	36	25
	F48f	F48 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	38	26

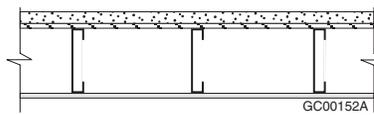
Table A-9.10.3.1.B. (Continued)

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	<b>F49</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00149A</p>		
	F49a	F49 with • no absorptive material in cavity • 15.9 mm Type X gypsum board	-	41	30
	F49b	F49 with • absorptive material in cavity • 15.9 mm Type X gypsum board	-	43	32
	F49c	F49 with • no absorptive material in cavity • 12.7 mm Type X gypsum board	-	41	30
	F49d	F49 with • absorptive material in cavity • 12.7 mm Type X gypsum board	-	43	32
	F49e	F49 with • no absorptive material in cavity • 12.7 mm regular gypsum board	-	38	29
	F49f	F49 with • absorptive material in cavity • 12.7 mm regular gypsum board	-	40	30
	<b>F50</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00150A</p>		
	F50a	F50 with • no absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	-	51	20
	F50b	F50 with • no absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	53	22
	F50c	F50 with • absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	-	57	24
	F50d	F50 with • absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	-	58	26
	F50e	F50 with • no absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	-	51	20

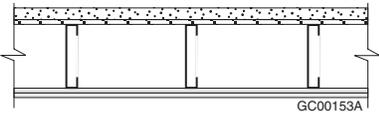
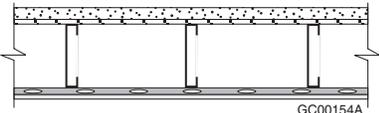
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F50f	F50 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	53	22
	F50g	F50 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	24
	F50h	F50 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	58	26
	F50i	F50 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	49 <sup>(9)</sup>	19
	F50j	F50 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	51	21
	F50k	F50 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	54	22
	F50l	F50 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	24
	<b>F51</b>	<ul style="list-style-type: none"> <li>• 25 mm gypsum-concrete topping (at least 44 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00151A</p>		
	F51a	F51 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	55	26
	F51b	F51 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	57	28
	F51c	F51 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	61	30
	F51d	F51 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	45 min [1 h] <sup>(13)</sup>	62	32

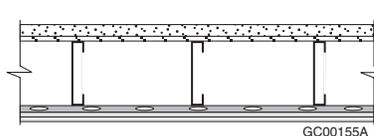
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F51e	F51 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	55	26
	F51f	F51 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	57	28
	F51g	F51 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	61	30
	F51h	F51 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	45 min [1 h] <sup>(13)</sup>	62	32
	F51i	F51 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	53	25
	F51j	F51 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	27
	F51k	F51 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	58	28
	F51l	F51 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	59	30
	<b>F52</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00152A</p>		
	F52a	F52 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	46	25
	F52b	F52 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	28
	F52c	F52 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	46	25
	F52d	F52 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	28
	F52e	F52 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	42	24

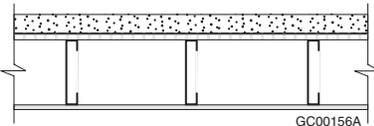
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F52f	F52 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	44	25
	<b>F53</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>			
	F53a	F53 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	47	30
	F53b	F53 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	32
	F53c	F53 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	47	30
	F53d	F53 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	32
	F53e	F53 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	43	29
	F53f	F53 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	45	30
	<b>F54</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F54a	F54 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	57	28
	F54b	F54 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	59	30
	F54c	F54 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	64	35
	F54d	F54 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	65	38

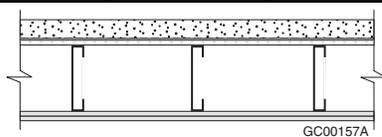
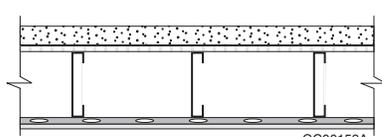
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F54e	F54 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	28
	F54f	F54 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	59	30
	F54g	F54 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	64	35
	F54h	F54 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	65	38
	F54i	F54 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	27
	F54j	F54 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	57	29
	F54k	F54 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	62	34
	F54l	F54 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	63	37
	<b>F55</b>	<ul style="list-style-type: none"> <li>• 38 mm concrete topping (at least 70 kg/m<sup>2</sup>)</li> <li>• subfloor of 12.5 mm plywood, OSB or waferboard, or 17 mm tongue and groove lumber</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00155A</p>		
	F55a	F55 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	64	36
	F55b	F55 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	65	38
	F55c	F55 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	69	44

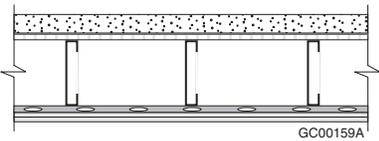
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F55d	F55 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	45 min [1 h] <sup>(13)</sup>	70	46
	F55e	F55 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	64	36
	F55f	F55 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	65	38
	F55g	F55 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	1 h	69	44
	F55h	F55 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	45 min [1 h] <sup>(13)</sup>	70	46
	F55i	F55 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	62	34
	F55j	F55 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	63	35
	F55k	F55 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	67	42
	F55l	F55 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	68	43
	<b>F56</b>	<ul style="list-style-type: none"> <li>• 50 mm concrete</li> <li>• 0.46 mm metal pan with a 19 mm rib</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>			
	F56a	F56 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	46	25
	F56b	F56 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	28
	F56c	F56 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	46	25
	F56d	F56 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	48 <sup>(9)</sup>	28

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F56e	F56 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	42	24
	F56f	F56 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	44	25
	<b>F57</b>	<ul style="list-style-type: none"> <li>• 50 mm concrete</li> <li>• 0.46 mm metal pan with a 19 mm rib</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00157A</p>		
	F57a	F57 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	47	30
	F57b	F57 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	32
	F57c	F57 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	47	30
	F57d	F57 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	49 <sup>(9)</sup>	32
	F57e	F57 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	43	29
	F57f	F57 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	45	30
	<b>F58</b>	<ul style="list-style-type: none"> <li>• 50 mm concrete</li> <li>• 0.46 mm metal pan with a 19 mm rib</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 1 layer of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00158A</p>		
	F58a	F58 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	57	28
	F58b	F58 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	59	30
	F58c	F58 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	64	35
	F58d	F58 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	-	65	38

**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As-sembly Number	Description <sup>(1)(2)(3)</sup>	Fire-Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F58e	F58 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	57	28
	F58f	F58 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	59	30
	F58g	F58 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	64	35
	F58h	F58 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm Type X gypsum board</li> </ul>	-	65	38
	F58i	F58 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	55	27
	F58j	F58 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	57	29
	F58k	F58 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	62	34
	F58l	F58 with <ul style="list-style-type: none"> <li>• absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 12.7 mm regular gypsum board</li> </ul>	-	63	37
	<b>F59</b>	<ul style="list-style-type: none"> <li>• 50 mm concrete</li> <li>• 0.46 mm metal pan with a 19 mm rib</li> <li>• on steel joists spaced not more than 600 mm o.c.</li> <li>• with or without absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm or 600 mm o.c.</li> <li>• 2 layers of gypsum board on ceiling side</li> </ul>	 <p style="text-align: right; font-size: small;">GC00159A</p>		
	F59a	F59 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 400 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	64	36
	F59b	F59 with <ul style="list-style-type: none"> <li>• no absorptive material in cavity</li> <li>• resilient metal channels spaced 600 mm o.c.</li> <li>• 15.9 mm Type X gypsum board</li> </ul>	1 h	65	38

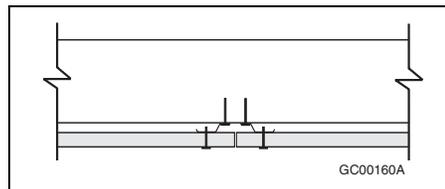
**Table A-9.10.3.1.B. (Continued)**

Type of Assembly	As- sembly Number	Description <sup>(1)(2)(3)</sup>	Fire- Resistance Rating <sup>(4)(5)(6)(7)</sup>	Typical Sound Transmission Class <sup>(4)(5)(8)(9)</sup> (STC)	Typical Impact Insulation Class <sup>(4)(8)(10)</sup> (IIC)
	F59c	F59 with • absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 15.9 mm Type X gypsum board	1 h	69	44
	F59d	F59 with • absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 15.9 mm Type X gypsum board	45 min [1 h] <sup>(13)</sup>	70	46
	F59e	F59 with • no absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1h	64	36
	F59f	F59 with • no absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	1 h	65	38
	F59g	F59 with • absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm Type X gypsum board	1 h	69	44
	F59h	F59 with • absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm Type X gypsum board	45 min [1 h] <sup>(13)</sup>	70	46
	F59i	F59 with • no absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	62	34
	F59j	F59 with • no absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	63	35
	F59k	F59 with • absorptive material in cavity • resilient metal channels spaced 400 mm o.c. • 12.7 mm regular gypsum board	-	67	42
	F59l	F59 with • absorptive material in cavity • resilient metal channels spaced 600 mm o.c. • 12.7 mm regular gypsum board	-	68	43
<b>Roofs</b>					
Wood Roof Trusses	R1	• wood trusses spaced not more than 600 mm o.c. • 1 layer 15.9 mm Type X gypsum board	45 min	-	-
<b>Rating Provided by Membrane Only</b>					
	M1	• supporting members spaced not more than 600 mm o.c. • 1 layer 15.9 mm Type X gypsum board	30 min	-	-
	M2	• supporting members spaced not more than 600 mm o.c. • 2 layers 15.9 mm Type X gypsum board	1 h	-	-

Table A-9.10.3.1.B. (Continued)

**Notes to Table A-9.10.3.1.B.:**

- (1) For systems with a ceiling of a single layer of gypsum board on resilient channels, the resilient channel arrangement at the gypsum board butt end joints is to be as shown in Figure A-9.10.3.1.-A.
- (2) For systems with a ceiling of 2 layers of gypsum board on resilient channels, the fastener and resilient channel arrangement at the gypsum board butt end joints are to be as shown in Figure A-9.10.3.1.-B.
- (3) STC values given are for the minimum thickness of subfloor as shown. Minimum subfloor thickness required is determined by joist or truss spacing - see Table 9.23.14.5.A. Thicker subflooring is also acceptable.
- (4) Sound absorptive material includes fibre processed from rock, slag, or glass, or cellulose fibre either loose-fill or spray-applied. To obtain the listed STC rating, the nominal insulation thickness is 150 mm for rock, slag, or glass fibres or loose-fill cellulose fibre, and 90 mm for spray-applied cellulose fibre. Absorptive material will affect the STC by approximately adding or subtracting 1 per 50 mm change of thickness.
- (5) The fire and sound ratings are based on the spacing of ceiling supports as noted. A narrower spacing will be detrimental to the sound rating but not to the fire rating.
- (6) Type and spacing of fasteners shall be in accordance with Subsection 9.29.5. or CSA A82.31-M:
  - (i) fastener distance to board edges and butt ends shall be no less than 38 mm, except for fasteners on the butt ends of the base layer in ceilings with two layers (see Figure A-9.10.3.1.-B); and
  - (ii) fasteners shall not be spaced more than 300 mm o.c.
- (7) See D-1.2.1.(2) in Appendix D for the significance of fire-resistance ratings.
- (8) STC values given are for depth of framing member noted. For shallower members, subtract 1 from the STC for each 50 mm reduction in framing depth. For framing members deeper than noted, add 1 to the STC for each 50 mm increase in framing depth.
- (9) STC values given reflect results for joist spacing of at least 400 mm o.c. unless otherwise specified. For joist spacing of at least 600 mm o.c., add 2 to the STC values given in the Table.
- (10) IIC values given are for floors tested with no finished flooring.
- (11) The fire rating value within square brackets is achieved only where absorptive material includes:
  - (i) fibre processed from rock or slag with a thickness of 90 mm and 2.8 kg/m<sup>2</sup>; or
  - (ii) cellulose fibre spray-applied with a minimum depth of 90 mm on the underside of the deck and 90 mm on the sides of the floor joists, and a minimum density of 50 kg/m<sup>3</sup>.
- (12) The fire-resistance rating values given only apply to systems with solid wood joists spaced not more than 400 mm o.c. No information is available on wood I-joists for these cases.
- (13) The fire rating value within square brackets is achieved only where absorptive material includes fibre processed from rock or slag with a thickness of 90 mm and 2.8 kg/m<sup>2</sup>.



**Figure A-9.10.3.1.-A**  
**Single layer butt joint details**

**Notes to Figure A-9.10.3.1.-A:**

- (1) Figure is for illustration purposes only and is not to scale.
- (2) The structural member can be any one of the types described in the Table.
- (3) Adjacent gypsum board butt ends are to be attached to separate resilient channels using regular Type S screws, located a minimum of 38 mm from the butt end.

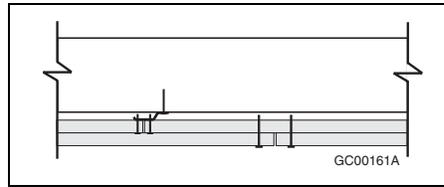


Figure A-9.10.3.1.-B

**Double layer butt joint details****Notes to Figure A-9.10.3.1.-B:**

- (1) Figure is for illustration purposes only and is not to scale.
- (2) The structural member can be any one of the types described in the Table.
- (3) Base layer butt ends can be attached to a single resilient channel using regular Type S screws.
- (4) Type G screws measuring a minimum of 32 mm in length and located a minimum of 38 mm from the butt end are to be used to fasten the butt ends of the face layer to the base layer.

**A-9.10.4.1.(4) Mezzanines Not Considered as Storeys.** Mezzanines increase the occupant load and the fire load of the storey of which they are part. To take the added occupant load into account for the purpose of evaluating other requirements that are dependent on this criteria, their floor area is added to the floor area of the storey.

**A-9.10.9.6.(1) Penetration of Fire-Rated Assemblies by Service Equipment.** This Sentence, together with Article 3.1.9.1., is intended to ensure that the integrity of fire-rated assemblies is maintained where they are penetrated by various types of service equipment.

For buildings regulated by the requirements in Part 3, fire stop materials used to seal openings around building services, such as pipes, ducts and electrical outlet boxes, must meet a minimum level of performance demonstrated by standard test criteria.

This is different from the approach in Part 9. Because of the type of construction normally used for buildings regulated by the requirements in Part 9, it is assumed that this requirement is satisfied by the use of generic fire stop materials such as mineral wool, gypsum plaster or Portland cement mortar.

**A-9.10.9.16.(4) Separation between Dwelling Units and Storage or Repair Garages.** The gas-tight barrier between a dwelling unit and an attached garage is intended to provide protection against the entry of carbon monoxide and gasoline fumes into the dwelling unit. Building assemblies incorporating an air barrier system will perform adequately with respect to gas tightness, provided all joints in the airtight material are sealed and reasonable care is exercised where the wall or ceiling is pierced by building services. Where a garage is open to the adjacent attic space above the dwelling unit it serves, a gas-tight barrier in the ceiling of the dwelling unit will also provide protection. Unit masonry walls forming the separation between a dwelling unit and an adjacent garage should be provided with two coats of sealer or plaster, or covered with gypsum wallboard on the side of the wall exposed to the garage. All joints must be sealed to ensure continuity of the barrier. (See also Sentences 9.25.3.3.(3) to (8).)

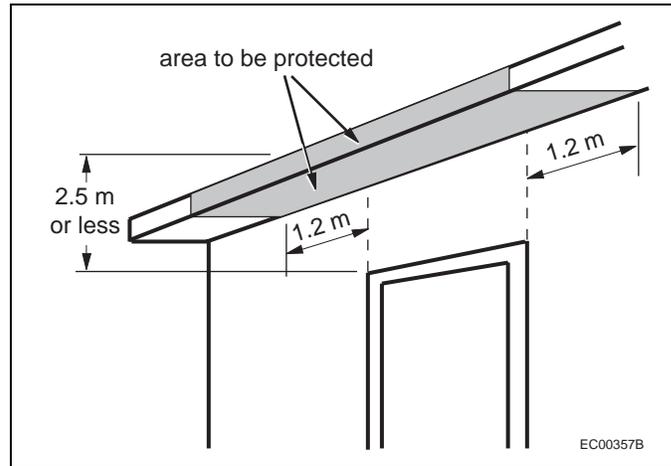
**A-9.10.12.4.(1) Protection of Overhang of Common Roof Space.**

Figure A-9.10.12.4.(1)  
Protection of overhang of common roof space

**A-9.10.12.4.(3) Protection at Soffits.** The materials required by this Sentence to be used as protection for soffit spaces in certain locations do not necessarily have to be the finish materials. They can be installed either behind the finishes chosen for the soffits or in lieu of these.

**A-9.10.12.5. Protection of Balconies.** This Article is intended to apply only to multi-family, multi-storey residential occupancies and multi-storey hotels or motels. It would not be appropriate to apply the requirements of this Article to row housing or single-family dwellings with or without secondary suites.

The popularity of exterior balconies as a place to smoke or barbecue, combined with combustible furnishings, propane, increased use of combustible cladding such as vinyl siding and lack of balcony sprinkler protection, has contributed to the potential for high-intensity residential fires.

Provided that the fire department is notified in an appropriate time frame, protecting the exterior wall assembly with some form of fire-resistant construction (either noncombustible cladding or a fire-resistant sheathing material) around the entire balcony will decrease the likelihood of a balcony fire propagating into the interior of a building or into a concealed space within the building prior to the arrival of firefighting personnel.

Extending the protection 1.2 m on either side of the balcony should ensure that any flame extension from a balcony fire is not able to compromise the protection provided under windy conditions that pull the flame around the edge of a balcony or further down the side of the wall.

**A-9.10.13.2.(1) Wood Doors in Fire Separations.** CAN4-S113 provides construction details to enable manufacturers to build wood core doors that will provide a 20 min fire-protection rating without the need for testing. The standard requires each door to be marked with

- (1) the manufacturer's or vendor's name or identifying symbol,
- (2) the words "Fire Door," and
- (3) a reference to the fire-protection rating of 20 min.

**A-9.10.14.5.(1) Minor Combustible Cladding Elements.** Where the cladding is required to be noncombustible, minor elements are permitted to be of combustible material. These elements are intended to be distributed over the building face and not concentrated in one area.

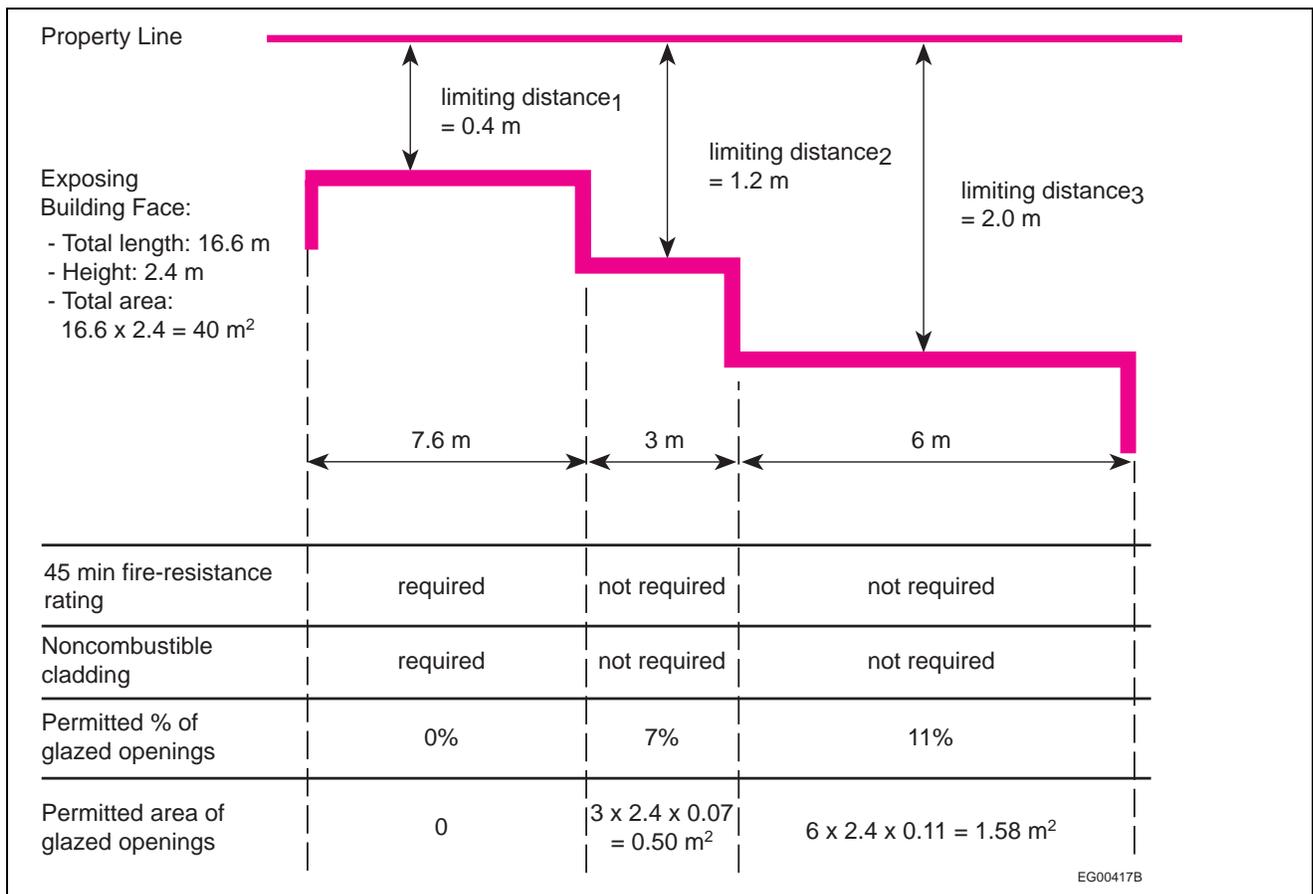
**A-9.10.15.1.(1) Application of Subsection 9.10.15.** Subsection 9.10.15. applies to the spatial separation between buildings of residential occupancy, not including hotels or motels, where there is not more than one dwelling unit above another dwelling unit. Such buildings include detached houses, semi-detached houses (duplexes), and row houses.

Any building that contains a dwelling unit above another dwelling unit must contain no more than 2 dwelling units and be 3 storeys or less in building height, including any basements. If the building contains more than 2 dwelling units or is more than 3 storeys in height, Subsection 9.10.14. applies.

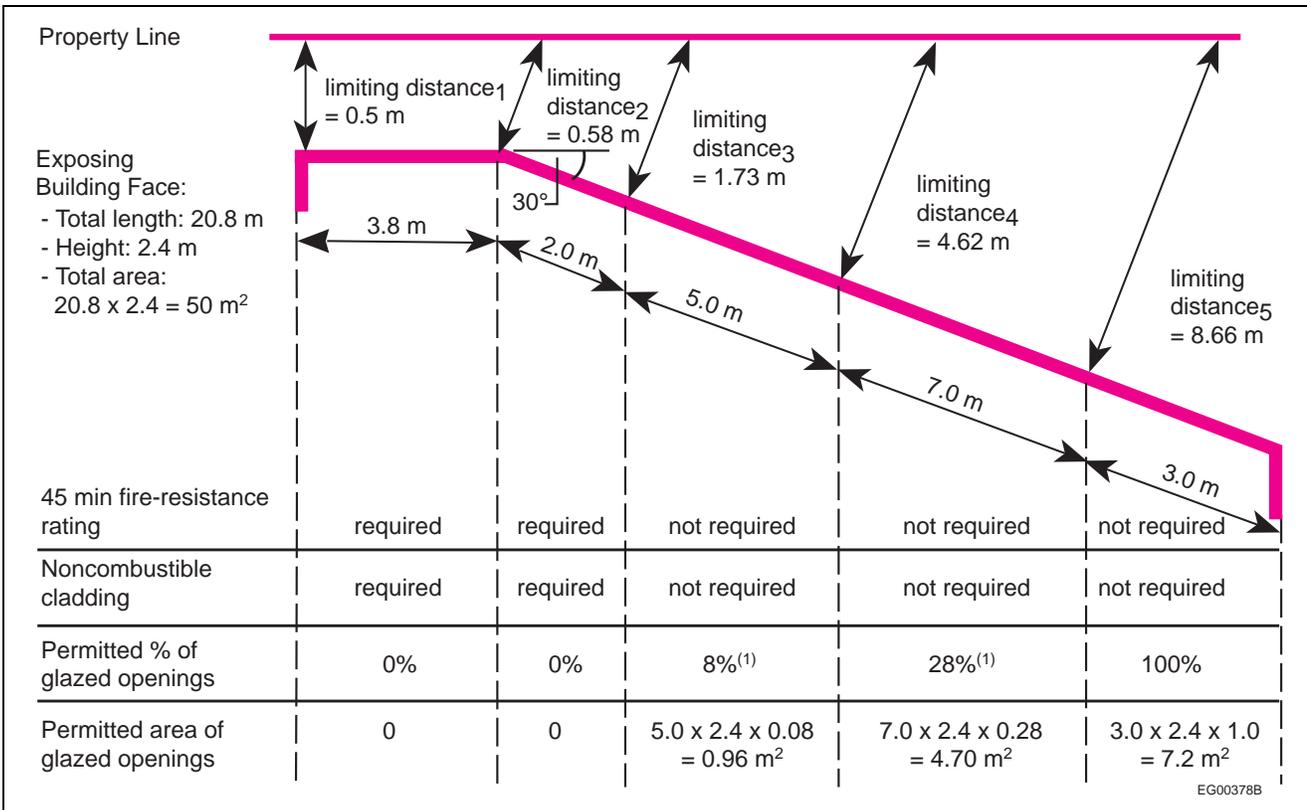
**A-9.10.15.4.(2) Staggered or Skewed Exposing Building Faces of Houses.** Studies at the National Fire Laboratory of the National Research Council have shown that, where an exposing building face is stepped back from the property line or is at an angle to the property line, it is possible to increase the percentage of glazing in those portions of the exposing building face further from the property line without increasing the amount of radiated energy that would reach the property line in the event of a fire in such a building. Figures A-9.10.15.4.(2)-A, A-9.10.15.4.(2)-B and A-9.10.15.4.(2)-C show how Sentences 9.10.15.4.(1) and (2), and 9.10.15.5.(1) and (3) can be applied to exposing building faces that are stepped back from or not parallel to the property line. The following procedure can be used to establish the maximum permitted area of glazed openings for such facades:

1. Calculate the total area of the exposing building face, i.e. facade of the fire compartment, as described in the definition of exposing building face.
2. Identify the portions into which the exposing building face is to be divided. It can be divided in any number of portions, not necessarily of equal size.
3. Measure the limiting distance for each portion. The limiting distance is measured along a line perpendicular to the wall surface from the point closest to the property line.
4. Establish the line in Table 9.10.15.4. from which the maximum permitted percentage area of glazed openings will be read. The selection of the line depends on the maximum area of exposing building face for the whole fire compartment, including all portions, as determined in Step 1.
5. On that line, read the maximum percentage area of glazed openings permitted in each portion of the exposing building face according to the limiting distance for that portion.
6. Calculate the maximum area of glazed openings permitted in each portion. The area is calculated from the percentage found applied to the area of that portion.

Table 9.10.15.4. is used to read the maximum area of glazed openings: this means that the opaque portion of doors does not have to be counted as for other types of buildings.



**Figure A-9.10.15.4.(2)-A**  
**Example of determination of criteria for the exposing building face of a staggered wall of a house**



**Figure A-9.10.15.4.(2)-B**

**Example of determination of criteria for the exposing building face of a skewed wall of a house with some arbitrary division of the wall**

**Note to Figure A-9.10.15.4.(2)-B:**

- (1) To simplify the calculations, choose the column for the lesser limiting distance nearest to the actual limiting distance. Interpolation for limiting distance is also acceptable and may result in a slightly larger permitted area of glazed openings. Interpolation can only be used for limiting distances greater than 1.2 m.

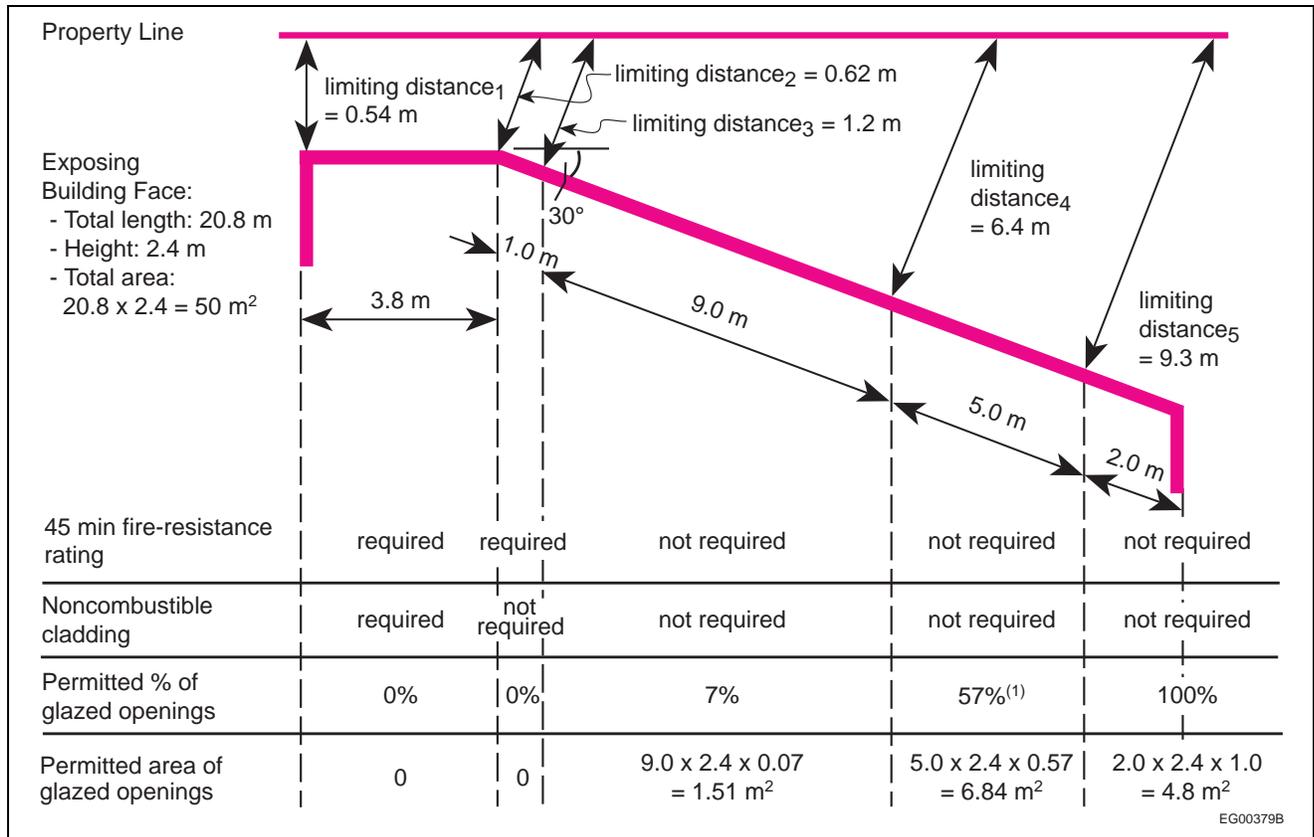


Figure A-9.10.15.4.(2)-C

Example of determination of criteria for the exposing building face of a skewed wall of a house with a different arbitrary division of the wall

Note to Figure A-9.10.15.4.(2)-C:

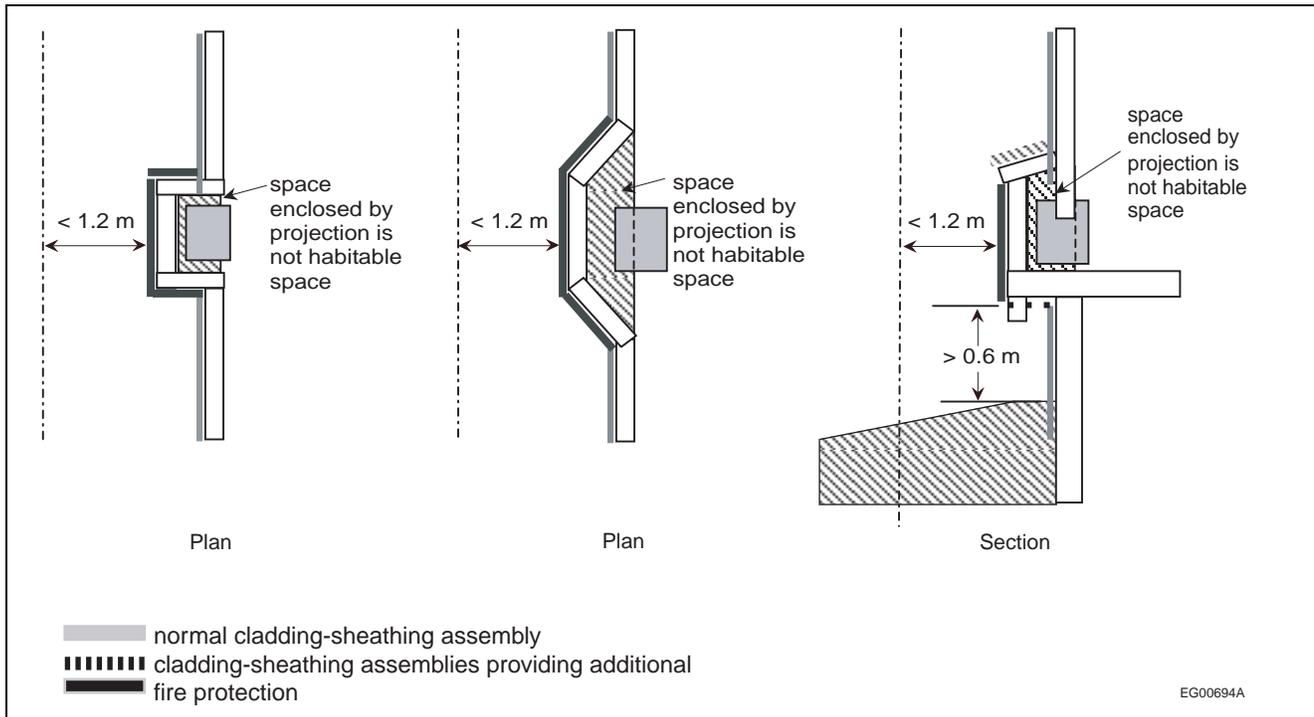
- (1) To simplify the calculations, choose the column for the lesser limiting distance nearest to the actual limiting distance. Interpolation for limiting distance is also acceptable and may result in a slightly larger permitted area of glazed openings. Interpolation can only be used for limiting distances greater than 1.2 m.

**A-9.10.15.5.(6) Permitted Projections.** The definition of exposing building face provided in Sentence 1.4.1.2.(1) of Division A refers to “that part of the exterior wall of a building ... or, where a building is divided into fire compartments, the exterior wall of a fire compartment ....” Because exposing building face is defined with respect to the exterior wall, projections from exposing building faces are elements that do not incorporate exterior walls. Depending on their specific configurations, examples of constructions that would normally be permitted by Sentence 9.10.15.5.(6) are balconies, platforms, canopies, eave projections and stairs. However, if a balcony, platform or stair is enclosed, its exterior wall would become part of an exposing building face and the construction could not be considered to be a projection from the exposing building face.

**A-9.10.15.5.(7) Protection at Projections.** Sentence 9.10.15.5.(6) permits certain projections from exposing building faces where the constructions do not have exterior walls and thus clearly do not constitute part of the exposing building face. Sentence 9.10.15.5.(7) refers to other types of projections from the exposing building face, such as for fireplaces and chimneys. It is recognized that these present more vertical surface area compared to platforms, canopies and eave projections, and may be enclosed by constructions that are essentially the same as exterior walls. These constructions, however, do not enclose habitable space, are of limited width and may not extend a full storey in height. Consequently, Sentence (7) allows these projections beyond the exposing building face of buildings identified in Sentence (6) provided additional fire protection is installed on the projection.

Figure A-9.10.15.5.(7) illustrates projections that extend within 0.6 m or 1.2 m of the property line where additional protection must be provided. Where a projection extends within 0.6 m of the property line, it must be protected to the same degree as an exposing building face that has a limiting distance of less than 0.6 m. Where a projection extends within 1.2 m but not within 0.6 m of the property line, it must be protected to the same degree as an exposing building face that has a limiting distance of less than 1.2 m.

Protection is also required on the underside of the projection where the projection is more than 0.6 m above finished ground level, measured at the exposing building face.



**Figure A-9.10.15.5.(7)**  
**Protection of projections**

**A-9.10.18.6.(1) Fire Alarm, Fire Detection and Smoke Detection Devices and Systems.** A number of provisions captured by the cross-reference to Subsection 3.2.4. address issues already addressed in Subsection 9.10.18. and so are not applicable to Part 9 buildings. For example, Articles 9.10.18.2. and 9.10.18.8. identify the Part 9 buildings where fire alarm systems are required, so Article 3.2.4.1. does not apply.

Note that, because the cross-reference relating to sprinkler systems in Sentence 9.10.1.2.(8) refers only to Subsection 3.2.5., the requirements of Subsection 3.2.4. regarding electrical supervision and monitoring do not normally apply to sprinkler systems in Part 9 buildings. However, where a sprinkler system is installed in lieu of heat and smoke detectors according to Sentence 9.10.18.3.(3), electrical supervision and monitoring of the sprinkler system must comply with the provisions in Subsection 3.2.4.

**A-9.10.19.2.(1) Location of Smoke Alarms.** There are two important points to bear in mind when considering where to locate smoke alarms in dwelling units:

- The most frequent point of origin for fires in dwelling units is the living area.
- The main concern in locating smoke alarms is to provide warning to people asleep in bedrooms.

Thus a smoke alarm located in the living area and wired so as to sound another smoke alarm located near the bedrooms is the ideal solution. However, it is difficult to define exactly what is meant by “living area.” It is felt to be too stringent to require a smoke alarm in every part of a dwelling unit that could conceivably be considered a “living area” (living room, family room, study, etc.). Sentence 9.10.19.2.(1) therefore addresses these issues by requiring at least one smoke alarm on every storey and setting a maximum distance that any point on a floor level can be from a smoke alarm. Thus, in a dwelling unit complying with Sentence 9.10.19.2.(1), every living area will probably be located within a reasonable distance of a smoke alarm. Nevertheless, where a choice arises as to where on a storey to locate the required smoke alarm or alarms, one should be located as close as possible to a living area, provided the requirement for proximity to bedrooms is also satisfied.

Regarding location of smoke alarms in bedroom areas, generally the most economical choice will be to locate one alarm in a hallway serving several bedrooms. However, in a small dwelling where the bedrooms may be close to cooking areas, placing one alarm inside each bedroom may be a better choice as it makes them less prone to false alarms.

**A-9.10.20.3.(1) Fire Department Access Route Modification.** In addition to other considerations taken into account in the planning of fire department access routes, special variations could be permitted for a house or residential building that is protected with an automatic sprinkler system. The sprinkler system must be designed in accordance with the appropriate NFPA standard and there must be assurance that water supply pressure and quantity are unlikely to fail. These considerations could apply to buildings that are located on the sides of hills and are not conveniently accessible by roads designed for firefighting equipment and also to infill housing units that are located behind other buildings on a given property.

**A-9.10.22. Clearances from Gas, Propane and Electric Ranges.** The electrical regulations made pursuant to the Safety Codes Act, referenced in Article 9.34.1.1., and the gas regulations made pursuant to the Safety Codes Act, referenced in Article 9.10.22.1., address clearances directly above, in front of, behind and beside the appliance. Where side clearances are zero, the regulations do not address clearances to building elements located both above the level of the range elements or burners and to the side of the appliance. Through reference to the electrical regulations and the gas regulations and the requirements in Articles 9.10.22.2. and 9.10.22.3., the Alberta Building Code addresses all clearances. Where clearances are addressed by the Alberta Building Code and the electrical regulations or the gas regulations, conformance with all relevant criteria is achieved by compliance with the most stringent criteria.

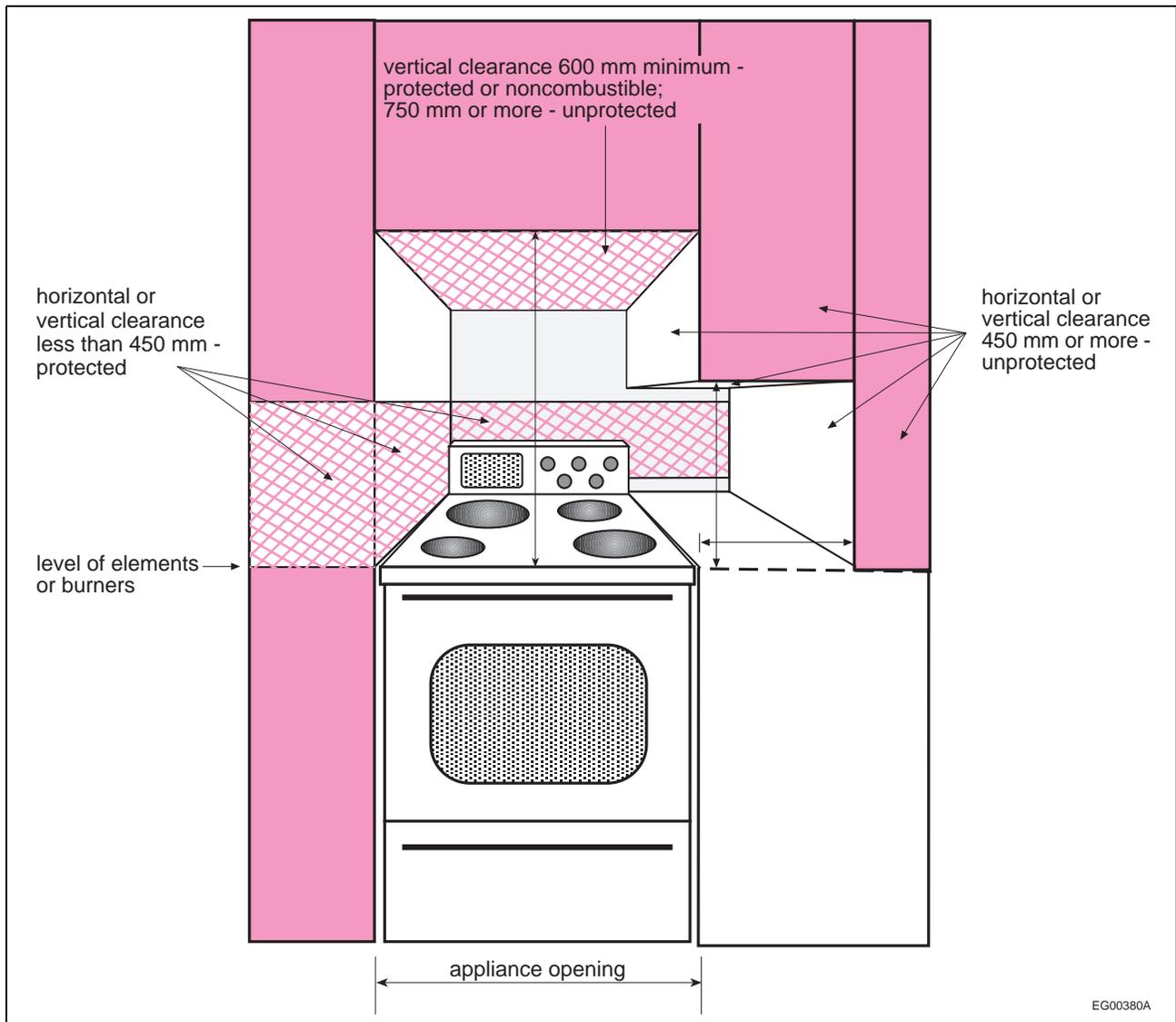


Figure A-9.10.22.  
Clearances from ranges to walls and cabinetry

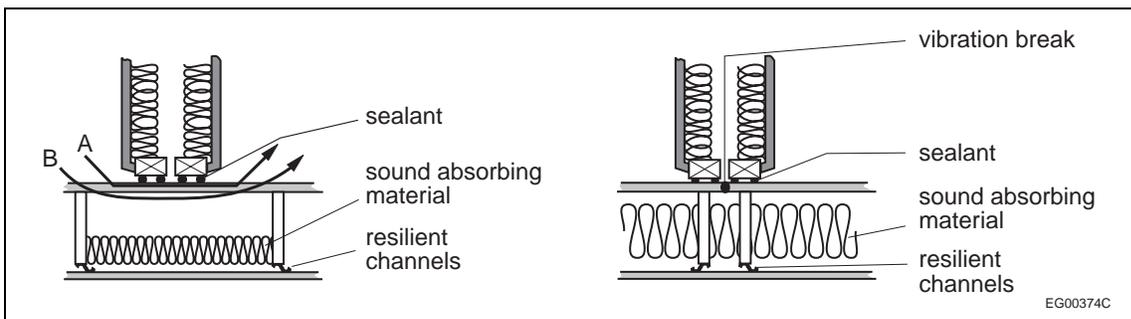
**A-9.11.1.1.(1) Sound Transmission Class Ratings.** The specified STC rating of 50 is considered the minimum acceptable value, but many builders prefer to design for STC 55 or more in high quality accommodation.

Another reason to choose assemblies rated higher than STC 50 is that the STC ratings of assemblies are based on laboratory tests, but the sound transmission of any assembly as constructed in the field may be significantly less than its rating. This can be due to sound leaks, departures from design, poor workmanship or indirect (flanking) transmission paths overlooked in design. To provide a margin of safety to compensate for these, builders often select wall and floor systems that have been rated at least 5 points higher than the design STC rating in laboratory tests.

Sound leaks can occur where one wall meets another, the floor, or the ceiling. Leaks may also occur where the wall finish is cut for the installation of equipment or services. Avoid back-to-back electrical outlets or medicine cabinets. Carefully seal cracks or openings so structures are effectively airtight. Apply sealant below the plates in stud walls, between the bottom of drywall sheets and the structure behind, around all penetrations for services and, in general, wherever there is a crack, a hole or the possibility of one developing. Sound-absorbing material inside a well-designed wall decreases sound transmission. It has another advantage; it also helps to reduce the effects of leaks due, perhaps, to poor workmanship.

Indirect or flanking transmission arises where the parts of a building are rigidly connected together and where cavities in hollow walls or floors, or continuous lightweight layers connect apartments. Sound travels in cavities, as vibration along surfaces and through walls, ceilings and floors to adjacent rooms. Many paths other than the direct one through the party wall or floor may be involved. To achieve good sound insulation, transmission along flanking paths must be minimized by introducing breaks and resilient connections in the construction. Some examples of bad and good details are shown in Figure A-9.11.1.1.(1)

Changes to constructions should not be made without consultation with someone competent in the field of acoustical design. Adding extra layers of drywall to walls in an attempt to reduce sound transmission, can actually increase it if done incorrectly. For example, attaching drywall on resilient channels directly to an existing wall or ceiling usually increases low frequency sound transmission. Adding an additional layer of drywall inside a double layer wall will also seriously increase sound transmission. Adding blocking inside walls to reduce the risk of fire spread should be done so it does not increase vibration transmission from one part of a wall or floor to the other.



**Figure A-9.11.1.1.(1)**  
**Cross-section through wall/floor junctions**

To verify that acoustical privacy is being achieved, a field test can be done at an early stage in the construction; ASTM E 336 will give a complete measurement. A simpler and less expensive method is ASTM E 597, "Determining a Single Number Rating of Airborne Sound Insulation for Use in Multi-Unit Building Specifications." The rating provided by this test is usually within 2 points of the STC obtained from ASTM E 336. It is useful for verifying performance and finding problems during construction. Alterations can then be made prior to project completion.

### Impact Noise

Section 9.11. has no requirements for control of impact noise transmission. Footstep and other impacts can cause severe annoyance in multi-family residences. Builders concerned about quality and reducing occupant complaints will ensure that floors are designed to minimize impact transmission. A recommended criterion is that bare floors (tested without a carpet) should achieve an impact insulation class (IIC) of 55. Some lightweight floors that satisfy this requirement may still cause complaints about low frequency

impact noise transmission. Adding carpet to a floor will always increase the IIC rating but will not necessarily reduce low frequency noise transmission. Good footstep noise rejection requires fairly heavy floor slabs or floating floors. Impact noise requirements are being considered for inclusion in future versions of the Alberta Building Code.

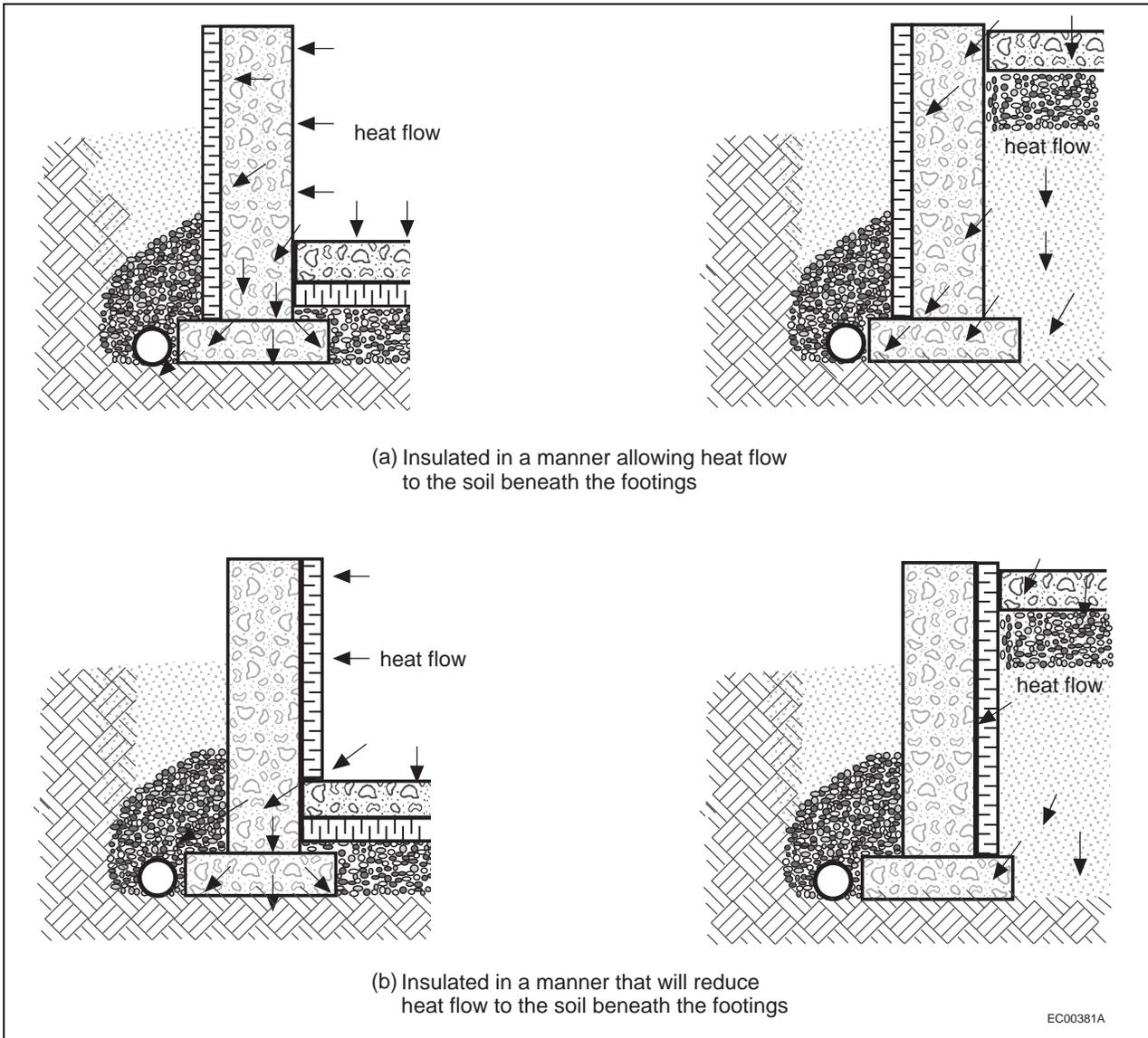
Most frequently used methods of test for impact noise are ASTM E 492, "Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using The Tapping Machine," or ASTM E 1007, "Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures."

#### **Machinery Noise**

Elevators, garbage chutes, plumbing, fans, and heat pumps are common sources of noise in buildings. To reduce annoyance from these, they should be placed as far as possible from sensitive areas. Vibrating parts should be isolated from the building structure using resilient materials such as neoprene or rubber.

**A-Table 9.12.2.2. Minimum Depths of Foundations.** The requirements for clay soils or soils not clearly defined are intended to apply to those soils that are subject to significant volume changes with changes in moisture content.

**A-9.12.2.2.(2) Depth and Insulation of Foundations.**



**Figure A-9.12.2.2.(2)**  
**Foundation insulation and heat flow to footings**

**A-9.12.3.3.(1) Deleterious Material in Backfill.** The deleterious debris referred to in this provision includes, but is not limited to:

- organic material and other material subject to decomposition and compaction, which could have an adverse effect on grading around the building,
- materials that will off-gas and have the potential to pose a health hazard, and
- materials that are incompatible with materials used in the foundations, footings, drainage materials or components, or other elements of the building whose required performance would be adversely affected.

**A-9.14.2.1.(2)(a) Insulation Applied to the Exterior of Foundation Walls.** In addition to the prevention of heat loss, some types of mineral fibre insulation, such as rigid glass fibre, are installed on the exterior of basement walls for the purpose of moisture control. This is sometimes used instead of crushed rock as a drainage layer between the basement wall and the surrounding soil in order to facilitate the drainage of soil moisture. Water drained by this drainage layer must be carried away from the foundation by the footing drains or the granular drainage layer in order to prevent it from developing hydro-static pressure against the wall. Provision must be made to permit the drainage of this water either by extending the insulation or crushed rock to the drain or by the installation of granular material connecting the two. The installation of such drainage layer does not eliminate the need for normal waterproofing or dampproofing of walls as specified in Section 9.13.

**A-9.15.1.1. Application of Footing and Foundation Requirements to Decks and Similar Constructions.** Because decks, balconies, verandas and similar platforms support occupancies, they are, by definition, considered as buildings or parts of buildings. Consequently, the requirements in Section 9.15. regarding footings and foundations apply to these constructions.

**A-9.15.1.1.(1)(c) and 9.20.1.1.(1)(b) Flat Insulating Concrete Form Walls.** Insulating concrete form (ICF) walls are concrete walls that are cast into polystyrene forms, which remain in place after the concrete has cured. Flat ICF walls are solid ICF walls where the concrete is of uniform thickness over the height and width of the wall.

**A-9.15.2.4.(1) Preserved Wood Foundations – Design Assumptions.** Tabular data and figures in CAN/CSA-S406, “Construction of Preserved Wood Foundations,” are based upon the general principles provided in CAN/CSA-O86, “Engineering Design in Wood,” with the following assumptions:

- soil bearing capacity: 75 kPa or more,
- clear spans for floors: 5000 mm or less,
- floor loadings: 1.9 kPa for first floor and suspended floor, and 1.4 kPa for second storey floor,
- foundation wall heights: 2400 mm for slab floor, 3000 mm for suspended wood floor,
- top of granular layer to top of suspended wood floor: 600 mm,
- lateral load from soil pressure: equivalent to fluid pressure of 4.7 kPa per metre of depth,
- ground snow load: 3 kPa,
- basic snow load coefficient: 0.6,
- roof loads are carried to the exterior wall,
- dead loads:

roof	0.50 kPa
floor	0.47 kPa
wall (with siding)	0.32 kPa
wall (with masonry veneer)	1.94 kPa
foundation wall	0.27 kPa
partitions	0.20 kPa

**A-9.15.3.4.(2) Footing Sizes.** The footing sizes in Table 9.15.3.4. are based on typical construction consisting of a roof, not more than 3 storeys, and centre bearing walls or beams. For this reason, Clause 9.15.3.3.(1)(b) stipulates a maximum supported joist span of 4.9 m.

It has become common to use flat wood trusses or wood I-joists to span greater distances in floors of small buildings. Where these spans exceed 4.9 m, minimum footing sizes may be based on the following method:

- (a) Determine for each storey the span of joists that will be supported on a given footing. Sum these lengths ( $sum_1$ ).
- (b) Determine the product of the number of storeys times 4.9 m ( $sum_2$ ).
- (c) Determine the ratio of  $sum_1$  to  $sum_2$ .
- (d) Multiply this ratio by the minimum footing sizes in Table 9.15.3.4. to get the required minimum footing size.

Example: A 2-storey house is built using wood I-joists spanning 6 m.

- (a)  $sum_1 = 6 + 6 = 12$  m
- (b)  $sum_2 = 4.9 \times 2 = 9.8$  m
- (c) ratio  $sum_1 / sum_2 = 12 / 9.8 = 1.22$

- (d) required minimum footing size = 1.22 x 350 mm (minimum footing size provided in Table 9.15.3.4.)  
= 427 mm.

**A-9.17.2.2.(2) Lateral Support of Columns.** Because the Alberta Building Code does not provide prescriptive criteria to describe the minimum required lateral support, constructions are limited to those that have demonstrated effective performance over time and those that are designed according to Part 4. Verandas on early 20th century homes provide one example of constructions whose floor and roof are typically tied to the rest of the building to provide effective lateral support. Large decks set on tall columns, however, are likely to require additional lateral support even where they are connected to the building on one side.

**A-9.17.3.4. Design of Steel Columns.** The permitted live floor loads of 2.4 kPa and the spans described for steel beams, wood beams and floor joists are such that the load on columns could exceed 36 kN, the maximum allowable load on columns prescribed in CAN/CGSB-7.2, "Adjustable Steel Columns." In the context of Part 9, loads on columns are calculated from the supported area times the live load per unit area, using the supported length of joists and beams. The supported length is half of the joist spans on each side of the beam and half the beam span on each side of the column.

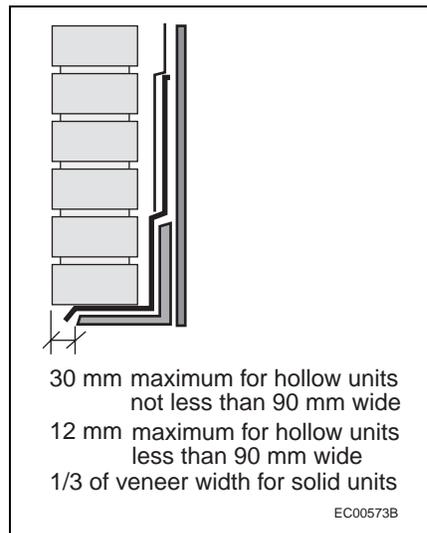
Dead load is not included based on the assumption that the maximum live load will not be applied over the whole floor. Designs according to Part 4 must consider all applied loads.

**A-9.19.1.1.(1) Venting of Attic or Roof Spaces.** Controlling the flow of moisture by air leakage and vapour diffusion into attic or roof spaces is necessary to limit moisture-induced deterioration. Given that imperfections normally exist in the vapour barriers and air barrier systems, recent research indicates that venting of attic or roof spaces is generally still required. The exception provided in Article 9.19.1.1. recognizes that some specialized ceiling-roof assemblies, such as those used in some factory-built buildings, have, over time, demonstrated that their construction is sufficiently tight to prevent excessive moisture accumulation. In these cases, ventilation would not be required.

**A-9.20.1.2. Seismic Information.** Information on spectral response acceleration values for various locations can be found in Appendix C, Climatic and Seismic Information for Building Design in Alberta.

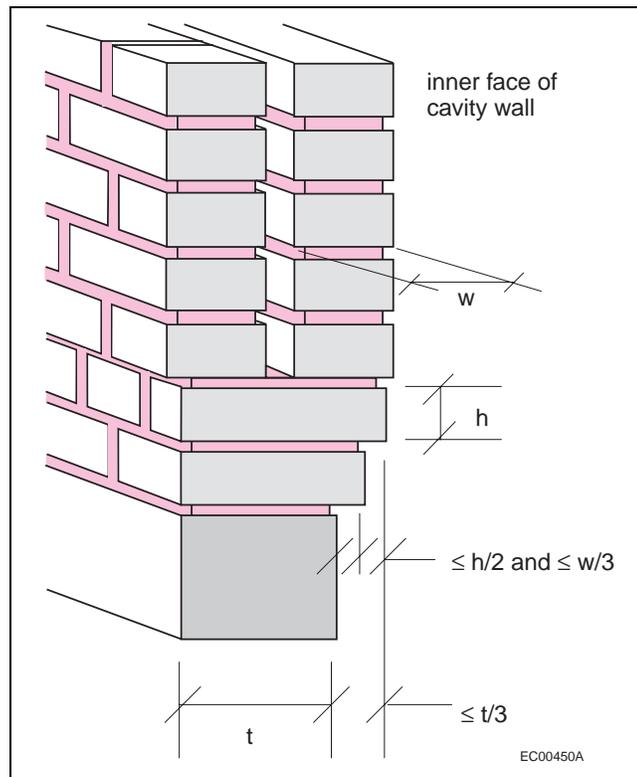
**A-9.20.5.1.(1) Masonry Support.** Masonry veneer must be supported on a stable structure in order to avoid cracking of the masonry due to differential movement relative to parts of the support. Wood framing is not normally used as a support for the weight of masonry veneer because of its shrinkage characteristics. Where the weight of masonry veneer is supported on a wood structure, as is the case for the preserved wood foundations referred to in Sentence 9.20.5.1.(1) for example, measures must be taken to ensure that any differential movement that may be harmful to the performance of masonry is minimized or accommodated. The general principle stated in Article 9.4.1.1., however, makes it possible to support the weight of masonry veneer on wood framing, provided that engineering design principles prescribed in Part 4 are followed to ensure that the rigidity of the support is compatible with the stiffness of the masonry being supported and that differential movements between the support and masonry are accommodated.

**A-9.20.8.5. Distance from Edge of Masonry to Edge of Supporting Members.**



**Figure A-9.20.8.5.**  
Maximum projection of masonry beyond its support

**A-9.20.12.2.(2) Corbelling of Masonry Foundation Walls.**



**Figure A-9.20.12.2.(2)**  
Maximum corbel dimensions

**A-9.20.13.9.(3) Dampproofing of Masonry Walls.** The reason for installing sheathing paper behind masonry walls is to prevent rainwater from reaching the interior finish if it should leak past the masonry. The sheathing paper intercepts the rainwater and leads it to the bottom of the wall where the flashing directs it to the exterior via weep holes. If the insulation is a type that effectively resists the penetration of water, and is installed so that water will not collect behind it, then there is no need for sheathing paper. If water that runs down between the masonry and the insulation is able to leak out at the joints in the insulation, such insulation will not act as a substitute for sheathing paper. If water cannot leak through the joints in the insulation but collects in cavities between the masonry and insulation, subsequent freezing could damage the wall. Where sheathing paper is not used, therefore, the adhesive or mortar should be applied to form a continuous bond between the masonry and the insulation. If this is not practicable because of an irregular masonry surface, then sheathing paper is necessary.

**A-9.21.3.6.(2) Metal Chimney Liners.** Under the provisions of Article 1.2.1.1. of Division A, masonry chimneys with metal liners may be permitted to serve solid-fuel-burning appliances if tests show that such liners will provide an equivalent level of safety.

A-9.21.4.4.(1) Location of Chimney Top.

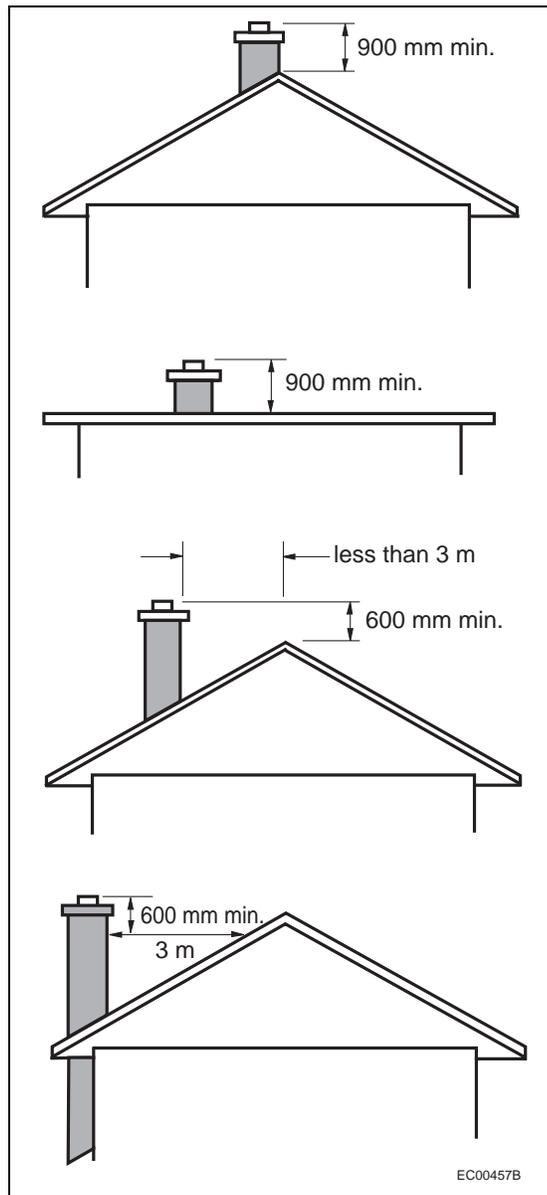


Figure A-9.21.4.4.(1)  
Vertical and horizontal distances from chimney top to roof

**A-9.21.4.5.(2) Lateral Support for Chimneys.** Where a chimney is fastened to the house framing with metal anchors, in accordance with CSA A370, "Connectors for Masonry," it is considered to have adequate lateral support. The portion of the chimney stack above the roof is considered as free standing and may require additional lateral support.

**A-9.21.5.1.(1) Clearance from Combustible Materials.** For purposes of this Sentence, an exterior chimney can be considered to be one which has at least one surface exposed to the outside atmosphere or unheated space over the majority of its height. All other chimneys should be considered to be interior.

**A-9.22.1.4.(1) Combustion Air for Fireplaces.** The intent of this Article is to allow the fireplace to be operated without affecting, or being affected by, other appliances or exhaust equipment. For this to occur, the fireplace must be provided with a supply of combustion air dedicated to the fireplace only; an opening to the exterior should be provided at or near the fireplace opening. The opening of a window is not considered to be sufficient, as discomfort from drafts is likely to inhibit its use. Factory-built fireplaces should have combustion air provided in accordance with manufacturers' installation instructions. In the case of site-built masonry fireplaces, this Article will be satisfied if the following procedures are followed:

- (1) The combustion air in Article 9.22.1.4. is supplied by a duct having a minimum diameter of 100 mm or equivalent area.
- (2) The air supply duct is noncombustible, corrosion-resistant and, where exposed to room air, insulated for its entire length with insulation having a thermal resistance value of RSI 1.41.
- (3) The air supply outlet is located as close to the fireplace opening as possible.
- (4) When the air supply outlet is placed inside the fire chamber, it is located at the front centre of the chamber hearth, is equipped with a noncombustible hood which when open will direct air away from the fire, and is designed to prevent embers from entering the supply duct.
- (5) The supply duct contains a damper that fits tightly when in the closed position and is located close to the outlet end.
- (6) The damper is operable from the room containing the fireplace and the control mechanism clearly indicates the actual position of the damper.
- (7) Any portion of the air supply duct within 1 m of its outlet in the fire chamber has a minimum 50 mm clearance from combustibles.
- (8) The exterior air supply duct is protected against the entry of rain and direct wind and the inlet opening has an insect screen of corrosion-resistant material.
- (9) The exterior air supply duct inlet is located so as to avoid being blocked by either snow or fallen leaves.

**A-9.22.8.1.(2) Heat Exchanger Inserts.** Heat exchanger inserts originally designed for use in masonry fireplaces or site-built fireplaces are not acceptable for use in factory-built fireplaces. Factory-built fireplaces are tested as complete systems and therefore components provided by other than the fireplace manufacturer would not be compatible unless listed and tested for that fireplace.

**A-9.23.1.1. Constructions Other than Light Wood-Frame Constructions.** The prescriptive requirements in Section 9.23. apply only to standard light wood-frame construction. Other constructions, such as post, beam and plank construction, plank frame wall construction, and log construction must be designed in accordance with Part 4.

**A-9.23.1.1.(1) Application of Section 9.23.** In previous editions of the Code, Sentence 9.23.1.1.(1) referred to "conventional" wood-frame construction. Over time, conventions have changed and the application of Part 9 has expanded.

The prescriptive requirements provided in Section 9.23. still focus on lumber beams, joists, studs and rafters as the main structural elements of "wood-frame construction." The requirements recognize—and have recognized for some time—that walls and floors may be supported by components made of material other than lumber; for example, by foundations described in Section 9.15. or by steel beams described in Article 9.23.4.3. These constructions still fall within the general category of wood-frame construction.

With more recent innovations, alternative structural components are being incorporated into wood-frame buildings. Wood I-joists, for example, are very common. Where these components are used in lieu of lumber, the requirements in Section 9.23. that specifically apply to lumber joists do not apply to these components: for example, limits on spans and acceptable locations for notches and holes. However, requirements regarding the fastening of floor sheathing to floor joists still apply, and the use of wood I-joists does not affect the requirements for wall or roof framing.

Similarly, if steel floor joists are used in lieu of lumber joists, the requirements regarding wall or roof framing are not affected.

Conversely, Sentence 9.23.1.1.(1) precludes the installation of pre-cast concrete floors on wood-frame walls since these are not "generally comprised of ... small repetitive structural members ... spaced not more than 600 mm o.c."

Thus, the reference to "engineered components" in Sentence 9.23.1.1.(1) is intended to indicate that, where an engineered product is used in lieu of lumber for one part of the building, this does not preclude the application of the remainder of Section 9.23. to the structure, provided the limits to application with respect to cladding, sheathing or bracing, spacing of framing members, supported loads and maximum spans are respected.

**A-9.23.3.1.(2) Standard for Screws.** The requirement that wood screws conform to ANSI/ASME B18.6.1, "Wood Screws (Inch Series)," is not intended to preclude the use of Robertson head screws. The requirement is intended to specify the mechanical properties of the fastener, not to restrict the means of driving the fastener.

**A-9.23.3.3.(1) Prevention of Splitting.** Figure A-9.23.3.3.(1) illustrates the intent of the phrase "staggering the nails in the direction of the grain."

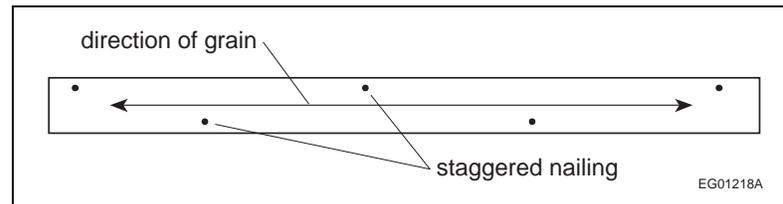


Figure A-9.23.3.3.(1)  
Staggered nailing

**A-9.23.4.2. Span Tables for Wood Joists, Rafters and Beams.** In these span tables the term "rafter" refers to a sloping wood framing member which supports the roof sheathing and encloses an attic space but does not support a ceiling. The term "roof joist" refers to a horizontal or sloping wood framing member that supports the roof sheathing and the ceiling finish but does not enclose an attic space.

Where rafters or roof joists are intended for use in a locality having a higher specified roof snow load than shown in the tables, the maximum member spacing may be calculated as the product of the member spacing and specified snow load shown in the span tables divided by the specified snow load for the locality being considered. The following examples show how this principle can be applied:

- (a) For a 3.5 kPa specified snow load, use spans for 2.5 kPa and 600 mm o.c. spacing but space members 400 mm o.c.
- (b) For a 4.0 kPa specified snow load, use spans for 2.0 kPa and 600 mm o.c. spacing but space members 300 mm o.c.

The maximum spans in the span tables are measured from the inside face or edge of support to the inside face or edge of support.

In the case of sloping roof framing members, the spans are expressed in terms of the horizontal distance between supports rather than the length of the sloping member. The snow loads are also expressed in terms of the horizontal projection of the sloping roof. Spans for odd size lumber may be estimated by straight line interpolation in the tables.

These span tables may be used where members support a uniform live load only. Where the members are required to be designed to support a concentrated load, they must be designed in conformance with Subsection 4.3.1.

Supported joist length in Tables A-8, A-9 and A-10 means half the sum of the joist spans on both sides of the beam. For supported joist lengths between those shown in the tables, straight line interpolation may be used in determining the maximum beam span.

Tables A-1 to A-16 cover only the most common configurations. Especially in the area of floors, a wide variety of other configurations is possible: glued subfloors, concrete toppings, machine stress rated lumber, etc. The Canadian Wood Council publishes "The Span Book," a compilation of span tables covering many of these alternative configurations. Although these tables have not been subject to the formal committee review process, the Canadian Wood Council generates, for the CCBFC, all of the Code's span tables for wood structural components; thus Code users can be confident that the alternative span tables in "The Span Book" are consistent with the span tables in the Code and with relevant Code requirements.

Spans for wood joists, rafters and beams which fall outside the scope of these tables, including those for U.S. species and individual species not marketed in the commercial species combinations described in the span tables, can be calculated in conformance with CAN/CSA-O86, "Engineering Design in Wood."

**A-9.23.4.2.(2) Numerical Method to Establish Vibration-Controlled Spans for Wood-Frame Floors.** In addition to the normal strength and deflection analyses, the calculations on which the floor joist span tables are based include a method of ensuring that the spans are not so long that floor vibrations could lead to occupants perceiving the floors as too “bouncy” or “springy.” Limiting deflection under the normal uniformly distributed loads to 1/360 of the span does not provide this assurance.

Normally, vibration analysis requires detailed dynamic modelling. However, the calculations for the span tables use the following simplified static analysis method of estimating vibration-acceptable spans:

- The span which will result in a 2 mm deflection of a single joist supporting a 1 kN concentrated midpoint load is calculated.
- This span is multiplied by a factor, K, to determine the “vibration-controlled” span for the entire floor system. If this span is less than the strength- or deflection-controlled span under uniformly distributed load, the vibration-controlled span becomes the maximum span.
- The K factor is determined from the following relationship:

$$\ln (K) = A - B \bullet \ln (S_i/S_{184}) + G$$

where

- A, B = constants, the values of which are determined from Tables A-9.23.4.2.(2)A. or B.,
- G = constant, the value of which is determined from Table A-9.23.4.2.(2)C.,
- S<sub>i</sub> = span which results in a 2 mm deflection of the joist in question under a 1 kN concentrated midpoint load,
- S<sub>184</sub> = span which results in a 2 mm deflection of a 38 x 184 mm joist of same species and grade as the joist in question under a 1 kN concentrated midpoint load.

For a given joist species and grade, the value of K shall not be greater than K<sub>3</sub>, the value which results in a vibration-controlled span of exactly 3 m. This means that for vibration-controlled spans 3 m or less, K always equals K<sub>3</sub>, and for vibration-controlled spans greater than 3 m, K is as calculated.

Note that, for a sawn lumber joist, the ratio S<sub>i</sub>/S<sub>184</sub> is equivalent to its depth (mm) divided by 184.

Due to rounding differences, the method, as presented here, might produce results slightly different from those produced by the computer program used to generate the span tables.

**Table A-9.23.4.2.(2)A.**  
**Constants A and B for Calculating Vibration-Controlled Floor Joist Spans – General Cases**

Subfloor Thickness, mm	With Strapping <sup>(1)</sup>			With Bridging			With Strapping and Bridging		
	Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
	300	400	600	300	400	600	300	400	600
Constant A									
15.5	0.30	0.25	0.20	0.37	0.31	0.25	0.42	0.35	0.28
19.0	0.36	0.30	0.24	0.45	0.37	0.30	0.50	0.42	0.33
Constant B									
	0.33			0.38			0.41		

**Notes to Table A-9.23.4.2.(2)A.:**

(1) Gypsum board attached directly to joists can be considered equivalent to strapping.

**Table A-9.23.4.2.(2)B.**  
**Constants A and B for Calculating Vibration-Controlled Floor Joist Spans – Special Cases**

Subfloor Thickness, mm	Joists with Ceiling Attached to Wood Furring <sup>(1)</sup>						Joists with Concrete Topping <sup>(2)</sup>		
	Without Bridging			With Bridging			With or Without Bridging		
	Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
	300	400	600	300	400	600	300	400	600
Constant A									
15.5	0.39	0.33	0.24	0.49	0.44	0.38	0.58	0.51	0.41
19.0	0.42	0.36	0.27	0.51	0.46	0.40	0.62	0.56	0.47
Constant B									
	0.34			0.37			0.35		

**Notes to Table A-9.23.4.2.(2)B.:**

- (1) Wood furring means 19 x 89 mm boards not more than 600 mm o.c., or 19 x 64 mm boards not more than 300 mm o.c. For all other cases, see Table A-9.23.4.2.(2)A.
- (2) 30 mm to 51 mm normal weight concrete (not less than 20 MPa) placed directly on the subflooring.

**Table A-9.23.4.2.(2)C.**  
**Constant G for Calculating Vibration-Controlled Floor Joist Spans**

Floor Description	Constant G
Floors with nailed <sup>(1)</sup> subfloor	0.00
Floor with nailed and field-glued <sup>(2)</sup> subfloor, vibration-controlled span greater than 3 m	0.10
Floor with nailed and field-glued <sup>(2)</sup> subfloor, vibration-controlled span 3 m or less	0.15

**Notes to Table A-9.23.4.2.(2)C.:**

- (1) Common wire nails, spiral nails or wood screws can be considered equivalent for this purpose.
- (2) Subfloor field-glued to floor joists with elastomeric adhesive complying with standard CAN/CGSB-71.26-M, "Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems."

Additional background information on this method can be found in the following publications:

- Onysko, D.M. Deflection Serviceability Criteria for Residential Floors. Project 43-10C-024. Forintek Canada Corp., Ottawa, Canada 1988.
- Onysko, D.M. Performance and Acceptability of Wood Floors – Forintek Studies. Proceedings of Symposium/Workshop on Serviceability of Buildings, Ottawa, May 16-18, National Research Council of Canada, Ottawa, 1988.

**A-9.23.4.3.(1) Maximum Spans for Steel Beams Supporting Floors in Dwellings.** A beam may be considered to be laterally supported if wood joists bear on its top flange at intervals of 600 mm or less over its entire length, if all the load being applied to this beam is transmitted through the joists and if 19 mm by 38 mm wood strips in contact with the top flange are nailed on both sides of the beam to the bottom of the joists supported. Other additional methods of positive lateral support are acceptable.

For supported joist lengths intermediate between those in the table, straight line interpolation may be used in determining the maximum beam span.

**A-Table 9.23.4.3. Spans for Steel Beams.** The spans are based on the following assumptions:

- Simply supported beam spans
- Laterally supported top flange
- Yield strength 350 MPa
- Deflection limit L/360
- Live load = 1.9 kPa
- Dead load 1.5 kPa

**A-9.23.4.4. Concrete Topping.** Vibration-controlled spans given in Table A-2 for concrete topping are based on a partial composite action between the concrete, subflooring and joists. Normal weight concrete having a compressive strength of not less than 20 MPa, placed directly on the subflooring, provides extra stiffness and results in increased capacity. The use of a bond breaker between the topping and the subflooring, or the use of lightweight concrete topping limits the composite effects.

Where either a bond breaker or lightweight topping is used, Table A-1 may be used but the additional dead load imposed by the concrete must be considered. The addition of 51 mm of concrete topping can impose an added load of 0.8 to 1.2 kPa, depending on the density of the concrete.

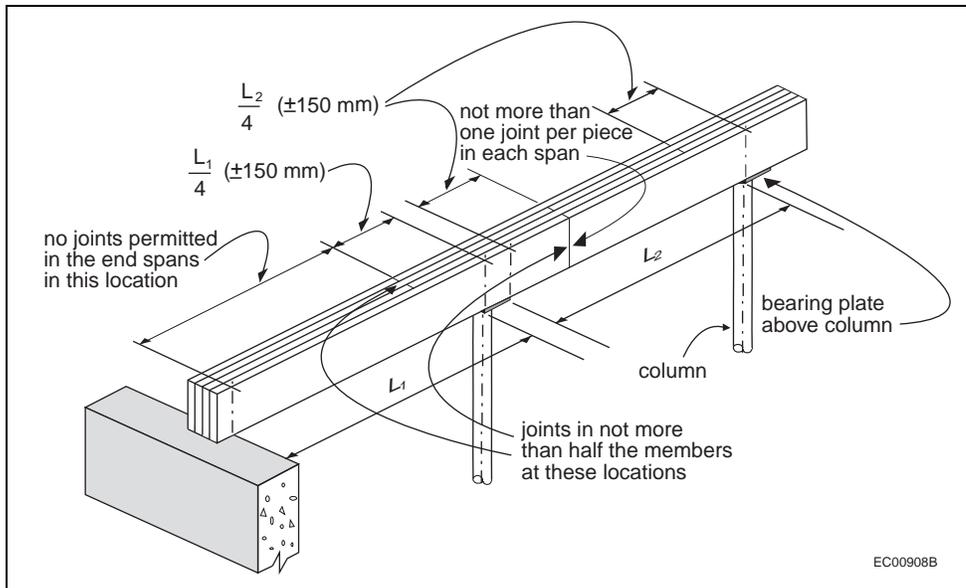
**Example**

**Assumptions:**

- basic dead load = 0.5 kPa
- topping dead load = 0.8 kPa
- total dead load = 1.3 kPa
- live load = 1.9 kPa
- vibration limit per A-9.23.4.2.(2)
- deflection limit = 1/360
- ceiling attached directly to joists, no bridging

The spacing of joists in the span tables can be conservatively adjusted to allow for the increased load by using the spans in Table A-1 for 600 mm spacing, but spacing the joists 400 mm apart. Similarly, floor beam span tables can be adjusted by using 4.8 m supported length spans for cases where the supported length equals 3.6 m.

**A-9.23.8.3. Joint Location in Built-Up Beams.**



**Figure A-9.23.8.3.**  
**Joint location in built-up beams**

**A-9.23.10.2. Bracing.** Traditionally, diagonal bracing has been provided at the corners of wood-framed walls to provide resistance against wind racking forces. Laboratory tests have indicated, however, that the bracing that had been traditionally used contributed relatively little to the overall strength of the wall. Most of the racking resistance was in effect provided by the interior finish. Because of this, the requirements for bracing were deleted in the late 1950's. (See "Shear Resistance of Wood Frame Walls," by A.T. Hansen, Building Practice Note 61, Institute for Research in Construction, National Research Council, Ottawa.)

Where the interior is not finished, however, bracing is necessary if the siding itself or the sheathing does not provide the required racking strength. If panel type siding is used, or if the sheathing consists of plywood, OSB, waferboard, gypsum board, diagonal lumber, or fibreboard sheathing, additional bracing is not considered necessary because of the wind bracing provided by these materials.

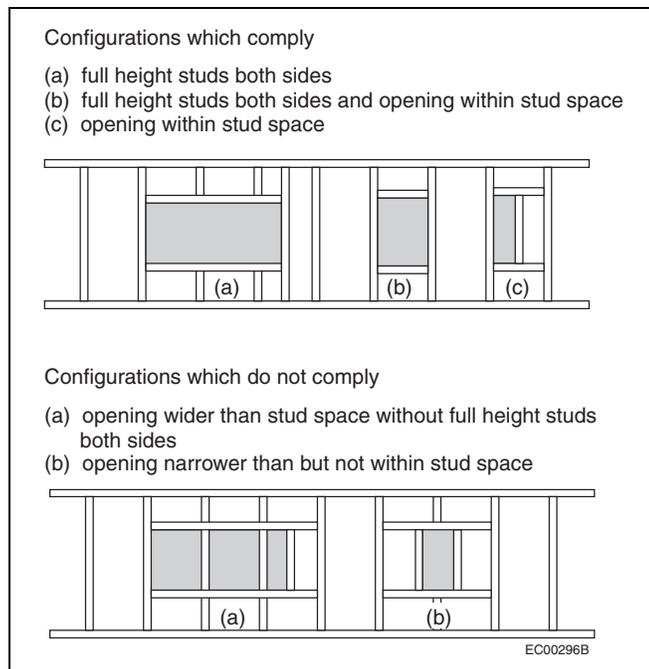
Where bracing is provided, it must be installed at roughly a 45° angle on each wall and in each storey, extending the full height of the storey. This type of bracing provides considerably greater resistance to wind forces than the traditional bracing, which was found to be relatively ineffective.

The permission to omit bracing assumes typical house designs. Some buildings may have reduced resistance to racking forces as a result of their configuration. These include tall narrow buildings in exposed locations with large door or window openings located in the short sides. In such cases, racking resistance can be improved by ensuring that paneled sections are placed adjacent to the openings.

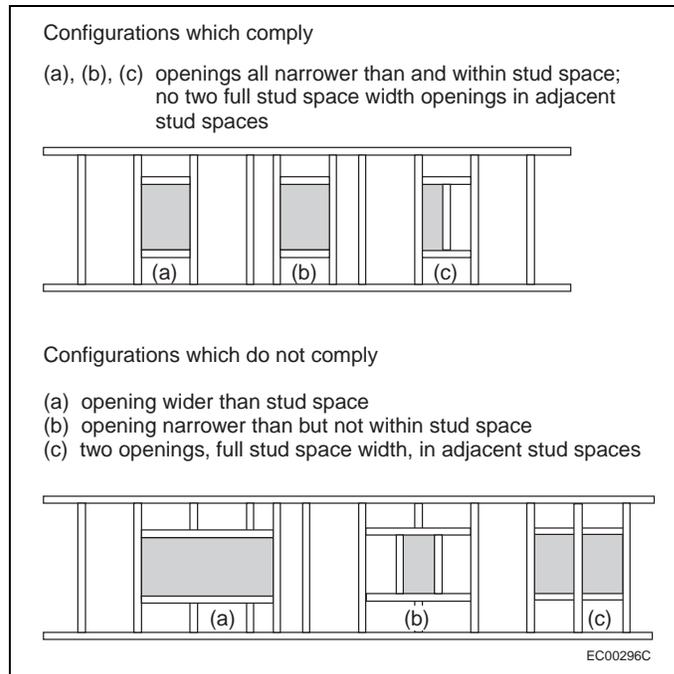
The Code does not address the issue of bracing of the structure during construction. It is often necessary to provide temporary bracing until the interior finish or sheathing is installed; however, this is not a Code requirement.

**A-9.23.10.4.(1) Fingerjoined Lumber.** The NLGA “Standard Grading Rules for Canadian Lumber (Interpretation Included),” referenced in Article 9.3.2.1. refers to two special product standards, SPS-1, “Fingerjoined Structural Lumber,” and SPS-3, “Fingerjoined “Vertical Stud Use Only” Lumber,” produced by NLGA. Material identified as conforming to these standards is considered to meet the requirements in this Sentence for joining with a structural adhesive. Lumber fingerjoined in accordance with SPS-3 should be used as a vertical end-loaded member in compression only, where sustained bending or tension-loading conditions are not present, and where the moisture content of the wood will not exceed 19%. Fingerjoined lumber may not be visually regraded or remanufactured into a higher stress grade even if the quality of the lumber containing fingerjoints would otherwise warrant such regrading.

**A-9.23.10.6.(3) Single Studs at Sides of Openings.**



**Figure A-9.23.10.6.(3)-A**  
**Single studs at openings in non-loadbearing interior walls**



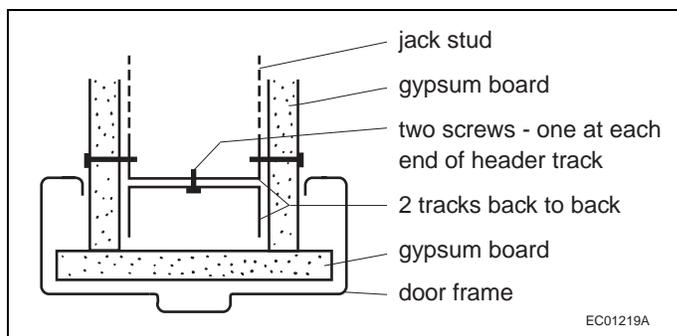
**Figure A-9.23.10.6.(3)-B**  
 Single studs at openings in all other walls

**A-9.23.13.11.(2) Wood Roof Truss Connections.** Sentence 9.23.13.11.(2) requires that the connections used in wood roof trusses be designed in conformance with Subsection 4.3.1. and Sentence 2.4.2.2.(1) of Division C, which applies to all of Part 4, requires that the designer be a professional engineer or architect skilled in the work concerned. This has the effect of requiring that the trusses themselves be designed by professional engineers or architects. Although this is a departure from the usual practice in Part 9, it is appropriate, since wood roof trusses are complex structures which depend on a number of components (chord members, web members, cross-bracing, connectors) working together to function safely. This complexity precludes the standardization of truss design into tables comprehensive enough to satisfy the variety of roof designs required by the housing industry.

**A-9.23.14.2.(4) Water Absorption Test.** A method for determining water absorption is described in ASTM D 1037, "Evaluating Properties of Wood-Base Fiber and Particle Panel Materials." The treatment to reduce water absorption may be considered to be acceptable if a 300 mm x 300 mm sample when treated on all sides and edges does not increase in weight by more than 6% when tested in the horizontal position.

**A-9.23.14.4.(2) OSB.** CSA O437.0, "OSB and Waferboard," requires that Type O (aligned or oriented) panels be marked to show the grade and the direction of face alignment.

**A-9.24.3.2.(3) Framing Above Doors in Steel Stud Fire Separations.**



**Figure A-9.24.3.2.(3)**  
 Steel stud header detail

**A-9.25.1.2. Location of Low Permeance Materials.****Low Air- and Vapour-Permeance Materials and Implications for Moisture Accumulation**

The location in a building assembly of a material with low air permeance is generally not critical; the material can restrict outward movement of indoor air whether it is located near the outer surface of the assembly, near the inner surface, or at some intermediate location, and such restriction of air movement is generally beneficial, whether or not the particular material is designated as part of the air barrier system. However, if such a material also has the characteristics of a vapour barrier (i.e. low permeability to water vapour) and low thermal resistance, its location must be chosen more carefully in order to avoid moisture accumulation.

Any moisture from the indoor air that diffuses through the inner layers of the assembly or is carried by air leakage through those layers may be prevented from passing right through the assembly by a low air- and vapour-permeance material. This moisture transfer will usually not cause a problem if the material is located where the temperature is above the dew point of the indoor air: the water vapour will remain as vapour, the humidity level in the assembly will come to equilibrium with that of the indoor air, further accumulation of moisture will cease or stabilize at a low rate, and no harm will be done.

But if the low air- and vapour-permeance material is located where the temperature is below the dew point of the air at that location, water vapour will condense and accumulate as water or ice, which will reduce the humidity level and encourage the movement of more water vapour into the assembly. If the temperature remains below the dew point for any length of time, significant moisture could accumulate. When warmer weather returns, the presence of a material with low water vapour permeance can retard drying of the accumulated moisture. Moisture that remains into warmer weather can support the growth of decay organisms.

**Cladding**

Different cladding materials have different vapour permeances and different degrees of susceptibility to moisture deterioration. They are each installed in different ways that are more or less conducive to the release of moisture that may accumulate on the inner surface. Sheet or panel-type cladding materials, such as metal sheet, have a vapour permeance less than  $60 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ . Sheet metal cladding that has lock seams also has a low air leakage characteristic and so must be installed outboard of a drained and vented air space. Assemblies clad with standard residential vinyl or metal strip siding do not require additional protection as the joints are not so tight as to prevent the dissipation of moisture.

**Sheathing**

Like cladding, sheathing materials have different vapour permeances and different degrees of susceptibility to moisture deterioration.

Low-permeance sheathing may serve as the vapour barrier if it can be shown that the temperature of the interior surface of the sheathing will not fall below that at which saturation will occur. This may be the case where insulating sheathing is used.

**Thermal Insulation**

Where low-permeance foamed plastic is the sole thermal insulation in a building assembly, the temperature of the inner surface of this element will be close to the interior temperature. In this case, no additional vapour barrier is needed to control condensation within the assembly due to vapour diffusion. However, where low-permeance thermal insulation is installed on the outside of an insulated frame wall, the temperature of the inner surface of the insulation may fall below the dew point. In this case, a separate element must be installed to provide the necessary vapour diffusion protection.

### Air Barrier Systems

In residential construction, the airtight element in the air barrier system often provides the required resistance to vapour diffusion and thereby also serves as the vapour barrier. In this case, the combined air/vapour barrier must be positioned sufficiently close to the warm side of the assembly so that its temperature remains above the dew point temperature at that location.

#### **Assumptions Followed in Developing Table 9.25.1.2.**

Article 9.25.1.2. specifies that a low air- and vapour-permeance material must be located on the warm face of the assembly, outboard of a vented air space, or within the assembly at a position where its inner surface is likely to be warm enough for most of the heating season such that no significant accumulation of moisture will occur. This last position is defined by the ratio of the thermal resistance values outboard and inboard of the innermost impermeable surface of the material in question, assuming that not less than a Type 2 vapour barrier [ $60 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ ] is installed as required by Subsection 9.25.4. The thermal resistance ratios also assume that, in regions with colder winters, the interior relative humidity (RH) does not exceed 35% for extended periods over the heating season.

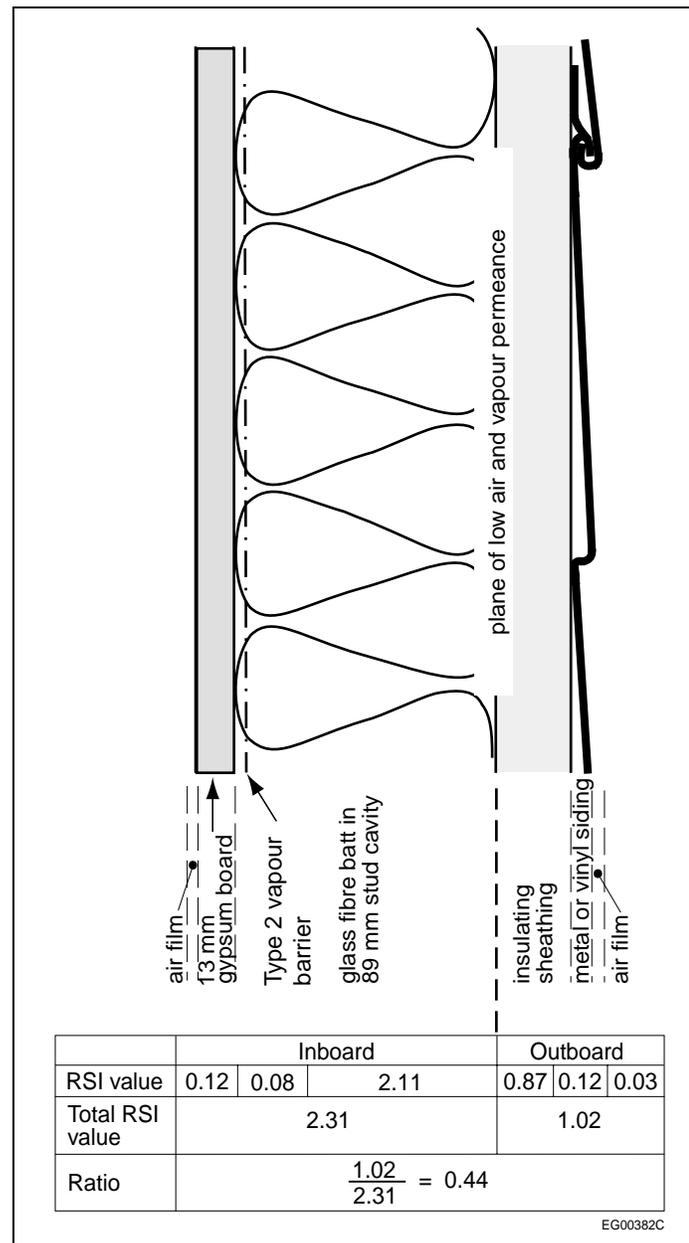
Health Canada recommends indoor relative humidities between 35% and 50% for healthy conditions. ASHRAE accepts a 30% to 60% range. Environments that are much drier tend to exacerbate respiratory problems and allergies; more humid environments tend to support the spread of microbes, moulds and dust mites, which can adversely affect health.

In most of Canada in the winter, indoor RH is limited by the exterior temperature and the corresponding temperature on the inside of windows. During colder periods, indoor RH higher than 35% will cause significant condensation on windows. When this occurs, occupants are likely to increase the ventilation to remove excess moisture. Although indoor RH may exceed 35% for short periods when the outside temperature is warmer, the criteria provided in Table 9.25.1.2. will still apply. Where higher relative humidities are maintained for extended periods in these colder climates, the ratios provided in the Table may not provide adequate protection. Some occupancies require that RH be maintained above 35% throughout the year, and some interior spaces support activities, such as swimming, that create high relative humidities. In these cases, Table 9.25.1.2. cannot be used and the position of the materials must be determined according to Part 5.

It should be noted that Part 9 building envelopes in regions with colder winters have historically performed acceptably when the interior RH does not exceed 35% over most of the heating season. With tighter building envelopes, it is possible to raise interior RH levels above 35%. There is no information, however, on how Part 9 building envelopes will perform when exposed to these higher indoor RH levels for extended periods during the heating season over many years. Operation of the ventilation system, as intended to remove indoor pollutants, will maintain the lower RH levels as necessary.

For locations in the B.C. coastal region, the warmer winter conditions are such that interior RH levels higher than 35% can be tolerated. However, if the use of the space is such that indoor RH will be maintained above an average 60% over the entire heating season, the ratios in Table 9.25.1.2. should not be relied upon to provide protection from moisture accumulation due to vapour diffusion.

Calculating Inboard to Outboard Thermal Resistance



**Figure A-9.25.1.2.**  
**Example of a wall section showing thermal resistance inboard and outboard of a plane of low air and vapour permeance**

The method of calculating the inboard to outboard thermal resistance ratio is illustrated in Figure A-9.25.1.2.. The example wall section shows three planes where low air- and vapour-permeance materials have been installed. A vapour barrier, installed to meet the requirements of Subsection 9.25.4., is on the warm side of the insulation consistent with Clause 9.25.1.2.(1)(a) and Sentences 9.25.4.1.(1) and 9.25.4.3.(2). The vinyl siding has an integral drained and vented air space consistent with Clause 9.25.1.2.(1)(c). The position of the interior face of the low-permeance insulating sheathing, however, must be reviewed in terms of its thermal resistance relative to the overall thermal resistance of the wall, and the climate where the building is located.

Comparing the RSI ratio from the example wall section with those in Table 9.25.1.2. indicates that this wall would be acceptable in areas with Celsius degree-day values up to 7999, which includes, for example, Whitehorse, Fort McMurray, Yorkton, Flin Flon, Geraldton, Val-d’Or and Wabush. (Degree-day values for various locations in Canada are provided in Appendix C.

A similar calculation would indicate that, for a similar assembly with a 140 mm stud cavity filled with an RSI 3.52 batt, the ratio would be 0.28. Thus such a wall could be used in areas with Celsius degree-day values up to 4999, which includes, for example, Cranbrook, Lethbridge, Ottawa, Montreal, Fredericton, Sydney, Charlottetown and St. John’s.

Similarly, if half the thickness of the same low-permeance sheathing were used, the ratio with an 89 mm cavity would be 0.25, permitting its use in areas with Celsius degree-day values up to 4999. The ratio with a 140 mm cavity would be 0.16; thus this assembly could not be used anywhere, since this ratio is below the minimum permitted in Table 9.25.1.2.

Table A-9.25.1.2.A. shows the minimum thicknesses of low-permeance insulating sheathing necessary to satisfy Article 9.25.1.2. in various degree-day zones for a range of resistivity values of insulating sheathing. These thicknesses are based on the detail shown in Figure A-9.25.1.2. but could also be used with cladding details, such as brick veneer or wood siding, which provide equal or greater outboard thermal resistance.

The air leakage characteristics and water vapour permeance values for a number of common materials are given in Table A-9.25.1.2.B. These values are provided on a generic basis; specific materials may have values differing somewhat from those in the Table.

**Table A-9.25.1.2.A.  
Minimum Thicknesses of Low-Permeance Insulating Sheathing**

Celsius Heating Degree-days	Min. RSI Ratio	38 x 89 Framing					38 x 140 Framing				
		Min. Outboard Thermal Resistance, RSI	Min. Sheathing Thickness, mm				Min. Outboard Thermal Resistance, RSI	Min. Sheathing Thickness, mm			
			Sheathing Thermal Resistance, RSI/mm					Sheathing Thermal Resistance, RSI/mm			
			0.0300	0.0325	0.0350	0.0400		0.0300	0.0325	0.0350	0.0400
≤ 4999	0.20	0.46	10	10	9	8	0.72	19	17	16	14
5000 to 5999	0.30	0.69	18	17	16	14	1.07	31	28	26	23
6000 to 6999	0.35	0.81	22	20	19	16	1.25	37	34	32	28
7000 to 7999	0.40	0.92	26	24	22	19	1.43	43	39	37	32
8000 to 8999	0.50	1.16	34	31	29	25	1.79	55	50	47	41
9000 to 9999	0.55	1.27	37	34	32	28	1.97	61	56	52	45
10000 to 10999	0.60	1.39	41	38	35	31	2.15	67	61	57	50
11000 to 11999	0.65	1.50	45	42	39	34	2.33	73	67	62	54
≥ 12000	0.75	1.73	53	49	45	40	2.69	85	78	72	63

**Table A-9.25.1.2.B.**  
**Air and Vapour Permeance Values<sup>(1)</sup>**

Material	Air Leakage Characteristic, L/(s•m²) at 75 Pa	Water Vapour Permeance, ng/(Pa•s•m²)
<b>Sheathing (low insulation value)</b>		
12.7-mm foil-backed gypsum board	negligible	negligible
6.4-mm plywood	0.0084	23 – 74
12.7-mm gypsum board sheathing	0.0091	1373
11-mm oriented strandboard	0.0108	44
11-mm fibreboard sheathing	0.8285	772 – 2465
17-mm wood sheathing	high – depends on no. of joints	982
<b>Insulation</b>		
25-mm foil-faced urethane	negligible	negligible
25-mm extruded polystyrene	negligible	23 – 92
25-mm urethane foam	negligible	69
25-mm phenolic foam	negligible	133
25-mm expanded polystyrene (Type 2)	0.0214	86 – 160
fibrous insulations	very high	very high
<b>Membrane materials</b>		
metal	negligible	negligible
0.15-mm polyethylene	negligible	1.6 – 5.8
breather type sheathing membrane	0.2706	170 – 1400
spun bonded polyolefin film	0.9593	3646

**Notes to Table A-9.25.1.2.B.:**

(1) Air leakage and vapour permeance values derived from:

- Bombaru, D., Jutras, R. and Patenaude, A. Air Permeance of Building Materials. Summary Report prepared by AIR-INS Inc. for Canada Mortgage and Housing Corporation, Ottawa, 1988. Values indicate properties of tested materials only. Values for specific products may vary significantly.
- Details of Air Barrier Systems for Houses. Ontario New Home Warranty Program, Toronto, 1993.

**References**

- (1) Exposure Guidelines for Residential Indoor Air Quality, Environmental Health Directorate, Health Protection Branch, Health Canada, Ottawa, April 1987 (Revised July 1989).
- (2) ANSI/ASHRAE 62, Ventilation for Acceptable Indoor Air Quality, American Society of Heating, Refrigeration and Air-Conditioning Engineers, Atlanta.

**A-9.25.2.2.(2) Flame-Spread Ratings of Insulating Materials.** Part 9 has no requirements for flame-spread ratings of insulation materials since these are seldom exposed in parts of buildings where fires are likely to start. Certain of the insulating material standards referenced in Sentence 9.25.2.2.(1) do include flame-spread rating criteria. These are included either because the industry producing the product wishes to demonstrate that their product does not constitute a fire hazard or because the product is regulated by authorities other than building authorities (e.g., Hazardous Products Act). However, the Code cannot apply such requirements to some materials and not to others. Hence, these flame-spread rating requirements are excepted in referencing these standards.

**A-9.25.2.3.(3) Position of Insulation.** For thermal insulation to be effective, it must not be short-circuited by convective airflow through or around the material. If low-density fibrous insulation is installed with an air space on both sides of the insulation, the temperature differential between the warm and cold sides will drive convective airflow around the insulation. If foamed plastic insulation is spot-adhered to a backing wall or adhered in a grid pattern to an air-permeable substrate, and is not sealed at the joints and around the perimeter, air spaces between the insulation and the substrate will interconnect with spaces behind the cladding. Any temperature or air pressure differential across the insulation will again lead to short circuiting of the insulation by airflow. Thermal insulation must therefore be installed in full and continuous contact with the air barrier or another continuous component with low air permeance. (See Appendix Note A-9.25.3.2. for examples of low-air-permeance materials.)

**A-9.25.2.4.(3) Loose-Fill Insulation in Existing Wood-Frame Walls.** The addition of insulation into exterior walls of existing wood-frame buildings increases the likelihood of damage to framing and cladding components as a result of moisture accumulation. Many older homes were constructed with little or no regard for protection from vapour transmission or air leakage from the interior. Adding thermal insulation will substantially reduce the temperature of the siding or sheathing in winter months, possibly leading to condensation of moisture at this location.

Defects in exterior cladding, flashing and caulking could result in rain entering the wall cavity. This moisture, if retained by the added insulation, could initiate the process of decay.

Steps should be taken therefore, to minimize these effects prior to the retrofit of any insulation. Any openings in walls that could permit leakage of interior heated air into the wall cavity should be sealed. The inside surface should be coated with a low-permeability paint to reduce moisture transfer by diffusion. Finally, the exterior siding, flashing and caulking should be checked and repaired if necessary to prevent rain penetration.

**A-9.25.2.4.(5) Loose-Fill Insulation in Masonry Walls.** Typical masonry cavity wall construction techniques do not lend themselves to the prevention of entry of rainwater into the wall space. For this reason, loose-fill insulation used in such space must be of the water repellent type. A test for water-repellency of loose-fill insulation suitable for installation in masonry cavity walls can be found in ASTM C 516, "Vermiculite Loose Fill Thermal Insulation."

**A-9.25.3.1.(1) Air Barrier Systems for Control of Condensation.** The majority of moisture problems resulting from condensation of water vapour in walls and ceiling/attic spaces are caused by the leakage of moist interior heated air into these spaces rather than by the diffusion of water vapour through the building envelope.

Protection against such air leakage must be provided by a system of air-impermeable materials joined with leak-free joints. Generally, air leakage protection can be provided by the use of air-impermeable sheet materials, such as gypsum board or polyethylene of sufficient thickness, when installed with appropriate structural support. However, the integrity of the airtight elements in the air barrier system can be compromised at the joints and here special care must be taken in design and construction to achieve an effective air barrier system.

Although Section 9.25. refers separately to vapour barriers and airtight elements in the air barrier system, these functions in a wall or ceiling assembly of conventional wood-frame construction are often combined as a single membrane that acts as a barrier against moisture diffusion and the movement of interior air into insulated wall or roof cavities. Openings cut through this membrane, such as for electrical boxes, provide opportunities for air leakage into concealed spaces, and special measures must be taken to make such openings as airtight as possible. Attention must also be paid to less obvious leakage paths, such as holes for electric wiring, plumbing installations, wall-ceiling and wall-floor intersections, and gaps created by shrinkage of framing members.

In any case, air leakage must be controlled to a level where the occurrence of condensation will be sufficiently rare, or the quantities accumulated sufficiently small, and drying sufficiently rapid, to avoid material deterioration and the growth of mould and fungi.

Generally the location in a building assembly of the airtight element of the air barrier system is not critical; it can restrict air leakage whether it is located near the outer surface of the assembly, near the inner surface or at some intermediate location. However, if a material chosen to act as an airtight element in the air barrier system also has the characteristics of a vapour barrier (i.e., low permeability to water vapour), its location must be chosen more carefully in order to avoid moisture problems. (See Appendix Notes A-9.25.1.2. and A-9.25.4.3.(2).)

In some constructions, an airtight element in the air barrier system is the interior finish, such as gypsum board, which is sealed to framing members and adjacent components by gaskets, caulking, tape or other methods to complete the air barrier system. In such cases, special care in sealing joints in a separate vapour barrier is

not critical. This approach often uses no separate vapour barrier but relies on appropriate paint coatings to give the interior finish sufficient resistance to water vapour diffusion that it can provide the required vapour diffusion protection.

The wording in Section 9.25. allows for such innovative techniques, as well as the more traditional approach of using a continuous sheet, such as polyethylene, to act as an “air/vapour barrier.”

Further information is available in “Moisture Problems in Houses,” by A.T. Hansen, Canadian Building Digest 231, available from the Institute for Research in Construction, National Research Council of Canada, Ottawa K1A 0R6.

**A-9.25.3.2. Air Barrier System Properties.** Materials that have been tested and are considered to have low air permeance include:

- 2 mm smooth surface roofing membrane
- 2.7 mm modified bituminous torch-on membranes
- 1.3 mm modified bituminous self-adhesive membranes
- 12.7 mm gypsum board
- 12.7 mm cement board
- 8 mm plywood
- 12.7 mm particle board
- 11 mm waferboard
- 3.2 mm tempered hardboard
- 38 mm extruded polystyrene
- 25.4 mm foil back urethane insulation
- 24 mm phenolic insulation board
- aluminum foil
- polyethylene sheet
- reinforced non-perforated polyolefin

Characteristics of specific products may vary significantly.

**A-9.25.4.3.(2) Location of Vapour Barriers.** Assemblies in which the vapour barrier is located partway through the insulation meet the intent of this Article provided it can be shown that the temperature of the vapour barrier will not fall below the dew point of the heated interior air.

**A-9.26.1.1.(2) Platforms that Effectively Serve as Roofs.** Decks, balconies, exterior walkways and similar exterior surfaces effectively serve as roofs where these platforms do not permit the free drainage of water through the deck. Unless the surface slopes to the outside edges and water can freely drain over the edge, water will pond on the surface. When rain is driven across the deck (roof) surface, water will move upward when it encounters an interruption.

**A-9.26.2.2.(4) Fasteners for Treated Shingles.** Where shingles or shakes have been chemically treated with a preservative or a fire retardant, the fastener should be of a material known to be compatible with the chemicals used in the treatment.

**A-9.26.4.1. Junctions between Roofs and Walls or Guards.** Drainage of water from decks and other platforms that effectively serve as roofs will be blocked by walls, and blocked or restricted by guards where significant lengths and heights of material are connected to the deck. Without proper flashing at such roof-wall junctions or roof-guard junctions, water will generally leak into the adjoining constructions and can penetrate into supporting constructions below. Exceptions include platforms where waterproof curbs of sufficient height are cast-in or where the deck and wall or guard are unit-formed. In these cases, the monolithic deck-wall or deck-guard junctions will minimize the likelihood of water ingress. (See also Appendix Note A-9.26.1.1.(2).)

**A-9.26.17.1.(1) Installation of Concrete Roof Tiles.** Where concrete roof tiles are to be installed, the dead load imposed by this material should be considered in determining the minimum sizes and maximum spans of the supporting roof members.

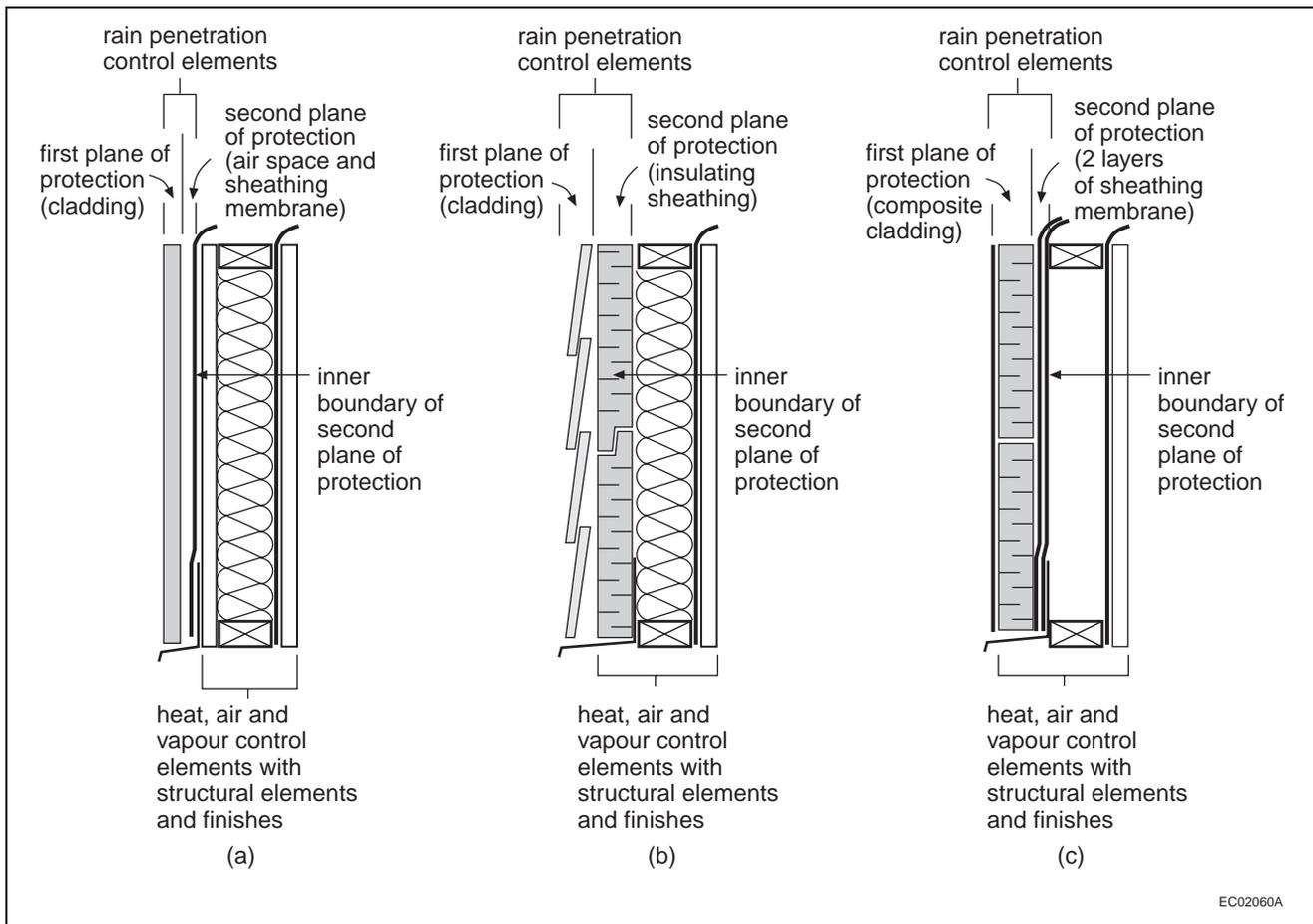
**A-9.27.2. Required Protection from Precipitation.** Part 5 and Part 9 of the Alberta Building Code recognize that mass walls and face-sealed, concealed barrier and rainscreen assemblies have their place in the Canadian context.

Mass walls are generally constructed of cast-in-place concrete or masonry. Without cladding or surface finish, they can be exposed to precipitation for a significant period before moisture will penetrate from the exterior to the interior. The critical characteristics of these walls are related to thickness, mass, and moisture transfer properties, such as shedding, absorption and moisture diffusivity.

Face-sealed assemblies have only a single plane of protection. Sealant installed between cladding elements and other envelope components is part of the air barrier system and is exposed to the weather. Face-sealed assemblies are appropriate where it can be demonstrated that they will provide acceptable performance with respect to the health and safety of the occupants, the operation of building services and the provision of conditions suitable for the intended occupancy. These assemblies, however, require more intensive, regular and on-going maintenance, and should only be selected on the basis of life-cycle costing considering the risk of failure and all implications should failure occur. Climate loads such as wind-driven rain, for example, should be considered. Face-sealed assemblies are not recommended where the building owner may not be aware of the maintenance issue or where regular maintenance may be problematic.

Concealed barrier assemblies include both a first and second plane of protection. The first plane comprises the cladding, which is intended to handle the majority of the precipitation load. The second plane of protection is intended to handle any water that penetrates the cladding plane. It allows for the dissipation of this water, primarily by gravity drainage, and provides a barrier to further ingress.

Like concealed barrier assemblies, rainscreen assemblies include both a first and second plane of protection. The first plane comprises the cladding, which is designed and constructed to handle virtually all of the precipitation load. The second plane of protection is designed and constructed to handle only very small quantities of incidental water; composition of the second plane is described in Appendix Note A-9.27.3.1. In these assemblies, the air barrier system, which plays a role in controlling precipitation ingress due to air pressure difference, is protected from the elements. (See Figure A-9.27.2.)



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The cladding assembly described in Sentence 9.27.2.2.(4) is a basic rainscreen assembly. This approach is required for residential buildings where a higher level of on-going performance is expected without significant maintenance. This approach, however, is recommended in all cases.

The cladding assemblies described in Sentence 9.27.2.2.(5) are also rainscreen assemblies. The assembly described in Clause 9.27.2.2.(1)(c) is again a basic rainscreen assembly. A wall with a capillary break as described in Clause 9.27.2.2.(1)(a) is an open rainscreen assembly. Walls with a capillary break as described in Clause 9.27.2.2.(1)(b) have been referred to as drainscreen assemblies.

**A-9.27.2.1.(1) Minimizing Precipitation Ingress.** The total prevention of precipitation ingress into wall assemblies is difficult to achieve and, depending on the wall design and construction, may not be absolutely necessary. The amount of moisture that enters a wall, and the frequency with which this occurs, must be limited. The occurrence of ingress must be sufficiently rare, accumulation sufficiently small and drying sufficiently rapid to prevent the deterioration of moisture-susceptible materials and the growth of fungi.

**A-9.27.2.2. Required Levels of Protection from Precipitation.** Precursors to Part 9 and all editions of the Alberta Building Code containing a Part 9 applying to housing and small buildings included a performance-based provision requiring that cladding provide protection from the weather for inboard materials. Industry requested that Part 9 provide additional guidance to assist in determining the minimum levels of protection from precipitation to be provided by cladding assemblies. As with all requirements in the Alberta Building Code, the new requirements in Article 9.27.2.2. describe the minimum cladding assembly configuration. Designers must still consider local accepted good practice, demonstrated performance and the specific conditions to which a particular wall will be exposed when designing or selecting a cladding assembly.

### Capillary Breaks

The properties that are necessary for a material or assembly to provide a capillary break, and quantitative values for those properties, have not been defined. Among the material properties that need to be addressed are water absorption and susceptibility to moisture-related deterioration. Among the assembly characteristics to be considered are bridging of spaces by water droplets, venting and drainage.

Clause 9.27.2.2.(1)(a) describes the capillary break configuration typical of open rainscreen construction. The minimum 10 mm will avoid bridging of the space by water droplets and allow some construction tolerance.

Clause 9.27.2.2.(1)(b) describes a variation on the typical open rainscreen configuration. Products used to provide the capillary break include a variety of non-moisture-susceptible, open-mesh materials.

Clause 9.27.2.2.(1)(c) describes a configuration that is typical of that provided by horizontal vinyl and metal siding, without contoured insulating backing. The air space behind the cladding components and the loose installation reduce the likelihood of moisture becoming trapped and promote drying by airflow.

Clause 9.27.2.2.(1)(d) recognizes the demonstrated performance of masonry cavity walls and masonry veneer walls.

### Moisture Index

The moisture index (MI) for a particular location reflects both the wetting and drying characteristics of the climate and depends on

- annual rainfall, and
- the temperature and relative humidity of the outdoor ambient air.

MI values are derived from detailed research and calculations.

Due to a lack of definitive data, the MI values identified in Sentence 9.27.2.2.(5), which trigger exceptions to or additional precipitation protection, are based on expert opinion. Designers should consider local experience and demonstrated performance when selecting materials and assemblies for protection from precipitation. For further information on MI, see Appendix C.

**A-9.27.3.1. Second Plane of Protection.** As specified in Sentence 9.27.3.1.(1), the second plane of protection consists of a drainage plane with an appropriate material serving as the inner boundary and flashing to dissipate rainwater or meltwater to the exterior.

#### Drainage Plane

Except for masonry walls, the simplest configuration of a drainage plane is merely a vertical interface between materials that will allow gravity to draw the moisture down to the flashing to allow it to dissipate to the exterior. It does not necessarily need to be constructed as a clear drainage space (air space).

For masonry walls, an open rainscreen assembly is required; that is, an assembly with first and second planes of protection where the drainage plane is constructed as a drained and vented air space. Such construction also constitutes best practice for walls other than masonry walls.

Section 9.20. requires drainage spaces of 25 mm for masonry veneer walls and 50 mm for cavity walls. In other than masonry walls, the drainage space in an open rainscreen assembly should be at least 10 mm deep. Drainage holes must be designed in conjunction with the flashing.

#### Sheathing Membrane

The sheathing membrane described in Article 9.27.3.2. is not a waterproof material. When installed to serve as the inner boundary of the second plane of protection, and when that plane of protection includes a drainage space at least 10 mm deep, the performance of the identified sheathing membrane has been demonstrated to be adequate. This is because the material is expected to have to handle only a very small quantity of water that penetrates the first plane of protection.

If the 10 mm drainage space is reduced or interrupted, the drainage capacity and the capillary break provided by the space will be reduced. In these cases, the material selected to serve as the inner boundary may need to be upgraded to provide greater water resistance in order to protect moisture-susceptible materials in the backing wall.

#### Appropriate Level of Protection

It is recognized that many cladding assemblies with no space or with discontinuous space behind the cladding, and with the sheathing membrane material identified in Article 9.27.3.2., have provided acceptable performance with a range of precipitation loads imposed on them. Vinyl and metal strip siding, and shake and shingle cladding, for example, are installed with discontinuous drained spaces, and have demonstrated acceptable performance in most conditions. Lapped wood and composite strip sidings, depending on their profiles, may or may not provide discontinuous spaces, and generally provide little drainage. Cladding assemblies with limited drainage capability that use a sheathing membrane meeting the minimum requirements are not recommended where they may be exposed to high precipitation loads or where the level of protection provided by the cladding is unknown or questionable. Local practice with demonstrated performance should be considered. (See also Article 9.27.2.2. and Appendix Note A-9.27.2.2.)

**A-9.27.3.4.(2) Detailing of Joints in Exterior Insulating Sheathing.** The shape of a joint is critical to its ability to shed water. Tongue and groove, and lapped joints can shed water if oriented correctly. Butt joints can drain to either side and so should not be used unless they are sealed. However, detailing of joints requires attention not just to the shape of the joint but also to the materials that form the joint. For example, even if properly shaped, the joints in insulating sheathing with an integral sheathing membrane could not be expected to shed water if the insulating material absorbs water, unless the membrane extends through the joints.

**A-9.27.3.5.(1) Sheathing Membranes in lieu of Sheathing.** Article 9.23.16.1., Required Sheathing, indicates that sheathing must be installed only where the cladding requires intermediate fastening between supports (studs) or where the cladding requires a solid backing. Cladding such as brick or panels would be exempt from this requirement and in these cases a double layer of sheathing membrane would generally be needed. The exception (Article 9.27.3.6.) applies only to those types of cladding that provide a face seal to the weather.

**A-9.27.3.6. Sheathing Membrane under Face Sealed Cladding.** The purpose of sheathing membrane on walls is to reduce air infiltration and to control the entry of wind-driven rain. Certain types of cladding consisting of very large sheets or panels with well-sealed joints will perform this function, eliminating the need for sheathing membrane. This is true of the metal cladding with lock-seamed joints sometimes used on mobile homes. However, it does not apply to metal or plastic siding applied in narrow strips which is intended to simulate the appearance of lapped wood siding. Such material does not act as a substitute for sheathing membrane since it incorporates provision for venting the wall cavity and has many loosely-fitted joints which cannot be counted on to prevent the entry of wind and rain.

Furthermore, certain types of sheathing systems can perform the function of the sheathing membrane. Where it can be demonstrated that a sheathing material is at least as impervious to air and water penetration as sheathing membrane and that its jointing system results in joints that are at least as impervious to air and water penetration as the material itself, sheathing membrane may be omitted.

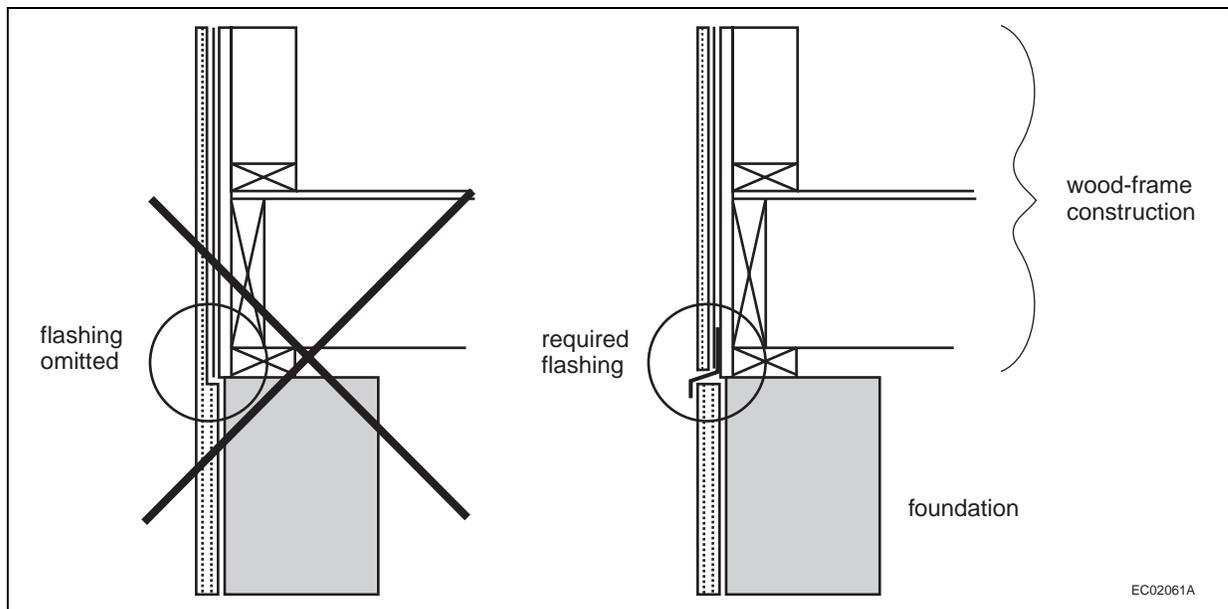
**A-9.27.3.8.(1) Required Flashing.**

**Horizontal Offsets**

Where a horizontal offset in the cladding is provided by a single cladding element, there is no joint between the offset and the cladding above. In this case, and provided the cladding material on the offset provides effective protection for the construction below, flashing is not required.

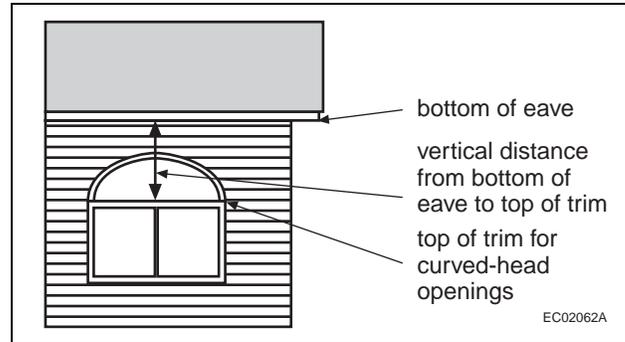
**Changes in Substrate**

In certain situations, flashing should be installed at a change of substrate: for example, where stucco cladding is installed on a wood-frame assembly, extending down over a masonry or cast-in-place concrete foundation and applied directly to it. Such an application does not take into account the potential for shrinkage of the wood frame and cuts off the drainage route for moisture that may accumulate behind the stucco on the frame construction.



**Figure A-9.27.3.8.(1)**  
**Flashing at change in substrate**

**A-9.27.3.8.(3) Flashing over Curved-Head Openings.** The requirement for flashing over openings depends on the vertical distance from the top of the trim over the opening to the bottom of the eave compared to the horizontal projection of the eave. In the case of curved-head openings, the vertical distance from the top of the trim increases as one moves away from the centre of the opening. For these openings, the top of the trim must be taken as the lowest height before the trim becomes vertical. (See Figure A-9.27.3.8.(3).)

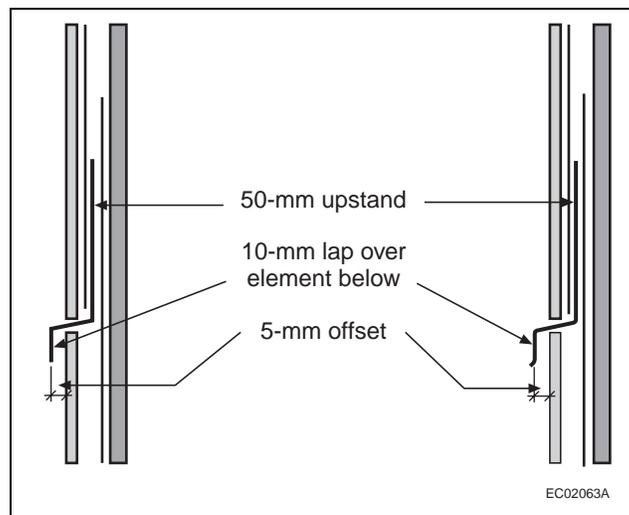


**Figure A-9.27.3.8.(3)**  
**Flashing over curved-head openings**

**A-9.27.3.8.(4) Flashing Configuration and Positive Drainage.**

**Flashing Configuration**

A 6% slope is recognized as the minimum that will provide effective flashing drainage. The 10 mm vertical lap over the building element below and the 5 mm offset are prescribed to reduce transfer by capillarity and surface tension. Figure A-9.27.3.8.(4) illustrates two examples of flashing configurations.



**Figure A-9.27.3.8.(4)**  
**Examples of flashing configurations showing upstands, horizontal offsets and vertical laps**

**Maintaining Positive Slope**

Sentence 9.27.3.8.(4) requires that the minimum 6% flashing slope remain after expected shrinkage of the building frame. Similarly, Sentence 9.26.3.1.(4) requires that a positive slope remain on roofs and similar constructions after expected shrinkage of the building frame.

For Part 9 wood-frame constructions, expected wood shrinkage can be determined based on the average equilibrium moisture content (MC) of wood, within the building envelope assembly, in various regions of the country (see Table A-9.27.3.8.(4)).

Table A-9.27.3.8.(4)  
Equilibrium Moisture Content for Wood

Regions	Equilibrium MC, % <sup>(1)</sup>
British Columbia and Atlantic Canada	10
Ontario and Quebec	8
Prairies and the North	7

Notes to Table A-9.27.3.8.(4):

(1) Wood Reference Handbook. Canadian Wood Council, Ottawa, 2000.

For three-storey constructions to which Part 9 applies, cumulative longitudinal shrinkage is negligible. Shrinkage need only be calculated for horizontal framing members using the following formula (from Introduction to Wood Building Technology, Canadian Wood Council, Ottawa, 1997):

$$\text{Shrinkage} = (\text{total horizontal member height}) \times (\text{initial MC} - \text{equilibrium MC}) \times (.002)$$

**A-9.27.3.8.(5) Protection against Precipitation Ingress at the Sill-to-Cladding Joint.** Many windows are configured in such a way that a line of sealant is the only protection against water ingress at the sill-to-cladding joint—a location that is exposed to all of the water that flows down the window. In the past, many windows were constructed with self-flashing sills—sills that extend beyond the face of the cladding and have a drip on the underside to divert water away from the sill-to-cladding joint. This sill configuration was considered to be accepted good practice and is recognized today as providing a degree of redundancy in precipitation protection.

Self-flashing sills are sills that

- slope toward the exterior where the sills have an upward facing surface that extends beyond the jambs,
- where installed over a masonry sill, extend not less than 25 mm beyond the inner face of that sill,
- incorporate a drip positioned not less than 5 mm outward from the outer face of the cladding below or not less than 15 mm beyond the inner edge of a masonry sill, and
- terminate at the jambs or, where the face of the jambs is not at least flush with the face of the cladding and the sills extend beyond the jambs, incorporate end dams sufficiently high to protect against overflow in wind-driven rain conditions.

A wind pressure of 10 Pa can raise water 1 mm. Thus, for example, if a window is exposed to a driving rain wind pressure of 200 Pa, end dams should be at least 20 mm high.

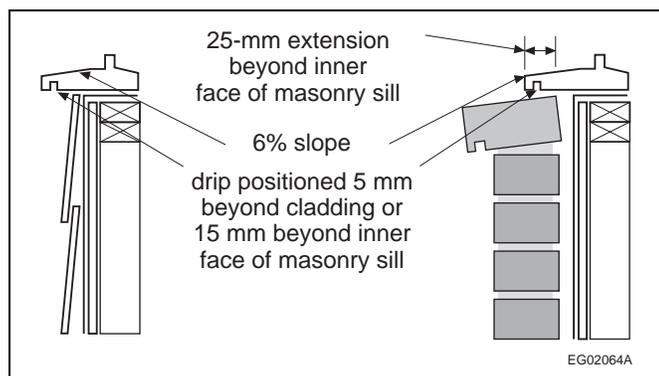


Figure A-9.27.3.8.(5)  
Examples of configurations of self-flashing sills

**A-9.27.3.8.(6) Exterior-Mounted Windows and Doors.** This provision applies to flanged windows or doors installed on the exterior of essentially flat, lock-seam metal cladding, such as the ones once used on small factory-built buildings.

**A-9.27.10.2.(3) Grooves in Hardboard Cladding.** Grooves deeper than that specified may be used in thicker cladding providing they do not reduce the thickness to less than the required thickness minus 1.5 mm. Thus for type 1 or 2 cladding, grooves must not reduce the thickness to less than 4.5 mm or 6 mm depending on method of support, or to less than 7.5 mm for type 5 material.

**A-9.27.11.2.(2) Thickness of Grade O-2 OSB.** In using Table 9.27.9.2. to determine the thickness of Grade O-2 OSB cladding, substitute "face orientation" for "face grain" in the column headings.

**A-9.27.12.1.(3) and (4) Material Standards for Aluminum Cladding.** Compliance with Sentence 9.27.12.1.(3) and CAN/CGSB-93.2-M, "Prefinished Aluminum Siding, Soffits, and Fascia for Residential Use," is required for aluminum siding that is installed in horizontal or vertical strips. Compliance with Sentence 9.27.12.1.(4) and CAN/CGSB-93.1-M, "Sheet, Aluminum Alloy, Prefinished, Residential," is required for aluminum cladding that is installed in large sheets.

**A-Table 9.28.4.3. Stucco Lath.** Paper-backed welded wire lath may also be used on horizontal surfaces provided its characteristics are suitable for such application.

**A-9.30.1.2.(1) Water Resistance.** In some areas of buildings, water and other substances may frequently be splashed or spilled onto the floor. It is preferable, in such areas, that the finish flooring be a type that will not absorb moisture or permit it to pass through; otherwise, both the flooring itself and the subfloor beneath it may deteriorate. Also, particularly in food preparation areas and bathrooms, unsanitary conditions may be created by the absorbed moisture. Where absorbent or permeable flooring materials are used in these areas, they should be installed in such a way that they can be conveniently removed periodically for cleaning or replacement, i.e., they should not be glued or nailed down. Also, if the subfloor is a type that is susceptible to moisture damage (this includes virtually all of the wood-based subfloor materials used in wood-frame construction), it should be protected by an impermeable membrane placed between the finish flooring and the subfloor. The minimum degree of impermeability required by Sentence 9.30.1.2.(1) would be provided by such materials as polyethylene, aluminum foil, and most single-ply roofing membranes (EPDM, PVC).

**A-9.32.3. Heating-Season Mechanical Ventilation.** For many years, houses were constructed without mechanical ventilation systems. They relied on natural air leakage through the building envelope for winter ventilation. However, houses have become progressively more airtight through the introduction of new products and practices, e.g., the substitution of panel sheathings, such as plywood and waferboard, for board sheathing, the replacement of paper-backed insulation batts with friction-fit batts and polyethylene film, improved caulking materials, and tighter windows and doors.

Following the energy crisis in the early 1970s, considerable emphasis was placed on reducing air leakage in order to conserve energy. Electric heating systems were encouraged and higher efficiency furnaces were developed, which further reduced air change rates in buildings. This led to concern that the natural air change in dwelling units might be insufficient in some instances to provide adequate indoor air quality. Condensation problems resulting from higher humidity levels were also a concern.

### Evolution of Alberta Building Code Ventilation Requirements

Mechanical ventilation requirements in the Alberta Building Code have evolved from a simple requirement in the 1981 edition that exhaust fans be incorporated in electrically heated houses, through requirements in the 1985 and 1990 editions that all houses have mechanical ventilation systems capable of exchanging the indoor air for outdoor air at a specified rate: 0.5 air changes per hour in the 1985 edition and 0.3 air changes per hour in the 1990 edition.

The Alberta Building Code 1997 addressed not only the overall air change rate created by the mechanical ventilation system but also the need to ensure that the outdoor air brought into the house by the system is distributed throughout the house.

### Current Requirements

The current requirements are a further refinement. The ventilation systems described herein are essentially the same as those described in the Alberta Building Code 1997 but additional provisions have been included with the following goals in mind:

- provisions that are easier to understand,
- reduced probability that outdoor air distributed through a forced-air heating system will be cool enough to cause premature deterioration of the furnace heat exchanger, and

- reduced probability that the ventilation system will cause excessive depressurization of the dwelling unit.

To some extent, the first of these goals conflicts with the other two and its achievement has suffered accordingly. Only in the manner of determining the capacity of the principal ventilation fan [see Sentence 9.32.3.3.(2)] has any significant simplification been achieved.

See also Appendix Note A-9.32.3.3.(2).

#### **A-9.32.3.1.(1) Required Ventilation.**

##### **Performance Approach [Clause 9.32.3.1.(1)(a)]**

Standard CAN/CSA-F326-M, “Residential Mechanical Ventilation Systems,” is a comprehensive performance standard. It gives experienced ventilation system designers the flexibility to design a variety of residential ventilation systems that satisfy those requirements.

##### **Prescriptive Approach [Clause 9.32.3.1.(1)(b)]**

The prescriptively described systems are intended to provide a level of performance approaching that provided by systems complying with CAN/CSA-F326-M. They are included in the Alberta Building Code for use by those less experienced in ventilation system design. Code users who do not find these prescriptively described systems satisfactory for their purposes, or who find them too restrictive, are free to use any other type of ventilation system that satisfies the performance requirements of CAN/CSA-F326-M.

**A-9.32.3.3. Principal Ventilation System.** The principal ventilation system circulates air throughout the house for the purpose of maintaining acceptable indoor air quality. Each ventilation system has three main components:

- indoor air exhaust
- outdoor air supply
- distribution of air

##### **Indoor Air Exhaust**

The principal ventilation fan (formerly named “principal exhaust fan” in the Alberta Building Code 1997) extracts indoor air. Its operation is linked with a means of introducing and distributing outdoor air to the dwelling unit at approximately the same rate at which the indoor air is exhausted, except as permitted by Article 9.32.3.6.

The principal ventilation fan must be capable of drawing air from throughout the dwelling unit and exhausting it to the outdoors. Though actual usage will be determined by the occupants, the fan must be capable of continuous operation. Unfortunately, there is no standard method of testing and designating fans for continuous use. Therefore, such a designation is not a mandatory requirement [see Sentence 9.32.3.3.(4)].

Supplemental exhaust fans, such as kitchen range hoods and bathroom fans, provide more ventilation at point of source when needed (see Article 9.32.3.7. and Appendix Note A-9.32.3.7.).

##### **Outdoor Air Supply**

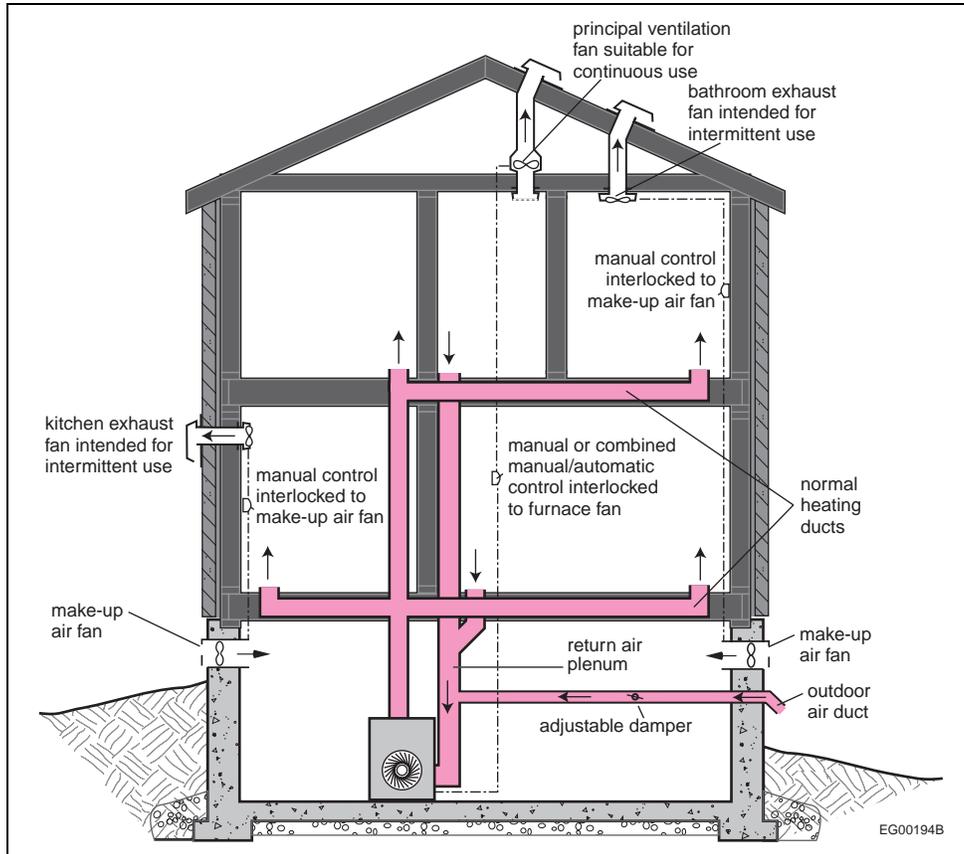
Outdoor air is brought into a house either through a supply duct in the exterior wall or, in exhaust-only systems permitted under Article 9.32.3.6., by leaks through the building envelope.

##### **Distribution of Air**

There are two approaches to ensuring air is distributed to all parts of the house:

- in forced air heating systems, the furnace circulation fan moves the air through heating distribution ducts (see Appendix Note A-9.32.3.4.),
- in non-forced air heating systems, a supply fan circulates air through dedicated ventilation distribution ducts (see Appendix Note A-9.32.3.5.).

Figures A-9.32.3.3.-A to A-9.32.3.3.-F show possible configurations of principal ventilation systems. However, even within these prescriptive solutions, a significant degree of flexibility is available. The configurations illustrated should therefore not be regarded as the only configurations acceptable under Sentence 9.32.3.1.(2).



**Figure A-9.32.3.3.-A**  
**Possible configuration of a ventilation system coupled with a forced air heating system**

**Note to Figure A-9.32.3.3.-A:**

- (1) The outdoor air supply duct shall be connected not less than 3 m upstream of the plenum connection to the furnace.

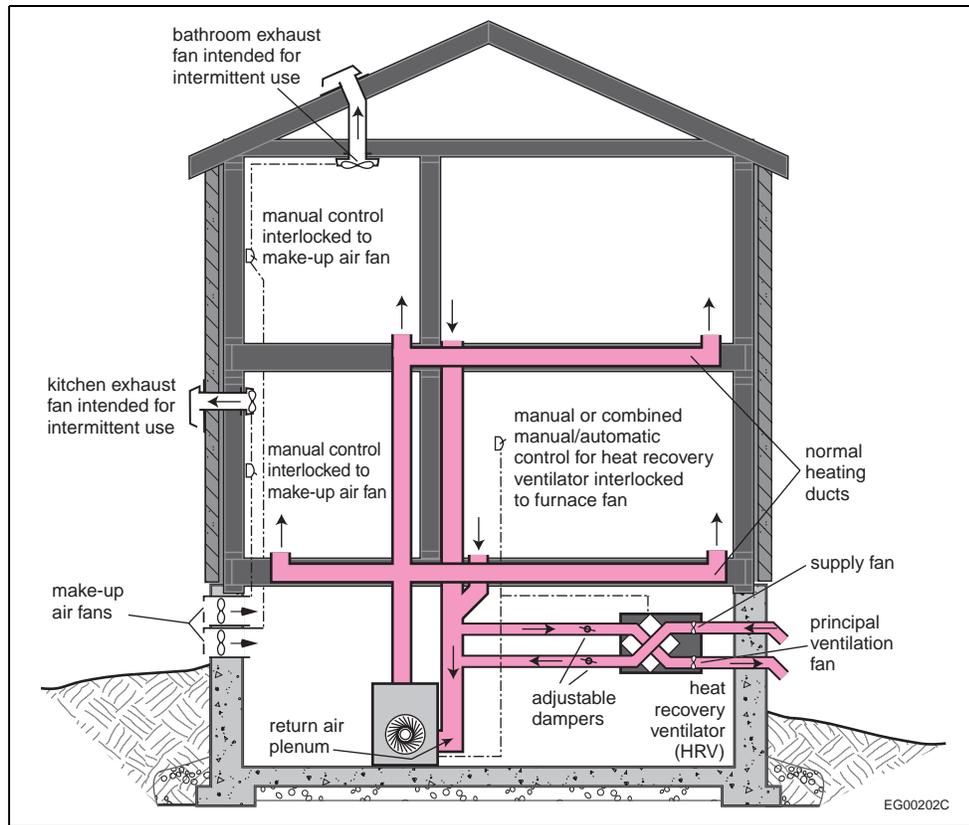
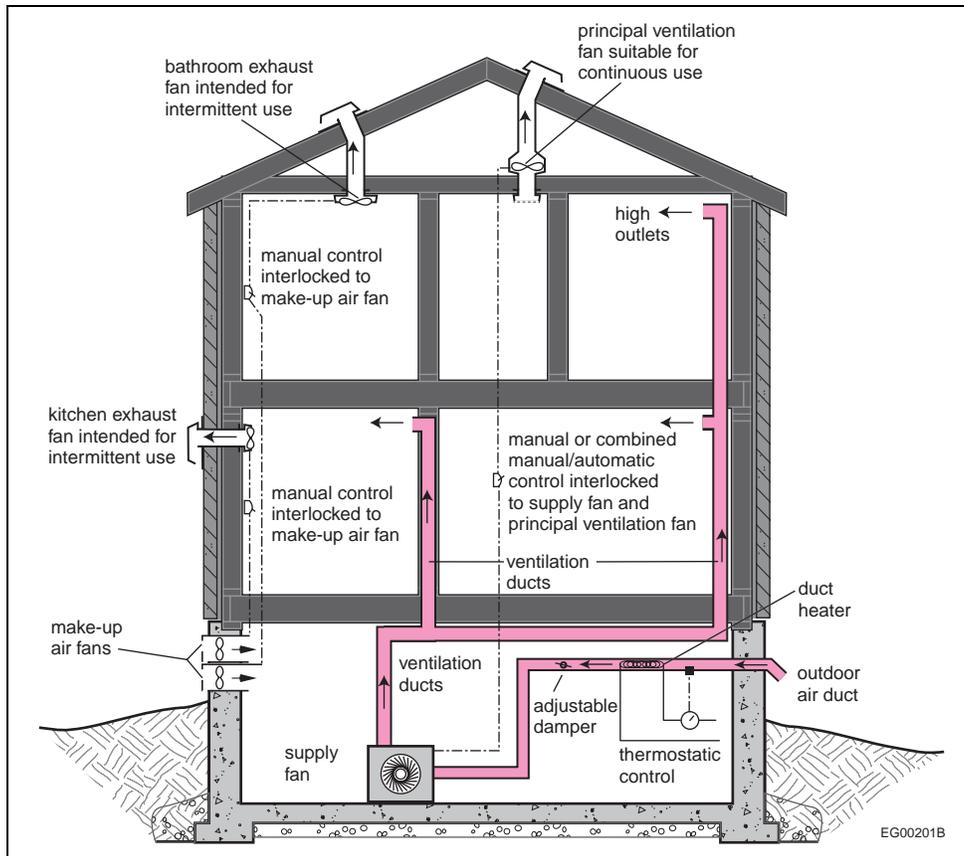


Figure A-9.32.3.3.-B

Possible configuration of a ventilation system using a heat recovery ventilator coupled with a forced air heating system

Notes to Figure A-9.32.3.3.-B:

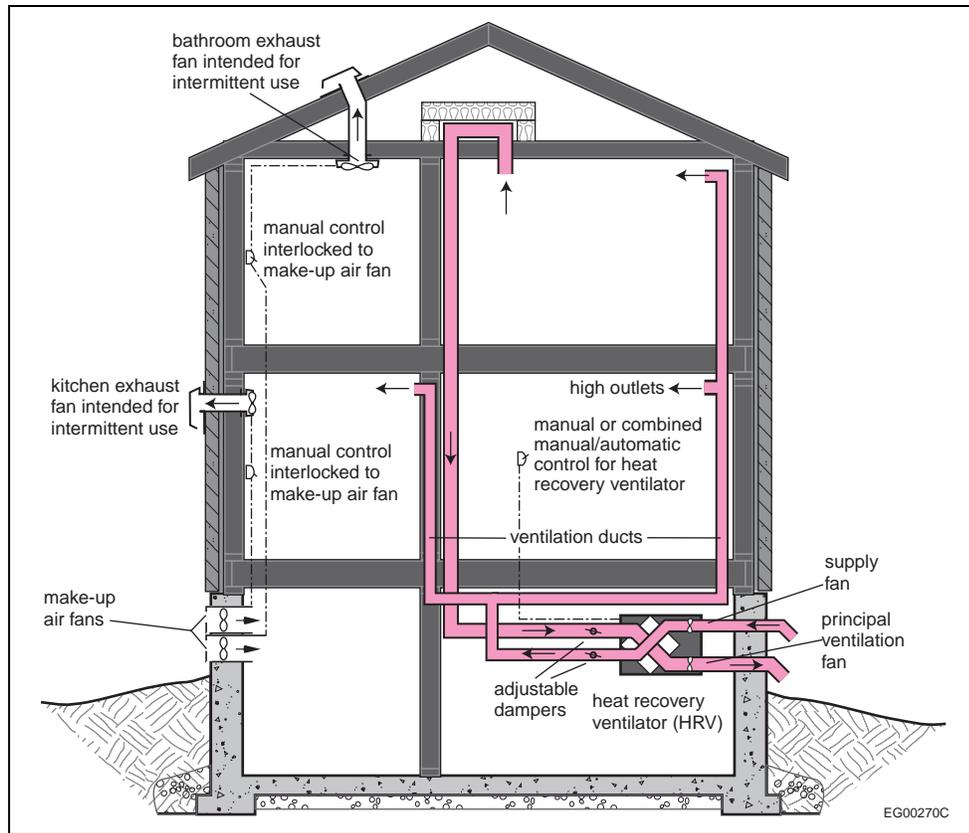
- (1) The outdoor air supply duct shall be connected not less than 3 m upstream of the plenum connection to the furnace.
- (2) The HRV supply inlet and exhaust outlet shall be separated by a distance of not less than 900 mm.



**Figure A-9.32.3.3.-C**  
**Possible configuration of a ventilation system not coupled with a forced air heating system**

**Note to Figure A-9.32.3.3.-C:**

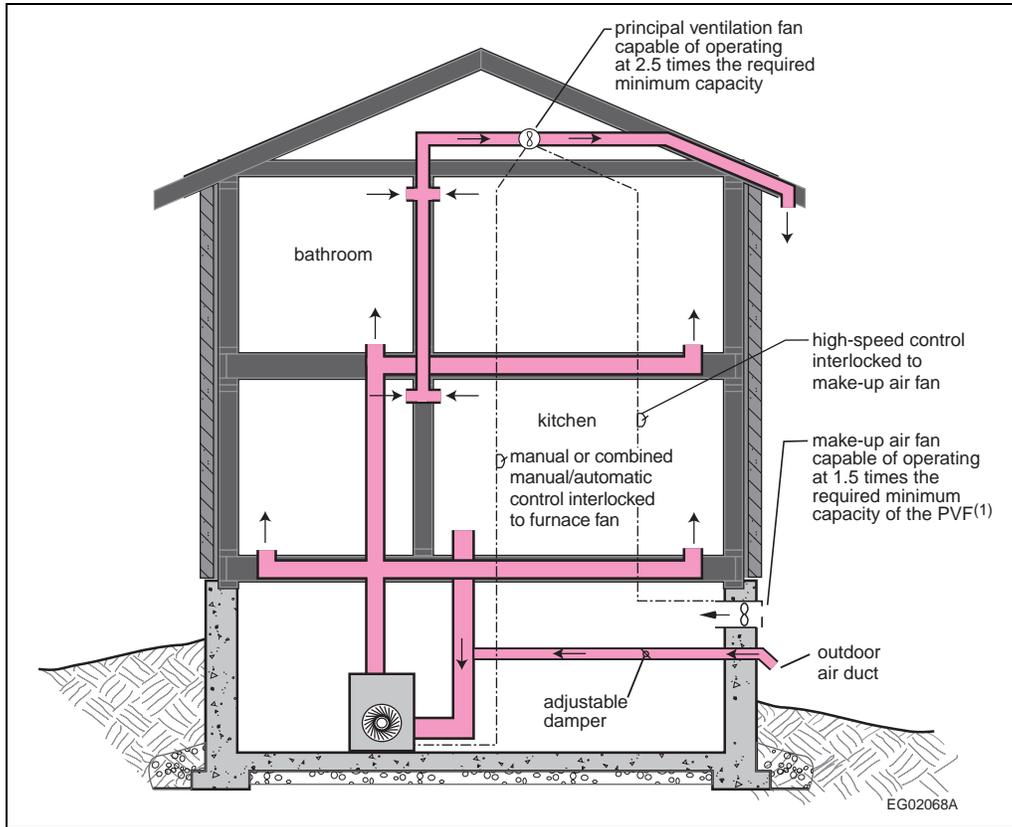
- (1) The outdoor air supply duct shall be connected not less than 3 m upstream of the plenum connection to the furnace.



**Figure A-9.32.3.3.-D**  
**Possible configuration of a ventilation system using a heat recovery ventilator not coupled with a forced air heating system**

**Note to Figure A-9.32.3.3.-D:**

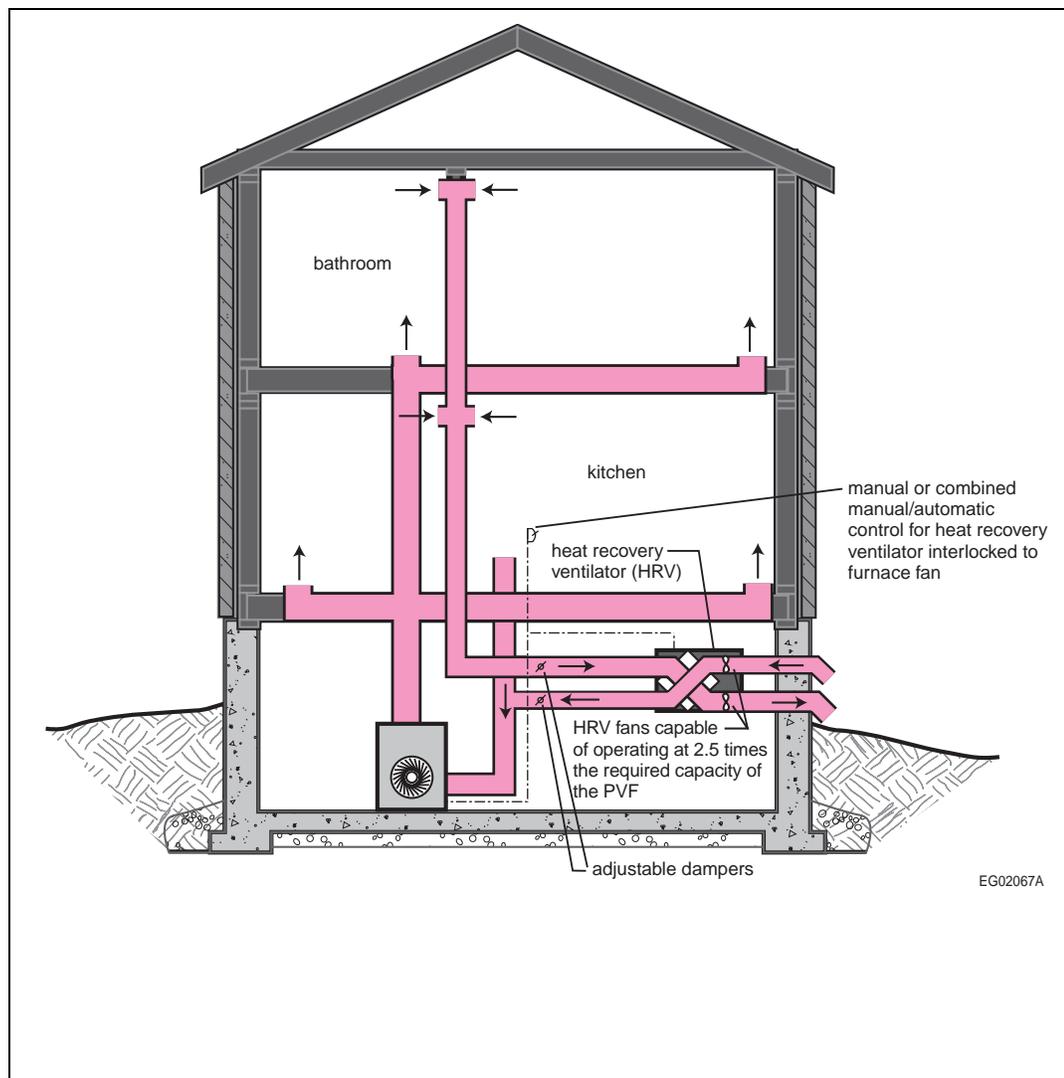
- (1) The HRV supply inlet and exhaust outlet shall be separated by a distance of not less than 900 mm.



**Figure A-9.32.3.3-E**  
**Ventilation system coupled with a forced air heating system and using a dual-capacity principal ventilation fan to eliminate the need for supplemental fans**

**Notes to Figure A-9.32.3.3-E:**

- (1) The make-up air fan operates when the PVF operates at 2.5 times the required capacity.
- (2) The outdoor air supply duct shall be connected not less than 3 m upstream of the plenum connection to the furnace.



**Figure A-9.32.3.3-F**  
**Ventilation system coupled with a forced air heating system and using a heat recovery ventilator as the principal ventilation fan to eliminate the need for supplemental fans**

**Notes to Figure A-9.32.3.3-F:**

- (1) The outdoor air supply duct shall be connected not less than 3 m upstream of the plenum connection to the furnace.
- (2) The HRV supply inlet and exhaust outlet shall be separated by a distance of not less than 900 mm.

**A-9.32.3.3.(2) Normal Operating Exhaust Capacity.** The principal ventilation fan operates at a rate known as the “normal operating exhaust capacity.” This rate is intended to be suitable for use on a continuous basis at any time that an ongoing, background level of ventilation is needed, e.g. the late fall or early spring when air leakage driven by wind and inside/outside temperature differences is lowest but it is too cold to rely on open windows.

The capacity of the principal ventilation fan is determined on the basis of the number of bedrooms in the house rather than on the basis of some fraction of the house volume, as in previous editions of the Alberta Building Code. This is because the amount of ventilation required is related to the activities of people, and the number of people in the house is usually related to the number of bedrooms rather than to the size of the house. It should be emphasized that this air change rate refers to the installed capacity of the system, not to the rate of ventilation that is actually used in the house.

In many households, ventilating even at the background rate would provide more ventilation than required, resulting in unnecessarily high heating bills and perhaps excessively low indoor relative humidity. Thus, although a system with the minimum capacity must be installed, it can incorporate controls that allow the system to be used at less than its full capacity most of the time.

A maximum is set for the capacity of the principal ventilation fan because, if it were to be much larger than the ventilation needs of the household, it might never be used. The principal ventilation fan is intended to provide a relatively low level of ventilation such that it can be run continuously without too much noise and without serious energy penalty. If the installed capacity exceeds the minimum by a large margin and the fan flow cannot be reduced, there is increased probability that the fan will not be used at all, thus defeating the purpose of having it in the first place. Sentence 9.32.3.3.(2) therefore places limits on oversizing.

**A-9.32.3.3.(3) Required Controls.** The principal ventilation fan must incorporate controls that allow it to be turned off. There are four main types of controls used in residential applications:

- (a) **Manual on-off switch:** This is the simplest form of control but, while acceptable, it is not the best means of maintaining indoor air quality. Occupants may turn the system off and forget to turn it back on, or may turn it off to save on heating bills or to reduce noise, not realizing the importance of proper ventilation.
- (b) **Dehumidistat:** A dehumidistat automatically activates the ventilation system in response to rising humidity. Humidity is often the main reason why ventilation is required, but not always. Depending on the activities of the occupants and the relative strengths of other sources of pollutants and humidity, the amount of ventilation required to control humidity may not be enough to control other pollutants.
- (c) **Carbon Dioxide Sensor:** Ventilation systems in large buildings are sometimes controlled by carbon dioxide (CO<sub>2</sub>) sensors and this technology is just beginning to be available on a residential scale. Increasing CO<sub>2</sub> concentration is usually a good indication of decreasing air quality. But even this form of control may not be satisfactory in cases where there are unusual pollutants, such as those generated by certain hobbies.
- (d) **Periodic Cycling Control:** Devices are available that cause the furnace circulation fan to operate at user-set intervals if the thermostat does not call for heat. If such a device were wired so that it turns on the principal ventilation fan as well as the furnace circulation fan, it would satisfy the requirements of Article 9.32.3.4. However, if it were wired to only operate the furnace circulation fan in a system designed to Article 9.32.3.4., at times the principal ventilation fan would operate without the furnace circulation fan. Since such systems rely on the furnace circulation fan drawing in outdoor air to balance the exhaust flow through the principal ventilation fan, this would result in the exhaust flow not being balanced and the dwelling being depressurized. This configuration would therefore not be acceptable. This device would be acceptable in conjunction with a system designed in accordance with Article 9.32.3.6.

**A-9.32.3.3.(5) Location of Controls.** The intent of the requirement to locate the controls in the living area is to have them easily accessible to the occupants, rather than in a little used room or unfinished basement, for example.

Installers should consider marking the manual switch with an icon depicting a fan as well as the words "Ventilation Fan."

**A-9.32.3.3.(10) Location of Exhaust Air Intakes.** Where the kitchen or a bathroom is chosen as the location for the air intake of the principal ventilation fan, the intake must be positioned high enough to capture contaminants, warm moist air, and hot gases, which tend to rise and stratify near the ceiling. These restrictions prevent the use of a range-top exhaust or range hood fan as the principal ventilation fan.

#### **A-9.32.3.4. Ventilation Systems Used in Conjunction with Forced Air Heating**

**Systems.** Coupling a ventilation system with a forced air heating system to provide the necessary distribution of outdoor air is relatively simple. A duct brings air from outdoors to the heating system's return air plenum. Whenever the principal ventilation fan is activated, the furnace fan is automatically activated to distribute the outdoor air [see Sentence 9.32.3.4.(9)]. Where no auxiliary supply fan is installed as per Sentence 9.32.3.4.(8), the furnace fan also drives the flow of outdoor air in through the outdoor air duct. Use of an auxiliary supply fan allows the size of the outdoor air supply duct to be reduced.

This system tempers the outdoor air before it reaches occupied areas of the house by mixing it with return air in the furnace's return air plenum. It is important that thorough mixing occur before the cold air reaches the furnace's heat exchanger, otherwise condensation could reduce the service life of the heat exchanger. The 3-m minimum distance between the furnace and the outdoor air duct connection is one means of addressing this concern. However, a well designed mixing device is likely to be more effective, as are certain arrangements of the outdoor air duct's connection to the return air plenum. Figures A-9.32.3.4.-A, A-9.32.3.4.-B, and A-9.32.3.4.-C illustrate one such device and arrangements that have been shown to be effective in research carried out by Canada Mortgage and Housing Corporation ("Testing of Fresh Air Mixing Devices," IRTA Research for Research Division of CMHC, March 1993).

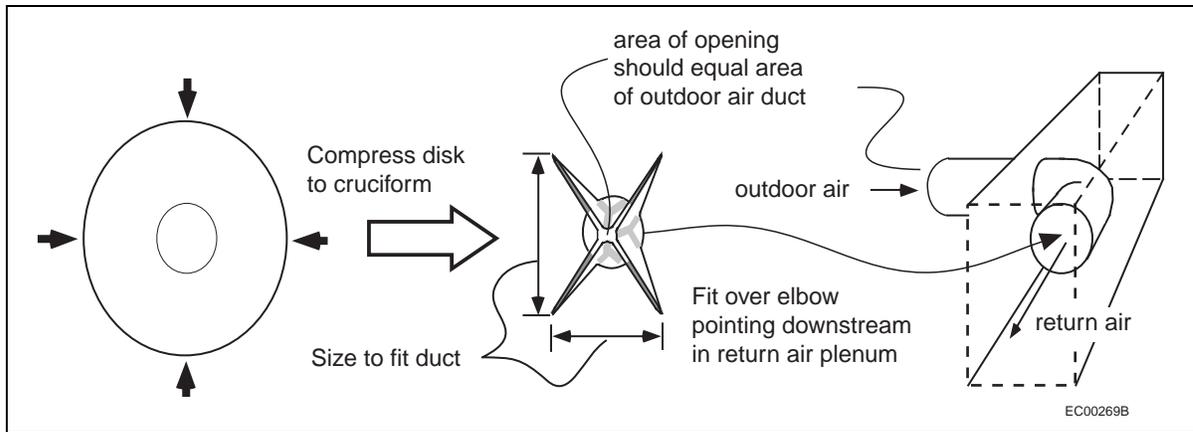


Figure A-9.32.3.4.-A  
Simple air mixing device

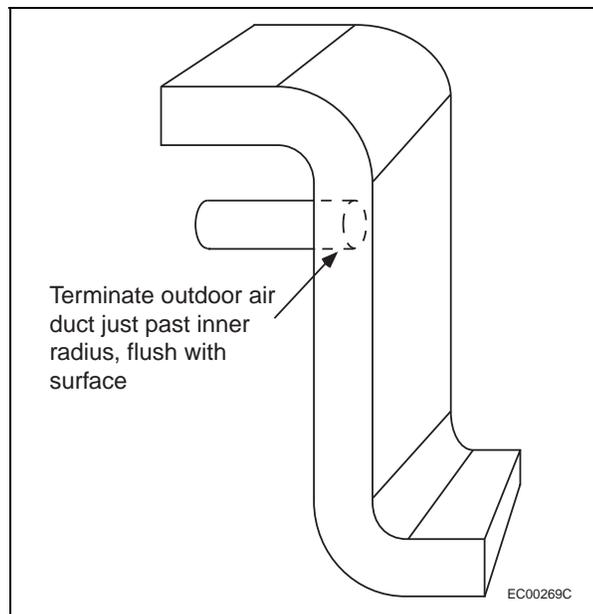
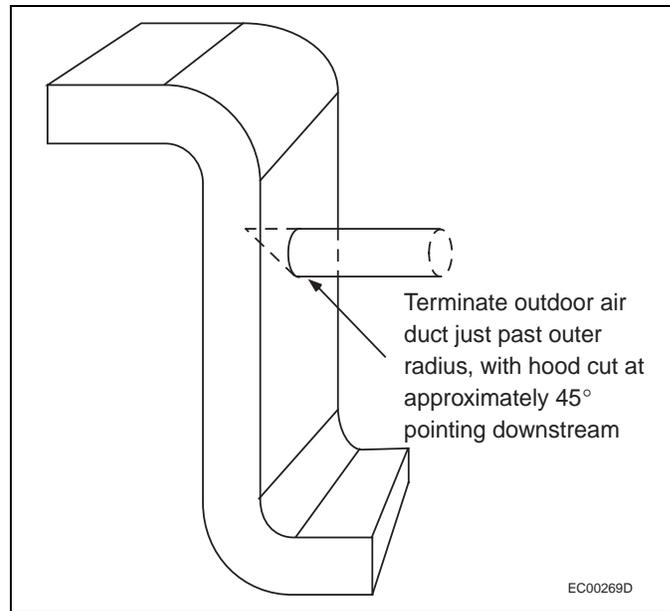


Figure A-9.32.3.4.-B  
Outdoor air duct directly connected to drop plenum – inner side of corner



**Figure A-9.32.3.4.-C**  
**Outdoor air duct directly connected to drop plenum – outer side of corner**

Even if the outdoor air is well mixed with the return air, in very cold weather the resulting mixed air temperature could still be lower than what the furnace heat exchanger can tolerate if there is too much outdoor air. That is why Article 9.32.3.4. includes several provisions, including Table 9.32.3.4. and the requirement to actually measure the outdoor airflow [see Sentence 9.32.3.4.(10)], to guard against this possibility. In some cases, it will not be possible to use the forced air heating system to circulate the outdoor air unless additional heating devices are used to temper the outdoor air before it reaches the furnace heat exchanger. This would be the case, for example, in a highly insulated house with a small furnace that is located in a very cold region.

The maximum outdoor airflow permitted by Table 9.32.3.4. must equal or exceed the “normal operating exhaust capacity” of the principal ventilation fan, as determined in accordance with Sentence 9.32.3.3.(2); otherwise there is an increased possibility that the mixed airflow over the furnace heat exchanger in cold weather will be colder than what the heat exchanger can tolerate. No values are listed in Table 9.32.3.4. when the maximum flow permitted exceeds the maximum capacity found in Table 9.32.3.3. since no higher outdoor airflow is required to match the flow of the principal ventilation fan.

Sentence 9.32.3.3.(9) is intended to avoid having the principal ventilation fan exhaust the outdoor air brought in through the outdoor air supply duct before it is circulated to the dwelling. The design of some advanced integrated mechanical systems is such that some portion of the outdoor air is exhausted before being circulated but this is taken into account in the design of the system and the total amount of outdoor air brought in is adjusted accordingly. This provision is not intended to preclude the use of such systems.

The duct bringing outdoor air to the furnace return air plenum must be equipped with a manual damper [see Sentence 9.32.3.4.(6)] that is adjusted [see Sentence 9.32.3.4.(10)] to balance the outdoor airflow with the flow through the principal ventilation fan. It is recommended, but not mandatory, that a motorized damper also be installed in this duct and that it be wired to be fully open when the principal ventilation fan is operating and fully closed when the principal ventilation fan is not operating. This damper will allow ventilation to occur only when the occupants have called for it by turning the “Ventilation Fan” switch to “on.” The absence of such a damper can lead to unwanted ventilation, which can result, in turn, in excessive dryness and increased heating costs in winter, and increased loading on air-conditioning equipment in the summer.

**A-9.32.3.5. Ventilation Systems Not Used in Conjunction with Forced Air Heating Systems.**

If there is no forced air heating system or if, for some reason, the heating system is not used to distribute the outdoor air, then a special air distribution system must be installed. Because such a system only handles ventilation air and not heating distribution air, smaller ducts can generally be used and the supply fan is quite a bit smaller than a normal furnace circulation fan. Sentences 9.32.3.5.(2) to (7) require that the supply fan operate at the same time and at the same rate as the principal ventilation fan in order to avoid either pressurizing or depressurizing the house. Pressurizing the house can lead to interstitial condensation within the building envelope. Depressurization can lead to the spillage of combustion products from heating equipment and increased entry of soil gas.

**Tempering of Outdoor Air**

The system described in Article 9.32.3.5. requires that the outdoor air be tempered before being circulated to the occupied areas of the house [see Sentence 9.32.3.5.(8)]. Tempering can be accomplished by passing the outdoor air over some type of heating element or by mixing it with indoor air. However, the latter approach is more complex, since it requires that the ratio between the outdoor air and indoor air ducts or openings be neither too large nor too small. It was judged to be too complex to include within the context of these prescriptive requirements. Therefore, where tempering by mixing with indoor air is chosen, the system must be designed in accordance with CAN/CSA-F326.

**Distribution of Outdoor Air**

Whereas a duct system associated with a forced air heating system would have ducts leading to almost all rooms, the requirements for these ventilation systems are more limited [see Sentences 9.32.3.5.(10) to (14)]. The most important point is that outdoor air must be provided to each bedroom; people often spend long periods of time in the bedroom with the door closed. It is also required that at least one duct lead to every storey, including the basement.

In houses where there is no storey without a bedroom (e.g. bungalows with no basement), a duct must lead to the principal living area. Where there is more than one area that could be considered as a "living area," at least one such area must be designated as the "principal living area."

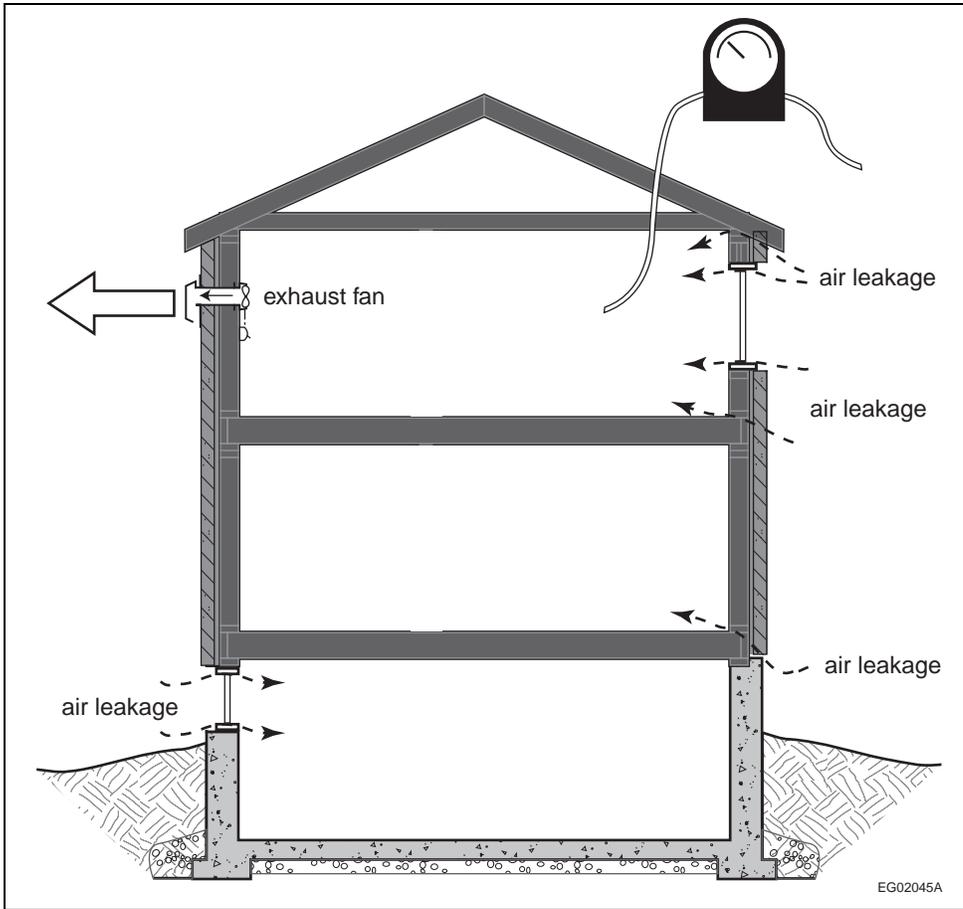
There is also the alternative of locating one of the exhaust air intakes for the principal ventilation fan in the principal living area, rather than supplying outdoor air directly to it; in this arrangement, the outdoor air will pass through the principal living area on its way to the exhaust fan. However, this arrangement will be less effective if only a small portion of the exhaust is withdrawn from the principal living area; thus, there is a limitation on the number of other exhaust air intakes for the principal ventilation fan [see Sentence 9.32.3.5.(11)].

**A-9.32.3.7. Supplemental Exhaust.** The CAN/CSA-F326-M standard requires a certain amount of exhaust from kitchens to capture pollutants at the source. When the principal ventilation fan air intake is not located in the kitchen, a separate kitchen exhaust fan must be installed [see Sentence 9.32.3.7.(1)]. However, when the principal ventilation fan is located in the kitchen but is connected to multiple inlets, there will not be enough exhaust from the kitchen. Therefore, a separate kitchen exhaust fan is required in this circumstance as well, unless the exhaust rate of the principal ventilation fan can be increased when additional kitchen ventilation is needed [see Sentence 9.32.3.7.(3)].

The bathroom is another possible location for an air intake of a principal ventilation fan. As with the kitchen, if this option is not chosen, a separate bathroom exhaust fan must be installed [see Sentence 9.32.3.7.(4)].

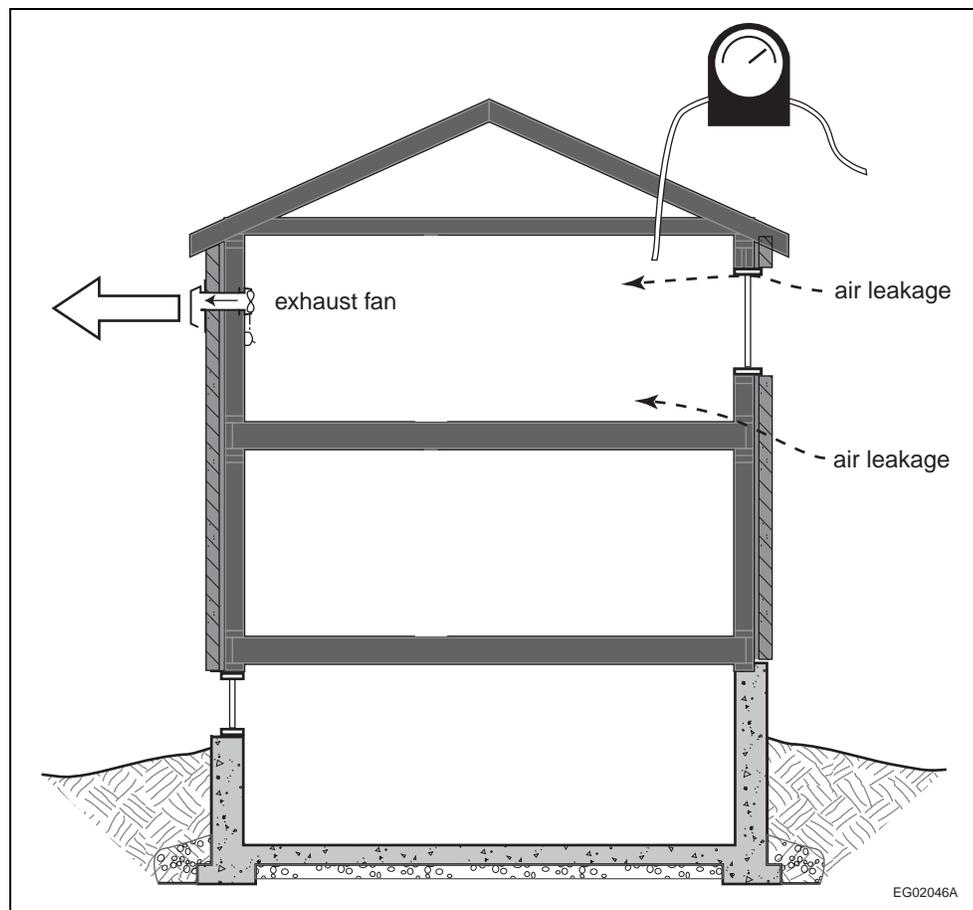
Supplemental exhaust fans, which in most instances are located in kitchens and bathrooms, are required to be coupled to supply fans of similar capacity. The make-up air is necessary so that operation of the supplementary exhaust fan(s) will not depressurize the house [see Sentence 9.32.3.8.(2)]. See also Appendix Note A-9.32.3.8.

**A-9.32.3.8. Protection against Depressurization.** When an exhaust device extracts air from a house and there are no provisions for the introduction of outdoor air, such as by means of an outdoor air duct as required by Articles 9.32.3.4. and 9.32.3.5., and no supply fans are operating simultaneously, the exhausted air will automatically be replaced by outside air that has infiltrated through the house's building envelope. The rate of inward leakage will automatically equal the rate of outward extraction: otherwise the house would eventually implode. The instant the exhaust device is turned on, the house pressure is lowered and the inside/outside pressure difference drives outside air in through any leaks it can find. See Figure A-9.32.3.8.-A.



**Figure A-9.32.3.8.-A**  
**Outdoor air drawn through a leaky envelope**

Even if the house is made more airtight, the inward leakage will equal the outward fan flow. However, because there are fewer and/or smaller leakage sites in an airtight house, it will take a larger inside/outside pressure difference to drive the same amount of air through the remaining leakage sites. See Figure A-9.32.3.8.-B.



**Figure A-9.32.3.8-B**  
**Outdoor air drawn through a tighter envelope**

It is possible that the exhaust device will no longer be able to achieve its rated flow when operating against a very high inside/outside pressure difference. However, in this case, the inward flow will also decrease and will still be in equilibrium with the outward flow, but now at a higher inside/outside pressure difference than in a leakier house.

An exhaust device not operated in conjunction with a supply fan will always depressurize a house to some extent—even a leaky house. But it will depressurize a tight house more than it will depressurize a leaky house. And, of course, an exhaust device with a higher capacity will depressurize a house more than a device with a smaller capacity.

### Spillage of Combustion Products

Depressurization of the house by the ventilation system or other exhaust devices can cause the spillage of combustion products from certain types of combustion appliances. The types of appliances that are susceptible to pressure-induced spillage can generally be identified by the fact that they are vented through a natural draft chimney rather than through an arrangement that uses a fan to draw the products of combustion out of the house. Naturally aspirated gas furnaces with draft hoods and oil furnaces with barometric dampers are examples of spillage-susceptible appliances.

On the other hand, some gas furnaces with induced draft venting systems and the “sealed combustion” oil furnaces commonly used in mobile homes, are more resistant to spillage. Terms used in gas appliance standards to describe categories of spillage-resistant appliances include “direct-vented” and “side-wall-vented.”

Almost all fireplaces are spillage-susceptible, even those with so called “airtight” glass doors and outside combustion air intakes, since most “airtight” doors are not really airtight. Certain types of gas combustion appliances, such as cooking appliances and “decorative appliances,” are not required to be vented. Their operation will not be significantly affected by depressurization of the house.

The Alberta Building Code addresses the potential for spillage from combustion appliances with requirements for:

- makeup air, and
- carbon monoxide alarms.

### Makeup Air Requirements

Depressurization caused by the principal ventilation system itself is not an issue in houses with balanced systems (that is, non-exhaust-only systems). However, the operation of other exhaust devices, such as stove-top barbecues, can cause depressurization. Therefore, in a house with spillage-susceptible appliances, any such exhaust devices, including the required supplemental exhaust fans, must be provided with makeup air [see Sentence 9.32.3.8.(2)].

In the past, the Alberta Building Code and other codes and standards have tended to rely on the passive supply of makeup air through makeup air openings. This is no longer considered to be a reliable approach in the context of a simple, prescriptively described system without sophisticated controls on depressurization. Therefore, the makeup air must be provided by a supply fan that is automatically activated whenever the exhaust device that requires the makeup air is activated [see Sentences 9.32.3.8.(2) and (3)].

The need for makeup air can be avoided by not using spillage-susceptible combustion equipment.

### Carbon Monoxide Alarm Requirements for Solid-Fuel-Burning Appliances

Even at a relatively low level of depressurization, certain open-type solid-fuel-burning appliances, such as fireplaces, or even closed-type solid-fuel-burning appliances whose stoking doors are left open, can spill products of combustion into the house when operating in their “die down” or smoldering stages. In the absence of more sophisticated design and installation controls to prevent such levels of depressurization (such as those mentioned in CAN/CSA-F326-M), the only available safeguard is to require the installation of a carbon monoxide (CO) alarm in any room incorporating a solid-fuel-burning device [see Sentence 9.32.3.8.(6)]. Where this is not acceptable, the prescriptively described alternatives must be abandoned and a system fully complying with CAN/CSA-F326-M must be designed.

One advantage of solid-fuel-burning devices is that their spillage is readily detected by a carbon monoxide alarm (which is not true of gas- or oil-burning devices). Therefore, where this is the only type of spillage-susceptible combustion device present, one has the choice of not providing makeup air for exhaust devices [see Sentence 9.32.3.8.(8)]: the carbon monoxide alarm required by Sentence 9.32.3.8.(6) will warn occupants when depressurization is causing spillage.

Battery-operated carbon monoxide alarms are permitted, but they must be mechanically fixed to a surface.

See also Appendix Note A-9.32.3.9.

**A-9.32.3.9. Carbon Monoxide Alarms.** Carbon monoxide (CO) is a colourless, odourless gas that can build up to lethal concentrations in an enclosed space without the occupants being aware of it. Thus, where an enclosed space incorporates or is near a potential source of CO, it is prudent to provide some means of detecting its presence.

Dwelling units have two common potential sources of CO:

- fuel-fired space- or water-heating equipment within the dwelling unit or in adjacent spaces within the building, and
- attached storage garages.

Most fuel-fired heating appliances do not normally produce CO and, even if they do, it is normally conveyed outside the building by the appliance’s venting system. Nevertheless, appliances can malfunction and venting systems can fail. Therefore, the provision of appropriately placed CO alarms in the dwelling unit is a relatively low-cost back-up safety measure.

Similarly, although Article 9.10.9.16. requires that the walls and floor/ceiling assemblies separating attached garages from dwelling units incorporate an air barrier system, there have been several instances of CO from garages being drawn into houses, which indicates that a fully gas-tight barrier is difficult to achieve. The likelihood of preventing the entry of all CO is decreased if the dwelling unit is depressurized in relation to the garage. This can readily occur due to the operation of exhaust equipment or simply due to the stack effect created by heating the dwelling unit. Again, CO alarms in the dwelling unit provide a relatively low-cost back-up safety measure.

See also Appendix Note A-9.32.3.8.

**A-9.32.3.10. Fans.** The principal ventilation fan is intended to be run for long periods. Even the supplemental exhaust fans may be used for significant periods. Therefore, all fans that are mounted such that their sound is likely to intrude on the household, other than kitchen exhaust fans, are required to have reasonably low sound ratings so that building occupants will not turn them off before the need for ventilation has been met.

**A-9.32.3.11. Ducts.** Table 9.32.3.11.A. is based on the data listed in Table 9, "Friction Chart for Round Ducts," Chapter 32, ASHRAE Handbook of Fundamentals 1997. The allowable duct lengths listed in the Table have been calculated assuming the "equivalent lengths" of ducts are four times their physical lengths. The static pressure offset to account for building pressures is 10 Pa. Using Table 9.32.3.11.A. will generally result in very conservatively sized (i.e. larger) ducts compared to what would be achieved using the normal duct design procedures referenced in Subsection 9.33.4.

**A-9.32.3.12. Heat Recovery Ventilators.** Enthalpy recovery ventilators (ERVs) are a type of heat recovery ventilator and must therefore comply with the requirements of Article 9.32.3.12.

**A-9.33.1.1.(2) Combustion Air and Tight Houses.** The operation of an air exhaust system or of a fuel-burning appliance removes the air from a house, creating a slight negative pressure inside. In certain cases the natural flow of air up a chimney can be reversed, leading to a possible danger of carbon monoxide poisoning for the inhabitants.

Newer houses are generally more tightly constructed than older ones because of improved construction practices, including tighter windows, weather stripping and caulking. This fact increases the probability that infiltration may not be able to supply enough air to compensate for simultaneous operation of exhaust fans, fireplaces, clothes dryers, furnaces and space heaters. It is necessary, therefore, to introduce outside air to the space containing the fuel-burning appliance. Information regarding combustion air requirements for various types of appliances can be found in the installation standards referenced in Sentences 6.2.1.4.(1) and 9.33.5.2.(1). In the case of solid-fuel-burning stoves, ranges and space heaters, CAN/CSA-B365 suggests that the minimum size of openings be determined by trial and error to accommodate the flue characteristics, the firing rate, the building characteristics, etc., and that, as a guide, the combustion air opening should be 0.5 times the flue collar area.

Further information is available in Canadian Building Digest 222, "Airtight Houses and Carbon Monoxide Poisoning," from the Institute for Research in Construction, National Research Council of Canada, Ottawa K1A 0R6.

**A-9.33.5.3. Design, Construction and Installation Standard for Solid-Fuel-Burning Appliances.** Standard CAN/CSA-B365 is essentially an installation standard, and covers such issues as accessibility, air for combustion and ventilation, chimney and venting, mounting and floor protection, wall and ceiling clearances, installation of ducts, pipes, thimbles and manifolds, and control and safety devices. But the standard also includes a requirement that solid-fuel-burning appliances and equipment satisfy the requirements of one of a series of standards, depending on the appliance or equipment, therefore also making it a design and construction standard. It is required that stoves, ranges, central furnaces and other space heaters be designed and built in conformity with the relevant referenced standard.

**A-9.33.6.14. Return Air System.** It is a common practice to introduce outdoor air to the house by means of an outdoor air duct connected to the return air plenum of a forced air furnace. This is an effective method and is a component of one method of satisfying the mechanical ventilation requirements of Subsection 9.32.3. However, some caution is required. If the proportion of cold outside to warm return air is too high, the resulting mixed air temperature could lead to excessive condensation in the furnace heat exchanger and possible premature failure of the heat exchanger. Standard CAN/CSA-F326-M, "Residential Mechanical Ventilation Systems," requires that this mixed air temperature not be below 15.5°C when the outdoor temperature is at the January 2.5% value. It is also important that the outdoor air and the return air mix thoroughly before reaching the heat exchanger. Appendix Note A-9.32.3. provides some guidance on this.

**A-9.33.10.2.(1) Factory-Built Chimneys.** Under the provisions of Article 1.2.1.1. of Division A, certain solid-fuel-burning appliances may be connected to factory-built chimneys other than those specified in Sentence 9.33.10.2.(1) if tests show that the use of such a chimney will provide an equivalent level of safety.

**A-9.34.2. Lighting Outlets.** The electrical regulations made pursuant to the Safety Codes Act contain requirements relating to lighting that are similar to those in the Alberta Building Code. The requirements in the electrical regulations, however, apply only to residential occupancies, whereas many of the requirements in the Alberta Building Code apply to all Part 9 buildings. Code users must therefore be careful to ensure that all applicable provisions of the Alberta Building Code are followed, irrespective of the limitations in the electrical regulations.

**A-9.37. Secondary Suites.** A secondary suite is only permitted where approved by the local authority, in accordance with municipal land use bylaws.

**A-9.37.2.13.(1) Gypsum Wallboard.** To minimize the passage of smoke, it is expected that all gypsum board joints are properly finished (i.e. taped and mudded). It is also expected that all service penetrations (i.e. pipes, cables and ducts) are tightly fitted or sealed with an appropriate gypsum board finishing compound.

**A-9.37.2.19.(1) Heating and Ventilation Systems.** The intent of Sentence 9.37.2.19.(1) is to ensure that each dwelling unit has an independent ductwork system where the building is heated and ventilated by a forced-air furnace. If the heating system does not include ductwork, i.e. hydronics, fancoils, electric baseboards, etc., it is anticipated that each dwelling unit will have its own control system for the heating system. It is not expected that homeowners will be required to install a second boiler and piping system in the case of a radiant floor heating system. It will be necessary, however, to ensure that each dwelling unit has its own independent ventilation system.

# Appendix B

## Fire Safety in High Buildings

**B-3.2.6. Smoke Control for High Buildings.** Experience with high buildings has shown that the time required for complete evacuation can exceed that which is considered necessary for the safe egress of all occupants. Studies of the “chimney effect” and observations of smoke movement in actual fires have shown that fire compartmentation to contain a fire on any one storey will not usually prevent the movement of smoke through elevator, stair and other vertical shafts to the upper floors of a high building. Occupants of a high building in which an automatic sprinkler system is not installed, and particularly those on upper storeys, could be faced with severe smoke conditions from fires occurring in storeys below them before their own evacuation is possible. The requirements of Subsection 3.2.6. are intended to maintain safe conditions for occupants of a high building who may have to remain in the building during a fire, and to assist the firefighters by providing efficient access to the fire floor. The material in this Appendix is intended to assist a designer in complying with the requirements of Subsection 3.2.6. The knowledge requirements are well within the capabilities of a competent designer. The designer should appreciate, however, that successful application requires a clear understanding of the principles that govern smoke movement. Subsection 3.2.6. contains only those items that relate to the design and construction of a building; operation of the facilities and recommended actions to be taken by the building owner, occupant and fire department are covered by the Alberta Fire Code.

The designer is cautioned that the tabular and graphical information in this Appendix has been developed for buildings having conventional configurations. The designer has to judge the extent to which the building under consideration has characteristics that will allow the application of this information; this is particularly true of designs employing air-handling systems for which a realistic assessment of the leakage characteristics of the enclosures of spaces may be critical.

It is assumed that buildings regulated by Subsection 3.2.6. will be in an area served by a fire department capable of an early response and that all firefighting and rescue situations will be under the direct control of the officer-in-charge of the fire department responding to the emergency. It is important that firefighters be provided with a smoke-free access to fire floors below grade. Provisions are included to separate exit stairways serving storeys above grade from those serving storeys below grade, and to limit entry of smoke into these shafts. Similarly, elevator hoistways and service shafts are required to be provided with a separation near grade, or be designed to limit their functioning as paths of smoke movement into upper floor areas from storeys below grade.

It is assumed that in the event of fire, occupants of the floor on which the fire occurs will leave by exit stairs immediately following the sounding of a fire alarm, and that occupants of the floor immediately above the floor on which the fire occurs will be advised to leave by the first fire department officer on the scene or other person assigned this responsibility. Occupants of all other floors may remain on their floors unless otherwise directed. It is also assumed that the owner of the building has complied with the Emergency Planning Section of the Alberta Fire Code by preparing a comprehensive fire safety plan to safeguard the building occupants and that the building supervisory staff are familiar with the requirements of Subsection 3.2.6. and with their responsibilities under the fire safety plan.

The Alberta Building Code requires that a check be made of the smoke control and mechanical venting systems. Testing will indicate deficiencies caused by inexact estimates of the leakage characteristics or of air supply requirements and, in all but the most extreme cases, will provide an opportunity for appropriate adjustments before the system is put into service.

**B-3.2.6.2.(2) Stairway Protection Below Lowest Exit Level.** A stairway serving floors below the lowest exit level is considered to comply with the intent of Sentence 3.2.6.2.(2) if the following conditions are satisfied.

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This Appendix is included for explanatory purposes only and does not form part of the requirements. The numbers that introduce each Appendix Note correspond to the applicable requirements in this Division.

- 1) The stairway has a vent or door to the outdoors at or near the top of the stairshaft that has an openable area of not less than 0.1 m<sup>2</sup> for each storey served by the stairway, less 0.01 m<sup>2</sup> for each weatherstripped door and 0.02 m<sup>2</sup> for each door that is not weatherstripped opening into the stairway.
- 2) The stairway is enclosed in a shaft that
  - a) does not pass through the floor above the lowest exit level and is separate from a shaft that contains a stairway serving upper storeys, or
  - b) contains a stairway serving upper storeys, but is separated from that stairway at the lowest exit level by a fire separation having a fire-resistance rating not less than that required for the shaft enclosure.
- 3) The stairway is provided with equipment capable of maintaining a flow of air introduced at or near the bottom of the stair shaft, at a rate equal to 0.47 m<sup>3</sup>/s for each storey served by the stairway.

**B-3.2.6.2.(3) Pressurization of Stair Shafts.** The purpose of providing open doors and vents at the bottom of a stair shaft is to create a positive pressure in the shaft relative to adjacent floor areas and thus keep it free of smoke. The pressure depends on the temperature differential between the interior and the exterior of the building which is most pronounced during winter months when stack effect is greatest. If a shaft does not have a direct opening to the exterior, alternative means must be provided to achieve smoke control. If a corridor or vestibule is used as a link between the exit level of an interior stair shaft and the outdoors to provide a venting system, it will be necessary to assess the reliability of the overall system. The probability of all doors or closures being opened at the same time has to be addressed, as well as the size of the vestibule and its impact on the overall smoke control system.

If mechanical methods are used to develop a positive pressure in a stair shaft, a minimum pressure differential of 12 Pa is recommended to prevent smoke migration from floor areas in a sprinklered building where fire temperatures are controlled and smoke movement may be dominated by stack effect in a stair shaft. During a fire emergency, persons will be entering and exiting a stair shaft as they move to a place of safety and under these conditions the number of doors open to the stair shaft cannot be predetermined. The number will vary depending on the occupancy of the building, population density and the evacuation plan for the building. It should be assumed that two doors are open. This is based in part as a practical level for most buildings and considers the positive fire experience in sprinklered buildings.

The maximum pressure differential created by a mechanical system should not prevent doors to the stair shafts from being opened. A specific maximum value cannot be given, as this value will depend on the door opening force and size of the door. These values should be calculated for each specific case. Although a maximum value of 130 N is suggested by research as the force that can be opened by the majority of people in most occupancies, this value is above the maximum value of 90 N generally specified in this Code. The use of values below 130 N can create a practical problem in achieving effective smoke control as it is difficult to design for the acceptable minimum and maximum pressure differential range. Special consideration may need to be given for doors located in a barrier-free path of travel.

Care should be taken by designers and by building and fire officials in implementation of these requirements. Assumptions involved in the design of a smoke control system may be different from final construction conditions. For this reason each system should be tested after installation to ensure that the design intent is met. The minimum pressure differential is not intended to apply to locations in stair shafts when doors in their proximity are open to adjacent floor areas.

**B-3.2.6.2.(4) Limiting Smoke Movement.** Measures to prevent the migration of smoke from floor areas below the lowest exit storey into upper storeys include the following.

- 1) An elevator hoistway that passes through the floor above the lowest exit storey should not penetrate the floor of the storey immediately below the lowest exit storey, unless there is a vestibule between the shaft and each floor area below the lowest exit storey that
  - a) has a fire separation, with a fire-resistance rating not less than 45 min, between the vestibule and any public corridor,
  - b) has a fire separation, with a fire-resistance rating not less than that required for an exit by Article 3.4.4.1., between the vestibule and any stair or elevator enclosure or any part of a floor area, other than a public corridor, and
  - c) except for elevator hoistway entrances, has a self-closing device on any door through the fire separation required by Clauses (a) and (b), with the door opening in the direction of travel from the floor area to the exit stairway.

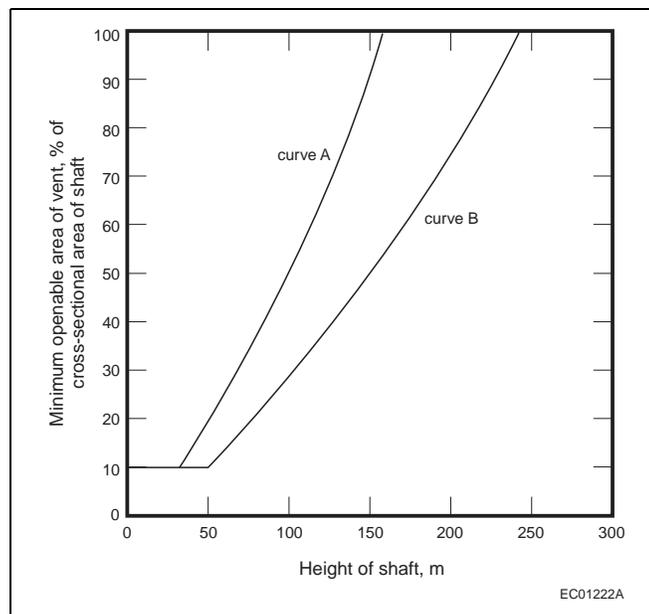


Figure B-3.2.6.2.(4)-A

Vent to a vertical service space with no other pressurized shaft in the building

Notes to Figure B-3.2.6.2.(4)-A:

- (1) Curve A applies to a vertical service space that is enclosed by unplastered unit masonry or by plaster and steel stud construction with all openings in the shaft sealed to the degree required by Articles 3.1.9.1. to 3.1.9.4.
- (2) Curve B applies to a vertical service space that is enclosed by monolithic concrete or by plastered unit masonry with all openings in the shaft sealed tightly to minimize air leakage.
- (3) A shaft having a vent that is 100% of the cross-sectional area of the shaft is acceptable for buildings up to 1.5 times the height shown by the appropriate curve in Figures B-3.2.6.2.(4)-A and B-3.2.6.2.(4)-B
- (4) The total leakage area, based on measurements in typical high buildings, is assumed to be 0.025 m<sup>2</sup> for every 10 m<sup>2</sup> of shaft wall area in the case of Curve A and 0.015 m<sup>2</sup> for every 10 m<sup>2</sup> of shaft wall area in the case of Curve B.

**2)** A vertical service space, other than an elevator hoistway, that passes through the floor assembly above the lowest exit storey, should be provided with a tight-fitting noncombustible seal or fire stop at the floor assembly of the storey immediately below the lowest exit storey, unless

- a) the vertical service space is vented to the outdoors at the top and the vent has an openable area that is not less than
  - i) that obtained from Figure B-3.2.6.2.(4)-A if the vertical service space is in a building in which other shafts are not mechanically pressurized, or
  - ii) that obtained from Figure B-3.2.6.2.(4)-B if the vertical service space is in a building in which other shafts are mechanically pressurized,
- b) for a shaft that serves floor areas above the lowest exit storey, a vent is located
  - i) at or near the top of the shaft if the shaft is above the mid-height of the building, or
  - ii) at or near the foot of the shaft at or near the exit level if the top of the shaft is below the mid-height of the building, or
- c) for a shaft that serves floor areas below the lowest exit storey, a vent is located at or near the top of the shaft.

**3)** Any closure provided for a vent opening referred to in Sentence (2) must be openable:

- a) manually,
- b) on a signal from a smoke detector located at or near the top of the shaft, and
- c) by a control device located at the central alarm and control facility.

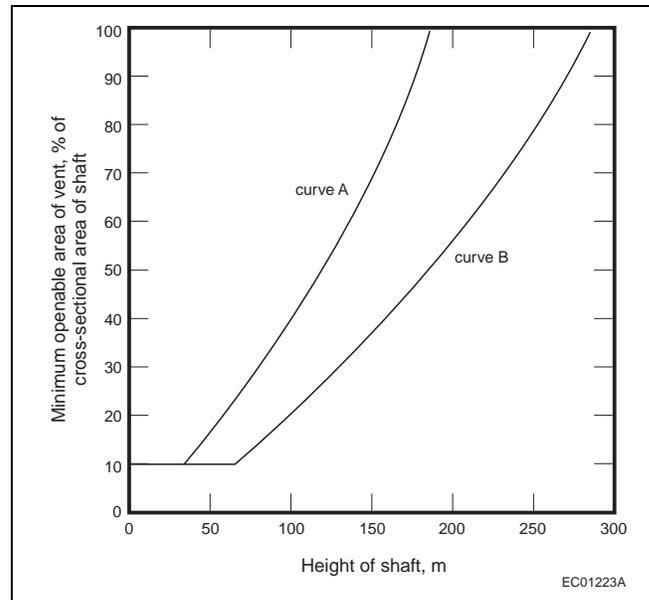


Figure B-3.2.6.2.(4)-B

**Vent to a vertical service space with other pressurized shafts in the building****Notes to Figure B-3.2.6.2.(4)-B:**

- (1) Curve A applies to a vertical service space that is enclosed by unplastered unit masonry or by plaster and steel stud construction with all openings in the shaft sealed to the degree required by Articles 3.1.9.1. to 3.1.9.4.
- (2) Curve B applies to a vertical service space that is enclosed by monolithic concrete or by plastered unit masonry with all openings in the shaft sealed tightly to minimize air leakage.
- (3) A shaft having a vent that is 100% of the cross-sectional area of the shaft is acceptable for buildings up to 1.5 times the height shown by the appropriate curve in Figures B-3.2.6.2.(4)-A and B-3.2.6.2.(4)-B
- (4) The total leakage area, based on measurements in typical high buildings, is assumed to be 0.025 m<sup>2</sup> for every 10 m<sup>2</sup> of shaft wall area in the case of Curve A and 0.015 m<sup>2</sup> for every 10 m<sup>2</sup> of shaft wall area in the case of Curve B.

**B-3.2.6.3.(1) Connected Buildings.** The measures described here are intended to prevent movement of smoke from one building to another. They are of particular significance for two buildings of unequal height that are joined together. The techniques suggested are the provision of a large opening to the outdoors in a connecting vestibule so that smoke entering through leakage areas around doors will be vented to the outdoors, or pressurization to maintain a higher pressure in the vestibule than in adjacent spaces, as illustrated in Figures B-3.2.6.3.(1)-A, B-3.2.6.3.(1)-B and B-3.2.6.3.(1)-C

The provisions for protection of openings are described in terms appropriate to a doorway. Openings other than doorways should be avoided if possible. Openings should be protected by an airlock that gives the same standard of protection as the vestibule referred to below.

The requirement of Article 3.2.6.3. that limits movement of smoke from one building to another may be met by incorporating in the link between the buildings the provisions of Sentences (1) and (2).

**1)** A firewall conforming to Subsection 3.1.10. is constructed between one building and the other with any opening in the firewall protected against the passage of smoke by a vestibule that has

- a) a fire separation between the vestibule and a public corridor with a fire-resistance rating not less than 45 min,
- b) a fire separation between the vestibule and the remainder of the floor area, other than a public corridor, with a fire-resistance rating not less than that required by Article 3.4.4.1. for an exit,
- c) a fire separation between the vestibule and a stair enclosure or elevator hoistway with a fire-resistance rating not less than that required by Article 3.4.4.1. for an exit, and
- d) any door in the fire separation required by Clauses (a), (b) or (c), except for an elevator entrance, provided with a self-closing device as required by Article 3.1.8.11. and opening in the direction of travel from the floor area to the exit stairway.

**2)** The vestibule referred to in Sentence (1) should have

- a) a vent to the outdoors that has a net area of  $10(0.023 d + 0.00045 a)$  m<sup>2</sup>, where 'd' is the number of doors having a perimeter not more than 6 m that open into the vestibule, or if the perimeter of doors exceeds 6 m, the value 'd' is increased in direct proportion to the increase in the perimeter, and 'a' is

- the area in square metres of enclosing walls, floors and ceilings whose outer face is in contact with the outside air, except that where the outer face of a wall is in contact with the ground or fill, it is assumed that there is no leakage through that portion, and the value of 'a' is assumed to be zero, or
- b) equipment capable of maintaining a supply of air into the vestibule sufficient to ensure that the air pressure in the vestibule when the doors are closed is higher by at least 12 Pa than that in adjacent floor areas when the outdoor temperature is equal to the January design temperature on a 2.5% basis.

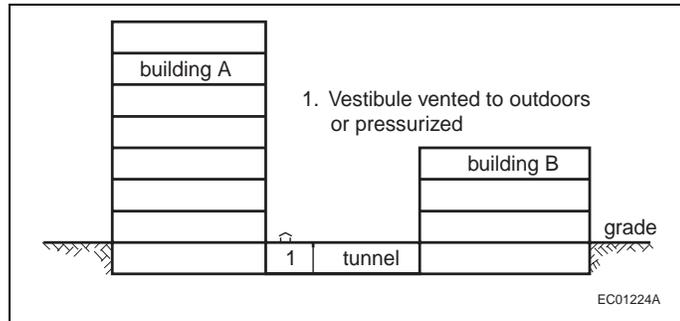


Figure B-3.2.6.3.(1)-A  
Buildings connected by a tunnel

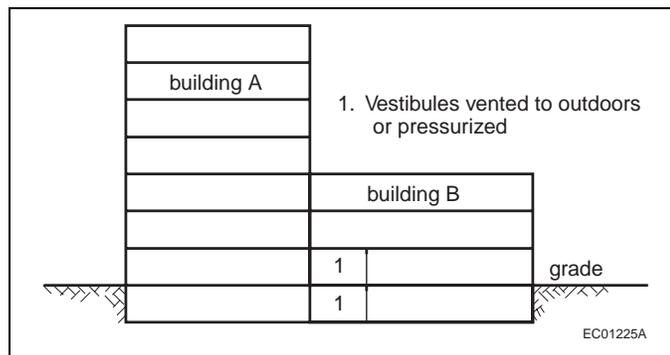


Figure B-3.2.6.3.(1)-B  
Buildings connected at a firewall

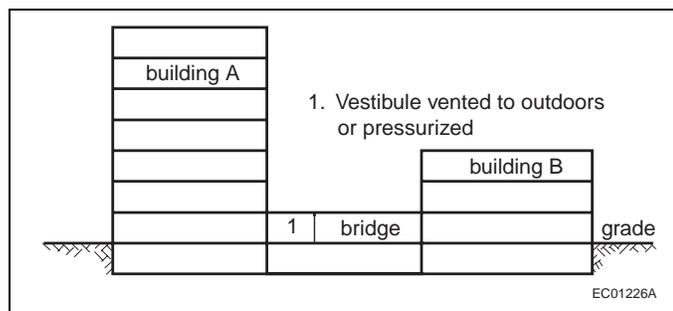


Figure B-3.2.6.3.(1)-C  
Buildings connected by a bridge

**B-3.2.6.5.(6)(b) Electrical Cable Protection.** Electrical cables that provide continuous operation for 1 h when subjected to the fire exposure of the time/temperature curve of CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," do not need additional protection against exposure to fire.

**B-3.2.6.6.(1) Venting to Aid Firefighting.** The requirements of Sentence 3.2.6.6.(1) are met by incorporating in a floor area windows or wall panels, as described in Sentence (1), by smoke shafts as described in Sentences (2) to (8), or by the use of building exhaust systems as described in Sentence (9).

- 1) If windows or wall panels are used for venting, they must

- a) be uniformly distributed along the exterior wall of each storey,
  - b) have a total area not less than 1% of the exterior wall area of each storey,
  - c) be readily openable from the interior without the use of wrenches or keys,
  - d) be readily identified from the interior, and from the exterior where they are accessible to firefighters, and
  - e) be designed so that when opened they will not endanger persons outside the building during a fire.
- 2)** If one or more smoke shafts or vertical service spaces are used for venting, they must
- a) have an opening or openings into each storey with an aggregate area not less than that obtained from Table B-3.2.6.6.A. for the height of the building and the area of the largest floor area served by the smoke shaft, and the leakage characteristics of the shaft wall and closures obtained from Table B-3.2.6.6.B., and Table B-3.2.6.6.C.,
  - b) have an aggregate unobstructed cross-sectional area equal to that required by Clause (a), and
  - c) be designed to comply with the requirements of Sentence (3).
- 3)** Each smoke shaft or vertical service space described in Sentence (2) must
- a) be separated from the remainder of the building by a fire separation that has a fire-resistance rating not less than that required for the floor assembly through which it passes, or be designed as a chimney conforming to Part 6, except that flue liners need not be provided,
  - b) have an opening to the outdoors at the top that has an area not less than the cross-sectional area of the shaft, with the opening protected from the weather,
  - c) terminate not less than 900 mm above the roof surface where it penetrates the roof, and
  - d) contain no combustible material, fuel lines or services that are required for use in an emergency.
- 4)** Each opening required by Clause (2)(a) must be located so that the top of the opening is not more than 250 mm below the ceiling, except that the opening may be above the ceiling if the ceiling freely allows passage of air.
- 5)** The opening into the smoke shaft must be provided with a closure that
- a) has a fire-protection rating conforming to Sentence 3.1.8.4.(2), except that the temperature on the unexposed face of the closure shall be not more than 250 °C after 30 min during the fire test used to determine its rating,
  - b) is no closer to combustible material, except for paint or tightly-adhering paper covering not more than 1 mm thick applied to a noncombustible backing, than the distances described in Table B-3.2.6.6.D.,
  - c) can be opened from a remote location such as a stair shaft, the storey immediately below, or the central alarm and control facility, and
  - d) does not open automatically on any floor, other than the fire floor, when smoke and hot gases pass through the shaft.
- 6)** Closures for openings described in Clause (3)(b) must
- a) be openable from outside the shaft, and
  - b) open automatically
    - i) on a signal from a smoke detector in the shaft,
    - ii) by operation of the fire alarm system, and
    - iii) when the closure required by Sentence (5) opens.
- 7)** A smoke shaft opening referred to in Sentence (2) that is less than 1070 mm above the floor must conform to Article 3.3.1.18.
- 8)** If a closure is required to comply with Sentence (5), the leakage area between closure components and between closure and frame must not be more than 3% of the openable area of the closure.
- 9)** The building air handling system may be used for smoke venting, provided
- a) the system can maintain an exhaust to the outdoors at the rate of 6 air changes per hour from any floor area, and
  - b) emergency power to the fans providing the exhaust required by Clause (a) is provided as described in Article 3.2.7.9.

**Table B-3.2.6.6.A.**  
**Minimum Size of Vent Openings into Smoke Shafts from Each Floor Area, m<sup>2</sup>(1)(2)**

Floor Area, m <sup>2</sup>	Leakage Area, % <sup>(3)</sup>	Building Height, m								
		18	37	73	110	146	183	220	256	293
200	0	0.10	0.11	0.13	0.15	0.16	0.18	0.19	0.20	0.22
500		0.22	0.25	0.29	0.32	0.36	0.37	0.39	0.41	0.43
1000		0.43	0.48	0.53	0.59	0.63	0.67	0.71	0.75	0.77
2000		0.83	0.91	1.01	1.08	1.16	1.22	1.29	1.34	1.39
3000		1.21	1.33	1.46	1.55	1.67	1.75	1.82	1.90	1.97
4000		1.62	1.75	1.90	2.02	2.15	2.25	2.35	2.44	2.53
5000		2.01	2.17	2.34	2.46	2.63	2.74	2.86	2.88	3.07
6000		2.39	2.57	2.76	2.91	3.10	3.23	3.37	3.47	3.58
200	1	0.10	0.12	0.15	0.19	0.22	0.27	0.35	0.43	0.55
500		0.23	0.27	0.35	0.40	0.49	0.57	0.69	0.83	1.04
1000		0.44	0.50	0.71	0.72	0.86	1.01	1.19	1.43	1.73
2000		0.85	0.97	1.15	1.33	1.56	1.81	2.10	2.48	2.95
3000		1.26	1.42	1.67	1.91	2.23	2.56	2.97	3.47	4.08
4000		1.66	1.88	2.18	2.49	2.37	3.28	3.79	4.40	5.16
5000		2.07	2.32	2.69	3.05	3.51	3.99	4.60	5.32	6.21
6000		2.47	2.76	3.18	3.59	4.14	4.68	5.37	6.20	7.23
200	2	0.10	0.13	0.18	0.24	0.37	0.61	1.28	4.60	89.57
500		0.24	0.29	0.39	0.52	0.75	1.13	2.10	6.11	94.50
1000		0.46	0.55	0.72	0.94	1.30	1.90	3.27	8.29	102.11
2000		0.88	1.05	1.34	1.73	2.32	3.28	5.36	12.14	116.80
3000		1.31	1.53	1.95	2.47	3.29	4.58	7.28	15.63	130.83
4000		1.73	2.01	2.55	3.20	4.23	5.83	9.12	19.97	144.03
5000		2.15	2.49	3.13	3.92	5.15	7.05	10.90	22.15	157.05
6000		2.57	2.96	3.73	4.63	6.07	8.26	12.65	25.39	169.29
200	3	0.11	0.14	0.21	0.37	0.88	2.06			
500		0.25	0.31	0.47	0.76	1.58	9.00			
1000		0.47	0.59	0.86	1.33	2.60	11.99			
2000		0.91	1.12	1.60	2.41	4.47	17.46			
3000		1.35	1.64	2.31	3.43	5.21	22.48			
4000		1.79	2.17	3.02	4.43	7.91	27.29			
5000		2.22	2.68	3.71	5.42	9.55	31.95			
6000		2.65	3.20	4.40	6.39	11.18	36.47			
200	4	0.11	0.15	0.28	0.70	24.83				
500		0.25	0.34	0.58	1.33	29.18				
1000		0.49	0.63	1.06	2.27	36.07				
2000		0.95	1.21	1.97	3.99	48.56				
3000		1.41	1.78	2.84	6.63	60.15				
4000		1.86	2.34	3.70	7.22	71.15				
5000		2.21	2.90	4.55	8.79	81.81				
6000		2.75	3.46	5.40	10.33	90.05				

**Table B-3.2.6.6.A. (Continued)**

Floor Area, m <sup>2</sup>	Leakage Area, % <sup>(3)</sup>	Building Height, m								
		18	37	73	110	146	183	220	256	293
200	5	0.11	0.16	0.36	3.33					
500		0.28	0.36	0.76	5.09					
1000		0.50	0.69	1.37	7.67					
2000		0.99	1.31	2.54	12.35					
3000		1.46	1.94	3.65	16.75					
4000		1.92	2.55	4.75	20.99					
5000		2.40	3.16	5.84	25.11					
6000		2.87	3.74	6.92	29.11					

**Notes to Table B-3.2.6.6.A.:**

- (1) The minimum size of a vent opening into a smoke shaft is obtained from Table B-3.2.6.6.A. and is dependant on the floor area and total leakage area of the smoke shaft walls and closures. This total leakage area may be estimated by adding the leakage areas for the shaft wall obtained from Table B-3.2.6.6.B. and for the dampered openings obtained from Table B-3.2.6.6.C., provided the cross-sectional area of the smoke shaft, the opening into the shaft and the opening to the outdoors at the top of the shaft are equal.
- (2) The size of the vent opening refers to the free or unobstructed area of the opening.
- (3) Leakage area is the total of the leakage area of smoke shaft wall obtained from Table B-3.2.6.6.B. and the leakage area of openings in smoke shafts obtained from Table B-3.2.6.6.C.

**Table B-3.2.6.6.B.  
Leakage Area of Smoke Shaft Wall**

Wall Construction	Leakage Area as % of Wall Area
Monolithic concrete	0.5
Masonry wall unplastered	1.5
Masonry wall plastered	0.5
Gypsum board on steel studs	1.0

**Table B-3.2.6.6.C.  
Leakage Area of Closures in Openings into Smoke Shaft**

Type of Closure	Leakage Area as % of Closure Area <sup>(1)(2)</sup>
Curtain fire damper	2.5
Single-blade fire damper	3.5
Multi-blade fire damper	4.5

**Notes to Table B-3.2.6.6.C.:**

- (1) Values include allowance for 0.5% leakage between frame and wall construction.
- (2) These leakage data are based on clearances applicable to closures that have been tested in accordance with CAN/ULC-S112-M, "Fire Test of Fire-Damper Assemblies."

**Table B-3.2.6.6.D.**  
**Minimum Distance from Closure to Combustible Material**

Area of Closure <sup>(1)</sup> , m <sup>2</sup>	Minimum Distance in Front of or Above Closure, m	Minimum Distance to the Sides or Below Closure, m
0.5	0.35	0.20
1.0	0.50	0.25
1.5	0.60	0.30
2.0	0.70	0.35
2.5 <sup>(2)</sup>	0.80	0.40

**Notes to Table B-3.2.6.6.D.:**

(1) For closure areas between those given in Table B-3.2.6.6.D., interpolation may be used to determine the appropriate distances.

(2) For closure areas greater than 2.5 m<sup>2</sup>, the minimum distance in front of or above the closure shall be one half of the square root of the closure area, and the minimum distance to the sides or below the closure shall be one quarter of the square root of the closure area.

**B-3.2.6.7.(1) Protection of Central Control Room.** The design of a room provided for a central alarm and control facility should take into account the nature and sensitivity of the electronic components of the equipment and the room should be adequately protected from fire and smoke. The room should be ventilated with a supply of fresh air so that it has a clean environment and should be provided with adequate lighting.

**B-3.2.6.7.(2) Central Control Room Air Control.** Depending on the method of mechanical venting and air control that is selected for the building, additional controls may be required at the central alarm and control facility. These additional controls include those with a capability of opening closures to vents in shafts, stopping air-handling systems, and initiating mechanical air supply to stair shafts.

**B-3.2.6.10.(1) Testing for Smoke Control.** The efficiency of a smoke control system may be checked by measuring pressure differences and the directions of airflow around doors and through separating walls of compartments. A pressure meter can be used to measure pressure differences on either side of a door or partition. Where this is impracticable, a punk stick held near a crack will indicate the direction of airflow. Measurements of airflow may be taken on the intake side of supply fans or in supply ducts to determine whether the specified airflow is being provided. In general, airflow should be from the spaces which may be occupied for various lengths of time during a fire emergency (e.g., vestibules, stair shafts, and elevator hoistways) toward the space in which the fire is assumed to have occurred. Measurements may be taken at certain critical locations to check the overall efficiency of the smoke control system.

In buildings where protection is obtained by venting corridors or vestibules to the outdoors, inspection of the building to determine whether the requirements have been met should be sufficient. Where service shafts are vented to the outdoors at the top, a check may be made of the wall between the shaft and the uppermost occupied floor areas, to ensure that the direction of flow is from each floor area into the shaft, when the vent to the outside is open and the outdoor air temperature is significantly less than that indoors. Where mechanically pressurized vestibules are used, a check may be made to ensure that the pressure in each vestibule or area of refuge is greater than that in the adjacent floor areas at each floor level.

Doors to stair shafts, elevator hoistways and vestibules in locations subject to pressure differences that may interfere with normal opening should be checked when the outdoor temperature is near the January design temperature, with the air injection system operating and a number of windows open to the outdoors on each floor in turn.



# Appendix C

## Climatic and Seismic Information for Building Design in Alberta

### Introduction

The diversity of climate in Alberta has a considerable effect on the performance of buildings; consequently, building design must reflect this diversity. This Appendix briefly describes how climatic design values are computed and provides recommended design data for a number of cities, towns, and smaller populated locations. Through the use of such data, appropriate allowances can be made for climate variations in different localities of Alberta and the Alberta Building Code can be applied provincially.

The climatic design data provided in this Appendix are based on weather observations collected by the Atmospheric Environment Service, Environment Canada. The climatic design data have been researched and analyzed for the Safety Codes Council by Environment Canada, and appear at the end of this Appendix in Table C-2, Design Data for Selected Locations in Alberta.

As it is not practical to list values for all municipalities in Alberta, recommended climatic design values for locations not listed can be obtained by contacting the Atmospheric Environment Service, Environment Canada, 4905 Dufferin Street, Downsview, Ontario M3H 5T4, (416) 739-4365.

The information on seismic hazard in spectral format has been provided by the Geological Survey of Canada of Natural Resources Canada. Information for municipalities not listed may be obtained through the Natural Resources Canada Web site at [www.EarthquakesCanada.ca](http://www.EarthquakesCanada.ca), or by writing to the Geological Survey of Canada at 7 Observatory Crescent, Ottawa, Ontario K1A 0Y3, or at P.O. Box 6000, Sidney, B.C. V8L 4B2.

### General

The choice of climatic elements tabulated in this Appendix and the form in which they are expressed have been dictated largely by the requirements for specific values in several sections of the Alberta Building Code 2006. These elements include the Ground Snow Loads, Wind Pressures, Design Temperatures, Heating Degree-Days, One-Day and 15-Minute Rainfalls, the Annual Total Precipitation values and Seismic Data. The following notes briefly explain the significance of these particular elements in building design, and indicate which weather observations were used and how they were analyzed to yield the required design values.

In Table C-2, Design Data for Selected Locations in Alberta (referred to in this Appendix as the Table), design weather recommendations and elevations are listed for 148 locations, which have been chosen based on a variety of reasons. Many incorporated cities and towns with significant populations are included unless located close to larger cities. For sparsely populated areas, many smaller towns and villages are listed. Other locations have been added to the list when the demand for climatic design recommendations at these sites has been significant. The named locations refer to the specific latitude and longitude defined by the Gazetteer of Canada (Natural Resources Canada), available from Publishing and Depository Services Canada, Public Works and Government Services Canada, Ottawa, Ontario K1A 0S5. The elevations are given in metres and refer to heights above sea level.

Almost all of the weather observations used in preparing the Table were, of necessity, observed at inhabited locations. To estimate design values for arbitrary locations, the observed or computed values for the weather stations were mapped and interpolated appropriately. Where possible, adjustments have been applied for the influence of elevation and known topographical effects. Such influences include the tendency of cold air to collect in depressions, for precipitation to increase with elevation, and for generally stronger winds near large bodies of water. Elevations have been added to the Table because of their potential to significantly influence climatic design values.

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This Appendix is included for explanatory purposes only and does not form part of the requirements.

Since interpolation from the values in the Table to other locations may not be valid due to local and other effects, Environment Canada will provide climatic design element recommendations for locations not listed in the Table. Local effects are particularly significant in mountainous areas, where the values apply only to populated valleys and not to the mountain slopes and high passes, where very different conditions are known to exist.

### **Changing and Variable Climates**

Climate is not static. At any location, weather and climatic conditions vary from season to season, year to year, and over longer time periods (climate cycles). This has always been the case. When estimating climatic design loads, this variability can be considered using appropriate statistical analysis, data records spanning sufficient periods, and meteorological judgement. The analysis generally assumes that the past climate will be representative of the future climate.

Past and ongoing modifications to atmospheric chemistry (from greenhouse gas emissions and land use changes) are expected to alter most climatic regimes in the future. As a result, it can no longer be safely assumed that the climate of the past few decades will be a sufficient guide to the climate of the next few decades. While average climatic conditions may be changing, the frequency and magnitude of extreme climatic events may also be changing in unknown ways. Although consensus is emerging on the long-term trends for some climatic elements, there is no agreement as yet on the changes expected in climatic variability.

### **January Design Temperatures**

A building and its heating system should be designed to maintain the inside temperature at some pre-determined level. To achieve this, it is necessary to know the most severe weather conditions under which the system will be expected to function satisfactorily. Failure to maintain the inside temperature at the pre-determined level will not usually be serious if the temperature drop is not great and if the duration is not long. The outside conditions should, therefore, not be the most severe in many years, but should be the somewhat less severe conditions that are occasionally but not greatly exceeded.

The January design temperatures are based on an analysis of January air temperatures only. Wind and solar radiation also affect the inside temperature of most buildings and may need to be considered for energy-efficient design.

The January design temperature is defined as the lowest temperature at or below which only a certain small percentage of the hourly outside air temperatures in January occur. In the past, a total of 158 stations with records from all or part of the period 1951-66 formed the basis for calculation of the 2.5 and 1% January temperatures. Where necessary, the data were adjusted for consistency. Since most of the temperatures were observed at airports, design values for the core areas of large cities could be 1 or 2°C milder, although the values for the fringe areas are probably about the same as for the airports. No adjustments were made for this urban heat island effect. The design values for the next 20 to 30 years probably will differ from these tabulated values due to year-to-year climate variability and global climate change resulting from human modifications to atmospheric chemistry.

A review of the design temperatures was undertaken for the 1997 issue of this Appendix using hourly temperature observations from 265 stations for the length of record up to 1993. Where needed, hourly temperatures were supplemented with correlated record minimum temperatures from 1449 long-term stations. The results from the recent analysis indicated reasonable consistency with the previous recommendations. Consequently, the January design temperatures remain unchanged from previous issues of the Supplement to the National Building Code of Canada.

The 2.5% January design temperature is the value ordinarily used in the design of heating systems. In special cases, when the control of inside temperature is more critical, the 1% value may be used. Other temperature-dependent climatic design parameters may be considered for future issues of this document.

### **July Design Temperatures**

A building and its cooling and dehumidifying system should be designed to maintain the inside temperature and humidity at certain pre-determined levels. To achieve this, it is necessary to know the most severe weather conditions under which the system is expected to function satisfactorily. Failure to maintain the inside temperature and humidity at the pre-determined levels will usually not be serious if the increases in temperature and humidity are not great and the duration is not long. The outside conditions used for design should, therefore, not be the most severe in many years, but should be the somewhat less severe conditions that are occasionally but not greatly exceeded.

The summer design temperatures in this Appendix are based on an analysis of July air temperatures and humidities. Wind and solar radiation also affect the inside temperature of most buildings and may, in some cases, be more important than the outside air temperature. More complete summer and winter design information can be obtained from Environment Canada.

In the past, two datasets formed the basis for calculation of the July 2.5% dry-bulb temperatures. The first dataset was based on temperature frequency distributions for 33 stations and an empirical relationship between design temperatures and the mean annual maximum temperature. The second dataset consisted of hourly data summaries for 109 stations based on records from 1957 to 1966. Results from the two datasets were averaged and adjusted for consistency. The July 2.5% wet-bulb temperatures were obtained in a similar way, using the two datasets, but without the use of an empirical relationship for the first dataset.

A review of the July design temperatures was undertaken for the 1997 issue of this Appendix. Design dry-bulb temperatures were analyzed using hourly temperature observations from 264 stations for the length of record up to 1993. Where needed, hourly dry-bulb temperatures were supplemented with correlated record maximum temperatures from 1450 long-term stations. The July 2.5% coincident wet-bulb temperatures were obtained by averaging wet-bulb temperatures for all hours when the dry-bulb temperature was within 0.2°C of the July design dry-bulb temperature. A comparison of the results indicated reasonable consistency for design dry-bulb temperatures but some differences for design wet-bulb temperatures that will be investigated for future issues. The July design temperatures remain unchanged for this issue.

### Heating Degree-Days

The rate of consumption of fuel or energy required to keep the interior of a small building at 21°C when the outside air temperature is below 18°C is roughly proportional to the difference between 18°C and the outside temperature. Wind speed, solar radiation, the extent to which the building is exposed to these elements and the internal heat sources also affect the heat required and may have to be considered for energy-efficient design. For average conditions of wind, radiation, exposure, and internal sources, however, the proportionality with the temperature difference generally still holds.

Since the fuel required is also proportional to the duration of the cold weather, a convenient method of combining these elements of temperature and time is to add the differences between 18°C and the mean temperature for every day in the year when the mean temperature is below 18°C. It is assumed that no heat is required when the mean outside air temperature for the day is 18°C or higher.

Although more sophisticated computer simulations using other forms of weather data have now almost completely replaced degree-day-based calculation methods for estimating annual heating energy consumption, degree-days remain a useful indicator of relative severity of climate and can form the basis for certain climate-related code requirements.

The degree-days below 18°C have been computed day by day for 1030 stations for the length of record available from the period 1961 to 1990. The average annual degree-day values were then interpolated from analyzed maps. When observations with 20 years or more of record were available, recommendations for those locations were weighted towards the observed value.

A difference of only one Celsius degree in the mean annual temperature will cause a difference of 250 to 350 in the Celsius degree-days. Since differences of 0.5 of a Celsius degree in the mean annual temperature are quite likely to occur between two stations in the same town, heating degree-days cannot be relied on to an accuracy of less than about 100 degree-days.

Heating degree-day values for the core areas of larger cities can be 200 to 400 degree-days less (warmer) than for the surrounding fringe areas. The observed degree-days, which are based on daily temperature observations, are often most representative of rural settings or the fringe areas of cities.

### Snow Loads

The roof of a building should be able to support the greatest weight of snow that is likely to accumulate on it in many years. Some observations of snow on roofs have been made in Canada, but not enough to form the basis for estimating roof snow loads throughout the country. Similarly, observations of the weight, or water equivalent, of the snow on the ground have not been available in digital form in the past. The observations of roof loads and water equivalents are very useful, as noted below, but the measured depth of snow on the ground is used to provide the basic information for a consistent set of snow loads.

The estimation of the design snow load on a roof from snow depth observations involves the following steps:

1. The depth of snow on the ground, which has an annual probability of exceedance of 1-in-50, is computed.

2. The appropriate unit weight is selected and used to convert snow depth to loads,  $S_s$ .
3. The load,  $S_r$ , which is due to rain falling on the snow, is computed.
4. Because the accumulation of snow on roofs is often different from that on the ground, adjustments are applied to the ground snow load to provide a design snow load on a roof.

The annual maximum depth of snow on the ground has been assembled for 1618 stations for which data has been recorded by the Atmospheric Environment Service (AES). The period of record used varied from station to station, ranging from 7 to 38 years. These data were analyzed using a Gumbel extreme value distribution fitted using the method of moments<sup>(1)</sup> as reported by Newark et al.<sup>(2)</sup> The resulting values are the snow depths, which have a probability of 1-in-50 of being exceeded in any one year.

The unit weight of old snow generally ranges from 2 to 5 kN/m<sup>3</sup>, and it is usually assumed in Canada that 1 kN/m<sup>3</sup> is the average for new snow. Average unit weights of the seasonal snow pack have been derived for different regions across the country<sup>(3)</sup> and an appropriate value has been assigned to each weather station. Typically, the values average 2.01 kN/m<sup>3</sup> east of the continental divide (except for 2.94 kN/m<sup>3</sup> north of the treeline), and range from 2.55 to 4.21 kN/m<sup>3</sup> west of the divide. The product of the 1-in-50 snow depth and the average unit weight of the seasonal snow pack at a station is converted to the snow load (SL) in units of kilopascals (kPa).

Except for the mountainous areas of western Canada, the values of the ground snow load at AES stations were normalized assuming a linear variation of the load above sea level in order to account for the effects of topography. They were then smoothed using an uncertainty-weighted moving-area average in order to minimize the uncertainty due to snow depth sampling errors and site-specific variations. Interpolation from analyzed maps of the smooth normalized values yielded a value for each location in the Table, which could then be converted to the listed code values ( $S_s$ ) by means of an equation in the form:

$$S_s = \text{smooth normalized SL} + bZ$$

where  $b$  is the assumed rate of change of SL with elevation at the location and  $Z$  is the location's elevation above mean sea level (MSL). Although they are listed in the Table of Design Data to the nearest tenth of a kilopascal, values of  $S_s$  typically have an uncertainty of about 20%. Areas of sparse data in northern Canada were an exception to this procedure. In these regions, an analysis was made of the basic SL values. The effects of topography, variations due to local climates, and smoothing were all subjectively assessed. The values derived in this fashion were used to modify those derived objectively.

For the mountainous areas of British Columbia, Yukon, and the foothills area of Alberta, a more complex procedure was required to account for the variation of loads with terrain and elevation. Since the AES observational network often does not have sufficient coverage to detail this variability in mountainous areas, additional snow course observations were obtained from the provincial and territorial governments of British Columbia, Yukon, and Alberta. The additional data allowed detailed local analysis of ground snow loads on a valley-by-valley basis. Similar to other studies, the data indicated that snow loads above a critical or reference level increased according to either a linear or quadratic relation with elevation. The determination of whether the increase with elevation was linear or quadratic, the rate of the increase and the critical or reference elevation were found to be specific to the valley and mountain ranges considered. At valley levels below the critical elevation, the loads generally varied less significantly with elevation. Calculated valley- and range-specific regression relations were then used to describe the increase of load with elevation and to normalize the AES snow observations to a critical or reference level. These normalized values were smoothed using a weighted moving-average.

Tabulated values cannot be expected to indicate all the local differences in  $S_s$ . For this reason, especially in complex terrain areas, values should not be interpolated from the Table for unlisted locations. The values of  $S_s$  in the Table apply for the elevation and the latitude and longitude of the location, as defined by the Gazetteer of Canada. Values at other locations can be obtained from Environment Canada.

The heaviest loads frequently occur when the snow is wetted by rain, thus the rain load,  $S_r$ , was estimated to the nearest 0.1 kPa and is provided in the Table. When values of  $S_r$  are added to  $S_s$ , this provides a 1-in-50-year estimate of the combined ground snow and rain load. The values of  $S_r$  are based on an analysis of about 2100 weather station values of the 1-in-50-year one-day maximum rain amount. This return period is appropriate because the rain amounts correspond approximately to the joint frequency of occurrence of the one-day rain on maximum snow packs. For the purpose of estimating rain on snow, the individual observed one-day rain amounts were constrained to be less than or equal to the snow pack water equivalent, which was estimated by a snow pack accumulation model reported by Bruce and Clark.<sup>(4)</sup>

The results from surveys of snow loads on roofs indicate that average roof loads are generally less than loads on the ground. The conditions under which the design snow load on the roof may be taken as a percentage of the ground snow load are given in Subsection 4.1.6. of the Code. The Code also permits further decreases in design snow loads for steeply sloping roofs, but requires substantial increases for roofs where snow accumulation may be more rapid due to such factors as drifting. Recommended adjustments are given in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

### Annual Total Precipitation

Total precipitation is the sum in millimetres of the measured depth of rainwater and the estimated or measured water equivalent of the snow (typically estimated as 0.1 of the measured depth of snow, since the average density of fresh snow is about 0.1 that of water).

The average annual total precipitation amounts in the Table have been interpolated from an analysis of precipitation observations from 1379 stations for the 30-year period from 1961 to 1990.

### Annual Rainfall

The total amount of rain that normally falls in one year is frequently used as a general indication of the wetness of a climate, and is therefore included in this Appendix. See also Moisture Index below.

### Rainfall Intensity

Roof drainage systems are designed to carry off rainwater from the most intense rainfall that is likely to occur. A certain amount of time is required for the rainwater to flow across and down the roof before it enters the gutter or drainage system. This results in the smoothing out of the most rapid changes in rainfall intensity. The drainage system, therefore, need only cope with the flow of rainwater produced by the average rainfall intensity over a period of a few minutes, which can be called the concentration time.

In Alberta, it has been customary to use the 15-minute rainfall that will probably be exceeded on an average of once in 10 years. The concentration time for small roofs is much less than 15 minutes and hence the design intensity will be exceeded more frequently than once in 10 years. The safety factors in the National Plumbing Code of Canada 2005 will probably reduce the frequency to a reasonable value and, in addition, the occasional failure of a roof drainage system will not be particularly serious in most cases.

The rainfall intensity values tabulated in previous editions of this information were based on measurements of the annual maximum 15-minute rainfalls at 139 stations with 7 or more years of record. They were the 15-minute rainfalls that would be exceeded once in 10 years on average, or the values that had 1 chance in 10 of being exceeded in any one year. The values were analyzed using a Gumbel extreme value distribution.<sup>(1)</sup>

It is very difficult to estimate the pattern of rainfall intensity in mountainous areas, where precipitation is extremely variable and rainfall intensity can be much greater than in other types of areas. Many of the observations for these areas were taken at locations in valley bottoms or in extensive, fairly level areas.

### One-Day Rainfall

If for any reason a roof drainage system becomes ineffective, the accumulation of rainwater may be great enough in some cases to cause a significant increase in the load on the roof. In previous editions of this information, it had been common practice to use the maximum one-day rainfall ever observed for estimating the additional load. Since the length of record for weather stations in Alberta is quite variable, the maximum one-day rainfall amounts in previous editions often reflected the variable length of record at nearby stations as much as the climatology. As a result, the maximum values often differed greatly within relatively small areas where little difference should be expected. The current values have been standardized to represent the one-day rainfall amounts that have 1 chance in 50 of being exceeded in any one year or the 1-in-50-year return value one-day rainfalls.

The one-day rainfall values in the Table were based on measurements of the annual maximum one-day rainfalls for 2051 stations with 10 years or more of record. These 1-in-50-year values were obtained using a Gumbel extreme value distribution fitted using the method of moments.<sup>(1)</sup>

Rainfall frequency observations can vary considerably over time and space. This is especially true for mountainous areas, where elevation effects can be significant. In other areas, small scale intense storms or local influences can produce significant spatial variability in the data. As a result, the analysis incorporates some spatial smoothing.

**Moisture Index (MI)**

Moisture index (MI) values were developed through the work of a consortium that included representatives from industry and researchers from the Institute for Research in Construction at NRC.<sup>10</sup> The MI is an indicator of the moisture load imposed on a building by the climate and is used in Part 9 to define the minimum levels of protection from precipitation to be provided by cladding assemblies on exterior walls.

It must be noted, in using MI values to determine the appropriate levels of protection from precipitation, that weather conditions can vary markedly within a relatively small geographical area. Although the values provided in the Table give a good indication of the average conditions within a particular region, some caution must be exercised when applying them to a locality that is outside the region where the weather station is located.

MI is calculated from a wetting index (WI) and a drying index (DI).

**Wetting Index (WI)**

To define, quantitatively, the rainwater load on a wall, wind speed and wind direction have to be taken into consideration in addition to rainfall, along with factors that can affect exposure, such as nearby buildings, vegetation and topography. Quantitative determination of load, including wind speed and wind direction, can be done. However, due to limited weather data, it is not currently possible to provide this information for most of the locations identified in the Table.

This lack of information, however, has been shown to be non-critical for the purpose of classifying locations in terms of severity of rain load. The results of the research indicated that simple annual rainfall is as good an indicator as any for describing rainwater load. That is to say, for Canadian locations, and especially once drying is accounted for, the additional sensitivity provided by hourly directional rainfall values does not have a significant effect on the order in which locations appear when listed from wet to dry.

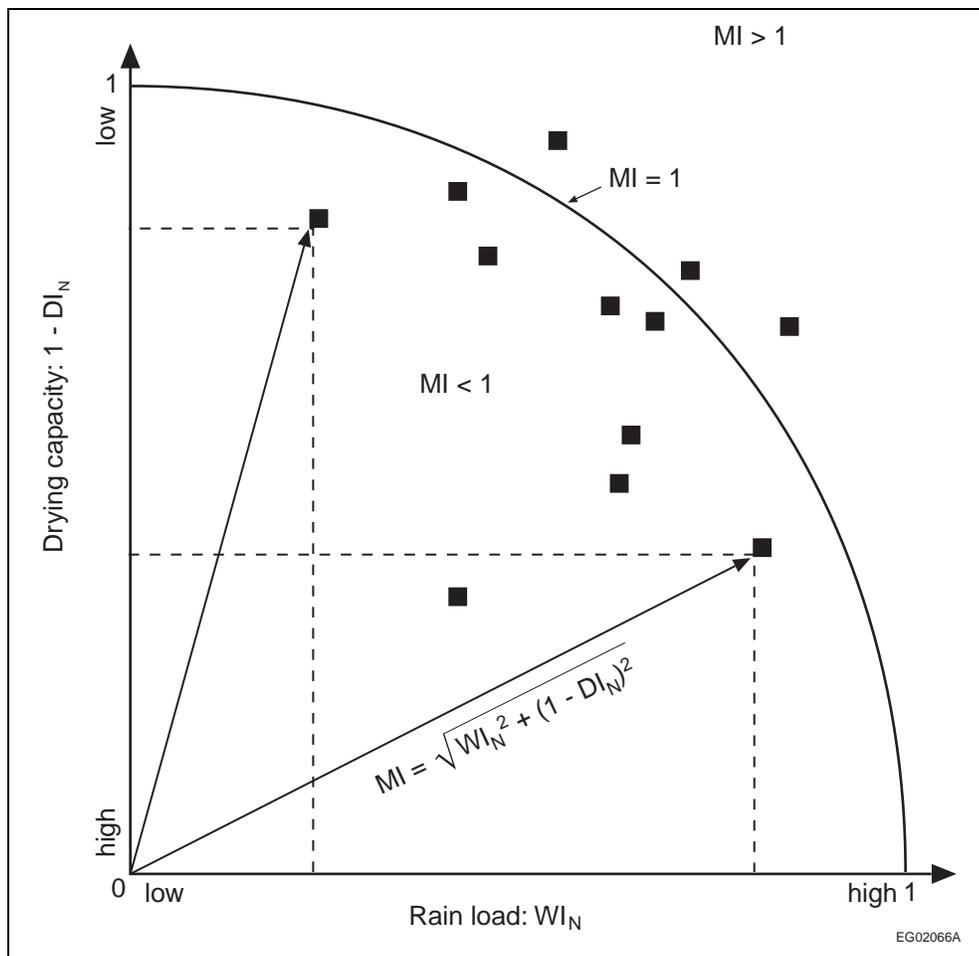
Consequently, the wetting index (WI) is based on annual rainfall and is normalized based on 1000 mm.

**Drying Index (DI)**

Temperature and relative humidity together define the drying capacity of ambient air. Based on simple psychrometrics, values were derived for the locations listed in the Table using annual average drying capacity normalized based on the drying capacity at Lytton, B.C. The resultant values are referred to as drying indices (DI).

**Determination of Moisture Index (MI)**

The relationship between WI and DI to correctly define moisture loading on a wall is not known. The MI values provided in the Table are based on the root mean square values of WI and 1-DI, with those values equally weighted. This is illustrated in Figure C-1. The resultant MI values are sufficiently consistent with industry's understanding of climate severity with respect to moisture loading as to allow limits to be identified for the purpose of specifying where additional protection from precipitation is required.



**Figure C-1**  
**Derivation of moisture index (MI) based on normalized values for wetting index (WI) and drying index (DI)**

**Note to Figure C-1:**

(1) MI equals the hypotenuse of the triangle defined by  $WI_N$  and  $1 - DI_N$

**Driving Rain Wind Pressure (DRWP)**

The presence of rainwater on the face of a building, with or without wind, must be addressed in the design and construction of the building envelope so as to minimize the entry of water into the assembly. Wind pressure on the windward faces of a building will promote the flow of water through any open joints or cracks in the facade.

Driving rain wind pressure (DRWP) is the wind load that is coincident with rain, measured or calculated at a height of 10 m. The values provided in the Table represent the loads for which there is 1 chance in 5 of being reached or exceeded in any one year, or a probability of 20% within any one year. Approximate adjustments for height can be made using the values for  $C_e$  given in Sentence 4.1.7.1.(5) as a multiplier.

Because of inaccuracies in developing the DRWP values related to the averaging of extreme wind pressures, the actual heights of recording anemometers, and the use of estimated rather than measured rainfall values, the values are considered to be higher than actual loads<sup>(9)</sup> Thus the actual probability of reaching or exceeding the DRWP in a particular location is less than 20% per year and these values can be considered to be conservative.

DRWP can be used to determine the height to which wind will drive rainwater up enclosed vertical conduits. This provides a conservative estimate of the height needed for fins in window extrusions and end dams on flashings to control water ingress. This height can be calculated as:

$$\text{height of water, mm} = \text{DRWP}/10, \text{ Pa}$$

Note that the pressure difference across the building envelope may be augmented by internal pressures induced in the building interior by the wind. These additional pressures can be estimated using the information provided in the Commentary entitled Wind Load and Effects of the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

**Wind Effects**

All structures need to be designed to ensure that the main structural system and all secondary components, such as cladding and appurtenances, will withstand the pressures and suctions caused by the strongest wind likely to blow at that location in many years. Some flexible structures, such as tall buildings, slender towers and bridges, also need to be designed to minimize excessive wind-induced oscillations or vibrations.

At any time, the wind acting upon a structure can be treated as a mean or time-averaged component and as a gust or unsteady component. For a small structure, which is completely enveloped by wind gusts, it is only the peak gust velocity that needs to be considered. For a large structure, the wind gusts are not well correlated over its different parts and the effects of individual gusts become less significant. The User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B) evaluates the mean pressure acting on a structure, provide appropriate adjustments for building height and exposure and for the influence of the surrounding terrain and topography (including wind speed-up for hills), and then incorporate the effects of wind gusts by means of the gust factor, which varies according to the type of structure and the size of the area over which the pressure acts.

The wind speeds and corresponding velocity pressures used in the Code are regionally representative or reference values. The reference wind speeds are nominally one-hour averages of wind speeds representative of the 10 m height in flat open terrain corresponding to Exposure A or open terrain in the terminology of the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B). The reference wind speeds and wind velocity pressures are based on long-term wind records observed at a large number of weather stations across Canada.

In the past, reference wind velocity pressures in the Code have been calculated from hourly averaged wind speed observations measuring the number of miles of wind passing a wind anemometer cup in one hour. The pressures derived from these measurements were representative of true hourly wind pressures. When wind pressures were last calculated in the early 1960s, the hourly averaged wind speeds were the records most commonly available for statistical analysis. Since that time, the majority of the principal observation stations, including the major airports, have converted their observation programs to aviation-type wind speed measurements or spot readings of wind speed.<sup>(5)</sup> These one-minute averaged wind speeds (later converted to two-minute averages) were observed just before the hour. True one-hour averaged wind speed records from over 100 stations for periods from 10 to 22 years formed the basis for most of the wind pressures provided in the Table. The wind velocity pressures, *q*, were calculated in Pascals using the following equation:

$$q = \frac{1}{2}\rho V^2$$

where  $\rho$  is an average air density for the windy months of the year and *V* is wind speed in metres per second. While air density depends on both air temperature and atmospheric pressure, the density of dry air at 0°C and standard atmospheric pressure of 1.2929 kg/m<sup>3</sup> was used as an average value for the wind pressure calculations. As explained by Boyd<sup>(6)</sup>, this value is within 10% of the monthly average air densities for most of Canada in the windy part of the year.

Hourly wind speeds that have 1 chance in 10 and 50\* of being exceeded in any one year were analyzed using the Gumbel extreme value distribution fitted using the method of moments with correction for sample size. Values of the 1-in-30-year wind speeds for locations in the Table were estimated from a mapping analysis of wind speeds. The 1-in-10- and 1-in-50-year speeds were then computed from the 1-in-30-year speeds using a map of the dispersion parameter that occurs in the Gumbel analysis.<sup>(1)</sup>

Table C-1 has been arranged to give pressures to the nearest one-hundredth of a kPa and their corresponding wind speeds. The value of "q" in kPa is assumed to be equal to 0.00064645 V<sup>2</sup>, where V is given in m/s.

\* Wind speeds that have a one-in-"n"-year chance of being exceeded in any year can be computed from the one-in-10 and one-in-50 return values in the Table using the following equation:

$$V_{1/n} = \frac{1}{1.4565} \left\{ V_{1/50} + 0.4565 V_{1/10} + \frac{V_{1/50} - V_{1/10}}{1.1339} \times \ln \frac{-0.0339}{\ln(1 - 1/n)} \right\}$$

**Table C-1  
Wind Speeds**

q kPa	V m/s	q kPa	V m/s	q kPa	V m/s	q kPa	V m/s
0.15	15.2	0.53	28.6	0.91	37.5	1.29	44.7
0.16	15.7	0.54	28.9	0.92	37.7	1.30	44.8
0.17	16.2	0.55	29.2	0.93	37.9	1.31	45.0
0.18	16.7	0.56	29.4	0.94	38.1	1.32	45.2
0.19	17.1	0.57	29.7	0.95	38.3	1.33	45.4
0.20	17.6	0.58	30.0	0.96	38.5	1.34	45.5
0.21	18.0	0.59	30.2	0.97	38.7	1.35	45.7
0.22	18.4	0.60	30.5	0.98	38.9	1.36	45.9
0.23	18.9	0.61	30.7	0.99	39.1	1.37	46.0
0.24	19.3	0.62	31.0	1.00	39.3	1.38	46.2
0.25	19.7	0.63	31.2	1.01	39.5	1.39	46.4
0.26	20.1	0.64	31.5	1.02	39.7	1.40	46.5
0.27	20.4	0.65	31.7	1.03	39.9	1.41	46.7
0.28	20.8	0.66	32.0	1.04	40.1	1.42	46.9
0.29	21.2	0.67	32.2	1.05	40.3	1.43	47.0
0.30	21.5	0.68	32.4	1.06	40.5	1.44	47.2
0.31	21.9	0.69	32.7	1.07	40.7	1.45	47.4
0.32	22.2	0.70	32.9	1.08	40.9	1.46	47.5
0.33	22.6	0.71	33.1	1.09	41.1	1.47	47.7
0.34	22.9	0.72	33.4	1.10	41.3	1.48	47.8
0.35	23.3	0.73	33.6	1.11	41.4	1.49	48.0
0.36	23.6	0.74	33.8	1.12	41.6	1.50	48.2
0.37	23.9	0.75	34.1	1.13	41.8	1.51	48.3
0.38	24.2	0.76	34.3	1.14	42.0	1.52	48.5
0.39	24.6	0.77	34.5	1.15	42.2	1.53	48.6
0.40	24.9	0.78	34.7	1.16	42.4	1.54	48.8
0.41	25.2	0.79	35.0	1.17	42.5	1.55	49.0
0.42	25.5	0.80	35.2	1.18	42.7	1.56	49.1
0.43	25.8	0.81	35.4	1.19	42.9	1.57	49.3
0.44	26.1	0.82	35.6	1.20	43.1	1.58	49.4
0.45	26.4	0.83	35.8	1.21	43.3	1.59	49.6
0.46	26.7	0.84	36.0	1.22	43.4	1.60	49.7
0.47	27.0	0.85	36.3	1.23	43.6	1.61	49.9
0.48	27.2	0.86	36.5	1.24	43.8	1.62	50.1
0.49	27.5	0.87	36.7	1.25	44.0	1.63	50.2
0.50	27.8	0.88	36.9	1.26	44.1	1.64	50.4
0.51	28.1	0.89	37.1	1.27	44.3	1.65	50.5
0.52	28.4	0.90	37.3	1.28	44.5	1.66	50.7

**Seismic Hazard**

The parameters used to represent seismic hazard for specific geographical locations are the 5%-damped horizontal spectral acceleration values for 0.2, 0.5, 1.0, and 2.0 second periods and the horizontal Peak Ground Acceleration value that have a 2% probability of being exceeded in 50 years. The four spectral parameters are deemed sufficient to define spectra closely matching the shape of the Uniform Hazard Spectra (UHS). Hazard values are 50th percentile (median) values based on a statistical analysis of the earthquakes that have been experienced in Canada and adjacent regions.<sup>(7)(8)</sup> The median was chosen over the mean because the mean is affected by the amount of epistemic uncertainty incorporated into the analysis. It is the view of the Geological Survey of Canada and the members of the Canadian National Committee on Earthquake Engineering that the estimation of the epistemic uncertainty is still too incomplete to adopt into the Code.

Further details regarding the representation of seismic hazard can be found in the Commentary on Design for Seismic Effects in the User's Guide – NBC 2005, Structural Commentaries (Part 4 of Division B).

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Table C-2  
Design Data for Selected Locations in Alberta

Site Name	Elev., m	Design Temperature				Degree- Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driv- ing Rain Wind Pres- sures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data <sup>(1)</sup>				
		January		July 2.5%									S <sub>s</sub>	S <sub>t</sub>	1/10	1/50	S <sub>a</sub> (0.2)	S <sub>a</sub> (0.5)	S <sub>a</sub> (1.0)	S <sub>a</sub> (2.0)	PGA
		2.5% °C	1% °C	Dry °C	Wet °C																
Acadia Valley	716	-33	-36	31	20	5500	18	75	240	0.31	310	220	1.5	0.1	0.39	0.52	0.12	0.06	0.02	0.01	0.06
Airdrie	1098	-32	-34	28	18	5200	17	95	325	0.38	440	210	1.2	0.1	0.38	0.51	0.14	0.08	0.04	0.02	0.09
Athabasca	515	-35	-38	28	19	6000	18	86	370	0.58	480	80	1.5	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06
Banff	1400	-30	-32	27	17	5500	18	65	300	0.58	500	120	3.6	0.1	0.39	0.48	0.24	0.14	0.07	0.04	0.12
Barrhead	645	-34	-37	28	19	6000	20	86	375	0.58	475	100	1.7	0.1	0.32	0.44	0.12	0.06	0.02	0.01	0.06
Bashaw	793	-36	-39	27	19	5600	21	85	340	0.53	460	180	2.0	0.1	0.29	0.39	0.12	0.06	0.02	0.01	0.06
Bassano	792	-32	-34	28	18	5350	17	85	265	0.27	340	220	1.3	0.1	0.39	0.52	0.12	0.06	0.02	0.01	0.06
Beaumont	735	-37	-40	27	19	5700	20	90	380	0.52	475	160	1.9	0.1	0.31	0.42	0.12	0.06	0.02	0.01	0.06
Beaver Lodge	730	-35	-38	28	18	5900	25	92	315	0.49	470	100	2.4	0.1	0.27	0.36	0.13	0.08	0.04	0.02	0.07
Benwyn	643	-40	-42	27	18	6350	14	80	310	0.51	395	100	2.3	0.1	0.24	0.33	0.12	0.06	0.02	0.01	0.06
Black Diamond	1159	-32	-34	28	18	5300	16	90	340	0.46	495	180	1.4	0.1	0.50	0.66	0.15	0.09	0.04	0.03	0.09
Blackfalds	880	-34	-38	28	19	5700	19	95	375	0.55	475	190	2.1	0.1	0.30	0.41	0.12	0.06	0.02	0.01	0.06
Bon Accord	625	-37	-40	27	19	5750	19	85	360	0.49	485	140	1.8	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Bonnyville	564	-36	-39	28	20	6100	21	75	320	0.53	430	120	1.9	0.1	0.32	0.42	0.12	0.06	0.02	0.01	0.06
Bow Island	799	-32	-36	32	20	4800	17	80	230	0.24	340	210	1.4	0.1	0.51	0.67	0.12	0.06	0.02	0.01	0.06
Bowden	991	-34	-38	28	19	5700	17	95	350	0.50	480	180	1.8	0.1	0.31	0.43	0.13	0.07	0.03	0.02	0.07
Brooks	760	-32	-34	32	19	5200	18	86	260	0.26	340	220	1.2	0.1	0.39	0.52	0.12	0.06	0.02	0.01	0.06
Bruderheim	637	-37	-40	27	19	5800	19	95	345	0.50	480	130	1.8	0.1	0.31	0.42	0.12	0.06	0.02	0.01	0.06
Calgary	1045	-31	-33	29	17	5200	23	103	325	0.37	425	220	1.1	0.1	0.40	0.50	0.15	0.08	0.04	0.02	0.09
Calmar	730	-35	-38	27	19	5600	20	95	380	0.52	490	150	1.9	0.1	0.32	0.45	0.12	0.06	0.02	0.01	0.06
Campsie	660	-34	-37	28	19	6000	20	86	375	0.58	475	100	1.7	0.1	0.32	0.44	0.12	0.06	0.02	0.01	0.06
Camrose	740	-33	-35	29	19	5700	20	92	355	0.54	470	160	2.0	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06
Canmore	1375	-31	-32	27	17	5500	18	65	325	0.57	500	120	3.5	0.1	0.37	0.50	0.24	0.14	0.07	0.04	0.12
Cardston	1130	-30	-33	29	18	4750	20	108	340	0.38	550	140	1.5	0.1	0.74	1.02	0.18	0.11	0.05	0.03	0.09
Carstairs	1060	-33	-36	28	18	5600	17	105	380	0.49	475	190	1.7	0.1	0.33	0.43	0.15	0.08	0.04	0.02	0.08

Table C-2 (Continued)

Site Name	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driv- ing Wind Pres- sures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data <sup>(1)</sup>				
		January		July 2.5%									S <sub>s</sub>	S <sub>t</sub>	1/10	1/50	S <sub>a</sub> (0.2)	S <sub>a</sub> (0.5)	S <sub>a</sub> (1.0)	S <sub>a</sub> (2.0)	PGA
		25% °C	1% °C	Dry °C	Wet °C																
Castor	816	-33	-36	29	20	5600	21	85	305	405	200	2.1	0.1	0.26	0.34	0.12	0.06	0.02	0.01	0.06	
Claresholm	1030	-31	-34	29	18	4800	15	103	310	440	200	1.3	0.1	0.66	0.87	0.15	0.09	0.05	0.03	0.09	
Coaldale	863	-31	-35	31	19	4700	17	85	250	390	200	1.3	0.1	0.61	0.81	0.14	0.08	0.04	0.02	0.08	
Cochrane	1159	-32	-34	28	18	5400	17	75	350	500	180	1.4	0.1	0.39	0.50	0.15	0.09	0.04	0.02	0.09	
Cold Lake	540	-36	-38	28	20	6100	15	81	320	430	140	1.7	0.1	0.31	0.40	0.12	0.06	0.02	0.01	0.06	
Coleman	1320	-31	-34	28	18	5300	15	76	400	550	120	2.7	0.3	0.54	0.76	0.24	0.13	0.07	0.04	0.12	
Coronation	790	-31	-33	30	19	5800	20	92	300	400	200	2.2	0.1	0.23	0.37	0.12	0.06	0.02	0.01	0.06	
Cowley	1175	-31	-34	29	18	5100	15	81	310	525	140	1.6	0.1	0.73	1.00	0.20	0.12	0.06	0.03	0.10	
Crossfield	1113	-32	-34	28	18	5500	17	105	370	485	200	1.5	0.1	0.34	0.45	0.14	0.08	0.04	0.02	0.08	
Daysland	708	-36	-39	28	19	5700	21	85	340	455	150	1.9	0.1	0.24	0.35	0.12	0.06	0.02	0.01	0.06	
Devon	709	-37	-40	27	19	5600	20	90	390	490	150	1.9	0.1	0.32	0.45	0.12	0.06	0.02	0.01	0.06	
Didsbury	1037	-33	-36	28	18	5600	17	100	370	480	190	1.5	0.1	0.29	0.42	0.15	0.08	0.04	0.02	0.08	
Drayton Valley	869	-35	-37	27	19	5700	20	85	420	525	120	2.0	0.1	0.32	0.43	0.12	0.06	0.03	0.02	0.06	
Drumheller	685	-31	-33	29	18	5300	20	86	300	375	220	1.2	0.1	0.32	0.44	0.12	0.06	0.02	0.01	0.06	
Eckville	930	-34	-37	27	19	5700	17	105	400	540	160	2.0	0.1	0.32	0.43	0.12	0.06	0.03	0.02	0.07	
Edmonton	645	-32	-34	28	19	5400	23	97	360	460	160	1.7	0.1	0.32	0.45	0.12	0.06	0.02	0.01	0.06	
Edson	920	-34	-37	28	18	5900	18	81	450	570	100	2.1	0.1	0.36	0.46	0.15	0.08	0.04	0.02	0.08	
Elk Point	598	-38	-40	28	20	6200	21	75	330	440	100	1.9	0.1	0.25	0.33	0.12	0.06	0.02	0.01	0.06	
Embaras Portage	220	-41	-44	27	19	7100	10	86	250	390	80	1.9	0.1	0.31	0.41	0.12	0.06	0.02	0.01	0.06	
Fairview	670	-38	-40	27	18	6050	15	86	330	450	100	2.6	0.1	0.26	0.35	0.12	0.06	0.02	0.01	0.06	
Falher	587	-40	-42	27	18	5900	15	55	310	420	100	2.4	0.1	0.27	0.36	0.12	0.06	0.02	0.01	0.06	
Foremost	889	-32	-36	32	20	4800	14	70	250	360	210	1.7	0.1	0.57	0.76	0.12	0.06	0.02	0.01	0.06	
Fort Chipewyan	221	-43	-46	26	19	7400	12	70	245	381	80	2.2	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06	
Fort MacLeod	945	-31	-33	31	18	4600	16	97	300	425	180	1.2	0.1	0.68	0.90	0.16	0.10	0.05	0.03	0.09	
Fort McMurray	255	-39	-41	28	19	6550	13	92	340	460	60	1.4	0.1	0.27	0.35	0.12	0.06	0.02	0.01	0.06	

Table C-2 (Continued)

Site Name	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driv- ing Rain Wind Pres- sures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data <sup>(1)</sup>				
		January		July 2.5%									S <sub>s</sub>	S <sub>t</sub>	1/10	1/50	S <sub>a</sub> (0.2)	S <sub>a</sub> (0.5)	S <sub>a</sub> (1.0)	S <sub>a</sub> (2.0)	PGA
		2.5% °C	1% °C	Dry °C	Wet °C																
Fort Saskatchewan	610	-32	-35	28	19	5700	20	86	350	0.49	425	140	1.6	0.1	0.31	0.43	0.12	0.06	0.02	0.01	0.06
Fort Vermilion	270	-41	-43	28	18	6900	13	65	250	0.53	380	60	2.1	0.1	0.22	0.29	0.12	0.06	0.02	0.01	0.06
Fox Creek	808	-36	-40	27	19	5900	17	90	340	0.54	550	80	2.2	0.1	0.35	0.46	0.12	0.06	0.02	0.01	0.06
Gibbons	643	-37	-40	27	19	5800	19	85	370	0.51	485	140	1.8	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Gleichen	903	-32	-34	28	18	5300	17	90	280	0.29	360	220	1.3	0.1	0.39	0.52	0.12	0.06	0.03	0.02	0.06
Grand Centre	541	-36	-39	28	20	6100	21	75	320	0.53	435	140	1.9	0.1	0.32	0.42	0.12	0.06	0.02	0.01	0.06
Grande Cache	1220	-35	-38	27	15	5700	14	70	370	0.55	605	80	3.2	0.1	0.31	0.42	0.24	0.14	0.07	0.04	0.12
Grande Prairie	650	-36	-39	27	18	6000	23	86	315	0.49	450	120	2.2	0.1	0.37	0.47	0.12	0.06	0.03	0.02	0.06
Granum	991	-33	-36	30	18	4800	17	95	300	0.35	440	190	1.4	0.1	0.66	0.88	0.16	0.09	0.05	0.03	0.09
Grimshaw	603	-40	-42	27	18	6350	14	80	310	0.51	390	100	2.3	0.1	0.24	0.33	0.12	0.06	0.02	0.01	0.06
Habay	335	-41	-43	28	18	7150	13	70	275	0.54	425	60	2.4	0.1	0.21	0.28	0.12	0.06	0.02	0.01	0.06
Hanna	785	-33	-36	29	20	5700	19	90	285	0.39	390	220	1.9	0.1	0.29	0.42	0.12	0.06	0.02	0.01	0.06
Hardisty	615	-33	-35	30	19	5900	20	76	325	0.48	425	140	1.7	0.1	0.24	0.36	0.12	0.06	0.02	0.01	0.06
High Level	320	-46	-47	26	18	7200	11	75	275	0.55	420	60	2.4	0.1	0.22	0.29	0.12	0.06	0.02	0.01	0.06
High Prairie	595	-38	-40	25	19	6000	15	75	375	0.57	470	80	2.3	0.1	0.28	0.37	0.12	0.06	0.02	0.01	0.06
High River	1040	-31	-33	28	17	5300	18	103	300	0.36	425	200	1.3	0.1	0.51	0.65	0.15	0.09	0.04	0.02	0.09
Hinton	990	-34	-38	27	17	5700	13	81	375	0.55	500	100	2.9	0.1	0.36	0.46	0.24	0.14	0.06	0.04	0.12
Innisfail	945	-34	-38	28	19	5700	18	95	355	0.52	480	190	1.9	0.1	0.31	0.42	0.12	0.06	0.03	0.02	0.07
Irvine	763	-32	-36	32	20	4900	17	75	250	0.25	360	220	1.4	0.1	0.40	0.55	0.12	0.06	0.02	0.01	0.06
Jasper	1060	-32	-35	28	18	5500	10	76	300	0.52	400	80	3.3	0.1	0.37	0.46	0.24	0.14	0.07	0.04	0.12
Keg River	420	-40	-42	28	18	6800	13	65	310	0.54	450	80	2.4	0.1	0.21	0.28	0.12	0.06	0.02	0.01	0.06
Killam	680	-35	-38	29	20	5700	21	90	335	0.51	445	150	1.9	0.1	0.24	0.35	0.12	0.06	0.02	0.01	0.06
Kitscoty	670	-35	-38	29	20	6150	22	80	305	0.50	430	110	1.9	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06
Lac la Biche	560	-35	-38	28	19	6150	15	86	375	0.58	475	80	1.6	0.1	0.31	0.40	0.12	0.06	0.02	0.01	0.06
Lacombe	855	-33	-35	29	18	5700	23	92	350	0.53	450	180	2.1	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06

Table C-2 (Continued)

Site Name	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driv- ing Rain Wind Pres- sures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data <sup>(1)</sup>				
		January		July 2.5%									S <sub>s</sub>	S <sub>t</sub>	1/10	1/50	S <sub>a</sub> (0.2)	S <sub>a</sub> (0.5)	S <sub>a</sub> (1.0)	S <sub>a</sub> (2.0)	PGA
		2.5% °C	1% °C	Dry °C	Wet °C																
Lake Louise	1600	-33	-34	27	14	6700	11	55	275	0.59	580	80	4.5	0.1	0.39	0.50	0.25	0.14	0.07	0.04	0.12
Lamont	653	-37	-40	27	19	5800	19	90	350	0.50	460	130	1.8	0.1	0.30	0.41	0.12	0.06	0.02	0.01	0.06
Leduc	730	-35	-38	27	19	5600	20	90	400	0.54	485	160	1.9	0.1	0.31	0.42	0.12	0.06	0.02	0.01	0.06
Lethbridge	910	-30	-33	31	18	4650	20	97	250	0.26	390	200	1.2	0.1	0.64	0.82	0.15	0.09	0.04	0.03	0.09
Lloydminster	645	-35	-38	29	20	6100	18	70	320	0.51	430	110	2.0	0.1	0.30	0.41	0.12	0.06	0.02	0.01	0.06
Magrath	983	-31	-35	31	19	4800	17	80	275	0.29	430	160	1.5	0.1	0.65	0.91	0.15	0.10	0.05	0.03	0.09
Manning	465	-39	-41	27	18	6700	13	81	280	0.49	390	80	2.3	0.1	0.21	0.28	0.12	0.06	0.02	0.01	0.06
Mayerthorpe	712	-36	-40	27	19	5950	15	90	425	0.62	555	100	2.0	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
McLennan	625	-40	-42	27	18	5900	15	65	340	0.53	425	90	2.4	0.1	0.26	0.35	0.12	0.06	0.02	0.01	0.06
Medicine Hat	705	-31	-34	33	19	4750	23	92	250	0.25	325	220	1.1	0.1	0.39	0.54	0.12	0.06	0.02	0.01	0.06
Milk River	1059	-31	-35	31	19	4800	16	70	280	0.29	375	190	1.7	0.1	0.62	0.83	0.14	0.08	0.04	0.02	0.08
Millet	755	-35	-38	27	19	5600	21	95	380	0.55	475	160	1.9	0.1	0.31	0.42	0.12	0.06	0.02	0.01	0.06
Morinville	700	-37	-40	27	19	5700	19	90	370	0.50	480	140	1.9	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Morrin	832	-34	-38	28	19	5500	19	75	310	0.44	390	220	1.8	0.1	0.29	0.42	0.12	0.06	0.02	0.01	0.06
Mundare	678	-37	-40	27	19	6100	20	90	325	0.50	450	110	1.9	0.1	0.29	0.39	0.12	0.06	0.02	0.01	0.06
Nanton	1024	-32	-34	28	18	5000	17	95	300	0.35	440	200	1.3	0.1	0.53	0.70	0.15	0.09	0.04	0.03	0.09
Okotoks	1051	-32	-34	28	18	5300	17	95	350	0.41	470	200	1.4	0.1	0.51	0.66	0.15	0.09	0.04	0.02	0.09
Olds	1041	-33	-36	28	18	5600	17	95	365	0.51	485	180	1.8	0.1	0.32	0.42	0.15	0.08	0.04	0.02	0.08
Oyen	770	-33	-36	29	20	5600	19	75	260	0.34	330	220	1.7	0.1	0.37	0.50	0.12	0.06	0.02	0.01	0.06
Peace River	330	-37	-40	27	18	6350	15	65	300	0.50	390	100	2.2	0.1	0.24	0.32	0.12	0.06	0.02	0.01	0.06
Penhold	871	-34	-38	28	19	5750	18	95	365	0.53	470	200	1.9	0.1	0.30	0.40	0.12	0.06	0.03	0.02	0.06
Picture Butte	905	-31	-35	31	19	4700	17	85	295	0.31	400	210	1.2	0.1	0.62	0.83	0.14	0.08	0.04	0.02	0.08
Pincher Creek	1130	-32	-34	29	18	5000	18	108	325	0.37	575	140	1.5	0.1	0.70	0.97	0.19	0.11	0.06	0.03	0.10
Ponoka	807	-34	-37	27	19	5600	21	80	385	0.56	480	170	2.0	0.1	0.30	0.41	0.12	0.06	0.02	0.01	0.06
Provost	668	-33	-36	29	20	5900	21	80	330	0.44	415	150	1.9	0.1	0.29	0.43	0.12	0.06	0.02	0.01	0.06

Table C-2 (Continued)

Site Name	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driv- ing Rain Wind Pres- sures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data <sup>(1)</sup>				
		January		July 2.5%									S <sub>s</sub>	S <sub>t</sub>	1/10	1/50	S <sub>a</sub> (0.2)	S <sub>a</sub> (0.5)	S <sub>a</sub> (1.0)	S <sub>a</sub> (2.0)	PGA
		2.5% °C	1% °C	Dry °C	Wet °C																
Rainbow Lake	534	-46	-47	26	18	7200	16	75	270	0.54	450	60	2.8	0.1	0.22	0.29	0.12	0.06	0.02	0.01	0.06
Ranfurly	670	-34	-37	29	19	5950	18	92	325	0.50	420	100	1.9	0.1	0.23	0.32	0.12	0.06	0.02	0.01	0.06
Raymond	960	-31	-35	31	19	4750	17	75	250	0.26	420	170	1.4	0.1	0.66	0.88	0.15	0.09	0.05	0.03	0.09
Red Deer	855	-32	-35	29	18	5750	23	97	375	0.54	475	200	2.0	0.1	0.31	0.40	0.12	0.06	0.02	0.01	0.06
Redcliff	745	-32	-36	32	20	4800	17	85	210	0.21	325	220	1.3	0.1	0.39	0.53	0.12	0.06	0.02	0.01	0.06
Redwater	625	-37	-40	27	19	5900	19	80	350	0.52	470	120	1.8	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Rimbey	930	-34	-37	27	19	5700	20	100	390	0.56	505	150	2.2	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Rocky Mountain House	985	-31	-33	28	18	5700	20	86	425	0.59	550	120	1.9	0.1	0.33	0.43	0.15	0.08	0.04	0.02	0.08
Ryley	693	-35	-38	27	19	5800	21	90	340	0.51	465	140	1.9	0.1	0.29	0.39	0.12	0.06	0.02	0.01	0.06
Sangudo	680	-36	-40	27	19	5900	17	95	400	0.58	555	110	2.0	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Sedgewick	663	-35	-38	29	20	5700	21	95	330	0.50	440	150	1.9	0.1	0.24	0.35	0.12	0.06	0.02	0.01	0.06
Sexsmith	724	-38	-41	27	18	6000	18	85	310	0.49	445	110	2.4	0.1	0.33	0.44	0.12	0.06	0.03	0.02	0.06
Sherwood Park	729	-37	-40	27	19	5500	20	90	365	0.49	480	160	1.8	0.1	0.32	0.45	0.12	0.06	0.02	0.01	0.06
Slave Lake	590	-36	-39	27	19	6000	15	81	380	0.62	500	80	1.9	0.1	0.28	0.37	0.12	0.06	0.02	0.01	0.06
Smoky Lake	623	-39	-42	27	20	6000	19	75	345	0.51	480	100	1.9	0.1	0.29	0.39	0.12	0.06	0.02	0.01	0.06
Spirit River	640	-38	-41	27	18	6200	18	75	310	0.49	440	110	2.4	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06
Spruce Grove	709	-37	-40	27	19	5600	19	90	400	0.51	500	120	1.8	0.1	0.32	0.45	0.12	0.06	0.02	0.01	0.06
Stavely	1044	-33	-36	30	18	4800	17	95	330	0.37	440	200	1.4	0.1	0.59	0.79	0.15	0.09	0.04	0.03	0.09
Stettler	820	-32	-34	30	19	5700	20	97	370	0.53	450	200	2.2	0.1	0.24	0.36	0.12	0.06	0.02	0.01	0.06
Stony Plain	710	-32	-35	28	19	5500	23	97	410	0.52	540	120	1.7	0.1	0.32	0.45	0.12	0.06	0.02	0.01	0.06
Strathmore	973	-32	-34	28	18	5300	17	80	305	0.33	430	220	1.3	0.1	0.40	0.52	0.14	0.07	0.03	0.02	0.07
St. Albert	689	-37	-40	27	19	5600	20	95	375	0.49	480	150	1.8	0.1	0.32	0.45	0.12	0.06	0.02	0.01	0.06
St. Paul	646	-37	-40	28	20	6100	21	75	320	0.53	440	90	1.9	0.1	0.25	0.33	0.12	0.06	0.02	0.01	0.06
Suffield	755	-32	-34	33	19	4900	20	86	230	0.23	325	220	1.3	0.1	0.43	0.57	0.12	0.06	0.02	0.01	0.06
Sundre	1093	-34	-37	27	19	5700	15	95	395	0.55	530	160	1.7	0.1	0.33	0.44	0.15	0.08	0.04	0.02	0.09

Table C-2 (Continued)

Site Name	Elev., m	Design Temperature				Degree-Days Below 18°C	15 Min. Rain, mm	One Day Rain, 1/50, mm	Ann. Rain, mm	Moist. Index	Ann. Tot. Ppn., mm	Driv- ing Rain Wind Pres- sures, Pa, 1/5	Snow Load, kPa, 1/50		Hourly Wind Pressures, kPa		Seismic Data <sup>(1)</sup>				
		January		July 2.5%									S <sub>s</sub>	S <sub>t</sub>	1/10	1/50	S <sub>a</sub> (0.2)	S <sub>a</sub> (0.5)	S <sub>a</sub> (1.0)	S <sub>a</sub> (2.0)	PGA
		2.5% °C	1% °C	Dry °C	Wet °C																
Swan Hills	1113	-36	-40	27	19	6100	15	95	370	0.60	500	80	2.9	0.1	0.28	0.37	0.12	0.06	0.02	0.01	0.06
Sylvan Lake	945	-34	-37	27	19	5700	18	95	390	0.56	545	180	2.1	0.1	0.30	0.41	0.12	0.06	0.03	0.02	0.06
Taber	815	-31	-33	31	19	4800	20	92	260	0.26	370	200	1.2	0.1	0.57	0.75	0.12	0.06	0.03	0.02	0.06
Thorhild	649	-37	-40	27	19	6000	17	75	360	0.54	480	110	1.8	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Three Hills	896	-34	-38	28	19	5450	19	80	315	0.44	400	220	1.8	0.1	0.31	0.42	0.12	0.06	0.02	0.01	0.06
Tofield	700	-37	-40	27	19	5800	21	95	350	0.52	465	150	1.9	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06
Trochu	872	-34	-38	28	19	5450	18	75	325	0.48	405	220	1.8	0.1	0.31	0.42	0.12	0.06	0.02	0.01	0.06
Turner Valley	1215	-31	-33	28	17	5600	20	97	350	0.48	600	180	1.4	0.1	0.51	0.65	0.15	0.09	0.04	0.03	0.09
Two Hills	603	-38	-40	28	20	6000	21	80	320	0.51	450	90	1.9	0.1	0.24	0.32	0.12	0.06	0.02	0.01	0.06
Valleyview	700	-37	-40	27	18	5900	18	86	360	0.54	490	80	2.3	0.1	0.35	0.47	0.12	0.06	0.02	0.01	0.06
Vauxhall	779	-31	-35	31	19	4850	17	85	255	0.26	335	210	1.2	0.1	0.53	0.69	0.12	0.06	0.03	0.02	0.06
Vegreville	635	-34	-36	29	19	6100	18	86	325	0.50	410	100	1.9	0.1	0.25	0.35	0.12	0.06	0.02	0.01	0.06
Vermilion	580	-35	-38	29	20	6150	18	86	310	0.53	410	100	1.7	0.1	0.23	0.31	0.12	0.06	0.02	0.01	0.06
Viking	691	-38	-40	28	20	5750	21	65	345	0.51	445	120	1.9	0.1	0.23	0.33	0.12	0.06	0.02	0.01	0.06
Vulcan	1049	-31	-34	30	18	5000	17	90	290	0.30	410	210	1.3	0.1	0.49	0.64	0.14	0.08	0.04	0.02	0.08
Wagner	585	-36	-39	27	19	6000	15	76	380	0.62	500	80	1.9	0.1	0.28	0.37	0.12	0.06	0.02	0.01	0.06
Wainwright	675	-33	-36	29	19	6000	20	81	310	0.47	425	120	2.0	0.1	0.24	0.36	0.12	0.06	0.02	0.01	0.06
Warner	1021	-31	-35	31	19	4750	16	75	250	0.26	375	180	1.5	0.1	0.62	0.83	0.14	0.08	0.04	0.02	0.08
Wembley	724	-38	-41	27	18	5900	18	85	315	0.49	470	100	2.3	0.1	0.32	0.43	0.12	0.07	0.04	0.02	0.06
Westflock	648	-37	-40	27	19	5900	17	75	375	0.57	490	110	1.9	0.1	0.30	0.42	0.12	0.06	0.02	0.01	0.06
Wetaskiwin	760	-33	-35	29	19	5800	23	86	400	0.57	500	160	2.0	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06
Whitecourt	690	-35	-38	27	18	6000	20	97	440	0.63	550	80	1.9	0.1	0.32	0.43	0.12	0.06	0.02	0.01	0.06
Wimborne	975	-31	-34	29	18	5650	23	92	325	0.48	450	200	1.6	0.1	0.30	0.40	0.12	0.06	0.02	0.01	0.06

Notes to Table C-2:

(1) Refer to the Commentary on Design for Seismic Effects in the Structural Commentaries on the National Building Code of Canada 2005 for more detailed data on seismic parameters in selected metropolitan areas.

# Appendix D

## Fire-Performance Ratings

### Section D-1 General

The contents of this Appendix have been prepared on the recommendations of the Standing Committee on Fire Safety and Occupancy, which was established by the Canadian Commission on Building and Fire Codes (CCBFC) for this purpose.

#### D-1.1. Introduction

##### D-1.1.1. Scope

- 1)** This fire-performance information is presented in a form closely linked to the performance requirements and the minimum materials specifications of the Alberta Building Code.
- 2)** The ratings have been assigned only after careful consideration of all available literature on assemblies of common building materials, where they are adequately identified by description. The assigned values based on this information will, in most instances, be conservative when compared to the ratings determined on the basis of actual tests on individual assemblies.
- 3)** The fire-performance information set out in this Appendix applies to materials and assemblies of materials which comply in all essential details with the minimum structural design standards described in Part 4 of the Alberta Building Code. Additional requirements, where appropriate, are described in other Sections of this Appendix.
- 4)** Section D-2 of this Appendix assigns fire-resistance ratings for walls, floors, roofs, columns and beams related to CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," and describes methods for determining these ratings.
- 5)** Section D-3 assigns flame-spread ratings and smoke developed classifications for surface materials related to CAN/ULC-S102, "Test for Surface Burning Characteristics of Building Materials and Assemblies" and CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies."
- 6)** Section D-4 describes non-combustibility in building materials when tested in accordance with CAN/ULC-S114, "Test for Determination of Non-Combustibility in Building Materials."
- 7)** Section D-5 contains requirements for the installation of fire doors and fire dampers in fire-rated stud wall assemblies and the installation of fire stop flaps in fire-rated membrane ceilings.
- 8)** Section D-6 contains background information regarding fire test reports, obsolete materials and assemblies, assessment of archaic assemblies and the development of the component additive method.

##### D-1.1.2. Referenced Documents

- 1)** Where documents are referenced in this Appendix, they shall be the editions designated in Table D-1.1.2.

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This Appendix is included for explanatory purposes only and does not form part of the requirements. The bold face reference numbers that introduce each item do not relate to specific requirements in this Division.

**Table D-1.1.2.**  
**Documents Referenced in Appendix D Fire-Performance Ratings**

Issuing Agency	Document Number	Title of Document	Reference
ANSI	A208.1-1999	Particleboard, Mat-Formed Wood	Table D-3.1.1.A.
ASTM	C 36/C 36M-03	Gypsum Wallboard	D-1.5.1. Table D-3.1.1.A.
ASTM	C 37/C 37M-01	Gypsum Lath	D-1.5.1.
ASTM	C 330-04	Lightweight Aggregates for Structural Concrete	D-1.4.3.(2)
ASTM	C 442/C 442M-04	Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board	D-1.5.1. Table D-3.1.1.A.
ASTM	C 588/C 588M-03	Gypsum Base for Veneer Plasters	D-1.5.1. Table D-3.1.1.A.
ASTM	C 630/C 630M-03	Water-Resistant Gypsum Backing Board	D-1.5.1. Table D-3.1.1.A.
ASTM	C 931/C 931M-04	Exterior Gypsum Soffit Board	D-1.5.1. Table D-3.1.1.A.
ASTM	C 960/C 960M-04	Predecorated Gypsum Board	D-1.5.1.
CCBFC	NRCC 30629	Supplement to the National Building Code of Canada 1990	D-6.2. D-6.3. D-6.4.
CGSB	4-GP-36M-1978	Carpet Underlay, Fiber Type	Table D-3.1.1.B.
CGSB	CAN/CGSB-4.129-97	Carpets for Commercial Use	Table D-3.1.1.B.
CGSB	CAN/CGSB-11.3-M87	Hardboard	Table D-3.1.1.A.
CGSB	CAN/CGSB-34.16-M89	Sheets, Asbestos-Cement, Flat, Fully Compressed	Table D-3.1.1.A.
CGSB	CAN/CGSB-92.2-M90	Trowel or Spray Applied Acoustical Material	D-2.3.4.(5)
CSA	CAN/CSA-A23.1-04/A23.2-04	Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete	D-1.4.3.(1)
CSA	A23.3-04	Design of Concrete Structures	D-2.1.5. D-2.6.6. Table D-2.6.6.B. D-2.8.2. Table D-2.8.2.
CSA	A82.5-M1978	Structural Clay Non-Load-Bearing Tile	Table D-2.6.1.A.
CSA	A82.22-M1977	Gypsum Plasters	Table D-3.1.1.A.
CSA	CAN/CSA-A82.27-M91	Gypsum Board	D-1.5.1. Table D-3.1.1.A.
CSA	A82.30-M1980	Interior Furring, Lathing and Gypsum Plastering	D-1.7.2.(1) D-2.3.9.(1) Table D-2.5.1.
CSA	A82.31-M1980	Gypsum Board Application	D-2.3.9.(1) D-2.3.9.(6)
CSA	A126.1-M1984	Vinyl Asbestos and Vinyl Composition Floor Tile	Table D-3.1.1.B.
CSA	A165.1-04	Concrete Block Masonry Units	Table D-2.1.1.
CSA	CAN/CSA-O86-01 (Including Supplement CAN/CSA-O86S1-05)	Engineering Design in Wood	D-2.11.2.(1) D-2.11.2.(2)
CSA	O121-M1978	Douglas Fir Plywood	Table D-3.1.1.A.
CSA	CAN/CSA-O141-05	Softwood Lumber	D-2.3.6.(2) Table D-2.4.1.
CSA	O151-04	Canadian Softwood Plywood	Table D-3.1.1.A.

**Table D-1.1.2. (Continued)**

Issuing Agency	Document Number	Title of Document	Reference
CSA	O153-M1980	Poplar Plywood	Table D-3.1.1.A.
CSA	O437.0-93	OSB and Waferboard	Table D-3.1.1.A.
CSA	CAN/CSA-S16-01 (Including Supplement CAN/CSA-S16S1-05)	Limit States Design of Steel Structures	D-2.6.6. Table D-2.6.6.B.
NFPA	80-1999	Fire Doors and Fire Windows	D-5.2.1.(1) D-5.2.1.(2)
ULC	CAN/ULC-S101-04	Fire Endurance Tests of Building Construction and Materials	D-1.1.1.(4) D-1.12.1. D-2.3.2.
ULC	CAN/ULC-S102-03	Test for Surface Burning Characteristics of Building Materials and Assemblies	D-1.1.1.(5)
ULC	CAN/ULC-S102.2-03	Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies	D-1.1.1.(5) Table D-3.1.1.B.
ULC	CAN/ULC-S114-05	Test for Determination of Non-Combustibility in Building Materials	D-1.1.1.(6) D-4.1.1. D-4.2.1.
ULC	S505-1974	Fusible Links for Fire Protection Service	D-5.3.2.
ULC	CAN/ULC-S702-97	Mineral Fibre Thermal Insulation for Buildings	Table D-2.3.4.A. Table D-2.3.4.D. D-2.3.5.(2) D-2.3.5.(4) Table D-2.6.1.E. D-6.4.
ULC	CAN/ULC-S703-01	Cellulose Fibre Insulation (CFI) for Buildings	D-2.3.4.(5)
ULC	CAN/ULC-S706-02	Wood Fibre Thermal Insulation for Buildings	Table D-3.1.1.A.

**D-1.1.3. Applicability of Ratings**

The ratings shown in this document apply if more specific test values are not available. The construction of an assembly that is the subject of an individual test report must be followed in all essential details if the fire-resistance rating reported is to be applied for use with this Code.

**D-1.1.4. Higher Ratings**

The authority having jurisdiction may allow higher fire-resistance ratings than those derived from this Appendix, where supporting evidence justifies a higher rating. Additional information is provided in summaries of published test information and the reports of fire tests carried out by the Institute for Research in Construction, National Research Council of Canada, included in Section D-6, Background Information.

**D-1.1.5. Additional Information on Fire Rated Assemblies**

Assemblies containing materials for which there is no nationally recognized standard are not included in this Appendix. Many such assemblies have been rated by Underwriters Laboratories (UL), Underwriters' Laboratories of Canada (ULC), or Intertek Testing Services NA Ltd. (ITS). The UL "Fire Resistance Directory," Volume 1, can be obtained from UL, 333 Pfingsten Road, Northbrook, Illinois 60062-2096 U.S.A. The ULC information is published in their "List of Equipment and Materials," Volume III, Fire Resistance Ratings. Copies of this document may be obtained from ULC, 7 Underwriters Road, Toronto, Ontario M1R 3B4. ITS' Directory of Listed Products can be obtained from ITS, 3210 American Drive, Mississauga, Ontario L4V 1B3.

**D-1.2. Interpretation of Test Results****D-1.2.1. Limitations**

1) The fire-performance ratings set out in this Appendix are based on those that would be obtained from the standard methods of test described in the Code. The test methods are essentially a means of comparing the performance of one building component or assembly with another in relation to its performance in fire.

2) Since it is not practicable to measure the fire resistance of constructions in situ, they must be evaluated under some agreed test conditions. A specified fire-resistance rating is not necessarily the actual time that the assembly would endure in situ in a building fire, but is that which the particular construction must meet under the specified methods of test.

3) Considerations arising from departures in use from the conditions established in the standard test methods may, in some circumstances, have to be taken into account by the designer and the authority having jurisdiction. Some of these conditions are covered at present by the provisions of the Alberta Building Code.

4) For walls and partitions, the stud spacings previously specified as 16 or 24 inch have been converted to 400 and 600 mm, respectively, for consistency with other metric values; however, the use of equivalent imperial dimensions for stud spacing is permitted.

**D-1.3. Concrete****D-1.3.1. Aggregates in Concrete**

Low density aggregate concretes generally exhibit better fire performance than natural stone aggregate concretes. A series of tests on concrete masonry walls, combined with mathematical analysis of the test results, has allowed further distinctions between certain low density aggregates to be made.

**D-1.4. Types of Concrete****D-1.4.1. Description**

1) For purposes of this Appendix, concretes are described as Types S, N, L, L<sub>1</sub>, L<sub>2</sub>, L40S, L<sub>1</sub>20S or L<sub>2</sub>20S as described in Sentences (2) to (8).

2) Type S concrete is the type in which the coarse aggregate is granite, quartzite, siliceous gravel or other dense materials containing at least 30% quartz, chert or flint.

3) Type N concrete is the type in which the coarse aggregate is cinders, broken brick, blast furnace slag, limestone, calcareous gravel, trap rock, sandstone or similar dense material containing not more than 30% of quartz, chert or flint.

4) Type L concrete is the type in which all the aggregate is expanded slag, expanded clay, expanded shale or pumice.

5) Type L<sub>1</sub> concrete is the type in which all the aggregate is expanded shale.

6) Type L<sub>2</sub> concrete is the type in which all the aggregate is expanded slag, expanded clay or pumice.

7) Type L40S concrete is the type in which the fine portion of the aggregate is sand and low density aggregate in which the sand does not exceed 40% of the total volume of all aggregates in the concrete.

8) Type L<sub>1</sub>20S and Type L<sub>2</sub>20S concretes are the types in which the fine portion of the aggregate is sand and low density aggregate in which the sand does not exceed 20% of the total volume of all aggregates in the concrete.

**D-1.4.2. Determination of Ratings**

Where concretes are described as being of Type S, N, L, L<sub>1</sub> or L<sub>2</sub>, the rating applies to the concrete containing the aggregate in the group that provides the least fire resistance. If the nature of an aggregate cannot be determined accurately enough to place it in one of the groups, the aggregate shall be considered as being in the group that requires a greater thickness of concrete for the required fire resistance.

**D-1.4.3. Description of Aggregates**

1) The descriptions of the aggregates in Type S and Type N concretes apply to the coarse aggregates only. Coarse aggregate for this purpose means that retained on a 5 mm sieve using the method of grading aggregates described in CAN/CSA-A23.1/A23.2, "Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete."

2) Increasing the proportion of sand as fine aggregate in low density concretes requires increased thicknesses of material to produce equivalent fire-resistance ratings. Low density aggregates for Type L and Types L-S concretes used in loadbearing components shall conform to ASTM C 330, "Lightweight Aggregates for Structural Concrete."

3) Non-loadbearing low density components of vermiculite and perlite concrete, in the absence of other test evidence, shall be rated on the basis of the values shown for Type L concrete.

**D-1.5. Gypsum Wallboard****D-1.5.1. Types of Wallboard**

1) Where the term gypsum wallboard is used in this Appendix, it is intended to include, in addition to gypsum wallboard, gypsum backing board and gypsum base for veneer plaster as described in

- a) CAN/CSA-A82.27-M, "Gypsum Board,"
- b) ASTM C 36/C 36M, "Gypsum Wallboard,"
- c) ASTM C 37/C 37M, "Gypsum Lath,"
- d) ASTM C 442/C 442M, "Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board,"
- e) ASTM C 588/C 588M, "Gypsum Base for Veneer Plasters,"
- f) ASTM C 630/C 630M, "Water-Resistant Gypsum Backing Board,"
- g) ASTM C 931/C 931M, "Exterior Gypsum Soffit Board," or
- h) ASTM C 960/C 960M, "Predecorated Gypsum Board."

2) Where the term Type X gypsum wallboard is used in this Appendix, it applies to special fire-resistant board as described in

- a) CAN/CSA-A82.27-M, "Gypsum Board,"
- b) ASTM C 36/C 36M, "Gypsum Wallboard,"
- c) ASTM C 442/C 442M, "Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board,"
- d) ASTM C 588/C 588M, "Gypsum Base for Veneer Plasters,"
- e) ASTM C 630/C 630M, "Water-Resistant Gypsum Backing Board,"
- f) ASTM C 931/C 931M, "Exterior Gypsum Soffit Board," or
- g) ASTM C 960/C 960M, "Predecorated Gypsum Board."

**D-1.6. Equivalent Thickness****D-1.6.1. Method of Calculating**

1) The thickness of solid-unit masonry and concrete described in this Appendix shall be the thickness of solid material in the unit or component thickness. For units that contain cores or voids, the Tables refer to the equivalent thickness determined in conformance with (2) to (10).

2) Where a plaster finish is used, the equivalent thickness of a wall, floor, column or beam protection shall be equal to the sum of the equivalent thicknesses of the concrete or masonry units and the plaster finish measured at the point that will give the least value of equivalent thickness.

3) Except as provided in (5), the equivalent thickness of a hollow masonry unit shall be calculated as equal to the actual overall thickness of a unit in millimetres multiplied by a factor equal to the net volume of the unit and divided by its gross volume.

4) Net volume shall be determined using a volume displacement method that is not influenced by the porous nature of the units.

5) Gross volume of a masonry unit shall be equal to the actual length of the unit multiplied by the actual height of the unit multiplied by the actual thickness of the unit.

6) Where all the core spaces in a wall of hollow concrete masonry or hollow-core precast concrete units are filled with grout, mortar, or loose fill materials such as expanded slag, burned clay or shale (rotary kiln process), vermiculite or perlite, the equivalent thickness rating of the wall shall be considered to be the same as that of a wall of solid units, or a solid wall of the same concrete type and the same overall thickness.

**7)** The equivalent thickness of hollow-core concrete slabs and panels having a uniform thickness and cores of constant cross section throughout their length shall be obtained by dividing the net cross-sectional area of the slab or panel by its width.

**8)** The equivalent thickness of concrete panels with tapered cross sections shall be the cross section determined at a distance of 2 t or 150 mm, whichever is less, from the point of minimum thickness, where t is the minimum thickness.

**9)** Except as permitted in (10), the equivalent thickness of concrete panels with ribbed or undulating surfaces shall be

- a)  $t_a$  for s less than or equal to 2 t,
- b)  $t + (4 t/s - 1)(t_a - t)$  for s less than 4 t and greater than 2 t, and
- c) t for s greater than or equal to 4 t

where

- t = minimum thickness of panel,
- $t_a$  = average thickness of panel (unit cross-sectional area divided by unit width), and
- s = centre to centre spacing of ribs or undulations.

**10)** Where the total thickness of a panel described in (9), exceeds 2 t, only that portion of the panel which is less than 2 t from the non-ribbed surface shall be considered for the purpose of the calculations in (9).

**D-1.7. Contribution of Plaster or Gypsum Wallboard Finish to Fire Resistance of Masonry or Concrete**

**D-1.7.1. Determination of Contribution**

**1)** Except as provided in (2), (3), (4) and (5), the contribution of a plaster or gypsum wallboard finish to the fire resistance of a masonry or concrete wall, floor or roof assembly shall be determined by multiplying the actual thickness of the finish by the factor shown in Table D-1.7.1., depending on the type of masonry or concrete to which it is applied. This corrected thickness shall then be included in the equivalent thickness as described in D-1.6.

**Table D-1.7.1.  
Multiplying Factors for Masonry or Concrete Construction**

Type of Surface Protection	Type of Masonry or Concrete			
	Solid Clay Brick, Unit Masonry and Monolithic Concrete, Type N or S	Cored Clay Brick, Clay Tile, Monolithic Concrete, Type L40S and Unit Masonry, Type L <sub>1</sub> 20S	Concrete Unit Masonry, Type L <sub>1</sub> or L <sub>2</sub> 20S and Monolithic Concrete, Type L	Concrete Unit Masonry, Type L <sub>2</sub>
Portland cement-sand plaster or lime sand plaster	1	0.75	0.75	0.50
Gypsum-sand plaster, wood fibred gypsum plaster or gypsum wallboard	1.25	1	1	1
Vermiculite or perlite aggregate plaster	1.75	1.5	1.25	1.25

**2)** Where a plaster or gypsum wallboard finish is applied to a concrete or masonry wall, the calculated fire-resistance rating of the assembly shall not exceed twice the fire-resistance rating provided by the masonry or concrete because structural collapse may occur before the limiting temperature is reached on the surface of the non-fire-exposed side of the assembly.

**3)** Where a plaster or gypsum wallboard finish is applied only on the non-fire-exposed side of a hollow clay tile wall, no increase in fire resistance is permitted because structural collapse may occur before the limiting temperature is reached on the surface of the non-fire-exposed side of the assembly.

**4)** The contribution to fire resistance of a plaster or gypsum wallboard finish applied to the non-fire-exposed side of a monolithic concrete or unit masonry wall shall be determined in conformance with (1), but shall not exceed 0.5 times the contribution of the concrete or masonry wall.

5) When applied to the fire-exposed side, the contribution of a gypsum lath and plaster or gypsum wallboard finish to the fire resistance of masonry or concrete wall, floor or roof assemblies shall be determined from Table D-2.3.4.A. or D-2.3.4.B.

### D-1.7.2. Plaster

1) Gypsum plastering shall conform to CSA A82.30-M, "Interior Furring, Lathing and Gypsum Plastering."

2) Portland cement-sand plaster shall be applied in 2 coats: the first coat containing 1 part Portland cement to 2 parts sand by volume, and the second coat containing 1 part Portland cement to 3 parts sand by volume.

3) Plaster finish shall be securely bonded to the wall or ceiling.

4) The thickness of plaster finish applied directly to monolithic concrete without metal lath shall not exceed 10 mm on ceilings and 16 mm on walls.

5) Where the thickness of plaster finish on masonry or concrete exceeds 38 mm, wire mesh with 1.57 mm diam wire and openings not exceeding 50 mm by 50 mm shall be embedded midway in the plaster.

### D-1.7.3. Attachment of Wallboard and Lath

Gypsum wallboard and gypsum lath finishes applied to masonry or concrete walls shall be secured to wood or steel furring members in conformance with D-2.3.9.

### D-1.7.4. Sample Calculations

The following examples are included as a guide to the method of calculating the fire resistance of concrete or hollow masonry walls with plaster or gypsum wallboard protection:

#### Example (1)

A 3 h fire-resistance rating is required for a monolithic concrete wall of Type S aggregate with a 20 mm gypsum-sand plaster finish on metal lath on each face.

- The minimum equivalent thickness of Type S monolithic concrete needed to give a 3 h fire-resistance rating = 158 mm (Table D-2.1.1.).
- Since the gypsum-sand plaster finish is applied on metal lath, D-1.7.1.(5) does not apply. Therefore, the contribution to the equivalent thickness of the wall of 20 mm gypsum-sand plaster on each face of the concrete is  $20 \times 1.25 = 25$  mm (see D-1.7.1.(1) to (4)).
- The total contribution of the plaster finishes is  $2 \times 25 = 50$  mm.
- The minimum equivalent thickness of concrete required is  $158 \text{ mm} - 50 \text{ mm} = 108$  mm.
- From Table D-2.1.1., the 108 mm equivalent thickness of monolithic concrete gives a contribution of less than 1.5 h. This is less than half the rating of the assembly so that the conditions in D-1.7.1.(2) are not met. Thus the equivalent thickness of monolithic concrete must be increased to 112 mm to give 1.5 h contribution.
- The total equivalent thickness of the plaster finishes can then be reduced to  $158 \text{ mm} - 112 \text{ mm} = 46$  mm.
- The total actual thickness of the plaster finishes required is therefore  $46 \text{ mm} \div 1.25 = 37$  mm (D-1.7.1.(1) to (4)) or 18.5 mm on each face.
- Since the thickness of the plaster finish on each face exceeds 16 mm, metal lath is still required (D-1.7.2.(4)).
- Since this wall is symmetrical with plaster on both faces, the contribution to fire resistance of the plaster finish on either face is limited to one-quarter of the wall rating by virtue of D-1.7.1.(2). Under these circumstances, the conditions in D-1.7.1.(4) are automatically met.

#### Example (2)

A 2 h fire-resistance rating is required for a hollow masonry wall of Type N concrete with a 12.7 mm Type X gypsum wallboard finish on each face.

- Since gypsum wallboard is used, D-1.7.1.(5) applies. The 12.7 mm gypsum wallboard finish on the fire-exposed side is, therefore, assigned 25 min by using Table D-2.3.4.A.
- The fire resistance required of the balance of the assembly is  $120 \text{ min} - 25 \text{ min} = 95$  min.
- Interpolating between 1.5 h and 2 h in Table D-2.1.1. for 95 min fire resistance, the equivalent thickness for hollow masonry units required is  $95 \text{ mm} + (18 \text{ mm} \times 5/30) = 95 \text{ mm} + 3 \text{ mm} = 98$  mm.

- (d) The contribution to the equivalent thickness of the wall of the 12.7 mm gypsum wallboard finish on the non-fire-exposed side using Table D-1.7.1. =  $12.7 \times 1.25 = 16$  mm.
- (e) Equivalent thickness required of concrete masonry unit =  $98 - 16 = 82$  mm.
- (f) The fire-resistance rating of a concrete masonry wall having an equivalent thickness of 82 mm = 1 h for  $73 \text{ mm} + (9 \text{ mm} \times 30/22) = 1 \text{ h } 12 \text{ min.}$

As this is more than 1 h, the conditions of D-1.7.1.(2) are met and the rating of 2 h is justified.

**Example (3)**

A 2 h fire-resistance rating is required for a hollow masonry exterior wall of Type L<sub>2</sub>20S concrete with a 15.9 mm Type X gypsum wallboard finish on the non-fire-exposed side only.

- (a) According to Table D-2.1.1., the minimum equivalent thickness for Type L<sub>2</sub>20S concrete masonry units needed to achieve a 2 h rating is 94 mm.
- (b) Since gypsum wallboard is not used on the fire-exposed side, D-1.7.1.(5) does not apply. The contribution to the equivalent thickness of the wall by the 15.9 mm Type X gypsum wallboard finish applied on the non-fire-exposed side is  $15.9 \times 1 \approx 16$  mm (see D-1.7.1.(1) and Table D-1.7.1.).
- (c) Therefore, the equivalent thickness required of the concrete masonry unit is  $94 - 16 = 78$  mm.
- (d) The contribution to fire resistance of a 78 mm L<sub>2</sub>20S concrete hollow masonry unit is 85 min. The contribution of the Type X gypsum wallboard finish is  $120 - 85 = 35$  min, which does not exceed half the 85 min contribution of the masonry unit or 42.5 min, so that the conditions in D-1.7.1.(4) are met.
- (e) The rating of the wall (120 min) is less than twice the contribution of the masonry unit (170 min) so that the conditions in D-1.7.1.(2) are also met.

**D-1.8. Tests on Floors and Roofs****D-1.8.1. Exposure to Fire**

All tests relate to the performance of a floor assembly or floor-ceiling or roof-ceiling assembly above a fire. It has been assumed on the basis of experience that fire on top will take a longer time to penetrate the floor than one below, and that the fire resistance in such a situation will be at least equal to that obtained from below in the standard test.

**D-1.9. Moisture Content****D-1.9.1. Effect of Moisture**

**1)** The moisture content of building materials at the time of fire test may have a significant influence on the measured fire resistance. In general, an increase in the moisture content should result in an increase in the fire resistance, though in some materials the presence of moisture may produce disruptive effects and early collapse of the assembly.

**2)** Moisture content is now controlled in standard fire test methods and is generally recorded in the test reports. In earlier tests, moisture content was not always properly determined.

**D-1.10. Permanence and Durability****D-1.10.1. Test Conditions**

The ratings in this Appendix relate to tested assemblies and do not take into account possible changes or deterioration in use of the materials. The standard fire test measures the fire resistance of a sample building assembly erected for the test. No judgment as to the permanence or durability of the assembly is made in the test.

**D-1.11. Steel Structural Members****D-1.11.1. Thermal Protection**

Since the ability of a steel structural member to sustain the loading for which it was designed may be impaired because of elevated temperatures, measures shall be taken to provide thermal protection. The fire-resistance ratings, as established by the provisions of this Appendix, indicate the time periods during which the effects of heat on protected steel structural members are considered to be within acceptable limits.

**D-1.12. Restraint Effects****D-1.12.1. Effect on Fire-Resistance Ratings**

In fire tests of floors, roofs and beams, it is necessary to state whether the rating applies to a thermally restrained or thermally unrestrained assembly. Edge restraint of a floor or roof, structural continuity, or end restraint of a beam can significantly extend the time before collapse in a standard test. A restrained condition is one in which expansion or rotation at the supports of a load-carrying element resulting from the effects of fire is resisted by forces or moments external to the element. An unrestrained condition is one in which the load-carrying element is free to thermally expand and rotate at its supports.

Whether an assembly or structural member can be considered thermally restrained or thermally unrestrained depends on the type of construction and location in a building. Guidance on this subject can be found in Appendix A1 of CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials." Different acceptance criteria also apply to thermally unrestrained and thermally restrained assemblies. These are described in CAN/ULC-S101.

The ratings for floors, roofs, and beams in this Appendix meet the conditions of CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," for thermally unrestrained specimens. In a thermally restrained condition, the structural element or assembly would probably have greater fire resistance, but the extent of this increase can be determined only by reference to behavior in a standard test.

**Section D-2 Fire-Resistance Ratings****D-2.1. Masonry and Concrete Walls****D-2.1.1. Minimum Equivalent Thickness for Fire-Resistance Rating**

The minimum thicknesses of unit masonry and monolithic concrete walls are shown in Table D-2.1.1. Hollow masonry units and hollow-core concrete panels shall be rated on the basis of equivalent thickness as described in D-1.6.

Table D-2.1.1.

Minimum Equivalent Thicknesses<sup>(1)</sup> of Unit Masonry and Monolithic Concrete Walls Loadbearing and Non-Loadbearing, mm

Type of Wall	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Solid brick units (80% solid and over), actual overall thickness	63	76	90	108	128	152	178
Cored brick units and hollow tile units (less than 80% solid), equivalent thickness	50	60	72	86	102	122	142
Solid and hollow concrete masonry units, equivalent thickness							
Type S or N concrete <sup>(2)</sup>	44	59	73	95	113	142	167
Type L <sub>1</sub> 20S concrete	42	54	66	87	102	129	152
Type L <sub>1</sub> concrete	42	54	64	82	97	122	143
Type L <sub>2</sub> 20S concrete	42	54	64	81	94	116	134
Type L <sub>2</sub> concrete	42	54	63	79	91	111	127
Monolithic concrete and concrete panels, equivalent thickness							
Type S concrete	60	77	90	112	130	158	180
Type N concrete	59	74	87	108	124	150	171
Type L40S or Type L concrete	49	62	72	89	103	124	140

**Notes to Table D-2.1.1.:**

(1) See definition of equivalent thickness in D-1.6.

(2) Hollow concrete masonry units made with Type S or N concrete shall have a minimum compressive strength of 15 MPa based on net area, as defined in CSA A165.1, "Concrete Block Masonry Units."

**D-2.1.2. Applicability of Ratings**

**1)** Ratings obtained as described in D-2.1.1. apply to either loadbearing or non-loadbearing walls, except for walls described in (2) to (6).

**2)** Ratings for walls with a thickness less than the minimum thickness prescribed for loadbearing walls in this Code apply to non-loadbearing walls only.

**3)** Masonry cavity walls (consisting of 2 wythes of masonry with an air space between) that are loaded to a maximum allowable compressive stress of 380 kPa have a fire resistance at least as great as that of a solid wall of a thickness equal to the sum of the equivalent thicknesses of the 2 wythes.

**4)** Masonry cavity walls that are loaded to a compressive stress exceeding 380 kPa are not considered to be within the scope of this Appendix.

**5)** A masonry wall consisting of 2 types of masonry units, either bonded together or in the form of a cavity wall, shall be considered to have a fire-resistance rating equal to that which would apply if the whole of the wall were of the material that gives the lesser rating.

**6)** A non-loadbearing cavity wall made up of 2 precast concrete panels with an air space or insulation in the cavity between them shall be considered to have a fire-resistance rating as great as that of a solid wall of a thickness equal to the sum of the thicknesses of the 2 panels.

**D-2.1.3. Framed Beams and Joists**

Beams and joists that are framed into a masonry or concrete fire separation shall not reduce the thickness of the fire separation to less than the equivalent thickness required for the fire separation.

**D-2.1.4. Credit for Plaster Thickness**

On monolithic walls and walls of unit masonry, the full plaster finish on one or both faces multiplied by the factor shown in Table D-1.7.1. shall be included in the wall thickness shown in Table D-2.1.1., under the conditions and using the methods described in D-1.7.

**D-2.1.5. Walls Exposed to Fire on Both Sides**

**1)** Except as permitted in (2), portions of loadbearing reinforced concrete walls, which do not form a complete fire separation and thus may be exposed to fire on both sides simultaneously, shall have minimum dimensions and minimum cover to steel reinforcement in conformance with D-2.8.2. to D-2.8.5.

**2)** A concrete wall exposed to fire from both sides as described in (1) has a fire-resistance rating of 2 h if the following conditions are met:

- a) its equivalent thickness is not less than 200 mm,
- b) its aspect ratio (width/thickness) is not less than 4.0,
- c) the minimum thickness of concrete cover over the steel reinforcement specified in (d) is not less than 50 mm,
- d) each face of the wall is reinforced with both vertical and horizontal steel reinforcement in conformance with either Clause 10 or Clause 14 of CSA A23.3, "Design of Concrete Structures,"
- e) the structural design of the wall is governed by the minimum eccentricity  $(15 + 0.03h)$  specified in Clause 10.15.3.1 of CSA A23.3, "Design of Concrete Structures," and
- f) the effective length of the wall,  $kl_u$ , is not more than 3.7 m

where

- $k$  = effective length factor obtained from CSA A23.3, "Design of Concrete Structures,"
- $l_u$  = unsupported length of the wall in metres.

**D-2.2. Reinforced and Prestressed Concrete Floor and Roof Slabs**

**D-2.2.1. Assignment of Rating**

**1)** Floors and roofs in a fire test are assigned a fire-resistance rating which relates to the time that an average temperature rise of 140°C or a maximum temperature rise of 180 °C at any location is recorded on the unexposed side, or the time required for collapse to occur, whichever is the lesser. The thickness of concrete shown in Table D-2.2.1.A. shall be required to resist the transfer of heat during the fire resistance period shown.

**Table D-2.2.1.A.**  
**Minimum Thickness of Reinforced and Prestressed Concrete Floor or Roof Slabs, mm**

Type of Concrete	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S concrete	60	77	90	112	130	158	180
Type N concrete	59	74	87	108	124	150	171
Type L40S or Type L concrete	49	62	72	89	103	124	140

**2)** The concrete cover over the reinforcement and steel tendons shown in Table D-2.2.1.B. shall be required to maintain the integrity of the structure and prevent collapse during the same period.

**Table D-2.2.1.B.**  
**Minimum Concrete Cover over Reinforcement in Concrete Slabs, mm**

Type of Concrete	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S, N, L40S or L concrete	20	20	20	20	25	32	39
Prestressed concrete slabs Type S, N, L40S or L concrete	20	25	25	32	39	50	64

**D-2.2.2. Floors with Hollow Units**

The fire resistance of floors containing hollow units may be determined on the basis of equivalent thickness as described in D-1.6.

**D-2.2.3. Composite Slabs**

**1)** For composite concrete floor and roof slabs consisting of one layer of Type S or N concrete and another layer of Type L40S or L concrete in which the minimum thickness of both the top and bottom layers is not less than 25 mm, the combined fire-resistance rating may be determined using the following expressions:

a) when the base layer consists of Type S or N concrete,

$$R = 0.00018t^2 - 0.00009dt + \frac{8.7}{t}$$

b) when the base layer consists of Type L40S or L concrete,

$$R = 0.0001t^2 + 0.0002dt - 0.0001d^2 + \frac{6.4}{t}$$

where

- R = fire resistance of slab, h,
- t = total thickness of slab, mm, and
- d = thickness of base layer, mm.

**2)** If the base course described in (1) is covered by a top layer of material other than Type S, N, L40S or L concrete, the top course thickness may be converted to an equivalent concrete thickness by multiplying the actual thickness by the appropriate factor listed in Table D-2.2.3.A. This equivalent concrete thickness may be added to the thickness of the base course and the fire-resistance rating calculated using Table D-2.2.1.A.

**3)** The minimum concrete cover under the main reinforcement for composite concrete floor and roof slabs with base slabs less than 100 mm thick shall conform to Table D-2.2.3.B. For base slabs 100 mm or more thick, the minimum cover thickness requirements of Table D-2.2.1.B. shall apply.

**4)** Where the top layer of a 2-layer slab is less than 25 mm thick, the fire-resistance rating for the slab shall be calculated as though the entire slab were made up of the type of concrete with the lesser fire resistance.

**Table D-2.2.3.A.  
Multiplying Factors for Equivalent Thickness**

Top Course Material	Base Slab Normal Density Concrete (Type S or N)	Base Slab Low Density Concrete (Type L40S or L)
Gypsum wallboard	3	2.25
Cellular concrete (mass density 400 – 560 kg/m <sup>3</sup> )	2	1.50
Vermiculite and perlite concrete (mass density 560 kg/m <sup>3</sup> or less)	1.75	1.50
Portland cement with sand aggregate	1	0.75
Terrazzo	1	0.75

**Table D-2.2.3.B.**  
**Minimum Concrete Cover under Bottom Reinforcement in Composite Concrete Slabs, mm**

Base Slab Concrete Type	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Reinforced concrete							
Type S, N, L40S or L	15	15	20	25	30	40	55
Prestressed concrete							
Type S	20	25	30	40	50	65	75
Type N	20	20	25	35	45	60	70
Type L40S or L	20	20	25	30	40	50	60

**D-2.2.4. Contribution of Plaster Finish**

1) The contribution of plaster finish securely fastened to the underside of concrete may be taken into account in floor or roof slabs under the conditions and using the methods described in D-1.7.

2) Plaster finish on the underside of concrete floors or roofs may be used in lieu of concrete cover referred to in D-2.2.1.(2) under the conditions and using the methods described in D-1.7.

**D-2.2.5. Concrete Cover**

1) In prestressed concrete slab construction, the concrete cover over an individual tendon shall be the minimum thickness of concrete between the surface of the tendon and the fire-exposed surface of the slab, except that for ungrouted ducts the assumed cover thickness shall be the minimum thickness of concrete between the surface of the duct and the bottom of the slab. For slabs in which several tendons are used, the cover is assumed to be the average of those of individual tendons, except that the cover for any individual tendon shall be not less than half of the value given in Table D-2.2.1.B. nor less than 20 mm.

2) Except as provided in (3), in post-tensioned prestressed concrete slabs, the concrete cover to the tendon at the anchor shall be not less than 15 mm greater than the minimum cover required by (1). The minimum concrete cover to the anchorage bearing plate and to the end of the tendon, if it projects beyond the bearing plate, shall be 20 mm.

3) The requirements of (2) do not apply to those portions of slabs not likely to be exposed to fire, such as the ends and tops.

**D-2.2.6. Minimum Dimensions for Cover**

Minimum dimensions and cover to steel tendons of prestressed concrete beams shall conform to D-2.10.

**D-2.3. Wood and Steel Framed Walls, Floors and Roofs**

**D-2.3.1. Maximum Fire-Resistance Rating**

The fire-resistance rating of walls constructed of wood studs or light gauge steel studs, floors constructed of wood joists or open web steel joists, and roofs constructed of wood joists, pre-manufactured wood trusses or open web steel joists, can be determined for ratings up to 90 min from the information in D-2.3.

**D-2.3.2. Loadbearing Conditions**

1) The ratings derived from the information in D-2.3. apply to both loadbearing and non-loadbearing wood framed walls, to non-loadbearing steel framed walls and to loadbearing floors and roofs.

2) Loadbearing conditions shall be as defined in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

**D-2.3.3. Limitations of Component Additive Method**

(See D-6, Background Information.)

1) The fire-resistance rating of a framed assembly depends primarily on the time during which the membrane on the fire-exposed side remains in place.

**2)** The assigned times in D-2.3.4.(2), (3) and (4) are not intended to be construed as the fire-resistance ratings of the individual components of an assembly. These assigned times are the individual contributions to the overall fire-resistance rating of the complete assembly.

**3)** Wallboard membranes are permitted to be installed in multiple layers only as listed in Table D-2.3.4.A. (double 12.7 mm Type X gypsum wallboard).

**D-2.3.4. Method of Calculation**

**1)** The fire-resistance rating of a framed assembly may be calculated by adding the time assigned in (2) for the membrane on the fire-exposed side plus the time assigned in (3) for the framing members plus the time assigned in (4) for additional protective measures such as the inclusion of insulation or the reinforcement of a membrane.

**2)** The times which have been assigned to membranes on the fire-exposed side of the assembly, based on their ability to remain in place during fire tests, are listed in Tables D-2.3.4.A. and D-2.3.4.B. (This is not to be confused with the fire-resistance rating of the membrane, which also takes into account the rise in temperature on the unexposed side of the membrane. [See D-2.3.3.(2).])

**Table D-2.3.4.A.  
Time Assigned to Wallboard Membranes on Fire-Exposed Side**

Description of Finish	Time, min
11.0 mm Douglas Fir plywood phenolic bonded	10 <sup>(1)</sup>
14.0 mm Douglas Fir plywood phenolic bonded	15 <sup>(1)</sup>
12.7 mm Type X gypsum wallboard	25
15.9 mm Type X gypsum wallboard	40
Double 12.7 mm Type X gypsum wallboard	80 <sup>(2)</sup>

**Notes to Table D-2.3.4.A.:**

- (1) Non-loadbearing walls only, stud cavities filled with mineral wool conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," and having a mass of not less than 2 kg/m<sup>2</sup>, with no additional credit for insulation according to Table D-2.3.4.D.
- (2) Applies to non-loadbearing steel framed walls only.

**Table D-2.3.4.B.  
Time Assigned for Contribution of Lath and Plaster Protection on Fire-Exposed Side, min<sup>(1)</sup>**

Type of Lath	Plaster Thickness, mm	Type of Plaster Finish		
		Portland Cement and Sand <sup>(2)</sup> or Lime and Sand	Gypsum and Sand or Gypsum Wood Fibred	Gypsum and Perlite or Gypsum and Vermiculite
9.5 mm gypsum	13	—	35	55
	16	—	40	65
	19	—	50	80 <sup>(1)</sup>
Metal	19	20	50	80 <sup>(1)</sup>
	23	25	65	80 <sup>(1)</sup>
	26	30	80	80 <sup>(1)</sup>

**Notes to Table D-2.3.4.B.:**

- (1) Values shown for these membranes have been limited to 80 min because the fire-resistance ratings of framed assemblies derived from these Tables shall not exceed 1.5 h.
- (2) For mixture of Portland cement-sand plaster, see D-1.7.2.(2).

**3)** When the membrane on the fire-exposed side of a framed assembly falls off, there is a brief period before structural failure occurs during which the studs or joists are exposed directly to flame. Table D-2.3.4.C. lists the times which have been assigned to the framing members based on the time involved between failure of the membrane and collapse of the assembly.

**Table D-2.3.4.C.**  
**Time Assigned for Contribution of Wood or Light Steel Frame**

Description of Frame	Time Assigned to Frame, min
Wood studs 400 mm o.c. maximum	20
Wood studs 600 mm o.c. maximum	15
Steel studs 400 mm o.c. maximum	10
Wood floor and wood roof joists 400 mm o.c. maximum	10
Open web steel joist floors and roofs with ceiling supports 400 mm o.c. maximum	10
Wood roof and wood floor truss assemblies 600 mm o.c. maximum	5

**4)** Preformed insulation of glass, rock or slag fibre provides additional protection to wood studs by shielding the studs from exposure to the fire and thus delaying the time of collapse. The use of reinforcement in the membrane exposed to fire also adds to the fire resistance by extending the time to failure. Table D-2.3.4.D. shows the time increments that may be added to the fire resistance if these features are incorporated in the assembly.

**Table D-2.3.4.D.**  
**Time Assigned for Additional Protection**

Description of Additional Protection	Time Assigned, min
Add to the fire-resistance rating of wood stud walls, sheathed with gypsum wallboard or lath and plaster, if the spaces between the studs are filled with preformed insulation of rock or slag fibres conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," and with a mass of not less than 1.22 kg/m <sup>2</sup> of wall surface <sup>(1)</sup>	15
Add to the fire-resistance rating of non-loadbearing wood stud walls, sheathed with gypsum wallboard or lath and plaster, if the spaces between the studs are filled with preformed insulation of glass fibres conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," and having a mass of not less than 0.6 kg/m <sup>2</sup> of wall surface	5
Add to the fire-resistance rating of plaster on gypsum lath ceilings if 0.76 mm diam wire mesh with 25 mm by 25 mm openings or 1.57 mm diam diagonal wire reinforcing at 250 mm o.c. is placed between lath and plaster	30
Add to the fire-resistance rating of plaster on gypsum lath ceilings if 76 mm wide metal lath strips are placed over joints between lath and plaster	10
Add to the fire-resistance rating of plaster on 9.5 mm thick gypsum lath ceilings (Table D-2.3.4.B.) if supports for lath are 300 mm o.c.	10

**Notes to Table D-2.3.4.D.:**

<sup>(1)</sup> There are no test data to justify the 15 min additional protection for preformed glass fibre insulation.

**5)** Cellulose fibre insulation conforming to CAN/ULC-S703, "Cellulose Fibre Insulation (CFI) for Buildings," applied in conformance with CAN/CGSB-92.2-M, "Trowel or Spray Applied Acoustical Material," does not affect the fire-resistance rating of a steel stud wall assembly, provided that it is sprayed to either face of the wall cavity.

**D-2.3.5. Considerations for Various Types of Assemblies**

**1)** Interior vertical fire separations shall be rated for exposure to fire on each side, and a membrane shall be provided on both sides of the assembly. In the calculation of the fire-resistance rating of such an assembly, however, no contribution to fire resistance can be assigned for a membrane on the non-fire-exposed side, since this membrane may fail when the structural members fail.

**2)** When an exterior wall assembly is required to be rated from the interior side only, such wall assemblies shall have an outer membrane consisting of sheathing and exterior cladding with spaces between the studs filled with insulation conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," and having a mass of not less than 1.22 kg/m<sup>2</sup> of wall surface.

**3)** In the case of a floor or roof, the standard test provides only for testing for fire exposure from below. Floor or roof assemblies of wood, light-gauge steel members or open-web steel joist framing shall have an upper membrane consisting of a subfloor and finish floor conforming to Table D-2.3.5. or any other membrane that has a contribution to fire resistance of not less than 15 min in Table D-2.3.4.A. For the purposes of this requirement, it is not necessary to comply with note (1) to Table D-2.3.4.A.

**Table D-2.3.5.**  
**Flooring or Roofing Membranes for Wood, Cold Formed Steel Members or Open-Web Steel Joists**

Type of Assembly	Structural Members	Subfloor or Roof Deck	Finish Flooring or Roofing
Floor	Wood or steel joists and wood trusses	12.5 mm plywood or 17 mm T & G softwood	Hardwood or softwood flooring on building paper  Resilient flooring, parquet floor, felted synthetic fibre floor coverings, carpeting, or ceramic tile on 8 mm thick panel-type underlay  Ceramic tile on 30 mm mortar bed
	Steel joists	50 mm reinforced concrete or 50 mm concrete on metal lath or formed steel sheet, or 40 mm reinforced gypsum-fibre concrete on 12.7 mm gypsum wallboard	Finish flooring
Roof	Wood or steel joists and wood trusses	12.5 mm plywood or 17 mm T & G softwood	Finish roofing material with or without insulation
	Steel joists	50 mm reinforced concrete or 50 mm concrete on metal lath or formed steel sheet, or 40 mm reinforced gypsum-fibre concrete on 12.7 mm gypsum wallboard	Finish roofing material with or without insulation

- 4)** Insulation used in the cavities of a wood floor assembly will not reduce the assigned fire-resistance rating of the assembly provided:
- a) the insulation is preformed of rock, slag or glass fibre conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," and having a mass of not more than 1.1 kg/m<sup>2</sup> and is installed adjacent to the bottom edge of the framing member, directly above steel furring channels,
  - b) the gypsum wallboard ceiling membrane is attached to
    - i) wood trusses in conformance with D-2.3.9.(2) by way of steel drywall furring channels spaced not more than 400 mm o.c., and the channels are secured to each bottom truss member with a double strand of 1.2 mm galvanized steel wire, or
    - ii) wood joists by way of drywall or resilient steel furring channels spaced not more than 400 mm o.c. in conformance with D-2.3.9.(2) and (3), and
  - c) a steel furring channel is installed midway between each furring channel mentioned in (b) to provide additional support for the insulation.

**D-2.3.6. Framing Members**

**1)** The values shown in Tables D-2.3.4.A., D-2.3.4.B. and D-2.3.12. apply to membranes supported on framing members installed in their conventional orientation and spaced in conformance with Table D-2.3.4.C.

**2)** Wood studs and wood roof and floor framing members are assumed to be not less than 38 mm by 89 mm. Wood trusses are assumed to consist of wood chord and web framing members and connector plates fabricated from not less than 1 mm thick galvanized steel with projecting teeth not less than 8 mm long. Dimensions for dressed lumber are given in CAN/CSA-O141, "Softwood Lumber."

**3)** The allowable spans for wood joists listed in Part 9 of Division B of this Code are provided for floors supporting specific occupancies.

**4)** Except as otherwise required in this Appendix, metal studs shall be of galvanized steel not less than 0.5 mm thick, not less than 63 mm wide and with a flange width of not less than 31 mm.

**5)** Metal studs in walls required to have a fire-resistance rating shall be installed with not less than 12 mm clearance between the top of the stud and the top of the runner to allow for expansion in the event of fire. Where attachment of the studs is necessary for alignment purposes during erection, such attachment shall be made to the bottom runners only.

**6)** Except as required in D-2.3.5.(4), resilient or drywall furring channels may be used to attach a gypsum wallboard ceiling membrane to a floor or roof assembly. The channels must be of galvanized steel not less than 0.5 mm thick, placed at a spacing of not more than 600 mm o.c. perpendicular to the framing members, with an overlap of not less than 100 mm at splices and a minimum end clearance between the channels and walls of 15 mm.

**D-2.3.7. Plaster Finish**

The thickness of plaster finish shall be measured from the face of gypsum or metal lath.

**D-2.3.8. Edge Support for Wallboard**

Gypsum wallboard installed over framing or furring shall be installed so that all edges are supported, except that 15.9 mm Type X gypsum wallboard may be installed horizontally with the horizontal joints unsupported when framing members are at 400 mm o.c. maximum.

**D-2.3.9. Membrane Fastening**

**1)** Except as provided in (2) to (6), the application of lath and plaster finish shall conform to CSA A82.30-M, "Interior Furring, Lathing and Gypsum Plastering," and gypsum wallboard finish shall conform to CSA A82.31-M, "Gypsum Board Application."

**2)** Where a membrane referred to in Tables D-2.3.4.A., D-2.3.4.B. and D-2.3.12. is applied to steel framing or furring, fasteners shall penetrate not less than 10 mm through the metal.

**3)** Except as provided in (4) and (5) where a membrane referred to in Tables D-2.3.4.A., D-2.3.4.B. and D-2.3.12. is applied to wood framing or furring, minimum fastener penetrations into wood members shall conform to Table D-2.3.9. for the time assigned to the membrane.

**Table D-2.3.9.**  
**Minimum Fastener Penetrations for Membrane Protection on Wood Frame, mm**

Type of Membrane	Assigned Contribution of Membrane to Fire Resistance <sup>(1)</sup> , min					
	5 – 25	30 – 35	40	50	55 – 70	80
Single layer	20	29	32	—	—	—
Double layer	20	20	20	29	35	44
Gypsum lath	20	20	23	23	29	29

**Notes to Table D-2.3.9.:**

(1) Assigned contributions of membranes to fire resistance are determined in Tables D-2.3.4.A., D-2.3.4.B. and D-2.3.12.

**4)** Where a membrane is applied in 2 layers, the fastener penetrations described in Table D-2.3.9. shall apply to the base layer. Fasteners for the face layer shall penetrate not less than 20 mm into wood supports.

**5)** Where adhesives are used to attach the face layer of gypsum wallboard in a double layer application for walls, the top and bottom of the face layer shall be secured to the supports by mechanical fasteners having lengths as required in (2) and (4) and spaced not more than 150 mm o.c. for wood supports and not more than 200 mm o.c. for steel supports.

**6)** In a double layer application of gypsum wallboard on wood supports, fastener spacing shall conform to CSA A82.31-M, "Gypsum Board Application."

**D-2.3.10. Ceiling Membrane Openings – Combustible Construction**

1) Except as permitted in D-2.3.12., where a floor or roof assembly of combustible construction is assigned a fire-resistance rating on the basis of D-2.3. and incorporates a ceiling membrane described in Table D-2.3.4.A. or D-2.3.4.B., the ceiling membrane may be penetrated by openings leading to ducts within concealed spaces above the membrane provided:

- a) the assembly is not required to have a fire-resistance rating in excess of 1 h,
- b) the area of any openings does not exceed 930 cm<sup>2</sup> (see (2)),
- c) the aggregate area of openings does not exceed 1% of the ceiling area of the fire compartment,
- d) the depth of the concealed space above the ceiling is not less than 230 mm,
- e) no dimension of any opening exceeds 310 mm,
- f) supports are provided for openings with any dimension exceeding 150 mm where framing members are spaced greater than 400 mm o.c.,
- g) individual openings are spaced not less than 2 m apart,
- h) the ducts above the membrane are sheet steel and are supported by steel strapping firmly attached to the framing members, and
- i) the clearance between the top surface of the membrane and the bottom surface of the ducts is not less than 100 mm.

- 2) Where an individual opening permitted in (1) exceeds 130 cm<sup>2</sup> in area, it shall be protected by
- a) a fire stop flap conforming to D-5.3., or
  - b) thermal protection above the duct consisting of the same materials as used for the ceiling membrane, mechanically fastened to the ductwork and extending 200 mm beyond the opening on all sides (see Figure D-2.3.10.).

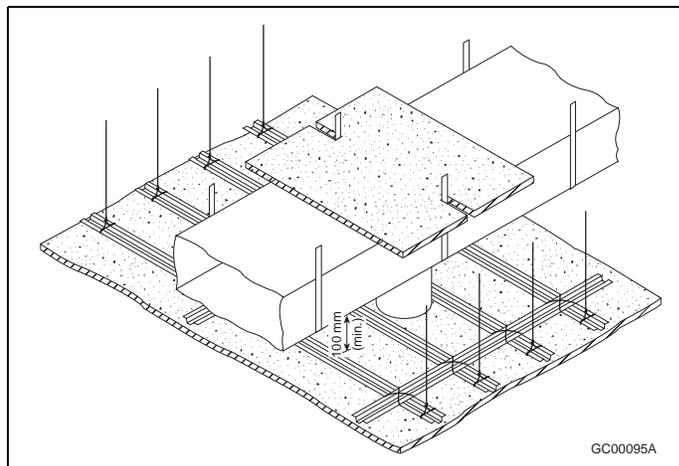


Figure D-2.3.10.  
Thermal protection above a duct

**D-2.3.11. Ceiling Membrane Openings – Noncombustible Construction**

1) Except as permitted in D-2.3.12., where a floor or roof assembly of noncombustible construction is assigned a fire-resistance rating on the basis of D-2.3. and incorporates a ceiling membrane described in Table D-2.3.4.A. or D-2.3.4.B., the ceiling membrane may be penetrated by openings leading to ducts located within concealed spaces provided:

- a) the area of any opening does not exceed 930 cm<sup>2</sup> (see (2)),
- b) the aggregate area of openings does not exceed 2% of the ceiling area of the fire compartment,
- c) no dimension of any opening exceeds 400 mm,
- d) individual openings are spaced not less than 2 m apart,
- e) openings are located not less than 200 mm from major structural members such as beams, columns or joists,
- f) the ducts above the membrane are sheet steel and are supported by steel strapping firmly attached to the framing members, and
- g) the clearance between the top surface of the membrane and the bottom surface of the duct is not less than 100 mm.

- 2) Where an individual opening permitted in (1) exceeds 130 cm<sup>2</sup> in area, it shall be protected by

- a) a fire stop flap conforming to D-5.3., or
- b) thermal protection above the duct consisting of the same materials as used for the ceiling membrane, mechanically fastened to the ductwork and extending 200 mm beyond the opening on all sides (see Figure D-2.3.10.).

**D-2.3.12. Ceiling Membrane Rating**

Where the fire-resistance rating of a ceiling assembly is to be determined on the basis of the membrane only and not of the complete assembly, the ratings may be determined from Table D-2.3.12., provided no openings are located within the ceiling membrane.

**Table D-2.3.12.  
Fire-Resistance Rating for Ceiling Membranes**

Description of Membrane	Fire-Resistance Rating, min
15.9 mm Type X gypsum wallboard with ≥ 75 mm mineral wool batt insulation above wallboard	30
19 mm gypsum-sand plaster on metal lath	30
Double 14.0 mm Douglas Fir plywood phenolic bonded	30
Double 12.7 mm Type X gypsum wallboard	45
25 mm gypsum-sand plaster on metal lath	45
Double 15.9 mm Type X gypsum wallboard	60
32 mm gypsum-sand plaster on metal lath	60

**D-2.3.13. Beams**

**1)** Where a beam is included with an open-web steel joist or similar construction and is protected by the same continuous ceiling, the beam is assumed to have a fire-resistance rating equal to that assigned to the rest of the assembly.

**2)** The ratings in this Appendix assume that the construction to which the beam is related is a normal one and does not carry unusual loads from the floor or slab above.

**D-2.3.14. Wired Glass Assembly Support**

**1)** Openings in a vertical fire separation having a fire-resistance rating of not more than 1 h are allowed to be protected by wired glass assemblies, provided the wired glass is

- a) not less than 6 mm thick;
- b) reinforced by a steel wire mesh in the form of diamonds, squares or hexagons having dimensions of
  - i) approximately 25 mm across the flats, using wire of not less than 0.45 mm diam, or
  - ii) approximately 13 mm across the flats, using wire of not less than 0.40 mm diam, the wire to be centrally embedded during manufacture and welded or intertwined at each intersection;
- c) set in fixed steel frames with metal not less than 1.35 mm thick and providing a glazing stop of not less than 20 mm on each side of the glass; and
- d) limited in area so that
  - i) individual panes are not more than 0.84 m<sup>2</sup>, with neither height nor width more than 1.4 m, and
  - ii) the area not structurally supported by mullions is not more than 7.5 m<sup>2</sup>.

**2)** It is intended that the structural mullions referred to in Subclause (1)(d)(ii) will not distort or be displaced to the extent that there would be a failure of the wired glass closure during the period for which a closure in the fire separation would be expected to function. Hollow structural steel tubing not less than 100 mm square filled with a Portland cement-based grout will satisfy the intent of the Subclause.

## D-2.4. Solid Wood Walls, Floors and Roofs

### D-2.4.1. Minimum Thickness

The minimum thickness of solid wood walls, floors and roofs for fire-resistance ratings from 30 min to 1.5 h is shown in Table D-2.4.1.

**Table D-2.4.1.**  
Minimum Thickness of Solid Wood Walls, Roofs and Floors, mm<sup>(1)(2)</sup>

Type of Construction	Fire-Resistance Rating			
	30 min	45 min	1 h	1.5 h
Solid wood floor with building paper and finish flooring on top <sup>(3)</sup>	89	114	165	235
Solid wood, splined or tongued and grooved floor with building paper and finish flooring on top <sup>(4)</sup>	64	76	—	—
Solid wood walls of loadbearing vertical plank <sup>(3)</sup>	89	114	140	184
Solid wood walls of non-loadbearing horizontal plank <sup>(3)</sup>	89	89	89	140

#### Notes to Table D-2.4.1.:

- (1) See CAN/CSA-O141, "Softwood Lumber," for sizes.
- (2) The fire-resistance ratings and minimum dimensions for floors also apply to solid wood roof decks of comparable thickness with finish roofing material.
- (3) The assembly shall consist of 38 mm thick members on edge fastened together with 101 mm common wire nails spaced not more than 400 mm o.c. and staggered in the direction of the grain.
- (4) The floor shall consist of 64 mm by 184 mm wide planks either tongued and grooved or with 19 mm by 38 mm splines set in grooves and fastened together with 88 mm common nails spaced not more than 400 mm o.c.

### D-2.4.2. Increased Fire-Resistance Rating

**1)** The fire-resistance rating of the assemblies described in Table D-2.4.1. may be increased by 15 min if one of the following finishes is applied on the fire-exposed side:

- a) 12.7 mm thick gypsum wallboard,
- b) 20 mm thick gypsum-sand plaster on metal lath, or
- c) 13 mm thick gypsum-sand plaster on 9.5 mm gypsum lath.

**2)** Fastening of the plaster to the wood structure shall conform to D-2.3.

### D-2.4.3. Supplementary Ratings

Supplementary ratings based on tests are included in Table D-2.4.3. The ratings given shall apply to constructions that conform in all details with the descriptions given.

**Table D-2.4.3.**  
Fire-Resistance Rating of Non-Loadbearing Built-up Solid Wood Partitions<sup>(1)</sup>

Construction Details	Actual Overall Thickness, mm	Fire-Resistance Rating
Solid panels of wood boards 64 mm to 140 mm wide grooved and joined with wood splines, nailed together, boards placed vertically with staggered joints, 3 boards thick	58	30 min
Solid panels with 4 mm plywood facings <sup>(2)</sup> glued to 46 mm solid wood core of glued, tongued and grooved construction for both sides and ends of core pieces with tongued and grooved rails in the core about 760 mm apart	54	1 h

#### Notes to Table D-2.4.3.:

- (1) The ratings and notes are taken from "Fire Resistance Classifications of Building Constructions," Building Materials and Structures Report BMS 92, National Bureau of Standards, Washington, 1942.
- (2) Ratings for plywood faced panel are based on phenolic resin glue being used for gluing facings to wood frames. If other types of glue are used for this purpose, the ratings apply if the facings are nailed to the frames in addition to being glued.

**D-2.5. Solid Plaster Partitions**

**D-2.5.1. Minimum Thickness**

The minimum thickness of solid plaster partitions for fire-resistance ratings from 30 min to 4 h is shown in Table D-2.5.1.

**Table D-2.5.1.**  
**Minimum Thickness of Non-Loadbearing Solid Plaster Partitions, mm**

Type of Plaster on Metal Lath <sup>(1)</sup>	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Portland cement-sand <sup>(2)</sup> or Portland cement-lime-sand	50 <sup>(3)</sup>	—	—	—	—	—	—
Gypsum-sand	50 <sup>(3)</sup>	50 <sup>(3)</sup>	64	—	—	—	—
Gypsum-vermiculite, gypsum-perlite, Portland cement-vermiculite or Portland cement-perlite	50 <sup>(3)</sup>	50 <sup>(3)</sup>	50 <sup>(3)</sup>	58	64	83	102

**Notes to Table D-2.5.1.:**

- (1) Metal lath shall be expanded metal lath or welded woven wire fabric supported on 19 mm vertical light steel studs spaced not more than 600 mm o.c. Plaster shall be applied to both sides of the lath.
- (2) For mixture of Portland cement-sand plaster, see D-1.7.2.(2).
- (3) CSA A82.30-M, "Interior Furring, Lathing and Gypsum Plastering," does not permit solid plaster partitions less than 50 mm thick.

**D-2.6. Protected Steel Columns**

**D-2.6.1. Minimum Thickness of Protective Covering**

The minimum thickness of protective covering to steel columns is shown in Tables D-2.6.1.A. to D-2.6.1.F. for fire-resistance ratings from 30 min to 4 h.

**Table D-2.6.1.A.**  
**Minimum Thickness of Concrete or Masonry Protection to Steel Columns, mm**

Description of Cover	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Monolithic concrete							
Type S concrete <sup>(1)</sup> (column spaces filled) <sup>(2)</sup>	25	25	25	25	39	64	89
Type N or L concrete <sup>(1)</sup> (column spaces filled) <sup>(2)</sup>	25	25	25	25	32	50	77
Concrete masonry units <sup>(3)</sup> or precast reinforced concrete units							
Type S concrete (column spaces not filled)	50	50	50	50	64	89	115
Type N or L concrete (column spaces not filled)	50	50	50	50	50	77	102
Clay or shale brick <sup>(4)</sup> (column spaces filled) <sup>(2)</sup>	50	50	50	50	50	64	77
Clay or shale brick <sup>(4)</sup> (column spaces not filled)	50	50	50	50	50	77	102
Hollow clay tile <sup>(5)</sup> (column spaces filled) <sup>(2)</sup>	50 <sup>(6)</sup>	50 <sup>(6)</sup>	50 <sup>(6)</sup>	50 <sup>(6)</sup>	<sup>(7)</sup>	<sup>(7)</sup>	<sup>(7)</sup>
Hollow clay tile <sup>(5)</sup> (column spaces not filled)	50 <sup>(6)</sup>	50 <sup>(6)</sup>	50 <sup>(6)</sup>	—	—	—	—

**Notes to Table D-2.6.1.A.:**

- (1) Applies to cast-in-place concrete reinforced with 5.21 mm diam wire wrapped around column spirally 200 mm o.c., or 1.57 mm diam wire mesh with 100 mm by 100 mm openings.
- (2) The space between the protective covering and the web or flange of the column shall be filled with concrete, cement mortar or a mixture of cement mortar and broken bricks.
- (3) Concrete masonry shall be reinforced with 5.21 mm diam wire or wire mesh with 1.19 mm diam wire and 10 mm by 10 mm openings, laid in every second course.

Table D-2.6.1.A. (Continued)

- (4) Brick cover 77 mm thick or less shall be reinforced with 2.34 mm diam wire or 1.19 mm diam wire mesh with 10 mm by 10 mm openings, laid in every second course.
- (5) Hollow clay tiles and masonry mortar shall be reinforced with 1.19 mm diam wire mesh with 10 mm by 10 mm openings, laid in every horizontal joint and lapped at corners.
- (6) Hollow clay tiles shall conform to CSA A82.5-M, "Structural Clay Non-Load-Bearing Tile."
- (7) 50 mm nominal hollow clay tile, reinforced with 1.19 mm diam wire mesh with 10 mm by 10 mm openings laid in every horizontal joint and covered with 19 mm gypsum-sand plaster and with limestone concrete fill in column spaces, has a 4 h fire-resistance rating.

**Table D-2.6.1.B.**  
**Minimum Thickness of Plaster Protection to Steel Columns, mm**

Description	Fire-Resistance Rating <sup>(1)(2)</sup>						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Gypsum-sand plaster on 9.5 mm gypsum lath <sup>(3)</sup>	13	13	13	20	—	—	—
Gypsum-perlite or vermiculite plaster on 9.5 mm gypsum lath <sup>(3)</sup>	13	13	13	20	25	—	—
Gypsum perlite or vermiculite plaster on 12.7 mm gypsum lath <sup>(3)</sup>	13	13	13	20	25	32	50
Gypsum perlite or vermiculite plaster on double 12.7 mm gypsum lath <sup>(3)</sup>	13	13	13	20	25	25	32
Portland cement-sand plaster on metal lath <sup>(4)(5)</sup>	25	25	25	—	—	—	—

**Notes to Table D-2.6.1.B.:**

- (1) Fire-resistance ratings of 30 min and 45 min apply to columns whose M/D ratio is 30 or greater. Fire-resistance ratings greater than 45 min apply to columns whose M/D ratio is greater than 60. Where the M/D ratio is between 30 and 60 and the required fire-resistance rating is greater than 45 min, the total thickness of protection specified in the Table shall be increased by 50%. (To determine M/D, refer to D-2.6.4.)
- (2) Where the thickness of plaster over gypsum lath is 25 mm or more, wire mesh with 1.57 mm diam wire and openings not exceeding 50 mm by 50 mm shall be placed midway in the plaster.
- (3) Lath held in place by 1.19 mm diam wire wrapped around lath 450 mm o.c.
- (4) Expanded metal lath 1.36 kg/m<sup>2</sup> fastened to 9.5 mm by 19 mm steel channels held in vertical position around column by 1.19 mm diam wire ties.
- (5) For mixture of Portland cement-sand plaster, see D-1.7.2.(2).

**Table D-2.6.1.C.**  
**Minimum Thickness of Gypsum-Sand Plaster on Metal Lath Protection to Steel Columns, mm**

M/D <sup>(1)</sup>	Fire-Resistance Rating					
	30 min	45 min	1 h	1.5 h	2 h	3 h
30 to 60	16	16	32	—	—	—
over 60 to 90	16	16	16	32	—	—
over 90 to 120	16	16	16	25	39	—
over 120 to 180	16	16	16	16	25	—
over 180	16	16	16	16	25	39

**Notes to Table D-2.6.1.C.:**

- (1) To determine the M/D ratio, refer to D-2.6.4.

**Table D-2.6.1.D.**  
**Minimum Thickness of Gypsum-Perlite or Gypsum-Vermiculite Plaster on Metal Lath Protection to Steel Columns, mm**

M/D <sup>(1)</sup>	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
30 to 60	16	16	20	32	35	—	—
over 60 to 90	16	16	16	20	26	35	45
over 90 to 120	16	16	16	16	26	35	45
over 120 to 180	16	16	16	16	20	32	35
over 180	16	16	16	16	16	26	35

**Notes to Table D-2.6.1.D.:**

(1) To determine the M/D ratio, refer to D-2.6.4.

**Table D-2.6.1.E.**  
**Steel Columns with Sheet-Steel Membrane and Insulation as Shown in Figures D-2.6.1-A. and D-2.6.1-B.**

Type of Protection	Steel Thickness, <sup>(1)</sup> mm	Fastening <sup>(2)</sup>	Insulation	Fire-Resistance Rating
See Figure D-2.6.1.-A	0.51	No. 8 sheet-metal screws 9.5 mm long, 200 mm o.c.	50 mm mineral wool batts <sup>(3)</sup>	45 min
See Figure D-2.6.1.-B	0.64	Self-threading screws or No. 8 sheet-metal screws, 600 mm o.c.	2 layers 12.7 mm gypsum wallboard	1.5 h
See Figure D-2.6.1.-A	0.64	No. 8 sheet-metal screws, 9.5 mm long 200 mm o.c.	75 mm mineral wool batts, <sup>(3)</sup> 12.7 mm gypsum wallboard	2 h
See Figure D-2.6.1.-B	0.76	Crimped joint or No. 8 sheet-metal screws, 300 mm o.c.	2 layers 15.9 mm gypsum wallboard	2 h

**Notes to Table D-2.6.1.E.:**

(1) Minimum thickness, galvanized or wiped-zinc-coated sheet-steel.

(2) Sheet-steel shall be securely fastened to the floor and superstructure, or where sheet-steel cover does not extend floor to floor, fire stopping shall be provided at the level where sheet-steel protection ends. In the latter case, an alternate type of fire protection shall be applied between the fire stopping and the superstructure.

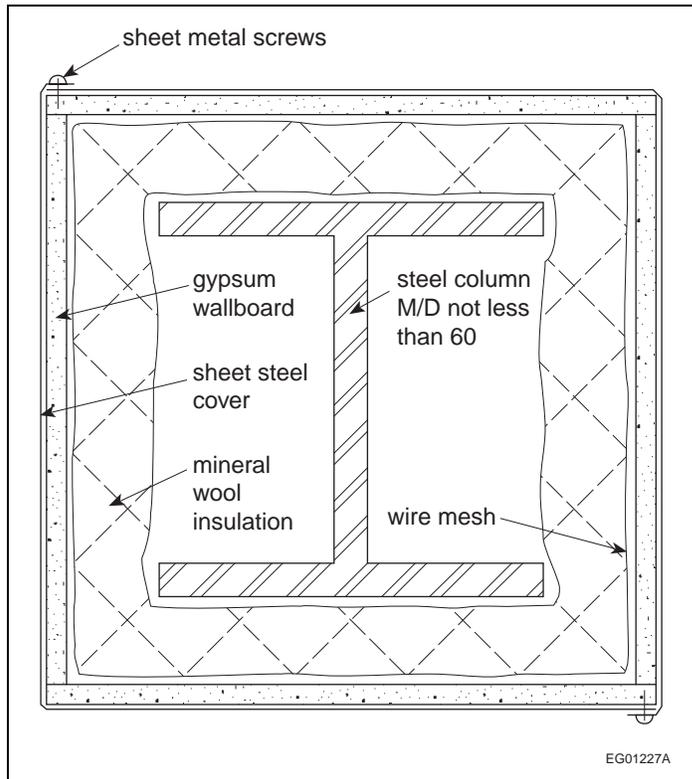
(3) Conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," Type 1A, minimum density 30 kg/m<sup>3</sup>: column section and batts wrapped with 25 mm mesh chicken wire.

**Table D-2.6.1.F.**  
**Minimum M/D Ratio for Steel Columns Covered with Type X Gypsum Wallboard Protection<sup>(1)</sup>**

Minimum Thickness of Type X Gypsum Wallboard Protection, <sup>(2)</sup> mm	Fire-Resistance Rating			
	1 h	1.5 h	2 h	3 h
12.7	75	—	—	—
15.9	55	—	—	—
25.4	35	60	—	—
28.6	35	50	—	—
31.8	35	40	75	—
38.1	35	35	55	—
41.3	35	35	45	—
44.5	35	35	35	—
47.6	35	35	35	—
50.8	35	35	35	75
63.5	35	35	35	45

**Notes to Table D-2.6.1.F.:**

- (1) To determine the M/D ratio, refer to D-2.6.4.
- (2) See D-2.6.5.



**Figure D-2.6.1.-A**  
**Column protected by sheet-steel membrane and mineral-wool insulation**

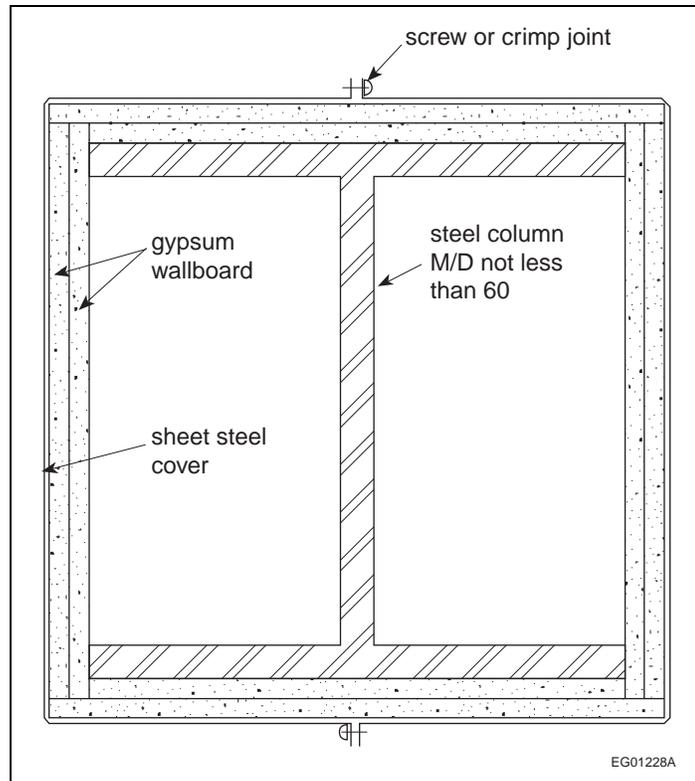


Figure D-2.6.1.-B  
Column protected by sheet-steel membrane and gypsum wallboard

**D-2.6.2. Hollow Unit Masonry Columns**

For hollow-unit masonry column protection, the thickness shown in Tables D-2.6.1.A. to D-2.6.1.D. is the equivalent thickness as described in D-1.6.

**D-2.6.3. Effect of Plaster**

The effect on fire-resistance ratings of the addition of plaster to masonry and monolithic concrete column protection is described in D-1.7.

**D-2.6.4. Determination of M/D Ratio**

1) The ratio M/D to which reference is made in Tables D-2.6.1.B., D-2.6.1.C., D-2.6.1.D. and D-2.6.1.F. shall be found by dividing “M,” the mass of the column in kilograms per metre by “D,” the heated perimeter of the steel column section in metres.

2) The heated perimeter “D” of steel columns, shown as the dashed line in Figure D-2.6.4.-A, shall be equal to 2 (B+H) in Examples (1) and (2), and 3.14B in Example (3). In Figure D-2.6.4.-B, the heated perimeter “D” shall be equal to 2 (B+H).

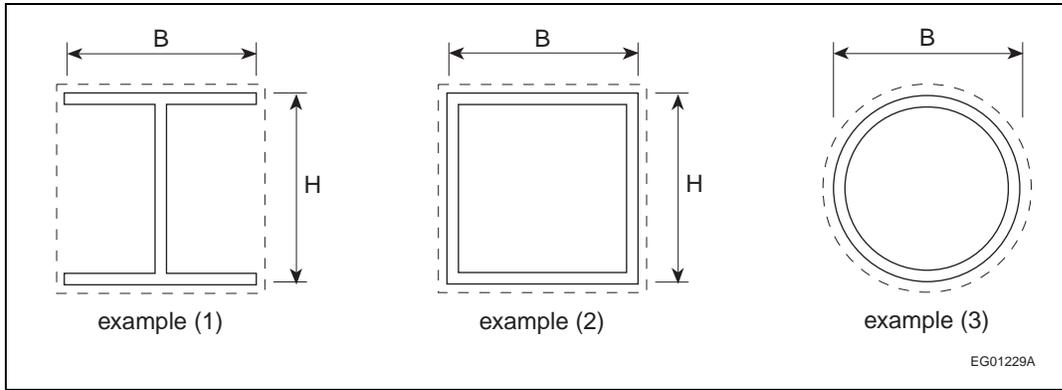


Figure D-2.6.4.-A  
 Example (1), standard or wide-flange beam; Example (2), hollow structural section (rectangular or square); Example (3), hollow structural section (round)

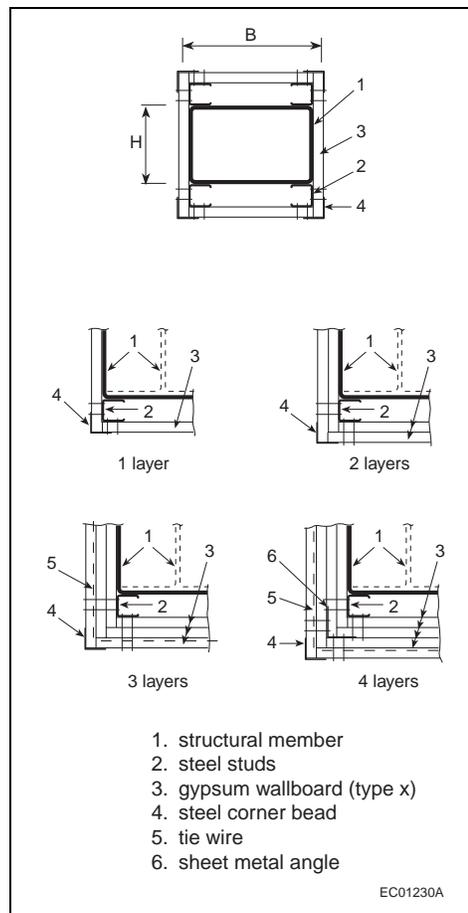


Figure D-2.6.4.-B  
 Columns protected by Type X gypsum wallboard without sheet-steel membrane

**D-2.6.5. Attachment of Gypsum Wallboard**

1) Where Type X gypsum wallboard is used to protect a steel column without an outside sheet-steel membrane, the method of wallboard attachment to the column shall be as shown in Figure D-2.6.4.-B and shall meet the construction details described in (2) to (7).

2) The Type X gypsum wallboard shall be applied vertically without horizontal joints.

**3)** The first layer of wallboard shall be attached to steel studs with screws spaced not more than 600 mm o.c. and other layers of wallboard shall be attached to steel studs and steel corner beads with screws spaced at a maximum of 300 mm o.c. Where a single layer of wallboard is used, attachment screws shall be spaced not more than 300 mm o.c.

**4)** Steel tie wires spaced at a maximum of 600 mm o.c. shall be used to secure the second last layer of wallboard in 3- and 4-layer systems.

**5)** Studs shall be fabricated of galvanized steel not less than 0.53 mm thick and not less than 41.3 mm wide, with legs not less than 33.3 mm long and shall be 12.7 mm less than the assembly height.

**6)** Corner beads shall

- a) be fabricated of galvanized steel that is not less than 0.41 mm thick,
- b) have legs not less than 31 mm long,
- c) be attached to the wallboard or stud with 25.4 mm screws spaced not more than 300 mm o.c., and
- d) have the attaching fasteners penetrate either another corner bead in multiple layer assemblies or the steel stud member.

**7)** In a 4-layer system, metal angles shall be fabricated of galvanized steel and shall be not less than 0.46 mm thick with legs not less than 51 mm long.

#### D-2.6.6. Concrete Filled Hollow Steel Columns

**1)** A fire-resistance rating, R, is permitted to be assigned to concentrically loaded hollow steel columns that are filled with plain concrete, steel-fibre reinforced concrete or bar-reinforced concrete, that are fabricated and erected within the tolerances stipulated in CAN/CSA-S16, "Limit States Design of Steel Structures," and that comply with Sentences (2) and (3), provided:

$$C \leq C_{\max}$$

where

C = axial compressive force due to dead and live loads without load factors, kN,

$$C_{\max} = \left( \frac{a (f'_c + 20) D^{2.5}}{R (KL - 1000)} \right)^2$$

but shall not exceed

- 1.0  $C'_r$  for plain concrete filling (PC),
- 1.1  $C'_r$  for steel-fibre reinforced concrete filling (FC), and
- 1.7  $C'_r$  for bar-reinforced concrete filling (RC),

where

$C'_r$  = factored compressive resistance of the concrete core in accordance with CAN/CSA-S16, "Limit States Design of Steel Structures,"

where

a = constant obtained from Table D-2.6.6.A.,

$f'_c$  = specified compressive strength of concrete in accordance with CSA A23.3, "Design of Concrete Structures," MPa,

D = outside diameter of a round column or outside width of a square column, mm,

R = specified fire-resistance rating, min, and

KL = effective length of column as defined in CAN/CSA-S16, "Limit States Design of Steel Structures," mm,

subject to the validity limits stated in Table D-2.6.6.B.

**2)** A pair of steam vent holes shall be provided at each end of the hollow steel column and at each intermediate floor level, and the holes shall be

- a) not less than 13 mm in diameter,
- b) located on opposite faces, 150 mm above or below a base plate, cap plate or concrete slab,
- c) orientated so that adjacent pairs are perpendicular, and
- d) not obstructed by other building elements.

**3)** Load application and reaction shall be through end bearing in accordance with CAN/CSA-S16, "Limit States Design of Steel Structures."

**Table D-2.6.6.A.**  
**Values of Constant "a"**

Filling Type	Concrete Type <sup>(1)</sup>	Steel Reinforcement	Circular Columns	Square Columns
PC	S	n/a	0.070	0.060
FC	S	≈ 2%	0.075	0.065
RC	S	1.5%-3%	0.080	0.070
RC	S	3%-5%	0.085	0.075
PC	N	n/a	0.080	0.070
FC	N	≈ 2%	0.085	0.075
RC	N	1.5%-3%	0.090	0.080
RC	N	3%-5%	0.095	0.085

**Notes to Table D-2.6.6.A.:**

(1) See Subsection D-1.4., Types of Concrete.

**Table D-2.6.6.B.**  
**Validity Limits**

Parameter	Type of Concrete Filling		
	PC	FC	RC
$f'_c$ (MPa)	20 to 40	20 to 55	20 to 55
D (round) (mm)	140 to 410	140 to 410	165 to 410
D (square) (mm)	140 to 305	102 to 305	175 to 305
Reinforcement (%)	n/a	≈ 2% of the concrete mix by mass	1.5% to 5% of cross-sectional area <sup>(1)</sup>
Concrete Cover (mm)	n/a	n/a	≥ 25
R (min)	≤ 120	≤ 180	≤ 180
KL (mm)	2 000 to 4 000	2 000 to 4 500	2 000 to 4 500
Class <sup>(2)</sup>	1, 2 or 3	1, 2 or 3	1, 2 or 3

**Notes to Table D-2.6.6.B.:**

(1) Limits on size, number and spacing of bars and ties in accordance with CSA A23.3, "Design of Concrete Structures."

(2) Classification of sections in accordance with CAN/CSA-S16, "Limit States Design of Steel Structures."

## D-2.7. Individually Protected Steel Beams

### D-2.7.1. Minimum Thickness of Protective Covering

The minimum thickness of protective covering on steel beams exposed to fire on 3 sides for fire-resistance ratings from 30 min to 4 h is shown in Table D-2.7.1.

**Table D-2.7.1.**  
**Minimum Thickness of Cover to Individual Protected Steel Beams, mm<sup>(1)</sup>**

Description of Cover	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S concrete <sup>(2)</sup> (beam spaces filled solid)	25	25	25	25	32	50	64
Type N or L concrete <sup>(2)</sup> (beam spaces filled solid)	25	25	25	25	25	39	50
Gypsum-sand plaster on 9.5 mm gypsum lath <sup>(3)</sup>	13	13	13	20	—	—	—
Gypsum-perlite or vermiculite plaster on 9.5 mm gypsum lath <sup>(3)</sup>	13	13	13	13	25	—	—
Gypsum-perlite or gypsum-vermiculite on 12.7 mm gypsum lath <sup>(3)</sup>	13	13	13	20	25	39	50
Gypsum-perlite or vermiculite plaster on double 12.7 mm gypsum lath <sup>(3)</sup>	13	13	13	20	25	25	39
Portland cement-sand on metal lath <sup>(4)</sup>	23	23	23	—	—	—	—
Gypsum-sand on metal lath <sup>(4)</sup> (plaster in contact with lower flange)	16	20	25	39	—	—	—
Gypsum-sand on metal lath with air gap between plaster and lower flange <sup>(4)</sup>	16	16	16	25	25	—	—
Gypsum-perlite or gypsum-vermiculite on metal lath <sup>(4)</sup>	16	16	16	23	23	35	48 <sup>(5)</sup>

**Notes to Table D-2.7.1.:**

- (1) Where the thickness of plaster finish applied over gypsum lath is 26 mm or more, the plaster shall be reinforced with wire mesh with 1.57 mm diam wire and 50 mm by 50 mm openings placed midway in the plaster.
- (2) Applies to cast-in-place concrete reinforced by 5.21 mm diam wire spaced 200 mm o.c. or 1.57 mm diam wire mesh with 100 mm by 100 mm openings.
- (3) Lath held in place by 1.18 mm diam wire wrapped around the gypsum lath 450 mm o.c.
- (4) Expanded metal lath 1.63 kg/m<sup>2</sup> fastened to 9.5 mm by 19 mm steel channels held in position by 1.19 mm diam wire.
- (5) Plaster finish shall be reinforced with wire mesh with 1.57 mm diam wire and 50 mm by 50 mm openings placed midway in the plaster.

**D-2.7.2. Types of Concrete**

Concrete is referred to as Type S, N or L, depending on the nature of the aggregate used. This is described in D-1.4.1.

**D-2.7.3. Effect of Plaster**

The effect on fire-resistance ratings of the addition of plaster finish to concrete or masonry beam protection is described in D-1.7.1.

**D-2.7.4. Exceptions**

The fire resistance of protected steel beams depends on the means used to hold the protection in place. Because of the importance of this factor, no rating has been assigned in Table D-2.7.1. to masonry units used as protective cover to steel beams. These ratings, however, may be determined on the basis of comparison with column protection at the discretion of the authority having jurisdiction, if satisfactory means of fastening are provided.

**D-2.7.5. Beam Protected by a Membrane**

A steel beam or steel joist assembly that is entirely above a horizontal ceiling membrane will be protected from fire below the membrane and will resist structural collapse for a period equal to the fire-resistance rating determined in conformance with D-2.3. The support for this membrane shall be equivalent to that described in D-2.3. The rating on this basis shall not exceed 1.5 h.

## D-2.8. Reinforced Concrete Columns

### D-2.8.1. Minimum Dimensions

Minimum dimensions for reinforced concrete columns and minimum concrete cover for vertical steel reinforcement are obtained from D-2.8.2. to D-2.8.5., taking into account the type of concrete, the effective length of the column and the area of the vertical reinforcement.

### D-2.8.2. Method

- 1) The minimum dimension,  $t$ , in millimetres, of a rectangular reinforced concrete column shall be equal to
- $75 f (R + 1)$  for all Types L and L40S concrete,
  - $80 f (R + 1)$  for Type S concrete when the design condition of the concrete column is defined in the second and fourth columns of Table D-2.8.2.,
  - $80 f (R + 0.75)$  for Type N concrete when the design condition of the concrete column is defined in the second and fourth columns of Table D-2.8.2., and
  - $100 f (R + 1)$  for Types S and N concrete when the design condition of the concrete column is defined in the third column of Table D-2.8.2.

where

- $f$  = the value shown in Table D-2.8.2.,
- $R$  = the required fire-resistance rating in hours,
- $k$  = the effective length factor obtained from CSA A23.3, "Design of Concrete Structures,"
- $h$  = the unsupported length of the column in metres, and
- $p$  = the area of vertical reinforcement in the column as a percentage of the column area.

- 2) The diameter of a round column shall be not less than 1.2 times the value  $t$  determined in (1) for a rectangular column.

**Table D-2.8.2.**  
Values of Factor  $f$ <sup>(1)</sup>

Overdesign Factor <sup>(2)</sup>	Values of Factor $f$ to be Used in Applying D-2.8.2.		
	Where $kh$ is not more than 3.7 m	Where $kh$ is more than 3.7 m but not more than 7.3 m	
		$t$ is not more than 300 mm, $p$ is not more than 3% <sup>(3)</sup>	All other cases <sup>(4)</sup>
1.00	1.0	1.2	1.0
1.25	0.9	1.1	0.9
1.50	0.83	1.0	0.83

#### Notes to Table D-2.8.2.:

- (1) For conditions that do not fall within the limits described in Table D-2.8.2., further information may be obtained from Reference (7) in D-6.1.
- (2) Overdesign factor is the ratio of the calculated load carrying capacity of the column to the column strength required to carry the specified loads determined in conformance with CSA A23.3, "Design of Concrete Structures."
- (3) Where the factor  $f$  results in a  $t$  greater than 300 mm, the appropriate factor  $f$  for "All other cases" shall be applicable.
- (4) Where  $p$  is equal to or less than 3% and the factor  $f$  results in a  $t$  less than 300 mm, the minimum thickness shall be 300 mm.

### D-2.8.3. Minimum Thickness of Concrete Cover

1) Where the required fire-resistance rating of a concrete column is 3 h or less, the minimum thickness in millimetres of concrete cover over vertical steel reinforcement shall be equal to 25 times the number of hours of fire resistance required or 50 mm, whichever is less.

2) Where the required fire-resistance rating of a concrete column is greater than 3 h, the minimum thickness in millimetres of concrete cover over vertical steel reinforcement shall be equal to 50 plus 12.5 times the required number of hours of fire resistance in excess of 3 h.

3) Where the concrete cover over vertical steel required in (2) exceeds 62.5 mm, wire mesh reinforcement with 1.57 mm diameter wire and 100 mm openings shall be incorporated midway in the concrete cover to retain the concrete in position.

**D-2.8.4. Minimum Requirements**

The structural design standards may require minimum column dimensions or concrete cover over vertical steel reinforcement differing from those obtained in D-2.8.2.(1) and D-2.8.2.(2). Where a difference occurs, the greater dimension shall govern.

**D-2.8.5. Addition of Plaster**

The addition of plaster finish to the concrete column may be taken into account in determining the cover over vertical steel reinforcement by applying the multiplying factors described in D-1.7. The addition of plaster shall not, however, justify any decrease in the minimum column sizes shown.

**D-2.8.6. Built-in Columns**

The fire-resistance rating of a reinforced concrete column that is built into a masonry or concrete wall so that not more than one face may be exposed to the possibility of fire at one time may be determined on the basis of cover to vertical reinforcing steel alone. In order to meet this condition, the wall shall conform to D-2.1. for the fire-resistance rating required.

**D-2.9. Reinforced Concrete Beams**

**D-2.9.1. Minimum Cover Thickness**

The minimum thickness of cover over principal steel reinforcement in reinforced concrete beams is shown in Table D-2.9.1. for fire-resistance ratings from 30 min to 4 h where the width of the beam or joist is at least 100 mm.

**Table D-2.9.1.**  
**Minimum Cover to Principal Steel Reinforcement in Reinforced Concrete Beams, mm**

Type of Concrete	Fire-Resistance Rating						
	30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S, N or L	20	20	20	25	25	39	50

**D-2.9.2. Maximum Rating**

No rating over 2 h may be assigned on the basis of Table D-2.9.1. to a beam or joist where the average width of the part that projects below the slab is less than 140 mm, and no rating over 3 h may be assigned where the average width of the part that projects below the slab is less than 165 mm.

**D-2.9.3. Beam Integrated in Floor or Roof Slab**

For the purposes of these ratings, a beam may be either independent of or integral with a floor or roof slab assembly.

**D-2.9.4. Minimum Thickness**

Where the upper extension or top flange of a joist or T-beam in a floor assembly contributes wholly or partly to the thickness of the slab above, the total thickness at any point shall be not less than the minimum thickness described in Table D-2.2.1.A. for the fire-resistance rating required.

**D-2.9.5. Effect of Plaster**

The addition of plaster finish to a reinforced concrete beam may be taken into account in determining the cover over principal reinforcing steel by applying the multiplying factors described in D-1.7.

## D-2.10. Prestressed Concrete Beams

### D-2.10.1. Minimum Cross-Sectional Area and Thickness of Cover

The minimum cross-sectional area and thickness of concrete cover over steel tendons in prestressed concrete beams for fire-resistance ratings from 30 min to 4 h are shown in Table D-2.10.1.

**Table D-2.10.1.**  
Minimum Thickness of Concrete Cover over Steel Tendons in Prestressed Concrete Beams, mm<sup>(1)</sup>

Type of Concrete	Area of Beam, cm <sup>2</sup>	Fire-Resistance Rating						
		30 min	45 min	1 h	1.5 h	2 h	3 h	4 h
Type S or N	260 to 970	25	39	50	64	—	—	—
	Over 970 to 1 940	25	26	39	45	64	—	—
	Over 1 940	25	26	39	39	50	77	102
Type L	Over 970	25	25	25	39	50	77	102

#### Notes to Table D-2.10.1.:

(1) Where the thickness of concrete cover over the tendons exceeds 64 mm, a wire mesh reinforcement with 1.57 mm diam wire and 100 mm by 100 mm openings shall be incorporated in the beams to retain the concrete in position around the tendons. The mesh reinforcement shall be located midway in the cover.

### D-2.10.2. Minimum Cover Thickness

The cover for an individual tendon shall be the minimum thickness of concrete between the surface of the tendon and the fire-exposed surface of the beam, except that for ungrouted ducts the assumed cover thickness shall be the minimum thickness of concrete between the surface of the duct and the surface of the beam. For beams in which several tendons are used, the cover is assumed to be the average of the minimum cover of the individual tendons. The cover for any individual tendon shall be not less than half the value given in Table D-2.10.1. nor less than 25 mm.

### D-2.10.3. Applicability of Ratings

The ratings in Table D-2.10.1. apply to a beam that is either independent of or integral with a floor or roof slab assembly. Minimum thickness of slab and minimum cover to steel tendons in prestressed concrete slabs are contained in D-2.2.

### D-2.10.4. Effect of Plaster

The addition of plaster finish to a prestressed concrete beam may be taken into account in determining the cover over steel tendons by applying the multiplying factors described in D-1.7.

### D-2.10.5. Minimum Cover

**1)** Except as provided in (2), in unbonded post-tensioned prestressed concrete beams, the concrete cover to the tendon at the anchor shall be not less than 15 mm greater than the minimum required away from the anchor. The concrete cover to the anchorage bearing plate and to the end of the tendon, if it projects beyond the bearing plate, shall be not less than 25 mm.

**2)** The requirements in (1) do not apply to those portions of beams not likely to be exposed to fire (such as the ends and the tops of flanges of beams immediately below slabs).

## D-2.11. Glued-Laminated Timber Beams and Columns

### D-2.11.1. Applicability of Information

The information in D-2.11. applies to glued-laminated timber beams and columns required to have fire-resistance ratings greater than those afforded under the provisions of Article 3.1.4.5. of this Code.

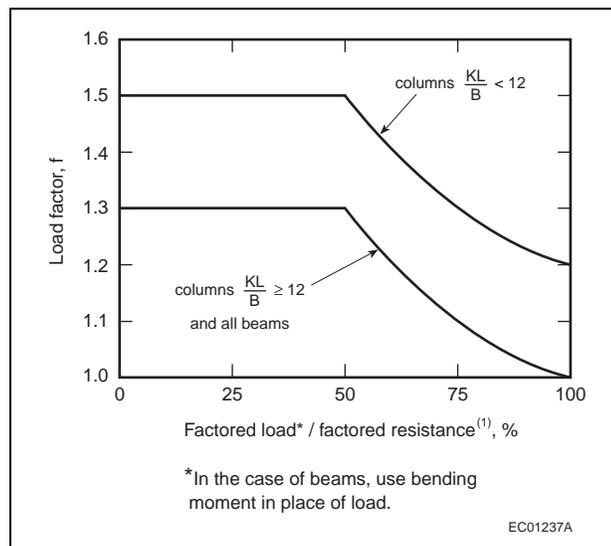
**D-2.11.2. Method of Calculation**

- 1)** The fire-resistance rating of glued-laminated timber beams and columns in minutes shall be equal to
  - a)  $0.1 f_B [4 - 2(B/D)]$  for beams that may be exposed to fire on 4 sides,
  - b)  $0.1 f_B [4 - (B/D)]$  for beams that may be exposed to fire on 3 sides,
  - c)  $0.1 f_B [3 - (B/D)]$  for columns that may be exposed to fire on 4 sides, and
  - d)  $0.1 f_B [3 - (B/2D)]$  for columns that may be exposed to fire on 3 sides,

where

- f = the load factor shown in Figure D-2.11.2.-A,
- B = the full dimension of the smaller side of a beam or column in millimetres before exposure to fire [see Figure D-2.11.2.-B],
- D = the full dimension of the larger side of a beam or column in millimetres before exposure to fire [see Figure D-2.11.2.-B],
- k = the effective length factor obtained from CAN/CSA-O86, "Engineering Design in Wood,"
- L = the unsupported length of a column in millimetres.

- 2)** The factored resistance of a beam or column shall be determined by using the specified strengths in CAN/CSA-O86, "Engineering Design in Wood."



**Figure D-2.11.2.-A**  
**Factors to compensate for partially loaded columns and beams**

**Note to Figure D-2.11.2.-A:**  
 (1) See D-2.11.2.(2).

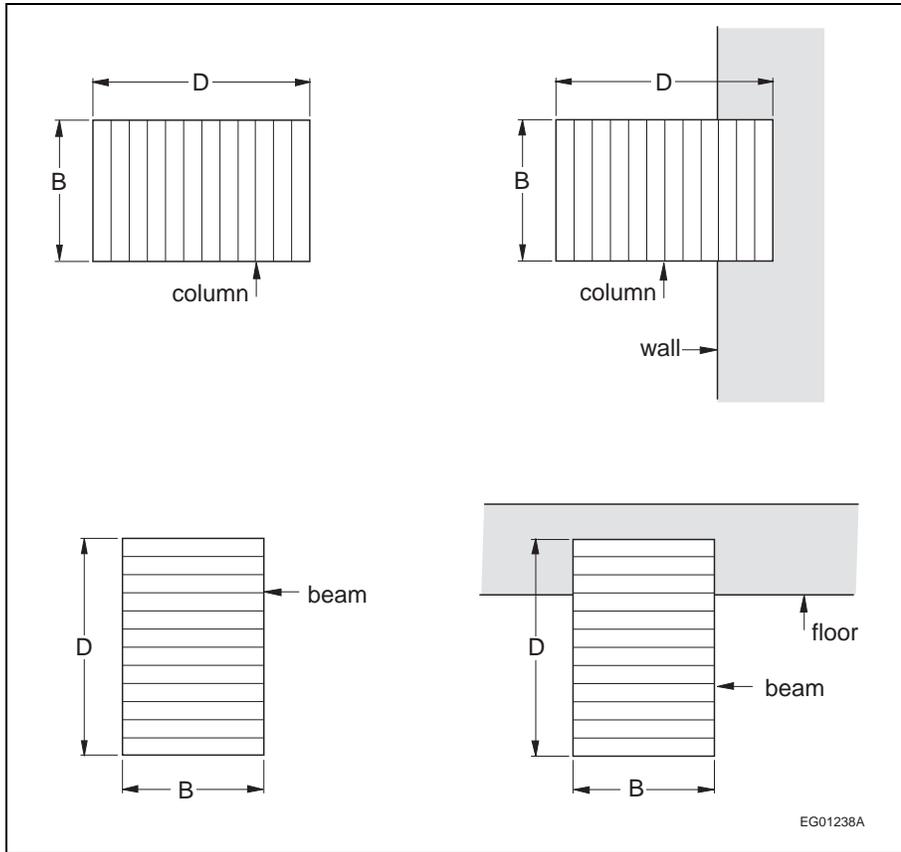


Figure D-2.11.2-B  
Full dimensions of glued-laminated beams and columns

## Section D-3 Flame-Spread Ratings and Smoke Developed Classifications

### D-3.1. Interior Finish Materials

#### D-3.1.1. Scope of Information

Tables D-3.1.1.A. and D-3.1.1.B. show flame-spread ratings and smoke developed classifications for combinations of some common interior finish materials. The values are based on all the evidence available at present. Many materials have not been included because of lack of test evidence or because of inability to classify or describe the material in generic terms for the purpose of assigning ratings.

**Table D-3.1.1.A.  
Assigned Flame-Spread Ratings and Smoke Developed Classifications for Combinations of Wall and Ceiling Finish Materials  
and Surface Coatings<sup>(1)</sup>**

Materials	Applicable Material Standard	Minimum Thickness, mm	Surface Coating	
			Unfinished	Paint or Varnish not more than 1.3 mm Thick, Cellulosic Wallpaper not more than One Layer <sup>(2)(3)</sup>
Asbestos cement board	CAN/CGSB-34.16-M	None	0/0	25/50
Brick, concrete, tile	None	None		
Steel, copper, aluminum	None	0.33		
Gypsum plaster	CSA A82.22-M	None		
Gypsum wallboard	CAN/CSA-A82.27-M ASTM C 36/C 36M ASTM C 442/C 442M ASTM C 588/C 588M ASTM C 630/C 630M ASTM C 931/C 931M	9.5	25/50	25/50
Lumber	None	16	150/300	150/300
Douglas Fir plywood <sup>(4)</sup>	CSA O121-M	11	150/100	150/300
Poplar plywood <sup>(4)</sup>	CSA O153-M			
Plywood with Spruce face veneer <sup>(4)</sup>	CSA O151-M			
Douglas Fir plywood <sup>(4)</sup>	CSA O121-M	6	150/100	150/100
Fiberboard low density	CAN/ULC-S706	11	X/100	150/100
Hardboard	CAN/CGSB-11.3-M	9	150/X	<sup>(5)</sup>
Type 1 Standard		6	150/300	150/300
Particleboard	ANSI A208.1	12.7	150/300	<sup>(5)</sup>
Waferboard	CSA O437.0	—	<sup>(5)</sup>	<sup>(5)</sup>

**Notes to Table D-3.1.1.A.:**

- (1) See D-1.1.1.(5) for standards used to assign flame-spread ratings and smoke developed classifications.
- (2) Flame-spread ratings and smoke developed classifications for paints and varnish are not applicable to shellac and lacquer.
- (3) Flame-spread ratings and smoke developed classifications for paints apply only to alkyd and latex paints.
- (4) The flame-spread ratings and smoke developed classifications shown are for those plywoods without a cellulose resin overlay.
- (5) Insufficient test information available.

**Table D-3.1.1.B.**  
**Flame-Spread Ratings and Smoke-Developed Classifications for Combinations of Common Floor Finish Materials and Surface Coatings<sup>(1)</sup>**

Materials	Applicable Standard	FSR/SDC <sup>(2)</sup>
Hardwood or softwood flooring either unfinished or finished with a spar or urethane varnish coating	None	300/300
Vinyl-asbestos flooring not more than 4.8 mm thick applied over plywood or lumber subfloor or direct to concrete	CSA A126.1-M	300/300
Wool carpet (woven), pile weight not less than 1120 g/m <sup>2</sup> , applied with or without felt underlay <sup>(3)</sup>	CAN/CGSB-4.129	300/300
Nylon carpet, pile weight not less than 610 g/m <sup>2</sup> and not more than 800 g/m <sup>2</sup> , applied with or without felt underlay <sup>(3)</sup>	CAN/CGSB-4.129	300/500
Nylon carpet, pile weight not less than 610 g/m <sup>2</sup> and not more than 1355 g/m <sup>2</sup> , glued down to concrete	CAN/CGSB-4.129	300/500
Wool/nylon blend carpet (woven) with not more than 20% nylon and pile weight not less than 1120 g/m <sup>2</sup>	CAN/CGSB-4.129	300/500
Nylon/wool blend carpet (woven) with not more than 50% wool, pile weight not less than 610 g/m <sup>2</sup> and not more than 800 g/m <sup>2</sup>	CAN/CGSB-4.129	300/500
Polypropylene carpet, pile weight not less than 500 g/m <sup>2</sup> and not more than 1200 g/m <sup>2</sup> , glued down to concrete	CAN/CGSB-4.129	300/500

**Notes to Table D-3.1.1.B.:**

- (1) Tested on the floor of the tunnel in conformance with provisions of CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies."  
 (2) Flame-Spread Rating/Smoke Developed Classification.  
 (3) Type 1 or 2 underlay as described in CGSB 4-GP-36M, "Carpet Underlay, Fiber Type."

**D-3.1.2. Ratings**

The ratings shown in Tables D-3.1.1.A. and D-3.1.1.B. are arranged in groups corresponding to the provisions of this Code. The ratings apply to materials falling within the general categories indicated.

**D-3.1.3. Table Entries**

In Tables D-3.1.1.A. and D-3.1.1.B., the first number of each entry relates to flame spread and the second number to smoke developed limit. For example:

25/50 represents a flame-spread rating of 0 to 25 and a smoke developed classification of 0 to 50,

150/300 represents a flame-spread rating of 75 to 150 and a smoke developed classification of 100 to 300, and

X/X applied to walls and ceilings means a flame-spread rating over 150 and a smoke developed classification over 300.

**D-3.1.4. Effect of Surface Coatings**

Thin surface coatings can modify flame-spread characteristics either upward or downward. Table D-3.1.1.A. includes a number of thin coatings that increase the flame-spread rating of the base material, so that these may be considered where more precise control over flame spread hazard is desired.

**D-3.1.5. Proprietary Materials**

**1)** Information on flame-spread rating of proprietary materials and fire-retardant treatments that cannot be described in sufficient detail to ensure reproducibility is available through the listing and labelling services of Underwriters' Laboratories of Canada, Intertek Testing Services NA Ltd. (3210 American Drive, Mississauga, Ontario L4V 1B3), or other recognized testing laboratory.

**2)** A summary of flame spread test results published prior to 1965 has been prepared by the Institute for Research in Construction of the National Research Council of Canada (see Item (1) in D-6.1., Fire Test Reports).

**D-3.1.6. Limitations and Conditions**

1) The propagation of flame along a surface in the standard test involves some finite depth of the material or materials behind the surface, and this involvement extends to the depth to which temperature variations are to be found during the course of the test; for many commonly used lining materials, such as wood, the depth involved is about 25 mm.

2) For all the combustible materials described in Table D-3.1.1.A., a minimum dimension is shown, and this represents the thickness of the test samples on which the rating has been based; when used in greater thicknesses than that shown, these materials may have a slightly lower flame-spread rating, and thinner specimens may have higher flame-spread ratings.

3) No rating has been included for foamed plastic materials because it is not possible at this time to identify these products with sufficient accuracy on a generic basis. Materials of this type that melt when exposed to the test flame generally show an increase in flame-spread rating as the thickness of the test specimen increases.

**D-3.1.7. Referenced Standards**

In Tables D-3.1.1.A. and D-3.1.1.B., the standards applicable to the materials described are noted because the ratings depend on conformance with these specifications.

## Section D-4 Non-combustibility

**D-4.1. Test Method****D-4.1.1. Determination of Non-combustibility**

1) Non-combustibility is required of certain components of buildings by the provisions of this Code, which specifies non-combustibility by reference to CAN/ULC-S114, "Test for Determination of Non-Combustibility in Building Materials."

2) The test to which reference is made in (1) is severe, and it may be assumed that any building material containing even a small proportion of combustibles will itself be classified as combustible. The specimen, 38 mm by 51 mm, is exposed to a temperature of 750°C in a small furnace. The essential criteria for non-combustibility are that the specimen does not flame or contribute to temperature rise.

**D-4.2. Materials Classified as Combustible****D-4.2.1. Combustible Materials**

Most materials from animal or vegetable sources will be classed as combustible by CAN/ULC-S114, "Test for Determination of Non-Combustibility in Building Materials," and wood, wood fibreboard, paper, felt made from animal or vegetable fibres, cork, plastics, asphalt and pitch would therefore be classed as combustible.

**D-4.2.2. Composite Materials**

Materials that consist of combustible and noncombustible elements in combination will in many cases also be classed as combustible, unless the proportion of combustibles is very small. Some mineral wool insulations with combustible binder, cinder concrete, cement and wood chips and wood-fibred gypsum plaster would also be classed as combustible.

**D-4.2.3. Effect of Chemical Additives**

The addition of a fire-retardant chemical is not sufficient to change a combustible product to a noncombustible product.

**D-4.3. Materials Classified as Noncombustible****D-4.3.1. Typical Examples**

Noncombustible materials include brick, ceramic tile, concrete made from Portland cement with noncombustible aggregate, asbestos cement, plaster made from gypsum with noncombustible aggregate, metals commonly used in buildings, glass, granite, sandstone, slate, limestone and marble.

**Section D-5 Protection of Openings in Fire-Rated Assemblies****D-5.1. Scope****D-5.1.1. Installation Information**

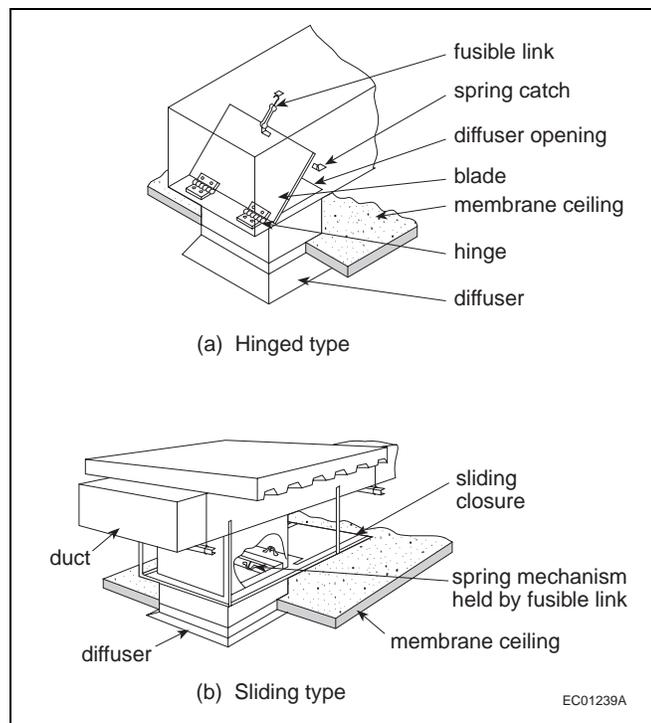
- 1) The information in D-5 specifies requirements for
  - a) the installation of fire doors and fire dampers in gypsum-wallboard-protected stud wall assemblies, and
  - b) fire stop flaps for installation in fire-rated membrane ceilings.

**D-5.2. Installation of Fire Doors and Fire Dampers****D-5.2.1. References**

- 1) Fire doors and fire dampers in gypsum-wallboard-protected steel stud non-loadbearing walls required to have a fire-resistance rating shall be installed in conformance with Section 9.24. of this Code and the applicable requirements of NFPA 80, "Fire Doors and Fire Windows."
- 2) Fire doors and fire dampers in gypsum-wallboard-protected wood stud walls required to have a fire-resistance rating shall be installed in conformance with Section 9.23. of this Code and the applicable requirements of NFPA 80, "Fire Doors and Fire Windows."

**D-5.3. Fire Stop Flaps****D-5.3.1. Construction Requirements**

Fire stop flaps shall be constructed of steel not less than 1.5 mm thick, covered on both sides with painted asbestos paper not less than 1.6 mm thick and equipped with pins and hinges of corrosion-resistant material (see Figure D-5.3.1.).



**Figure D-5.3.1.**  
Typical fire stop flaps

**D-5.3.2. Hold-open Devices**

Fire stop flaps shall be held open with fusible links conforming to ULC-S505, “Fusible Links for Fire Protection Service,” or other heat-activated devices having a temperature rating approximately 30°C above the maximum temperature that would exist in the system either with the system in operation or shut down.

**Section D-6 Background Information**

**D-6.1. Fire Test Reports**

Summaries of available fire test information have been published by the Institute for Research in Construction (formerly the Division of Building Research) as follows:

- (1) M. Galbreath, Flame Spread Performance of Common Building Materials. Technical Paper No. 170, Division of Building Research, National Research Council Canada, Ottawa, April 1964. NRCC 7820.
- (2) M. Galbreath and W.W. Stanzak, Fire Endurance of Protected Steel Columns and Beams. Technical Paper No. 194, Division of Building Research, National Research Council Canada, Ottawa, April 1965. NRCC 8379.
- (3) T.Z. Harmathy and W.W. Stanzak, Elevated-Temperature Tensile and Creep Properties of Some Structural and Prestressing Steels. American Society for Testing and Materials, Special Technical Publication 464, 1970, p. 186 (DBR Research Paper No. 424) NRCC 11163.
- (4) T.Z. Harmathy, Thermal Performance of Concrete Masonry Walls in Fire. American Society for Testing and Materials, Special Technical Publication 464, 1970, p. 209 (DBR Research Paper No. 423) NRCC 11161.
- (5) L.W. Allen, Fire Endurance of Selected Non-Loadbearing Concrete Masonry Walls. DBR Fire Study No. 25, Division of Building Research, National Research Council Canada, Ottawa, March 1970. NRCC 11275.
- (6) A. Rose, Comparison of Flame Spread Ratings by Radiant Panel, Tunnel Furnace, and Pittsburgh-Corning Apparatus. DBR Fire Study No. 22, Division of Building Research, National Research Council Canada, Ottawa, June 1969. NRCC 10788.
- (7) T.T. Lie and D.E. Allen, Calculation of the Fire Resistance of Reinforced Concrete Columns. DBR Technical Paper No. 378, Division of Building Research, National Research Council Canada, Ottawa, August 1972. NRCC 12797.

- (8) W.W. Stanzak, Column Covers: A Practical Application of Sheet Steel as a Protective Membrane. DBR Fire Study No. 27, Division of Building Research, National Research Council Canada, Ottawa, February 1972. NRCC 12483.
- (9) W.W. Stanzak, Sheet Steel as a Protective Membrane for Steel Beams and Columns. DBR Fire Study No. 23, Division of Building Research, National Research Council Canada, Ottawa, November 1969. NRCC 10865.
- (10) W.W. Stanzak and T.T. Lie, Fire Tests on Protected Steel Columns with Different Cross-Sections. DBR Fire Study No. 30, Division of Building Research, National Research Council Canada, Ottawa, February 1973. NRCC 13072.
- (11) G. Williams-Leir and L.W. Allen, Prediction of Fire Endurance of Concrete Masonry Walls. DBR Technical Paper No. 399, Division of Building Research, National Research Council Canada, Ottawa, November 1973. NRCC 13560.
- (12) G. Williams-Leir, Prediction of Fire Endurance of Concrete Slabs. DBR Technical Paper No. 398, Division of Building Research, National Research Council Canada, Ottawa, November 1973. NRCC 13559.
- (13) A. Rose, Flammability of Fibreboard Interior Finish Materials. Building Research Note No. 68, Division of Building Research, National Research Council Canada, Ottawa, October 1969.
- (14) L.W. Allen, Effect of Sand Replacement on the Fire Endurance of Lightweight Aggregate Masonry Units. DBR Fire Study No. 26, Division of Building Research, National Research Council Canada, Ottawa, September 1971. NRCC 12112.
- (15) L.W. Allen, W.W. Stanzak and M. Galbreath, Fire Endurance Tests on Unit Masonry Walls with Gypsum Wallboard. DBR Fire Study No. 32, Division of Building Research, National Research Council Canada, Ottawa, February 1974, NRCC 13901.
- (16) W.W. Stanzak and T.T. Lie, Fire Resistance of Unprotected Steel Columns. Journal of Structural Division, Proc., Am. Soc. Civ. Eng., Vol. 99, No. ST5 Proc. Paper 9719, May 1973 (DBR Research Paper No. 577) NRCC 13589.
- (17) T.T. Lie and T.Z. Harmathy, Fire Endurance of Concrete-Protected Steel Columns. A.C.I. Journal, January 1974, Title No. 71-4 (DBR Technical Paper No. 597) NRCC 13876.
- (18) T.T. Lie, A Method for Assessing the Fire Resistance of Laminated Timber Beams and Columns. Can. J. Civ. Eng., Vol. 4, No. 2, June 1977 (DBR Technical Paper No. 718) NRCC 15946.
- (19) T.T. Lie, Calculation of the Fire Resistance of Composite Concrete Floor and Roof Slabs. Fire Technology, Vol. 14, No. 1, February 1978 (DBR Technical Paper No. 772) NRCC 16658.

### **D-6.2. Obsolete Materials and Assemblies**

Building materials, components and structural members and assemblies in buildings constructed before 1995 may have been assigned ratings based on earlier editions of the Supplement to the National Building Code of Canada or older reports of fire tests. To assist users in determining the ratings of these obsolete assemblies and structural members, the following list of reference documents has been prepared. Although some of these publications are out of print, reference copies are available at the Institute for Research in Construction, National Research Council Canada, Ottawa, Ont., K1A 0R6.

- (1) M. Galbreath, Fire Endurance of Unit Masonry Walls. Technical Paper No. 207, Division of Building Research, National Research Council Canada, Ottawa, October 1965. NRCC 8740.
- (2) M. Galbreath, Fire Endurance of Light Framed and Miscellaneous Assemblies. Technical Paper No. 222, Division of Building Research, National Research Council Canada, Ottawa, June 1966. NRCC 9085.
- (3) M. Galbreath, Fire Endurance of Concrete Assemblies. Technical Paper No. 235, Division of Building Research, National Research Council Canada, Ottawa, November 1966. NRCC 9279.
- (4) Guideline on Fire Ratings of Archaic Materials and Assemblies. Rehabilitation Guideline #8, U.S. Department of Housing and Urban Development, Germantown, Maryland 20767, October 1980.
- (5) T.Z. Harmathy, Fire Test of a Plank Wall Construction. Fire Study No. 2, Division of Building Research, National Research Council Canada, Ottawa, July 1960. NRCC 5760.
- (6) T.Z. Harmathy, Fire Test of a Wood Partition. Fire Study No. 3, Division of Building Research, National Research Council Canada, Ottawa, October 1960. NRCC 5769.

### **D-6.3. Assessment of Archaic Assemblies**

Information in this document applies to new construction. Please refer to early editions of the Supplement to the National Building Code of Canada for the assessment or evaluation of assemblies that do not conform to the information in this edition of the Alberta Building Code. As with other documents, this Code is revised according to the information presented to the standing committee responsible for its content, and with each update new material may be added and material that is not relevant may be deleted.

### D-6.4. Development of the Component Additive Method

The component additive method was developed based upon the following observations and conclusions drawn from published as well as unpublished test information.

Study of the test data showed that structural failure preceded failure by other criteria (transmission of heat or hot gases) in most of the tests of loadbearing wood-framed assemblies. The major contributor to fire resistance was the membrane on the fire-exposed side.

Fire tests of wood joist floors without protective ceilings resulted in structural failure between 8 and 10 min. Calculation of the time for wood joists to approach breaking stress, based upon the charring rate of natural woods, suggested a time of 10 min for structural failure. This time was subtracted from the fire-resistance test results of wood joist floors and the remainder considered to be the contribution of the membrane.

The figures obtained for the contribution of membranes were then applied to the test results for open web steel joist floors and wood and steel stud walls and values of 20 min for the contribution of wood stud framing and 10 min for steel framing were derived.

The fire-resistance rating has been limited to 1.5 h as this method of developing ratings for framed assemblies was new and untried. Although this is the subject of current review, no decision has been made to extend the ratings beyond 1.5 h.

- (1) M. Galbreath, G. C. Gosselin, and R. B. Chauhan, Historical Guide to Chapter 2 of the Supplement to the National Building Code of Canada, Committee Paper FPR 1-3, Prepared for the Standing Committee on Fire Performance Ratings, May 1987.

Example showing fire-resistance rating of a typical membrane assembly, calculated using the component additive method.

#### 1 hour Gypsum Board/Wood Stud Interior Partition

A 1 h fire-resistance rating is required for an interior wood framed partition, using 12.7 mm Type X gypsum wallboard.

- (a) Since gypsum wallboard is used (D-2.3.4.(2) and Table D-2.3.4.A.) time assigned to 12.7 mm Type X gypsum wallboard membrane on the fire-exposed side of the partition = 25 min
- (b) Time assigned to wood framing members at 400 mm o.c. (D-2.3.4.(3) and Table D-2.3.4.C.) = 20 min
- (c) Time assigned to insulation, if the spaces between the studs are filled with preformed insulation of rock or slag fibres conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," (D-2.3.4.(4) and Table D-2.3.4.D.) = 15 min
- (d) Time assigned to the membrane on the non-fire-exposed side (D-2.3.5.(1)) = 0 min  
Fire-resistance rating = 25 + 20 + 15 = 60 min



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### Conversion Factors

To Convert	To	Multiply by
°C	°F	1.8 and add 32
kg	lb.	2.205
kPa	lbf/in. <sup>2</sup> (psi)	0.1450
kPa	lbf/ft. <sup>2</sup>	20.88
L	gal. (imp.)	0.2200
L/s	gal./min (gmp)	13.20
lx	ft.-candle	0.09290
m	ft.	3.281
m <sup>2</sup>	ft. <sup>2</sup>	10.76
m <sup>3</sup>	ft. <sup>3</sup>	35.31
mm	in.	0.03937
m <sup>3</sup> /h	ft. <sup>3</sup> /min (cfm)	0.5886
m/s	ft./min	196.8
MJ	Btu	947.8
N	lbf	0.2248
ng/(Pa • s • m <sup>2</sup> )	Btu/h	3.412