CANADIAN COMMISSION ON BUILDING AND FIRE CODES

FIRE

National Fire Code – 2023 Alberta Edition

National Research Council Canada
Conseil national de recherches Canada

Safety Codes Council

Alberta

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National Fire Code – 2023 Alberta Edition

Issued by the

Canadian Commission on Building and Fire Codes

National Research Council of Canada

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First Edition 1992
Second Edition 1998
Third Edition 2006
Fourth Edition 2014
Fifth Edition 2019
Sixth Edition 2023

NRCC-CONST-56659E

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Paper: ISBN 978-0-660-68448-2 Cat. No. NR24-27/2-2023E
PDF: ISBN 978-0-660-68447-5 Cat. No. NR24-27/2-2023E-PDF

Printed in Canada

Second Printing
Includes Revisions and Errata released in April 2026.

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Preface

National Fire Code of Canada 2020

The National Fire Code of Canada 2020 (NFC), together with the National Building Code of Canada 2020 (NBC), the National Energy Code of Canada for Buildings 2020 (NECB) and the National Plumbing Code of Canada 2020 (NPC), was developed by the Canadian Commission on Building and Fire Codes (CCBFC) as 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 the following aspects of buildings and facilities within their jurisdictions:

- activities related to the construction, use or demolition of buildings and facilities
- the condition of specific elements of buildings and facilities
- the design or construction of specific elements of facilities related to certain hazards
- protection measures for the current or intended use of buildings

This legislation may involve the adoption of the NFC without change or with modifications to suit local needs, and the enactment of other laws and regulations related to these aspects of buildings and facilities, including requirements for professional involvement.

The NFC is a model code that helps promote consistency among provincial and territorial fire codes.

National Fire Code – 2023 Alberta Edition

By agreement with the National Research Council of Canada, Alberta is committed to using the National Fire Code of Canada as its base document with changes and modifications to suit Alberta's needs in regulating the fire standards.

The National Fire Code – 2023 Alberta Edition is referred to throughout this document as "NFC(AE)."

This edition of the NFC(AE) succeeds the National Fire Code – 2019 Alberta Edition.

Development of the National Model Codes

GOVERNANCE CHANGE NOTE: The national code development system underwent a governance change in November 2022 to support efforts to harmonize construction codes in jurisdictions throughout Canada. The CCBFC, which had been in place since 1991, was dissolved and replaced by a new governance model in which the Canadian Board for Harmonized Construction Codes (CBHCC) is responsible for developing, approving and maintaining the National Model Codes based on the strategic priorities set by the Canadian Table for Harmonized Construction Codes Policy. The 2020 National Model Codes were developed by the CCBFC. In this section, references to the CCBFC are written in the past tense to reflect the change in governance.

The CCBFC, an independent committee established by the National Research Council of Canada (NRC), was responsible for the content of the 2020 editions of the National Model Codes. The CCBFC was made up of volunteers from across the country and from all facets of the Codes-user community. Members of the CCBFC and its standing committees included

builders, engineers, skilled trade workers, architects, building owners, building operators, fire and building officials, manufacturers and representatives of general interests.

The CCBFC was advised on scope, policy and technical issues pertaining to the Codes by the Provincial/Territorial Policy Advisory Committee on Codes (PTPACC), which was a committee of senior representatives from provincial/territorial ministries responsible for building, fire, plumbing and energy regulation 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, the provinces and territories were engaged in every phase of the Codes development process.

Codes Canada staff within the Construction Research Centre at the NRC provided technical and administrative support to the CCBFC and its standing committees, and coordinated the provision of evidence-based research to inform Codes development. The NRC publishes the National Model Codes and periodic revisions to the Codes to address pressing issues.

The broader Codes-user community makes significant contributions to the Codes development process by submitting requests for changes or additions to the Codes and by commenting on the proposed changes during the public reviews that precede each new edition.

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

More information on the Codes development process is available on the CBHCC's website.

Development of the Alberta Safety Codes

The Safety Codes Act is the legislation under which the National Fire Code – 2023 Alberta Edition 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 King's Printer.

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 Fire Sub-Council is one of twelve councils forming the Safety Codes Council.

Based on public review of a proposed new edition of the NFC(AE), the Fire Sub-Council established the content of the Code and proposed its adoption to the Minister of Municipal Affairs as an Alberta Regulation, the National Fire Code – 2023 Alberta Edition.

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

National Fire Code – 2023 Alberta Edition

The NFC(AE) sets out technical provisions regulating the following:

- activities related to the construction, use or demolition of buildings and facilities
- the condition of specific elements of buildings and facilities
- the design or construction of specific elements of facilities related to certain hazards
- protection measures for the current or intended use of buildings

The NFC(AE) establishes requirements to address the following three objectives:

- safety
- health
- fire protection of buildings and facilities

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Code provisions do not necessarily address all the characteristics of buildings and facilities that might be considered to have a bearing on the Code's objectives. Through an extensive consensus process at the national and provincial levels, the Codes-user community has decided which characteristics should be regulated through the NFC(AE).

The NFC(AE) is not a guideline on the operation, maintenance, protection, design or construction of buildings and facilities. Executing these activities in a technically sound manner depends upon many factors beyond compliance with fire regulations. Such factors include the availability of knowledgeable practitioners who have received appropriate education, training and experience and who are familiar with the principles of good practice and experience using reference manuals and technical guides.

The NFC(AE) does not list acceptable proprietary products. It establishes the criteria that materials, products and assemblies must meet. Some of these criteria are explicitly stated in the NFC(AE) 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 NFC(AE).

Relationship between the NBC(AE) and the NFC(AE)

The National Building Code – 2023 Alberta Edition (NBC(AE)) and NFC(AE) each contain provisions that relate to the safety of persons in buildings in the event of a fire and the protection of buildings from the effects of fire.(1) 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 NBC(AE) and the NFC(AE).

The NBC(AE) covers the fire safety and fire protection features that are required to be incorporated in a building 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 NFC(AE) 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 NFC(AE) contains provisions regarding fire safety and fire protection features that must be added to existing buildings when certain hazardous activities or processes are introduced into these buildings.

Some of the NFC(AE)'s provisions are incorporated by reference in the NBC(AE) and, thus may apply to original construction, alterations, or changes in use.

Code Requirements

Most Code requirements address at least one of the Code's three stated objectives (safety, health, and fire protection of buildings and facilities).

In processing proposed changes or additions to any of the National Model Codes, many issues are considered, such as the following:

- Does the proposed requirement 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 requirement using commonly accepted practices?

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

- Will enforcement agencies be able to enforce the requirement?
- Are the costs of implementing the requirement justifiable?
- Have the potential policy implications of the requirement been identified and addressed?
- Is there broad consensus on this requirement among Code users as well as among provincial and territorial governments?

Guidelines for requesting changes to the NFC are available on the NRC's website.

Objective-Based Code Format

The NFC(AE) has been published in an objective-based code format since 2006.

As described in more detail in the section entitled Structure of the NFC(AE), the Code comprises three Divisions:

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

Most of the requirements in Division B are linked to three types of information:

- objectives (Code objectives, such as safety or health, which individual requirements help to address),
- functional statements (statements of the functions of the building or facility that a particular requirement helps to achieve), and
- intent statements (detailed statements of the specific intent of the requirement).

Objectives

The NFC(AE)'s objectives are fully defined in Section 2.2. of Division A.

The objectives describe, in broad terms, the overall goals that the NFC(AE)'s requirements are intended to achieve. They serve to define the boundaries of the subject areas the Code addresses. However, the Code does not address 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 prevent from occurring in buildings and facilities. The wording of most 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 NFC(AE) cannot entirely prevent those undesirable situations from happening. The phrase "unacceptable risk" acknowledges that the NFC(AE) 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 determining compliance with the Code.

The objectives attributed to the requirements or portions of requirements in Division B are listed in a table following the provisions in each Part of Division B.

Functional Statements

The NFC(AE)'s functional statements are defined in Section 3.2. of Division A.

The functional statements are more detailed than the objectives. They describe conditions in the building or facility 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 or facility that serves to achieve more than one objective.

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Like objectives, functional statements are entirely qualitative and are not intended to be used on their own in determining compliance with the Code.

The functional statements attributed to the requirements or portions of requirements in Division B are listed in a table following the provisions in each Part of Division B.

Intent Statements

Intent statements explain the basic thinking behind each Code provision contained in Division B. Intent statements, each of which is unique to the provision with which it is associated, explain how requirements help to achieve their attributed objectives and functional statements. Like the objectives, the intent statements are expressed in terms of risk avoidance and expected performance. 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 the explanatory Notes at the end of each Part. Due to the sheer volume of intent statements—thousands for the NFC alone—they are made available as a separate electronic document entitled "Supplement to the NFC 2020: Intent Statements," which is posted on the NRC's website.

It is important to note that intent statements are not available for requirements that are unique to the NFC(AE).

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

- Clarity of intent: The objectives, functional statements and intent statements linked to a Code requirement clarify the reasoning behind that requirement and facilitate understanding of what must be done to satisfy that requirement. This added information may also help avoid disputes between practitioners and officials over these types of issues.
- 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 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 the NFC(AE)

The NFC(AE) is organized into three Divisions.

Division A: Compliance, Objectives and Functional Statements

Division A defines the scope of the NFC(AE) and presents the objectives that the Code addresses and the functions the building or facility must perform to help to satisfy those objectives.

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

Division B: Acceptable Solutions

The term "acceptable solutions" refers to the technical requirements contained in the Code. It reflects the principle that fire codes establish an acceptable level of risk or performance and underlines the fact that a code cannot describe all possible valid Code compliance options. Acceptable solutions represent the minimum level of performance that will satisfy the NFC(AE)'s objectives.

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Most of the requirements in Division B—the 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 presented in Division B and that they will consult Division A only when seeking clarification on the application of Division B's requirements to a particular situation, when considering an alternative solution, or when looking up the definition of selected terms in the context of the NFC(AE).

Division C: Administrative Provisions

Division C contains administrative provisions relating to the application of the Code.

Relationship between Division A and Division B

Sentence 1.2.1.1.(1) of Division A is a very important 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 Note A-1.2.1.1.(1)(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 Note A-1.2.1.1.(1)(b)).

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) 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 proponent 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 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

The following numbering system has been used throughout the NFC(AE). 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:

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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

Meaning of the Words "And" and "Or" between the Clauses and Subclauses of a Sentence

Multiple Clauses and Subclauses are connected by the word "and" or "or" at the end of the second last Clause or Subclause in the series. Although this connecting word appears only once, it is meant to apply to all the preceding Clauses or Subclauses within that series.

For example, in a series of five Clauses—(a) to (e)—in a Sentence, the appearance of the word "and" at the end of Clause (d) means that all Clauses in the Sentence are connected to each other with the word "and." Similarly, in a series of five Clauses—(a) to (e)—in a Sentence, the appearance of the word "or" at the end of Clause (d) means that all Clauses in the Sentence are connected to each other with the word "or."

In all cases, it is important to note that a Clause (and its Subclauses, if any) must always be read in conjunction with its introductory text appearing at the beginning of the Sentence. Moreover, the connecting words "and" and "or" must be read in the context of the Sentence. In particular, the use of the word "and" as a connecting word does not necessarily mean that all Clauses (or Subclauses) are applicable for compliance with the Sentence.

Change Indication

Where a technical addition or revision has been made relative to the 2015 edition of the NFC, a thin vertical line has been added in the margin next to the affected provision to indicate the approximate location of new or revised content. Where a technical change or addition has been made to the 2020 edition of the NFC at the time it was adopted in Alberta as the National Fire Code – 2023 Alberta Edition, a heavy vertical line has been added in the margin next to the affected provision to indicate the approximate location of the new or revised content. No change indication is provided for editorial revisions or for renumbered or deleted content.

Units

All values in the NFC(AE) are given in metric units. Some of the metric values in the Code have been converted and rounded from imperial values. A conversion table of imperial equivalents for the most common units used in the operation of buildings and facilities is located at the end of the Code.

Complementary Publications

The following publications are referenced in the NFC(AE) 2023 or facilitate the application of its requirements:

National Building Code – 2023 Alberta Edition
Supplement to the NFC 2020: Intent Statements
User's Guide – NBC 1995, Fire Protection, Occupant Safety and Accessibility (Part 3)

These and other Code documents published by the NRC are made available in free electronic format on the NRC's website.

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STANDATA

From time to time, Alberta Municipal Affairs issues revisions or STANDATA for the NFC(AE).

Revisions are changes to the Code that are implemented after publication. They are brought into force through a Fire Code amendment regulation made pursuant to the Safety Codes Act.

STANDATA come in the following formats: Fire Code Variances, Fire Code Interpretations, Fire Code Bulletins and Fire Code Errata.

Code pages containing revisions and/or errata are identified with the words "Amended Page" in the footer; pages with editorial updates are not flagged.

Persons interested in receiving automatic e-mail notification of revisions or STANDATA can subscribe to a list server at http://municipalaffairs.gov.ab.ca/am_list_subscription_services.

Contact Information

The CBHCC welcomes comments and suggestions for improvements to the NFC. Persons interested in requesting a change to an NFC provision should refer to the guidelines available on the CBHCC's website.

To submit comments or suggestions, please contact:
The Secretary
Canadian Board for Harmonized Construction Codes
1200 Montreal Road
Ottawa, Ontario K1A 0R6
E-mail: CBHCCSecretary-SecretaireCCHCC@nrc-cnrc.gc.ca

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Relationship of the NFC(AE) to Standards Development and Conformity Assessment

The development of many provisions in the NFC(AE) 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 network of accredited organizations concerned with standards development, certification, testing and inspection 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 accredits standards development organizations, certification bodies, testing and calibration laboratories, and inspection bodies, among others.

The SCC is a non-profit federal Crown corporation responsible for the coordination of voluntary standardization in Canada. It also coordinates Canadian participation in voluntary international standardization activities.

Canadian Standards

Many of the standards referenced in this Code are published by standards development organizations accredited in Canada. As part of the accreditation requirements, these organizations adhere to the principle of consensus, which 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 standards development organizations also have formal procedures for the balloting and second-level review of standards prepared under their oversight.

The following organizations are accredited as standards development organizations in Canada:

- Air-Conditioning, Heating and Refrigeration Institute (AHRI)
- ASTM International
- Bureau de normalisation du Québec (BNQ)
- Canadian General Standards Board (CGSB)
- CSA Group
- International Association of Plumbing and Mechanical Officials (IAPMO)
- ULC Standards
- Underwriters' Laboratories Inc. (UL)

Table 1.3.1.2. of Division B lists the standards referenced in this Code. Standards proposed to be referenced in this Code are reviewed to ensure that their content is compatible with the Code. Thereafter, referenced standards are reviewed as needed during each Code cycle. Standards development organizations are asked to provide information on any changes in the status of their standards referenced in this Code—withdrawals, amendments, new editions, etc. This information is passed on to the CBHCC, its code development committees, and interested stakeholders, 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 experience 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.

Non-Canadian Standards

A number of subject areas for which the standards development organizations accredited in Canada have not developed standards are covered in the NFC(AE). In these cases, the Code often references standards developed by organizations in other countries, such as the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the National Fire Protection Association (NFPA). These standards are developed using processes that may differ from those used by the standards development organizations accredited in Canada; nevertheless, the standards have been reviewed by the relevant standing committees and found to be acceptable.

Conformity Assessment

The NFC(AE) establishes minimum measures, which are set out within its own text or within referenced standards. However, the NFC(AE) does not set out who is responsible for assessing conformity to the measures or how those with this responsibility might carry it out. This responsibility is established under the Safety Codes Act and its Regulations.

Those persons responsible for ensuring that materials, appliances, systems and equipment meet the requirements of this Code have several means available to assist them, ranging 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 Standards Council of Canada (SCC) accredits testing and calibration laboratories that are capable of reliably testing products to specified standards. The test results produced by these organizations can be used in the certification, evaluation and qualification of products for compliance with Code provisions. The SCC's website (www.scc.ca) lists accredited testing and calibration laboratories, along with their scope of accreditation.

Certification

Certification is the confirmation by an independent organization that a product, process, service or system meets a requirement. Certification may entail physical examination, testing as specified in appropriate standards, an initial plant inspection, and/or 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, service 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 an accredited certification body and specifically designed to measure the performance of that product.

Certification bodies publish lists of certified products and companies. The Standards Council of Canada's website (www.scc.ca) lists accredited certification bodies, along with their scope of accreditation. Several organizations including the Canadian Construction Materials Centre (CCMC) at the NRC offer product certification services.

Evaluation

An evaluation is a written opinion by an independent professional organization that a product will perform its intended function. An evaluation is 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.

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Qualification

Qualification 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 product manufacturing and/or testing facilities for compliance with the Code and relevant standards.

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Canadian Commission on Building and Fire Codes and Standing Committees

Canadian Commission on Building and Fire Codes

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Revisions and Errata

Issued by the Canadian Board for Harmonized Construction Codes and Alberta Municipal Affairs

The Change Summary table that follows describes revisions, errata and editorial updates that apply to the National Fire Code – 2023 Alberta Edition:

- Revisions are changes that have been approved by the Canadian Board for Harmonized Construction Codes for publication between Code editions.
- Errata are corrections to existing text.
- Editorial updates are provided for information purposes only.

Code pages containing revisions and/or errata are identified with the words "Amended Page" in the footer; pages with editorial updates are not flagged.

Change Summary (Date: 2026-04) — National Fire Code – 2023 Alberta Edition

Division	Code Reference	Change	Description of Change
Preface	n/a	editorial update	Preface was updated to reflect change in governance of national code development system
A	1.4.1.2.	erratum	"(See Note A-1.4.1.2.(1).)" was added after the definition for "Authority having jurisdiction"
B	1.3.1.1.(1)	revision	Date stated in Sentence was revised to read "15 July 2022"
	Table 1.3.1.2.	revision	Document references were updated as applicable to reflect more recent editions published as of 15 July 2022
		erratum	Entry for ULC/ORD-C107.21-92 was deleted
	1.3.2.1.	editorial update	List of abbreviations was updated to include "CBHCC"
	A-2.1.3.1.(1)	editorial update	First paragraph of Note was updated to read "... it is intended that the NFC(AE) ..."
	4.6.3.2.(1)	erratum	Sentence was corrected to read "… requirements of CAN/ULC-S664, 'Standard for Containment Sumps, Sump Fittings, and Accessories for Flammable and Combustible Liquids.'"
	6.7.1.1.	erratum	The referenced document was revised to read "Standard for the Inspection, Testing and Maintenance of Smoke Alarms"
C	2.1.2.6.	erratum	"Subsections 4.3.15. and 4.3.16." was changed to "Subsections 4.3.16. and 4.3.17." and the words "inventory control" were replaced with "permit and approval"
	2.2.3.1.	erratum	New Sentence (7) was added for clarity
	2.2.4.3.	erratum	In Sentence (1), "an Alberta" was replaced with "a" in Clauses (a) and (b), and Clause (c) was deleted; in Clause (2)(a), "an Alberta" was replaced with "a" in Subclauses (i) and (ii), and Subclause (iii) was deleted
	A-2.2.3.1.(6)	erratum	Entire text of Note was revised for clarity
	A-2.2.4.3.(1)	erratum	Qualification date was updated to read "December 31, 2026"
	A-2.3.1.	editorial update	Last paragraph of Note was updated to read "... on the CBHCC's website."

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Division A

Compliance, Objectives and Functional Statements

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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 all new and existing *buildings* and facilities, and to *building* construction, renovation or demolition sites. (See Note A-1.1.1.1.(1).)

2) Part 4 of Division B of this Code does not apply to

a) the storage of *flammable liquids* or *combustible liquids* on farms for individual farm use and on isolated construction projects (see Note A-1.1.1.1.(2)(a)),
b) the storage of aerosol products covered under Subsection 3.2.5. of Division B,
c) liquified petroleum gas-burning appliances and equipment within the scope of the gas regulations made pursuant to the Safety Codes Act,
d) the production, storage or handling of liquified natural gas within the scope of the gas regulations made pursuant to the Safety Codes Act,
e) liquids such as certain halogenated hydrocarbons and mixtures containing hydrocarbons which are without flash points, but which may be flammable under certain conditions,
f) the storage and handling of raw production *flammable liquids* or *combustible liquids* and the incidental storage and handling of hydrocarbon-based chemicals resulting from or used during crude oil or natural gas exploration, production or transmission as mandated under the scope of AER Directive 055, "Storage Requirements for the Upstream Petroleum Industry," or
g) spills and leaks pertaining to products other than *flammable liquids* and *combustible liquids* that do not fall within the requirements of Section 4.3. of Division B. (See Note A-1.1.1.1.(2)(g)).

3) Secondary suites shall conform to the requirements of the Code in force at the time the permit was issued.

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 Note A-1.2.1.1.(1)(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 Note A-1.2.1.1.(1)(b)).

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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.

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 and 3

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

1.3.3. Application of Division B

1.3.3.1. Application of Parts 1 to 6

1) Parts 1 to 6 of Division B apply to all *buildings* and facilities covered in this Code. (See Article 1.1.1.1.)

1.3.3.2. Application of Part 7

1) Part 7 of Division B applies to high *buildings* as defined in the National Building Code – 2023 Alberta Edition..

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* and facilities 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 and its Regulations, or the meanings that are commonly assigned to them in the

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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 and 3.

3) Where acceptable solutions are referred to in this Code, they shall be the provisions stated in Parts 2 to 7 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 Oxford University Press 2004, "Canadian Oxford Dictionary, 2nd Edition."

1.4.1.2. Defined Terms

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

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*.

Air-supported structure means a structure consisting of a pliable membrane that achieves and maintains its shape and support by internal air pressure.

Appliance means a device to convert fuel into 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.

Approved means acceptable to the *Provincial Fire Administrator*.

Assembly occupancy (Group A) 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.

Atmospheric storage tank means a *storage tank* designed to operate at pressures from atmospheric to 3.5 kPa (gauge).

Authority having jurisdiction means a safety codes officer in the fire discipline exercising authority pursuant to designation of powers and terms of employment in accordance with the Safety Codes Act. (See Note A-1.4.1.2.(1).)

Basement means a *storey* or *storeys* of a *building* located below the *first storey*.

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*.

Business and personal services occupancy (Group D) 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.

Care means the provision of services other than *treatment* by or through care facility management to residents who require these services because of cognitive, physical or behavioural limitations.

Care occupancy (Group B, Division 3) means the *occupancy* or use of a *building* or part thereof, other than a *home-type care occupancy*, where *care* is provided to residents. (See Note A-1.4.1.2.(1).)

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

Closed container means a container sealed by means of a lid or other device such that neither liquid nor vapour will escape from it at ordinary temperatures.

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.

Combustible construction means that type of construction that does not meet the requirements for *noncombustible construction* or *encapsulated mass timber construction*.

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Combustible dusts means dusts and particles that are ignitable and liable to produce an explosion.

Combustible fibres means finely divided, combustible vegetable or animal fibres and thin sheets or flakes of such materials which, in a loose, unbaled condition, present a flash fire hazard, including cotton, wool, hemp, sisal, jute, kapok, paper and cloth.

Combustible liquid means a liquid having a *flash point* at or above 37.8°C and below 93.3°C. (See Subsection 4.1.2. of Division B.)

Dangerous goods means products, materials or substances that are

(a) regulated by TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)" (see Table 3.2.7.1. of Division B), or

(b) classified as controlled products under HC SOR/2015-17, "Hazardous Products Regulations" (see Note A-Table 3.2.7.1. of Division B).

(See Note A-1.4.1.2.(1).)

Detention occupancy (Group B, Division 1) means the *occupancy* by persons who are restrained from or are incapable of evacuating to a safe location without the assistance of another person because of security measures not under their control.

Dispenser sump means a liquid-tight container intended for installation under a dispensing unit for the collection of any internal leakage of *flammable liquid* and *combustible liquid* from the dispensing unit.

Distilled beverage alcohol means a beverage that is produced by fermentation and contains more than 20% by volume of water-miscible alcohol.

Distillery means a *process plant* where *distilled beverage alcohols* are produced, concentrated or otherwise processed, and includes facilities on the same site where the concentrated products may be blended, mixed, stored or packaged.

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.

Encapsulated mass timber construction means that type of construction in which a degree of fire safety is attained by the use of encapsulated mass timber elements with an *encapsulation rating* and minimum dimensions for structural members and other *building* assemblies.

Encapsulation rating means the time in minutes that a material or assembly of materials will delay the ignition and combustion of encapsulated mass timber elements when it is exposed to fire under specified conditions of test and performance criteria, or as otherwise prescribed by this Code.

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 Note A-1.4.1.2.(1).)

Fire compartment means an enclosed space in a *building* that 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-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 the National Building Code – 2023 Alberta Edition.

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

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therefrom as prescribed in the National Building Code – 2023 Alberta Edition. (See Note A-1.4.1.2.(1).)

Fire separation means a construction assembly that acts as a barrier against the spread of fire. (See Note A-1.4.1.2.(1).)

Fire stop flap means a device intended for use in horizontal assemblies required to have a *fire-resistance rating* and incorporating protective ceiling membranes that 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 the National Building Code – 2023 Alberta Edition.

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 D323, "Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)." (See Subsection 4.1.2. of Division B.)

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. (See Subsection 4.1.3. of Division B.)

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*.

Fuel-dispensing station means any premises or part thereof at which *flammable liquids* or *combustible liquids* are dispensed from fixed equipment into the fuel tanks of motor vehicles, watercraft or aircraft.

Grade means the lowest of the average levels of finished ground adjoining each exterior wall of a *building*, except that localized depressions need not be considered in the determination of average levels of finished ground. (See *First storey* and Note A-1.4.1.2.(1).)

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.

Home-type care occupancy (Group B, Division 4) means the *occupancy* or use of a *building* consisting of a single detached housekeeping unit where *care* is provided to residents and may include the living space of the caregiver and their family. (See Note A-1.4.1.2.(1).)

Individual storage area (ISA) means the area occupied by piles, bin boxes, *racks* or shelves, including subsidiary aisles providing access to the stored products, and separated from adjacent storage by aisles not less than 2.4 m in width. (See Note A-1.4.1.2.(1).)

Industrial occupancy (Group F) 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*.

Lower explosive limit means the minimum concentration of vapour in air at which the propagation of flame occurs on contact with a source of ignition.

Low-hazard industrial occupancy (Group F, Division 3) means an *industrial occupancy* in which the combustible content is not more than 50 kg/m^2 or 1 200 MJ/m^2 of *floor area*.

Low pressure storage tank means a *storage tank* designed to operate at pressures greater than 3.5 kPa (gauge) and up to 100 kPa (gauge).

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 – *Detention occupancies* in which persons are under restraint or are incapable of self-preservation because of security measures not under their control

B2 – *Treatment occupancies*

B3 – *Care occupancies*

B4 – *Home-type care occupancies*

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*

Marine fuel-dispensing station means a *fuel-dispensing station* at which *flammable liquids* or *combustible liquids* are dispensed into the fuel tanks of watercraft or aircraft.

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*.

Medium-hazard industrial occupancy (Group F, Division 2) means an *industrial occupancy* in which the combustible content is more than 50 kg/m^2 or 1 200 MJ/m^2 of *floor area* and not classified as a *high-hazard industrial occupancy*.

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

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.

Overfill protection device means a device or combination of components that is installed in a *storage tank*, fill tube or vent that prevents a *storage tank* from being overfilled when product is being delivered to the *storage tank*.

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

Pressure vessel means a *storage tank* designed to operate at pressures greater than 100 kPa (gauge).

Process plant means an *industrial occupancy* where materials, including *flammable liquids*, *combustible liquids* or gases, are produced or used in a process. (See Table 3.2.7.1. of Division B.)

Provincial Fire Administrator means a person in the fire discipline appointed as an Administrator under the Safety Codes Act.

Rack means any combination of vertical, horizontal or diagonal members that support stored materials on solid or open shelves, including both fixed and portable units.

Refinery means any *process plant* in which *flammable liquids* or *combustible liquids* are produced from crude petroleum, including areas on the same site where the resulting products are blended, packaged or stored on a commercial scale.

Residential occupancy (Group C) means the *occupancy* or use of a *building* or part thereof by persons for whom sleeping accommodation is provided but who are not harboured for the purpose of receiving *care* or *treatment* and are not involuntarily detained.

Secondary containment means containment that prevents any materials spilled or leaked from the primary *storage tank system* from reaching the land or water outside the containment area before cleanup occurs and includes double-walled *storage tank systems* and impermeable membranes or liners.

Self-service outlet means a *fuel-dispensing station* other than a *marine fuel-dispensing station* where the public handles the dispenser.

Service room means a room provided in a *building* to contain equipment associated with *building* services. (See Note A-1.4.1.2.(1).)

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.

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*.

Spill containment sump means a liquid-tight container intended to catch, retain and provide for the evacuation of any product at the time of filling.

Sprinklered (as applying to a *building* or part thereof) means that the *building* or part thereof is equipped with a system of automatic sprinklers.

Storage tank means a vessel for *flammable liquids* or *combustible liquids* having a capacity of more than 230 L, and designed to be installed in a fixed location.

Storage tank system means a system for the storage and dispensing of *flammable liquids* and *combustible liquids* and is not limited to *storage tanks*, associated piping, vents, pumps and dispensing equipment.

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.

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.

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 Note A-1.4.1.2.(1).)

Supervisory staff means those occupants of a *building* who have some delegated responsibility for the fire safety of other occupants under the fire safety plan.

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Tank vehicle means any vehicle, other than railroad tank cars and boats, with a cargo tank having a capacity of more than 450 L, mounted or built as an integral part of the vehicle and used for the transportation of *flammable liquids* or *combustible liquids* and including tank trucks, trailers and semi-trailers.

Transition sump means an underground liquid-tight container intended for installation where mechanical connection or transition takes place for the collection of any internal leakage of *flammable liquid* and *combustible liquid*.

Treatment means the provision of medical or other health-related intervention to persons, where the administration or lack of administration of these interventions may render them incapable of evacuating to a safe location without the assistance of another person. (See Note A-1.4.1.2.(1).)

Treatment occupancy (Group B, Division 2) means the *occupancy* or use of a *building* or part thereof for the provision of *treatment*, and where overnight accommodation is available to facilitate the *treatment*. (See Note A-1.4.1.2.(1).)

Turbine sump means a container designed to provide access to equipment and to contain minor leakage, and installed to prevent water ingress.

Underground storage tank system means a system for storing and dispensing *flammable liquids* or *combustible liquids* including one or more *storage tanks*, installed at least partially underground, and all piping, pumps and dispensing equipment connected to the system.

Unstable liquid means a liquid, including *flammable liquids* and *combustible liquids*, that is chemically reactive to the extent that it will vigorously react or decompose at or near normal temperature and pressure conditions or that is chemically unstable when subject to impact.

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.

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.

cm ..... centimetre(s)
cSt ..... centistoke(s)
°C ..... degree(s) Celsius
h ..... hour(s)
kg ..... kilogram(s)
kPa ..... kilopascal(s)
L ..... litre(s)
m ..... metre(s)
max. ..... maximum
min. ..... minimum
min ..... minute(s)
MJ ..... megajoule(s)
mm ..... millimetre(s)
No. ..... number(s)
pS/m ..... pico Siemens per metre
s ..... second(s)
St ..... stoke(s)

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> ..... greater than

< ..... less than

≤ ..... less than or equal to

% ..... per cent

Section 1.5. Referenced Documents and Organizations

1.5.1. Referenced Documents

1.5.1.1. Application of Referenced Documents

1) Except as provided in Sentence (2), 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

a) *buildings* and facilities, and

b) the objectives and functional statements attributed to the applicable acceptable solutions in Division B where the documents are referenced.

(See Note A-1.5.1.1.(1).)

2) Where a provision of this Code references the NECB, NBC(AE) or NPC, the applicable objectives and functional statements shall include those found in that referenced Code.

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.

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Notes to Part 1 Compliance

A-1.1.1.1.(1) Application of this Code. This Code applies to buildings and facilities, whether occupied or vacant. For the purposes of Sentence 1.1.1.1.(1), the term "facilities" is used in its broadest sense to include all premises that are not included in the definition of "building" in this Code, such as outdoor and underground areas, including areas for outdoor special events, structures and equipment. Such "facilities" are often associated with storage, distribution and manufacturing activities.

The NFC(AE) contains references to the National Building Code – 2023 Alberta Edition (NBC(AE)) for the design, construction and installation of many fire protection features. Some NBC(AE) requirements are most readily applied to new buildings and their retroactive application to existing situations as prescribed by this Code could result in some difficulty in achieving compliance. It is the intent of the NFC(AE) that an equivalent level of safety be achieved rather than necessarily achieving strict conformance to the NBC(AE). The application of this Code to the upgrading of existing facilities should be based on the judgment of the enforcement authority, who must deal with each case on its own merits.

The NFC(AE) states that the owner or the owner's authorized agent is responsible for carrying out the provisions of the Code (see Article 2.2.1.1. of Division C). However, the owner is expected to communicate with the authority having jurisdiction, who is in a position to assess the relative significance of variances from the NBC(AE) requirements. Such authority may then determine that upgrading measures are not necessary, on the basis that the existing arrangement represents an equivalent level of fire and life safety. The NFC(AE) presumes that the adopting legislation provides for the exercise of the necessary discretionary judgment on the part of the enforcing officials, along with appropriate rights to appeal (see Note A-2.2. of Division C). See also Note A-2.1.3.1.(1) of Division B and Note A-1.1.1.2. of Division A of the NBC(AE).

A-1.1.1.1.(2)(a) Temporary Fuelling Facilities. Such temporary fuelling facilities may include isolated construction sites, earth moving projects, road building, forestation, and firefighting base camps where storage tanks will not be in a fixed location for more than one year. The design and location of the storage tank system should include requirements such as appropriate construction standards, provisions for secondary containment, devices to prevent spillage during tank and equipment filling, fire extinguishers, and collision protection acceptable to the authority having jurisdiction.

A-1.1.1.1.(2)(g) Reporting of Spills or Leaks under Other Legislation. Specifications under other legislation (i.e. Pipeline Act, Environmental Protection and Enhancement Act) require the owner to report spills or leaks. Information on those requirements may be found on the Alberta Energy Regulator website, Release Reporting, and on the Alberta Hazardous Waste Spills website. The reporting of spills and leaks to the authority having jurisdiction pertains to flammable liquids and combustible liquids as identified in Article 2.2.7.1. of Division C.

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.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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 what it is intended to achieve. The resultant 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. They are published as a separate electronic document entitled "Supplement to the NFC 2020: Intent Statements," which is available on the NRC's website. It is important to note that intent statements are not available for requirements that are unique to the NFC(AE).

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: OS1, 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: OP1, Fire Protection of the Building or Facility, for example. However, if none of the applicable acceptable solutions are linked to Objective OP1, it is not necessary that alternative solutions proposed to replace these acceptable solutions provide a similar benefit related to Fire Protection of the Building or Facility. 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, the use of sprinklers to protect the exterior wall of a building may permit combustible materials to be stored closer to that wall than otherwise permitted by the Code, but the proximity of the stored materials to the wall may contravene firefighter access provisions elsewhere in the Code. All applicable acceptable solutions should be taken into consideration in demonstrating the compliance of an alternative solution.

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A-1.4.1.2.(1) Defined Terms.

Authority Having Jurisdiction

The defined term "authority having jurisdiction" refers to a safety codes officer as the appointed individual responsible for decision-making in a number of areas. In most cases, this individual will be a member of an accredited municipal fire department. In municipalities that use accredited agencies for their inspection and enforcement, the fire department may not be involved. It is important that accredited municipalities employing accredited agencies properly designate the person(s) acting as the authority having jurisdiction.

In addition, municipalities using accredited agencies should ensure that the agency has a close working relationship with the fire department during the decision-making process.

Care Occupancy

Support services rendered by or through care facility management refer to services provided by the organization that is responsible for the care for a period exceeding 24 consecutive hours. They do not refer to services provided by residents of dwelling units or suites, or to services arranged directly by residents of dwelling units or suites with outside agencies.

In the context of care occupancies, these services may include a daily assessment of the resident's functioning, awareness of their whereabouts, the making of appointments for residents and reminding them of those appointments, the ability and readiness to intervene if a crisis arises for a resident, supervision in areas of nutrition or medication, and provision of transient medical services. Services may also include activities of daily living such as bathing, dressing, feeding, and assistance in the use of washroom facilities, etc. No actual treatment is provided by or through care facility management.

Dangerous Goods

Prior to the 2019 edition of the NFC(AE), the terminology used to identify dangerous goods came from "Transportation of Dangerous Goods Regulations (TDGR)." The TDGR apply solely to the adequate identification of hazards related to dangerous goods in the contexts of transportation and emergency response.

Dangerous goods in the workplace are identified in accordance with the "Workplace Hazardous Materials Information System (WHMIS)," established in accordance with the Hazardous Products Act. The WHMIS identification system is specifically designed with the users of the product in mind.

Since the 2010 edition, the NFC(AE) identifies dangerous goods as products regulated by the TDGR or classified under the WHMIS. In order to harmonize these two nomenclatures for dangerous goods, class descriptors were developed taking into consideration both the TDGR and WHMIS classification systems. The NFC(AE) nomenclature uses a descriptive approach to classifying dangerous goods, which is similar to the one used by the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) developed by the United Nations (UN). Canada has actively participated in the development of the GHS and has committed to its implementation through the TDGR and WHMIS regulations.

The NFC(AE) nomenclature takes a common sense approach that corresponds more closely to how people refer to dangerous goods on a daily basis, blending TDGR and WHMIS terminology without using non-descript numbers and letters as previously found in the NFC(AE), TDGR and WHMIS.

Table A-1.4.1.2.(1)
TDGR, WHMIS and NFC(AE) Class Descriptors for Dangerous Goods

TDGR		WHMIS	NFC(AE)
Class	Descriptor		
1	Explosives	Explosives	Explosives
2	Gases	Gases under pressure	Compressed gases
2.1	Flammable gases	Flammable gases; Flammable aerosols	Flammable gases; Flammable aerosols
2.2	Non-flammable, non-toxic gases	Gases under pressure	Non-flammable, non-toxic gases
2.2 (5.1)	—	Oxidizing gases	Oxidizing gases
2.3	Toxic gases	—	Toxic gases

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Table A-1.4.1.2.(1) (Continued)

TDGR		WHMIS	NFC(AE)
Class	Descriptor		
3	Flammable liquids	Flammable liquids	Flammable liquids
4.1	Flammable solids	Flammable solids	Flammable solids
4.2	Substances liable to spontaneous combustion	Pyrophoric liquids; Pyrophoric solids	Pyrophoric materials
4.3	Water-reactive substances	Substances and mixtures which, in contact with water, emit flammable gases	Water-reactive substances
5.1	Oxidizing substances	Oxidizing liquids; Oxidizing solids	Oxidizers
5.2	Organic peroxides	Organic peroxides	Organic peroxides
6.1	Toxic substances	(1)	Toxic substances
6.2	Infectious substances	(1)	Infectious materials
7	Radioactive materials	Not covered by WHMIS	Radioactive materials
8	Corrosives	(2)	Corrosives
9	Miscellaneous products, substances, or organisms	(2)	Miscellaneous dangerous goods
—	—	Previously Class F	Dangerously reactive materials

Notes to Table A-1.4.1.2.(1):

(1) The WHMIS has various descriptors for this Class of products based on their toxicity.

(2) The WHMIS has various descriptors for this Class of products based on the nature of the danger presented by the product.

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-Resistance Rating

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.

Fire Separation

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

Grade

Localized depressions that need not be considered in the determination of the elevation of grade include such features as vehicle and pedestrian entrances and other minor depressions that do not affect accessibility for firefighting or evacuation.

Home-Type Care Occupancy

Support services rendered to the residents of a home-type care occupancy refer to services provided at a cost by caregivers who are responsible for the care for a period exceeding 24 consecutive hours. They do not refer to services provided by family members of the residents, or to services arranged directly by residents with outside agencies.

In the context of home-type care occupancies, these services may include a daily assessment of the resident's functioning, awareness of their whereabouts, the making of appointments for residents and reminding them of those appointments, the ability and readiness to intervene if a crisis arises for a resident, supervision in areas of nutrition or medication, and provision of transient medical services. Services may also include activities of daily living such as bathing, dressing, feeding, and assistance in the use of washroom facilities, etc. No actual treatment is provided by the caregivers.

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Individual Storage Area

The width of subsidiary aisles providing access to stored products within an individual storage area may be determined by material handling methods, or other criteria such as minimum width for access to exits or fire protection equipment.

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.

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 patients have little control of that space, even though they pay the hospital a per diem rate for the privilege of using the hospital facilities, which include the sleeping areas.

For certain requirements in the NBC(AE), 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.

Treatment

The ability to evacuate unassisted implies that a person is capable of recognizing and responding to an emergency given their physical, cognitive and behavioural abilities, and able to move to a safe location without the assistance of another person. For example, such persons must be able to arise and walk, or transfer from a bed or chair to a means of mobility, and leave the building or move to a safe location on their own.

Treatment Occupancy

"Treatments" may include such things as surgery, intensive care, and emergency medical intervention. Treatment services differ from the services provided by care occupancies like personal care assistance or the administration of medication, and from those provided by business and personal services occupancies like dentistry or day procedures.

A-1.5.1.1.(1) Application of Referenced Documents. Documents referenced in the NFC(AE) 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. protection of stored products against damage or loss due to fire. Sentence 1.5.1.1.(1) is intended to make it clear that, whereas referencing these documents in the NFC(AE) generally has the effect of making the provisions of those documents part of the Code, provisions that are unrelated to buildings and facilities 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 NFC(AE) 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

NFC(AE): 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).

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Part 2
Objectives

2.1. Application
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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* and facilities covered in this Code. (See Article 1.1.1.1.)

2.1.1.2. Application of Objectives

1) Except as provided in Sentence (2), the objectives described in this Part apply
a) to all *buildings* and facilities 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 OP, Fire Protection of Buildings and Facilities (including Sub-Objectives OP1, Fire Protection of the Building or Facility, and OP3, Protection of Adjacent Buildings or Facilities from Fire), does not apply to farm buildings.

Section 2.2. Objectives

2.2.1. Objectives

2.2.1.1. Objectives

1) The objectives of this Code are as follows (see Note A-2.2.1.1.(1)):

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

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OS1 Fire Safety

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

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

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

OS3 Safety in Use

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

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

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
OS3.7 – persons being delayed in or impeded from moving to a safe place during an emergency (see Note A-2.2.1.1.(1))

OH Health

An objective of this Code is to limit the probability that, as a result of specific circumstances related to the *building* or facility, a person will be exposed to an unacceptable risk of illness.

OH5 Hazardous Substances Containment

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

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

the public will be exposed to an unacceptable risk of illness due to the release of hazardous substances from the *building* or facility.

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OP Fire Protection of Buildings and Facilities

An objective of this Code is to limit the probability that, as a result of specific circumstances related to the *building* or facility, the *building* or facility will be exposed to an unacceptable risk of damage due to fire.

OP1 Fire Protection of the Building or Facility

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

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

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

OP3 Protection of Adjacent Buildings or Facilities from Fire

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

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

adjacent *buildings* or facilities will be exposed to an unacceptable risk of damage due to fire. The risks of damage to adjacent *buildings* and 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

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Notes to Part 2 Objectives

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 four principal Code Documents—the National Building Code – 2023 Alberta Edition, the National Energy Code for Buildings, the National Fire Code – 2023 Alberta Edition and the National Plumbing Code—but not all objectives are pertinent to all Codes.

The building or facility

Where the term "the building or facility" is used in the wording of the objectives, it refers to the building or facility for which compliance with the National Fire Code – 2023 Alberta Edition 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 objective OS3.7 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.

Fire Safety

In the definition of Objective OS1, Fire Safety, the term "person" refers to any individual in or adjacent to the building or facility, including the occupants, the public, and emergency responders including firefighters when performing their duties.

Certain technical requirements in the National Model Codes are intended to address the safety of emergency responders, including firefighters, when performing their duties.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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Part 3
Functional Statements

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Part 3
Functional Statements

Section 3.1. Application

3.1.1. Application

3.1.1.1. Application

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

3.1.1.2. Application of Functional Statements

1) The functional statements described in this Part apply
a) to all *buildings* and facilities 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.

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 facility or its elements to perform the following functions (see Note A-3.2.1.1.(1)):

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.

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F22 To limit movement under expected loads and forces.

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.

F34 To resist or discourage unwanted access or entry.

F36 To minimize the risk that persons will be trapped in confined spaces.

F40 To limit the level of contaminants.

F43 To minimize the risk of release of hazardous substances.

F44 To limit the spread of hazardous substances beyond their point of release.

F51 To maintain appropriate air and surface temperatures.

F52 To maintain appropriate relative humidity.

F53 To maintain appropriate indoor/outdoor air pressure differences.

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.

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Notes to Part 3
Functional Statements

A-3.2.1.1.(1) 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 four principal Code Documents—the National Building Code – 2023 Alberta Edition, the National Energy Code for Buildings, the National Fire Code – 2023 Alberta Edition and the National Plumbing Code—but not all functional statements are pertinent to all Codes.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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Division B

Acceptable Solutions

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Part 1 General

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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* and facilities 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 Sections 2.16., 3.4., 4.12., 5.7., 6.9. and 7.4. (See Note A-1.1.2.1.(1).)

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 and its Regulations, or the meanings 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 B, 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 B, they shall be the provisions stated in Parts 2 to 7.

4) For words not defined by Sentence (1), reference should be made to the Oxford University Press 2004, "Canadian Oxford Dictionary, 2nd Edition."

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.

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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, reaffirmations, reapprovals, addenda and supplements effective to 15 July 2022.

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.

Table 1.3.1.2.
Documents Referenced in the NFC(AE)(1)
Forming Part of Sentence 1.3.1.2.(1)

Issuing Agency	Document Number(2)	Title of Document	Code Reference
ACGIH	28th Edition	Industrial Ventilation: A Manual of Recommended Practice for Design	A-3.2.7.3.(1)(b)
AER	Directive 055	Storage Requirements for the Upstream Petroleum Industry	1.1.1.1.(2)(3) A-2.2.7.1.(1) to (3)(4)
API	SPEC 5L (2012)	Line Pipe	4.5.2.1.(4)
API	SPEC 12B (2008)	Specification for Bolted Tanks for Storage of Production Liquids	4.3.1.2.(1) A-4.3.1.2.(2)(b)
API	SPEC 12D (2008)	Specification for Field Welded Tanks for Storage of Production Liquids	4.3.1.2.(1) A-4.3.1.2.(2)(b)
API	SPEC 12F (2008)	Specification for Shop Welded Tanks for Storage of Production Liquids	4.3.1.2.(1) A-4.3.1.2.(2)(b)
API	STD 620 (2013)	Design and Construction of Large, Welded, Low-Pressure Storage Tanks	4.3.1.3.(1)
API	STD 650 (2013)	Welded Tanks for Oil Storage	4.3.1.2.(1)
API	STD 653 (2009)	Tank Inspection, Repair, Alteration, and Reconstruction	4.3.1.10.(2) Table 4.4.1.2.-B
API	STD 1104 (2013)	Welding of Pipelines and Related Facilities	4.5.5.2.(1) A-4.5.10.7.(6)
API	RP 1604 (1996)	Closure of Underground Petroleum Storage Tanks	A-4.3.16.1.(1)
API	STD 2000 (2009)	Venting Atmospheric and Low-Pressure Storage Tanks	4.3.1.2.(2) 4.3.4.1.(1) A-4.3.13.10.(1)
API	RP 2003 (2008)	Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents	A-4.7.4.5.
API	RP 2009 (2002)	Safe Welding, Cutting and Hot Work Practices in the Petroleum and Petrochemical Industries	A-5.2.3.4.(1)(b)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
API	STD 2015 (2001)	Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, Planning and Managing Tank Entry From Decommissioning Through Recommissioning	A-5.2.3.4.(1)(b)
API	RP 2200 (2010)	Repairing Crude Oil, Liquefied Petroleum Gas, and Product Pipelines	A-4.5.10.7.(6)
API	RP 2201 (2003)	Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries	A-4.5.10.7.(6) A-5.2.3.4.(1)(b)
API	RP 2207 (2007)	Preparing Tank Bottoms for Hot Work	A-5.2.3.4.(1)(b)
ARPM	IP-2-2014	Hose Handbook	A-4.8.8.1.(1)(a)
ASME/CSA	ASME A17.1-2019/CSA B44:19	Safety Code for Elevators and Escalators	7.2.2.1.(2)
ASME	BPVC-2021	Boiler and Pressure Vessel Code	4.3.1.3.(1) 4.5.9.5.(2) 4.5.9.6.(1)
ASME	B16.5-2020	Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard	4.5.5.3.(1)
ASME	B31.3-2020	Process Piping	4.5.2.1.(5)
ASTM	A53/A53M-20	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	4.5.2.1.(4)
ASTM	A193/A193M-20	Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications	4.5.5.4.(1)
ASTM	D5/D5M-20	Standard Test Method for Penetration of Bituminous Materials	A-4.1.3.1.
ASTM	D56-21a	Standard Test Method for Flash Point by Tag Closed Cup Tester	4.1.3.1.(1)
ASTM	D92-18	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester	A-4.1.2.2.
ASTM	D93-20	Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester	4.1.3.1.(2)
ASTM	D323-20a	Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)	1.4.1.2.(1)[3]
ASTM	D3278-21	Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus	4.1.3.1.(4) A-4.1.3.1.
ASTM	D3828-16a	Standard Test Methods for Flash Point by Small Scale Closed Cup Tester	4.1.3.1.(3)
ASTM	D4359-90	Standard Test Method for Determining Whether a Material Is a Liquid or a Solid	A-4.1.3.1.
CCBFC	NRCC 34018	Alberta Building Code 1990	A-2.1.2.1.(1)
CCBFC	NRCC 40383	User's Guide – NBC 1995, Fire Protection, Occupant Safety and Accessibility (Part 3)	7.1.1.2.(2) 7.2.3.1.(1) 7.2.3.3.(1) 7.3.2.1.(1) 7.3.3.1.(1) 7.3.4.1.(1) 7.3.5.1.(1) 7.3.6.1.(1) 7.3.7.1.(1) 7.3.8.1.(1) 7.3.9.1.(1) 7.3.10.1.(1) 7.3.11.1.(1) 7.3.12.1.(1) 7.3.13.1.(1) 7.3.14.1.(1) 7.3.15.1.(1)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
CCBFC	NRCC 48673	Alberta Building Code 2006	A-2.1.3.1.(1)
CCBFC	NRCC-CONST-56438E	National Energy Code of Canada for Buildings 2020	1.5.1.1.(2)[3] A-2.2.1.1.(1)[3] A-3.2.1.1.(1)[3]
CCBFC	NRCC-CONST-56436E	National Plumbing Code of Canada 2020	1.5.1.1.(2)[3] A-2.2.1.1.(1)[3] A-3.2.1.1.(1)[3] A-4.1.6.2.(2) 1.2.1.1.(5)[4]
CCBFC	NRCC-CONST-56660E	National Building Code – 2023 Alberta Edition	1.3.3.2.(1)[3] 1.4.1.2.(1)[3] 1.5.1.1.(2)[3] A-1.1.1.1.(1)[3] A-1.4.1.2.(1)[3] A-2.2.1.1.(1)[3] A-3.2.1.1.(1)[3] 2.1.2.1.(1) 2.1.3.1.(1) 2.1.3.2.(1) 2.1.3.3.(1) 2.1.3.4.(1) 2.1.3.7.(1) 2.2.1.1.(1) 2.2.1.1.(2) 2.2.1.1.(3) 2.2.2.1.(1) 2.2.2.1.(2) 2.2.2.4.(2) 2.2.3.1.(1) 2.3.1.1.(1) 2.3.1.2.(1)[4] 2.3.1.4.(1) 2.4.1.2.(1) 2.5.1.1.(1) 2.6.1.1.(1) 2.6.1.5.(1) 2.6.1.9.(1) 2.6.2.1.(1) 2.7.1.1.(1) 2.7.1.2.(1) 2.7.1.4.(2) 2.7.3.1.(1) 2.8.1.1.(1) 2.8.2.2.(1) 2.8.2.12.(2) 2.8.3.1.(1) 2.8.3.2.(1) 2.9.1.1.(1) 2.9.3.6.(1) 2.10.1.1.(1) 2.11.1.1.(1) 2.13.2.1.(1) 2.14.1.1.(2) A-2.1.3.1.(1) A-2.1.3.3.(3) A-2.1.3.4.(1) A-2.7.1.3.(1)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
		National Building Code – 2023 Alberta Edition (continued)	A-2.7.1.4.(2) A-2.7.3.1.(1) A-2.8.1.2.(2) A-2.9.3.5.(1) 3.1.4.1.(1) 3.2.4.2.(1) 3.2.6.2.(1) 3.2.7.5.(6) 3.2.7.5.(7) 3.2.7.8.(1) 3.2.7.12.(3) 3.2.8.2.(1) 3.2.8.3.(1) 3.2.9.2.(1) 3.2.9.2.(2) 3.2.9.2.(3) 3.2.9.2.(4) 3.2.9.2.(5) 3.3.2.5.(1) 3.3.6.7.(1) A-3.2.2.3.(5) A-3.2.7.9.(1) A-3.2.7.12.(3) A-3.2.9.2.(5) 4.1.7.1.(1) 4.2.4.3.(2) 4.2.7.5.(2) 4.2.9.5.(1) 4.2.11.3.(1) 4.2.12.1.(1) 4.3.2.4.(2) 4.3.3.2.(1) 4.5.6.10.(2) 4.5.8.2.(3) 4.6.3.3.(2) 4.6.3.3.(3) 4.9.3.2.(1) A-4.1.7.1.(1) A-4.2.7.5.(2) 5.1.3.1.(1) 5.3.3.4.(1) 5.5.2.2.(1) 5.5.4.1.(1) 5.5.4.2.(1) 5.5.4.3.(1) 5.5.4.4.(1) 5.6.1.6.(1) 5.6.1.6.(2) 5.6.1.8.(2) 5.6.1.20.(1) 5.6.3.1.(1) 5.6.3.4.(2) 5.6.3.5.(1) 5.6.3.7.(1) 5.6.3.7.(3) 5.6.3.8. 5.6.4.1.(1) 5.6.4.3.(1) 5.6.4.3.(3)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
		National Building Code – 2023 Alberta Edition (continued)	A-5.6.1.2.(1) A-5.6.1.4.(4) A-5.6.1.6. A-5.6.1.8. A-6.1.1.2.(1) 7.1.1.1.(1) 7.1.1.2.(1) 7.1.1.2.(2) 7.1.1.4.(2) 1.2.1.1.(5)[4] 2.1.1.1.(3)[4] 2.1.2.4.(1)[4] 2.2.3.1.(5)[4] 2.2.10.1.(2)[4] 2.2.10.1.(4)[4] A-2.2.4.3.(1)[4]
CCME	PN 1326 (2003)	Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products	A-4.3.16.1.(1) A-4.4.2.1.(3)
CFA	1990	Using the Canadian Fuels Colour-Symbol System to Mark Equipment and Vehicles For Product Identification	4.3.1.7.(1) 4.5.4.1.(3) 4.5.7.6.(1)
CFA	PACE Report 87-1	Impressed Current Method of Cathodic Protection of Underground Storage Tanks	2.2.9.1.(3)[4]
CGA	P-1 (2008)	Standard for Safe Handling of Compressed Gases in Containers	A-3.1.1.4.(1)(a)
CGSB	CAN2-4.162-M80 (formerly CAN/CGSB-4.162-M80)	Hospital Textiles – Flammability Performance Requirements	2.3.2.3.(1)
CNSC	S.C. 1997, c. 9	Nuclear Safety and Control Act	3.1.1.2.(1)
CSA	B51:19	Boiler, pressure vessel, and pressure piping code	4.3.1.3.(2)
CSA	B108.2:21	Liquefied natural gas refuelling stations installation code	4.6.1.1.(2)
CSA	B139 Series:19	Installation code for oil-burning equipment	4.1.1.1.(3) 4.3.13.6.(1) A-4.1.1.1.(3)(b) A-4.3.13.4.(1)(b) 5.6.1.10.(1) 2.2.3.1.(6)[4]
CSA	B149.1-20	Natural gas and propane installation code	3.1.1.4.(2) 3.1.1.4.(3) 4.6.1.1.(2) 5.6.1.10.(1)
CSA	B149.2-20	Propane storage and handling code	3.1.1.4.(2) 3.2.8.2.(3) 4.6.1.1.(2)
CSA	B306-M1977	Portable Fuel Tanks for Marine Use	4.2.3.1.(1)
CSA	B346-M1980	Power-Operated Dispensing Devices for Flammable Liquids	4.6.3.1.(1)
CSA	B376:22	Portable containers for gasoline and other petroleum fuels	4.2.3.1.(1)
CSA	B620-14	Highway tanks and TC portable tanks for the transportation of dangerous goods	4.2.3.1.(1)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
CSA	C22.1-24	Canadian Electrical Code, Part I (25th edition), Safety Standard for Electrical Installations	4.1.4.1.(1) 4.1.4.1.(2) A-4.10.3.3.(1) 5.1.2.1.(1) 5.1.2.2.(1) 5.3.1.2.(2) 5.3.1.2.(3) 5.3.1.10.(2) 5.5.3.4.(1) 5.6.1.9.(3) A-5.1.2.1.(1) A-5.5.3.4.(1)
CSA	CAN/CSA-C22.2 No. 61010-1-12	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements (Tri-national standard, with UL 61010-1 and ANSI/ISA-61010-1 (82.02.01)	A-5.5.3.4.(1)
CSA	C282-15	Emergency electrical power supply for buildings	6.5.1.1.(1) 6.5.1.4.(1) A-6.5.1.1.(2) A-6.5.1.5.(1) 2.2.4.7.(1)[4] 2.2.4.7.(2)[4]
CSA	W117.2:19	Safety in welding, cutting and allied processes	5.2.1.1.(2)
CSA	Z32-15	Electrical safety and essential electrical systems in health care facilities	6.5.1.1.(2) A-6.5.1.1.(2)
CSA	Z245.1-14	Steel pipe	4.5.2.1.(4)
CSA	Z305.12-06 (R2021)	Safe storage, handling, and use of portable oxygen systems in residential buildings and health care facilities	2.2.11.1.(1)[4]
CSA	PLUS 2203 (3rd. ed. pub. 2001)	Hazardous Locations: A Guide for the Design, Testing, Construction, and Installation of Equipment in Explosive Atmospheres	A-4.1.4.1.(1)
EPA	510-B-93-004	Doing Inventory Control Right for Underground Storage Tanks	A-4.4.2.1.(2)
EPA	510-B-95-009	Introduction To Statistical Inventory Reconciliation For Underground Storage Tanks	A-4.4.2.1.(4)
EPA	530/UST-90/007	Standard Test Procedures For Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods	A-4.4.2.1.(4)
EPA	530/UST-90/008	Standard Test Procedures For Evaluating Leak Detection Methods: Vapor-Phase Out-of-Tank Product Detectors	A-4.4.2.1.(3)
EPA	530/UST-90/009	Standard Test Procedures For Evaluating Leak Detection Methods: Liquid-Phase Out-of-Tank Product Detectors	A-4.4.2.1.(3)
FM Global	Data Sheet 7-50 (2014)	Compressed Gases in Portable Cylinders	A-3.2.8.2.(2)
FM Global	Data Sheet 7-83 (2015)	Drainage and Containment Systems for Ignitable Liquids	A-4.1.6.1.(1)
Govt. of Alberta	A.R. 161/2022	Designated Trades and Restricted Activities Regulation	2.2.4.3.(3)[4] 2.2.4.4.(6)[4] 2.2.4.4.(7)[4] 2.2.4.6.(4)[4]
Govt. of Alberta	R.S.A. 2000, c. E-12	Environmental Protection and Enhancement Act and its Regulations	A-1.1.1.1.(2)(g)[3] A-2.2.7.1.(1) to (3)[4]
Govt. of Alberta	R.S.A. 2000, c. M-26	Municipal Government Act and its Regulations	2.2.4.6.(5)[4]
Govt. of Alberta	R.S.A. 2000, c. P-15	Pipeline Act and its Regulations	A-1.1.1.1.(2)(g)[3] A-2.2.7.1.(1) to (3)[4]

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
Govt. of Alberta	R.S.A. 2000, c. S-1	Safety Codes Act and its Regulations	1.1.1.1.(2)[3] 1.4.1.1.(1)[3] 1.4.1.2.(1)[3] 1.2.1.1.(1) 1.2.1.1.(5) 1.2.1.1.(1)[4] 2.1.1.1.(3)[4] 2.2.3.1.(7)[4] 2.2.5.1.(1)[4] A-2.1.2.2.(1)[4] A-2.2.[4]
Govt. of Alberta	S.A. 1973, c. 85	Uniform Building Standards Act and its Regulations	2.1.1.1.(3)[4]
Govt. of Alberta	S.A. 2007, c. E-0.1	Early Learning and Child Care Act and its Regulations	2.10.2.1.(1)
HC	R.S.C. 1985, c. H-3	Hazardous Products Act	4.2.3.2.(2)
HC	S.C. 2002, c. 28	Pest Control Products Act	4.2.3.2.(2)
HC	SOR/2001-269	Consumer Chemicals and Containers Regulations, 2001	A-3.2.5.2.(1)
HC	SOR/2015-17	Hazardous Products Regulations	1.4.1.2.(1)[3] 3.1.2.1.(1) 3.2.7.1.(3) Table 3.2.7.1. Table 3.2.7.6. 3.3.4.1.(3) A-3.2.5.2.(1) A-Table 3.2.7.1. A-3.2.7.6.(3) A-4.2.2.3.(2)
HC	WHMIS 1988	Workplace Hazardous Materials Information System (WHMIS)	A-1.4.1.2.(1)[3] 3.1.2.1.(1) 3.2.7.1.(3) Table 3.2.7.1. Table 3.2.7.6. 3.2.7.15.(2) 3.3.4.1.(3) A-Table 3.2.7.1. A-3.2.7.1.(3) A-3.2.7.1.(3)(b) A-3.2.7.6.(3) A-3.2.7.13.(1) A-3.2.7.14.(1)
IMO	2012	International Maritime Dangerous Goods Code	3.3.4.8.(1)
NACE	SP0169-2013	Control of External Corrosion on Underground or Submerged Metallic Piping Systems	4.5.3.1.(1)
NACE	SP0285-2011-SG	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection	4.3.10.1.(1)
NFPA	2008	Fire Protection Handbook, Twentieth Edition	A-2.4.1.3.(1)
NFPA	10-2013	Standard for Portable Fire Extinguishers	2.1.5.1.(3) 6.2.1.1.(1) 2.2.4.2.(3)[4]
NFPA	11-2016	Standard for Low-, Medium-, and High-Expansion Foam	2.1.3.5.(3) 4.3.2.5.(2)
NFPA	12-2015	Standard on Carbon Dioxide Extinguishing Systems	2.1.3.5.(3)
NFPA	12A-2018	Standard on Halon 1301 Fire Extinguishing Systems	2.1.3.5.(3) A-2.1.3.5.(3)(c) and (d)
NFPA	12B-1990	Standard on Halon 1211 Fire Extinguishing Systems	2.1.3.5.(3) A-2.1.3.5.(3)(c) and (d)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
NFPA	13-2019[5]	Standard for the Installation of Sprinkler Systems	A-2.1.3.1.(1) 3.2.1.1.(1) 3.2.2.4.(3) 3.2.3.3.(1) 3.2.4.3.(1) 3.2.6.3.(4) A-3.2.1.1.(1)(a) A-3.2.2.4.(3) A-3.2.3.3.(2)
NFPA	13D-2016	Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes	2.2.4.4.(2)[4] 2.2.4.4.(3)[4]
NFPA	13R-2019	Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies	2.2.4.4.(2)[4] 2.2.4.4.(4)[4] 2.2.4.4.(5)[4]
NFPA	15-2017	Standard for Water Spray Fixed Systems for Fire Protection	2.1.3.5.(4) 4.3.2.5.(2) A-4.1.6.1.(1)
NFPA	16-2019	Standard on Installation of Foam-Water Sprinkler and Foam-Water Spray Systems	2.1.3.5.(4)
NFPA	17-2021	Standard for Dry Chemical Extinguishing Systems	2.1.3.5.(3)
NFPA	17A-2021	Standard for Wet Chemical Extinguishing Systems	2.1.3.5.(3)
NFPA	18-2021	Standard on Wetting Agents	2.1.3.5.(5)
NFPA	25-2020	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems	6.4.1.1.(1) 2.2.4.4.(4)[4] 2.2.4.4.(5)[4] 2.2.4.6.(3)[4] 2.2.4.6.(6)[4]
NFPA	30-2018	Flammable and Combustible Liquids Code	4.2.7.6.(1) A-4.1.1.1.(2) A-4.1.4.1.(1) A-4.1.6.1.(1) A-4.2.7.6.(1) A-4.3.16.1.(1)
NFPA	30B-2019	Code for the Manufacture and Storage of Aerosol Products	3.2.5.2.(1) 3.2.5.5.(1) A-3.2.5.2.(1)
NFPA	32-2016	Standard for Drycleaning Facilities	5.4.2.1.(1)
NFPA	33-2018	Standard for Spray Application Using Flammable or Combustible Materials	5.4.5.2.(1)
NFPA	34-2018	Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids	5.4.6.2.(1)
NFPA	36-2021	Standard for Solvent Extraction Plants	A-4.1.1.1.(2)
NFPA	37-2018	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	4.3.13.2.(1)
NFPA	51-2023	Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes	5.2.2.4.(1)
NFPA	51B-2024	Standard for Fire Prevention During Welding, Cutting, and Other Hot Work	A-5.2.3.3.(1) A-5.2.3.7.(1)
NFPA	55-2020	Compressed Gases and Cryogenic Fluids Code	A-3.1.1.4. A-5.5.5.3.(5)(b) and (7)(b)
NFPA	61-2017	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities	A-5.3.1.3.(2)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
NFPA	68-2013	Standard on Explosion Protection by Deflagration Venting	3.2.8.2.(1) 4.3.14.3.(1) 4.9.3.1.(1) 4.9.4.2.(1) 5.3.1.6.(2)
NFPA	69-2014	Standard on Explosion Prevention Systems	4.3.2.5.(2) 4.9.4.2.(1) 5.3.1.7.(2)
NFPA	80-2013	Standard for Fire Doors and Other Opening Protectives	2.2.2.4.(5)
NFPA	80A-2012	Recommended Practice for Protection of Buildings from Exterior Fire Exposures	A-2.4.1.1.(6) 3.3.6.3.(2)
NFPA	82-2014	Standard on Incinerators and Waste and Linen Handling Systems and Equipment	2.6.2.2.(1)
NFPA	86-2019	Standard for Ovens and Furnaces	5.4.1.2.(1)
NFPA	91-2015	Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids	3.2.2.3.(5) 4.1.7.2.(5) A-5.3.1.3.(2)
NFPA	96-2024	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations	2.6.1.9.(2)
NFPA	120-2020	Standard for Fire Prevention and Control in Coal Mines	A-5.3.1.3.(2)
NFPA	241-2019	Standard for Safeguarding Construction, Alteration, and Demolition Operations	A-5.6.1.1.
NFPA	326-2020	Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair	A-5.6.1.11.(4)
NFPA	484-2019	Standard for Combustible Metals	A-5.3.1.3.(2)
NFPA	497-2021	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas	A-4.1.4.1.(1)
NFPA	505-2018	Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations	3.1.3.1.(1)
NFPA	654-2017	Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids	A-5.3.1.3.(2)
NFPA	655-2017	Standard for Prevention of Sulfur Fires and Explosions	A-5.3.1.3.(2)
NFPA	664-2017	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities	5.3.2.1.(1) A-5.3.1.3.(2)
NFPA	705-2018	Recommended Practice for a Field Flame Test for Textiles and Films	2.3.2.2.(1) 2.9.2.1.(1) A-2.3.2.2.(1)
NFPA	750-2019	Standard on Water Mist Fire Protection Systems	2.1.3.5.(4)
NFPA	1142-2017	Standard on Water Supplies for Suburban and Rural Fire Fighting	3.3.2.16.(1) A-3.3.2.16.(1)(b)
NFPA	1962-2018	Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances	2.2.6.1.(6)[4]
NFPA	2001-2018	Standard on Clean Agent Fire Extinguishing Systems	2.1.3.5.(3)
NRCan	2010	Display Fireworks Manual	5.1.1.3.(1)
NRCan	R.S.C. 1985, c. E-17	Explosives Act	3.1.1.3.(1) A-3.2.9.1.(1) 5.1.1.2.(1) 2.1.2.1.(2)[4]

Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
OCIMF	2009	Guide to Manufacturing and Purchasing Hoses for Offshore Moorings, 5th Edition	A-4.8.8.1.(1)(a)
Oxford University Press	June 2004	Canadian Oxford Dictionary, 2nd Edition	1.4.1.1.(5)[3] 1.2.1.1.(4) 1.2.1.1.(5)[4]
SFPE	4th Edition	Handbook of Fire Protection Engineering	A-4.1.6.1.(1)
STI/SPFA	SP031-2008	Standard for Repair of Shop Fabricated Aboveground Tanks for Storage of Flammable and Combustible Liquids	4.3.1.10.(2)
TC	2001	Standards Respecting Pipeline Crossings Under Railways	4.5.6.5.(3)
TC	General Order No. 0-32, C.R.C., c. 1148	Flammable Liquids Bulk Storage Regulations	4.5.6.5.(4) 4.7.2.2.(1) 4.7.4.1.(2)
TC	SOR/82-1015	Railway Prevention of Electric Sparks Regulations	4.7.4.5.(2) 4.8.5.1.(1)
TC	SOR/96-433	Canadian Aviation Regulations – Part III	2.13.1.1.(1)
TC	SOR/2001-286	Transportation of Dangerous Goods Regulations (TDGR)	1.4.1.2.(1)[3] A-1.4.1.2.(1)[3] 3.1.2.1.(1) 3.2.7.1.(3) Table 3.2.7.1. Table 3.2.7.6. 3.2.7.14.(1) 3.2.7.14.(4) 3.2.7.15.(2) 3.3.4.1.(3) A-3.2.7.1.(3)(b) A-3.2.7.6.(3) A-3.2.7.14.(1) 4.1.1.1.(3) 4.2.3.1.(1) 4.2.3.2.(2) A-4.1.2.1. A-4.2.2.3.(2)
TC	SOR/2012-69	Vessel Pollution and Dangerous Chemicals Regulations	A-4.8.8.1.(1)(a)
ULC	ANSI/CAN/UL/ULC 2258:2018	Standard for Aboveground Nonmetallic Tanks for Fuel Oil and Other Combustible Liquids	4.3.1.2.(1)
ULC	CAN/ULC-S109-14	Standard Method for Flame Tests of Flame-Resistant Fabrics and Films	2.3.2.1.(1)
ULC	CAN/ULC-S137:2017	Standard Method of Test for Fire Growth of Mattresses (Open Flame Test)	2.3.2.3.(2)
ULC	CAN/ULC-S503-05	Standard for Carbon-Dioxide Fire Extinguishers	2.1.5.1.(4)
ULC	CAN/ULC-S504-12	Standard for Dry Chemical Fire Extinguishers	2.1.5.1.(4) 2.1.2.7.(4)
ULC	CAN/ULC-S507-05	Standard for Water Fire Extinguishers	2.1.5.1.(4)
ULC	CAN/ULC-S508-02	Standard for the Rating and Fire Testing of Fire Extinguishers	2.1.5.1.(5)
ULC	CAN/ULC-S512-M87	Standard for Halogenated Agent Hand and Wheeled Fire Extinguishers	2.1.5.1.(4)
ULC	CAN/ULC-S513-11	Standard for Threaded Couplings for 38 mm and 65 mm Fire Hose	2.2.6.1.(3)[4]
ULC	CAN/ULC-S524:2019	Standard for Installation of Fire Alarm Systems	2.2.9.2.(1)[4]
ULC	CAN/ULC-S531:2019	Standard for Smoke Alarms	2.1.3.3.(1)
ULC	CAN/ULC-S532-07	Standard for the Regulation of the Servicing of Portable Fire Extinguishers	2.2.4.2.(2)[4]

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
ULC	CAN/ULC-S536:2019	Standard for Inspection and Testing of Fire Alarm Systems	6.3.1.2.(1) 2.2.1.2.(9)[4] 2.2.4.3.(6)[4] 2.2.9.2.(1)[4]
ULC	CAN/ULC-S537:2019	Standard for the Verification of Fire Alarm Systems	2.2.1.2.(9)[4] 2.2.9.2.(1)[4]
ULC	CAN/ULC-S540-13	Standard for Residential Fire and Life Safety Warning Systems: Installation, Inspection, Testing and Maintenance	6.7.1.1.(3)
ULC	CAN/ULC-S543-09	Standard for Internal Lug Quick-connect Couplings for Fire Hose	2.2.6.1.(4)[4]
ULC	CAN/ULC-S552-14	Standard for the Inspection, Testing and Maintenance of Smoke Alarms	6.7.1.1.(1)
ULC	CAN/ULC-S553-14	Standard for the Installation of Smoke Alarms	2.1.3.3.(3) A-2.1.3.3.(3)
ULC	CAN/ULC-S554:2016	Standard for Water Based Agent Fire Extinguishers	2.1.5.1.(4)
ULC	CAN/ULC-S561:2022	Standard for Installation and Services for Fire Signal Receiving Centres and Systems	6.3.1.3.(1) A-6.3.1.3.(1)
ULC	CAN/ULC-S566:2017	Standard for Halocarbon Clean Agent Fire Extinguishers	2.1.5.1.(4)
ULC	CAN/ULC-S601-14	Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids	4.3.1.2.(1) 4.3.3.2.(1)
ULC	CAN/ULC-S602-14	Standard for Steel Aboveground Tanks for Fuel Oil and Lubricating Oil	4.3.1.2.(1)
ULC	CAN/ULC-S603-14	Standard for Steel Underground Tanks for Flammable and Combustible Liquids	4.3.1.2.(1) 4.4.3.2.(4)
ULC	CAN/ULC-S603.1:2022	Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids	4.3.1.2.(1) 4.3.8.6.(1) 4.3.10.1.(1) 4.5.3.1.(1) 2.2.9.1.(3)[4]
ULC	CAN/ULC-S612:2016	Standard for Hose and Hose Assemblies for Flammable and Combustible Liquids	4.6.5.1.(1)
ULC	CAN/ULC-S615-14	Standard for Fibre Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids	4.3.1.2.(1) 4.3.8.6.(2) 4.4.3.2.(4)
ULC	CAN/ULC-S620:2016	Standard for Hose Nozzle Valves for Flammable and Combustible Liquids	4.5.7.1.(2) 4.6.5.2.(1)
ULC	CAN/ULC-S633:2017	Standard for Flexible Connector Piping for Fuels	4.5.6.14.(2)
ULC	CAN/ULC-S642:2021	Standard for Compounds and Tapes for Threaded Pipe Joints	4.5.5.1.(1)
ULC	CAN/ULC-S644:2016	Standard for Emergency Breakaway Fittings for Flammable and Combustible Liquids	4.6.5.2.(4)
ULC	CAN/ULC-S651:2016	Standard for Emergency Valves for Flammable and Combustible Liquids	4.5.7.1.(3) 4.6.6.3.(1)
ULC	CAN/ULC-S652:2016	Standard for Tank Assemblies for the Collection, Storage and Removal of Used Oil	4.3.1.2.(1)
ULC	CAN/ULC-S653:2016	Standard for Aboveground Horizontal Steel Contained Tank Assemblies for Flammable and Combustible Liquids	4.3.1.2.(1)
ULC	CAN/ULC-S655-15	Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids	4.3.1.2.(1) 4.3.2.1.(7) 4.3.7.4.(2) 4.6.2.1.(3)
ULC	CAN/ULC-S661-10	Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks	4.3.1.8.(1) 4.3.1.8.(2)

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Table 1.3.1.2. (Continued)

Issuing Agency	Document Number[2]	Title of Document	Code Reference
ULC	CAN/ULC-S663-11	Standard for Spill Containment Devices for Flammable and Combustible Liquid Aboveground Storage Tanks	4.3.6.4.(4)
ULC	CAN/ULC-S664:2017	Standard for Containment Sumps, Sump Fittings, and Accessories for Flammable and Combustible Liquids	4.3.9.2.(1) 4.6.3.2.(1)
ULC	CAN/ULC-S668-12	Standard for Liners Used for Secondary Containment of Aboveground Flammable and Combustible Liquid Tanks	4.3.7.2.(2)
ULC	CAN/ULC-S669-14	Standard for Internal Retrofit Systems for Underground Tanks for Flammable and Combustible Liquids	4.3.1.10.(3) A-4.3.1.10.(3)
ULC	CAN/ULC-S675.1-14	Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids	A-4.4.2.1.(5) A-4.4.2.1.(7) A-4.4.2.1.(10)(a)
ULC	CAN/ULC-S675.2-14	Standard for Nonvolumetric Precision Leak Detection Devices for Underground and Aboveground Storage Tanks and Piping for Flammable and Combustible Liquids	A-4.4.2.1.(7) A-4.4.2.1.(10)(a)
ULC	CAN/ULC-S676-15	Standard for Refurbishing of Storage Tanks for Flammable and Combustible Liquids	4.3.1.10.(1) A-4.3.8.4.(2)
ULC	CAN/ULC-S677-14	Standard for Fire Tested Aboveground Tank Assemblies for Flammable and Combustible Liquids	4.3.1.2.(1)
ULC	CAN/ULC-S679:2017	Standard for Metallic and Nonmetallic Underground Piping for Flammable and Combustible Liquids	4.5.2.1.(3) 4.5.6.14.(2)
ULC	CAN/ULC-S1001-11	Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems	6.8.1.1.(1) A-6.8.1.1.(1) 2.2.1.2.(9)[4]
ULC	ULC/ORD-C30-95	Safety Containers	4.1.5.8.(2) 4.2.3.1.(1) 4.2.6.4.(1) 5.5.5.2.(2)
ULC	ULC/ORD-C107.12-92	Line Leak Detection Devices for Flammable Liquid Piping	4.4.2.1.(11) 4.4.3.4.(2) 4.4.4.2.(1)
ULC	ULC/ORD-C410A-94	Absorbents for Flammable and Combustible Liquids	A-4.1.6.3.(3)(b)
ULC	ULC/ORD-C536-98	Flexible Metallic Hose	4.5.6.14.(2)
ULC	ULC/ORD-C558-75	Guide for the Investigation of Internal Combustion Engine-Powered Industrial Trucks	3.1.3.1.(2)
ULC	ULC/ORD-C583-74	Guide for the Investigation of Electric Battery Powered Industrial Trucks	3.1.3.1.(3)
ULC	ULC/ORD-C842-84	Guide for the Investigation of Valves for Flammable and Combustible Liquids	4.5.7.1.(1)
ULC	ULC/ORD-C1275-84	Guide for the Investigation of Storage Cabinets for Flammable Liquid Containers	4.2.10.5.(1)

Notes to Table 1.3.1.2.:

(1) While every effort was made to ensure the accuracy of the information in this Table, the NRC is not responsible for the accuracy, timeliness or reliability of the content presented therein. For all purposes of interpreting and applying the referenced standards, Code users should refer to the most recent official versions of the referenced editions.

(2) Some documents may have been reaffirmed or reapproved. Check with the applicable issuing agency for up-to-date information.

(3) Code reference is in Division A.

(4) Code reference is in Division C.

(5) Subsection 9.3.15, Sprinkler-Protected Glazing, does not apply in the context of Division B.

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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.

ACGIH	American Conference of Governmental Industrial Hygienists (www.acgih.org)
ANSI	American National Standards Institute (www.ansi.org)
API	American Petroleum Institute (www.api.org)
ARPM	Association for Rubber Products Manufacturers (www.arpminc.com)
ASABE	American Society of Agricultural and Biological Engineers (www.asabe.org)
ASCA	Alberta Safety Codes Authority (www.safetycodes.ab.ca)
AER	Alberta Energy Regulator (www.aer.ca)
ASME	American Society of Mechanical Engineers (www.asme.org)
ASTM	ASTM International (www.astm.org)
CAN	National Standard of Canada designation (www.scc.ca)
CBHCC	Canadian Board for Harmonized Construction Codes (cbhcc-cchcc.ca)
CCBFC	Canadian Commission on Building and Fire Codes (see NRC)
CCME	Canadian Council of Ministers of the Environment (www.ccme.ca)
CFA	Canadian Fuels Association (www.canadianfuels.ca)
CGA	Compressed Gas Association (www.cganet.com)
CGSB	Canadian General Standards Board (www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html)
CNSC	Canadian Nuclear Safety Commission (nuclearsafety.gc.ca/eng)
CSA	CSA Group (www.csagroup.org)
EPA	Environmental Protection Agency (U.S.) (www.epa.gov)
FM Global	FM Global (www.fmglobal.com)
HC	Health Canada (www.hc-sc.gc.ca)
IMO	International Maritime Organization (www.imo.org)
NACE	NACE International (www.nace.org)
NBC	National Building Code of Canada 2020
NBC(AE)	National Building Code – 2023 Alberta Edition
NFC	National Fire Code of Canada 2020
NFC(AE)	National Fire Code – 2023 Alberta Edition
NFPA	National Fire Protection Association (www.nfpa.org)
NRC	National Research Council of Canada (nrc.canada.ca)
NRCan	Natural Resources Canada (www.nrcan.gc.ca)
OCIMF	Oil Companies International Marine Forum (www.ocimf.com)
SFPE	Society of Fire Protection Engineers (www.sfpe.org)
STI/SPFA	Steel Tank Institute/Steel Plate Fabricators Association (www.steeltank.com)
TC	Transport Canada (www.tc.canada.ca)
UL	Underwriters' Laboratories Inc. (www.ul.com)
ULC	ULC Standards (canada.ul.com/ulcstandards)
UN	United Nations (www.un.org)

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Notes to Part 1 General

A-1.1.2.1.(1) Objectives and Functional Statements Attributed to Acceptable Solutions. The objectives and functional statements attributed to each Code provision are listed in a table following the provisions in each Part.

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.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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Part 2
Building and Occupant Fire Safety

2.1. General
2.1.1. Scope 2-1
2.1.2. Classification of Buildings 2-1
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Part 2
Building and Occupant Fire Safety

Section 2.1. General

2.1.1. Scope

2.1.1.1. Application

1) This Part provides for the safety of the occupants in existing *buildings*, the elimination or control of fire hazards in and around *buildings*, the installation and maintenance of certain life safety systems in *building*s, the installation and maintenance of posted signs and information, and the establishing of a fire safety plan for locations identified in Article 2.8.1.1.

2.1.2. Classification of Buildings

2.1.2.1. Classification

1) For the purpose of applying this Code, every *building* or part thereof shall be classified according to its *major occupancy* in conformance with the NBC(AE). (See Note A-2.1.2.1.(1).)

2.1.2.2. Hazardous Activities

1) Activities that create a hazard and that are not allowed for in the original design shall not be carried out in a *building* unless provisions are made to control the hazard in conformance with this Code. (See Note A-2.1.2.2.(1).)

2) No *major occupancy* of Group F, Division 1 shall be contained within a *building* with any *occupancy* classified as an *assembly*, *care*, *home-type care*, *treatment*, *detention* or *residential occupancy*.

2.1.3. Fire Safety Installations

2.1.3.1. Fire Alarm, Standpipe and Sprinkler Systems

1) Except as otherwise provided in this Code, where fire alarm, standpipe and sprinkler systems are provided, they shall be designed and installed in conformance with the NBC(AE). (See Note A-2.1.3.1.(1).)

2) When changes in the use of *buildings* or *floor areas* create a hazard exceeding the criteria for which the fire protection systems were designed, such fire protection systems shall be upgraded to accommodate the increased hazard.

2.1.3.2. Voice Communication Systems

1) A voice communication system or systems integrated with the general fire alarm system shall be provided in *buildings* as specified in Subsection 3.2.6. of Division B of the NBC(AE).

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2.1.3.3. Smoke Alarms

1) *Smoke alarms* conforming to CAN/ULC-S531, "Standard for Smoke Alarms," shall be installed

a) in each *home-type care occupancy* and *dwelling unit*, except where the *building* has a residential fire warning system installed in conformance with the NBC(AE), and
b) in each sleeping room not within a *dwelling unit*, except for *care*, *treatment* or *detention occupancies* required to have a fire alarm system.

2) *Smoke alarms* within *home-type care occupancies* and *dwelling units* shall be installed between each sleeping area and the remainder of the *home-type care occupancy* or *dwelling unit*, and where the sleeping areas are served by hallways, the *smoke alarms* shall be installed in the hallways.

3) *Smoke alarms* shall be installed in conformance with CAN/ULC-S553, "Standard for the Installation of Smoke Alarms." (See Note A-2.1.3.3.(3).)

4) *Smoke alarms* are permitted to be battery-operated. (See Sentence 2.1.1.1.(4) of Division C.)

2.1.3.4. Protection of Combustible Sprinkler Piping

1) Materials installed to protect combustible sprinkler piping, as is required by the NBC(AE), shall be maintained in accordance with the provisions of the same edition of the NBC(AE) used for their installation. (See Note A-2.1.3.4.(1).)

2.1.3.5. Special Fire Suppression Systems

1) Where a special fire suppression system is required by this Code or installed through application of good engineering practices, the system shall conform to one of the standards listed in Sentences (3) and (4).

2) If a water-based fire suppression system is not compatible with the fire suppression requirements for certain types of *dangerous goods*, a special fire suppression system conforming to one of the standards listed in Sentence (3) is permitted to be installed in lieu of a water-based system.

3) The design and installation of a special fire suppression system that is not water-based shall conform to one of the following standards:

a) NFPA 11, "Standard for Low-, Medium-, and High-Expansion Foam,"
b) NFPA 12, "Standard on Carbon Dioxide Extinguishing Systems,"
c) NFPA 12A, "Standard on Halon 1301 Fire Extinguishing Systems" (see Note A-2.1.3.5.(3)(c) and (d)),
d) NFPA 12B, "Standard on Halon 1211 Fire Extinguishing Systems" (see Note A-2.1.3.5.(3)(c) and (d)),
e) NFPA 17, "Standard for Dry Chemical Extinguishing Systems,"
f) NFPA 17A, "Standard for Wet Chemical Extinguishing Systems," or
g) NFPA 2001, "Standard on Clean Agent Fire Extinguishing Systems."

4) The design and installation of a water-based special fire suppression system shall conform to one of the following standards:

a) NFPA 15, "Standard for Water Spray Fixed Systems for Fire Protection,"
b) NFPA 16, "Standard on Installation of Foam-Water Sprinkler and Foam-Water Spray Systems," or
c) NFPA 750, "Standard on Water Mist Fire Protection Systems."

5) Wetting agents used in conjunction with water-based fire suppression systems shall conform to NFPA 18, "Standard on Wetting Agents."

6) A hazard for which a fire suppression system has been designed is not permitted to be increased unless the level of fire protection is also commensurately increased.

7) Operating and maintenance instructions for a special fire suppression system shall be posted in proximity to the equipment and, if manual controls are provided, shall be posted near the manual controls.

8) Valves and controls for a special fire suppression system shall be clearly marked to indicate their function and shall be accessible at all times.

2.1.3.6. Inspection, Maintenance and Testing of Fire Safety Devices

(See Note A-2.1.3.6.)

1) Where specific references to the inspection, maintenance and testing of fire safety devices and *building* fire safety features are not made in this Code, such devices and features shall be maintained to ensure they operate as per their design or function according to their original intent.

2.1.3.7. Integrated Life Safety and Fire Protection Systems

1) Where life safety and fire protection systems are installed, they shall be tested in accordance with the NBC(AE).

2.1.4. Posted Information

2.1.4.1. Posting

1) Where a sign, notice, placard or information is required to be posted, it shall be
a) clearly legible, and
b) except as provided in Sentence (2), permanently mounted in a conspicuous or prominent location in proximity to the situation to which it refers.

2) Where the situation for which posting is required is of a temporary nature, permanent mounting need not be provided.

2.1.4.2. Maintenance

1) Every sign, notice, placard or information that is required to be posted shall be maintained in conformance with Article 2.1.4.1.

2.1.5. Portable Extinguishers

2.1.5.1. Selection and Installation

1) Except as provided in Sentence (2), portable extinguishers shall be installed in all *buildings*.

2) Sentence (1) does not apply to *dwelling units*, unless the *dwelling unit* is a *home-type care occupancy*.

3) Except as otherwise required by this Code, portable extinguishers shall be selected and installed in accordance with NFPA 10, "Standard for Portable Fire Extinguishers."

4) Notwithstanding the requirements of Sentence (3), portable extinguishers used to comply with this Code shall conform to the following performance standards as applicable:
a) CAN/ULC-S503, "Standard for Carbon-Dioxide Fire Extinguishers,"
b) CAN/ULC-S504, "Standard for Dry Chemical Fire Extinguishers,"
c) CAN/ULC-S507, "Standard for Water Fire Extinguishers,"
d) CAN/ULC-S512-M, "Standard for Halogenated Agent Hand and Wheeled Fire Extinguishers,"
e) CAN/ULC-S554, "Standard for Water Based Agent Fire Extinguishers," and
f) CAN/ULC-S566, "Standard for Halocarbon Clean Agent Fire Extinguishers."

5) Notwithstanding the requirements of Sentence (3), portable extinguishers shall be rated and identified in conformance with CAN/ULC-S508, "Standard for the Rating and Fire Testing of Fire Extinguishers."

6) Portable extinguishers in proximity to a fire hazard shall be located so as to be accessible without exposing the operator to undue risk. (See Note A-2.1.5.1.(6).)

7) Portable extinguishers that are subject to corrosion shall not be installed in a corrosive environment unless they are provided with appropriate corrosion protection.

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Section 2.2. Fire Separations, Encapsulation Materials and Fire Protection Materials

2.2.1. General

2.2.1.1. Fire Separations

1) Where a *building* contains more than one *major occupancy*, such *occupancies* shall be separated from each other in conformance with the NBC(AE).

2) Where rooms or spaces within a *building* contain a *high-hazard industrial occupancy*, such *occupancy* shall be separated from the remainder of the *building* by *fire separations* in conformance with this Code and the NBC(AE).

3) Rooms, corridors, shafts and other spaces shall be separated where practicable by *fire separations* conforming to the NBC(AE).

2.2.1.2. Damage to Fire Separations and Fire Protection Materials

1) Where *fire separations* are damaged so as to affect their integrity, they shall be repaired so that the integrity of the *fire separation* is maintained.

2) Where materials used to provide fire protection are damaged or removed, they shall be repaired or replaced so that the integrity of the fire protection is maintained.

2.2.2. Closures

2.2.2.1. Openings in Fire Separations

1) Openings in *fire separations* shall be protected with *closures* in conformance with the NBC(AE).

2) Where *closures* in *fire separations* are replaced, the replacements shall be in conformance with the NBC(AE).

2.2.2.2. Damage to Closures

1) Where *closures* are damaged so as to affect the integrity of their *fire-protection rating*, they shall be repaired so that their integrity is maintained in conformance with Article 2.2.2.1.

2.2.2.3. Protective Guarding Devices

1) Protective guarding devices shall be

a) provided where necessary to prevent damage to the mechanical components of doors in *fire separations*, and
b) installed so as not to interfere with the proper operation of the doors.

2.2.2.4. Inspection and Maintenance

1) Defects that interfere with the operation of *closures* in *fire separations* shall be corrected, and such *closures* shall be maintained to ensure that they are operable at all times by

a) keeping fusible links and other heat-actuated devices undamaged and free of paint and dirt,
b) keeping guides, bearings and stay rolls clean and lubricated,
c) making necessary adjustments and repairs to door hardware and accessories to ensure proper closing and latching, and
d) repairing or replacing inoperative parts of hold-open devices and automatic releasing devices.

(See Article 2.1.2.4. of Division C.)

2) Except where they are equipped with hold-open devices conforming to the NBC(AE), doors in *fire separations* that are required to be equipped with self-closing devices shall be inspected at intervals not greater than 24 h to ensure that they remain in the closed position when not in use.

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3) Doors in *fire separations* shall be operated at intervals not greater than one month to ensure that they are properly maintained in accordance with Sentence (1), as specified in the fire safety plan prepared in conformance with Section 2.8.

4) *Closures* in *fire separations* shall not be obstructed, blocked, wedged open, or altered in any way that would prevent the intended operation of the *closure*. (See Article 2.1.2.4. of Division C.)

5) *Fire dampers*, smoke dampers, combination smoke/*fire dampers* and *fire stop flaps* shall be

a) inspected at intervals not greater than 12 months to ensure that they are in place and not obviously damaged or obstructed, and
b) tested in accordance with NFPA 80, "Standard for Fire Doors and Other Opening Protectives."

2.2.3. Encapsulation Materials

2.2.3.1. Damaged or Removed Encapsulation Materials

1) Where encapsulation materials or an assembly of materials that provide protection for mass timber elements in *encapsulated mass timber construction* are damaged or removed so as to affect their integrity, they shall be repaired or replaced in conformance with the NBC(AE) so that the required *encapsulation rating* is restored.

Section 2.3. Interior Finishing, Furnishing and Decorative Materials

2.3.1. General

2.3.1.1. Interior Finish

1) The interior finish material that forms part of the interior surface of a floor, wall, *partition* or ceiling shall conform to the NBC(AE).

2.3.1.2. Movable Partitions and Screens

1) Movable *partitions* or screens, including acoustical screens, shall have a *flame-spread rating* not greater than that required for the interior finish of the area in which they are located.

2.3.1.3. Decorative Materials

1) Decorative materials on walls or ceilings shall have a *flame-spread rating* not greater than that required for the interior finish of the space in which they are located.

2.3.1.4. Interconnected Floor Spaces

1) Combustible contents in *interconnected floor spaces* in which the ceiling is more than 8 m above the floor, shall not exceed the limit specified in Subsection 3.2.8. of Division B of the NBC(AE).

2.3.2. Flame Resistance

2.3.2.1. Drapes, Curtains and Decorative Materials

1) Drapes, curtains and other decorative materials, including textiles and films, used in *buildings* shall conform to CAN/ULC-S109, "Standard Method for Flame Tests of Flame-Resistant Fabrics and Films," when such drapes, curtains and other decorative materials are used in

a) any *assembly occupancy* or Group B, Division 1 *detention occupancy*,
b) any lobby or *exit*, or
c) any open *floor areas* exceeding 500 m^2 in any *business and personal services*, *mercantile* or *industrial occupancy*, except where the *floor area* is divided

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into *fire compartments* not exceeding 500 m² in area and separated from the remainder of the *floor area* by *fire separations* having at least a 1 h *fire-resistance rating*.

2.3.2.2. Flame-Retardant Treatments

1) Flame-retardant treatments shall be renewed as often as is required to ensure that the material will pass the match flame test in NFPA 705, "Recommended Practice for a Field Flame Test for Textiles and Films." (See Note A-2.3.2.2.(1).)

2.3.2.3. Textiles in Group B Occupancies

1) Except as provided in Sentence (3), bed linen, window drapes and cubicle curtains shall conform to CAN2-4.162-M, "Hospital Textiles – Flammability Performance Requirements," if used in

a) Group B, Division 2 *treatment occupancies*, or
b) Group B, Division 3 *care occupancies*.

2) Except as provided in Sentence (3), mattresses and mattress sets shall conform to CAN/ULC-S137, "Standard Method of Test for Fire Growth of Mattresses (Open Flame Test)," if used in

a) Group B, Division 1 *detention occupancies*,
b) Group B, Division 2 *treatment occupancies*, or
c) Group B, Division 3 *care occupancies*.

3) Mattresses, bed linen, window drapes and cubicle curtains need not comply with Sentences (1) and (2) if used in

a) *suites* in a *building* of *care occupancy*, or
b) *care occupancies* with not more than 10 residents.

Section 2.4. Fire Hazards

2.4.1. Combustible Materials

2.4.1.1. Accumulation of Combustible Materials

(See also Sections 3.2. and 3.3.)

1) Combustible waste materials in and around *buildings* shall not be permitted to accumulate in quantities or locations that will constitute an undue fire hazard. (See Note A-2.4.1.1.(1).)

2) Combustible materials, other than those for which the location, room or space is designed, shall not be permitted to accumulate in any part of an elevator shaft, ventilation shaft, *means of egress*, *service room* or *service space*. (See Note A-2.4.1.1.(2).)

3) Horizontal concealed spaces, such as crawl spaces and ceiling spaces, shall not be used for the storage of combustible materials.

4) Combustible materials shall not be stored on a roof or adjacent to any *building* so as to create a fire hazard to the *building* or its occupants.

5) Abandoned optical fibre cables and electrical wires and cables with combustible insulation, jackets, or sheathes, and nonmetallic raceways shall be removed from a plenum unless

a) they are permanently enclosed by the structure or finish of the *building*,
b) their removal would disturb the structure or finish of the *building*,
c) their removal could affect the performance of cables in use, or
d) the plenum space is *sprinklered*.

6) Outdoor storage receptacles, such as dumpsters, used for combustible materials shall be located so that they do not create an undue fire hazard to surrounding *buildings*. (See Note A-2.4.1.1.(6).)

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2.4.1.2. Storage Rooms for Combustible Waste Materials

1) Where rooms are provided for the storage of combustible waste materials, such rooms shall conform to the NBC(AE).

2.4.1.3. Waste Receptacles

1) Materials subject to spontaneous ignition, such as oily rags, shall be deposited in a receptacle conforming to Sentence (4) or be removed from the premises. (See Note A-2.4.1.3.(1).)

2) All ashes shall be stored in receptacles conforming to Sentence (4) and combustible materials shall not be stored with ashes in the same container.

3) Except as permitted in Sentence (4), noncombustible receptacles as required in Sentences (1) and (2) shall not be placed closer than 1 m to combustible materials.

4) A receptacle required by Sentences (1) and (2) shall
a) be constructed of noncombustible materials,
b) have a close-fitting, self-closing metal cover, and
c) if the flooring material upon which it is placed is combustible, have a flanged bottom or legs not less than 50 mm high.

2.4.1.4. Lint Traps for Laundry Equipment

1) Lint traps in laundry equipment shall be cleaned after each use of the equipment, and vents and associated piping shall be cleaned at intervals frequent enough to prevent lint from accumulating in quantities that will constitute a fire hazard.

2.4.2. Smoking

2.4.2.1. Smoking Areas

1) Smoking shall not be permitted in areas where conditions are such as to make smoking a fire or explosion hazard.

2) An area where smoking is not permitted in Sentence (1) shall be identified by signs conforming to Article 2.4.2.2.

3) Where smoking is permitted, an adequate number of ash trays shall be provided.

2.4.2.2. Signs

1) Signs prohibiting smoking shall have black lettering not less than 50 mm high with a stroke not less than 12 mm wide on a yellow background, except that symbols of not less than 150 mm by 150 mm are permitted to be used in lieu of lettering.

2.4.3. Open Flames

2.4.3.1. Open Flames in Processions

1) Open flames whose quantity and method of use create a fire hazard shall not be permitted in processions
a) in *assembly occupancies*, or
b) in dining areas in Group B, Divisions 2, 3 and 4 *treatment*, *care* and *home-type care occupancies*.

2.4.3.2. Flaming Meals and Drinks

1) In Group B, Divisions 2 , 3 and 4 *treatment*, *care* and *home-type care occupancies*, flaming meals or drinks shall not be served.

2) In *assembly occupancies*, flaming meals or drinks shall be ignited only at the location of serving.

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3) In *assembly occupancies*, the refuelling of equipment used to flame meals or drinks, or to warm food, shall be carried out
a) outside the serving area, and
b) away from ignition sources.

4) A portable extinguisher having a minimum rating of 5-B:C shall be located on the serving cart or table where flaming meals and drinks referred to in Sentences (2) and (3) are served.

2.4.3.3. Devices Having Open Flames

1) Devices having open flames shall be securely supported in noncombustible holders and shall be located or protected so as to prevent accidental contact of the flame with combustible materials.

2.4.4. Use of Dangerous Goods

2.4.4.1. Flammable and Combustible Liquids

1) *Flammable liquids* and *combustible liquids* shall be classified, stored and handled in conformance with Part 4.

2) Class I liquids shall not be used for cleaning purposes, except where such cleaning is an essential part of a process.

3) Spills of *flammable liquids* or *combustible liquids* within *buildings* shall be removed in conformance with Subsection 4.1.6.

2.4.4.2. Flammable Gases

1) *Dangerous goods* classified as flammable gases shall not be used to inflate balloons.

2.4.4.3. Parking of Vehicles Transporting Dangerous Goods

1) No person shall park a vehicle carrying tanks, containers or cylinders of *flammable liquids*, *combustible liquids* or *dangerous goods* in
a) an underground parking facility, or
b) any enclosed parking structure used by the general public.

2.4.5. Open Air Fires

2.4.5.1. Open Air Fires

1) Except for fires used for cooking in fireplaces, grills or barbecues, open air fires shall not be set unless appropriate measures are taken to limit their spread. (See Note A-2.4.5.1.(1).)

2.4.6. Vacant Buildings

2.4.6.1. Security

1) Vacant *buildings* shall be secured against unauthorized entry. (See Note A-2.4.6.1.(1).)

2.4.7. Electrical Installations

2.4.7.1. Use and Maintenance

1) Electrical installations shall be used and maintained so as not to constitute an undue fire hazard.

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Section 2.5. Fire Department Access to Buildings

(See Subsection 2.2.10. of Division C.)

2.5.1. General

2.5.1.1. Access to Building

1) Fire department vehicles shall have direct access to at least one face of every *building* by means of a *street*, yard or roadway in conformance with the NBC(AE).

2.5.1.2. Access Panels and Windows

1) Access panels or windows provided to facilitate access for firefighting operations shall be maintained free of obstruction.

2.5.1.3. Access to Roof

1) Where access to a roof is provided for firefighting purposes, keys shall be provided for locked roof access doors and kept in a location determined in cooperation with the fire department.

2.5.1.4. Access to Fire Department Connections

1) Access to fire department connections for sprinkler or standpipe systems by firefighters and their equipment shall be maintained free of obstructions at all times.

2.5.1.5. Maintenance of Fire Department Access

1) *Streets*, yards and roadways provided for fire department access shall be maintained so as to be ready for use at all times by fire department vehicles.

2) Vehicles shall not be parked to obstruct access by fire department vehicles and signs shall be posted prohibiting such parking.

Section 2.6. Service Equipment

2.6.1. Heating, Ventilating and Air-conditioning

2.6.1.1. Installation

1) Heating, ventilating and air-conditioning *appliances* and equipment shall be installed in conformance with the NBC(AE).

2.6.1.2. Coal and Wood Bins

1) Coal and wood bins shall be located not less than 1.2 m from the *appliance* served.

2.6.1.3. Hoods, Ducts and Filters

1) Hoods, ducts and filters subject to accumulations of combustible deposits shall be inspected at intervals not greater than 7 days, and shall be cleaned if the accumulation of such deposits creates a fire hazard.

2.6.1.4. Chimneys, Flues and Flue Pipes

1) Every *chimney*, *flue* and *flue pipe* shall be inspected to identify any dangerous condition

a) at intervals not greater than 12 months,
b) at the time of addition of any *appliance*, and
c) after any *chimney* fire.

(See Note A-2.6.1.4.(1).)

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2) *Chimneys*, *flues* and *flue pipes* shall be cleaned as often as necessary to keep them free from dangerous accumulations of combustible deposits. (See Note A-2.6.1.4.(2).)

3) A *chimney*, *flue*, or *flue pipe* shall be replaced or repaired to eliminate
a) any structural deficiency or decay (see Note A-2.6.1.4.(3)(a)), and
b) all abandoned or unused openings that are not effectively sealed in a manner that would prevent the passage of fire or smoke.

2.6.1.5. Clearances

1) Required clearances between *chimneys*, *flue pipes* or *appliances* and *combustible construction* or *encapsulated mass timber construction* shall be maintained in conformance with the NBC(AE).

2) Combustible materials shall not be located within the required clearance space surrounding *chimneys*, *flue pipes* or *appliances*, or adjacent to ash pit or cleanout doors.

2.6.1.6. Operation and Maintenance Procedures

1) Heating, ventilating and air-conditioning systems, including *appliances*, *chimneys* and *flue pipes*, shall be operated and maintained so as not to create a hazardous condition.

2) Except as provided in Sentence (3), disconnect switches for mechanical heating, ventilating and air-conditioning systems shall be operated at intervals not greater than 12 months to establish that the system can be shut down in an emergency.

3) Sentence (2) does not apply to self-contained systems within *dwelling units*, unless the *dwelling unit* is a *home-type care occupancy*.

2.6.1.7. Ventilation Shafts

1) Ventilation shafts shall be used only for ventilating purposes.

2.6.1.8. Repairs and Renovations

1) Work on ducts involving the use of heat-producing devices for cutting, welding or soldering shall not be undertaken before
a) the system has been shut down,
b) the duct has been cleaned of any accumulations of combustible deposits, and
c) any combustible lining and covering material that could be ignited by such work has been removed.

2) Precautions shall be taken, where necessary, to ensure that there is no damage to fuel supply piping or equipment that would result in fuel leakage or a fire hazard during renovations or excavation.

2.6.1.9. Commercial Cooking Equipment

1) Commercial cooking equipment exhaust and fire protection systems shall be designed and installed in conformance with the NBC(AE).

2) Except as required in Sentences (3) to (5), the use, inspection and maintenance of commercial cooking equipment exhaust and fire protection systems shall be in conformance with NFPA 96, "Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations."

3) Hoods, grease removal devices, fans, ducts, and other appurtenances shall be cleaned at frequent intervals to prevent surfaces from becoming heavily contaminated with grease or other residues. (See Note A-2.6.1.9.(3).) (See also Article 2.2.4.5. of Division C.)

4) Flammable cleaning materials or solvents shall not be used for the cleaning of exhaust systems.

5) Instructions for manually operating the fire protection systems shall be posted conspicuously in the kitchen as part of the fire safety plan.

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6) Commercial cooking equipment that is certified shall be installed and maintained in conformance with its certification.

7) Uncertified commercial cooking equipment shall be installed and maintained so as not to create a fire hazard.

2.6.2. Incinerators

2.6.2.1. Indoor Incinerators

1) The installation and alteration of indoor incinerators shall conform to the NBC(AE).

2.6.2.2. Outdoor Incinerators

1) The design, construction, installation, alteration and maintenance of outdoor incinerators shall conform to NFPA 82, "Standard on Incinerators and Waste and Linen Handling Systems and Equipment," except that the *flue* venting an incinerator shall not serve as the chute conveying waste material to the incinerator.

2.6.2.3. Spark Arresters

1) Spark arresters installed in conformance with Articles 2.6.2.1. and 2.6.2.2. shall be inspected and cleaned at intervals not greater than 12 months or more frequently where accumulations of debris will adversely affect operations.

2) Burnt-out spark arresters shall be repaired or replaced.

2.6.3. Electrical Equipment Vaults

2.6.3.1. Use

1) Electrical equipment vaults shall not be used for storage purposes.

2.6.3.2. Security

1) Electrical equipment vaults shall be kept locked so that unauthorized persons will not have access to them.

Section 2.7. Safety to Life

2.7.1. Means of Egress

2.7.1.1. Means of Egress

1) *Means of egress* shall be provided in *buildings* in conformance with the NBC(AE).

2.7.1.2. Open Floor Areas

1) Aisles conforming to Sentences (2) to (4) shall be provided in every *floor area* that is required by the NBC(AE) to have more than one egress doorway.

2) Every required egress doorway shall be served by an aisle that
a) has a clear width not less than 1 100 mm,
b) has access to at least one additional egress doorway, and
c) at every point on the aisle, provides a choice of 2 opposite directions by which to reach an egress doorway.

3) A subsidiary aisle with only a single direction of travel to an aisle described in Sentence (2) is permitted, provided it has a clear width not less than 900 mm and a length not greater than
a) 7.5 m in *business and personal services*, *mercantile* and *high-hazard industrial occupancies*,
b) 10 m in *medium-hazard industrial occupancies*, or
c) 15 m in *low-hazard industrial occupancies*.

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4) Every individual work area in *business and personal services occupancies* shall be located adjacent to an aisle or subsidiary aisle.

2.7.1.3. Occupant Load

1) The maximum permissible *occupant load* for any room shall be calculated on the basis of the lesser of

a) 0.4 m² of net floor space per occupant, or
b) the *occupant load* for which *means of egress* are provided.

(See Note A-2.7.1.3.(1).)

2) The number of occupants permitted to enter a room shall not exceed the maximum *occupant load* calculated in conformance with Sentence (1).

2.7.1.4. Signs

1) In *assembly occupancies* with *occupant loads* exceeding 60 persons, the *occupant load* shall be posted in conspicuous locations near the principal entrances to the room or *floor area*.

2) Signs required by the NBC(AE) to indicate the *occupant load* for a *floor area* shall be posted in conspicuous locations near the principal entrances to the *floor area*. (See Note A-2.7.1.4.(2).)

3) Signs required in Sentences (1) and (2) shall have lettering not less than 50 mm high with a 12 mm stroke.

2.7.1.5. Nonfixed Seating

1) When nonfixed seats are provided in *assembly occupancies*,

a) except as provided in Sentence (3), the seats shall be arranged in rows having an unobstructed passage of not less than 400 mm between rows 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 behind in the unoccupied position,
b) except as provided in Sentence (2), aisles shall be located so that there are not more than 7 seats between every seat and the nearest aisle,
c) except as provided in Sentence (2), the clear width of an aisle in millimetres shall be not less than the greater of 1 100 or the product of the number of seats served by that aisle and 6.1,
d) the width of an aisle is permitted to be reduced to not less than 750 mm when serving 60 seats or fewer,
e) dead-end aisles shall not be longer than 6 m, and
f) except as provided in Sentence (3), when the *occupant load* exceeds 200 persons,
   i) the seats in a row shall be fastened together in units of no fewer than 8 seats, or
   ii) where there are 7 seats or fewer in a row, all the seats in the row shall be fastened together.

2) When nonfixed seats are provided in outdoor *assembly occupancies*,

a) aisles shall be located so that there are not more than 15 seats between every seat and the nearest aisle, and
b) the clear width of an aisle in millimetres shall be not less than the greater of 1 200 or the product of the number of seats served by that aisle and 1.8.

3) When nonfixed seats are provided at tables arranged in rows, the spacing between the nearest edges of tables in 2 successive rows shall be not less than

a) 1 400 mm where seating is arranged on both sides of tables (back to back), or
b) 1 000 mm where seating is on one side only.

2.7.1.6. Maintenance

1) *Means of egress* shall be maintained in good repair and free of obstructions. (See Note A-2.7.1.6.(1).)

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2.7.1.7. Exterior Passageways and Exit Stairs

1) Exterior passageways and exterior *exit* stairs serving occupied *buildings* shall be maintained free of snow and ice accumulations.

2) Where equipment is provided to melt snow or ice on exterior passageways and exterior *exit* stairs serving an occupied *building*, such equipment shall be maintained in working order or alternative measures shall be taken to comply with Sentence (1).

2.7.1.8. Free of Obstruction

1) Where an *exit* door leading directly to the outside is subject to being obstructed by parked vehicles or storage because of its location, a visible sign or a physical barrier prohibiting such obstructions shall be installed on the exterior side of the door.

2.7.2. Doors and Means of Egress

(See Article 2.1.2.4. of Division C.)

2.7.2.1. Exit Doors

1) Except as provided in Sentences (2), (3) and (4), all doors forming part of a *means of egress* shall be tested at intervals not greater than one month to ensure that they are operable.

2) The safety features of revolving doors shall be tested at intervals not greater than 12 months.

3) Sliding doors that are required to swing on their vertical axes in the direction of egress when pressure is applied shall be tested at intervals not greater than 12 months.

4) When doors are equipped with electromagnetic locks, these locks shall be tested at intervals not greater than 12 months.

2.7.2.2. Records

1) Records of tests required in Sentences 2.7.2.1.(2), (3) and (4) shall be retained in conformance with Article 2.2.1.2. of Division C.

2.7.3. Exit Lighting, Exit Signs and Emergency Lighting

2.7.3.1. Installation and Maintenance

1) *Exit* lighting, *exit* signs and emergency lighting shall be provided in *buildings* in conformance with the NBC(AE). (See Note A-2.7.3.1.(1).)

2) *Exit* lighting and *exit* signs shall be illuminated during times when the *building* is occupied.

3) Emergency lighting and *exit* signs shall be maintained in operating condition, in conformance with Section 6.5.

Section 2.8. Emergency Planning

2.8.1. General

2.8.1.1. Application

1) Fire emergency procedures conforming to this Section shall be provided for

a) every *building* containing a *care*, *home-type care*, *treatment* or *detention occupancy*,
b) every *building* containing a school, college or university, or a daycare facility,
c) every *building* containing a licensed beverage establishment or a licensed restaurant,
d) every *building* containing an *assembly occupancy* other than one of those described in Clauses (b) and (c) with an *occupant load* of more than 30,

e) every *building* containing an area where *treatment* is provided in *business and personal services occupancies*,
f) every *building* required by the NBC(AE) to have a fire alarm system,
g) demolition and construction sites regulated under Section 5.6.,
h) storage areas in *buildings* or parts of *buildings* described in Article 3.2.1.1.,
i) outdoor areas where products described in Article 3.3.1.1. are stored,
j) every *building*, part of a *building*, and open area described in Article 4.1.1.1., and
k) every *building*, part of a *building*, and open area where processes and operations described in Article 5.1.1.1. take place.

2.8.1.2. Supervisory Staff

1) *Supervisory staff* shall be trained in the fire emergency procedures described in the fire safety plan before they are given any responsibility for fire safety. (See Note A-2.8.1.2.(1).)

2) A sufficient number of *supervisory staff* shall be on duty in *care*, *home-type care*, *treatment* and *detention occupancies* to carry out the emergency procedures outlined in Clause 2.8.2.1.(3)(a). (See Note A-2.8.1.2.(2).)

3) In Group A, Division 1 *assembly occupancies* intended for an *occupant load* of more than 60, at least one *supervisory staff* member shall be on duty in the *building* to carry out the emergency procedures outlined in Clause 2.8.2.1.(3)(a) whenever the *building* is open to the public.

2.8.1.3. Keys and Special Devices

(See Subsection 2.2.10. of Division C.)

1) Any keys or special devices needed to operate the fire alarm system or provide access to any fire protection systems or equipment shall be readily available to on-duty *supervisory staff*.

2.8.2. Fire Safety Plan

(See Sentence 2.2.1.2.(14) and Note A-2.2.7.2.(3) of Division C.)

2.8.2.1. Measures in a Fire Safety Plan

1) For *buildings*, parts of *buildings* and areas described in Article 2.8.1.1., a fire safety plan conforming to this Section shall be prepared in cooperation with the fire department and other applicable regulatory authorities.

2) The fire safety plan shall be reviewed at intervals not greater than 12 months to ensure that it takes account of changes in the use and other characteristics of the *building*.

3) The fire safety plan shall include, in addition to the information required in Articles 2.8.2.2. to 2.8.2.11., as applicable, information on

a) the emergency procedures to be carried out in case of fire, including
   i) sounding the fire alarm (see Note A-2.8.2.1.(3)(a)(i)),
   ii) notifying the fire department,
   iii) instructing occupants on the procedures to be followed when the fire alarm sounds,
   iv) evacuating occupants, including special provisions for persons requiring assistance (see Note A-2.8.2.1.(3)(a)(iv)), and
   v) confining, controlling and extinguishing the fire,
b) the appointment and organization of designated *supervisory staff* to carry out fire safety duties,
c) the training of *supervisory staff* and other occupants on their responsibilities as regards fire safety,
d) the type, location and operation of the *building* fire emergency systems, including diagrams,
e) the holding of fire drills,

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f) the measures for controlling fire hazards in and around the *building*, and
g) the inspection and maintenance of *building* facilities provided for the safety of occupants.

(See Note A-2.8.2.1.(3).)

2.8.2.2. High Buildings

1) For *buildings* within the scope of Subsection 3.2.6. of Division B of the NBC(AE), the fire safety plan shall include

a) information on the training of *supervisory staff* in the use of the voice communication system,
b) the procedures for the use of elevators,
c) information on the action to be taken by *supervisory staff* in initiating any smoke control or other fire emergency systems installed in a *building* in the event of fire until the fire department arrives,
d) instructions to the *supervisory staff* and fire department for the operation of the systems referred to in Clause (c),
e) the procedures established to facilitate fire department access to the *building* and fire location within the *building*, and
f) the test procedures described in Subsections 7.3.2. to 7.3.15., as appropriate to the fire safety measure being used, in addition to those required by Sections 7.1. and 7.2., unless otherwise specified in the fire safety plan.

2.8.2.3. Indoor and Outdoor Storage of Dangerous Goods

1) Where *dangerous goods* are stored or handled, the fire safety plan shall include the names, addresses and telephone numbers of persons to be contacted in case of fire during non-operating hours.

2) Where the *dangerous goods* referred to in Sentence (1) consist of *dangerous goods* classified as radioactive materials, the fire safety plan shall also include

a) methods to control a fire emergency and to safely and efficiently recover radioactive materials and equipment containing radioactive materials,
b) the names, addresses and telephone numbers of primary and alternative sources of expert advice and assistance on radiation safety, and
c) the location of primary and alternative sources of radiation survey instruments.

2.8.2.4. Indoor Storage of Combustible Products and Dangerous Goods

1) The fire safety plan for *buildings* or parts of *buildings* used for the storage of products listed in Sentence 3.2.1.1.(1) shall include the information described in Sentences (2) and (3).

2) The fire safety plan shall identify

a) the product classifications for each part of the *building* where products of different classifications are stored,
b) the method of storage, including aisle widths for *rack* storage,
c) the maximum permitted height of storage for the *building* or part of the *building*, if different,
d) the maximum permitted size of *individual storage areas*, and
e) in *sprinklered buildings*, the sprinkler system design criteria, inside and outside hose allowances, and results of the benchmark sprinkler system main drain and waterflow tests.

3) Where the products stored include Group A plastics, rubber products, Level 2 or 3 aerosols, or *dangerous goods*, the fire safety plan shall identify their location and the maximum quantity of each product being stored.

2.8.2.5. Outdoor Storage

1) The fire safety plan for outdoor areas used for the storage of products listed in Sentence 3.3.1.1.(1) shall identify

a) the location and classification of the products being stored,

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b) the method of storage, including the clear spaces required and the maximum permitted size of *individual storage areas*,
c) the location of fire alarm systems and firefighting equipment, and
d) the measures for controlling fire hazards in and around the outdoor storage area.

2.8.2.6. Rooms for Storage Tanks

1) The fire safety plan for rooms for *storage tanks* referred to in Sentence 4.3.13.4.(1) shall identify the liquids being stored as *flammable liquids* or *combustible liquids* and the capacity of each *storage tank*.

2.8.2.7. Spill Control

1) The fire safety plan for *buildings*, parts of *buildings*, and open areas described in Article 4.1.1.1. shall include a spill management plan that describes the measures to be taken to direct the overflow of spilled liquids and water used for firefighting away from
a) *buildings*,
b) adjoining properties,
c) *means of egress*,
d) air intakes and openings that could allow vapour to enter the *building*,
e) fire alarm control panels,
f) fire department access routes,
g) valves controlling fire protection systems and the water supply for firefighting,
h) fire department pumper connections or wall hydrants,
i) isolation valves controlling processes, and
j) valves controlling the flow of *flammable liquids* or *combustible liquids*.

2.8.2.8. Hazardous Processes and Operations

1) The fire safety plan for areas where processes and operations described in Article 5.1.1.1. take place shall include
a) the location and identification of storage and use areas for specific products, in conformance with Article 2.8.2.4.,
b) the names, addresses and telephone numbers of persons to be contacted in case of fire during non-operating hours, and
c) where *dangerous goods* classified as radioactive materials are used or handled, the information specified in Article 2.8.2.3.

2.8.2.9. Hot Works

1) The fire safety plan for areas where hot works are conducted shall include the safety measures described in Section 5.2.

2.8.2.10. Laboratories

1) The fire safety plan for laboratories shall conform to Article 2.8.2.8.

2.8.2.11. Construction and Demolition Sites

1) Except as required in Sentence (2), prior to the commencement of construction, alteration or demolition operations, a fire safety plan shall be prepared for the site that includes
a) the designation and organization of site personnel to carry out fire safety duties, including a fire watch service if applicable,
b) the emergency procedures to be followed in the event of a fire, including
   i) initiating a fire warning,
   ii) notifying the fire department,
   iii) instructing site personnel on the procedures to be followed once the warning has been initiated, and
   iv) confining, controlling and extinguishing the fire,

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c) measures for controlling fire hazards in and around the *building* (see Note A-2.8.2.11.(1)(c)), and
d) a maintenance procedure for firefighting measures required in Section 5.6.

2) Where construction, alteration or demolition operations are carried out in an existing *building* that is required to have a fire safety plan conforming to this Section, the fire safety plan shall take into account the changes occurring to the *building*.

2.8.2.12. Retention of Fire Safety Plans

1) The fire safety plan shall be kept in the *building* for reference by the fire department, *supervisory staff*, the *authority having jurisdiction*, and other personnel.

2) The fire safety plan for a *building* within the scope of Subsection 3.2.6. of Division B of the NBC(AE) shall be kept at the central alarm and control facility.

3) The fire safety plan for a *building* or facility within the scope of Sections 3.1., 4.1., and 5.1. shall be kept at the principal entrance to the *building* or facility.

2.8.2.13. Distribution

1) A copy of the fire emergency procedures and other duties for *supervisory staff*, as laid down in the fire safety plan, shall be given to all *supervisory staff*.

2.8.2.14. Posting of Fire Emergency Procedures

1) At least one copy of the fire emergency procedures for a *building* or part of a *building* shall be prominently posted in each *floor area*.

2) At least one copy of the fire emergency procedures for an outdoor storage site shall be prominently posted at the outdoor storage site.

3) In every hotel and motel bedroom, the fire safety rules for occupants shall be posted showing the locations of *exits* and the paths of travel to *exits*.

4) Where a fire alarm system has been installed with no provisions to transmit a signal to the fire department, a sign shall be posted at each manually actuated signalling box requesting that the fire department be notified, and including the telephone number of that department.

2.8.3. Fire Drills

2.8.3.1. Fire Drill Procedures

1) The procedure for conducting fire drills shall be determined by the person in responsible charge of the *building*, taking into consideration
a) the *building occupancy* and its fire hazards,
b) the safety features provided in the *building*,
c) the desirable degree of participation of occupants other than *supervisory staff*,
d) the number and degree of experience of participating *supervisory staff*,
e) the features of fire emergency systems installed in *buildings* within the scope of Subsection 3.2.6. of Division B of the NBC(AE), and
f) the requirements of the fire department.

(See Note A-2.8.3.1.(1).)

2.8.3.2. Fire Drill Frequency

1) Except as provided in Sentence (2), fire drills as described in Sentence 2.8.3.1.(1) shall be held at intervals not greater than 12 months for the *supervisory staff*, except that
a) in daycare centres and in Group B *major occupancies*, such drills shall be held at intervals not greater than one month,
b) in schools attended by children, total evacuation fire drills shall be held at least 3 times in each of the fall and spring school terms, and
c) in *buildings* within the scope of Subsection 3.2.6. of Division B of the NBC(AE), such drills shall be held at intervals not greater than 2 months.

2) Fire drills in a laboratory shall be held at intervals not greater than 3 months.

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Section 2.9. Tents and Air-Supported Structures

2.9.1. General

2.9.1.1. Tents and Air-Supported Structures

1) Tents and *air-supported structures* shall be designed and installed in conformance with the NBC(AE).

2.9.2. Materials

2.9.2.1. Flame-Retardant Treatments

1) Flame-retardant treatments shall be renewed as often as is required to ensure that the material will pass the match flame test in NFPA 705, "Recommended Practice for a Field Flame Test for Textiles and Films." (See Note A-2.3.2.2.(1).)

2.9.3. Fire Hazards and Control

2.9.3.1. Electrical Systems

1) The electrical system in a tent or *air-supported structure* shall be maintained and operated in a safe manner.

2) Portable electrical systems shall be inspected for fire hazards and defects shall be corrected before the tent or *air-supported structure* is occupied by the public.

3) The electrical system and equipment in a tent or *air-supported structure*, including electrical fuses and switches, shall be inaccessible to the public.

4) Cables on the ground in areas used by the public in a tent or *air-supported structure* shall be placed in trenches or protected by covers to prevent damage from traffic.

2.9.3.2. Combustible Materials

1) Hay, straw, shavings or similar combustible materials other than necessary for the daily feeding and care of animals shall not be permitted within a tent or *air-supported structure* used for an *assembly occupancy*, except that sawdust and shavings are permitted to be used if kept damp.

2) The ground enclosed by a tent or *air-supported structure* and for not less than 3 m outside the structure shall be cleared of all flammable material or vegetation that will spread fire. (See Note A-2.9.3.2.(2).)

2.9.3.3. Smoking and Open Flame Devices

1) Smoking and open flame devices shall not be permitted in a tent or *air-supported structure* while it is occupied by the public.

2.9.3.4. Fire Watch

1) A person shall be employed to watch for fires when a tent or *air-supported structure* is occupied by more than 1 000 persons.

2) A person employed to watch for fires as described in Sentence (1) shall
a) be familiar with all fire safety features, including the fire safety plan as provided in conformance with Section 2.8. and the condition of *exits*, and
b) patrol the area to ensure that the *means of egress* are kept clear and that requirements of the *authority having jurisdiction* are enforced.

2.9.3.5. Fire Alarm System

1) Where tents and *air-supported structures* are designed to accommodate more than 1 000 persons, a fire alarm and emergency communication system shall be provided. (See Note A-2.9.3.5.(1).)

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2.9.3.6. Blower Engines

1) Internal combustion engines used to power supplementary blowers required by the NBC(AE) shall be operated and maintained in conformance with Section 6.5.

Section 2.10. Daycare Centres

2.10.1. Construction

2.10.1.1. Construction

1) Daycare centres shall be constructed in conformance with the NBC(AE).

2.10.2. Supervision of Children

2.10.2.1. Supervision of Children

1) The operators of daycare centres shall provide a staffing ratio for the supervision of children as required by the Early Learning and Child Care Act and its Regulations.

2) Where handicapped children are being cared for in a centre, sufficient staff shall be present to escort the children to safety during the period they are in the centre.

2.10.3. Combustible Materials

2.10.3.1. Combustible Materials Attached to Walls

1) Combustible materials, such as artwork and teaching materials, that are attached to walls shall not exceed 20% of the area of such walls.

2.10.3.2. Waste Receptacles

1) Waste receptacles shall be made of noncombustible materials.

2.10.3.3. Flammable and Combustible Liquids

1) *Flammable liquids* and *combustible liquids* shall be stored in conformance with Part 4 and in areas inaccessible to children.

2.10.4. Fire Safety Measures

2.10.4.1. Fire Prevention Inspections

1) Staff members of daycare centres in which more than 10 children are cared for shall conduct fire prevention inspections in conformance with the fire safety plan at intervals not greater than one month.

Section 2.11. Boarding and Lodging Houses

2.11.1. General

2.11.1.1. Construction

1) *Buildings* altered or occupied for purposes of providing accommodation for boarders, lodgers or roomers shall conform to the NBC(AE).

2.11.2. Fire Safety Measures

2.11.2.1. Portable Extinguishers

1) At least one portable extinguisher having a 2-A rating shall be installed on each *storey* of a *building* described in Article 2.11.1.1.

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Section 2.12. Covered Malls

2.12.1. General

2.12.1.1. Use

1) Except as permitted in Sentence (2), covered malls designed for ornamental and pedestrian oriented uses only shall not be used for merchandising or public activities.

2) A covered mall referred to in Sentence (1) is permitted to be used for merchandising or public activities on a temporary basis provided

a) it conforms to Articles 2.12.1.2. to 2.12.1.9., and
b) the fire safety plan required in Section 2.8. includes additional provisions to offset any hazard that may be created by such activity.

2.12.1.2. Adequacy of Sprinkler System

1) Merchandising or public activities in a *sprinklered* covered mall described in Article 2.12.1.1. shall not be permitted where such activity will create a hazard exceeding the design criteria for which the sprinkler system was designed.

2.12.1.3. Alternatives to Spatial Separation

1) When a covered mall having a width of not less than 9 m has been provided for the purpose of considering each portion of the *building* separated by the mall as a separate *building*, merchandising or public activities are permitted within the required 9 m width provided alternative protection is installed in conformance with Article 1.2.1.1. of Division A.

2.12.1.4. Access to Exits

1) *Access to exits* within a covered mall shall be provided and maintained in conformance with Subsection 2.7.1.

2.12.1.5. Access to Fire Protection Equipment

1) Where a covered mall is used for merchandising or public activities, the activity shall be arranged so that access to fire protection equipment, including sprinkler control valves, fire hose stations, portable extinguishers and fire alarm stations, is not restricted.

2.12.1.6. Decorative Materials

1) Decorative materials used for merchandising or public activities in a covered mall shall conform to Subsection 2.3.2.

2.12.1.7. Flammable and Combustible Liquids and Flammable Gases

1) *Flammable liquids*, *combustible liquids* and *dangerous goods* classified as flammable gases shall not be used or displayed in a covered mall.

2.12.1.8. Fuelled Equipment

1) Where a covered mall is used for the display of fuelled equipment, batteries shall be disconnected and caps for fuel tanks shall be locked or secured against tampering.

2.12.1.9. Propane-Fuelled Automotive Vehicles

1) A propane-fuelled automotive vehicle shall not be displayed in a covered mall unless

a) the propane fuel tank is permanently installed,
b) the fuel system is equipped with an automatic stop-fill valve,
c) the fuel cut-off valve is closed,
d) fuel tank filling connections are locked or secured against tampering, and
e) batteries are disconnected.

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Section 2.13. Helicopter Landing Areas on Roofs

2.13.1. Construction

2.13.1.1. Construction

1) Helicopter landing areas on roofs shall be constructed in conformance with the requirements for heliports contained in TC SOR/96-433, "Canadian Aviation Regulations – Part III."

2.13.2. Fire Safety Measures

2.13.2.1. Fire Separations

1) Areas or rooms communicating with the landing area shall be separated therefrom by a *fire separation* conforming to the NBC(AE).

2.13.2.2. Smoking

1) Smoking shall not be permitted on helicopter landing areas on roofs, and signs conforming to Article 2.4.2.2. shall be placed at the *exits* from the rooftop and in the vicinity of the landing area.

2.13.2.3. Fire Watch

1) Two persons knowledgeable in the use of firefighting equipment shall be in attendance on the roof deck at each landing area when it is in use.

2.13.2.4. Refuelling, Repair and Maintenance Operations

1) Helicopter refuelling, repair and maintenance operations shall not be carried out on helicopter landing areas on roofs except in an emergency.

2.13.2.5. Inspection of Separators

1) Aviation fuel and oil separators provided in the drainage system shall be inspected at intervals not greater than 7 days to ensure safe operation and shall be serviced when necessary.

Section 2.14. Industrial Relocatable Accommodation

2.14.1. General

2.14.1.1. General

1) In this Section, industrial relocatable accommodation means a *building* that is used to provide accommodation for an industrial work force that lives and works at a temporary location.

2) Industrial relocatable accommodation shall conform with the requirements of the NBC(AE).

3) The owner of industrial relocatable accommodation shall, at a camp location,

a) appoint a fire crew and ensure that it is trained for firefighting duties at the camp (see Note A-2.14.1.1.(3)(a)),
b) ensure that the work force is familiar with the fire hazards that exist in and around the camp, and
c) appoint one person to be responsible for fire prevention and inspection duties in the camp.

4) The person appointed under Clause (3)(c) shall inspect the camp complex, including all industrial relocatable accommodation, for fire hazards on a monthly basis.

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5) The person making the inspection required by Sentence (4) shall provide the owner with a written report of their findings.

6) The inspections required by Sentence (4) are permitted to be suspended if
a) the camp is vacated for a period of 2 months or more,
b) the final inspection report is considered during the closing down process, and
c) the final inspection report is incorporated as an integral part of the re-inspection plans before the camp is re-occupied.

2.14.2. Flammable and Combustible Liquids and Flammable Gases

2.14.2.1. Flammable and Combustible Liquids and Flammable Gases

1) Where containers or *storage tanks* containing *flammable liquids*, *combustible liquids* or liquefied petroleum gases located outdoors are used for heating, cooking or power generation purposes at industrial relocatable accommodation, they shall not be installed
a) in any *exit* or corridor providing *access to exit*, including open air or exterior corridors,
b) under any fire escape, outside *exit* stair, passage or ramp, or
c) within 7.5 m of any *exit*.

Section 2.15. Homes and Hospitals

2.15.1. General

2.15.1.1. Inspection

1) The person in charge of a *building* classified as a Group B, Division 2 *occupancy* shall appoint a fire marshal.

2) A fire marshal appointed under Sentence (1) shall, at least every 6 months, inspect the *building* and all related *buildings* for fire hazards and provide a written report to the person in charge indicating
a) the condition of the *exits*, fire extinguishers and fire alarm equipment, and
b) any other conditions relative to fire safety in the *building* or related *buildings*.

3) The person in charge shall forward a copy of the report referred to in Sentence (2) to the *authority having jurisdiction*.

Section 2.16. Objectives and Functional Statements

2.16.1. Objectives and Functional Statements

2.16.1.1. 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 Table 2.16.1.1. (See Note A-1.1.2.1.(1).)

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Table 2.16.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 2
Forming Part of Sentence 2.16.1.1.(1)

Provision	Functional Statements and Objectives(1)
2.1.2.2. Hazardous Activities	
(1)	[F01,F30,F31,F43,F32,F81-OS3.1,OS3.2,OS3.3,OS3.4]
	[F01-OP1.2]
	[F01-OS1.1]
(2)	[F02,F03-OS1.2] [F10-OS1.5]
2.1.3.1. Fire Alarm, Standpipe and Sprinkler Systems	
(2)	[F02-OP1.2]
	[F02-OS1.2]
2.1.3.3. Smoke Alarms	
(1)	[F81,F11-OS1.5]
(2)	[F11-OS1.5]
(3)	[F11,F81-OS1.5]
2.1.3.4. Protection of Combustible Sprinkler Piping	
(1)	[F06,F82-OS1.2]
	[F06,F82-OP1.2]
	[F06,F82-OP3.1]
2.1.3.5. Special Fire Suppression Systems	
(2)	[F02,F81-OS1.1]
	[F02,F81-OP1.1]
(3)	[F02,F81-OS1.2] [F81-OS1.4]
	[F02,F81-OP1.2] [F81-OP1.4]
(4)	[F02,F81-OS1.2]
	[F02,F81-OP1.2]
(5)	[F02,F81-OS1.1]
	[F02,F81-OP1.2]
(6)	[F02-OP1.2]
	[F02-OS1.2]
(7)	[F82,F12-OP1.2]
	[F82,F12-OS1.2]
(8)	[F12-OP1.2]
	[F12-OS1.2]
2.1.3.6. Inspection, Maintenance and Testing of Fire Safety Devices	
(1)	[F82-OS1.4]
	[F82-OP1.4]
2.1.4.1. Posting	
(1)	[F12,F10,F82,F81-OS1.1,OS1.2]
2.1.5.1. Selection and Installation	
(1)	[F02-OS1.2]
	[F02-OP1.2]

Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
(3)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
(4)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
(5)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
(6)	[F12,F06-OS1.2]
	[F12,F06-OP1.2]
(7)	[F80-OP1.2]
	[F80-OS1.2]
2.2.1.1. Fire Separations	
(2)	[F03-OP1.2] Applies to conformance with the NBC(AE).
	[F03-OS1.2] Applies to conformance with the NBC(AE).
2.2.1.2. Damage to Fire Separations and Fire Protection Materials	
(1)	[F03-OP1.2]
	[F03-OS1.2]
(2)	[F03-OP1.2]
	[F03-OS1.2]
2.2.2.2. Damage to Closures	
(1)	[F82-OP1.2]
	[F82-OS1.2]
2.2.2.3. Protective Guarding Devices	
(1)	[F81-OP1.2]
	[F81-OS1.2]
2.2.2.4. Inspection and Maintenance	
(1)	[F82-OP1.2]
	[F82-OS1.2]
(2)	[F82-OP1.2]
	[F82-OS1.2]
(3)	[F82-OP1.2]
	[F82-OS1.2]
(4)	[F81-OP1.2]
	[F81-OS1.2]
(5)	[F82-OP1.2]
	[F82-OS1.2]
2.2.3.1. Damaged or Removed Encapsulation Materials	
(1)	[F02-OP1.2]
	[F02-OS1.2]
2.3.1.2. Movable Partitions and Screens	
(1)	[F02-OS1.2]
2.3.1.3. Decorative Materials	
(1)	[F02-OS1.2]

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Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
2.3.1.4. Interconnected Floor Spaces	
(1)	[F02-OP1.2]
	[F02-OS1.2]
2.3.2.1. Drapes, Curtains and Decorative Materials	
(1)	[F02-OP1.2]
	[F02-OS1.2,OS1.5]
2.3.2.2. Flame-Retardant Treatments	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
2.3.2.3. Textiles in Group B Occupancies	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02-OS1.2]
	[F02-OP1.2]
2.4.1.1. Accumulation of Combustible Materials	
(1)	[F01,F02-OS1.2,OS1.1]
	[F01,F02-OP1.2,OP1.1]
(2)	[F01,F02-OS1.2]
	[F01,F02-OP1.2]
(3)	[F01,F02-OS1.2]
	[F01,F02-OP1.2]
(4)	[F01,F02-OS1.2]
	[F01,F02-OP1.2]
(5)	[F02-OS1.2]
	[F02-OP1.2]
(6)	[F01-OS1.2,OS1.1]
	[F01,F02-OP1.2,OP1.1]
2.4.1.2. Storage Rooms for Combustible Waste Materials	
(1)	[F03,F02-OS1.2]
	[F03,F02-OP1.2]
2.4.1.3. Waste Receptacles	
(1)	[F01-OS1.1] Applies to portion of Code text: "… be removed from the premises."
(2)	[F01-OS1.1] Applies to the storage of combustible materials and ashes in the same container.
(3)	[F03-OS1.2]
	[F03-OP1.2]
(4)	[F03,F02,F01-OS1.2]
	[F03,F02,F01-OP1.2]
2.4.1.4. Lint Traps for Laundry Equipment	
(1)	[F01-OS1.1]
2.4.2.1. Smoking Areas	
(1)	[F01-OS1.1]
(3)	[F01-OS1.1]

Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
2.4.2.2. Signs	
(1)	[F01-OS1.1]
2.4.3.1. Open Flames in Processions	
(1)	[F01-OS1.1]
2.4.3.2. Flaming Meals and Drinks	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
(4)	[F12,F02-OS1.2]
	[F12,F02-OP1.2]
2.4.3.3. Devices Having Open Flames	
(1)	[F01-OS1.1]
2.4.4.1. Flammable and Combustible Liquids	
(2)	[F01-OS1.1]
2.4.4.2. Flammable Gases	
(1)	[F01-OS1.1]
2.4.4.3. Parking of Vehicles Transporting Dangerous Goods	
(1)	[F01,F81-OS1.1]
	[F01,F81-OP1.1]
2.4.5.1. Open Air Fires	
(1)	[F01,F03,F02-OP1.2]
	[F01,F03,F02-OS1.2]
2.4.6.1. Security	
(1)	[F34-OS1.1,OS1.2]
	[F34-OP3.1]
2.4.7.1. Use and Maintenance	
(1)	[F01,F82,F81-OS1.1]
	[F01,F82,F81-OP1.1]
2.5.1.2. Access Panels and Windows	
(1)	[F12-OP1.2]
	[F12-OS1.2]
2.5.1.4. Access to Fire Department Connections	
(1)	[F12-OP1.2]
	[F12-OS1.2]
2.5.1.5. Maintenance of Fire Department Access	
(1)	[F12-OP1.2]
	[F12-OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
2.6.1.2. Coal and Wood Bins	
(1)	[F01-OP1.1]
	[F01-OS1.1]

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Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
2.6.1.3. Hoods, Ducts and Filters	
(1)	[F01,F02-OP1.2]
	[F01,F02-OS1.2]
2.6.1.4. Chimneys, Flues and Flue Pipes	
(1)	[F01-OP1.2] [F82-OP1.1]
	[F01-OS1.2] [F82-OS1.1]
(2)	[F01-OP1.2]
	[F01-OS1.2]
(3)	[F82-OP1.2,OP1.1]
	[F82-OS1.1,OS1.2]
	[F82-OS3.4]
	(a) [F82-OS3.1] Applies to portion of Code text: "… any structural deficiency or decay …"
2.6.1.5. Clearances	
(1)	[F01-OP1.2,OP1.1]
	[F01-OS1.1,OS1.2]
(2)	[F01-OP1.2,OP1.1]
	[F01-OS1.1,OS1.2]
2.6.1.6. Operation and Maintenance Procedures	
(1)	[F01,F81,F82-OP1.2,OP1.1]
	[F81,F82-OS3.4]
	[F01,F81,F82-OS1.1,OS1.2]
(2)	[F82-OP1.2]
	[F82-OS1.2]
2.6.1.7. Ventilation Shafts	
(1)	[F01,F81-OP1.2]
	[F01,F81-OS1.2]
2.6.1.8. Repairs and Renovations	
(1)	[F02,F03-OP1.2]
	[F02,F03-OS1.2] [F01-OS1.1]
(2)	[F81,F43-OS1.1]
	[F81,F43-OH5]
	[F81,F43-OP1.1]
2.6.1.9. Commercial Cooking Equipment	
(1)	[F01-OS1.1,OS1.2] [F02,F81-OS1.2]
	[F02,F81-OP1.2]
(2)	[F01-OS1.2,OS1.1] [F81,F82-OS1.2]
	[F01,F81,F82-OP1.2]
(3)	[F82-OS1.1] [F02-OS1.2]
	[F02-OP1.2]
(4)	[F01-OS1.1]
(5)	[F12-OS1.2]
	[F12-OP1.2]

Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(6)	[F01,F81,F82-OS1.1]
(7)	[F01,F81,F82-OS1.1]
2.6.2.2. Outdoor Incinerators	
(1)	[F03-OS1.2] Applies to portion of Code text: "… except that the *flue* venting an incinerator shall not serve as the chute conveying waste material to the incinerator."
	[F03-OS1.2] [F82,F81-OS1.1]
2.6.2.3. Spark Arresters	
(1)	[F81,F82-OS1.1]
(2)	[F82,F01-OS1.1]
2.6.3.1. Use	
(1)	[F02-OP1.2]
	[F02-OS1.2] [F01-OS1.4,OS1.5]
2.6.3.2. Security	
(1)	[F34-OS1.1]
	[F34-OS3.3]
	[F34-OP1.1]
2.7.1.2. Open Floor Areas	
(2)	[F10,F05-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
2.7.1.3. Occupant Load	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
2.7.1.4. Signs	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
2.7.1.5. Nonfixed Seating	
(1)	[F10-OS3.7]
(2)	[F10-OS3.7]
(3)	[F10-OS3.7]
2.7.1.6. Maintenance	
(1)	[F12,F82-OP1.2]
	[F12,F82-OS1.2]
	[F10,F12,F82-OS3.7]
2.7.1.7. Exterior Passageways and Exit Stairs	
(1)	[F12-OP1.2]
	[F12-OS1.2]
	[F10,F12-OS3.7] [F30-OS3.1]
(2)	[F82,F12-OS1.2]
	[F82,F12-OP1.2]
	[F82,F10,F12-OS3.7] [F82,F30-OS3.1]

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Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
2.7.1.8. Free of Obstruction	
(1)	[F10-OS3.7]
2.7.2.1. Exit Doors	
(1)	[F82-OP1.2]
	[F82-OS3.7]
	[F82-OS1.2]
(2)	[F82-OS3.7]
(3)	[F82-OS3.7]
(4)	[F82-OS3.7]
2.7.3.1. Installation and Maintenance	
(2)	[F10-OS3.7]
2.8.1.2. Supervisory Staff	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(2)	[F12-OS1.5,OS1.2] [F01-OS1.1] [F02-OS1.2]
(3)	[F12-OS1.5,OS1.2] [F01-OS1.1] [F02-OS1.2]
2.8.1.3. Keys and Special Devices	
(1)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
2.8.2.1. Measures in a Fire Safety Plan	
(1)	[F12-OP1.2]
	[F12-OS1.2]
(2)	[F13,F12-OP1.2] [F01,F82-OP1.1] [F02,F82-OP1.2]
	[F11,F13,F12,F10-OS1.5,OS1.2] [F01,F82-OS1.1] [F02,F82-OS1.2]
(3)	(a)(i) [F12,F13-OP1.2] (a)(ii) [F13-OP1.2] (a)(iii) [F11-OP1.2] (a)(v) [F02-OP1.2] (b) to(d) [F12-OP1.2] (f) [F01-OP1.1] (g) [F82-OP1.2]
	(a)(i) [F11,F13-OS1.5] (a)(ii) [F13-OS1.5,OS1.2] (a)(iii) [F11-OS1.2,OS1.5] (a)(iv) [F10-OS1.5] (a)(v) [F02-OS1.2] (b) to (d) [F12-OS1.2,OS1.5] (e) [F10,F12-OS1.5] (f) [F01-OS1.1] (g) [F82-OS1.2,OS1.5]
2.8.2.2. High Buildings	
(1)	[F02,F12,F13-OP1.2]
	[F02,F12,F11,F13,F36-OS1.5,OS1.2]
2.8.2.3. Indoor and Outdoor Storage of Dangerous Goods	
(1)	[F12-OS1.1]
(2)	[F12-OS1.1]

Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
2.8.2.4. Indoor Storage of Combustible Products and Dangerous Goods	
(2)	[F81,F02,F12-OP1.2]
	[F81-OS1.1] [F81,F02,F12-OS1.2]
(3)	[F02,F12-OP1.2]
	[F02,F12-OS1.2]
2.8.2.5. Outdoor Storage	
(1)	[F81,F12,F13-OH5]
	[F01,F81,F12,F02,F13-OP3.1]
2.8.2.6. Rooms for Storage Tanks	
(1)	[F81-OS1.1] [F12-OS1.2]
	[F81-OP1.1] [F12-OP1.2]
2.8.2.7. Spill Control	
(1)	[F44-OP1.1,OP1.2]
	[F44-OS1.1,OS1.2]
	[F44-OH5]
2.8.2.8. Hazardous Processes and Operations	
(1)	(b) [F12-OS1.2]
2.8.2.9. Hot Works	
(1)	[F01-OS1.1]
2.8.2.11. Construction and Demolition Sites	
(1)	[F11,F13,F12-OS1.2,OS1.5] [F01,F82-OS1.1] [F02,F82-OS1.2]
	[F13,F12-OP1.2] [F01,F82-OP1.1] [F02,F82-OP1.2]
2.8.2.12. Retention of Fire Safety Plans	
(1)	[F12-OP1.2]
	[F12-OS1.5,OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
(3)	[F12-OS1.2,OS1.5]
	[F12-OP1.2]
2.8.2.13. Distribution	
(1)	[F12,F13-OP1.2] [F01,F82-OP1.1] [F02,F82-OP1.2]
	[F11,F13,F12,F10-OS1.2,OS1.5] [F01,F82-OS1.1] [F02,F82-OS1.2]
2.8.2.14. Posting of Fire Emergency Procedures	
(1)	[F10-OS1.5]
(2)	[F81,F12-OH5]
	[F81,F12-OP3.1]
(3)	[F10-OS1.5]
(4)	[F13-OP1.2]
	[F13-OS1.2]

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Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
2.8.3.1. Fire Drill Procedures	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5] [F10-OS1.5]
2.8.3.2. Fire Drill Frequency	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5] [F10-OS1.5]
(2)	[F12-OS1.5]
2.9.2.1. Flame-Retardant Treatments	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
2.9.3.1. Electrical Systems	
(1)	[F82,F81,F01-OP1.1]
	[F82,F81-OS3.1,OS3.2,OS3.3,OS3.4]
	[F82,F81,F01-OS1.1]
(2)	[F82-OP1.1]
	[F82-OS1.1]
(3)	[F34-OP1.1]
	[F34-OS3.3]
	[F34-OS1.1]
(4)	[F81-OP1.1]
	[F81-OS1.1]
2.9.3.2. Combustible Materials	
(1)	[F02-OS1.2] Applies to portion of Code text: "… except that sawdust and shavings are permitted to be used if kept damp."
	[F02-OS1.2] Applies to the restriction of combustible materials within tents or *air-supported structures*.
(2)	[F01,F02,F03-OS1.2]
	[F01,F02,F03-OP1.2]
2.9.3.3. Smoking and Open Flame Devices	
(1)	[F01-OS1.1]
2.9.3.4. Fire Watch	
(1)	[F12-OS1.2,OS1.5]
(2)	(a) [F10,F12-OS1.5] [F12-OS1.2] Applies to familiarity with the condition of the *exits*. (b) [F10,F12-OS1.5] [F12-OS1.2] Applies to the *means of egress* being kept clear.
	(a) [F12-OS1.2,OS1.5] Applies to familiarity with the fire safety plan. (b) [F12-OS1.2,OS1.5] Applies to the requirements of the *authority having jurisdiction*.
2.9.3.5. Fire Alarm System	
(1)	[F13-OP1.2]
	[F11-OS1.5] [F13-OS1.2]
2.10.2.1. Supervision of Children	
(1)	[F01-OS1.1,OS1.2] [F10-OS1.5] [F12,F13-OS1.2]

Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F12-OS1.5]
2.10.3.1. Combustible Materials Attached to Walls	
(1)	[F02-OP1.2]
	[F02-OS1.2]
2.10.3.2. Waste Receptacles	
(1)	[F02,F01-OS1.2]
	[F02,F01-OP1.2]
2.10.3.3. Flammable and Combustible Liquids	
(1)	[F01,F34-OS1.1] Applies to storage in areas inaccessible to children.
2.10.4.1. Fire Prevention Inspections	
(1)	[F01,F82-OS1.1]
2.11.2.1. Portable Extinguishers	
(1)	[F02,F12-OP1.2]
	[F02,F12-OS1.2]
2.12.1.1. Use	
(1)	[F01,F02-OP1.1,OP1.2]
	[F01,F02-OS1.1,OS1.2] [F10-OS1.5]
(2)	[F01,F02,F03-OP1.1,OP1.2]
	[F01,F02,F03-OS1.1,OS1.2]
2.12.1.2. Adequacy of Sprinkler System	
(1)	[F02-OP1.2]
	[F02-OS1.2]
2.12.1.5. Access to Fire Protection Equipment	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
2.12.1.7. Flammable and Combustible Liquids and Flammable Gases	
(1)	[F01,F02-OS1.1,OS1.2,OS1.5]
2.12.1.8. Fuelled Equipment	
(1)	[F01,F34-OS1.1,OS1.5]
2.12.1.9. Propane-Fuelled Automotive Vehicles	
(1)	(a),(b),(c) [F43-OS1.1,OS1.5] (d) [F34,F81-OS1.1] (e) [F01-OS1.1]
2.13.1.1. Construction	
(1)	[F01,F02,F81-OP1.2,OP1.1]
	[F01,F02,F81-OS1.1,OS1.2]
2.13.2.1. Fire Separations	
(1)	[F03-OP1.2]
	[F03-OS1.2]
2.13.2.2. Smoking	
(1)	[F01-OS1.1] Applies to portion of Code text: "Smoking shall not be permitted on helicopter landing areas on roofs …"

Table 2.16.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
2.13.2.3. Fire Watch	
(1)	[F12-OS1.2]
	[F12-OP1.2]
2.13.2.4. Refuelling, Repair and Maintenance Operations	
(1)	[F01-OS1.1]
2.13.2.5. Inspection of Separators	
(1)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
2.14.2.1. Flammable and Combustible Liquids and Flammable Gases	
(1)	[F10-OS1.5]
	[F10-OP1.2]
2.15.1.1. Inspection	
(2)	[F03,F06,F12,F13-OS1.2]
	F03,F06,F12,F13-OP1.2]

Notes to Table 2.16.1.1.:

(1) See Parts 2 and 3 of Division A.

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Notes to Part 2
Building and Occupant Fire Safety

A-2.1.2.1.(1) The Alberta Building Code 1990 introduced changes to the method of determining building height. Application of the current method to existing buildings for the purposes of this Code could result in certain buildings being reclassified as higher buildings. For this reason, the NFC(AE) suggests that building height is that which was established by the building code that was applicable at the time of construction in the case of original construction, or at the time of alteration if additional storeys have been added to the building.

A-2.1.2.2.(1) Arena-type buildings are often used for events such as community dances, rallies and trade shows. These events may increase the occupant and fuel loads beyond that for which the space was designed. To ensure safety during such events, additional egress facilities may be required to compensate for the additional occupant load and, in some cases, additional fire suppression measures may be required to compensate for the increased fuel load.

Large public corridors in mercantile occupancies are also used on a temporary basis for community activities, merchandising and for special displays. In these cases, additional egress facilities and fire suppression may be needed, depending on the increase in hazard.

A-2.1.3.1.(1) The NBC(AE) 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 a class of buildings, be altered for reasons of public safety. It is not intended that either the NBC(AE) or the NFC(AE) be used to enforce the retrospective application of new requirements in the NBC(AE) to existing buildings. Although the NFC(AE) 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 before the Alberta Building Code 2006 was issued, it is intended that the NFC(AE) not be applied in this manner to these buildings.

It is usually difficult to change structural features of an existing building when undertaking alterations or additions, but the installation of "active" fire protection systems, such as alarms, sprinklers and standpipes, in existing buildings may be possible. These systems may be considered as contributing to an adequate degree of life safety in cases where the structural features of a building do not conform to the NBC(AE).

Sentence 2.1.3.1.(1) is intended to address the installation of fire alarm, sprinkler and standpipe systems in existing buildings presently not so equipped, and in existing buildings that do not provide an acceptable level of safety to meet the current installation standards specified in the NBC(AE). It is not intended that existing fire protection systems that provide an acceptable level of life safety be upgraded with each new edition of the NBC(AE) or in conjunction with the inclusion of new requirements not in force at the time that a building was constructed. The authority having jurisdiction is expected to use discretion in enforcing this requirement. The authority having jurisdiction may accept alternatives to strict compliance with the NBC(AE) as provided for in Clause 1.2.1.1.(1)(b) of Division A and its Note. (See also Note A-1.1.1.1.(1) of Division A and Note A-1.1.1.2. of Division A of the NBC(AE).)

This provision is also intended to direct Code users primarily to Subsection 3.2.5. of Division B of the NBC(AE), which specifies NFPA 13, "Standard for the Installation of Sprinkler Systems," as the appropriate standard for the design and installation of automatic sprinkler systems and provides several exceptions and supplementary requirements (in certain cases, other provisions in the NBC(AE) may also apply). However, where a specific hazard, such as highly piled storage or the storage of flammable and combustible liquids or rubber tires, is not

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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addressed in the NBC(AE), the applicable NFPA standards that contain design criteria for the sprinkler system required can be found in the NFC(AE).

A-2.1.3.3.(3) Part 3 and Part 9 of Division B of the NBC(AE) and CAN/ULC-S553, "Standard for the Installation of Smoke Alarms," contain additional information for locating, installing and interconnecting smoke alarms in dwelling units. Consideration should be given to the inspection, maintenance and testing of smoke alarms installed at elevated levels (e.g. vaulted ceilings, cathedral ceilings or ceilings exceeding a height of 3 m) by selecting smoke alarms with a remote testing capability.

A-2.1.3.4.(1) Editions of the NBC(AE) prior to 2005 permitted the use of combustible sprinkler piping for wet pipe sprinkler systems in residential and light-hazard occupancies on condition that the piping was protected from exposure to a fire in the space beneath. Article 2.1.3.4. requires that the necessary protection of the piping be maintained so that the performance of the sprinkler system will not be compromised in the event of fire. Some of the conditions included restricting use of the piping to light-hazard occupancies, the piping must be a wet system, use of steel suspension grids and correct tile weight, and integrity of the fire protection covering.

A-2.1.3.5.(3)(c) and (d) Concern over the impact of halons on the environment is resulting in changes to the regulations of various agencies that affect their use and release to the atmosphere and their reduction, recycling and eventual phase-out as fire extinguishment agents. Standards referenced in the NFC(AE) may not reflect the current status of requirements developed by certain agencies regarding the installation, use and testing of fire suppression systems that employ halons.

The installation of new halon fire suppression systems is prohibited following the international ban on halon gas production. However, both NFPA 12A, "Standard on Halon 1301 Fire Extinguishing Systems," and NFPA 12B, "Standard on Halon 1211 Fire Extinguishing Systems," are still relevant to the maintenance, decommissioning and recycling of existing halon fire suppression systems.

A-2.1.3.6. The Code requires the installation of several fire safety devices and building fire safety features for the control of fire hazards. The inspection, maintenance and testing requirements for many of these devices are referenced in the applicable Articles. However, several Sections of the Code do not include such references for certain fire safety devices and building fire safety features, examples of which include, but are not limited to:

- ventilation system interlocks and associated audible alarms for rooms or enclosed spaces containing flammable and combustible liquids (e.g. Subsection 4.1.7.)
- vapour detection alarm systems for rooms or enclosed spaces containing flammable and combustible liquids (e.g. Subsection 4.1.7.)
- bonding and grounding systems for flammable and combustible liquid handling processes (e.g. Subsection 4.1.8.)
- fill pipe backflow prevention systems for aboveground storage tanks for flammable and combustible liquids (e.g. Subsection 4.3.1.)
- leak detection monitoring devices for aboveground storage tanks for flammable and combustible liquids (e.g. Section 4.4.).

A-2.1.5.1.(6) Following are examples of measures deemed to minimize the risk of injury for portable extinguisher operators: affixing prominent cautionary labels on portable extinguishers and warning signs at entry points to confined spaces, enabling remote applications such as by providing special nozzles, installing special ventilation systems, providing breathing apparatus and other personal protective equipment, and adequately training personnel.

A-2.3.2.2.(1) The small scale match flame test in NFPA 705, "Recommended Practice for a Field Flame Test for Textiles and Films," is a relatively simple test that can be used to assess the condition of flame-retardant treatments on samples from fabrics that have been in use for a while. It is not intended that NFPA 705 be used as the primary standard for the application of fire-retardant treatments.

A-2.4.1.1.(1) The accumulation of a certain amount of combustible waste material in and around buildings may be necessary for the day-to-day operation of many industrial or commercial premises. If basic measures of good housekeeping are observed, the presence of these combustibles may not constitute an "undue fire hazard."

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A-2.4.1.1.(2) The defined term "service rooms" includes boiler rooms, furnace rooms, incinerator rooms, garbage rooms, janitors' closets and rooms to accommodate air-conditioning or heating appliances, pumps, compressors and electrical services. The intent of Sentence 2.4.1.1.(2) is to discourage the use of these rooms for the storage of miscellaneous combustible materials. If storage space is needed in a building, a room that does not contain building service equipment should be provided. Even in garbage rooms, combustible materials should not be allowed to accumulate. When the garbage is periodically cleared from the room, the room should be empty, except for the garbage container itself.

A-2.4.1.1.(6) Measures such as those described in NFPA 80A, "Recommended Practice for Protection of Buildings from Exterior Fire Exposures," must be taken to ensure that buildings are protected from fires in outdoor receptacles containing combustible materials.

A-2.4.1.3.(1) Generally, self-heating and self-ignition are most commonly encountered in organic materials, such as animal and vegetable solids and oils. A rag saturated with linseed oil, for example, is susceptible to self-heating and self-ignition when crumpled and put in a waste container.

Certain inorganic materials, such as metal powders, may also self-heat and self-ignite under isolated conditions. Materials such as motor or lubricating oils are not subject to self-heating and self-ignition.

The NFPA's "Fire Protection Handbook" provides a list of materials that are susceptible to spontaneous heating and ignition.

A-2.4.5.1.(1) Measures that can be considered to limit fire spread include sufficient clear space between the fire and adjacent buildings, combustibles and woodlands, the size and height of the pile of combustibles to be burned, prevailing meteorological conditions, fire control measures such as hoses and water tanks and, if a receptacle is to be used, the design of the receptacle. In some cases, a permit or licence may be required for open air fires.

A-2.4.6.1.(1) Vacant buildings frequently become the target of vandalism and arson. They should be locked, and accessible windows and doors should be barricaded to prevent unauthorized entry. However, fire department access to the interior of the building in the event of a fire should not be made unduly difficult.

A-2.6.1.4.(1) External inspection of enclosed chimneys and surrounding construction may require the installation of one or more access openings in the enclosure surrounding the chimney. The presence of scorched or charred adjacent combustible or encapsulated mass timber construction indicates the need for further investigation of the cause of the overheating.

Internal inspection of chimneys can be accomplished by lowering a light from the top, insertion of a light at the bottom or at intermediate locations, together with the use of one or more mirrors.

During inspection of a chimney connected to an operating appliance, the presence of dense smoke at the outlet indicates improper operation of the appliance, incorrect sizing of the chimney or that unsuitable fuels are being used. These factors must be promptly corrected to reduce the accumulation of combustible deposits on the chimney and flue pipe walls.

A-2.6.1.4.(2) The presence in a chimney of deposits of soot or creosote in excess of 3 mm thick indicates the need for immediate cleaning, possible modification of burning procedures, and more frequent inspections.

A-2.6.1.4.(3)(a) Structural deficiencies are deviations from required construction, such as the absence of a liner or inadequate design of supports or ties. Instances of decay are cracking, settling, crumbling mortar, distortion, advanced corrosion, separation of sections, or loose or broken supports.

A-2.6.1.9.(3) Depending on the amount of cooking equipment usage, the entire exhaust system, including grease extractors, should be inspected at intervals not greater than 7 days to determine if grease or other residues have been deposited within. When grease or other residues are in evidence as deposits within the hood, grease removal devices, or ducts, the system should be cleaned. In general, exhaust systems should be cleaned at intervals not greater than 12 months, but in the case of deep fat cooking, char broiling or similar cooking operations, the systems should be cleaned at intervals not greater than 3 months.

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A-2.7.1.3.(1) The NFC(AE) uses two criteria to determine the maximum permissible occupant load in existing buildings: the exit capacity, and the total clear floor space per person. Assuming that exit capacity is sufficient, the value of 0.4 m^2/person ensures that a crowd of people will be able to move steadily toward the exits.

Table 3.1.17.1. of Division B of the NBC(AE) should not be used to determine the maximum permissible occupant load for rooms or spaces in existing buildings. NBC(AE) Table 3.1.17.1. is intended to allow a building designer to calculate a minimum occupant load for the purpose of designing certain building features, such as means of egress and fire alarm systems. The designer may choose to design for more or fewer persons, in which case the actual design occupant load must be posted in a conspicuous location. In an existing building, the process must be calculated in reverse, from the measured exit capacity, or other building features, to a maximum permissible occupant load. The result of the calculation may not be, and is not intended to be, consistent with values obtained using NBC(AE) Table 3.1.17.1.

Net floor space referred to in Clause 2.7.1.3.(1)(a) is the floor space in a room excluding areas occupied by structural features and fixtures, such as tables, furnishings or equipment. In certain assembly occupancies, where the number and type of furnishings may change according to the nature of the function taking place, it may be appropriate to calculate maximum occupant loads for each of the different functions anticipated.

It should also be noted that Article 2.1.3.1. of this Code requires fire alarm systems to be installed in conformance with the NBC(AE). This means that if the occupant load determined by Sentence 2.7.1.3.(1) exceeds that for which a fire alarm system is required by the NBC(AE), a fire alarm system must be provided in the building.

A-2.7.1.4.(2) Sentence 3.1.17.1.(2) of Division B of the NBC(AE) requires that the occupant load used in the design of a floor area be posted if it differs from that determined by Table 3.1.17.1. of Division B of the NBC(AE).

A-2.7.1.6.(1) Some people with cognitive disabilities such as dementia are at risk of wandering away from the residence or healthcare facility in which they are being treated. To reduce this risk, some residences and healthcare facilities install special hardware on egress and exit doors that can only be operated by designated persons. This solution keeps residents/patients from wandering, but the doors can still trigger anxiety in residents/patients who may nevertheless try to leave the space through them, without success.

Recent studies have shown that applying murals (of a landscape, for example) on exit and egress doors in these environments can help reduce anxiety in people with cognitive disabilities who tend to view them as a pleasant natural barrier rather than as a means of escape.

Where this approach is implemented and the doors are not reasonably discernible, an alternative means of egress from the space should be provided. It is expected that the designers and authorities having jurisdiction will use judgement in determining whether or not an alternative means of egress is required. Additionally, the murals should be applied with care so that they do not conceal or impair the operation of any fire and life safety systems installed nearby, including, but not limited to, exit signage, emergency lighting, fire alarm devices, sprinklers or door hardware. Egress and exit doors with murals should be reasonably discernible to residential care or healthcare staff who will be required to assist residents/patients in the event that the space must be evacuated, and to visitors who will be expected to evacuate on their own.

A-2.7.3.1.(1) Subsections 3.2.7. and 3.4.5. of Division B of the NBC(AE) describe the requirements for the placement of exit signs and for emergency and non-emergency lighting.

A-2.8.1.2.(1) Adequately trained supervisory staff can be of great value in directing people to move in an orderly fashion in the event of a fire and in carrying out appropriate fire control measures until the public fire department arrives. These measures are, as described in the fire safety plan, developed in cooperation with the fire department. The supervisory staff referred to in this Section are assigned their responsibilities by the building owner, unless the public fire department is prepared to take on these responsibilities. Except in hospitals and nursing homes, it is not intended that supervisory staff should be in the building on a continuous basis, but that they should be available to fulfill their obligations as described in the fire safety plan on notification of a fire emergency. In hospitals and nursing homes, however, staff must be in the building at all times to assist occupants who are not capable of caring for themselves in an emergency.

A-2.8.1.2.(2) Some residents of care occupancies require assistance during evacuation as they are unable to proceed independently to a place of safety.

The design requirements in the NBC(AE) for home-type care occupancies that are not sprinklered facilitate early fire detection and timely evacuation. It is anticipated that these design features, along with the assistance

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of supervisory staff, will allow a complete evacuation of home-type care occupancies within the same time frame as other Code-compliant care occupancies, such as convalescent homes and children's custodial homes.

The number of supervisory staff required in home-type care occupancies is determined by the applicable regulatory authorities, including the licensing authority. The general assumption is that at least one supervisory staff would be on duty for every two residents requiring assistance. Since residents in home-type care occupancies that are not sprinklered are located on the first storey, which is served by two barrier-free means of egress, a greater number of residents may be able to evacuate without assistance.

A-2.8.2.1.(3) The fire safety plan may provide important information to the fire department for use in the preparation of plans for firefighting procedures in specific buildings. This is especially true for buildings where flammable or combustible liquids or other dangerous goods are stored.

The development of the fire safety plan for large retail occupancies, especially the bulk merchandising stores, should take into consideration various unique risk factors prevalent in these stores. A bulk merchandising store is characterized as a retail store in which the sales area includes the storage of material usually located in piles, on pallets or on racks up to 3.7 m in storage height. These mercantile occupancies tend to store and display in the sales area, large quantities of products ranging from compressed gas cylinders, oxidizers, flammable liquids, combustible liquids, foamed plastics, and combustible materials.

Documented evidence of fires in these types of stores has shown that smoke obscuration occurs within 7.5 to 12 min from the inception of a fire. Prompt response by occupants in a fire emergency is therefore critical. Human behaviour studies have shown that occupants in a retail environment tend to delay evacuation for various reasons such as unfamiliarity with exits or a lack of visibility of exits, reluctance to leave check-out lines, and uncertainty about the events unfolding. The training and education of staff are crucial elements in clearly notifying and instructing occupants during an emergency. A reliable public address system should be an integral part of the fire safety plan.

Furthermore, although the Code does not address the use of mass notification systems, many organizations integrate them into their fire alarm and public address systems. Mass notification systems provide real-time notification and instructions to persons in a building or series of buildings, a campus, a community or similar areas using a series of voice communications, signals, and text or phone messages to communicate the appropriate actions and responses in the event of an emergency situation.

Where such systems are installed, the authority having jurisdiction should be consulted to ensure that the interconnection and cross-communication with other Code-prescribed life safety systems (e.g. fire alarm systems) is well coordinated and understood. The sequencing of events must be carefully prioritized to ensure that persons are not given instructions that are contrary to the life safety requirements of the Code.

Note that, where strobes are used in mass notification systems, consideration should be given to ensure that all strobes, including those for the fire alarm system, are synchronized.

The fire safety plan should be commensurate with the known risks and address the concerns identified above.

A-2.8.2.1.(3)(a)(i) These procedures should also include training authorized personnel to silence fire alarm and alert signals under specified conditions. If special keys or devices are required to operate the alarm system, they should be readily available to supervisory staff on duty.

A-2.8.2.1.(3)(a)(iv) Some occupants of a building may require special assistance during evacuation because cognitive or physical limitations make them unable to proceed independently to a place of safety. Fire safety for these persons will depend to a large extent on preplanning and on their awareness of the fire protection measures incorporated into the building. In some buildings, it may be appropriate to advise such occupants of these provisions by posted notices, handouts or other suitable means. In certain residential occupancies, such as hotels or motels, staff should be aware of rooms occupied by persons requiring special assistance during evacuation and should inform the responding fire department.

A-2.8.2.11.(1)(c) The control of fire hazards in and around buildings being constructed, renovated or demolished includes fire protection for combustible construction materials and combustible refuse on the site. The sizes of piles of materials and refuse and the location of such piles in relation to adjacent buildings are factors that should be taken into consideration in determining which fire protection measures to implement. The selection of fire protection measures for demolition operations will also depend on the demolition procedure being used, the specific conditions existing on the site, and the firefighting capabilities of the responding fire department.

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It is the intent of this Code that requirements regarding the outdoor storage of materials stated in Section 3.3. be referred to and applied at construction and demolition sites.

A-2.8.3.1.(1) A fire safety plan is of little value if it is not reviewed periodically so that all supervisory staff remain familiar with their responsibilities. A fire drill, then, is at least a review of the fire safety plan by supervisory staff. The extent to which non-supervisory staff participate in a fire drill should be worked out in cooperation with the fire department. The decision as to whether all occupants should leave the building during a fire drill should be based on the nature of the occupancy.

It may be necessary to hold additional fire drills outside normal working hours for the benefit of employees on afternoon or night shifts, who should be as familiar with fire drill procedures as those who work during the day. If full-scale fire drills are not possible during non-regular working hours, arrangements should be made so that night-shift supervisory staff can participate in fire drills conducted during the daytime.

A-2.9.3.2.(2) It is not the intent of this Sentence to require that all vegetation be removed before the placement of temporary circus tents, jump rides, beer tents, etc. The requirement ensures that such structures are not subject to the hazards associated with ground cover fires. Precautions such as wetting of the area and grass mowing should be considered if conditions are not deemed appropriate.

A-2.9.3.5.(1) The type of fire alarm and emergency communication system anticipated for tents and air-supported structures will vary according to the hazard and the number of occupants. If a tent or air-supported structure is to be permanent, a fire alarm and emergency communication system, as defined in the NBC(AE), may be required. If such structures are to be temporary, however, a somewhat less sophisticated system is anticipated, depending on local conditions.

A-2.14.1.1.(3)(a) It is the owner's responsibility to appoint and train a fire crew, to appoint a person to be responsible for fire prevention, and to ensure camp occupants are familiar with fire hazards. These requirements apply for all camps; however, they become more important as the size of the camp increases.

It is not the intent of the NFC(AE) that the fire crew be equipped and trained to the level expected of a municipal volunteer or paid fire department. It is expected that the crew will be knowledgeable of the site and building layout and fire safety systems, and capable of performing basic firefighting duties with the fire suppression equipment provided.

In assessing a camp site, it is the responsibility of the authority having jurisdiction to ensure the owner has complied with the above.

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Part 3
Indoor and Outdoor Storage

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Part 3
Indoor and Outdoor Storage

Section 3.1. General

3.1.1. Scope

3.1.1.1. Application

1) Except as provided in Sentence 5.5.5.1.(1), this Part applies to the storage of combustible products and *dangerous goods*, both inside and outside of *buildings*. (See Note A-3.1.1.1.(1).)

3.1.1.2. Radioactive Materials

1) *Dangerous goods* classified as radioactive materials shall be stored in conformance with CNSC S.C. 1997, c. 9, "Nuclear Safety and Control Act," and its Regulations.

3.1.1.3. Explosives

1) The storage of *dangerous goods* classified as explosives shall be in conformance with NRCan R.S.C. 1985, c. E-17, "Explosives Act," and its Regulations.

3.1.1.4. Compressed Gases

(See Note A-3.1.1.4.)

1) This Part shall not apply to

a) facilities operated by manufacturers or distributors at which *dangerous goods* classified as compressed gases are manufactured, or containers are filled or distributed, provided that storage and handling is in conformance with good engineering practice (see Note A-3.1.1.4.(1)(a)), and

b) the storage and dispensing of *dangerous goods* classified as flammable gases at *fuel-dispensing stations* covered in Section 4.6.

2) Except as provided in this Part, the storage and handling of liquefied petroleum gases shall conform to

a) CSA B149.1, "Natural gas and propane installation code," and

b) CSA B149.2, "Propane storage and handling code."

3) Except as provided in this Part, the storage and handling of natural gas shall conform to CSA B149.1, "Natural gas and propane installation code."

3.1.2. Dangerous Goods

3.1.2.1. Classification

1) Classes and divisions of *dangerous goods* referred to in this Code shall mean

a) their primary and first subsidiary classification as defined in Part 2 of TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)," or

b) the categories and subcategories established by the "Workplace Hazardous Materials Information System (WHMIS)" for controlled

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products determined in Part 7 of HC SOR/2015-17, "Hazardous Products Regulations."

2) Substances classified as miscellaneous *dangerous goods* shall be stored according to the hazard they present based on their properties as *dangerous goods*.

3) For the purposes of this Code, *dangerous goods* classified as flammable liquids shall mean *flammable liquids* and *combustible liquids* as defined in Subsection 4.1.2.

3.1.2.2. Ambient Temperature

1) Ammonium nitrate classified as oxidizers and *dangerous goods* classified as compressed gases shall not be stored in an area where the ambient air temperature is higher than 52°C.

2) *Dangerous goods* shall not be stored in areas where the ambient temperature may cause them to become unstable or susceptible to undesirable reactions.

3) *Dangerous goods* shall be stored in refrigerated areas where such refrigeration is necessary to stabilize the substances.

3.1.2.3. Packages and Containers

1) *Dangerous goods* shall be stored in packages or containers
a) made of materials that are compatible with the product they contain, and
b) of durable construction and designed to resist damage from normal material handling activities.

2) Where the package or container for a specific type of *dangerous goods* is subject to a standard established by a transportation regulatory authority, such package or container shall conform with the applicable standard. (See Note A-3.1.2.3.(2).)

3.1.2.4. Storage Arrangement and Conditions

1) *Dangerous goods* shall be stored in stable piles such that they will not collapse under normal operating conditions.

2) In addition to the provisions of Article 3.1.2.2., *dangerous goods* shall not be stored in areas where they may be subject to
a) temperature extremes or atmospheric pressure that could cause their containers to become deformed or rupture, or
b) physical impact or temperature extremes that could cause a chemical reaction or chemical instability such that a fire could occur.

3.1.2.5. Compressed Gases

1) Cylinders and tanks of *dangerous goods* classified as compressed gases shall be protected against mechanical damage.

2) Cylinders of *dangerous goods* classified as compressed gases that are in storage shall be
a) protected against valve damage (see Note A-3.1.2.5.(2)(a)), and
b) firmly secured in a position that will not interfere with the operation of the cylinder valve assembly.

3) Cylinders of *dangerous goods* classified as compressed gases shall be transported in devices designed to provide restraint against movement in any direction.

4) Except for portable fire extinguishers, cylinders of *dangerous goods* classified as compressed gases shall not be stored
a) in any *exit* or corridor providing *access to exits*,
b) under any fire escape, outside *exit* stair, passage or ramp, or
c) within 1 m of any *exit*.

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3.1.2.6. Reactive Materials

(See Note A-3.1.2.6.)

1) Reactive materials shall be stored based on their properties when classified as *dangerous goods*.

2) Reactive materials that are unstable and susceptible to reactions, such as polymerization, or self-accelerating decomposition initiated by heat, shock, vibration, light, an increase in pressure, or sound waves, shall be stored in a location and manner that will prevent the undesired reaction.

3) Reactive materials that may react with water or humidity shall be stored in sealed containers in a dry location.

4) Reactive materials that ignite spontaneously in air shall be stored in a liquid that is inert to the material, in an inert atmosphere or in sealed containers.

5) For the purposes of this Code, unstable *dangerous goods* shall be considered as reactive materials based on their reactive properties.

3.1.2.7. Fire Safety Plan

1) A fire safety plan conforming to Section 2.8. shall be prepared.

3.1.3. Industrial Trucks

3.1.3.1. Industrial Trucks

1) Except as provided in Sentences (2) and (3), the designation, use, maintenance and operation of industrial trucks shall conform to NFPA 505, "Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations."

2) Fuel-fired industrial trucks shall conform to ULC/ORD-C558, "Guide for the Investigation of Internal Combustion Engine-Powered Industrial Trucks."

3) Battery-powered industrial trucks shall conform to ULC/ORD-C583, "Guide for the Investigation of Electric Battery Powered Industrial Trucks."

3.1.3.2. Fuel-Fired Industrial Trucks

1) Fuel-fired industrial trucks shall be stored
a) in detached *buildings*,
b) in areas separated from the remainder of the storage area by a *fire separation* having a *fire-resistance rating* of not less than 1 h, or
c) in areas where the vehicles will not create a fire hazard to the storage area.

2) Except as provided in Sentence (3), fuel-fired industrial trucks shall be refuelled only at designated locations outside *buildings*.

3) Fuel-fired industrial trucks that are fuelled by replaceable propane cylinders are permitted to have their cylinders replaced indoors, provided
a) cylinder replacement is done at a safe location that is at least 7.5 m from ignition sources, open pits and underground entrances,
b) the cylinders' valves are closed,
c) when an automatic quick-closing coupling that closes in both directions when uncoupled is not provided, the engine is operated until the fuel in the system is consumed, and
d) spare propane cylinders are stored in conformance with Subsection 3.3.5.

4) Each fuel-fired industrial truck shall be equipped with at least one portable extinguisher having a minimum rating of 2-A:30-B:C.

3.1.3.3. Battery-Powered Industrial Trucks

1) Battery-charging installations for battery-powered industrial trucks shall be located
a) at least 1.5 m from combustible materials,

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b) when serving more than 2 trucks, in well ventilated areas,
c) in areas where flammable gases or vapours, *combustible dusts* or *combustible fibres* are not present in hazardous quantities, and
d) in areas where precautions are taken to prevent ignition sources, such as open flames, sparks or electric arcs.

2) Battery-charging installations for battery-powered industrial trucks shall be equipped with at least one portable extinguisher having a minimum rating of 2-A:30-B:C.

3.1.3.4. Training

1) Only trained and authorized personnel shall be permitted to
a) operate industrial trucks,
b) replace or refuel propane cylinders for fuel-fired industrial trucks,
c) refuel fuel-fired industrial trucks, or
d) charge batteries for battery-powered industrial trucks.

3.1.4. Electrical Installations

3.1.4.1. Hazardous Locations

1) Where wiring or electrical equipment is located in areas in which flammable gases or vapours, *combustible dusts* or *combustible fibres* are present in quantities sufficient to create a hazard, such wiring and electrical equipment shall conform to Sentence 3.3.6.2.(4) of Division B of the NBC(AE).

Section 3.2. Indoor Storage

3.2.1. Scope

3.2.1.1. Application

1) Except as permitted in Sentence (2), this Section shall apply to *buildings* or parts of *buildings* used for the storage of the following products:
a) Class I, II, III and IV commodities, and Group A, B and C plastics, as defined in NFPA 13, "Standard for the Installation of Sprinkler Systems" (see Note A-3.2.1.1.(1)(a)),
b) rubber tires and *combustible fibres*,
c) packaged Level 1, 2 and 3 aerosols, as described in Subsection 3.2.5.,
d) *dangerous goods* in packages or containers, as covered in Subsection 3.2.7., or
e) *closed containers* of *distilled beverage alcohols*.

(See Note A-3.2.1.1.(1).)

2) High *rack* storage warehouses with storage heights greater than 13 m, where conditions exist that must be addressed by design and operational details specific to the hazard, need not conform to this Section, where alternative protection is provided in conformance with Article 1.2.1.1. of Division A.

3.2.2. General

3.2.2.1. Application

1) Unless otherwise specified, this Subsection shall apply to the indoor storage of any product covered in this Section.

3.2.2.2. Access Aisles

(See Note A-3.2.2.2.)

1) Adequate access for firefighting purposes shall be provided and maintained to all portions of the storage area.

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2) Access aisles not less than 1.0 m wide shall be provided to fire department access panels and to fire protection equipment.

3) Aisles shall be maintained free of obstruction.

4) A storage room or area that is greater than 100 m² shall be provided with at least one main aisle conforming to Sentences (5) to (8).

5) Except as permitted in Sentence (6), main access aisles shall have a minimum width of

a) 2.4 m for storage heights of not more than 6 m, and
b) 3.6 m for storage heights of more than 6 m.

6) The width of main access aisles referred to in Sentence (5) need not exceed 2.4 m where the products are stored in *racks* and the *building* is *sprinklered*.

7) Main access aisles shall extend

a) the length of the storage area where only one main access aisle is provided, or
b) the length or width of the storage area where 2 or more main access aisles are provided.

8) Main access aisles shall be accessible from at least 2 fire department access points, which shall be located such that, in the event one becomes unusable due to fire, the other will still allow emergency responders to access the *building*.

3.2.2.3. Clearances

1) Wall clearances of not less than 600 mm shall be maintained where stored products may swell or expand with the absorption of water.

2) In *buildings* that are not *sprinklered*, a clearance of not less than 1 m between the top of storage and the underside of the floor or roof deck shall be maintained. (See Note A-3.2.2.3.(2).)

3) If the top of storage in piles, on shelves, in bin boxes or on *racks* is above the lower chords of floor or roof structural framing members, a clear space of not less than 300 mm shall be maintained between the storage and the structural members.

4) In *sprinklered buildings*, the clearance between the top of storage and ceiling sprinkler deflectors shall conform to the standard used to design the sprinkler system.

5) Clearance between stored products and ducts of exhaust ventilation systems shall be maintained in conformance with NFPA 91, "Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids." (See Note A-3.2.2.3.(5).)

3.2.2.4. Combustible Pallets

1) Except as permitted in Sentences (2) and (3), combustible pallets shall be stored outdoors in conformance with Section 3.3.

2) Indoor storage of combustible pallets is permitted in a *building* that is not *sprinklered*, provided

a) the height of storage of combustible pallets is not more than 1.2 m,
b) the width of an *individual storage area* is not more than 7.5 m, and
c) the aggregate area of storage is not more than
   i) 100 m² for wood or solid deck non-expanded polyethylene pallets, or
   ii) 50 m² for plastic pallets not designated in Subclause (c)(i).

3) In a *sprinklered building*, the storage of combustible pallets is permitted to exceed the values stated in Sentence (2), provided such storage conforms to NFPA 13, "Standard for the Installation of Sprinkler Systems." (See Note A-3.2.2.4.(3).)

3.2.2.5. Fire Safety Plan

1) A fire safety plan conforming to Section 2.8. and Sentence (2) shall be prepared.

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2) The storage method and maximum height of storage as established in the fire safety plan in accordance with Clauses 2.8.2.4.(2)(b) and (c) shall be posted in the storage area.

3) Signs required in Sentence (2) shall have
a) a minimum dimension of 200 mm, and
b) letters not less than 25 mm high.

3.2.2.6. Smoking

1) Except as provided in Subsection 2.4.2., smoking shall not be permitted in an indoor storage area.

3.2.2.7. Storage Arrangements

1) The maximum permitted height of storage in any *individual storage area* shall be determined according to
a) its base area and shape, and the stability of the stored products, and
b) the height limitations otherwise set in this Section.

3.2.3. General Indoor Storage

3.2.3.1. Application

1) This Subsection applies to the indoor storage of Class I to IV commodities, Group A, B or C plastics, and *closed containers* of *distilled beverage alcohol*, in solid piles, on pallets, on shelves or in bin boxes or *racks*.

2) When *flammable liquids* or *combustible liquids* are stored with products covered by this Subsection, the liquids shall meet the requirements of the applicable provisions of Part 4.

3.2.3.2. Individual Storage Areas

1) Except as provided in Sentence (2), the size of *individual storage areas* shall not exceed the limits shown in Table 3.2.3.2.

2) In a *sprinklered building*, the height of storage in *racks* is permitted to exceed the limits shown in Table 3.2.3.2. (See Note A-3.2.3.2.(2).)

Table 3.2.3.2.
Size Limits for Individual Storage Areas
Forming Part of Sentences 3.2.3.2.(1) and (2) and Clause 3.2.7.5.(1)(c)

Product Classification	*Buildings* that are not *Sprinklered*		*Sprinklered Buildings*	
	Area, m^2	Height of Storage, m	Area, m^2	Height of Storage, m
Class I commodities	500	6.5	1 500	9.0
Class II commodities	500	6.5	1 500	9.0
Class III commodities, Group C plastics	250	4.5	1 000	9.0
Closed containers of *distilled beverage alcohol*	250	4.5	1 000	9.0
Class IV commodities, Group B plastics	250	3.6	1 000	9.0
Group A plastics	250	1.5	500	6.1

3.2.3.3. Sprinkler Systems

1) Except as provided in Sentence (2), where a sprinkler system is required to accommodate *individual storage areas* referred to in Article 3.2.3.2., the sprinkler system shall be designed and installed in conformance with NFPA 13, "Standard for the Installation of Sprinkler Systems."

2) For *closed containers* of *distilled beverage alcohol*, the sprinkler system referred to in Sentence (1) shall be designed in conformance with good engineering practice. (See Note A-3.2.3.3.(2).)

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3.2.4. Indoor Tire Storage

3.2.4.1. Application

1) This Subsection shall apply to *buildings* or parts of *buildings* used for the storage of rubber tires.

3.2.4.2. Fire Separations

1) A tire storage area designed to contain more than 375 m^3 of rubber tires shall be separated from the remainder of the *building* by a *fire separation* conforming to Article 3.3.6.5. of Division B of the NBC(AE). (See Note A-3.2.4.2.(1).)

3.2.4.3. Sprinkler Protection

1) *Buildings* regulated by this Subsection shall be *sprinklered* in conformance with NFPA 13, "Standard for the Installation of Sprinkler Systems," whenever

a) the aggregate of *individual storage areas* in the *building* exceeds 500 m^2,
b) any *individual storage area* exceeds 250 m^2, 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^3.

3.2.4.4. Portable Extinguishers

1) In addition to the requirements of Part 2, multi-purpose dry chemical portable extinguishers having a rating of 4-A:80-B shall be installed

a) in every 500 m^2 of *floor area*, and
b) so that the travel distance to any extinguisher does not exceed 25 m.

3.2.5. Indoor Storage of Aerosol Products

3.2.5.1. Application

1) This Subsection shall apply to the indoor storage of packaged aerosol products as classified in Article 3.2.5.2. (See Note A-3.2.5.1.(1).)

3.2.5.2. Classification

1) For the purposes of this Subsection, aerosol products shall be classified as Level 1, 2 or 3 in conformance with NFPA 30B, "Code for the Manufacture and Storage of Aerosol Products." (See Note A-3.2.5.2.(1).)

3.2.5.3. Level 1 Aerosols

1) Packaged Level 1 aerosol products shall be protected as required for Class III commodities, in both palletized and *rack* storage, in conformance with Article 3.2.3.2.

3.2.5.4. Level 2 and 3 Aerosols

1) The storage of packaged Level 2 and 3 aerosol products shall conform to Table 3.2.5.4. and Articles 3.2.5.5. to 3.2.5.8.

2) Where storage of packaged aerosol products is mixed, protection shall be provided for the most hazardous classification present.

Table 3.2.5.4.
Maximum Amount of Packaged Level 2 and 3 Aerosol Products, kg(1)
Forming Part of Sentences 3.2.5.4.(1) and 3.2.5.5.(2)

Product Classification	Type of Dedicated Area Required					
	Buildings that are not *Sprinklered*			*Sprinklered Buildings*		
	None	A(2)	B(3)	None	A(2)	B(3)
Levels 2 and 3	1 000	5 000	10 000	10 000	50 000	No Limit

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Table 3.2.5.4. (Continued)

Notes to Table 3.2.5.4.:

(1) One pallet load of packaged aerosols is approximately 1 000 kg.
(2) See Article 3.2.5.6.
(3) See Article 3.2.5.7.

3.2.5.5. Sprinkler Systems

1) Where a sprinkler system is required to accommodate the storage limits in Sentence 3.2.5.4.(1), the sprinkler system shall be designed and installed in conformance with Article 3.2.3.3., with additional sprinkler protection provided in conformance with NFPA 30B, "Code for the Manufacture and Storage of Aerosol Products," for areas in which packaged aerosol products are stored.

2) Where the sprinkler system required to accommodate the storage limits in Sentence 3.2.5.4.(1) does not conform to Sentence (1), the storage of packaged Level 2 or 3 aerosol products shall conform to Table 3.2.5.4. for *buildings* that are not *sprinklered*.

3.2.5.6. Type A Dedicated Areas

1) Where a Type A dedicated storage area is required to accommodate the storage limits stated in Sentence 3.2.5.4.(1), it shall be separated from the remainder of the *building* by chain link fencing or a noncombustible *partition* that is capable of withstanding the impact of rocketing cans and that extends to the underside of the roof deck or to the ceiling which must also be capable of withstanding the impact of rocketing cans.

2) Chain link fencing referred to in Sentence (1) shall be not lighter than 2.9 mm steel wire woven into a 50 mm diamond mesh.

3.2.5.7. Type B Dedicated Areas

1) Where a Type B dedicated storage area is required to accommodate the storage limits in Sentence 3.2.5.4.(1), it shall be separated from the remainder of the *building* by *partitions*

a) having not less than a 1 h *fire-resistance rating*,
b) capable of withstanding the impact of rocketing cans, and
c) extending to the underside of the roof or to a ceiling of construction equivalent to the *partitions*.

3.2.5.8. Storage Height

1) Except as provided in Sentence (2), the height of storage of packaged Level 2 or 3 aerosols shall be not greater than

a) 1.75 m where products are in solid piles or on pallets, or
b) 6.1 m where products are on *racks*.

2) Where the *building* is *sprinklered* in conformance with Article 3.2.5.5., and an enclosure conforming to Articles 3.2.5.6. or 3.2.5.7. is provided, the height of storage of packaged Level 2 or 3 aerosols shall be not greater than

a) 6.1 m where products are in solid piles or on pallets, or
b) the height limit determined by the design capacity of the sprinkler system where products are on *racks*.

3.2.5.9. Aisles

1) Aisles separating *racks*, shelves, or piles of packaged Level 2 or 3 aerosol products shall be not less than 2.4 m wide.

3.2.6. Indoor Storage of Combustible Fibres

3.2.6.1. Application

1) This Subsection shall apply to the storage of *combustible fibres* inside *buildings*.

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3.2.6.2. Building Construction

1) *Buildings* or parts thereof used for the storage of baled *combustible fibres* shall conform to Article 3.1.2.6. of Division B of the NBC(AE).

3.2.6.3. Loose Combustible Fibres

1) Up to 3 m^3 of loose *combustible fibres* are permitted to be kept in a *fire compartment* provided they are stored in metal-lined bins equipped with self-closing metal-lined covers.

2) Quantities of loose *combustible fibres* exceeding 3 m^3 but not exceeding 15 m^3 shall be stored in rooms separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

3) Quantities of loose *combustible fibres* exceeding 15 m^3 but not exceeding 30 m^3 shall be stored in rooms separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

4) Quantities of loose *combustible fibres* that exceed 30 m^3 shall be stored in an individual room

a) that is *sprinklered* in conformance with NFPA 13, "Standard for the Installation of Sprinkler Systems,"
b) that is separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 2 h, and
c) except as provided in Sentence (5), with *individual storage areas* not exceeding the design area of the sprinkler system.

5) The *individual storage areas* for loose *combustible fibres* described in Sentence (4) shall not exceed 250 m^2.

3.2.6.4. Baled Combustible Fibres

1) Except as permitted in Sentences (2), (3) and (4), baled *combustible fibres* shall be stored so that

a) no *individual storage area* exceeds 250 m^2,
b) the height of storage in an *individual storage area* does not exceed 4.5 m,
c) subsidiary aisles within *individual storage areas* are not less than 1 m wide, and
d) the clearance between piles and *building* walls is not less than 1 m.

2) Except as permitted in Sentence (4), where baled *combustible fibres* are stored in *sprinklered buildings*, the maximum area of any *individual storage area* shall be 500 m^2.

3) Where baled raw pulp is stored in a *building* that is not *sprinklered*,

a) the maximum area of any *individual storage area* shall be 500 m^2, and
b) the maximum height of storage shall be 6 m.

4) Where baled raw pulp is stored in a *sprinklered building*,

a) the maximum area of any *individual storage area* shall be 1 000 m^2, and
b) the maximum height of storage shall be 6 m.

5) The sides of baled storage piles shall be inclined back from the base of the pile with a slope of not less than 1 m for each 10 m of height.

3.2.6.5. Heating Equipment

1) Unless the use of fuel-fired *appliances* and electrical heating elements is controlled in a manner such that they will not create a fire or explosion hazard, they shall not be permitted in a storage area for *combustible fibres*.

2) Shields shall be provided that will prevent stored material from coming within 300 mm of any part of a heating system's heat distribution network.

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3.2.7. Indoor Storage of Dangerous Goods

3.2.7.1. Application

1) Except as provided in Sentence (2) and Part 4 and except as otherwise specified in this Code, this Subsection applies to *buildings* or parts of *buildings* where *dangerous goods* in packages or containers are stored in a single *fire compartment*.

2) Where the amount of stored *dangerous goods* referred to in Sentence (1) does not exceed the amount stated in Column C of Table 3.2.7.1., it shall be exempted from the requirements of this Subsection.

3) Where a product has multiple classes, the applicable small quantity exemption referred to in Sentence (2) shall be determined using

a) Column A of Table 3.2.7.1. based on the class having precedence, as established in Section 2.8 of TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR),"
b) Column B of Table 3.2.7.1. based on the class having precedence, as established in Table A-3.2.7.1.(3)(b), for controlled products under the "Workplace Hazardous Materials Information System (WHMIS)" as classified in Part 7 of HC SOR/2015-17, "Hazardous Products Regulations" (see Note A-3.2.7.1.(3)(b)), or
c) when the class having precedence cannot be established, Column C of Table 3.2.7.1. based on the lesser of the two small quantity exemptions.

(See Note A-3.2.7.1.(3).)

Table 3.2.7.1.
Small Quantity Exemptions for Dangerous Goods
Forming Part of Sentences 3.2.7.1.(2) and (3), 3.2.7.18.(2), and 3.3.4.1.(2) and (3)

NFC Class	Column A		Column B	Column C
	TDG Class[1]		WHMIS Class[2]	Maximum Exempt Amount of Stored Product
Explosives	1	Explosives	—	See Article 3.1.1.3.
Compressed Gases	2	Gases	A	
flammable gases/aerosols		Division 1[3] flammable gases	B1	25 kg[4]
			B5	See Subsection 3.2.5.
non-flammable, non-toxic gases		Division 2 non-flammable, non-toxic gases	A	150 kg
oxidizing gases		Division 2 with subsidiary Class 5.1	A+C	75 kg[4]
toxic gases		Division 3[5] toxic gases	A+D1 A+D2 A+E	0
Flammable Liquids	3	Flammable Liquids	B2	See Part 4
			B3	
Flammable Solids	4	Division 1 flammable solids	B4	100 kg[6]
Pyrophoric Materials		Division 2 substances liable to spontaneous combustion	—	50 kg
Water-Reactive Substances		Division 3 water-reactive substances	B6	
Oxidizing Substances[7]	5	Oxidizing Substances and Organic Peroxides	—	
oxidizers		Division 1 oxidizing substances[8] Packing Group I Packing Group II Packing Group III	—	250 kg or 250 L
organic peroxides		Division 2 organic peroxides	C[9]	100 kg or 100 L

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Table 3.2.7.1. (Continued)

NFC Class	Column A		Column B	Column C
	TDG Class[1]		WHMIS Class[2]	Maximum Exempt Amount of Stored Product
Toxic and Infectious Substances		Toxic and Infectious Substances	D	
		Division 1 toxic substances[8]	—	
		Packing Group I	D1A	0
toxic substances	6	Packing Group II	D1B	100 kg or 100 L
		Packing Group III	D2A D2B	1 000 kg or 1 000 L
infectious materials		Division 2 infectious substances	D3	0
Radioactive Materials	7	Radioactive Materials	—	See Article 3.1.2.6.
Corrosives	8	Corrosives[8]	—	
		Packing Group I		500 kg or 500 L
		Packing Group II	E	1 000 kg or 1 000 L
		Packing Group III		2 000 kg or 2 000 L
Miscellaneous *Dangerous Goods*	9	Miscellaneous Products, Substances or Organisms	—	See Article 3.1.2.1.[10]
Dangerously Reactive Materials	—	—	F	0

Notes to Table 3.2.7.1.:

(1) The numbers refer to the class and division of *dangerous goods* as defined in TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)."

(2) The categories and subcategories in the "Workplace Hazardous Materials Information System (WHMIS)" refer to controlled products classified in Part 7 of HC SOR/2015-17, "Hazardous Products Regulations." See Note A-Table 3.2.7.1.

(3) See Article 3.2.8.2.

(4) See Note A-3.2.8.2.(2).

(5) See Article 3.2.8.3.

(6) 50 kg for nitrocellulose-based products; 10 kg for "strike anywhere" matches.

(7) "Oxidizing substances" refers to solids or liquids, not gases.

(8) The TDGR define "packing group" as "a group in which dangerous goods are included based on the inherent danger of the dangerous goods." Packing Group I products are more hazardous than Packing Group III products.

(9) Class C in the WHMIS applies to oxidizing materials. Oxidizers do not usually self-combust but they will feed a fire by supplying oxygen or cause other materials to suddenly ignite. Oxidizers exist in all three states: gas (oxygen, ozone), liquid (nitric acid, perchloric acid solutions) and solid (potassium permanganate, sodium chlorite). Some oxidizers, such as the organic peroxide family, have both combustibility and oxidizing properties, which means they can have strong reactions that can result in an explosion.
The exempt amount listed for oxidizing materials in this Table applies to two categories of oxidizers based on the TDGR classification: oxidizing substances and organic peroxides. Since the WHMIS does not have a corresponding classification for these two categories of oxidizers, it was decided that the exempt amount applicable to Class C should be the more stringent one, thus reducing the potential that large quantities of oxidizing materials with combustibility properties will be stored without implementing the applicable safety measures in Subsection 3.2.7.

(10) Small quantity exemptions may be determined by other authorities such as the TDGR, the WHMIS and environmental protection legislation.

3.2.7.2. Ignition Sources

1) Heating *appliances* shall not be permitted in a *fire compartment* used for the storage of *dangerous goods* classified as flammable gases, flammable liquids, flammable solids, pyrophoric materials, water-reactive substances, oxidizers or organic peroxides, unless they are installed in a manner that will not create a fire or explosion hazard.

2) Smoking shall not be permitted within a *fire compartment* used for the storage of *dangerous goods* and signs shall be posted in conformance with Article 2.4.2.2.

3) Except as provided in Subsection 3.1.3. and in Section 5.2., open flames and spark-producing devices shall not be used in an area where *dangerous goods* are stored. (See Note A-4.1.5.2.(1).)

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3.2.7.3. Ambient Conditions

1) Rooms or parts of *buildings* used for the storage of *dangerous goods*
a) shall be dry and cool, and
b) where the products being stored are capable of releasing flammable or toxic gases or vapours under normal ambient conditions, shall be provided with a ventilation system to exhaust such gases or vapours outdoors to an area where they will not return to the *building* (see Note A-3.2.7.3.(1)(b)).

3.2.7.4. Housekeeping

1) Areas where *dangerous goods* are stored shall be kept free of waste packaging materials, debris of any kind, or any spilled product.

2) Broken packages or containers of *dangerous goods* shall be moved to a safe location and the product repackaged and labelled as soon as possible.

3.2.7.5. Storage Arrangements

1) The method of storage of *dangerous goods* shall
a) be determined to ensure the physical and chemical stability of the stored products,
b) except as provided in Sentences (2) and (5), not exceed the maximum heights of storage shown in Table 3.2.7.5., and
c) not exceed the maximum base areas for *individual storage areas* shown in Table 3.2.3.2. (see Note A-3.2.7.5.(1)(c)).

2) Storage heights for a protected storage area stated in Table 3.2.7.5. are permitted to be exceeded provided the *dangerous goods* are stored on *racks* or shelves.

3) When a storage area is required by this Article to be protected, it shall be *sprinklered* or protected with a special fire suppression system, in conformance with Part 2 and good engineering practice with respect to specific *dangerous goods*. (See Note A-3.2.7.9.(1).)

4) Stored *dangerous goods* other than compressed gases shall be kept not less than 100 mm above the floor level.

5) *Flammable liquids* and *combustible liquids* shall be stored in conformance with Part 4.

Table 3.2.7.5.
Storage Height Limits for Dangerous Goods, m
Forming Part of Sentences 3.2.7.5.(1) and (2)

Packing Group(1)	Unprotected Storage	Protected Storage
Packing Group I	1.8	2.4
Packing Group II	2.4	4
Packing Group III	4.5	6

Notes to Table 3.2.7.5.:
(1) See Table 3.2.7.1.

6) Except as permitted in Table 3.2.7.6., solid and liquid *dangerous goods* classified as oxidizers or organic peroxides shall be separated from the remainder of the *building* in conformance with Sentence 3.3.6.2.(1) of Division B of the NBC(AE).

7) Reactive materials shall be separated from the remainder of the *building* in conformance with Sentence 3.3.6.2.(2) of Division B of the NBC(AE).

8) Packages or containers of *dangerous goods* classified as organic peroxides shall not be opened, or the product dispensed, in the same area where it is stored.

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9) Except where the width of storage of *dangerous goods* is not more than 1.5 m, measured out from the wall, wall clearances of not less than 400 mm shall be maintained.

3.2.7.6. Separation from Other Dangerous Goods

1) Except as required in Sentences (3) and (4), Clause 3.2.8.2.(1)(g) and Sentence 3.2.8.3.(2), *dangerous goods* shall be separated from other *dangerous goods* in conformance with Table 3.2.7.6.

2) The *fire-resistance rating* of the *fire separations* delimiting each *fire compartment* shall be determined in accordance with the applicable requirements of the Code. (See Note A-3.2.7.6.(2).)

3) In addition to the separation requirements in Sentence (1), *dangerous goods* shall be stored in conformance with the information provided in the Safety Data Sheet for the specific *dangerous good*. (See Note A-3.2.7.6.(3).)

4) *Flammable liquids*, *combustible liquids* and *dangerous goods* classified as corrosives shall not be stored with *dangerous goods* classified as radioactive materials in quantities or in a manner that would constitute an undue risk in the event of a fire.

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Table 3.2.7.6.
Separation Chart for Storage of Dangerous Goods(1)(2)
Forming Part of Sentences 3.2.7.5.(6), 3.2.7.6.(1), 3.2.7.9.(2), 3.3.4.3.(2) and 4.2.2.3.(2)

NFC Class			Flammable Gases/ Aerosols	Non-flammable, Non-toxic Gases	Oxidixing Gases	Toxic Gases	*Flammable Liquids*	Flammable Solids	Pyrophoric Materials	Water-reactive Substances	Oxidizers	Organic Peroxides	Toxic Substances/ Infectious Materials	Corrosives		Dangerously Reactive Materials
	TDG Class(3)		2.1	2.2	2.2(5.1)	2.3	3	4.1	4.2	4.3	5.1	5.2	6	8		–
		WHMIS Class(4)	B1, B5	A	A+C	A+D, A+E	B2, B3	B4	—	B6	—	C	D	E		F
														Acid(5)	Base(6)	
Dangerously Reactive Materials	—	F	X	X	X	X	X	X	X	X	X	X	X	X	X	P
Corrosives	8	E Acid(5)	X	P	X	1m	1m	1m	1m	X	X	X	1m	P	1m	X
		E Base(6)	X	P	1m	1m	1m	1m	1m	X	1m	1m	1m	1m	P	X
Toxic Substances/ Infectious Materials	6	D	X	P	1m	DS	DS	DS	DS	DS	1m	X	P	1m	1m	X
Organic Peroxides	5.2	C	X	P	X	X	X	X	X	X	X	P	X	X	1m	X
Oxidizers	5.1	—	X	P	P	1m	X	X	X	X	P	X	1m	X	1m	X
Water-reactive Substances	4.3	B6	DS	P	X	DS	1m	DS	DS	P	X	X	DS	X	X	X
Pyrophoric Materials	4.2	—	1m	P	X	1m	1m	1m	P	DS	X	X	DS	1m	1m	X
Flammable Solids	4.1	B4	P	P	X	1m	P	P	1m	DS	X	X	DS	1m	1m	X
Flammable Liquids	3	B2, B3	P	P	X	X	P	P	1m	1m	X	X	DS	1m	1m	X
Toxic Gases	2.3	A+D, A+E	X	P	1m	P	X	1m	1m	DS	1m	X	DS	1m	1m	X
Oxidizing Gases	2.2(5.1)	A+C	X	P	P	1m	X	X	X	X	P	X	1m	X	1m	X
Non-flammable, Non-toxic Gases	2.2	A	P	P	P	P	P	P	P	P	P	P	P	P	P	X
Flammable Gases/Aerosols	2.1	B1, B5	P	P	X	X	P	P	1m	DS	X	X	X	X	X	X

Notes to Table 3.2.7.6.:

(1) For the purpose of this Table:

- If a *dangerous good* has both a TDG Class and a WHMIS Class, the TDG Class shall apply.
- If two *dangerous goods* each have a TDG Class with or without a WHMIS Class, the TDG Class shall apply.
- If two *dangerous goods* each have a WHMIS Class but no TDG Class, the WHMIS Class shall apply.
- If a *dangerous good* has more than one WHMIS Class, the Class having precedence shall be determined using Table A-3.2.7.1.(3)(b).
- If one *dangerous good* has a WHMIS Class but no TDG Class and another *dangerous good* has a TDG Class but no WHMIS Class, the TDG Class and the WHMIS Class in combination shall apply.

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Table 3.2.7.6. (Continued)

(2) Definitions for entries in this table:

X = incompatible *dangerous goods*: these goods shall be stored in separate *fire compartments*.
1m = incompatible *dangerous goods*: these goods shall be separated by a horizontal distance of not less than 1 m.
P = permitted *dangerous goods*: these goods are permitted to be stored close together.
DS = refer to Safety Data Sheet for these *dangerous goods*. See Note A-Table 3.2.7.6.
A+C = controlled products of Class A combined with C
A+D = controlled products of Class A combined with D
A+E = controlled products of Class A combined with E
B2, B3 = controlled products of Class B2 or B3
B1, B5 = controlled products of class B1 or B5

(3) The numbers refer to the classes and divisions of *dangerous goods* as defined in TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)."

(4) The letters and numbers refer to the categories and subcategories of controlled products under the "Workplace Hazardous Materials Information System (WHMIS)" as classified in Part 7 of HC SOR/2015-17, "Hazardous Products Regulations." See Note A-Table 3.2.7.1.

(5) Acid: corrosive materials with a pH below 2 according to the Safety Data Sheet. See Note A-Table 3.2.7.6.

(6) Base: corrosive materials with a pH above 11.5 according to the Safety Data Sheet. See Note A-Table 3.2.7.6.

3.2.7.7. Corrosion Protection

1) Measures shall be taken to prevent or minimize corrosion or deterioration of shelving, *racks*, and piping system components due to contact with stored *dangerous goods*.

3.2.7.8. Flooring Materials

1) Floors in areas where *dangerous goods* are stored shall be
a) constructed in conformance with Sentence 3.3.6.7.(1) of Division B of the NBC(AE), and
b) maintained as an impervious membrane.

2) *Dangerous goods* classified as oxidizers or organic peroxides shall not be stored on combustible floors or platforms.

3.2.7.9. Fire Suppression Systems

1) Except as permitted in Sentences (2) and (3) and in Part 4, *buildings* used for the storage of *dangerous goods* regulated by this Subsection shall be equipped throughout with a sprinkler system or other fire suppression system, designed in conformance with Part 2 and good engineering practice with respect to specific *dangerous goods*. (See Note A-3.2.7.9.(1).)

2) *Buildings* described in Sentence (1) need not be equipped throughout with a sprinkler system or other fire suppression system, provided that
a) the sum of *individual storage areas* in the *building* used for the storage of *dangerous goods*, other than substances classified as miscellaneous *dangerous goods* with no other class and those covered in Part 4, does not exceed 100 m^2, and
b) the *dangerous goods* are
   i) separated in conformance with Table 3.2.7.6., and
   ii) stored in *fire compartments* separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

3) *Buildings* described in Sentence (1) need not be equipped throughout with a sprinkler system or other fire suppression system, provided that storage consists only of *dangerous goods* classified as non-flammable, non-toxic gases with no subsidiary class of oxidizing substances.

3.2.7.10. Smoke Venting

1) Where the collective *individual storage areas* for *dangerous goods* exceed 10 m^2 in a *fire compartment*, means shall be provided for manual or automatic venting of smoke and toxic gases from the storage area under fire conditions. (See Note A-3.2.7.10.(1).)

3.2.7.11. Spill Control

1) Measures to control spilled liquid or solid *dangerous goods* shall be provided in conformance with Subsection 4.1.6.

2) Materials or liquids used in the cleanup of spills and leakages of *dangerous goods* shall be
a) compatible and non-reactive with the *dangerous goods* being cleaned up, and
b) disposed of in conformance with Subsection 4.1.6.

3.2.7.12. Fire Department Access

1) Except as provided in Sentences (2) and (3), fire department access to *buildings* described in Article 3.2.7.1. shall be in conformance with Section 2.5.

2) Where the collective *individual storage area* for *dangerous goods* exceeds 10 m^2, *buildings* regulated by Sentence (1) shall be accessible to fire department vehicles from at least 2 sides for the purpose of firefighting. (See Note A-3.2.7.12.(2).)

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3) In *buildings* regulated by Sentence (1), access openings to each *storey* provided in conformance with the NBC(AE) shall be not less than 750 mm wide by 1 100 mm high. (See Note A-3.2.7.12.(3).)

3.2.7.13. Labels

1) Products classified as *dangerous goods* shall display appropriate identifying labels from the time they enter a facility until they are issued as finished products or waste material. (See Note A-3.2.7.13.(1).)

3.2.7.14. Placards

1) *Individual storage areas* used for the storage of *dangerous goods* and laboratories where *dangerous goods* are used shall be clearly designated as such by posted placards conforming to TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)," and Sentences (2) to (4). (See Note A-3.2.7.14.(1).)

2) Where the *dangerous goods* identified in Sentence (1) consist of a single product, only the UN number need be posted.

3) Where the *dangerous goods* identified in Sentence (1) consist of multiple products within the same class, the individual class and division placard shall be posted.

4) Where the *dangerous goods* identified in Sentence (1) consist of more than one class of products, a placard for each individual class, or the "Danger" placard shown in TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)," shall be posted at the entrance to the storage area.

5) *Individual storage areas* described in Sentence (1) shall be identified in the fire safety plan as required in Article 2.8.2.4.

3.2.7.15. Training

1) In a *building* regulated by this Subsection, at least one person shall be
a) trained in conformance with Sentence (2),
b) in responsible charge during operating hours, and
c) available to respond to a day or night emergency.

2) The person in responsible charge specified in Sentence (1) shall be trained in the correct procedures for the handling, storing and offering for transport of *dangerous goods* in accordance with
a) the appropriate federal, provincial, or territorial occupational safety and health regulations, or
b) in the absence of regulations mentioned in Clause (a),
   i) TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)," or
   ii) the WHMIS 1988, "Workplace Hazardous Materials Information System (WHMIS)."

3) All employees involved in the storage and handling of *dangerous goods* shall be trained in safe handling procedures and correct responses to an emergency situation.

3.2.7.16. Unauthorized Access

1) An area used for the storage of *dangerous goods* shall be secured against unauthorized access.

3.2.7.17. Separation from Combustible Products

1) Except for Class I commodities, *dangerous goods* shall not be stored in the same *individual storage area* with other products listed in Sentence 3.2.1.1.(1).

3.2.7.18. Storage of Oxidizers in Mercantile Occupancies

1) This Article applies to *mercantile occupancies*.

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2) *Dangerous goods* classified as oxidizers that are located within *mercantile occupancies* in quantities not exceeding those permitted by Table 3.2.7.1. shall be separated from ordinary combustible material by a distance of at least 1 m.

3) A clear space of not less than 2.4 m shall be maintained between the oxidizing substances identified in Sentence (2) and any other *dangerous goods*. (See Note A-3.1.2.6.)

3.2.8. Indoor Storage of Compressed Gases

3.2.8.1. Application

1) Except as provided in Subsection 3.1.1., this Subsection applies to the indoor storage of *dangerous goods* classified as compressed gases.

3.2.8.2. Flammable Gases

1) Except as provided in Sentences (2) and (3), cylinders of *dangerous goods* classified as flammable gases stored indoors shall be located in a room that

a) is separated from the remainder of the *building* in conformance with Sentence 3.3.6.3.(1) of Division B of the NBC(AE),
b) is located on an exterior wall of the *building*,
c) can be entered from the exterior, and whose *closures* leading to the interior of the *building* are in conformance with Sentence 3.3.6.3.(1) of Division B of the NBC(AE),
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, "Standard on Explosion Protection by Deflagration Venting" (see Note A-3.2.8.2.(1)(d)),
e) is provided with natural or mechanical ventilation in conformance with Subsection 4.1.7.,
f) does not contain fuel-fired *appliances* or high-temperature heating elements, and
g) is used for no purpose other than the storage of *dangerous goods* classified as compressed gases.

2) Cylinders of *dangerous goods* classified as flammable, lighter-than-air gases are permitted to be stored outside of a room described in Sentence (1), provided the aggregate capacity per *fire compartment* of expanded gas outside of the room is not more than

a) 60 m^3 in a *building* of *combustible construction* that is not *sprinklered*, and
b) 170 m^3 in a *sprinklered building* or in a *building* of *noncombustible construction*.

(See Note A-3.2.8.2.(2).)

3) The storage of "single-trip" non-refillable cylinders (i.e. TC-39, TC-2P, and TC-2Q) with water capacities of more than 375 g and less than 1.13 kg located within *mercantile occupancies* shall conform to the provisions stipulated in CSA B149.2, "Propane storage and handling code."

3.2.8.3. Indoor Storage of Anhydrous Ammonia and Toxic or Oxidizing Gases

1) Cylinders of anhydrous ammonia or *dangerous goods* classified as toxic or oxidizing gases stored indoors shall be located in a room that

a) is separated from the remainder of the *building* in conformance with Sentence 3.3.6.3.(2) of Division B of the NBC(AE),
b) is located on an exterior wall,
c) can be entered from the exterior, and whose *closures* leading to the interior of the *building* are in conformance with Sentence 3.3.6.3.(2) of Division B of the NBC(AE), and
d) is provided with ventilation to the outdoors.

2) Cylinders of gases described in Sentence (1) shall not be stored in a room containing combustible materials.

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3.2.9. Indoor Storage of Ammonium Nitrate

3.2.9.1. Application

1) This Subsection shall apply to the storage of ammonium nitrate mixtures (Class 5.1 oxidizing substances) in quantities exceeding 1 000 kg inside *buildings*. (See Note A-3.2.9.1.(1).)

2) The requirements of Subsection 3.2.3. regarding Class II commodities shall also apply to bagged storage of ammonium nitrate. (See Note A-3.2.1.1.(1)(a).)

3.2.9.2. Storage Buildings

1) The *occupancy* classification of *buildings* intended for the storage of ammonium nitrate shall conform to Sentence 3.3.6.6.(1) of Division B of the NBC(AE).

2) The height of *buildings* intended for the storage of ammonium nitrate shall conform to Sentence 3.3.6.6.(2) of Division B of the NBC(AE).

3) *Buildings* intended for the storage of ammonium nitrate shall
a) conform to Sentence 3.3.6.6.(3) of Division B of the NBC(AE),
b) have ventilation in conformance with Sentence 3.3.6.6.(4) of Division B of the NBC(AE), and
c) be designed to prevent the ammonium nitrate from coming into contact with *building* materials that may react with it as described in Sentence 3.3.6.6.(6) of Division B of the NBC(AE).

4) All flooring in storage areas shall be constructed of noncombustible materials, as stated in Sentence 3.3.6.6.(5) of Division B of the NBC(AE).

5) *Buildings* used for the storage of ammonium nitrate shall incorporate spatial separation and exposure protection in conformance with Subsection 3.2.3. of Division B of the NBC(AE). (See Note A-3.2.9.2.(5).)

3.2.9.3. Industrial Trucks

1) In addition to the requirements of Subsection 3.1.3., industrial trucks used or stored within *buildings* where ammonium nitrate is also stored shall be maintained so that fuels or hydraulic fluids do not contaminate the ammonium nitrate. (See Note A-3.2.9.3.(1).)

2) Fuel-dispensing operations shall not be carried out in *buildings* where ammonium nitrate is stored.

3) An internal combustion engine shall not be permitted to remain unattended in a *building* where ammonium nitrate is stored, unless the engine is located in an area that will prevent the spread of a fire originating in the engine.

4) Industrial trucks used for the transportation of ammonium nitrate shall be cleaned of remaining material following use.

3.2.9.4. Portable Extinguishers

1) In addition to the requirements of Part 2, pressurized water portable fire extinguishers having a rating of 2-A or larger shall be installed. (See Note A-3.2.9.4.(1).)

Section 3.3. Outdoor Storage

3.3.1. Scope

3.3.1.1. Application

1) Except as permitted in Sentence (2), this Section shall apply to the outdoor storage of the following products:
a) Class III and IV commodities, and Group A, B and C plastics, as described in Section 3.2.,
b) rubber tires,

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c) forest products, including lumber, timber and wood pallets,
d) forest by-products, including wood chips and hogged material (see Note A-3.3.1.1.(1)(d)),
e) manufactured *buildings* (see Note A-3.3.1.1.(1)(e)),
f) wrecked vehicles in salvage yards, and
g) *dangerous goods* in packages or containers, as covered in Subsection 3.3.4.

2) This Section shall not apply to
a) a site where the total storage area is not more than 100 m^2, except
   i) for distance requirements between stored products and a *building*, and
   ii) requirements for *dangerous goods* classified as compressed gases in Subsection 3.3.5.,
b) Class I and II commodities, as classified in Section 3.2.,
c) intermodal shipping containers, except when containing *dangerous goods* (see Note A-3.3.1.1.(2)(c)),
d) buried products and landfill operations,
e) products stored on the roof of a *building*,
f) vehicles in parking areas or parking lots,
g) logs and similar untreated forest products in ranked piles (see Note A-3.3.1.1.(2)(g)), or
h) bulk products, except as described in Clause (1)(d).

3.3.2. General

3.3.2.1. Application

1) Unless otherwise specified, this Subsection shall apply to the outdoor storage of any product covered in this Section.

3.3.2.2. Height

1) The maximum permitted height of any *individual storage area* shall
a) be determined to ensure the physical stability of the stored products under normal circumstances as well as under fire conditions,
b) be determined according to its base area and shape, and the type of packaging, combustibility and chemical reactivity of the stored products, and
c) not exceed the limits specified in Subsections 3.3.3., 3.3.4. and 3.3.6.

3.3.2.3. Individual Storage Areas and Clearances

1) Except as provided in Sentence (2), the size limits and clearances for *individual storage areas* shall conform to Subsections 3.3.3., 3.3.4. and 3.3.6.

2) An outdoor storage area shall be arranged such that there is a clear space of not less than
a) 30 m between stored products and brush or forested areas, and
b) 6 m between stored products and uncontrolled grass or weeds.

3.3.2.4. Storage beneath Power Lines

1) Products covered in this Section shall not be stored beneath electrical power lines.

3.3.2.5. Fire Department Access

1) Except as provided in Sentence (2), an access route constructed in conformance with Subsection 3.2.5. of Division B of the NBC(AE) shall be provided to permit the approach of fire department vehicles to within 60 m travelling distance of any part of an *individual storage area*.

2) Where the total storage area exceeds 6 000 m^2, the access route required in Sentence (1) shall be connected with a public thoroughfare in at least 2 locations.

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3.3.2.6. Fencing

1) An outdoor storage area shall be surrounded by a firmly anchored fence that is
a) substantially constructed to discourage climbing and unauthorized entry,
b) not less than 1.8 m high, and
c) provided with gates that shall be locked when the storage area is not staffed.

2) When in a fire department access route, the gates required in Clause (1)(c) shall be of adequate width and design, and in a location that readily permits the entry of fire department vehicles, in conformance with Article 3.3.2.5. (See Note A-3.3.2.6.(2).)

3.3.2.7. Maintenance

1) Any access route, gateway or clear space required in this Section shall be
a) maintained in conformance with Section 2.5., and
b) kept free of obstructions and piles of snow.

2) Private hydrants, fire department connections and private valves controlling water supplies to fire protection systems shall be
a) maintained in conformance with Part 6, and
b) kept accessible to firefighters and their equipment at all times.

3.3.2.8. Ignition Sources

1) Unless controlled in a manner that will not create a fire hazard, a device, operation or activity that produces open flames, sparks or heat shall not be permitted in an outdoor storage area. (See Note A-4.1.5.2.(1).)

2) Except as provided in Subsection 2.4.2., smoking shall not be permitted in an outdoor storage area.

3) Except as provided in Subsection 2.6.2., the burning of materials in an outdoor storage area shall be performed only in a burner that is
a) designed, constructed and maintained in conformance with good engineering practice, and
b) located not less than 15 m from a *building* or stored products.

3.3.2.9. Fire Safety Plan

1) A fire safety plan conforming to Section 2.8. shall be prepared.

3.3.2.10. Portable Extinguishers

1) Any *building* located in an outdoor storage area shall be provided with portable extinguishers.

2) Each motorized vehicle operating in an outdoor storage area shall be equipped with at least one portable extinguisher having a minimum rating of 2-A:30-B:C.

3.3.2.11. Site Preparation

1) The storage site shall be
a) level, and
b) solid ground or paved with asphalt, concrete or other hard surface material.

3.3.2.12. Fuel Dispensing

1) Except as provided in Sentence (2), the dispensing of *flammable liquids* or *combustible liquids* into the fuel tank of a vehicle shall conform to Section 4.6.

2) A clear space of not less than 6 m shall be maintained between the stored products and fuel dispensers.

3.3.2.13. Spill Control

1) Provision shall be made for the safe drainage and containment of waste oils or *dangerous goods* emptied or escaping from stored products under normal storage conditions or in a fire situation, in conformance with Subsection 4.1.6.

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3.3.2.14. Fire Separation

1) It is permitted to reduce the clear space between *individual storage areas* prescribed in this Section if a noncombustible *fire separation* or a dirt berm, not less than 1.5 times the height of the stored products, is provided.

3.3.2.15. Fire Protection

1) It is permitted to increase the height and size of *individual storage areas* prescribed in this Section if fire extinguishing measures conforming to good engineering practice are provided.

3.3.2.16. Water Supply

1) Except as permitted by Sentence (2), water supplies for firefighting shall be available from

a) a public or private water system, or
b) water supplies that conform to the requirements of NFPA 1142, "Standard on Water Supplies for Suburban and Rural Fire Fighting" (see Note A-3.3.2.16.(1)(b)).

2) Other methods acceptable to the *authority having jurisdiction* are permitted to be used to supply water to a storage area in lieu of the water supplies specified in Sentence (1).

3) The water supply systems shall be capable of supplying water for a period not less than 3 h at a minimum rate of

a) 4 000 L/min if the storage area is less than 600 m^3, or
b) 8 000 L/min if the storage area is equal to or greater than 600 m^3.

4) On-site storage of at least 300 m of 65 mm hose and sufficient nozzles shall be provided if not immediately available from responding public fire departments.

5) Water supply required by Sentences (1) and (2) shall be available so that any part of the storage area can be reached by using not more than 150 m of hose.

3.3.2.17. Hydrant Systems

1) Except as permitted by Sentence (2), where a municipal hydrant system exists and is adjacent to the storage yard, the hydrant system shall be extended into the yard area so that all parts of the yard can be reached by using not more than 60 m of hose.

2) If acceptable to the *authority having jurisdiction*, fire protection is permitted to be provided by municipal *street* hydrants and mobile pumping equipment. (See Note A-3.3.2.17.(2).)

3.3.3. General Outdoor Storage

3.3.3.1. Application

1) This Subsection applies to the outdoor storage of products other than *dangerous goods*.

3.3.3.2. Individual Storage Areas and Clearance

1) Except as provided in Sentences (2) to (4), the size and clearances for *individual storage areas* shall conform to Table 3.3.3.2. (See Note A-3.3.3.2.(1).)

2) Except as permitted in Sentences (3) and (4), a clear space of not less than 15 m shall be maintained between stored products and a *building* on the same property to reduce the risk of fire spreading from the outdoor storage area to the *building*.

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Table 3.3.3.2.
Size and Clearances for Individual Storage Areas (ISA)
Forming Part of Sentence 3.3.3.2.(1)

Product Classification(1)	Max. Base Area, m²	Max. Height of Storage, m	Min. Clear Space Around Each *ISA*, m
Class III and IV commodities, Group A, B and C plastics, lumber, timber, manufactured *buildings*, wrecked vehicles	1 000 1 000	≤ 3 > 3 but ≤ 6	6 twice the height of storage
Wood chips, hogged material	15 000	18	9
Rubber tires,(2) combustible pallets	1 000	3	15

Notes to Table 3.3.3.2.:
(1) See Sentence 3.3.1.1.(1).
(2) See Subsection 3.3.6., Outdoor Storage of Tires.

3) The clearance requirement stated in Sentence (2) is permitted to be waived where
a) the stored products do not consist of wood chips, hogged material, rubber tires or combustible pallets,
b) the exposed wall of the *building* has a *fire-resistance rating* of not less than 2 h, and
c) the stored products are separated from any unprotected wall opening by a horizontal distance of not less than
   i) 3 m on either side of the opening, and
   ii) 6 m perpendicularly in front of the opening.

4) The clearance requirement stated in Sentence (2) is permitted to be waived where an *individual storage area* has a base area not greater than 5 m².

3.3.3.3. Rubber Tires

1) Any access route required in Article 3.3.2.5. shall be located so that a clear space of not less than 6 m is provided between stored rubber tires and the nearest side of the access route.

3.3.4. Outdoor Storage of Dangerous Goods

3.3.4.1. Application

1) Except as provided in Part 4 or otherwise specified in this Code, this Subsection applies to the outdoor storage of *dangerous goods* in packages or containers.

2) The storage of *dangerous goods* in quantities exceeding the maximum exempted amounts stated in Table 3.2.7.1., in a single *individual storage area*, shall conform to this Subsection.

3) Where a product has multiple classes, the applicable small quantity exemption referred to in Sentence (2) shall be determined using
a) Column A of Table 3.2.7.1. based on the class having precedence, as established in Section 2.8 of TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR),"
b) Column B of Table 3.2.7.1. based on the class having precedence, as established in Table A-3.2.7.1.(3)(b), for controlled products under the "Workplace Hazardous Materials Information System (WHMIS)" as classified in Part 7 of HC SOR/2015-17, "Hazardous Products Regulations," or
c) when the class having precedence cannot be established, Column C of Table 3.2.7.1. based on the lesser of the two small quantity exemptions.
(See Note A-3.2.7.1.(3).)

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3.3.4.2. Individual Storage Areas and Clearances

1) An *individual storage area* for *dangerous goods* shall not be greater than 1 000 m².

2) Except for the distance between a *building* and cylinders of *dangerous goods* classified as compressed gases, a clear space of not less than 6 m shall be provided around each *individual storage area* for *dangerous goods*. (See Note A-3.3.3.2.(1).)

3) *Dangerous goods* shall not be stored to a height greater than 6 m.

3.3.4.3. Separation from Other Dangerous Goods

1) Except as provided in Sentences (2) and 3.3.4.8.(1), *dangerous goods* shall be separated from other *dangerous goods* in conformance with Article 3.2.7.6.

2) Incompatible *dangerous goods* that are not allowed in Table 3.2.7.6. to be stored in the same *fire compartment* are permitted to be separated by a minimum horizontal distance of 3 m in lieu of a *fire separation* when in an outdoor storage area.

3.3.4.4. Separation from Combustible Products

1) *Dangerous goods* and other products described in Sentence 3.3.1.1.(1) shall not be stored in the same *individual storage area*.

3.3.4.5. Identification

1) The outdoor storage of *dangerous goods* shall conform to Articles 3.2.7.13. and 3.2.7.14.

3.3.4.6. Training

1) The training of personnel involved in the outdoor storage of *dangerous goods* shall conform to Article 3.2.7.15.

3.3.4.7. Safety Precautions

1) When *dangerous goods* are stored outside of a *building*, safety precautions shall be taken to prevent undesirable reactions from the effects of atmospheric conditions.

2) Damaged or leaking packages or containers of *dangerous goods* shall be moved to a safe location and the product repackaged and labelled as soon as possible.

3.3.4.8. Intermodal Shipping Containers

1) Intermodal shipping containers used for the transportation of *dangerous goods*, as well as their contents, shall be stored in conformance with the segregation requirements stated in IMO 2012, "International Maritime Dangerous Goods Code." (See Note A-3.3.1.1.(2)(c).)

3.3.5. Outdoor Storage of Compressed Gases

3.3.5.1. Application

1) Except as provided in Subsection 3.1.1., this Subsection applies to the outdoor storage of *dangerous goods* classified as compressed gases.

3.3.5.2. Location

1) Where cylinders of *dangerous goods* classified as compressed gases are stored outdoors, they shall be

a) supported on raised concrete or other noncombustible platforms, and
b) located in an enclosure fenced in conformance with Article 3.3.2.6.

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3.3.5.3. Clearances

1) Except as provided in Sentence (2), cylinders of anhydrous ammonia or *dangerous goods* classified as flammable or toxic gases that are stored outdoors shall be not less than

a) 1.5 m from any *building* opening, if the aggregate capacity of expanded gas is not more than 170 m^3,
b) 7.5 m from any *building* opening, if the aggregate capacity of expanded gas is more than 170 m^3 but less than 500 m^3, and
c) 15 m from any *building* opening, if the aggregate capacity of expanded gas is 500 m^3 or more.

(See Note A-3.2.8.2.(2).)

2) The distances required in Sentence (1) need not apply where the *building* opening leads into a room conforming to Subsection 3.2.8. that is used for storing *dangerous goods* classified as compressed gases.

3.3.6. Outdoor Storage of Tires

3.3.6.1. Application

1) This Subsection shall apply to the outdoor storage of tires or shredded tires where the bulk volume of stored product exceeds 300 m^3. (See Note A-3.3.6.1.(1).)

3.3.6.2. Covered Storage

1) This Subsection shall not apply to the storage of tires or shredded tires that are

a) covered by a minimum depth of 150 mm of noncombustible material, or
b) buried in a lined and covered trench system for recovery and reuse.

(See Note A-3.3.6.2.(1).)

3.3.6.3. Pile Size and Location

1) No person shall store or permit to be stored tires or shredded tires in outdoor storage piles that exceed

a) an individual pile volume of 300 m^3,
b) an *individual storage area* of 100 m^2, or
c) a storage pile height of 3 m.

2) No person shall store tires or shredded tires unless clearances from other stored product or salvage, including but not limited to tires, are maintained

a) with a clear space of not less than 6 m,
b) with at least 15 m from surrounding property lines, and
c) with at least 15 m from *buildings* or as indicated in NFPA 80A, "Recommended Practice for Protection of Buildings from Exterior Fire Exposures," whichever is the greatest distance.

3) Storage piles shall not be located beneath electrical power lines.

3.3.6.4. Fire Break

1) A 22 m fire break shall be provided around the perimeter of individual storage piles where the total bulk volume of stored tires or shredded tires is greater than 4 800 m^3.

3.3.6.5. Fuel-fired Vehicles

1) Fuel-fired vehicles operating in a storage area shall be maintained regularly so as not to be a fire hazard.

3.3.6.6. Open Flame

1) No person shall smoke or use an open-flame *appliance* or device, including welding or cutting equipment, in a storage area.

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3.3.6.7. Fire Department Access Routes

1) A minimum of two fire department access routes conforming to Article 3.2.5.6. of Division B of the NBC(AE) and located as remotely as possible from each other shall be provided for each tire storage area.

2) A fire department access route shall be provided within 50 m of any point in the storage yard where storage piles are located, and not closer than 6 m to any individual storage pile.

3.3.6.8. Fencing

1) If the total volume of stored tires or shredded tires is more than 600 m^3, the area occupied by the tires shall be fenced in conformance with Article 3.3.2.6.

3.3.6.9. Maintenance

1) Storage areas shall be maintained free of combustible vegetation for at least 4.5 m from the stored material and shall be not less than 30 m from brush and forested areas.

Section 3.4. Objectives and Functional Statements

3.4.1. Objectives and Functional Statements

3.4.1.1. 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 Table 3.4.1.1. (See Note A-1.1.2.1.(1).)

Table 3.4.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 3
Forming Part of Sentence 3.4.1.1.(1)

Provision	Functional Statements and Objectives[1]
3.1.1.2. Radioactive Materials	
(1)	[F01,F02,F03,F81-OS1.1,OS1.2]
3.1.1.3. Explosives	
(1)	[F01,F02,F03,F81-OS1.1,OS1.2]
3.1.1.4. Compressed Gases	
(2)	[F01,F02,F03,F81-OS1.1,OS1.2]
(3)	[F01,F02,F03,F81-OS1.1,OS1.2]
3.1.2.2. Ambient Temperature	
(1)	[F51-OS1.1]
(2)	[F51-OS1.1]
(3)	[F51-OS1.1]
3.1.2.3. Packages and Containers	
(1)	[F20,F43,F80,F81-OH5]
	[F20,F43,F80,F81-OS3.4]
	[F20,F43,F80,F81,F01-OS1.1]

Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F20,F43,F80,F81-OH5]
	[F20,F43,F80,F81-OS3.4]
	[F20,F43,F80,F81,F01-OS1.1]
3.1.2.4. Storage Arrangement and Conditions	
(1)	[F01,F43-OS1.1]
	[F43-OS3.4]
	[F10,F30-OS3.7]
	[F01,F43-OP1.1]
	[F43-OH5]
(2)	(b) [F01,F43-OS1.1]
	(a) [F43-OS3.4]
	(b) [F01,F43-OP1.1]
	(a) [F43-OH5]
3.1.2.5. Compressed Gases	
(1)	[F81-OS3.4]
	[F81-OS1.1]
(2)	[F81-OS3.4]
	[F81-OS1.1]
(3)	[F81,F22-OS3.4]
	[F22,F81-OS1.1]

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Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(4)	[F05-OS1.5]
3.1.2.6. Reactive Materials	
(2)	[F22,F51,F81-OS1.1]
(3)	[F01,F52-OS1.1]
(4)	[F01-OS1.1]
3.1.3.1. Industrial Trucks	
(1)	[F01,F81,F82-OS1.1]
(2)	[F01,F81-OS1.1]
(3)	[F01,F81-OS1.1]
3.1.3.2. Fuel-Fired Industrial Trucks	
(1)	(a) [F03-OS1.2]
	(a) [F03-OP1.2]
	(b) [F03-OS1.2]
	(b) [F03-OP1.2]
	(c) [F01,F02-OS1.1]
	(c) [F01,F02-OP1.1]
(2)	[F01,F44-OS1.1]
	[F01,F44-OP1.1]
(3)	(a) to (c) [F01-OS1.1]
	(a) to (c) [F01-OP1.1]
	(d) [F01,F02-OP1.1]
	(d) [F01,F02-OS1.1]
(4)	[F03,F12-OS1.2]
	[F02,F12-OP1.2]
3.1.3.3. Battery-Powered Industrial Trucks	
(1)	(a) [F03-OS1.2]
	(a) [F03-OP1.2]
	(b) to (d) [F01-OS1.1]
	(b) to (d) [F01-OP1.1]
(2)	[F02,F12-OP1.2]
	[F02,F12-OS1.2]
3.1.3.4. Training	
(1)	[F12-OP1.1]
	[F12-OS1.1]
	[F12-OP1.2]
	[F12-OS1.2]
3.2.1.1. Application	
(2)	[F02-OP1.2]
	[F02-OS1.2]
3.2.2.2. Access Aisles	
(1)	[F12-OP1.2]
	[F12-OS1.2]

Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2]
(4)	[F12-OP1.2]
	[F12-OS1.2]
(5)	[F12-OP1.2]
	[F12-OS1.2] [F06-OS1.5]
(6)	[F06,F02-OP1.2]
	[F06-OS1.5] [F02-OS1.2]
(7)	[F12-OP1.2]
	[F12-OS1.2]
(8)	[F12-OP1.2]
	[F12-OS1.2]
3.2.2.3. Clearances	
(1)	[F21-OP1.3,OP1.2]
	[F21-OS1.3,OS1.2]
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F04-OP1.3,OP1.2]
	[F04-OS1.3,OS1.2]
(4)	[F02-OP1.2]
	[F02-OS1.2]
(5)	[F01-OS1.1]
3.2.2.4. Combustible Pallets	
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	[F02-OS1.2]
	[F02-OP1.2]
3.2.2.5. Fire Safety Plan	
(2)	[F81,F02,F12-OP1.2]
	[F81-OS1.1] [F81,F02,F12-OS1.2]
(3)	[F81,F02,F12-OP1.2]
	[F81-OS1.1] [F81,F02,F12-OS1.2]
3.2.2.6. Smoking	
(1)	[F01-OS1.1]
3.2.2.7. Storage Arrangements	
(1)	[F20-OS1.1,OS1.2] [F04-OS1.2,OS1.5]
3.2.3.2. Individual Storage Areas	
(1)	[F02-OS1.2]
	[F02-OP1.2]
	[F04-OP1.2]
	[F20-OS1.1] [F04-OS1.2,OS1.5]

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Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F04,F02-OP1.2]
	[F20-OS1.1] [F04,F02-OS1.2]
3.2.3.3. Sprinkler Systems	
(1)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
(2)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
3.2.4.3. Sprinkler Protection	
(1)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
3.2.4.4. Portable Extinguishers	
(1)	[F02,F12,F81-OP1.2]
	[F02,F12,F81-OS1.2]
3.2.5.4. Level 2 and 3 Aerosols	
(1)	[F02,F03-OP1.2] Applies to conformance to Table 3.2.5.4.
	[F02,F03-OS1.2] Applies to conformance to Table 3.2.5.4.
(2)	[F02,F03-OP1.2]
	[F02,F03-OS1.2]
3.2.5.5. Sprinkler Systems	
(1)	[F02,F81-OP1.2]
	[F02,F81-OS1.2]
(2)	[F02,F03-OP1.2]
	[F02,F03-OS1.2]
3.2.5.6. Type A Dedicated Areas	
(1)	[F20-OS1.2]
	[F20-OP1.2]
(2)	[F20-OS1.2]
3.2.5.7. Type B Dedicated Areas	
(1)	[F03,F20-OP1.2]
	[F03,F20-OS1.2]
3.2.5.8. Storage Height	
(1)	[F04-OP1.2]
	[F20,F81-OS1.1] [F04-OS1.2,OS1.5]
(2)	(b) [F02,F03,F20,F04-OS1.2] [F20-OS1.1]
	(b) [F02,F03,F04,F20-OP1.2]
	(a) [F02,F03,F20-OP1.2]
	(a) [F02,F03,F20-OS1.2]
3.2.5.9. Aisles	
(1)	[F03-OP1.2]
	[F03-OS1.2] [F06-OS1.5]
3.2.6.3. Loose Combustible Fibres	
(1)	[F03,F02-OS1.2]
	[F03,F02-OP1.2]

Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F03,F02-OP1.2]
	[F03,F02-OS1.2]
(3)	[F03,F02-OP1.2]
	[F03,F02-OS1.2]
(4)	[F03,F02-OS1.2]
	[F03,F02-OP1.2]
(5)	[F03,F02-OS1.2]
	[F03,F02-OP1.2]
3.2.6.4. Baled Combustible Fibres	
(1)	(b) [F04-OS1.2,OS1.5]
	(a) [F02-OP1.2]
	(d) [F21-OS1.3,OS1.2]
	(b) [F04-OP1.2]
	(c) [F21-OS1.5]
	(d) [F21-OP1.3,OP1.2]
	(a) [F02-OS1.2]
(2)	[F02-OP1.2]
	[F02-OS1.2]
(3)	(b) [F04-OS1.5,OS1.2]
	(b) [F04-OP1.2]
	(a) [F02-OP1.2]
	(a) [F02-OS1.2]
(4)	(b) [F04-OS1.5,OS1.2]
	(b) [F04-OP1.2]
	(a) [F02-OP1.2]
	(a) [F02-OS1.2]
(5)	[F04-OP1.2]
	[F04-OS1.5,OS1.2]
3.2.6.5. Heating Equipment	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
3.2.7.2. Ignition Sources	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1] Applies to portion of Code text: “Smoking shall not be permitted within a *fire compartment* used for the storage of *dangerous goods* ...”
(3)	[F01-OS1.1]
3.2.7.3. Ambient Conditions	
(1)	(b) [F01-OS1.1]
	(b) [F40-OS3.4]
	(a) [F51,F52-OS1.1]
	(a) [F51,F52-OS3.4]

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Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
3.2.7.4. Housekeeping	
(1)	[F81,F01-OS1.1]
(2)	[F43,F81-OS3.4]
	[F43-OH5]
	[F43,F81-OS1.1]
3.2.7.5. Storage Arrangements	
(1)	(b) [F20-OS1.1,OS1.2] [F04-OS1.2,OS1.5]
	(b) [F20-OS3.4]
	(a) [F20-OS3.4]
	(a) [F20-OS1.1,OS1.2] [F04-OS1.2,OS1.5]
	(c) [F02-OS1.1]
	(c) [F02-OP1.2]
(2)	[F20-OS1.1,OS1.2] [F04-OS1.2,OS1.5] [F02-OS1.2]
(3)	[F02-OP1.2]
	[F02-OS1.2]
(4)	[F81,F43,F12-OS3.4]
	[F81,F12-OH5]
	[F81,F01,F12-OS1.1]
(8)	[F01-OP1.2]
	[F01-OS1.2]
(9)	[F81,F82-OS3.4]
	[F81,F82-OS1.1] [F10-OS1.5]
3.2.7.6. Separation from Other Dangerous Goods	
(1)	[F43-OS3.4]
	[F01-OS1.1]
(3)	[F43-OS3.4]
	[F01-OS1.1]
(4)	[F02-OS1.1,OS3.4]
3.2.7.7. Corrosion Protection	
(1)	[F80-OS3.4]
	[F80-OH5]
	[F80-OS1.1]
3.2.7.8. Flooring Materials	
(1)	(b) [F01-OS1.1]
(2)	[F01-OS1.1]
3.2.7.9. Fire Suppression Systems	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02,F03-OP1.2] [F01-OP1.1]
	[F02,F03-OS1.2] [F01-OS1.1]
3.2.7.10. Smoke Venting	
(1)	[F12,F02-OP1.2]
	[F12,F02-OS1.2,OS1.5]

Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
3.2.7.11. Spill Control	
(2)	(a) [F43-OS3.4]
	(a) [F01-OS1.1]
3.2.7.12. Fire Department Access	
(2)	[F12-OP1.2]
	[F12-OS1.2]
(3)	[F12-OP1.2]
	[F12-OS1.2]
3.2.7.13. Labels	
(1)	[F12,F81-OS3.4]
	[F12-OS1.1,OS1.2] [F81-OS1.1]
3.2.7.14. Placards	
(1)	[F12,F81-OS3.4]
	[F12-OS1.1,OS1.2] [F81-OS1.1]
(2)	[F12-OS3.4]
	[F12-OS1.2]
(3)	[F12-OS3.4]
	[F12-OS1.2]
(4)	[F12-OS3.4]
	[F12-OS1.2]
3.2.7.15. Training	
(1)	(c) [F12-OS1.1,OS1.2] [F81-OS1.1]
	(b) [F12-OS1.1,OS1.2] [F81-OS1.1]
	(b) [F12,F81-OS3.4]
	(c) [F12-OS3.4]
(2)	[F81-OS3.4]
	[F81-OS1.1]
(3)	[F81,F12-OS3.4]
	[F81,F12-OS1.1]
3.2.7.16. Unauthorized Access	
(1)	[F34-OH5]
	[F34-OS3.4]
	[F34-OS1.1]
3.2.7.17. Separation from Combustible Products	
(1)	[F03-OS1.2] [F01-OS1.1]
3.2.7.18. Storage of Oxidizers in Mercantile Occupancies	
(2)	[F03-OS1.2] [F01-OS1.1]
(3)	[F03-OS1.2] [F01-OS1.1]

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Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
3.2.8.2. Flammable Gases	
(1)	(d) [F02-OS1.3]
	(f) [F01-OS1.1]
	(b) [F12-OS1.2] [F01-OS1.1] [F02-OS1.3]
	(g) [F01,F02-OS1.1]
	(b) [F02-OP1.3]
(2)	(a) [F01-OS1.1]
	(b) [F01-OS1.1] [F02-OS1.2]
(3)	[F01,F02,F03,F81-OS1.1,OS1.2]
3.2.8.3. Indoor Storage of Anhydrous Ammonia and Toxic or Oxidizing Gases	
(1)	(d) [F44-OS1.2,OS1.5,OS1.1]
	(b) [F12-OS1.2] [F01-OS1.1]
(2)	[F01,F02-OS1.1,OS1.2,OS1.5]
3.2.9.3. Industrial Trucks	
(1)	[F01,F81-OS1.1]
(2)	[F01,F81-OS1.1]
(3)	[F03-OS1.2] [F01-OS1.1]
	[F03-OP1.2] [F01-OP1.1]
(4)	[F01-OS1.1]
3.2.9.4. Portable Extinguishers	
(1)	[F02-OS1.2]
3.3.2.2. Height	
(1)	[F04-OP3.1]
	[F04-OS1.5]
3.3.2.3. Individual Storage Areas and Clearances	
(2)	[F03-OP3.1]
3.3.2.4. Storage beneath Power Lines	
(1)	[F06-OS1.1]
	[F01,F06-OP3.1]
3.3.2.5. Fire Department Access	
(1)	[F12-OP3.1]
(2)	[F12-OP3.1]
3.3.2.6. Fencing	
(1)	[F34-OS3.4]
	[F34-OH5]
	[F34-OP3.1]
(2)	[F12-OP3.1]
3.3.2.7. Maintenance	
(1)	(b) [F12-OP3.1]
(2)	(b) [F12-OP3.1]
3.3.2.8. Ignition Sources	
(1)	[F01-OP3.1]

Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F01-OP3.1]
(3)	(b) [F03-OS1.2] Applies to portion of Code text: "… located not less than 15 m from a *building* …"
	[F01,F03-OP3.1]
3.3.2.10. Portable Extinguishers	
(2)	[F02-OP3.1]
3.3.2.11. Site Preparation	
(1)	[F04-OS1.2]
	[F20-OS3.4]
	[F04,F12-OP3.1]
3.3.2.12. Fuel Dispensing	
(2)	[F03-OP3.1]
3.3.2.14. Fire Separation	
(1)	[F03-OP3.1]
3.3.2.15. Fire Protection	
(1)	[F02-OP3.1]
3.3.2.16. Water Supply	
(1)	[F03,F12-OP1.2]
	[F03,F12-OP3.1]
	[F03,F12-OS1.2]
(4)	[F03,F12-OP1.2]
	[F03,F12-OP3.1]
	[F03,F12-OS1.2]
(5)	[F03,F12-OP1.2]
	[F03,F12-OP3.1]
	[F03,F12-OS1.2]
3.3.2.17. Hydrant Systems	
(1)	[F03,F12-OP1.2]
	[F03,F12-OP3.1]
	[F03,F12-OS1.2]
3.3.3.2. Individual Storage Areas and Clearance	
(1)	[F04-OS1.5]
	[F02,F03-OP3.1] Applies to the maximum size (base area) and minimum clearances. [F04-OP3.1] Applies to the maximum height.
(2)	[F03-OP3.1]
	[F03-OS1.2]
(3)	[F02,F03-OP3.1]
	[F02,F03-OS1.2]
(4)	[F02-OP3.1]
	[F02-OS1.2]
3.3.3.3. Rubber Tires	
(1)	[F06-OP3.1]

Table 3.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
3.3.4.2. Individual Storage Areas and Clearances	
(1)	[F02-OP3.1]
	[F02-OS1.2]
(2)	[F03-OP3.1]
	[F03-OS1.2]
(3)	[F20-OS3.4]
	[F20-OS1.1] [F04-OS1.2,OS1.5]
3.3.4.3. Separation from Other Dangerous Goods	
(2)	[F43-OS3.4]
	[F01-OS1.1]
3.3.4.4. Separation from Combustible Products	
(1)	[F03,F01-OS1.1]
3.3.4.7. Safety Precautions	
(1)	[F43-OS1.1]
(2)	[F43,F81-OS3.4]
	[F43-OH5]
	[F43,F81-OS1.1]
3.3.4.8. Intermodal Shipping Containers	
(1)	[F01-OS1.1]
	[F43-OS3.4]
3.3.5.2. Location	
(1)	(a) [F80,F81,F02-OS1.1]
	(b) [F34-OS1.2]
	(b) [F34-OP1.2]
3.3.5.3. Clearances	
(1)	[F44-OS3.4]
	[F44-OS1.1]
(2)	[F44-OS3.4]
	[F01,F44-OS1.1] [F03-OS1.2]
3.3.6.3. Pile Size and Location	
(1)	[F02-OP1.2]
(2)	[F03,F12-OP1.2]
	[F03,F12-OP3.1]
(3)	[F06-OS1.1]
	[F01,F06-OP3.1]
3.3.6.4. Fire Break	
(1)	[F03-OP1.4]
3.3.6.5. Fuel-fired Vehicles	
(1)	[F82-OP1.4]
3.3.6.6. Open Flame	
(1)	[F01-OP1.1]
3.3.6.7. Fire Department Access Routes	
(1)	[F12-OP1.2]
	[F12-OP3.1]
(2)	[F12-OP1.2]
	[F12-OP3.1]
3.3.6.9. Maintenance	
(1)	[F03,F82-OP1.2]
	[F03,F82-OP3.1]

Notes to Table 3.4.1.1.:

[1] See Parts 2 and 3 of Division A.

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Notes to Part 3
Indoor and Outdoor Storage

A-3.1.1.1.(1) Part 3 applies to the short- or long-term storage of products, whether raw or waste materials, goods in process, or finished goods.

This Part does not deal with products or materials that are directly supplied to appliances, equipment or apparatus through piping, hose, ducts, etc. For example, the gas cylinders that are mounted on propane barbecues are not covered by Part 3: they are considered to be "in use" as opposed to "in storage" and are not intended to be regulated by the storage requirements stated in the NFC(AE).

A-3.1.1.4. Part 3 deals mainly with the storage of cylinders of dangerous goods classified as compressed gases. It is expected that gas installations that are not covered in the Code will conform to good engineering practice, such as that described in NFPA 55, "Compressed Gases and Cryogenic Fluids Code."

A-3.1.1.4.(1)(a) In the context of the exemption in Clause 3.1.1.4.(1)(a), a distributor is deemed to be a commercial enterprise regularly handling or storing more than 1 500 kg of dangerous goods classified as compressed gases for the purposes of resale. Such distributors are expected to follow the same good engineering practices as their suppliers. CGA P-1, "Standard for Safe Handling of Compressed Gases in Containers," represents good engineering practice for the handling of dangerous goods classified as compressed gases.

A-3.1.2.3.(2) The International Maritime Organization, the International Civil Aviation Organization, the United Nations and Transport Canada are examples of regulatory authorities that may establish standards for the design and construction of packages and containers for dangerous goods.

A-3.1.2.5.(2)(a) Methods of preventing valve damage include the use of valve caps, storage in crates (for small cylinders) and the provision of steel rings or protective handles. Certain high-pressure cylinders are required by other legislation to be equipped with valve caps.

A-3.1.2.6. Reactive materials include various classes of unstable or reactive dangerous goods, such as flammable solids, pyrophoric materials, oxidizers, corrosives, water-reactive substances and organic peroxides.

In general, it is unsafe to store highly reactive oxidizers close to liquids with low flash points, combustible products or chemically incompatible products. Quantities of oxidizers or other dangerously reactive materials should therefore be limited and the storage area should be constructed of noncombustible materials, should be kept cool and ventilated, and should not impede egress.

In some cases, depending on the quantity and nature of the oxidizing agent, normal fire protection measures (e.g. sprinklers, fire hose and extinguishers) are ineffective due to the self-yielding of oxygen by the oxidizing agent.

When containers of highly reactive oxidizers become damaged or are exposed to excessive heat, humidity or contamination (e.g. sawdust, petroleum products, or other chemicals), a very violent fire or explosion can result.

The following oxidizing substances, among others, are known to supply oxygen: organic and inorganic peroxides; pool chemicals (e.g. calcium hypochlorite, sodium dichloroisocyanurate); oxides; permanganates; perrhenates; chlorates; perchlorates; persulfates; organic and inorganic nitrates; bromates; iodates; periodates; perselenates; chromates, dichromates; ozone; perborates.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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When containers of dangerously reactive materials become damaged or are exposed to water or humidity, a flammable gas (such as hydrogen, ammonia or methane) or a toxic gas (such as hydrogen chloride, hydrogen bromide or phosphine) can be released.

The following dangerously reactive materials, among others, are known to release a flammable gas in reaction to contact with water or humidity: alkali metals (e.g. sodium, potassium, cesium); reactive metals (e.g. zinc, aluminum, magnesium); metallic hydride (e.g. sodium borohydride, germanium tetrahydride, calcium hydride).

The following dangerously reactive materials, among others, are known to release a toxic gas in reaction to contact with water or humidity: organic and inorganic chloride (e.g. phosphorus trichloride, phosphorus oxide trichloride, acetyl chloride); organic and inorganic bromide (e.g. phosphorus tribromide, aluminum tribromide, acetyl bromide).

A-3.2.1.1.(1) Section 3.2. applies to all parts of buildings, including warehousing or storage areas, manufacturing areas, shipping and receiving areas, and sales areas. It does not apply to the storage of unpackaged grain or coal. Additional requirements in Part 5 of this Code address the dust hazard associated with bulk grain or coal storage.

A-3.2.1.1.(1)(a) NFPA 13, "Standard for the Installation of Sprinkler Systems," gives an extensive description with numerous examples of commodities for classification purposes and should be consulted. The following is a brief overview of the NFPA 13 classification of commodities:

A Class I commodity is defined as essentially noncombustible products in ordinary corrugated cartons or in ordinary paper wrappings, with or without combustible pallets.

A Class II commodity is defined as Class I products in slatted wooden crates, solid wooden boxes, multiple thickness paperboard cartons or equivalent combustible packaging material, with or without combustible pallets.

A Class III commodity is defined as wood, paper, natural fibre, cloth, or Group C plastics, with or without combustible pallets. Products may contain a limited amount of Group A or B plastics.

A Class IV commodity is defined as Class I, II, or III products in corrugated cartons, containing an appreciable amount of Group A plastics or with Group A plastics packaging, with or without combustible pallets. Group B plastics and free-flowing Group A plastics are also included in this class.

Group A plastics include, but are not limited to, ABS, acrylic, butyl rubber, fiberglass reinforced polyester, natural rubber (if expanded), nitrile rubber, polycarbonate, polyester elastomer, polyethylene, polypropylene, polystyrene, polyurethane, highly plasticized PVC, and SBR.

Group B plastics include, but are not limited to, cellulosics, fluoroplastics, natural rubber (not expanded), nylon, and silicone rubber.

Group C plastics include, but are not limited to, fluoroplastics, melamine, phenolic resins, rigid PVC, and urea formaldehyde.

A-3.2.2.2. The purpose of Article 3.2.2.2. is to provide adequate access to the interior of the storage area for firefighting and overhaul operations. Means of egress must also be provided in accordance with Section 2.7. The use of dead-end aisles in storage areas should be minimized because of the potential hazard they create with respect to egress. Access aisles required in Sentence 3.2.2.2.(2) include aisles to fire department access panels, or to fire protection equipment such as sprinkler control valves, fire hose stations, portable extinguishers and manual stations.

Sentences 3.2.2.2.(4) to (8) prescribe requirements for main access aisles in the storage area. More than one main access aisle may be required depending on the storage configuration and alternate arrangements to a single main access aisle are permitted in Sentence 3.2.2.2.(7). These requirements are in addition to the general requirement for 2.4 m aisles separating individual storage areas. The width of subsidiary aisles within individual storage areas is determined by material handling needs.

Fire department access to a storage area can be by means of doors or access panels on exterior walls, or through doors from another fire compartment in the building, provided that fire compartment in turn has adequate fire department access. The access points should be as remote from each other as possible. Where practicable, the preferred arrangement is for main aisles to terminate at exterior doors on opposite sides of the building.

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Where stored products are liable to expand with the absorption of water, there exists a significant danger of collapse of the products into the aisles. It does not matter whether the products are in racks or not, nor whether the water comes from hose streams or sprinklers. Examples of such products include certain paper products and baled rags. Numerous firefighters have been killed through being crushed by falling products, or through being trapped after their escape routes have become blocked by fallen products. Special consideration should be given in these cases to rack design, aisle widths and layout to prevent such hazards or to minimize their effect.

A-3.2.2.3.(2) In buildings that are not sprinklered, a clear space is required above the storage to permit hose streams to be directed onto the top of storage.

A-3.2.2.3.(5) Clearance between stored products and heating equipment must also be maintained in conformance with Section 2.6., which references Part 6 of Division B of the NBC(AE) for installation requirements for heating systems. All stored combustible materials should be kept away from hot elements of heating equipment.

A-3.2.2.4.(3) NFPA 13, "Standard for the Installation of Sprinkler Systems," gives sprinkler system design criteria for areas where combustible pallets are stored, based on the height, area and type of pallets.

A-3.2.3.2.(2) For self-contained, multi-tiered structural rack or shelf systems, the storage height should be determined as the height from the lowest floor level to the top of storage on the uppermost tier.

A-3.2.3.3.(2) NFPA 13, "Standard for the Installation of Sprinkler Systems," does not provide sufficient information on the design of sprinkler systems in buildings used for the storage of closed containers of distilled beverage alcohol.

A-3.2.4.2.(1) 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-3.2.5.1.(1) Aerosol products that are displayed in mercantile occupancies represent a lower hazard and do not require specific storage limits or additional fire protection, provided they have been removed from their combustible cartons or cartons have been display-cut so that only the bottom and the lowest 50 mm of the side panels is retained. The storage of packaged aerosols in mercantile occupancies must nevertheless conform to Subsection 3.2.5.

A-3.2.5.2.(1) This Code has adopted the aerosol classification system developed by the National Fire Protection Association in NFPA 30B, "Code for the Manufacture and Storage of Aerosol Products."

Examples of Level 1 aerosol products include shaving cream, spray starch, window cleaners, alkaline oven cleaners, rug shampoos, some air fresheners and some insecticides. These aerosols are less hazardous than Level 2 or Level 3 aerosols, and represent a storage hazard comparable to Class III commodities.

Examples of Level 2 water-miscible flammable base aerosol products include most personal care products such as deodorants (except for oil-based antiperspirants), and hair sprays. They may also include antiseptics and anesthetics, some furniture polishes and windshield de-icers. Level 2 aerosols are less hazardous than Level 3 aerosols.

Examples of Level 3 aerosol products include some automotive products such as engine and carburetor cleaners, undercoats and lubricants; some wood polishes, paints and lacquers; some insecticides; and oil-based antiperspirants.

In Canada, some aerosol products are required by HC SOR/2015-17, "Hazardous Products Regulations," HC SOR/2001-269, "Consumer Chemicals and Containers Regulations," and certain other legislation to bear flammability hazard symbols. The nature of the symbol on the can is determined on the basis of a flame projection test, which measures the susceptibility of the aerosol spray to ignite; this is most important for protecting consumers who, for example, might be smoking while using an aerosol product. A direct comparison between the flammability hazard symbols used in Canadian regulations and the NFPA Level 1, 2 or 3 classification system used in the NFC(AE) is not reliable as the latter measures the overall contribution of flammable base product, combined with flammable gas propellant, to the rate of growth and severity of a fire involving a substantial number of aerosols.

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A-Table 3.2.7.1. Categories and Subcategories of Controlled Products (WHMIS). The letters and numbers in Column B of Table 3.2.7.1. refer to the categories and subcategories of controlled products under the "Workplace Hazardous Materials Information System (WHMIS)" as classified in Part 7 of HC SOR/2015-17, "Hazardous Products Regulations."

A: compressed gases
B1: flammable gases
B2: flammable liquids
B3: combustible liquids
B4: flammable solids
B5: flammable aerosols
B6: reactive flammable materials
C: oxidizing materials
D: poisonous and infectious materials
    D1: materials causing immediate and serious toxic effects
    D1A: very toxic materials
    D1B: toxic materials
    D2: materials causing other toxic effects
    D2A: very toxic materials
    D2B: toxic materials
    D3: biohazardous infectious materials
E: corrosive materials
F: dangerously reactive materials
A+C: controlled products of Class A combined with C
A+D1, A+D2, A+E: controlled products of Class A combined with D1, or A combined with D2, or A combined with E

A-3.2.7.1.(3) Small Quantity Exemptions for Dangerous Goods. Figure A-3.2.7.1.(3) illustrates the steps involved in determining which Class of dangerous goods has precedence for the purpose of applying the maximum exempt amount allowed to be stored using Table 3.2.7.1.

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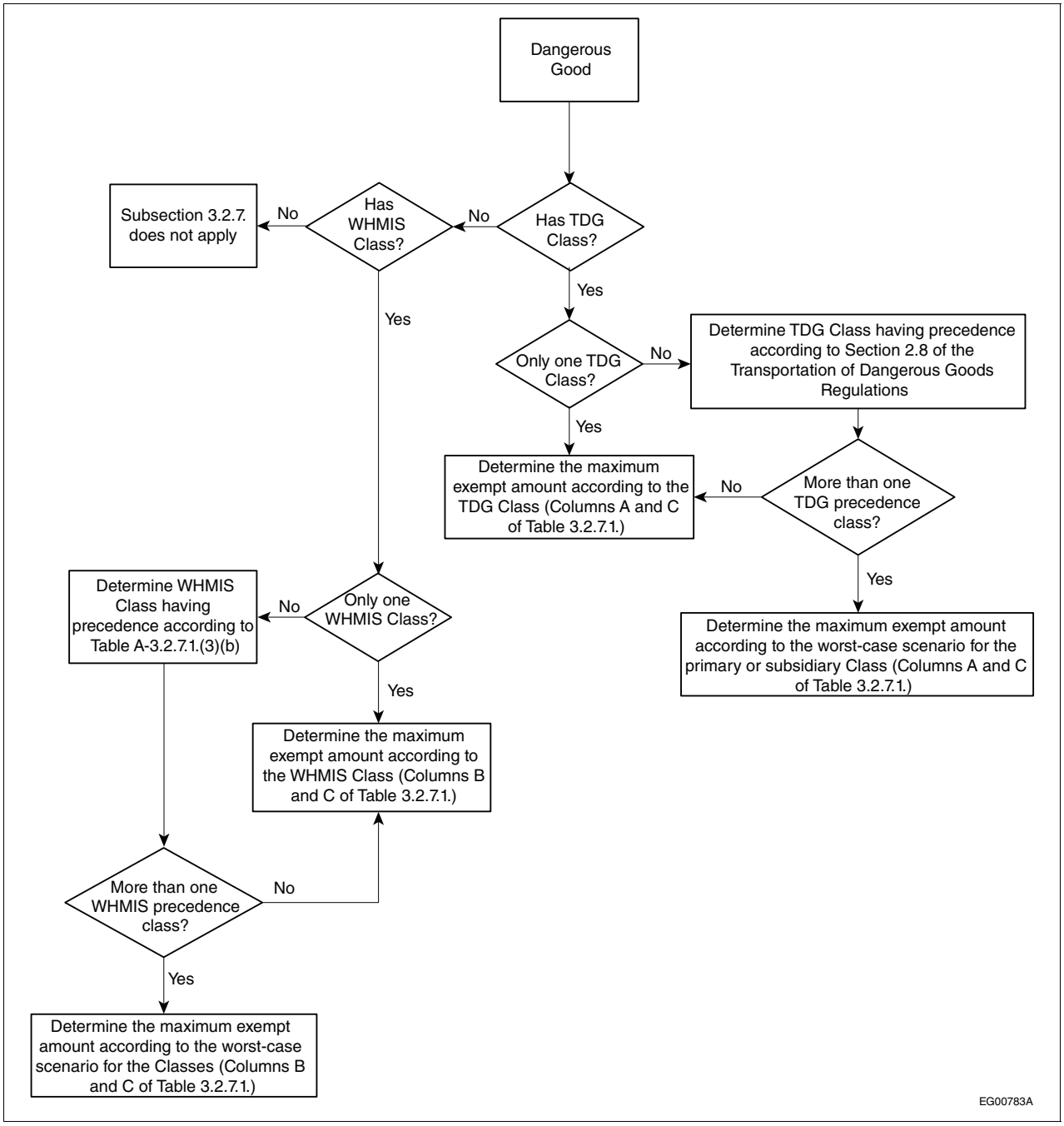

Figure A-3.2.7.1.(3)
Decision flow chart for small quantity exemptions applicable to dangerous goods

A-3.2.7.1.(3)(b) Class of Controlled Product (WHMIS) Having Precedence. Where a dangerous good includes more than one class of controlled product, the class indicated in Table A-3.2.7.1.(3)(b) is considered as the primary class for segregation purposes only.

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Table A-3.2.7.1.(3)(b)
Precedence of Classes of Controlled Products under the WHMIS(1)
Forming Part of Note A-3.2.7.1.(3)(b)

WHMIS Class Combinations	B6	C	D1A	D1B	D2A or D2B	E
	Class of Controlled Product Having Precedence					
B2	B6	B2	B2	B2	B2	B2
B3	B6	B3	D1A	D1B	B3	E
B4	B6	B4	D1A	D1B	B4	E
B6	—	B6	D1A	B6	B6	B6
C	B6	—	D1A	C	C	C
D1A	D1A	D1A	—	D1A	D1A	D1A
D1B	B6	C	D1A	—	D1B	D1B
D2A or D2B	B6	C	D1A	D1B	—	E

Notes to Table A-3.2.7.1.(3)(b):

(1) This Table is an adaptation of the Table entitled "Precedence of Classes, Class and Packing Group" presented in Section 2.8 of the "Transportation of Dangerous Goods Regulations (TDGR)" for the classes of controlled products under the "Workplace Hazardous Materials Information System (WHMIS)."

Example 1– How to Use Table A-3.2.7.1.(3)(b)

If, for example, a substance meets the criteria for inclusion in Classes B2, E and D1A, compare two classes at a time to determine the primary class. First, consider the combination of Classes B2 and E. Find Class B2 in the left-hand column of the Table and follow the row across to the column on the right that refers to E. The Class at the intersection of the row and the column is the class having precedence, which, in this case, is B2; Class E is therefore set aside.

WHMIS Class	B6	C	D1A	D1B	D2A or D2B	**E**
B2	B6	B2	B2	B2	B2	***B2***

Now consider the combination of Classes B2 and D1A. In this case, Class B2 also takes precedence; Class D1A is set aside, leaving Class B2 as the primary class.

WHMIS Class	B6	C	**D1A**	D1B	D2A or D2B	E
B2	B6	B2	***B2***	B2	B2	B2

A-3.2.7.3.(1)(b) Part 4 of the NFC(AE) specifies ventilation rates to prevent the buildup of dangerous concentrations of flammable vapours in rooms used for storing flammable and combustible liquids. The same principles should apply to dangerous goods capable of releasing toxic gases, or where the accidental mixing of incompatible substances could generate flammable vapours or toxic gases. Where no guidance is given, the design of the ventilation system should conform to good engineering practice. Recommendations in the NFPA standards or in the ACGIH's "Industrial Ventilation: A Manual of Recommended Practice for Design" are considered examples of good engineering practice.

A-3.2.7.5.(1)(c) Clause 3.2.7.5.(1)(c) requires compliance with Table 3.2.3.2. so as to ensure that the fuel load of stored dangerous goods, including packaging materials, does not exceed individual storage area size limits for sprinklered buildings and those that are not sprinklered.

A-Table 3.2.7.6.

Combinations of dangerous goods indicated by "DS"

Where a combination of dangerous goods is indicated by "DS" in Table 3.2.7.6., refer to the Safety Data Sheet published by the products' manufacturer(s), or as needed, refer to a chemical database such as CAMEO Chemicals, which is an online library of more than 6000 data sheets containing response-related information and recommendations for hazardous materials that are commonly transported, used, and/or

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stored. The CAMEO Chemicals database also contains the Chemical Reactivity Worksheet, which can be used to predict potential reactive hazards between chemicals of concern.

Corrosive acids and bases

The reaction between an acid (H+ releaser) and a base (OH- releaser) produces water (H_2O) through an exothermic (i.e. heat-producing) reaction. The reaction between an acid and a base of high power and concentration can produce extreme heat. The power of an acid or a base can be determined based on its pH level, which is a measure of the acidity or basicity of a liquid material on a scale of 0 to 14. Liquid materials with a pH less than 7 are acidic and those with a pH greater than 7 are basic or alkaline. Pure water is neutral with a pH close to 7.0 at 25°C.

An acid that is classified as a corrosive is powerful and its pH value is generally lower than 2. A base that is classified as a corrosive is also powerful and its pH value is generally higher than 11.5. Consequently, the reaction between a corrosive base and a corrosive acid would be strong, likely producing a large amount of heat that could ignite surrounding combustible materials. When the corrosive is also a flammable liquid, the liquid itself could ignite. The dangerous goods classification of a corrosive does not indicate if it is a base or an acid; this information is available in the Safety Data Sheet for the substance.

A-3.2.7.6.(2) For oxidizing or reactive materials, Sentences 3.2.7.5.(6) and (7) require a 2 h fire-resistance rating. For compressed gases, Subsection 3.2.8. requires a 1 h or 2 h fire-resistance rating depending on the type of gases. For aerosols, Subsection 3.2.5. applies following the same reasoning.

A-3.2.7.6.(3) It is assumed that Safety Data Sheets will in many cases be provided as part of the documentation for TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)," or for the "Workplace Hazardous Materials Information System (WHMIS)" established in conformance with HC SOR/2015-17, "Hazardous Products Regulations."

The following are examples of basic principles that should apply to any storage situation involving dangerous goods:

- Chemicals should not be stored using an alphabetical sequence system but should be grouped according to compatibility.
- Organic materials should not be stored with either strong acids or oxidizers.
- Alkalis should not be stored with strong acids or chlorinated hydrocarbons.
- Strong acids should not be stored with oxidizers.
- Sulphites, bisulphites and sulphides should not be stored with acids.

Poisonous chemicals should not be stored together on the basis that they are poisons, but rather on the basis of compatibility. As with the storage of all chemicals, the primary consideration is what might happen in the event of a mishap causing them to be mixed. For instance, the following are all dangerous goods classified as toxic substances but will cause serious problems when mixed in the presence of water (such as water used for firefighting purposes):

- sodium azide + dimethyl sulphate = explosion;
- sodium cyanide + anhydrous chloral = highly toxic vapour cloud.

Dangerous goods classified as toxic substances should not be stored in the vicinity of chemicals that are designated as B.P., B.P.C., U.S.P., F.C.C. and N.F. grades. Many of these chemicals find their way into cosmetics, pharmaceutical drugs and foodstuffs. A spill of a poisonous substance would not only cause contamination of the product itself, but also of the outside of the container and of the clean room in which it is processed.

A-3.2.7.9.(1) So many types, quantities, and concentrations of dangerous goods could be present in a building that setting maximum quantities allowed in unprotected buildings is very difficult. The hazard presented by the dangerous goods is not necessarily a function of their inherent flammability, but rather a function of their potential for hampering firefighting. If the area involved in dangerous goods storage is large enough, the owner must provide some degree of built-in automatic fire suppression for the building. Therefore, the point at which installation of an active fire suppression system becomes mandatory is based on the total area involved in dangerous goods storage, regardless of the product stored.

The active fire suppression system intended is a sprinkler system, installed throughout the building, not just in the area of dangerous goods storage. The objective is to control both a fire originating in a spot remote from the dangerous goods, so that it never threatens the dangerous goods, and a fire involving the dangerous goods themselves. Even if a fire originates in a dangerous good on which water should not be applied (stored pesticides for example), sprinklers may provide better control than alternative firefighting measures. A

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sprinkler system should control the fire, limit its spread, and minimize the number of containers that fail. The sprinkler alarm will notify responsible persons who can take corrective action while the fire is small. The amount of water applied to the pesticide by the sprinklers will be small in comparison to what will have to be applied by hose streams once the fire is established.

Sentence 2.1.3.1.(1) refers to the NBC(AE), which sets the basic criteria for sprinkler systems. These criteria may not be appropriate for specific dangerous goods. For example, water may not be the best extinguishing agent to use on a particular product. In such cases, special arrangements may be required, such as isolating that product in a room that is not sprinklered that is protected by a fixed fire suppression system conforming to Article 2.1.3.5.

It is assumed that the fire suppression system will be designed by persons experienced in such design, using good engineering practice to establish design criteria, such as type of suppressant to use, and rate of application.

A-3.2.7.10.(1) Venting of smoke and other products of combustion can be achieved by opening roof vents, breaking skylights, removing panels or opening windows. Smoke and hot gases should be vented directly to the outdoors.

A-3.2.7.12.(2) Access to at least 2 sides of a building used for the storage of dangerous goods is required so that, if necessary, firefighting operations can be set up on the upwind side of the building to minimize the adverse effects of toxic smoke.

A-3.2.7.12.(3) Protective clothing worn by firefighters in a fire involving dangerous goods is bulkier than the usual firefighting turnout gear. Therefore, Sentence 3.2.7.12.(3) requires access openings into buildings used for the storage of dangerous goods to be wider than otherwise required by the NBC(AE).

A-3.2.7.13.(1) Firefighters need to identify the substances they may encounter in a building during a fire. Labelling of products to comply with the "Workplace Hazardous Materials Information System (WHMIS)" or other provincial, territorial or federal regulations is deemed to satisfy this requirement.

A-3.2.7.14.(1) Some products are only classified under the "Workplace Hazardous Materials Information System (WHMIS)" and are not regulated by TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)." One or more placards should nonetheless be posted to identify the hazards associated with the product using its corresponding TDGR classification. For example, a TDGR placard for corrosives can be used to identify the hazard associated with a corrosive product that is only classified under the WHMIS.

One or more placards are required at the door into a room used for the storage of dangerous goods, or into a laboratory where dangerous goods are used, to inform firefighters, emergency responders and occupants that dangerous goods are contained within. In larger storage areas containing a variety of dangerous goods in different individual storage areas, each individual storage area should have placards.

It is understood that it is not reasonable to strictly enforce the use of placards conforming to the TDGR due to the limited space available on the exterior wall and/or door of laboratories in relation to the placard dimension requirement outlined in the TDGR. The intent of Sentence 3.2.7.14.(1)—as it applies to laboratories—is to ensure that the dangerous goods used within are either clearly identified by class or that their presence is signalled through the use of a "Danger" placard, either of which will help alert firefighters, emergency responders and occupants to the potential hazards associated with the presence of dangerous goods in the fire compartments containing laboratories.

A-3.2.8.2.(1)(d) When a flammable mixture of air and vapour/gas/dust is ignited and causes an explosion, the exothermic reaction results in the rapid expansion of heated gases and the corresponding pressure waves travel through the mixture at sonic or supersonic velocities. The pressures developed by an explosion very rapidly reach levels that most buildings and equipment cannot withstand unless specifically designed to do so. Explosion venting consists of devices designed to open at a predetermined pressure to relieve internal pressure build-up inside a room or enclosure, hence limiting the structural and mechanical damage.

The major parameters to be considered in designing an explosion venting system for a building are:

- the physical and chemical properties of the flammable air mixture, such as the particle size or the droplet diameter, the moisture content, the minimum ignition temperature and explosive concentration, the burning velocity or explosibility classification, the maximum explosion pressure and the rate of pressure rise,
- the concentration and dispersion of the flammable mixture in the room,
- the turbulence and physical obstructions in the room,

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- the size and shape of the room, the type of construction and its ability to withstand internal pressures, and
- the type, size and location of relief panels, which should also be designed to reduce the possibility of injury to people in the immediate vicinity of the panels.

A-3.2.8.2.(2) Table A-3.2.8.2.(2) lists the specific volume (m^3/kg) of some common gases at normal temperature and pressure. This information is also available in the gas manufacturer's literature. Cylinder data for industrial gases can be found in FM Global Data Sheet 7-50, "Compressed Gases in Portable Cylinders." All this information is needed to convert gas mass (kg) into gas expanded volume (m^3), and vice versa.

The volume, V, of gas in a compressed cylinder is a function of its pressure, P, in the cylinder. Applying the Ideal Gas Law—PV = nRT (where n is the number of moles, R is the gas constant, and T is the temperature) at constant temperature—provides the volume of gas in the cylinder at normal pressure and temperature. Since the temperature is kept constant, the following equation can then be derived:

$$P_1 \times V_1 = P_2 \times V_2$$

where

P_1 = pressure of the compressed gas in the cylinder,
V_1 = internal volume of the cylinder (commonly referred to as water volume) based on the manufacturer's cylinder specification,
P_2 = atmospheric pressure (101.325 kPa or 14.7 psig), and
V_2 = expanded volume of gas in the cylinder at atmospheric pressure ($V_2 = P_1V_1/P_2$).

Once V_2 is calculated, the specific volumes for common gases listed in Table A-3.2.8.2.(2) or in the gas manufacturer's literature can be converted into units of mass.

Table A-3.2.8.2.(2)
Specific Volume of Common Gases
Forming Part of Note A-3.2.8.2.(2)

Gas	Specific Volume, m^3/kg
Acetylene	0.9
Ammonia, anhydrous	1.4
Arsine	0.3
Butane	0.4
Carbon dioxide	0.5
Chlorine	0.3
Ethylene oxide	0.5
Fluorine	0.6
Hydrogen	12.0
Methane	1.5
Methyl acetylene	0.6
Methyl chloride	0.5
Nitrogen	0.9
Oxygen	0.8
Phosphine	0.7
Propane	0.5
Propylene	0.6

A-3.2.9.1.(1) The chemical composition of ammonium nitrate is [NH_4NO_3], which makes it an inorganic nitrate. It comes in granular, prilled, flaked, crystalline or solid forms. Ammonium nitrate is manufactured in two densities used for different purposes and is treated with a wax or clay protective coating to prevent moisture absorption, which causes caking of the product.

High-density ammonium nitrate is a fertilizer used in the agricultural sector. Subsection 3.2.9. applies only to ammonium nitrate mixtures designated as Class 5.1 oxidizing substances, which may be composed of as little

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as 45% ammonium nitrate. Sentence 3.2.9.1.(1) increases the maximum exempt amount stated in Table 3.2.7.1. from 250 kg to 1 000 kg.

Low-density ammonium nitrate, when sensitized, is a blasting explosive used in the mining and construction sectors. When a carbonaceous or organic substance, such as fuel or diesel oil, nut hulls, or carbon black, is added and admixed with ammonium nitrate, the mixture may become a blasting explosive. This Code does not apply to ammonium-nitrate-based blasting explosives.

Blasting explosives are classified as Class 1 explosives; their storage is regulated under NRCan R.S.C. 1985, c. E-17, "Explosives Act," and its Regulations.

A-3.2.9.2.(5) The minimum spatial separation stated in Subsection 3.2.3. of Division B of the NBC(AE) may be increased by the authority having jurisdiction with respect to the nearness of assembly, institutional, residential and mercantile occupancies regarding the proximity of these exposures and congested commercial or industrial areas with due consideration to the exposure of toxic vapours from fires involving ammonium nitrate.

A-3.2.9.3.(1) It is recommended that electric or LP-gas-powered industrial trucks be used rather than gasoline- or diesel-fuelled ones so as to reduce the potential for contamination of the ammonium nitrate.

A-3.2.9.4.(1) Dry chemical extinguishers are not permitted to be used to fight fires involving ammonium nitrate, but may be used to extinguish fires involving industrial trucks, conveyors, etc.

A-3.3.1.1.(1)(d) Hogged material can be described as mill waste consisting mainly of hogged bark but may include a mixture of bark, chips, dust, or other by-products from trees. This also includes material designated as hogged fuel.

A-3.3.1.1.(1)(e) Factory-assembled combustible structures, such as mobile or modular homes and office trailers, that are transportable in one or more sections, are designated as manufactured buildings in this Section.

A-3.3.1.1.(2)(c) An intermodal shipping container can be described as a standard sized reusable structure into which commodities are packed and designed to be used in more than one mode of transportation.

A-3.3.1.1.(2)(g) Treated forest products are those that have been coated or impregnated with flammable or combustible liquids. Ranked piles are typically piles of logs evenly arranged by conveyor, crane or other means.

A-3.3.2.6.(2) The width and location of gates in a fire department access route should take into account the connection with public thoroughfares, width of the roadway, radius of curves, and the type and size of fire department vehicles available in the municipality or area where the storage site is located. Padlocks that can be forced and replaced are preferred by fire departments for easy access to the storage site.

A-3.3.2.16.(1)(b) Where on-site reservoirs or other established water supplies are used as a fire department draft source, they shall be equipped with dry hydrants in accordance with NFPA 1142, "Standard on Water Supplies for Suburban and Rural Fire Fighting," Annex B.

Other water supply systems or other measures may be used if the systems or measures will provide sufficient fire suppression capability in the circumstances and if the systems or measures are accepted by the authority having jurisdiction.

A-3.3.2.17.(2) Experience has shown that water supplies for a yard fire hydrant system capable of supplying four 19 L/s hose streams simultaneously are sufficient to handle the demand created by a well-equipped and manned fire department response. Hydrants with the same hose threads as the local fire department equipment, located at 75 m intervals and equipped with 60 m of 65 mm hose, assist firefighters by permitting rapid hose lays to all parts of the storage areas. Large stream equipment such as portable turrets and deluge sets require 57 L/s to 75 L/s for each unit. Monitor towers may require supplies more than 75 L/s for each unit. In large yards, where the hazard is severe, many of these units may be operated simultaneously.

A-3.3.3.2.(1) Where the adjoining property is land that may be built upon or used for storage, it is intended that the required clearance be maintained between the stored products and the property line. If the adjoining property does not present a fire exposure hazard, such as a street, right of way, watercourse, or park land, the required clearance could be beyond the property line. In all cases, care should be taken that the storage close to the property line does not defeat the purpose of other safety measures prescribed in this Code.

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A-3.3.6.1.(1) A pile of this size will contain more than 2 500 and fewer than 10 000 unshredded passenger tires, depending on the degree of compaction and packing obtained. For purposes of estimating tire quantities, it can be assumed that a pile such as this will contain approximately 5 000 tires. If the tires are shredded, it is estimated that a pile of this size would contain approximately 15 000 passenger tires.

A-3.3.6.2.(1) This Subsection applies to the outdoor storage of tires or shredded tires where the bulk volume of stored product exceeds 300 m^3 but does not apply where the stored tires or shredded tires are covered by a minimum depth of 150 mm of noncombustible material, as would be the case in a properly operated sanitary landfill. Similarly, in-ground (buried) storage of tires in a lined and covered trench system with a view to future recovery would not be subject to this Subsection.

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Flammable and Combustible Liquids

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Part 4
Flammable and Combustible Liquids

Section 4.1. General

4.1.1. Scope

4.1.1.1. Application

(See Sentence 1.1.1.1.(2) of Division A.)

1) Except as provided in Sentences (2) and (3), this Part applies to the storage, handling, use and processing of

a) *flammable liquids* and *combustible liquids* in *buildings*, structures and open areas,
b) water-miscible liquid mixtures classified as *flammable liquids* or *combustible liquids* in conformance with Article 4.1.2.2. in *buildings*, structures and open areas, and
c) *dangerous goods* classified as flammable gases at *fuel-dispensing stations*.

(See Note A-4.1.1.1.(1).)

2) Areas in *process plants*, where conditions must be addressed by design and operational details specific to the hazard, need not conform to this Part, where alternative protection is provided in conformance with Article 1.2.1.1. of Division A. (See Note A-4.1.1.1.(2).)

3) This Part shall not apply to

a) the transportation of *flammable liquids* or *combustible liquids* under TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR),"
b) *appliances* and their ancillary equipment within the scope of CSA B139 Series, "Installation code for oil-burning equipment," except for aboveground *storage tanks* with an individual capacity exceeding 2 500 L (see Note A-4.1.1.1.(3)(b)),
c) the storage of *flammable liquids* or *combustible liquids* on farms for individual farm use, or
d) the storage of aerosol products covered under Subsection 3.2.5.

4) In addition to the requirements in this Part, the storage, handling and use of *flammable liquids* and *combustible liquids* in laboratories shall be in conformance with Section 5.5.

5) Unless otherwise specified, this Section shall apply to all areas involved in the storage, handling or use of *flammable liquids* and *combustible liquids* covered in this Part.

4.1.2. Classification

4.1.2.1. Classification

(See Note A-4.1.2.1.)

1) Except as provided in Article 4.1.2.2., for the purposes of this Part, *flammable liquids* and *combustible liquids* shall be classified in conformance with Sentences (2) and (3).

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2) *Flammable liquids* shall be Class I liquids, and shall be subdivided into:
a) Class IA liquids, which shall include those having a *flash point* below 22.8°C and a boiling point below 37.8°C,
b) Class IB liquids, which shall include those having a *flash point* below 22.8°C and a boiling point at or above 37.8°C, and
c) Class IC liquids, which shall include those having a *flash point* at or above 22.8°C and below 37.8°C.

3) *Combustible liquids* shall be Class II or Class IIIA liquids, and shall be subdivided into:
a) Class II liquids, which shall include those having a *flash point* at or above 37.8°C and below 60°C, and
b) Class IIIA liquids, which shall include those having a *flash point* at or above 60°C and below 93.3°C (see Note A-4.1.2.1.(3)(b)).

4.1.2.2. Water-Miscible Liquid Mixtures

(See Note A-4.1.2.2.)

1) For the purposes of this Part, mixtures of methanol, ethanol, 2-propanol, acetone or acetic acid and water shall be classified in conformance with Sentences (2) to (6).

2) A mixture of methanol and water shall be classified as
a) a Class IB liquid if the concentration of methanol is 90% or more by volume,
b) a Class IC liquid if the concentration of methanol is 30% or more but less than 90% by volume, or
c) a Class II liquid if the concentration of methanol is 20% or more but less than 30% by volume.

3) A mixture of ethanol and water shall be classified as
a) a Class IB liquid if the concentration of ethanol is 90% or more by volume,
b) a Class IC liquid if the concentration of ethanol is 30% or more but less than 90% by volume, or
c) a Class II liquid if the concentration of ethanol is 20% or more but less than 30% by volume.

4) A mixture of 2-propanol and water shall be classified as a Class IC liquid if the concentration of 2-propanol is 20% or more by volume.

5) A mixture of acetone and water shall be classified as a Class IB liquid if the concentration of acetone is 5% or more by volume.

6) A mixture of acetic acid and water shall be classified as a Class IB liquid if the concentration of acetic acid is 8% or more by volume.

4.1.2.3. Heated Liquids

1) When a liquid having a *flash point* at or above 37.8°C is being processed, stored, handled or used at a temperature at or above its *flash point*, it shall be treated as a Class I liquid.

4.1.2.4. Used Lubricating Oil

(See Note A-4.1.2.4.)

1) Except as provided in Sentence (2), used lubricating oil drained from motor vehicles shall be classified as a Class IIIA liquid.

2) When Class I or II liquids are added to the used oils described in Sentence (1), the resulting mixture shall be classified
a) through tests conforming to Subsection 4.1.3., or
b) in the absence of the tests referred to in Clause (a),
   i) as a Class IC liquid if Class I liquids are added, or
   ii) as a Class II liquid if only Class II liquids are added.

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4.1.3. Flash Point

4.1.3.1. Determination of Flash Point

(See Note A-4.1.3.1.)

1) Except as provided in Sentences (3) and (4), the *flash point* of liquids having a kinematic viscosity less than 6 cSt at 37.8°C and a *flash point* below 93.3°C shall be determined in conformance with ASTM D56, "Standard Test Method for Flash Point by Tag Closed Cup Tester."

2) Except as provided in Sentences (3) and (4), the *flash point* of liquids having a kinematic viscosity of 6 cSt or more at 37.8°C or a *flash point* of 93.3°C or higher shall be determined in conformance with ASTM D93, "Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester."

3) ASTM D3828, "Standard Test Methods for Flash Point by Small Scale Closed Cup Tester," is permitted to be used for testing aviation turbine fuels within the scope of this procedure.

4) ASTM D3278, "Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus," is permitted to be used for paints, enamels, lacquers, varnishes and related products and their components having *flash points* between 0°C and 110°C, and having a kinematic viscosity less than 150 St at 25°C.

4.1.4. Electrical Installations

4.1.4.1. Hazardous Locations

1) Where *flammable liquids* or *combustible liquids* are present, electrical equipment shall conform to CSA C22.1, "Canadian Electrical Code, Part I," for hazardous locations. (See Notes A-4.1.4.1.(1) and A-5.1.2.1.(1).)

2) Where refrigerators are used to store Class I liquids, they shall be designed so that

a) electrical equipment located within the storage compartment, within the outer shell, on the door and on the door frame of the refrigerator is in conformance with CSA C22.1, "Canadian Electrical Code, Part I," for Class I, Zone 0 or 1 hazardous locations based on the frequency of occurrence and duration of an explosive gaseous atmosphere, and
b) electrical equipment mounted on the outside surface of the refrigerator is
   i) in conformance with CSA C22.1, "Canadian Electrical Code, Part I," for Class I, Zone 2 hazardous locations, or
   ii) located above the top of the storage compartment.

4.1.5. Fire Prevention and Protection

4.1.5.1. Additional Fire Protection Equipment

1) Fire protection equipment shall be provided where there are special hazards related to the use, handling, processing, dispensing or storage of *flammable liquids* or *combustible liquids*.

4.1.5.2. Ignition Sources

1) Unless controlled in a manner that will not create a fire or explosion hazard, a device, operation or activity that produces open flames, sparks or heat shall not be permitted in an area described in Article 4.1.1.1. (See Note A-4.1.5.2.(1).)

4.1.5.3. Smoking

1) Except for designated safe smoking areas conforming to Subsection 2.4.2., smoking shall not be permitted in areas described in Article 4.1.1.1.

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4.1.5.4. Removal of Combustibles

1) Areas described in Article 4.1.1.1. shall be kept clean and free of ground vegetation and accumulations of combustible materials not essential to operations.

2) Used rags and similar materials contaminated with *flammable liquids* or *combustible liquids* shall be stored in receptacles conforming to Article 2.4.1.3.

4.1.5.5. Emergency Planning

1) Emergency planning measures conforming to Section 2.8. shall be provided for all *buildings*, parts of *buildings* and open areas.

4.1.5.6. Access for Firefighting

1) Required aisles and other access paths shall be maintained to permit the unobstructed movement of personnel and fire department apparatus so that firefighting operations can be carried out in any part of an area used for the storage, use or handling of *flammable liquids* or *combustible liquids*.

4.1.5.7. Hot Works

1) Hot works shall be performed in conformance with Section 5.2.

4.1.5.8. Basement Storage

(See Note A-4.1.5.8.)

1) Except as permitted in Sentence (2) and in *dwelling units* as described in Article 4.2.4.5., and in *mercantile occupancies* as described in Sentence 4.2.5.3.(3), Class I liquids shall not be stored, handled or used in *basements* or pits.

2) Up to 10 L of Class I liquid is permitted to be stored in *basements*, provided it is stored in safety containers conforming to ULC/ORD-C30, "Safety Containers."

4.1.6. Spill Control and Drainage Systems

(See Article 2.2.7.1. of Division C.)

4.1.6.1. Spill Control

1) Except as permitted in Sentence (3), a spill of *flammable liquids* or *combustible liquids* shall be prevented from flowing outside the spill area and from reaching waterways, sewer systems and potable water sources by

a) constructing a noncombustible barrier capable of containing the spill, or
b) grading the site or sloping the floor to divert the spill to a drainage system conforming to Article 4.1.6.2.

(See Note A-4.1.6.1.(1).)

2) When barriers required in Sentence (1) are provided to contain accidental spillage from aboveground *storage tanks*, they shall conform to the requirements for *secondary containment* in Subsection 4.3.7.

3) Water-miscible effluent from spills and firefighting operations is permitted to be directed into a sewer system, provided it does not create a fire hazard or any risk to public health or safety.

4) Aboveground *storage tanks* shall be provided with a spill containment device as required by Sentences 4.3.6.4.(4) and 4.3.15.1.(3).

4.1.6.2. Drainage Systems

1) A drainage system referred to in Clause 4.1.6.1.(1)(b) shall

a) terminate at a location where a spill of *flammable liquids* or *combustible liquids* will not create a fire hazard or any risk to public health or safety, and
b) direct the spill away from the areas identified in Article 2.8.2.7.

2) Closed drainage systems shall be equipped with a trap. (See Note A-4.1.6.2.(2).)

4.1.6.3. Spills and Leaks

1) Maintenance and operating procedures shall be established to prevent the escape of *flammable liquids* or *combustible liquids* to areas where they could create a fire or explosion hazard.

2) Except as provided in Sentence (3), all reasonable steps shall be taken to recover escaped liquid and to remove or treat contaminated soil.

3) Spilled or leaked *flammable liquids* or *combustible liquids* shall be
a) flushed to a location where they will not create a fire or explosion hazard, or any risk to public health or safety, or
b) neutralized or absorbed and cleaned up with the aid of a product that is compatible and non-reactive with the liquid being cleaned up (see Note A-4.1.6.3.(3)(b)), and
   i) deposited in a receptacle conforming to Article 2.4.1.3., or
   ii) disposed of in a manner that does not create a fire or explosion hazard.

4.1.7. Ventilation

4.1.7.1. Rooms or Enclosed Spaces

1) Where *flammable liquids* and *combustible liquids* are processed, handled, stored, dispensed, transferred or used within rooms or enclosed spaces, ventilation shall conform to the appropriate provincial or territorial regulations or municipal bylaws, or in the absence of such legislation, to this Part and the NBC(AE). (See Note A-4.1.7.1.(1).)

4.1.7.2. Ventilation Measures

1) Except as permitted in Sentence (2), a room or enclosed space referred to in Article 4.1.7.1. shall be provided with one of the following ventilation systems:
a) continuous mechanical ventilation where Class I liquids are processed, dispensed or used in a manner that releases flammable vapours into the room or enclosed space, or
b) either natural or continuous mechanical ventilation where
   i) Class I liquids are stored, processed, dispensed or used in a manner that does not release flammable vapours into the room or enclosed space, or
   ii) Class II liquids are processed, dispensed or used.

2) Ventilation referred to in Clause (1)(b) need not be provided for the storage of Class I liquids if
a) storage consists of only *closed containers*, and
b) no dispensing operations are performed.

3) Ventilation required in Sentence (1) shall be sufficient to ensure that flammable vapour concentrations outside the zone identified as Class I, Zone 0 or 1 in conformance with Article 4.1.4.1. do not exceed 25% of the *lower explosive limit* of the flammable vapour. (See Note A-4.1.7.2.(3).)

4) A mechanical ventilation system is deemed to comply with Sentence (3) if it is capable of exhausting at least 18 $m^3/h/m^2$ of room area, but not less than 250 m^3/h.

5) Where continuous mechanical ventilation is installed in order to meet the conditions of Sentence (1), it shall
a) be provided with automatic interlocks so that the activity generating flammable vapours cannot be performed when the ventilation system is not in operation,
b) sound an audible alarm in an attended area upon shut-down of the ventilation system, and
c) conform to NFPA 91, "Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids."

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4.1.7.3. Location of Air Inlets and Outlets

1) Ventilation air inlets and outlets within a room or enclosed space referred to in Article 4.1.7.1. shall be arranged so as to provide air movement in all portions of the room to prevent the accumulation of flammable vapours in conformance with Sentence 4.1.7.2.(3).

2) Inlets and outlets conforming to Sentence (3) or (4) shall be deemed to have met the requirements of Sentence (1).

3) Where the flammable vapour being removed is heavier than air,
- a) at least one air inlet shall be located at a point near a wall, and no higher than 300 mm from the floor, and
- b) at least one air outlet shall be located near the opposite wall, no higher than 300 mm from the floor.

4) Where the flammable vapour being removed is lighter than air,
- a) at least one air inlet shall be located at a point near a wall, and no lower than 300 mm from the ceiling, and
- b) at least one air outlet shall be located near the opposite wall, no lower than 300 mm from the ceiling.

4.1.7.4. Location of Mechanical Ventilation Exhaust Air Outlets

1) Except as provided in Article 4.1.7.6., the exhaust air outlet from a mechanical ventilation system required in Article 4.1.7.2. shall be
- a) located outdoors, not less than 3 m from any *building* opening, and
- b) arranged so that the exhaust air does not discharge toward any unprotected opening within 7.5 m of the discharge point.

4.1.7.5. Make-up Air

1) Make-up air for a natural or mechanical ventilation system shall be taken from a point remote from any exhaust air discharge described in Article 4.1.7.4.

2) Make-up air for a natural ventilation system shall be taken from a point outside the *building*.

3) Subject to the provisions in Clause 3.2.8.2.(1)(c), where make-up air for a mechanical ventilation system is taken from within the *building*, the opening into the room or enclosed space shall be provided with a *fire damper*.

4.1.7.6. Recirculating Ventilation Systems

1) Where a mechanical ventilation system is installed in conformance with Article 4.1.7.2., and where exhaust air is recirculated, a fail-safe vapour detection and alarm system shall be provided
- a) to continuously monitor the flammable vapour concentration in the exhaust air, and
- b) if the vapour concentration in Clause (a) exceeds 25% of the *lower explosive limit* of the vapour, to
  - i) sound an alarm in an attended area,
  - ii) stop the recirculation of air, and
  - iii) redirect the exhaust air to an outdoor location.

4.1.7.7. Exclusive Use of Ducts

1) Ducts used in a ventilation system conforming to Article 4.1.7.2. shall not be used for any other ventilation or exhaust system.

4.1.7.8. Maintenance

1) All components of the ventilation system shall be kept free of obstructions that may interfere with its operation.

4.1.8. Handling of Flammable and Combustible Liquids

4.1.8.1. Containers and Storage Tanks

1) Except as provided in Sentence 4.1.8.4.(1), *flammable liquids* and *combustible liquids* shall be kept in containers conforming to Subsection 4.2.3. or in *storage tanks* conforming to Subsection 4.3.1.

2) Containers and *storage tanks* for *flammable liquids* or *combustible liquids* shall be kept closed when not in use.

3) Containers and *storage tanks* shall not be filled beyond their safe filling level.

4) Containers or *storage tanks* that leak or have become damaged shall not be used to transport *flammable liquids* or *combustible liquids*.

4.1.8.2. Control of Static Electric Charge

1) When Class I liquids are dispensed from or into a container or a *storage tank*,
a) all metallic or electrically conducting material in the transfer system shall be electrically bonded and grounded, or
b) if the container or tank is made of non-electrically conducting material, measures shall be taken to minimize the potential for static electric charge to develop (see Note A-4.1.8.2.(1)(b)).

2) Except as provided in Sentence (3), when Class I liquids are transferred into a *storage tank* through the top of the tank, the fill pipe shall terminate within 150 mm of the bottom of the tank.

3) Sentence (2) shall not apply when
a) the *storage tank* vapour space cannot exceed 25% of the *lower explosive limit* or is filled with an inert gas that prevents the ignition of the vapour mixture, or
b) the liquid being transferred has a minimum conductivity that prevents the accumulation of static electricity (see Note A-4.1.8.2.(3)(b)).

4) Fill pipes referred to in Sentence (2) shall be installed in such a way as to minimize vibration of the pipe.

4.1.8.3. Transfer

1) Class I liquids shall be drawn from or transferred into containers or *storage tanks* within a *building*
a) through a piping or transfer system conforming to Section 4.5.,
b) by means of a pump designed in conformance with good engineering practice on top of the container or *storage tank*, or
c) by gravity through a self-closing valve designed in conformance with good engineering practice.

(See Note A-4.1.8.3.(1).)

2) Except as provided in Subsection 4.5.9., the transfer of *flammable liquids* or *combustible liquids* by means of pressure applied to a container or *storage tank* shall not be permitted.

4.1.8.4. Fuel Tanks of Vehicles

1) It is permitted to use movable tanks for dispensing *flammable liquids* or *combustible liquids* into the fuel tanks of vehicles or other motorized equipment, provided such movable tanks are used in conformance with the requirements of this Part for *storage tanks*. (See Note A-4.1.8.4.(1).)

2) Only enclosed pumping equipment designed in conformance with good engineering practice shall be used to transfer Class I liquids to or from the fuel tanks of vehicles inside *buildings*. (See Note A-4.1.8.3.(1).)

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Section 4.2. Container Storage and Handling

4.2.1. Scope

4.2.1.1. Application

1) Except as provided in Sentence (2), this Section shall apply to the storage, handling and use of *flammable liquids* or *combustible liquids* that are in

a) containers conforming to Clauses 4.2.3.1.(1)(a) to (d) having an individual capacity of not more than 230 L,
b) portable tanks conforming to Clause 4.2.3.1.(1)(e) having an individual capacity of not more than 2 500 L, or
c) intermediate bulk containers conforming to Clause 4.2.3.1.(1)(a) having an individual capacity of not more than 3 000 L.

2) Except as otherwise stated in this Code, this Section shall not apply to

a) bulk plants covered in Section 4.7., *refineries* covered in Section 4.9. and *distilleries* covered in Section 4.10.,
b) liquids in the fuel tank of motors or engines,
c) *distilled beverage alcohol* in *closed containers* when stored in conformance with Part 3,
d) food and pharmaceutical products when in *closed containers* having a capacity of not more than 5 L, or
e) products containing not more than 50% by volume of water-miscible *flammable liquids* or *combustible liquids* with the remainder of the solution being non-flammable, when in *closed containers* having a capacity of not more than 5 L.

3) Portable tanks having a capacity greater than 2 500 L shall be installed in conformance with Section 4.3.

4) For the purpose of this Section, *unstable liquids* shall meet the requirements for Class IA liquids.

5) Except as otherwise stated, requirements for containers in this Part shall also apply to portable tanks described in Sentence (1).

4.2.2. General

4.2.2.1. Prohibited Locations

1) *Flammable liquids* or *combustible liquids* shall not be stored in or adjacent to *exits*, elevators or principal routes that provide *access to exits*.

4.2.2.2. Storage Arrangement and Conditions

1) *Flammable liquids* and *combustible liquids* shall be stored in stable piles such that they will not collapse under normal operating conditions.

2) *Flammable liquids* and *combustible liquids* shall not be stored in areas where they may be subject to

a) temperature extremes or atmospheric pressure that could cause their containers to become deformed or rupture, or
b) physical impact or temperature extremes that could cause a chemical reaction or chemical instability such that a fire could occur.

4.2.2.3. Separation from Other Dangerous Goods

1) Except as provided in Sentence (2), *flammable liquids* and *combustible liquids* shall be separated from other *dangerous goods* in conformance with Sections 3.2. and 3.3.

2) For the purpose of applying Table 3.2.7.6., Class IIIA and B3 liquids shall be treated as *dangerous goods* classified as flammable liquids. (See Note A-4.2.2.3.(2).)

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4.2.3. Containers and Portable Tanks

4.2.3.1. Design and Construction

1) Except as permitted in Article 4.2.3.3., containers and portable tanks for *flammable liquids* or *combustible liquids* shall be built in conformance with the following:

a) TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR),"
b) CSA B376, "Portable containers for gasoline and other petroleum fuels,"
c) CSA B306-M, "Portable Fuel Tanks for Marine Use,"
d) ULC/ORD-C30, "Safety Containers," or
e) CSA B620, "Highway tanks and TC portable tanks for the transportation of dangerous goods."

4.2.3.2. Markings or Labels

1) Except as provided in Sentence (2) and Article 4.2.3.1., containers for *flammable liquids* or *combustible liquids* shall be distinctly marked or labelled in easily legible type that is in contrast to any other printed matter on the label with a warning to indicate that

a) the material in the container is flammable,
b) it should be kept away from heat, sparks and open flames, and
c) it should be kept closed when not in use.

2) Markings referred to in Sentence (1) are not required when the container is labelled in conformance with

a) TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR),"
b) HC R.S.C. 1985, c. H-3, "Hazardous Products Act," or
c) HC S.C. 2002, c. 28, "Pest Control Products Act."

4.2.3.3. Other Types of Containers

1) The storage, handling and use of *flammable liquids* or *combustible liquids* in a container other than one of those listed in Article 4.2.3.1. shall be permitted only if

a) the required purity of the liquid would be affected by containers of the types listed in Article 4.2.3.1. or if the liquid would cause the excessive corrosion of those types of containers,
b) the container not conforming to Article 4.2.3.1. has a capacity of not more than 1 L if used for Class I liquids and not more than 5 L if used for Class II or IIIA liquids, or
c) the container not conforming to Article 4.2.3.1. is a sample container used for quality control purposes or for testing by regulatory officials.

4.2.4. Assembly and Residential Occupancies

4.2.4.1. Application

1) This Subsection shall apply to the storage and handling of *flammable liquids* and *combustible liquids* in *buildings* classified as *assembly* or *residential occupancies*, except that it shall not apply to nonresidential schools, universities or colleges covered in Subsection 4.2.6.

4.2.4.2. Maximum Quantities

1) Except as provided in Sentence (4) and in Articles 4.2.4.5. and 4.2.4.6., the maximum quantity of *flammable liquids* or *combustible liquids* stored in a *fire compartment* with a *fire-resistance rating* of at least 1 h shall conform to Sentences (2) and (3).

2) When a single class of *flammable liquid* or *combustible liquid* is stored in a *fire compartment* with a *fire-resistance rating* of at least 1 h, the total quantity of liquid shall not exceed

a) 30 L of Class I liquids,

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b) 150 L of Class II liquids, or
c) 600 L of Class IIIA liquids.

3) When 2 or more classes of *flammable liquid* or *combustible liquid* are stored in the same *building*, the total quantity permitted for each class of liquid shall be calculated as follows:

$$\frac{q_I}{30} + \frac{q_{II}}{150} + \frac{q_{IIIA}}{600} \leq 1$$

where
q_I = actual quantity of Class I liquids present,
q_{II} = actual quantity of Class II liquids present, and
q_{IIIA} = actual quantity of Class IIIA liquids present.

4) Quantities of *flammable liquids* or *combustible liquids* exceeding those permitted in Sentence (1) are permitted, provided they are kept
a) in storage cabinets conforming to Subsection 4.2.10., except that the total quantity of *flammable liquids* and *combustible liquids* stored in such cabinets shall not exceed the quantity permitted for one cabinet, or
b) in a storage room conforming to Subsection 4.2.9. and having no openings that communicate directly with the public portions of the *building*.

4.2.4.3. Storage Cabinets and Storage Rooms

1) The storage cabinets referred to in Sentence 4.2.4.2.(4) shall not be located above or below the *first storey*.

2) The location of storage rooms referred to in Sentence 4.2.4.2.(4) shall conform to Article 3.3.2.16. and Sentence 3.3.4.3.(4) of Division B of the NBC(AE).

4.2.4.4. Exterior Balconies

1) *Flammable liquids* and *combustible liquids* shall not be stored on exterior balconies.

4.2.4.5. Dwelling Units

1) Not more than 30 L of *flammable liquids* and *combustible liquids*, of which not more than 10 L shall be Class I liquids, are permitted to be stored in each *dwelling unit*. (See Sentence 4.1.1.1.(3) for oil-burning *appliances*.)

4.2.4.6. Attached Garages and Sheds

1) Not more than 50 L of *flammable liquids* and *combustible liquids*, of which not more than 30 L shall be Class I liquids, are permitted to be stored in a garage or shed attached to a *dwelling unit*.

4.2.5. Mercantile Occupancies

4.2.5.1. Application

1) This Subsection applies to the storage and handling of *flammable liquids* and *combustible liquids* in *mercantile occupancies*.

4.2.5.2. Maximum Quantities

1) Except as provided in Sentence (5), the quantities of *flammable liquids* and *combustible liquids* stored in *mercantile occupancies* shall not exceed those in Sentences (2) to (4).

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2) In *mercantile occupancies* that are not *sprinklered*, the maximum quantity of *flammable liquids* and *combustible liquids* permitted to be stored in a single *suite* shall be the lesser of

a) 8 L/m² of the total area of the *suite*, provided that not more than 2 L/m² are Class I liquids, of which not more than 0.3 L/m² shall be Class IA, Class IB, or any combination of these 2 classes, or
b) 8 000 L, provided that not more than 2 000 L are Class I liquids, of which not more than 300 L shall be Class IA, Class IB, or any combination of these 2 classes.

3) In *sprinklered mercantile occupancies*, the maximum quantity of *flammable liquids* and *combustible liquids* permitted to be stored in a single *suite* shall be the lesser of

a) 24 L/m² of the total area of the *suite*, provided that not more than 6 L/m² are Class I liquids, of which not more than 1 L/m² shall be Class IA, Class IB, or any combination of these 2 classes, or
b) 24 000 L, provided that not more than 6 000 L are Class I liquids, of which not more than 1 000 L shall be Class IA, Class IB, or any combination of these 2 classes.

4) For the purposes of calculating permissible quantities in Sentences (2) and (3), *mercantile occupancies* of less than 250 m² *floor area* shall be assumed to be 250 m² in area.

5) Quantities of *flammable liquids* and *combustible liquids* in excess of those permitted in Sentences (2) to (4) shall be kept in a storage area conforming to Subsection 4.2.7.

4.2.5.3. Containers

1) *Flammable liquids* and *combustible liquids* in *mercantile occupancies* shall be kept in *closed containers*.

2) *Closed containers* of Class I and II liquids shall not be stacked more than 1.5 m high on floors, or 1 m high on individual fixed shelves.

3) Class I liquids in *closed containers* are permitted to be stored in *basements* of *mercantile occupancies*.

4.2.5.4. Transfer

1) Except as permitted in Sentence (2), in *mercantile occupancies*, the transfer of *flammable liquids* or *combustible liquids* from or into containers shall only be permitted in a storage room conforming to Subsection 4.2.9. (See Note A-4.2.5.4.(1).)

2) Tinting operations involving paint containers not exceeding 25 L in capacity may be carried out in *mercantile occupancies* outside of a storage room conforming to Subsection 4.2.9.

4.2.6. Business and Personal Services, Educational, Care, Home-Type Care, Treatment and Detention Occupancies

4.2.6.1. Application

1) This Subsection shall apply to the storage, handling and use of *flammable liquids* and *combustible liquids* in *business and personal services*, *care*, *home-type care*, *treatment* or *detention occupancies* and shall include non-residential schools, universities and colleges.

4.2.6.2. Storage Cabinets and Storage Rooms

1) Except as permitted in Article 4.2.6.3., *flammable liquids* and *combustible liquids* shall be kept in *closed containers* and stored

a) in cabinets conforming to Subsection 4.2.10., except that the total quantity of *flammable liquids* and *combustible liquids* stored in such cabinets shall not exceed the quantity permitted for one cabinet, or
b) in a room having no openings communicating directly with the public portions of the *building* and conforming to Subsection 4.2.9.

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4.2.6.3. Maximum Quantities

1) Except as provided in Sentence (2), the storage of *flammable liquids* and *combustible liquids* outside of a cabinet or storage room required in Article 4.2.6.2. is permitted, provided such storage does not exceed

a) 10 L, including not more than 5 L of Class I liquids, in a single room, or
b) 250 L, including not more than 60 L of Class II liquids, or 10 L of Class I liquids, in a single *fire compartment* with a *fire-resistance rating* of at least 45 min.

2) In the automotive shops or industrial arts area of an educational facility, storage of up to 75 L of *flammable liquids* and *combustible liquids*, including not more than 25 L of Class I liquids, shall be permitted outside of a cabinet or storage room as required in Article 4.2.6.2.

4.2.6.4. Containers

1) Where individual containers with a capacity of more than 5 L are required for the storage of *flammable liquids* or *combustible liquids* in a *building*, safety containers of not more than 25 L capacity conforming to ULC/ORD-C30, "Safety Containers," shall be used.

4.2.6.5. Separation of Dangerous Goods

1) *Flammable liquids* or *combustible liquids* stored in cabinets or storage rooms shall be separated from other *dangerous goods* in conformance with Article 4.2.2.3.

4.2.7. Industrial Occupancies

4.2.7.1. Application

1) Except as provided in Subsection 4.2.12. regarding self-service storage *buildings*, this Subsection applies to the storage of *flammable liquids* and *combustible liquids* in *closed containers* in *industrial occupancies*.

4.2.7.2. Storage Facilities

1) In *industrial occupancies*, *flammable liquids* and *combustible liquids* shall be stored

a) in conformance with Subsection 4.2.8.,
b) in cabinets conforming to Subsection 4.2.10.,
c) in rooms conforming to Subsection 4.2.9., or
d) in storage areas conforming to Article 4.2.7.5.

4.2.7.3. Fire Compartments

1) *Fire compartments* regulated by this Subsection shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 h.

4.2.7.4. Dispensing and Transfer

1) Except as permitted in Subsection 4.2.8. and in Sentence (2), the dispensing or transfer of Class I or II liquids shall be conducted in rooms conforming to Subsection 4.2.9.

2) It is permitted to dispense or transfer Class I or II liquids in a storage area conforming to Article 4.2.7.5., provided

a) the storage area does not exceed 100 m^2, and
b) the dispensing or transfer operations conform to the applicable requirements of Subsection 4.2.9.

4.2.7.5. Maximum Quantities

1) Except as provided in Sentence (2), the storage of *flammable liquids* and *combustible liquids* in storage areas specified in Clause 4.2.7.2.(1)(d) shall

a) conform to Table 4.2.7.5.-A
   i) where it consists of palletized or solid piled storage, or
   ii) where stored in *racks* in *buildings* not protected in conformance with Article 4.2.7.6., or
b) conform to Table 4.2.7.5.-B where stored in *racks* in *buildings* protected in conformance with Article 4.2.7.6.

Table 4.2.7.5.-A
Indoor Container Storage (Palletized or Solid Piled Storage and Unprotected Rack Storage)
Forming Part of Sentences 4.2.7.5.(1) and (4), 4.2.8.4.(3) and 4.2.9.1.(3)

Class of Liquid	Storage Level	Protected Storage[1]			Unprotected Storage		
		Maximum Quantity per *ISA*, L	Maximum Storage Height, m	Maximum Quantity per *Fire Compartment*, L	Maximum Quantity per *ISA*, L	Maximum Storage Height, m	Maximum Quantity per *Fire Compartment*, L
Class IA	*First storey*	10 000	1.5	50 000	2 500	1.5	2 500
	Storeys above the *first storey*	7 500	1.5	30 000	2 500	1.5	2 500
	Basement	Not permitted	Not permitted	Not permitted	Not permitted	Not permitted	Not permitted
Class IB or IC	*First storey*	20 000	2.0	60 000	10 000	1.5	10 000
	Storeys above the *first storey*	10 000	2.0	50 000	10 000	1.5	10 000
	Basement	Not permitted	Not permitted	Not permitted	Not permitted	Not permitted	Not permitted
Class II	*First storey* and *storeys* above the *first storey*	40 000	3.0	100 000	15 000	3.0	30 000
	Basement	25 000	1.5	25 000	Not permitted	Not permitted	Not permitted
Class IIIA	*First storey* and *storeys* above the *first storey*	60 000	6.0	200 000	50 000	4.5	100 000
	Basement	40 000	3.0	100 000	Not permitted	Not permitted	Not permitted

Notes to Table 4.2.7.5.-A:
(1) See Article 4.2.7.6.

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Table 4.2.7.5.-B
Indoor Container Storage (Protected Rack Storage)(1)
Forming Part of Sentences 4.2.7.5.(1) and (4)

Class of Liquid	Storage Level	Maximum Storage Height, m	Maximum Quantity per *ISA* and per *Fire Compartment*, L
Class IA	*First storey*	7.5	30 000
	Storeys above *first storey*	4.5	17 000
	Basement	Not permitted	Not permitted
Class IB or IC	*First storey*	7.5	60 000
	Storeys above *first storey*	4.5	35 000
	Basement	Not permitted	Not permitted
Class II	*First storey*	7.5	100 000
	Storeys above *first storey*	7.5	100 000
	Basement	4.5	35 000
Class IIIA	*First storey*	12.0	200 000
	Storeys above *first storey*	6.0	200 000
	Basement	6.0	100 000

Notes to Table 4.2.7.5.-B:
(1) See Article 4.2.7.6.

2) Where a *building* or part of a *building* is designed for the storage of *flammable liquids* or *combustible liquids*, there is no limit on the total quantity of storage per *fire compartment*, provided the *building* or part of *building* is separated from adjacent *buildings* or parts of *buildings* by

a) a *firewall* having a *fire-resistance rating* of at least 4 h, or
b) spatial separation in conformance with the NBC(AE).

(See Note A-4.2.7.5.(2).)

3) Where containers for 2 or more liquids having different *flash points* are stored together in a single *individual storage area*, the maximum quantity permitted in the *individual storage area* shall equal that permitted for the liquid with the lowest *flash point*.

4) Where *flammable liquids* or *combustible liquids* are stored in solid pile or *rack* storage configurations or a combination of both in a single *fire compartment*, the maximum quantity permitted for each class of liquid shall be calculated as follows:

$$\left\{\frac{q_{IA}}{Q_{IA}}+\frac{q_{IB}}{Q_{IB}}+\frac{q_{IC}}{Q_{IC}}+\frac{q_{II}}{Q_{II}}+\frac{q_{IIIA}}{Q_{IIIA}}\right\}_{\text{Rack}}+\left\{\frac{q_{IA}}{Q_{IA}}+\frac{q_{IB}}{Q_{IB}}+\frac{q_{IC}}{Q_{IC}}+\frac{q_{II}}{Q_{II}}+\frac{q_{IIIA}}{Q_{IIIA}}\right\}_{\text{Solid Pile}}\leq 1$$

where

$q_{IA,\,IB\,or\,IC}$ = actual quantity of Class IA, IB or IC liquids present in a *rack* or solid pile,
q_{II} = actual quantity of Class II liquids present in a *rack* or solid pile,
q_{IIIA} = actual quantity of Class IIIA liquids present in a *rack* or solid pile,
$Q_{IA,\,IB,\,IC}$ = maximum quantity of Class IA, IB or IC liquids permitted in Table 4.2.7.5.-A or Table 4.2.7.5.-B for the arrangement,
Q_{II} = maximum quantity of Class II liquids permitted in Table 4.2.7.5.-A or Table 4.2.7.5.-B for the arrangement, and
Q_{IIIA} = maximum quantity of Class IIIA liquids permitted in Table 4.2.7.5.-A or Table 4.2.7.5.-B for the arrangement.

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4.2.7.6. Fire Suppression Systems

1) Where protection is required by this Code, storage areas for *flammable liquids* and *combustible liquids* shall be

a) *sprinklered* in conformance with NFPA 30, "Flammable and Combustible Liquids Code," or

b) protected by an automatic fire suppression system.

(See Note A-4.2.7.6.(1).)

4.2.7.7. Clearances

1) The clearance between the top of storage and the lowest structural members shall not be less than 450 mm.

2) The clearance between the top of storage and the ceiling sprinkler deflectors or other overhead fire protection systems shall be in accordance with the standard used for the design of the respective system.

3) A clearance of not less than 400 mm shall be maintained between stored *flammable liquids* and *combustible liquids* and walls, except that where the width of storage adjacent to the wall is not more than 1.5 m, such wall clearance is not required. (See Note A-4.2.7.7.(3).)

4.2.7.8. Aisles

1) Except as provided in Article 4.2.7.9., main aisles, access aisles and aisles defining *individual storage areas* shall be in conformance with Article 3.2.2.2.

4.2.7.9. Separation from Other Dangerous Goods

1) *Flammable liquids* and *combustible liquids* shall not be stored with other *dangerous goods* unless in conformance with Article 4.2.2.3.

4.2.7.10. Separation from Combustible Products

1) Except for Class I commodities, *flammable liquids* and *combustible liquids* shall not be stored in the same *individual storage area* with other products listed in Sentence 3.2.1.1.(1).

4.2.7.11. Absorbents

1) Absorbent materials shall be available in the storage area for use in clean-up of spilled *flammable liquids* or *combustible liquids* in conformance with Article 4.1.6.3.

4.2.8. Incidental Use

4.2.8.1. Application

1) Except as otherwise noted in this Part, this Subsection applies to *industrial occupancies* where the use, storage and handling of *flammable liquids* or *combustible liquids* is secondary to the principal activity. (See Note A-4.2.8.1.(1).)

4.2.8.2. Maximum Quantities

1) Except as provided in Sentences (2) and (3) and in Article 4.2.8.4., the quantity of *flammable liquids* and *combustible liquids* permitted to be located outside of storage rooms conforming to Subsection 4.2.7., 4.2.9. or 4.3.14., or storage cabinets conforming to Subsection 4.2.10., in any one *fire compartment* of a *building*, shall not be more than

a) 600 L of *flammable liquids* and *combustible liquids* in *closed containers*, of which not more than 100 L shall be Class IA liquids, and

b) 5 000 L of Class IB, IC, II and IIIA liquids in *storage tanks* or portable tanks.

2) Where required for normal plant activity, quantities of *flammable liquids* and *combustible liquids* are permitted to exceed those specified in Sentence (1), but shall not be greater than the supply for one day of normal operation.

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3) Where larger quantities than those permitted by Sentence (2) are required, such quantities shall be in *storage tanks* installed in conformance with Sentence 4.3.13.4.(2).

4.2.8.3. Handling

1) Areas in which *flammable liquids* or *combustible liquids* are transferred from one container or *storage tank* to another, or where they are used in such a way as to release potentially explosive concentrations of flammable vapours, shall be separated from possible sources of ignition by a spatial separation of not less than 6 m, or by a *fire separation*. (See Note A-4.2.8.3.(1).) (See also Note A-4.1.5.2.(1).)

4.2.8.4. General Storage Areas

1) In a general storage area covered in Subsection 3.2.3., quantities of *flammable liquids* and *combustible liquids* are permitted to exceed those in Sentence 4.2.8.2.(1), provided the storage area is in conformance with Sentences (2) to (6).

2) The storage area referred to in Sentence (1) shall be *sprinklered* in conformance with Article 3.2.3.3., providing a level of protection not less than that required for Class IV commodities stored up to a height of 6 m.

3) The height of storage of *flammable liquids* and *combustible liquids* shall be not more than that permitted for unprotected storage in Table 4.2.7.5.-A.

4) When a single class of liquid is stored, the total quantity in a single *fire compartment* shall be not more than

a) 2 500 L of Class IB and IC liquids,
b) 5 000 L of Class II liquids, or
c) 10 000 L of Class IIIA liquids.

5) When 2 or more classes of liquid are stored in the same *fire compartment*, the total quantity permitted for each class of liquid shall be calculated as follows:

$$\frac{q_{I}}{2500} + \frac{q_{II}}{5000} + \frac{q_{IIIA}}{10,000} \leq 1$$

where

q_{I} = actual quantity of Class IB and IC liquids present,
q_{II} = actual quantity of Class II liquids present, and
q_{IIIA} = actual quantity of Class IIIA liquids present.

6) When 2 or more classes of liquid are stored in the same *individual storage area*, the maximum quantity permitted in the *individual storage area* shall be that permitted for the liquid with the lowest limit listed in Sentence (4).

4.2.9. Rooms for Container Storage and Dispensing

4.2.9.1. Maximum Quantities

1) Except as provided in Sentences (2) and (3), where *flammable liquids* and *combustible liquids* are stored in a room required in this Part, the storage densities averaged over the total room area and the total quantities of such liquids shall conform to Table 4.2.9.1.

Table 4.2.9.1.
Rooms for Container Storage and Dispensing
Forming Part of Sentences 4.2.9.1.(1) and (2)

Maximum Quantity, L	Minimum *Fire Separation* Around Room, h	Maximum Density, L/m²
10 000	2	200
1 500	1	100

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2) The maximum quantities and densities of *flammable liquids* and *combustible liquids* shown in Table 4.2.9.1. are permitted to be doubled, provided the storage room is protected by an automatic fire suppression system conforming to Article 4.2.7.6.

3) The maximum quantities of Class I liquids in an unprotected storage room with a *fire separation* having a *fire-resistance rating* of not less than 2 h shall

a) not exceed those specified for unprotected storage in Table 4.2.7.5.-A, and
b) comply with Sentences 4.2.7.5.(3) and (4).

4.2.9.2. Spill Control

1) Storage rooms referred to in Article 4.2.9.1. shall be liquid-tight where the walls join the floor.

4.2.9.3. Aisles

1) The contents of *flammable liquid* and *combustible liquid* storage rooms referred to in Article 4.2.9.1. shall be arranged to provide aisle widths of not less than 1 m.

4.2.9.4. Dispensing

1) Dispensing of *flammable liquids* or *combustible liquids* from containers having a capacity of more than 30 L shall be by pumps or through self-closing valves designed in conformance with good engineering practice. (See Note A-4.1.8.3.(1).)

4.2.9.5. Explosion Venting

1) Except for the storage of *distilled beverage alcohol*, where Class IA or IB liquids are used, dispensed or stored in open containers within a storage room, or where Class IA liquids are stored in containers exceeding 4 L in capacity, the room shall be designed to prevent critical structural and mechanical damage from an internal explosion in conformance with Sentence 3.3.6.4.(2) of Division B of the NBC(AE). (See Note A-3.2.8.2.(1)(d).)

4.2.10. Cabinets for Container Storage

4.2.10.1. Containers

1) *Flammable liquids* and *combustible liquids* stored in cabinets required in this Part shall be in *closed containers* conforming to Article 4.2.3.1.

4.2.10.2. Maximum Quantity per Cabinet

1) The maximum quantity of *flammable liquids* and *combustible liquids* stored in a cabinet shall be 500 L.

4.2.10.3. Maximum Quantity per Fire Compartment

1) Except as provided in Sentences (2) and (3), the total quantity of *flammable liquids* and *combustible liquids* stored in cabinets in a single *fire compartment* shall not exceed the quantity permitted in Article 4.2.10.2. for 3 cabinets.

2) In *industrial occupancies*, quantities of *flammable liquids* and *combustible liquids* greater than those specified in Sentence (1) are permitted in a single *fire compartment*, provided

a) the total quantity stored in a group of cabinets is not more than the quantity permitted for 3 cabinets, and
b) the distance between groups of cabinets described in Clause (a) is not less than 30 m.

3) In *care*, *home-type care*, *treatment* or *detention occupancies*, the total quantity of *flammable liquids* and *combustible liquids* stored in cabinets in a single *fire compartment* shall not exceed the quantity permitted for one cabinet.

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4.2.10.4. Labelling

1) Cabinets for container storage shall be labelled in conspicuous lettering to indicate that the cabinet contains flammable materials and that open flames must be kept away.

4.2.10.5. Fire Endurance

1) Storage cabinets required in this Part shall conform to ULC/ORD-C1275, "Guide for the Investigation of Storage Cabinets for Flammable Liquid Containers."

4.2.10.6. Ventilation

1) Where a storage cabinet required in this Part is provided with ventilation openings,

a) the ventilation openings shall be sealed with materials providing a fire protection at least equivalent to that required for the construction of the cabinet, or
b) the cabinet shall be vented outdoors using vent piping providing a fire protection at least equivalent to that required in Clause (a) for seals.

4.2.11. Outdoor Container Storage

4.2.11.1. Quantities and Clearances

1) Except as provided in Sentence (2), the quantities and clearances for *flammable liquids* and *combustible liquids* stored in containers in outdoor storage areas shall conform to Table 4.2.11.1.

Table 4.2.11.1.
Outdoor Container Storage
Forming Part of Sentence 4.2.11.1.(1)

Class of Liquid	Maximum Total Quantity per Pile, L	Minimum Distance between Piles, m	Minimum Distance to a Property Line or to a *Building* on the Same Property, m
Class IA	5 000	1.5	6
Class IB or IC	15 000	1.5	6
Class II	35 000	1.5	6
Class IIIA	85 000	1.5	6

2) The clearances required in Sentence (1) do not apply where not more than 5 000 L of *flammable liquids* or *combustible liquids* are stored adjacent to a *building* on the same property, provided that either

a) the *building* is limited to 1 *storey* in *building* height and is used primarily for the storage or handling of *flammable liquids* or *combustible liquids*, or
b) the exposed wall has a *fire-resistance rating* of at least 2 h and has no openings within 3 m of such outdoor storage.

4.2.11.2. Mixed Storage

1) Where 2 or more liquids with different *flash points* are stored outdoors in containers that form a single pile, the maximum total quantity permitted in the pile shall be equal to that permitted for the liquid with the lowest *flash point*.

4.2.11.3. Fire Department Access

1) An access route not less than 6 m wide constructed in conformance with Subsection 3.2.5. of Division B of the NBC(AE) shall be provided in outdoor storage areas to permit the approach of fire department vehicles to within 60 m of any part of a pile.

4.2.11.4. Spill Control

1) Outdoor storage areas for *flammable liquids* or *combustible liquids* shall be designed to accommodate possible spillage in conformance with Subsection 4.1.6.

4.2.11.5. Fencing

1) An outdoor area used for the container storage of *flammable liquids* or *combustible liquids* shall be fenced in conformance with Article 3.3.2.6.

4.2.12. Self-Service Storage Buildings

4.2.12.1. Application

1) This Subsection applies to the storage and handling of *flammable liquids* and *combustible liquids* in self-service storage *buildings* within the scope of Section 3.9. of Division B of the NBC(AE).

4.2.12.2. Maximum Quantities

1) Not more than 50 L of *flammable liquids* and *combustible liquids*, of which not more than 30 L shall be Class I liquids, are permitted to be stored in individual self-service storage units.

4.2.12.3. Dispensing and Handling

1) Except within a *dwelling unit*, the dispensing and handling of *flammable liquids* and *combustible liquids* shall not be permitted within self-service storage *buildings*.

Section 4.3. Tank Storage

4.3.1. Design, Construction and Use of Storage Tanks

4.3.1.1. Application

1) This Section applies to *storage tanks* for *flammable liquids* and *combustible liquids*.

4.3.1.2. Atmospheric Storage Tanks

1) Except as permitted in Sentence (3) and in Section 4.10., *atmospheric storage tanks* shall be built in conformance with the following:

a) except as provided in Sentence (2), API SPEC 12B, "Specification for Bolted Tanks for Storage of Production Liquids,"
b) except as provided in Sentence (2), API SPEC 12D, "Specification for Field Welded Tanks for Storage of Production Liquids,"
c) except as provided in Sentence (2), API SPEC 12F, "Specification for Shop Welded Tanks for Storage of Production Liquids,"
d) API STD 650, "Welded Tanks for Oil Storage,"
e) CAN/ULC-S601, "Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids,"
f) CAN/ULC-S602, "Standard for Steel Aboveground Tanks for Fuel Oil and Lubricating Oil,"
g) CAN/ULC-S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids,"
h) CAN/ULC-S603.1, "Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids,"
i) CAN/ULC-S615, "Standard for Fibre Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids,"
j) CAN/ULC-S652, "Standard for Tank Assemblies for the Collection, Storage and Removal of Used Oil,"
k) CAN/ULC-S653, "Standard for Aboveground Horizontal Steel Contained Tank Assemblies for Flammable and Combustible Liquids,"

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l) CAN/ULC-S655, "Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids,"
m) CAN/ULC-S677, "Standard for Fire Tested Aboveground Tank Assemblies for Flammable and Combustible Liquids," or
n) ANSI/CAN/UL/ULC 2258, "Standard for Aboveground Nonmetallic Tanks for Fuel Oil and Other Combustible Liquids."

2) Tanks built in conformance with Clause (1)(a), (b) or (c) shall be
a) used only for the storage of crude petroleum and oil field production liquids, and
b) provided with emergency venting that (see Note A-4.3.1.2.(2)(b))
   i) conforms to API STD 2000, "Venting Atmospheric and Low-Pressure Storage Tanks," and
   ii) is compatible with the design features of the tank.

3) When necessitated by possible contamination of the liquid to be stored or possible rapid corrosion of the tank, *storage tanks* need not conform to Sentence (1), provided that they are designed and built in conformance with good engineering practice for the material being used. (See Note A-4.3.1.2.(3).)

4) *Atmospheric storage tanks* shall not be used for the storage of *flammable liquids* or *combustible liquids* at temperatures at or above their boiling points.

4.3.1.3. Low Pressure Storage Tanks and Pressure Vessels

1) *Low pressure storage tanks* shall be constructed in conformance with
a) API STD 620, "Design and Construction of Large, Welded, Low-Pressure Storage Tanks," or
b) ASME BPVC, "Boiler and Pressure Vessel Code."

2) *Pressure vessels* shall be constructed in conformance with CSA B51, "Boiler, pressure vessel, and pressure piping code."

3) *Low pressure storage tanks* and *pressure vessels* are permitted to be used as *atmospheric storage tanks*.

4.3.1.4. Operating Pressure

1) The normal operating pressure of a *storage tank* shall not exceed its design pressure.

4.3.1.5. Corrosion Protection

1) Aboveground *storage tanks* and their integral fittings that are subject to corrosion shall be protected by any means against exposure to conditions that would initiate corrosion.

4.3.1.6. Floating Roofs

1) Except for perimeter sealing material, floating roof assemblies or internal floating covers installed in *storage tanks* shall be constructed of metal or other materials and designed in conformance with one of the tank construction standards listed in this Subsection.

4.3.1.7. Identification

1) A *storage tank* and its filling and emptying connections shall be identified in conformance with CFA 1990, "Using the Canadian Fuels Colour-Symbol System to Mark Equipment and Vehicles For Product Identification."

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4.3.1.8. Overfill Protection

1) Except as required in Sentences (2) and (3), a *storage tank* shall be prevented from being overfilled by providing

a) continuous supervision of the filling operations by personnel qualified to supervise such operations, or

b) an *overfill protection device* conforming to CAN/ULC-S661, "Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks" (see Note A-4.3.1.8.(1)(b)).

2) Except as provided in Sentence (3), tight-filled aboveground horizontal *storage tanks* and underground *storage tanks* shall be prevented from being overfilled by providing a positive shut-off device conforming to CAN/ULC-S661, "Standard for Overfill Protection Devices for Flammable and Combustible Liquid Storage Tanks." (See Note A-4.3.1.8.(2).)

3) *Storage tanks* that are filled remotely with used lubricating oil described in Article 4.1.2.4. shall be prevented from being overfilled by providing an *overfill protection device* in accordance with Clause (1)(b).

4.3.1.9. Installation and Use

(See Subsection 2.2.5. of Division C.)

1) Unless otherwise specified in this Code, a *storage tank* shall be installed and used in conformance with the applicable installation and use provisions of the design document to which the *storage tank* was built as required by this Section.

4.3.1.10. Reuse

1) A *storage tank* that has been taken out of service shall not be reused for the storage of *flammable liquids* or *combustible liquids* unless it has been

a) refurbished so as to conform to one of the standards listed in Sentence 4.3.1.2.(1),

b) refurbished so as to conform to CAN/ULC-S676, "Standard for Refurbishing of Storage Tanks for Flammable and Combustible Liquids," or

c) refurbished in conformance with Sentence (2) or (3).

2) A *storage tank* is permitted to be refurbished for aboveground use in conformance with good engineering practice such as that described in

a) API STD 653, "Tank Inspection, Repair, Alteration, and Reconstruction," and

b) STI/SPFA SP031, "Standard for Repair of Shop Fabricated Aboveground Tanks for Storage of Flammable and Combustible Liquids."

3) A *storage tank* is permitted to be refurbished for underground use in conformance with good engineering practice such as that described in CAN/ULC-S669, "Standard for Internal Retrofit Systems for Underground Tanks for Flammable and Combustible Liquids." (See Note A-4.3.1.10.(3).)

4) A riveted *storage tank* shall not be relocated.

4.3.2. Installation of Outside Aboveground Storage Tanks

4.3.2.1. Location

1) Every outside aboveground *storage tank* for the storage of *flammable liquids* or *combustible liquids* shall be located in conformance with Sentences (2) to (5) with respect to a property line or a *building* on the same property.

2) Except as provided in Sentences (6) and (7), every aboveground *storage tank* containing stable liquids and having a working pressure of not more than 17 kPa (gauge) shall be separated from a property line or a *building* on the same property by distances

a) half those in Table 4.3.2.1., where protection is provided against fire or explosion in the tank in conformance with Sentence 4.3.2.5.(2), or

b) equal to those in Table 4.3.2.1., where protection referred to in Clause (a) is not provided.

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Table 4.3.2.1.
Location of Aboveground Storage Tanks
Forming Part of Sentences 4.3.2.1.(2), (3) and (4), and 4.9.2.1.(2) and (3)

Maximum Tank Capacity, L	Minimum Distance to a Property Line or to a *Building* on the Same Property, m
250 000	3
500 000	4.5
2 500 000	9
5 000 000	12
> 5 000 000	15

3) Every aboveground *storage tank* containing *unstable liquids* and having a working pressure of not more than 17 kPa (gauge) shall be separated from a property line or a *building* on the same property by distances

a) equal to those in Table 4.3.2.1., but not less than 7.5 m, where protection is provided against fire or explosion in the tank in conformance with Sentence 4.3.2.5.(2), or
b) 3 times those in Table 4.3.2.1., but not less than 15 m, where protection referred to in Clause (a) is not provided.

4) Every aboveground *storage tank* containing boil-over liquids shall be separated from a property line or a *building* on the same property by distances

a) 0.75 times those in Table 4.3.2.1., where protection is provided against fire or explosion in the tank in conformance with Sentence 4.3.2.5.(2), or
b) equal to those in Table 4.3.2.1., where protection referred to in Clause (a) is not provided.

(See Note A-4.3.2.1.(4).)

5) Where a *storage tank* containing stable liquids or *unstable liquids* has a working pressure greater than 17 kPa (gauge), the distances from a property line or a *building* on the same property shall be those specified in Sentences (2) and (3) multiplied by 1.5, but shall be not less than 7.5 m.

6) The minimum distance required in Sentence (2) from a *storage tank* containing only Class II or IIIA liquids to a *building* on the same property is permitted to be reduced to

a) 1.5 m provided the tank capacity is not more than 80 000 L, or
b) zero provided the tank capacity is not more than 2 500 L.

7) The minimum distance required in Sentence (2) is permitted to be waived, provided the *storage tank* is in conformance with CAN/ULC-S655, "Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids."

8) Where end failure of horizontal *storage tanks* may endanger adjacent property, the tanks shall be placed with the longitudinal axis parallel to such property.

4.3.2.2. Spacing between Storage Tanks

1) Except as required in Sentences (2) and (3) and in Article 4.3.2.3., the minimum distance between every combination of 2 aboveground *storage tanks* shall be 0.25 times the sum of their diameters, but shall be not less than 1 m.

2) The minimum distance between any 2 *storage tanks*, neither of which has a capacity of more than 250 000 L, shall be 1 m.

3) Where either of 2 aboveground *storage tanks* contains *unstable liquids*, the distance required in Sentences (1) and (2) shall be doubled.

4.3.2.3. Clearances from Liquefied Petroleum Gas Cylinders and Tanks

1) The minimum separation between a *flammable liquid* or *combustible liquid storage tank* and a liquefied petroleum gas cylinder or tank shall be 6 m.

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2) *Secondary containments* for *flammable liquid* and *combustible liquid storage tanks* shall not contain any liquefied petroleum gas cylinder or tank, and the centre line of the *secondary containment* wall shall be not less than

a) 3 m away from a liquefied petroleum gas cylinder, and
b) 6 m away from a liquefied petroleum gas tank.

4.3.2.4. Fire Department Access

1) Except as provided in Sentences (2) and (3), *storage tanks* for *flammable liquids* or *combustible liquids* shall be spaced so that each *storage tank* is accessible for firefighting purposes.

2) An access route constructed in conformance with Subsection 3.2.5. of Division B of the NBC(AE) shall be provided in outdoor storage areas to permit the approach of fire department vehicles to within 60 m travelling distance of any *storage tank*.

3) Where firefighting access to *storage tanks* containing Class I or II liquids is not provided, fire extinguishing measures conforming to Sentence 4.3.2.5.(2) shall be provided.

4.3.2.5. Fire Protection Systems

(See Note A-4.3.2.5.)

1) Where the diameter of a *storage tank* exceeds 45 m, the *storage tank* shall be provided with protection against fires or explosions in conformance with Sentence (2).

2) Protection against fires or explosions required for a *storage tank* shall consist of fixed protection systems designed in conformance with good engineering practice such as that described in

a) NFPA 11, "Standard for Low-, Medium-, and High-Expansion Foam,"
b) NFPA 15, "Standard for Water Spray Fixed Systems for Fire Protection," and
c) NFPA 69, "Standard on Explosion Prevention Systems."

4.3.3. Supports, Foundations and Anchorage for Aboveground Storage Tanks

4.3.3.1. Foundations and Supports

1) *Storage tanks* shall rest on the ground or on foundations, supports or piling made of concrete, masonry or steel.

2) Tank supports shall be installed on firm foundations designed to minimize uneven settling of the tank and to minimize corrosion of the part of the tank resting on the foundation.

3) Where the clearance below the base of the tank exceeds 300 mm, tank supports shall have a minimum *fire-resistance rating* of 2 h.

4) Every aboveground *storage tank* shall be supported in a manner that will prevent the allowable design stress of the tank from being exceeded.

4.3.3.2. Earthquake Protection

1) In areas subject to earthquake forces, *storage tanks*, supports and connections shall be designed to resist such forces in conformance with

a) Part 4 of Division B of the NBC(AE), and
b) Appendix A2 of CAN/ULC-S601, "Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids."

4.3.3.3. Protection against Flooding

1) When aboveground *storage tanks* are located in an area that is subject to flooding, the tanks shall be securely anchored to prevent floating.

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4.3.4. Normal and Emergency Venting for Aboveground Storage Tanks

4.3.4.1. Design and Installation

1) *Atmospheric* and *low pressure storage tanks* shall be provided with normal and emergency venting in conformance with

a) API STD 2000, "Venting Atmospheric and Low-Pressure Storage Tanks," or
b) the tank design standards listed in Sentence 4.3.1.2.(1).

4.3.4.2. Unstable Liquids

1) When *unstable liquids* are stored, the effects of heat or gas resulting from polymerization, decomposition, condensation or self-reactivity shall be allowed for in the determination of the total venting capacity.

4.3.5. Vent Piping for Aboveground Storage Tanks

4.3.5.1. Materials and Construction

1) Except at *distilleries* covered in Section 4.10., vent piping materials and construction shall conform to Subsections 4.5.2., 4.5.3. and 4.5.5.

4.3.5.2. Location of Vent Pipe Outlets

1) Normal vent pipe outlets for *storage tanks* of Class I liquids

a) shall be located outside *buildings* not less than
   i) 3.5 m above the adjacent ground level, and
   ii) 1.5 m from any *building* opening, and
b) shall discharge so that flammable vapours will not enter the *building* or be trapped near any part of the *building*.

2) Normal vent pipe outlets for *storage tanks* of Class II or IIIA liquids shall discharge outside *buildings* not less than

a) 2 m above the adjacent ground level, and
b) 1.5 m from any *building* opening.

3) Emergency vent outlets for *storage tanks* shall discharge outside *buildings* not less than 1.5 m from any *building* opening and from any combustible component of any *building*'s exterior wall.

4.3.5.3. Interconnection of Vent Piping

1) Except as provided in Sentence (2), 2 or more *storage tanks* are permitted to be connected to a common vent pipe for normal relief venting, provided the vent pipe size is designed to vent the combined vapours produced in the connected tanks without exceeding the allowable stresses of the tanks.

2) Vent piping for *storage tanks* for Class I liquids shall not be connected to vent piping for *storage tanks* for Class II or IIIA liquids, unless an effective arrangement is provided to prevent the vapours from the Class I liquids from entering the other tanks.

4.3.6. Openings Other than Vents in Aboveground Storage Tanks

4.3.6.1. Provision of Valves

1) Each connection to an aboveground *storage tank* through which the liquid can normally flow shall be provided with an internal or external shut-off valve located as close as practical to the shell of the tank.

2) Each connection to an aboveground *storage tank* that is below the liquid level and through which liquid does not normally flow shall be provided with a liquid-tight closing device.

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4.3.6.2. Materials

1) Valves and their connections to a *storage tank* shall be made of steel, except that when the chemical characteristics of the liquid stored are incompatible with steel, materials other than steel are permitted to be used.

2) Materials for valves and their connections to a *storage tank* shall be suitable for the pressures, stresses and temperatures that may be expected, including those of possible fire exposure.

4.3.6.3. Openings for Liquid Level Measurements

1) Openings for measuring liquid levels in *storage tanks* for Class I liquids shall be equipped with caps or covers which shall be opened only when measuring the liquid level.

4.3.6.4. Connections for Filling and Emptying

1) Except as provided in Sentence (3), connections used as part of normal operating conditions for filling or emptying *storage tanks* for *flammable liquids* and *combustible liquids* shall be located

a) outside *buildings*,
b) at a location free of sources of ignition, and
c) not less than 1.5 m away from *building* openings.

2) Connections for filling or emptying *storage tanks* shall be kept closed to prevent leakage when not in use.

3) A filling connection described in Sentence (1) is permitted to be located inside a *building* if

a) this is made necessary
   i) by a process or activity located indoors and to which the tank is directly associated, or
   ii) for the collection of used liquids, and
b) the fill piping is provided with means to prevent flammable vapours from returning to the *building*.

4) Connections for filling or emptying *storage tanks* shall be provided with a spill containment device designed to catch, retain and provide for the evacuation of spilled *flammable liquids* or *combustible liquids* in conformance with CAN/ULC-S663, "Standard for Spill Containment Devices for Flammable and Combustible Liquid Aboveground Storage Tanks."

4.3.7. Secondary Containment for Aboveground Storage Tanks

4.3.7.1. General

1) The area surrounding a *storage tank* or group of *storage tanks* shall be designed to accommodate accidental spillage in conformance with Subsection 4.1.6.

2) Where barriers described in Sentence 4.1.6.1.(1) are provided to contain accidental spillage from aboveground *storage tanks*, they shall conform to the requirements for *secondary containment* in this Subsection.

3) A *storage tank* conforming to Sentence 4.3.7.4.(2) shall be considered as conforming to this Subsection provided it is used and maintained in conformance with Articles 4.3.7.8. and 4.3.7.9.

4.3.7.2. Construction

1) Except as provided in Sentence (2), the base and walls of a *secondary containment* shall be made of noncombustible materials, and shall be designed, constructed and maintained to

a) withstand full hydrostatic head, and
b) provide a permeability of not more than 10^{-6} cm/s to the *flammable liquids* or *combustible liquids* contained in the *storage tanks*.

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2) A membrane providing the level of impermeability required in Clause (1)(b) shall

a) conform to CAN/ULC-S668, "Standard for Liners Used for Secondary Containment of Aboveground Flammable and Combustible Liquid Tanks," and
b) if it is combustible, be covered with a noncombustible material that will prevent the membrane from failing in the event that the *secondary containment* is exposed to fire.

3) Except as provided in Sentence (4), openings shall not be permitted in a *secondary containment*.

4) Where piping passes through a *secondary containment*, such passages shall conform to Sentences (1) and (2).

4.3.7.3. Capacity

(See Note A-4.1.6.1.(1).)

1) Except as permitted in Sentence (3), a *secondary containment* for a single *storage tank* shall have a volumetric capacity of not less than 110% of the capacity of the tank.

2) Except as permitted in Sentence (3), a *secondary containment* for more than one *storage tank* shall have a volumetric capacity of not less than the sum of

a) the capacity of the largest *storage tank* located in the contained space, and
b) 10% of the greater of
   i) the capacity specified in Clause (a), or
   ii) the aggregate capacity of all other *storage tanks* located in the contained space.

3) When the *secondary containment* is designed to prevent the entry of precipitation and water used for firefighting purposes into the contained space, it shall have a volumetric capacity of not less than the capacity of the largest *storage tank* located in the contained space.

4.3.7.4. Clearances

(See Note A-4.3.7.4.)

1) Except as provided in Sentence (2), no part of a *secondary containment* wall shall be less than 1.5 m from a *storage tank* shell.

2) The distance required in Sentence (1) is permitted to be waived, provided the *storage tank*

a) has a capacity of not more than 80 000 L and is constructed in accordance with
   i) Clause 4.3.1.2.(1)(j), (k) or (m), incorporating *secondary containment*, or
   ii) Clause 4.3.1.2.(1)(e) for double-walled *storage tanks*, or
b) conforms to CAN/ULC-S655, "Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids."

3) Aboveground *storage tanks* shall be protected by posts or guardrails where they are exposed to potential collision damage.

4.3.7.5. Access to Storage Tanks and Ancillary Equipment

1) A *secondary containment* shall permit

a) access to *storage tanks*, valves and ancillary equipment,
b) egress from the contained space, and
c) access for firefighting as specified in Article 4.3.2.4.

(See Note A-4.3.7.5.(1).)

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2) Where a *storage tank* contains Class I liquids, provisions shall be made for the normal operation of valves and for access to the *storage tank* roof without entering the contained space created by the *secondary containment* where

a) the average height of the *secondary containment* exceeds 3.5 m, measured from the ground level of the interior of the contained area, or
b) the distance between the tank shell and the top inside edge of the *secondary containment* wall is less than the height of this wall.

(See Note A-4.3.7.5.(2).)

4.3.7.6. Emergency Venting

1) Where the *secondary containment* is not open to the atmosphere, emergency venting shall be provided to relieve any buildup of internal pressure in the contained space when exposed to heat or fire.

4.3.7.7. Leak Detection

1) Where the contained space created by the *secondary containment* is not accessible for an internal visual examination, and the *secondary containment* is not sloped so as to permit liquid to flow to a specific location that can be monitored, a monitoring device shall be provided to indicate the loss of integrity of the *secondary containment*.

4.3.7.8. Drainage

1) Liquids, debris and precipitation shall not accumulate in the contained space created by the *secondary containment*.

2) Provisions shall be made for removing liquid from the *secondary containment* in conformance with Subsection 4.1.6.

3) Controls for the liquid removal system required in Sentence (2) shall be

a) normally closed,
b) accessible under fire exposure conditions, and
c) located so they can be operated from outside the contained space.

4) Centrifugal type pumps shall not be used to transfer water contaminated with *flammable liquids* or *combustible liquids* from diked areas to a collection system.

4.3.7.9. Use of Secondary Containment

1) The contained space created by a *secondary containment* shall not be used for storage purposes.

4.3.8. Installation of Underground Storage Tanks

4.3.8.1. Construction

1) *Storage tanks* installed underground shall be of double-walled construction and shall be built in conformance with the underground *storage tank* standards identified in Sentence 4.3.1.2.(1).

4.3.8.2. Location

1) Underground *storage tanks* shall be located so that loads from *building* foundations and supports are not transmitted to the tank.

2) Underground *storage tanks* shall be separated by a horizontal distance of not less than

a) 600 mm from adjacent underground tanks or structures,
b) 1 m from a *building* foundation or a *street* line, and
c) 1.5 m from other property lines.

4.3.8.3. Ground Cover

1) Except as required in Sentences (2) to (4), underground *storage tanks* shall be installed with not less than 600 mm of ground cover over the tank.

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2) Except as required in Sentence (3), *storage tanks* subjected to vehicular traffic shall be installed not less than 1 m below finished ground level.

3) Either a 150 mm reinforced concrete slab or a 200 mm unreinforced concrete slab over not less than 450 mm of sand is permitted in lieu of the protection described in Sentence (2), provided the slab extends at least 300 mm beyond the *storage tank*.

4) Where subsurface conditions make it impracticable to install a *storage tank* totally below adjacent ground level, an underground *storage tank* shall be installed so that at least

a) 75% of its mass is below adjacent ground level, provided there is not less than 600 mm of ground cover over the portion of the tank above adjacent ground level, or
b) 50% of its mass is below adjacent ground level, provided there is not less than 1 m of ground cover over the portion of the tank above adjacent ground level.

4.3.8.4. Damage Repair

1) Underground *storage tanks* that are in the process of being installed shall be inspected, and any damage to the tank shell, protective coating, fittings or anodes shall be repaired before they are lowered into the excavation.

2) An underground *storage tank* that is damaged shall not be repaired on site and used for storage unless

a) the repair is done by the manufacturer in accordance with ULC refurbishing specifications, and
b) the manufacturer certifies in writing that the repaired tank meets the applicable manufacturing codes.

(See Note A-4.3.8.4.(2).)

4.3.8.5. Damage Prevention

1) Underground *storage tanks* shall be lowered into the excavation by the use of lifting lugs and hooks and, where necessary, spreader bars to prevent damage to the tank shell, protective coating, fittings or anodes.

2) Any method of handling that might result in damage to the protective coating of the tank shall not be used.

4.3.8.6. Installation

1) Underground steel *storage tanks* shall be installed in conformance with Appendix A of CAN/ULC-S603.1, "Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids."

2) Underground reinforced plastic *storage tanks* shall be installed in conformance with Appendix B of CAN/ULC-S615, "Standard for Fibre Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids."

3) Underground *storage tanks* shall not be placed in direct contact with reinforced concrete slabs but shall be separated by not less than 150 mm of sand or other suitable material to evenly distribute the weight of the tank on the supporting base.

4.3.8.7. Filling

1) *Flammable liquids* or *combustible liquids* shall not be placed in an underground *storage tank* until

a) the fill pipe and vent line have been installed in the tank, and
b) all other openings have been sealed.

4.3.8.8. Spillage

1) If a spillage occurs, the escaped liquid and all soil contaminated by the spill shall be removed in conformance with Subsection 4.1.6.

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4.3.8.9. Anchorage

1) Underground *storage tanks* shall be protected against hydrostatic forces which can cause the uplift of the tanks once they are empty. (See Note A-4.3.8.9.(1).)

2) Where anchors and ground straps are used to resist the uplift forces referred to in Sentence (1), they shall be

a) electrically isolated from the tank, and
b) installed in such a manner that they do not damage the tank's shell, protective coating, fittings or anodes.

4.3.9. Sumps

4.3.9.1. Installation

1) A *dispenser sump* shall be provided under a dispenser, unless the dispenser is located on top of an aboveground *storage tank*.

2) A *spill containment sump* shall be provided at every underground *storage tank* fill point.

3) A *transition sump* shall be provided for all mechanical pipe connections located below *grade*.

4) A *turbine sump* shall be provided for all turbine pump assemblies located below *grade* or above *grade* where they are not readily visible.

5) In addition to the requirements of Article 4.3.9.2., the sumps referred to in Sentences (1) to (4) shall be installed in conformance with the sump manufacturer's instructions.

4.3.9.2. Construction

1) Sumps required by Article 4.3.9.1. shall be constructed in accordance with CAN/ULC-S664, "Standard for Containment Sumps, Sump Fittings, and Accessories for Flammable and Combustible Liquids."

4.3.9.3. Leak Detection Monitoring

1) Where *dispenser sumps*, *turbine sumps* and *transition sumps* referred to in Article 4.3.9.1. are used in underground applications, they shall be provided with an electronic monitoring device to indicate the presence of liquid.

4.3.10. Corrosion Protection of Underground Steel Storage Tanks

4.3.10.1. Corrosion Protection

1) Underground steel *storage tanks* and integral fittings subject to corrosion shall be

a) protected in conformance with CAN/ULC-S603.1, "Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids," or
b) protected by impressed current in conformance with NACE SP0285, "Corrosion Control of Underground Storage Tank Systems by Cathodic Protection."

4.3.11. Vents for Underground Storage Tanks

4.3.11.1. Vent Design

1) Underground *storage tanks* shall be provided with vent openings and piping of sufficient cross-sectional area designed to vent the tanks during the maximum filling or withdrawal rate without causing the allowable stress for the tank to be exceeded.

4.3.11.2. Materials and Construction

1) Except at *distilleries* covered in Section 4.10., vent piping materials and construction shall conform to Subsections 4.5.2., 4.5.3. and 4.5.5.

4.3.11.3. Installation

1) Vent pipe outlets from underground *storage tanks* for Class I liquids
a) shall be located outside *buildings* higher than the fill pipe openings but not less than
   i) 3.5 m above the adjacent ground level,
   ii) 1.5 m from any *building* opening, and
   iii) 7.5 m from any dispenser, and
b) shall discharge so that flammable vapours will not enter *building* openings or be trapped near any part of the *building*.

2) Vent pipe outlets from underground *storage tanks* for Class II or IIIA liquids shall be located outside *buildings* at a height that is above the fill pipe opening but not less than 2 m above finished ground level.

3) Vent pipes from underground *storage tanks* for *flammable liquids* or *combustible liquids* shall not be obstructed by any device that may cause excessive back pressure, except that vent pipes from underground *storage tanks* for Class II or IIIA liquids are permitted to be fitted with return bends, coarse screens or other devices to minimize the entry of foreign material.

4) Vent piping shall enter the *storage tank* through the top of the tank and shall not extend into the tank more than 25 mm.

5) Vent piping shall be
a) installed so that any nominally horizontal run shall slope towards the *storage tank*,
b) constructed without traps,
c) adequately supported to prevent sagging, and
d) where necessary, protected against mechanical damage.

6) Vent piping shall be tested for leaks at the commissioning stage in conformance with Clause 4.4.1.2.(1)(a).

4.3.11.4. Interconnection of Vent Pipes

1) Except as permitted in Sentence (2), where vent piping connects 2 or more *storage tanks*, pipe sizes shall be designed to vent the combined vapours produced in the connected underground *storage tanks* without exceeding the allowable stresses of the tanks when being filled simultaneously.

2) Where it is not possible to fill the connected *storage tanks* referred to in Sentence (1) simultaneously, or where the connected vents have a vapour recovery system, the vent piping shall be sized to accommodate the maximum vapour flow possible in the system.

3) Vent piping for an underground *storage tank* containing a Class I liquid shall not be connected to the vent piping for a *storage tank* containing a Class II or IIIA liquid, unless an effective method is provided to prevent the vapours from the Class I liquid *storage tank* from entering the other tank.

4.3.12. Openings Other than Vents in Underground Storage Tanks

4.3.12.1. Connections

1) Connections for all openings in underground *storage tanks* shall be liquid- and vapour-tight.

4.3.12.2. Openings for Measuring Liquid Level

1) Openings for measuring liquid levels in underground *storage tanks* if independent of the fill pipe shall be equipped with a vapour-tight cap or cover which shall be opened only when measuring the liquid level.

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4.3.12.3. Fill Piping and Discharge Piping

1) Fill piping and discharge piping shall enter underground *storage tanks* only through the top of the tank and discharge piping used in suction systems shall be sloped toward the *storage tanks*.

2) The fill point of an underground *storage tank* shall not be located higher than the discharge point of the tank's vent.

3) Except as provided in Sentence (5), connections used as part of normal operating conditions for filling or emptying *storage tanks* for *flammable liquids* and *combustible liquids* shall be located

a) outside *buildings*,
b) at a location free of sources of ignition, and
c) not less than 1.5 m away from *building* openings.

4) Connections for filling or emptying *storage tanks* described in Sentence (3) shall be kept closed to prevent leakage when not in use.

5) A filling connection described in Sentence (3) is permitted to be located inside a *building* if

a) this is made necessary
   i) by a process or activity located indoors and to which the *storage tank* is directly associated, or
   ii) for the collection of used liquids, and
b) the fill piping is provided with means to prevent flammable vapours from returning to the *building*.

6) If a fill piping system has an offset component from the fill point on the *storage tank*, all fill pipes shall be

a) double-walled,
b) sloped to the *storage tank*, and
c) electronically monitored for leak detection in conformance with Section 4.4.

(See Note A-4.3.12.3.(6).)

7) Where the fill point is below the normal liquid level in the *storage tank*,

a) the fill line shall be equipped with a manual or automatic valve located at the fill point to prevent spillage when the fill cap is removed, and
b) if the *storage tank* contains *flammable liquids* or *combustible liquids*, the fill line drop tube shall be equipped with a method to prevent siphoning of the tank's content should a leak occur in the fill line.

4.3.13. Installation of Storage Tanks inside Buildings

4.3.13.1. Occupancy

1) Except as provided in Article 4.3.13.2., *storage tanks* located inside *buildings* shall conform to Subsections 4.3.13. to 4.3.15. and be permitted in

a) *industrial occupancies*, and
b) *occupancies* other than *industrial occupancies* where *combustible liquids* are stored and used as fuel for oil-burning equipment, emergency generators and fire pumps.

4.3.13.2. Stationary Combustion Engines

1) Installations using Class I liquids as fuel supplies for stationary engines inside *buildings* shall conform to NFPA 37, "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines."

4.3.13.3. Maximum Static Head

1) The static head imposed on a *storage tank* inside a *building* shall not exceed 70 kPa (gauge) at the bottom of the tank when the vent or fill pipe is filled with liquid unless the tank is designed for greater pressures.

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4.3.13.4. Maximum Quantities and Location

1) Except as provided in Subsection 4.2.8. and in Sentence (2), *storage tanks* for *flammable liquids* or *combustible liquids* shall be

a) located in dedicated storage rooms conforming to Subsection 4.3.14., and
b) located in conformance with Tables 4.3.13.4.-A and 4.3.13.4.-B (see Note A-4.3.13.4.(1)(b)).

Table 4.3.13.4.-A
Indoor Tank Storage in Industrial Occupancies
Forming Part of Sentences 4.3.13.4.(1) and (2), and 4.3.13.8.(1)

Class of Liquid	Storage Level	Maximum Quantity per Storage Room[1], L One or More Tanks	
		Protected Storage[2]	Unprotected Storage
Class I	*First storey*	40 000	25 000
	Storeys above the *first storey*	7 500	Not permitted
	Basement	Not permitted	Not permitted
Classes II and IIIA	*First storey*	200 000	100 000
	Storeys above the *first storey*	20 000	Not permitted
	Basement	20 000	Not permitted

Notes to Table 4.3.13.4.-A:
(1) See Subsection 4.3.14.
(2) See Article 4.2.7.6.

Table 4.3.13.4.-B
Indoor Tank Storage in Occupancies Using Oil-Burning Equipment, Emergency Generators and Fire Pumps
Forming Part of Sentences 4.3.13.4.(1) and 4.3.13.5.(1) and (2)

Class of Liquid	Storage Level	Quantity per Protected Storage Room[1], L	
		Individual Tank	Aggregate
Classes II and IIIA	*First storey*[2]	> 2 500[3]	200 000
		> 20 000[4]	
	Basement and *storeys* above the *first storey*	> 2 500[3]	20 000
		> 20 000[4]	45 000

Notes to Table 4.3.13.4.-B:
(1) See Article 4.2.7.6.
(2) For *industrial occupancies* where the tanks are located in a separate storage room from the equipment, refer to Table 4.3.13.4.-A.
(3) See Sentence 4.3.13.5.(1).
(4) See Sentence 4.3.13.5.(2).

2) When quantities greater than those permitted for incidental use in Subsection 4.2.8. are required for special process operations, *storage tanks* for *flammable liquids* or *combustible liquids* are permitted to be located outside of a storage room referred to in Sentence (1), provided that

a) total quantities per *fire compartment* are not more than one-half the quantities permitted in Table 4.3.13.4.-A,
b) they are located on the *first storey*, and
c) the installation conforms to Articles 4.3.13.9. to 4.3.13.12.

4.3.13.5. Storage Tank Construction

1) *Storage tanks* with an individual capacity exceeding 2 500 L but not exceeding 20 000 L that are used in conformance with Table 4.3.13.4.-B shall be

a) of double-walled construction in conformance with Clause 4.3.1.2.(1)(e) or a minimum of 300 deg. secondarily contained construction, and
b) monitored for leakage in conformance with Sentence 4.4.2.1.(7).

2) *Storage tanks* with an individual capacity exceeding 20 000 L that are used in conformance with Table 4.3.13.4.-B shall

a) conform to Clause 4.3.1.2.(1)(l), and
b) be monitored for leakage in conformance with Sentence 4.4.2.1.(7).

4.3.13.6. Piping Systems

1) Piping systems serving oil-burning equipment, diesel-engine-driven emergency generators and fire pumps shall conform to CSA B139 Series, "Installation code for oil-burning equipment."

4.3.13.7. Fire Compartments

1) *Fire compartments* regulated by this Subsection shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

4.3.13.8. Mixed Storage

1) When 2 or more classes of liquids are stored in a single storage room referred to in Sentence 4.3.13.4.(1), the total quantity permitted for each class of liquid shall be calculated as follows:

$$\frac{q_{I}}{Q_{I}} + \frac{q_{II+IIIA}}{Q_{II+IIIA}} \leq 1$$

where

q_{I} = actual quantity of Class I liquids present,
$q_{II+IIIA}$ = actual quantity of Class II and IIIA liquids present,
Q_{I} = maximum quantity of Class I liquids permitted in Table 4.3.13.4.-A, and
$Q_{II+IIIA}$ = maximum quantity of Class II and IIIA liquids permitted in Table 4.3.13.4.-A.

4.3.13.9. Storage Tanks outside Storage Rooms

1) Where *storage tanks* for *flammable liquids* or *combustible liquids* are located outside of storage rooms conforming to Subsection 4.3.14.,

a) provision shall be made to contain a spill equal to at least 100% of the volume of the largest *storage tank*, or to drain away spilled *flammable liquids* or *combustible liquids*, and
b) the area in which the *storage tanks* are located shall be ventilated (see Note A-4.3.13.9.(1)(b)).

4.3.13.10. Vents

1) Except as provided in Sentence (2), normal and emergency vents for *storage tanks* in *buildings* shall be provided in conformance with Subsections 4.3.4. and 4.3.5. (See Note A-4.3.13.10.(1).)

2) The use of weak roof-to-side shell seams, designed to rupture before the allowable design stress of the *storage tank* is reached, shall not be permitted as a means of emergency venting of *storage tanks* inside *buildings*.

4.3.13.11. Supports, Foundations and Anchorage

1) Except as provided in Sentence (2), where *storage tanks* for *flammable liquids* or *combustible liquids* are installed inside *buildings*, the supports, foundations and anchorage for such *storage tanks* shall be in conformance with Subsection 4.3.3.

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2) Where a *storage tank* is suspended, rather than supported on a foundation, supports shall be designed and installed in conformance with good engineering practice. (See Note A-4.3.13.11.(2).)

4.3.13.12. Bonding and Grounding

1) Where *storage tanks* for *flammable liquids* or *combustible liquids* are installed inside *buildings*, tanks, piping and discharge equipment shall be bonded and grounded.

4.3.14. Rooms for Storage Tanks

4.3.14.1. Design and Construction

1) Rooms for *storage tanks* inside *buildings*, referred to in Sentence 4.3.13.4.(1), shall be

a) separated from the rest of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 h,
b) designed to contain a spill equal to at least 100% of the volume of the largest *storage tank*, or to drain away spilled *flammable liquids* or *combustible liquids*,
c) made liquid-tight where the walls join the floor, and
d) used for no other purposes than the storage and handling of *flammable liquids* or *combustible liquids*.

4.3.14.2. Clearances

1) A minimum clear space of 550 mm shall be maintained between the walls of a room described in Article 4.3.14.1. and the sides of any *storage tanks* within the room.

4.3.14.3. Explosion Venting

1) Where Class IA or IB liquids are dispensed within a storage room, the room shall be designed to prevent critical structural and mechanical damage from an internal explosion in conformance with NFPA 68, "Standard on Explosion Protection by Deflagration Venting." (See Note A-3.2.8.2.(1)(d).)

4.3.14.4. Placards

1) Placards conforming to Article 3.2.7.14. that identify the liquids stored as *flammable liquids* or *combustible liquids* and the capacities of the *storage tanks* shall be posted in a conspicuous location outside of the room.

4.3.15. Openings Other than Vents in Storage Tanks inside Buildings

4.3.15.1. Connections

1) Connections for all openings in *storage tanks* in *buildings* shall be liquid- and vapour-tight.

2) Connections to *storage tanks* through which liquid can flow shall be provided with valves located as close as practicable to the tank.

3) Connections for filling or emptying *storage tanks* shall be provided with a spill containment device in accordance with Sentence 4.3.6.4.(4).

4.3.15.2. Openings for Liquid Level Measurement

1) Openings that are independent of the fill pipe and are used for measuring the liquid level in *storage tanks* containing Class I or II liquids shall be equipped with a vapour-tight cap which shall be opened only when measuring the liquid level.

2) Openings referred to in Sentence (1) shall be protected against overflow and vapour pressure by means of a spring-loaded check valve.

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4.3.16. Out of Service

4.3.16.1. Underground Storage Tanks

1) When underground *storage tanks* will be out of service for a period not exceeding 180 days,

a) the liquid level in the *storage tank* shall be measured at intervals not greater than one month and a record of the measurements shall be retained in conformance with Article 2.2.1.2. of Division C,
b) fill pipe covers and covers over openings to measure liquid levels, dispensers and power controls shall be kept locked when not in use, and
c) vent piping shall be kept open.

2) Except as provided in Sentence (3), when underground *storage tanks* will be out of service for a period exceeding 180 days,

a) the *authority having jurisdiction* shall be notified, in writing, as soon as practicable,
b) the *storage tanks*, connected piping and dispensers shall be emptied of Class I liquid, and
c) fill pipe covers and covers over openings to measure liquid levels, dispensers and power controls shall be locked.

3) Where underground *storage tank* facilities are operated on a seasonal basis,

a) at the close of each season of operation,
   i) the liquid level of each *storage tank* shall be measured,
   ii) a record of the measurements shall be retained in conformance with Article 2.2.1.2. of Division C, and
   iii) all fill pipe covers and covers over openings for measuring liquid levels, dispensers and power controls shall be locked, and
b) before the start of each season of operation,
   i) the liquid level in each *storage tank* shall be measured,
   ii) the measurements shall be compared with those recorded at the close of the previous season, and
   iii) when a loss of liquid or water intrusion is apparent, immediate action shall be taken to determine and correct the condition.

4) When an underground *storage tank* is to be reused for the storage of *flammable liquids* or *combustible liquids*, the *authority having jurisdiction* shall be notified.

5) If an underground *storage tank* has been out of service for more than 12 months, the tank and piping shall be tested for leakage in conformance with Section 4.4.

4.3.16.2. Aboveground Storage Tanks

1) When an aboveground *storage tank* will be out of service or unsupervised for a period not exceeding 180 days, the piping from the tank shall be capped or the valves that are necessary to achieve similar isolation of the tank shall be closed and securely locked.

2) Where a *storage tank* referred to in Sentence (1) contains *flammable liquids* or *combustible liquids*, the liquid level in the tank shall be measured and compared with subsequent readings taken at intervals not greater than one month.

3) When an aboveground *storage tank* will be out of service or unsupervised for a period exceeding 180 days, all liquid and vapours shall be removed from the *storage tank* and its connected piping.

4) Aboveground *storage tanks* that have been out of service for a period of more than 180 days and are to be returned to service shall, where possible, be internally inspected and the *authority having jurisdiction* shall be advised of the inspection results and the intention to return the *storage tanks* to service.

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4.3.16.3. Disposal

1) When a *storage tank* is to be permanently disposed of, sufficient openings shall be cut in the tank to render it unfit for further use.

4.3.16.4. Underground Piping Systems

1) The removal, abandonment in place, disposal or temporary taking out of service of an underground piping system shall be in conformance with good engineering practice. (See Note A-4.3.16.1.(1).)

4.3.16.5. Corrosion Protection

1) Corrosion protection systems shall be maintained in operating condition when a *storage tank* is temporarily out of service and during seasonal shutdowns.

4.3.17. Removal and Abandonment in Place of Underground Storage Tanks

4.3.17.1. Removal

1) Except as permitted in Article 4.3.17.2., when an *underground storage tank system* has no further use or has been out of service for 2 years,

a) the owner shall notify the *authority having jurisdiction* in writing at least 30 days before the removal of an *underground storage tank system*,
b) *storage tanks* shall have all *flammable liquids* and *combustible liquids* removed from them,
c) *storage tanks* shall be purged of vapours and removed from the ground (see Note A-4.3.17.1.(1)(c)), and
d) the associated piping shall be
   i) purged of vapours and the ends permanently sealed by capping or plugging, or
   ii) removed from the ground.

2) If soil surrounding the *storage tanks* described in Sentence (1) is found to be contaminated, the owner shall

a) notify the *authority having jurisdiction*,
b) when requested, provide a report showing the extent of the site soil contamination, and
c) remove, treat or replace the contaminated soil in a manner acceptable to the *authority having jurisdiction*.

4.3.17.2. Abandonment in Place

1) If it is impracticable to remove an underground *storage tank*, the owner shall apply to the *authority having jurisdiction* for permission to abandon the *storage tank* in place.

2) An owner who makes application for permission to abandon a *storage tank* in place in accordance with Sentence (1) shall

a) describe in the application the reasons why it is impracticable to remove the *storage tank* and provide other information that supports the application,
b) satisfy the *authority having jurisdiction* that the soil under and around the *storage tank* has not been contaminated with petroleum product, and
c) provide confirmation that the owner of the property is aware of the application and agrees with the plan to abandon the *storage tank* in place.

3) The owner may be granted permission to abandon the *storage tank* in place if the *authority having jurisdiction* is satisfied that the *storage tank* is

a) located in whole or in part beneath a permanent *building* or other facility, making excavation impracticable,
b) of a size or type of construction that makes excavation impracticable,

c) inaccessible to the heavy equipment necessary for removal of the *storage tank*, or
d) situated so that removal of the *storage tank* would endanger the structural integrity of nearby *buildings* or other facilities.

4) If the *authority having jurisdiction* grants permission to abandon a *storage tank* in place in accordance with Sentence (3), the owner shall
a) purge the *storage tank* of vapours to less than 10% of the *lower explosive limit*,
b) check for the presence of vapours using combustible gas detection equipment,
c) arrange for a certified person to enter the *storage tank* and conduct an internal inspection of the *storage tank* for perforations,
d) notify the *authority having jurisdiction* if the *storage tank* is perforated,
e) conduct additional investigations or take remedial actions in accordance with directions issued by the *authority having jurisdiction*,
f) remove sludge from the *storage tank* and dispose of it in a manner acceptable to the *authority having jurisdiction*,
g) make holes along the top of the *storage tank* large enough to permit filling the *storage tank* with inert material,
h) fill the *storage tank* with sand, gravel, concrete or other inert material acceptable to the *authority having jurisdiction*, and
i) remove associated piping from service in conformance with Clause 4.3.17.1.(1)(d).

5) If it is considered impracticable to carry out the internal inspection required by Clause (4)(c), the owner shall conduct precision leak tests if so directed by the *authority having jurisdiction*. (See Section 4.4.)

Section 4.4. Leak Detection of Storage Tanks and Piping Systems

4.4.1. General

4.4.1.1. Application

1) Except as provided in Sentence (2) and except as otherwise specified in this Code, this Section provides the minimum requirements regarding the detection of leaks in aboveground and underground *storage tanks*, piping systems and sumps.

2) This Section shall not apply to *storage tanks* that have been taken out of service in compliance with the applicable provisions of Subsections 4.3.16. and 4.3.17.

4.4.1.2. Frequency and Methods of Leak Detection Testing and Monitoring

1) Every *storage tank*, piping system and sump, including those at *fuel-dispensing stations*, shall be tested and monitored for leaks in conformance with Tables 4.4.1.2.-A to 4.4.1.2.-E, which establish the minimum requirements regarding the frequency and methods to be used for
a) commissioning testing,
b) subsequent in-service monitoring, and
c) testing when a leak is suspected.
(See Note A-4.4.1.2.(1).)

2) The methods referred to in Sentence (1) shall conform to Subsections 4.4.2. to 4.4.4.

3) The commissioning testing referred to in Sentence (1) shall be performed at the time of installation
a) once backfill and surfacing have been completed but before being put into service, in the case of an underground *storage tank* or underground piping system,

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b) before being put into service, in the case of an aboveground *storage tank* or exposed piping system, and
c) once the final surface materials have been installed but before being put into service, in the case of a sump.

4) The frequency of the in-service monitoring referred to in Sentence (1) shall be calculated from the date of the commissioning test.

5) Immediate action shall be taken when a leak is suspected and the leak detection testing referred to in Sentence (1) shall be performed if
a) a loss of liquid or a gain of water is indicated by any of the leak detection measures described in this Section, or
b) the level of water at the bottom of an underground *storage tank* exceeds 50 mm.

6) Where *dispenser sumps*, *transition sumps* and *turbine sumps* are provided with electronic monitoring devices in accordance with Sentence 4.3.9.3.(1), the devices shall be interlocked with the dispenser or pump to shut it down upon detection of either product or a high liquid level.

7) The minimum requirements referred to in Sentence (1) shall not preclude the appropriate use of alternative solutions, innovative new technologies, or methods capable of achieving the same objectives. (See Note A-4.4.1.2.(7).)

Table 4.4.1.2.-A
Leak Detection Testing and Monitoring of Underground Storage Tanks
Forming Part of Sentences 4.4.1.2.(1) and 4.4.2.1.(5)

Type of Containment	Commissioning Test	In-Service Monitoring		Leak Suspected
		Continuous	Periodic	
Single-walled[1]	Not applicable[2]	Inventory Reconciliation	Precision Leak Detection Test every 2 years	Precision Leak Detection Test
		Inventory Reconciliation and Monitoring Wells	Precision Leak Detection Test every 5 years	
		Statistical Inventory Reconciliation (SIR)		
		Automatic Tank Gauge	None required	
		Continuous In-Tank Leak Detection		
Double-walled[3]	Precision Leak Detection Test or *Secondary Containment* Test[4]	*Secondary Containment* Monitoring	None required	Precision Leak Detection Test or *Secondary Containment* Test[4]

Notes to Table 4.4.1.2.-A:
(1) Applies to single-walled *storage tanks* of typical construction, including *storage tanks* that do not meet the requirements for double-walled *storage tanks*.
(2) Not applicable because underground *storage tanks* must be of double-walled construction as per Sentence 4.3.8.1.(1).
(3) Applies to double-walled *storage tanks*, which have an interstitial space that allows for monitoring using high- or low-tech methods.
(4) The *Secondary Containment* Test is a precision test capable of detecting leaks in the interstitial space of the *storage tank*. Risers, connections and vents are also susceptible to leakage and must therefore also be precision-tested.

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Table 4.4.1.2.-B
Leak Detection Testing and Monitoring of Aboveground Storage Tanks
Forming Part of Sentence 4.4.1.2.(1)

Type of Containment[1]	Commissioning Test	In-Service Monitoring		Leak Suspected
		Continuous	Periodic	
Contained open[2] vertical tank	Visual inspection[3] during Liquid Media Test	Inventory Reconciliation and *Secondary Containment* Monitoring	API STD 653 or Tank floor inspection every 10 years	API STD 653 or Tank floor inspection
Contained open[2] horizontal tank	Visual inspection[3] during Liquid Media Test		None required	Visual inspection[3]
Double-walled[4]	Visual inspection[3]	*Secondary Containment* Monitoring	None required	*Secondary Containment* Test

Notes to Table 4.4.1.2.-B:
(1) See Subsection 4.3.7.
(2) Applies to *storage tanks* contained in an open arrangement that do not meet the requirements for double-walled *storage tanks*.
(3) Visual leak detection may apply to single- or double-walled *storage tanks* and piping. See Sentence 4.4.2.1.(8).
(4) Applies to double-walled *storage tanks*, which have an interstitial space that allows for monitoring using high- or low-tech methods.

Table 4.4.1.2.-C
Leak Detection Testing and Monitoring of Underground Piping Systems
Forming Part of Sentence 4.4.1.2.(1)

Type of Containment	Commissioning Test	In-Service Monitoring		Leak Suspected
		Continuous	Periodic	
Single-walled[1] and single-walled, buried mechanical threaded connections[2]	Not applicable[3]	Inventory Reconciliation	Pipe Leak Detection Test[4] every 2 years (annually for mechanical connections)	Pipe Leak Detection Test[4]
		Inventory Reconciliation and Monitoring Wells	Pipe Leak Detection Test[4] every 5 years (annually for mechanical connections)	
		SIR		
		Single Check Valve[5]		
		Electronic Line Leak Detection (with a detectable limit of 0.76 L/h monthly)	Electronic Line Leak Detection (with a detectable limit of 0.38 L/h annually)	
		Continuous Electronic Line and Tank Leak Detection (with a detectable limit of 0.76 L/h monthly)	Continuous Electronic Line and Tank Leak Detection (with a detectable limit of 0.38 L/h annually)	
Double-walled[6]	Pipe Leak Detection Test and *Secondary Containment* Test[7]	*Secondary Containment* Monitoring	None required	Pipe Leak Detection Test[4] or *Secondary Containment* Test[7]

Notes to Table 4.4.1.2.-C:
(1) Applies to single-walled piping systems of typical construction, including piping systems that do not meet the requirements for double-walled piping systems.
(2) See Article 4.5.5.6.
(3) Not applicable because underground piping systems must be of double-walled construction as per Sentence 4.5.6.1.(1).
(4) The Pipe Leak Detection Test results shall conform to Sentence 4.4.3.4.(9) with a probability of detection of 0.95 or greater and a probability of false alarm of 0.05 or less.
(5) Applies to suction line only.
(6) Applies to double-walled piping systems, which have an interstitial space that allows for monitoring using high- or low-tech methods. Monitoring of the sump using high-tech methods in accordance with Table 4.4.1.2.-E is considered as meeting the requirements for monitoring of an open-draining interstitial space of double-walled piping.
(7) The *Secondary Containment* Test shall conform to Article 4.4.3.3.

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Table 4.4.1.2.-D
Leak Detection Testing and Monitoring of Exposed Piping Systems
Forming Part of Sentence 4.4.1.2.(1)

Type of Containment	Commissioning Test	In-Service Monitoring		Leak Suspected
		Continuous	Periodic	
Single-walled(1)	Pipe Leak Detection Test	Visual inspection(2)	None required	Identify and repair
Flexible hose lines over water			Pipe Leak Detection Test(3) every 12 months	
Double-walled(4)		*Secondary Containment* Monitoring	None required	Identify and repair
Contained open(5)		Visual inspection(2)	None required	Identify and repair

Notes to Table 4.4.1.2.-D:
(1) Applies to single-walled piping systems of typical construction, including piping systems that do not meet the requirements for double-walled or contained open piping systems.
(2) See Sentence 4.4.2.1.(8).
(3) The Pipe Leak Detection Test results shall conform to Sentence 4.4.3.4.(9) with a probability of detection of 0.95 or greater and a probability of false alarm of 0.05 or less.
(4) Applies to double-walled piping systems with an interstitial space contiguous to the primary containment that can be monitored using high- or low-tech methods.
(5) Applies to piping systems contained in an open arrangement that do not meet the requirements for double-walled piping systems and do not conform to Subsection 4.3.7.

Table 4.4.1.2.-E
Leak Detection Testing and Monitoring of Turbine, Transition, Dispenser and Spill Containment Sumps
Forming Part of Sentence 4.4.1.2.(1)

Type of Containment	Commissioning Test	In-Service Monitoring		Leak Suspected
		Continuous	Periodic	
Dispenser, *turbine* and *transition sumps*	Static Liquid Media Leak Detection Test(1)	Weekly visual inspection or electronic monitoring(2)	Annual visual inspection(3)	Identify and repair
Spill containment sumps		Weekly visual inspection at fill point		

Notes to Table 4.4.1.2.-E:
(1) See Article 4.4.3.5.
(2) Electronic monitoring devices need to be tested at least once annually in conformance with the manufacturer's recommendations.
(3) See Note A-4.4.1.2.(1).

4.4.1.3. Remedial Action

1) Except as provided in Sentence (2), when a leak detection test required by this Section detects a leak in a *storage tank*, piping system or sump, the leaking components or system shall be
a) repaired and tested,
b) replaced, or
c) removed.

2) When a leak detection test required by this Section detects a leak in a single-walled construction underground *storage tank* or piping system, the leaking components or system shall be
a) replaced in conformance with Articles 4.3.8.1. and 4.5.6.1., or
b) taken out of service in conformance with Subsection 4.3.16.

3) Where a leak is detected as described in Sentence (1) or (2), the escaped liquid shall be removed in conformance with Subsection 4.1.6.

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4.4.1.4. Retention of Records

1) Records of the tests referred to in this Section shall be retained in conformance with Article 2.2.1.2. of Division C.

4.4.2. Leak Detection Testing and Monitoring Methods

4.4.2.1. Definition and Performance of Leak Detection Testing and Monitoring Methods

1) This Subsection applies to the leak detection testing and monitoring methods referred to in this Section.

2) Inventory reconciliation referred to in this Section shall
a) for the time period designated, determine product loss or gain based on the reconciliation of
   i) change in physical inventory,
   ii) inventory additions (deliveries),
   iii) inventory removals (sales), and
   iv) miscellaneous inventory alterations, and
b) determine the level of water in the tank.
(See Note A-4.4.2.1.(2).)

3) A leak detection method that monitors vapours in the soil or liquids on the groundwater shall conform to good engineering practice and meet the requirements of vapour monitoring or groundwater monitoring systems. (See Note A-4.4.2.1.(3).)

4) Statistical inventory reconciliation (SIR) methodology shall be capable of detecting a leak
a) of 0.38 L/h with a probability of detection of 0.95 or greater and a probability of false alarm of 0.05 or less, based on an inventory record of specified length to be considered as an annual test, or
b) of 0.76 L/h with a probability of detection of 0.95 or greater and a probability of false alarm of 0.05 or less, based on an inventory record of specified length to be considered as a monthly test.
(See Note A-4.4.2.1.(4).)

5) Where inventory reconciliation is performed using automatic tank gauging referred to in Sentence (2), the system shall conform to good engineering practice and meet the requirements of a precision leak detection test when a leak is suspected in conformance with Table 4.4.1.2.-A. (See Note A-4.4.2.1.(5).)

6) A continuous in-tank leak detection system shall conform to good engineering practice and meet the requirements of a precision leak detection test. (See Note A-4.4.2.1.(6).)

7) High-tech *secondary containment* monitoring referred to in this Section shall include the use of an automatic device that continuously monitors the interstitial space between the inner tank or inner piping and the *secondary containment*. (See Sentence 4.3.7.7.(1).) (See Note A-4.4.2.1.(7) for low-tech method.)

8) Visual inspection referred to in this Section shall,
a) in the case of an exposed piping system, conform to Article 4.5.10.5., and
b) in the case of an aboveground *storage tank*, consist of
   i) a visual examination of the tank shell, or
   ii) if the bottom of the tank is not amenable to a visual examination, testing the bottom of the tank (see Note A-4.4.2.1.(8)(b)(ii)).

9) A static liquid media leak detection test shall conform to Article 4.4.3.5.

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10) The precision leak detection test for underground *storage tanks* that is referred to in this Section shall

a) be capable of detecting a *storage tank* leak rate as small as 0.38 L/h within 24 h with a probability of detection of 0.95 or greater and a probability of false alarm of 0.05 or less (see Note A-4.4.2.1.(10)(a)), and
b) be conducted by an individual who has been trained in the proper care and use of the test equipment and the operating procedures.

(See also Sentences 4.4.3.1.(2) and (3).)

11) Pipe leak detection referred to in this Section shall conform to ULC/ORD-C107.12, "Line Leak Detection Devices for Flammable Liquid Piping." (See also Articles 4.4.3.3. and 4.4.3.4.)

12) A single vertical check valve referred to in this Section shall

a) consist of a vertical check valve located immediately under the pump,
b) be installed with no other check valve between the suction pump and the *storage tank*, and
c) be part of an installation where lines must be sufficiently sloped so that any liquid in the line will drain back into the *storage tank* should a leak occur in the piping system.

(See Note A-4.4.2.1.(12).)

4.4.3. Leak Detection Testing of Storage Tanks, Piping Systems and Sumps

4.4.3.1. Leak Detection Tests

1) Where field test methods are included in the *storage tank* construction standards referred to in Articles 4.3.1.2. and 4.3.1.3., such tests shall be permitted for *storage tanks* conforming to those standards.

2) If a precision leak detection test referred to in Sentence 4.4.2.1.(10) detects a leak rate exceeding 0.38 L/h on an underground *storage tank*, the tank shall be considered to be leaking.

3) During a leak detection test on a *storage tank*, the pressure at the bottom of the tank shall not exceed the tank manufacturer's specifications.

4.4.3.2. Pneumatic Leak Detection Tests

1) Pneumatic leak detection tests using compressed air shall not be performed on *storage tanks* and piping systems having once contained *flammable liquids* or *combustible liquids*.

2) Except as provided in Sentence (1), pneumatic leak detection tests using compressed air or an inert gas shall include the application of soap and water to the *storage tank* and piping surface, fittings, joints and connections to help in the detection of leaks.

3) In the case of underground *storage tanks* or piping, the test referred to in Sentence (2) shall be conducted prior to covering the tank or piping system.

4) Where a pneumatic leak detection test is conducted before an underground *storage tank* is backfilled, in the case of a new tank, or after the tank is uncovered, in the case of a previously installed tank, the test pressure shall be in conformance with the production testing requirements of

a) CAN/ULC-S603, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids," or
b) CAN/ULC-S615, "Standard for Fibre Reinforced Plastic Underground Tanks for Flammable and Combustible Liquids."

5) Pneumatic leak detection tests shall not be performed on field-erected aboveground *storage tanks*.

6) Measures shall be taken to guard against the hazards associated with pneumatic leak detection testing in areas where explosive mixtures of *flammable liquid* or

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combustible liquid vapours and air may be present in the vicinity of a *storage tank* that has been in use.

4.4.3.3. Protocols for Pneumatic Leak Detection Testing of Piping Systems

1) A pressure decline test using an inert gas is permitted to be used as a leak detection test for piping systems that

a) are new or in use, and
b) convey a volume of less than 1 000 L.

2) A pressure decline test performed on a piping system shall conform to Sentences (3) to (9).

3) The design and installation of the piping system permitting, the piping system's contents shall be drained prior to conducting the pressure decline test procedure.

4) Pumps, dispensers and other auxiliary equipment that are connected to the piping system and cannot withstand the pressure of the test shall be isolated from the test procedure to prevent damage to the equipment.

5) A stabilization period of up to 30 min is required after pressurization.

6) Pipe volumes of 500 L or less shall be pressurized for at least 60 min after stabilization.

7) Pipe volumes greater than 500 L but less than 1 000 L shall be pressurized for at least 2 h after stabilization.

8) Test pressures shall

a) be the greater of 350 kPa (gauge) or 1.5 times the maximum operating pressure, and
b) not exceed the piping manufacturer's test specifications.

9) The piping system shall be considered to be leaking if any pressure decline is detected within the time periods stated.

4.4.3.4. Protocols for Liquid Media Leak Detection Testing of Piping Systems

1) Liquid media leak detection testing of piping systems shall conform to Sentences (2) to (9).

2) Test devices and methods shall conform to the performance requirements of ULC/ORD-C107.12, "Line Leak Detection Devices for Flammable Liquid Piping."

3) Tests shall be conducted by an individual who has been trained in the proper use of the test device and the operating procedures.

4) A sufficient amount of time shall be allocated to stabilize the temperature of the liquid throughout the volume of the piping during the test.

5) Except as provided in Sentences (6) and (7), test pressure shall

a) be the greater of 350 kPa (gauge) or 1.5 times the maximum operating pressure, and
b) not exceed the piping manufacturer's test specifications.

6) Test pressures exceeding 700 kPa (gauge) shall not be permitted unless the piping system is designed for such pressures.

7) Where test pressures exceed the design pressures for pumps or similar components connected to the piping system being tested, such pumps or components shall be isolated from the test procedure.

8) Class I liquids shall not be used for pressure testing piping systems, except that pressure piping normally containing Class I liquids is permitted to be tested with such liquids at pressures not exceeding their maximum operating pressures.

9) The piping system shall be considered to be leaking if the leak rate exceeds 0.38 L/h.

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4.4.3.5. Protocols for Leak Detection Testing of Sumps

1) Static liquid media leak detection testing of *turbine*, *transition*, *dispenser* and pump sumps shall conform to Sentences (2) to (4).

2) Static liquid media testing of sumps shall be performed at the installation stage after all electrical and mechanical work passing through the sump wall has been completed, but before any backfilling around the exterior of the sump is completed.

3) The liquid used for the test shall
a) exceed the elevation of the piping and other points of entry into the sump by at least 50 mm, and
b) not be a *flammable liquid* or a *combustible liquid*.

4) The minimum duration of the test shall be 1 h with no visual or measured evidence of leakage.

4.4.4. Leak Detection Monitoring of Storage Tanks and Piping Systems

4.4.4.1. Inventory Reconciliation

(See Note A-4.4.4.1.)

1) Where inventory reconciliation is required by this Section, the liquid level in any *storage tank* shall be measured at intervals not greater than 7 days in conformance with Sentences (2) to (4), except that at *fuel-dispensing stations* the measurements shall be taken each day the station is in operation.

2) The level of water at the bottom of an underground *storage tank* shall be measured at intervals not greater than 7 days, except that at *fuel-dispensing stations* the measurements shall be taken each day the station is in operation.

3) Investigative action shall be undertaken if the inventory reconciliation described in Sentence 4.4.2.1.(2) indicates the following inexplicable conditions:
a) a monthly loss of
   i) 0.5 percent or more of the throughput from an underground *storage tank*, or
   ii) 1.0 percent or more of the throughput from an aboveground *storage tank*,
b) three consecutive losses greater than 200 L/day, and
c) a water level greater than 50 mm.

4) A record of the measurements for each *storage tank* and of the computations described in Sentence (3) shall be retained in conformance with Article 2.2.1.2. of Division C.

4.4.4.2. Leakage Detection

1) Where continuous leak detection is provided on an underground piping system, it shall conform to ULC/ORD-C107.12, "Line Leak Detection Devices for Flammable Liquid Piping."

Section 4.5. Piping and Transfer Systems

4.5.1. Scope

4.5.1.1. Application

1) This Section applies to piping and transfer systems for *flammable liquids* and *combustible liquids*.

2) Except where otherwise stated in this Part, this Section shall not apply to the following:
a) tubing or casings and piping for oil or gas wells,
b) transmission pipelines,

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c) piping for vehicles, aircraft, watercraft and portable or stationary engines,
d) piping systems in *fuel-dispensing stations* and *distilleries*, and
e) piping that falls within the scope of the applicable provincial or territorial codes regulating boilers and *pressure vessels*.

4.5.2. Materials for Piping, Valves and Fittings

4.5.2.1. Materials

1) Materials for piping systems containing *flammable liquids* or *combustible liquids* shall be suitable for the maximum anticipated working pressures and operating temperatures and for the chemical properties of the contained liquid.

2) Except as provided in Sentence (3), the use of the following materials for piping systems referred to in Sentence (1) shall not be permitted:
a) materials that are subject to failure from internal stress or rupture by mechanical damage, or
b) combustible or low-melting-point materials that are subject to failure even in moderate fires.

3) Metallic and non-metallic piping systems are permitted to be used for underground installations, provided they conform to CAN/ULC-S679, "Standard for Metallic and Nonmetallic Underground Piping for Flammable and Combustible Liquids."

4) Except as provided in Sentence (5), where steel piping is used, it shall conform to
a) API SPEC 5L, "Line Pipe,"
b) ASTM A53/A53M, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless," or
c) CSA Z245.1, "Steel pipe."

5) Where service pressures exceeding 875 kPa (gauge) may occur, piping and fittings shall be designed in conformance with ASME B31.3, "Process Piping."

6) Underground piping systems shall include piping in tank sumps, *transition sumps* and *dispenser sumps*.

4.5.2.2. Special Materials

1) Where problems of corrosion, contamination, or sanitation or standards of purity require special materials, it is permitted to use non-metallic materials for piping, valves and fittings in conformance with Clause 1.2.1.1.(1)(b) of Division A.

4.5.3. Corrosion Protection of Piping Systems

4.5.3.1. Corrosion Protection

1) Underground metallic piping systems in contact with the soil or groundwater shall be protected against corrosion in conformance with
a) CAN/ULC-S603.1, "Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids," or
b) NACE SP0169, "Control of External Corrosion on Underground or Submerged Metallic Piping Systems."

4.5.4. Identification of Piping Systems

4.5.4.1. Identification

1) Pipelines for *flammable liquids* or *combustible liquids* shall be marked with the contents of the line, and these markings shall be maintained in a clearly legible form.

2) Piping for *flammable liquids* or *combustible liquids* shall not be painted red.

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3) Transfer points in piping systems for *flammable liquids* and *combustible liquids* shall be identified in conformance with CFA 1990, "Using the Canadian Fuels Colour-Symbol System to Mark Equipment and Vehicles For Product Identification."

4.5.4.2. Documentation

1) Documentation on the piping systems for *flammable liquids* or *combustible liquids*, including the tank and pumping arrangements, shall be made available to the fire department upon request.

2) Documents referred to in Sentence (1) shall be kept at two separate locations so that one copy remains readily available in the event the other is inaccessible due to fire.

4.5.5. Joints in Piping Systems

4.5.5.1. Threaded Joints

1) Threaded joints in piping systems for *flammable liquids* or *combustible liquids* shall be made using joint compound or polytetrafluoroethylene tape conforming to CAN/ULC-S642, "Standard for Compounds and Tapes for Threaded Pipe Joints."

4.5.5.2. Welded Piping

1) Welding of piping for *flammable liquids* or *combustible liquids* shall conform to Section 5.2. and to the appropriate provincial or territorial regulations or municipal bylaws, or in the absence of such regulations, to API STD 1104, "Welding of Pipelines and Related Facilities."

2) Flanged joints for piping shall be provided in welded systems at intervals that will facilitate dismantling and avoid subsequent in-place cutting and welding operations.

4.5.5.3. Flanged Joints

1) Except as permitted in Sentence (2), flanged joints for piping shall be made with forged or cast steel flanges designed, constructed and installed in conformance with ASME B16.5, "Pipe Flanges and Flanged Fittings: NPS ½ through NPS 24 Metric/Inch Standard."

2) Bronze flanges for 50 mm diameter or smaller size piping referred to in Article 4.5.5.2. are permitted to be used where copper and brass piping is permitted.

4.5.5.4. Bolting Materials

1) Bolting materials for flanged connections in steel piping systems for *flammable liquids* or *combustible liquids* shall be of alloy steel equivalent to ASTM A193/A193M, "Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications," Grade B-7.

4.5.5.5. Gaskets

1) Gaskets in flanged connections shall be of a material resistant to the liquid being carried and capable of withstanding temperatures of at least 650°C without damage that would impair their function.

4.5.5.6. Mechanical Connections

(See Note A-4.5.5.6.)

1) Mechanical connections in underground piping systems shall
a) be readily accessible for inspection and maintenance,
b) not be in direct contact with the soil, and
c) be provided within a *transition sump*.

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4.5.5.7. Penetrations into Sumps

1) All penetrations into a sump shall be situated at least 50 mm from the bottom of the sump. (See Note A-4.5.5.7.(1).)

4.5.6. Location and Arrangement of Piping

4.5.6.1. Construction

1) Except for vent risers and vertical fill piping systems, underground piping systems shall be of double-walled construction. (See Note A-4.5.6.1.(1).)

4.5.6.2. Location

1) Piping shall be installed outdoors whenever possible and located so it will not create a hazard to *buildings* or equipment.

2) Where piping for *flammable liquids* or *combustible liquids* is installed within a *building*, the length of piping shall be as direct and as short as practicable.

3) It is not permitted to use any portion of a piping system in a manner that could damage it or for any purpose other than the transfer of product.

4) Vent piping and connections for filling and emptying *storage tanks* shall be located in conformance with Section 4.3.

4.5.6.3. Supports for Aboveground Outdoor Piping

1) Aboveground outdoor piping shall be supported and arranged to prevent excessive vibration and stress on equipment connected to it.

2) Where vehicular, watercraft or aircraft impact or physical damage is possible, protective guarding devices shall be provided for aboveground outdoor piping.

3) Aboveground piping systems shall be supported such that they are not in direct contact with the surface of the ground.

4.5.6.4. Arrangement of Aboveground Outdoor Piping

1) Aboveground outdoor piping shall not be located
a) on the exterior of walls except on those of *noncombustible construction*, or
b) above windows.

2) Aboveground outdoor piping shall not be located above roofs, except above roofs of impermeable and *noncombustible construction* with provision for accidental spillage provided in conformance with Subsection 4.1.6.

3) Where aboveground piping crosses roadways or railway sidings, ample overhead clearance and warning signs indicating the clearance height shall be provided.

4) Piping passing though the *secondary containment* walls of an aboveground *storage tank* shall be designed to prevent excessive stress resulting from settlement or fire exposure.

4.5.6.5. Arrangement of Underground Piping

1) Underground piping shall be located so it will not be damaged as a result of vibrations or settling of an adjacent *building* or structure.

2) Underground piping shall be located not less than 300 mm away from the foundations of any *building* or structure, except where such piping enters the *building* as permitted in Article 4.5.6.8.

3) Piping passing under railway tracks shall be installed in conformance with TC 2001, "Standards Respecting Pipeline Crossings Under Railways."

4) Piping adjacent to railway tracks shall be installed in conformance with TC General Order No. O-32, C.R.C., c. 1148, "Flammable Liquids Bulk Storage Regulations."

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4.5.6.6. Installation of Underground Piping

1) Underground piping shall be
a) supported on
   i) undisturbed or compacted soil, or
   ii) not less than 150 mm of clean sand, pea gravel or clean crushed stone, and
b) backfilled on the top and sides with not less than
   i) 300 mm of pea gravel or clean crushed stone, or
   ii) 300 mm of clean sand, free of cinders and stones, and compacted in layers not more than 300 mm thick.

4.5.6.7. Piping in Service Tunnels

1) Piping for *flammable liquids* or *combustible liquids* shall not be located in service tunnels that are used for pedestrian traffic other than maintenance personnel.

4.5.6.8. Piping at Entrances to Buildings

1) Piping for *flammable liquids* or *combustible liquids* shall be located aboveground where the piping enters a *building*.

2) Piping referred to in Sentence (1) shall be provided with inside and outside shut-off valves.

3) Where piping referred to in Sentence (1) passes through a wall that would restrict the expansion or contraction of the piping, pipe sleeves shall be provided at the wall penetration to facilitate such movement.

4.5.6.9. Indoor Piping

1) Indoor piping for *flammable liquids* or *combustible liquids* shall either be supported overhead or be located in trenches conforming to Article 4.5.6.10.

2) Piping referred to in Sentence (1) shall not be installed under combustible flooring.

3) Piping in trenches referred to in Sentence (1) shall be covered with noncombustible material.

4.5.6.10. Piping in Trenches

1) Where indoor piping for *flammable liquids* or *combustible liquids* is installed in trenches, a trapped drainage system shall be provided.

2) When piping referred to in Sentence (1) contains Class I liquids, the trench shall be provided with ventilation designed to prevent the accumulation of flammable vapours in accordance with Sentence 6.9.1.2.(2) of Division B of the NBC(AE).

4.5.6.11. Overhead Piping

1) Overhead piping for *flammable liquids* or *combustible liquids* shall be installed close to the ceiling or beams or along walls not less than 1.8 m above the floor to protect it against mechanical damage.

2) Where practicable, overhead piping referred to in Sentence (1) shall be supported from *building* framing members.

3) In *buildings* of steel frame construction, piping referred to in Sentence (1) shall be fastened to steel beams or columns by pipe hangers attached to the flanges.

4) Piping under concrete ceilings shall be suspended with the use of through bolts or expansion shields.

4.5.6.12. Supports for Overhead Piping

1) Piping shall be supported on pipe hangers or other supports so that allowable stresses in the pipe are not exceeded. (See Note A-4.5.6.12.(1).)

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2) Anchors of the expansion shield type used to suspend piping shall not be used to suspend piping from unsound or lightweight concrete or from gypsum assemblies.

4.5.6.13. Protection of Pipe Risers

1) Exposed pipe risers shall be protected against mechanical damage by
a) installing such risers
   i) adjacent to walls or pilasters,
   ii) between flanges of steel columns, or
   iii) within securely anchored larger perforated pipe, and
b) providing mechanical guards where the risers are exposed to mobile equipment.

4.5.6.14. Provision for Expansion and Contraction

1) In the design of piping systems for *flammable liquids* or *combustible liquids,* provision shall be made for the expansion and contraction of the piping system and of the product it conveys.

2) To prevent excessive stresses resulting from vibration, settling or temperature changes,
a) flexible non-metallic hose connectors conforming to CAN/ULC-S633, "Standard for Flexible Connector Piping for Fuels Connectors for Flammable and Combustible Liquids," are permitted to be used where necessary in underground piping systems carrying *flammable liquids* or *combustible liquids*,
b) flexible metallic and non-metallic pipe and fittings conforming to CAN/ULC-S679, "Standard for Metallic and Nonmetallic Underground Piping for Flammable and Combustible Liquids," are permitted to be used where necessary in underground piping systems carrying *flammable liquids* or *combustible liquids*, or
c) flexible metallic hose connectors conforming to ULC/ORD-C536, "Flexible Metallic Hose," are permitted to be used where necessary in aboveground and underground piping systems carrying *flammable liquids* or *combustible liquids*.

4.5.7. Valves in Piping Systems

4.5.7.1. Design

1) Except as provided in Sentences (2) and (3), valves in piping systems for *flammable liquids* or *combustible liquids* shall be designed to accommodate the temperatures and pressures of those systems and shall conform to ULC/ORD-C842, "Guide for the Investigation of Valves for Flammable and Combustible Liquids."

2) Every hose nozzle valve shall conform to CAN/ULC-S620, "Standard for Hose Nozzle Valves for Flammable and Combustible Liquids."

3) Every emergency valve shall conform to CAN/ULC-S651, "Standard for Emergency Valves for Flammable and Combustible Liquids."

4.5.7.2. Shut-off Valves

1) Shut-off valves shall be provided in all *flammable liquid* or *combustible liquid* piping and pumping systems.

2) Where practicable, valves referred to in Sentence (1) shall be located outdoors or be immediately accessible from outdoors.

3) Except as permitted in Sentence (4), steel shut-off valves shall be provided
a) at connections to all aboveground *storage tanks*,
b) on supply piping where it enters *buildings* or structures,
c) on branch lines from the main supply line,
d) on supply lines at dispensing locations,
e) to isolate one part of a piping system from another, and
f) to isolate meters and air eliminators.

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4) Stainless steel, monel metal or lined steel bodied valves are permitted to be used when special conditions warrant their use.

4.5.7.3. Diaphragm Valves

1) Diaphragm valves shall have no direct connections between the liquid and air sections that might permit leakage of the liquid past the packing into the air lines.

4.5.7.4. Globe Valves

1) Globe valves shall be arranged so that the packing is on the low pressure side.

4.5.7.5. Indicating Valves

1) Rising stem or other indicating valves shall be used where necessary to determine whether the valves are open or shut.

4.5.7.6. Identification

1) All valves shall be identified in conformance with CFA 1990, "Using the Canadian Fuels Colour-Symbol System to Mark Equipment and Vehicles For Product Identification."

2) Every identification tag shall be kept clean so that its colour and inscription are easily recognizable.

4.5.8. Heating of Piping Systems

4.5.8.1. Design

1) Heating equipment for piping systems containing *flammable liquids* or *combustible liquids* shall be designed not to overheat or create an ignition source for the liquids being heated.

4.5.8.2. Steam Heating

1) *Flammable liquid* and *combustible liquid* piping is permitted to be heated by steam lines provided the minimum steam temperature and pressure to make the liquid fluid are used and Sentences (2) and (3) are complied with.

2) A pressure regulator shall be provided in the steam line with a relief valve on the downstream side of the regulator.

3) Piping and steam lines shall be enclosed in insulation conforming to the NBC(AE).

4.5.8.3. Electrical Heating Cables

1) Electrical heating cables including electrical induction heating shall conform to Subsection 4.1.4.

4.5.8.4. Thermal Electrical Conduction Heating

1) Thermal electrical conduction heating conforming to Sentence (2) is permitted to be used by passing a low-voltage alternating current through the pipe.

2) Systems permitted in Sentence (1) shall be installed and tested as complete units and shall conform to the following:

a) unheated sections of piping shall be isolated from heated sections by means of nonconductive fittings,
b) thermostatic controls, high temperature limit controls and fuses shall have the lowest practical rating to ensure satisfactory operation,
c) all parts of the piping and fittings shall be enclosed by insulating coverings of a type that will prevent accidental grounding of the systems, and
d) switches, transformers, contactors and other spark-producing equipment shall be located in an area not subject to flammable vapours.

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3) Upon completion of installation, systems permitted in Sentence (1) shall be tested to ensure that all components are functioning as intended.

4.5.8.5. Open Flames

1) The use of open flames as a heat source shall not be permitted for heating piping for *flammable liquids* or *combustible liquids*.

4.5.9. Methods of Transfer in Piping Systems

4.5.9.1. Location of Outdoor Pumps

1) Pumps for *flammable liquid* or *combustible liquid* piping systems installed aboveground and outside of *buildings* shall be located not less than

a) 3 m from the property line, and
b) 1.5 m from *building* openings.

4.5.9.2. Pump Houses and Pump Rooms

1) Pumps located indoors shall be in rooms built in conformance with Subsection 4.2.9. (See Note A-4.5.9.2.(1).)

2) Pump houses and pump rooms shall not be used for any purpose other than to serve the pumping equipment.

4.5.9.3. Pits

1) Pits for subsurface pumps for piping systems or for piping connected to submersible pumps shall be designed to withstand the forces to which they may be subjected without causing damage to the system.

2) Pits provided in conformance with Sentence (1) shall not be larger than necessary for inspection and maintenance and shall be provided with a cover.

4.5.9.4. Control Switches

1) Pumps for piping systems shall be provided with duplicate control switches to shut down the pumps in case of emergency, with one located in the operating area and the other at a remote location.

4.5.9.5. Hydraulic Transfer Systems

1) Where *flammable liquids* or *combustible liquids* are transferred by water pressure as a result of displacement, such system shall not be used for liquids that are miscible in water.

2) All *pressure vessels* for hydraulic transfer systems referred to in Sentence (1) shall be constructed, installed and tested in conformance with ASME BPVC, "Boiler and Pressure Vessel Code."

3) Hydraulic transfer systems referred to in Sentence (1) shall be designed to prevent water pressure in excess of the design pressure of the tank or piping.

4) Operating pressures shall be controlled by a constant-level float valve or a pressure-regulating valve on the water supply side of the hydraulic transfer system referred to in Sentence (1).

5) Hydraulic transfer systems referred to in Sentence (1) shall be arranged so that there is no water pressure on the system except when liquid is being discharged.

6) Check valves shall be provided for both water and *flammable liquid* or *combustible liquid* piping to prevent backflow in hydraulic transfer systems referred to in Sentence (1).

4.5.9.6. Inert Gas Transfer Systems

1) Where *flammable liquids* or *combustible liquids* are transferred as a result of displacement by the expansion of nitrogen, carbon dioxide or other inert gases, all

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pressure vessels involved shall be constructed, installed and tested in conformance with ASME BPVC, "Boiler and Pressure Vessel Code."

2) Pressure regulators for inert gas transfer systems referred to in Sentence (1) shall be provided in the gas line to control the pressure of the gas at the minimum pressure required to force the liquid through the piping system at the required rate.

3) A relief valve with a slightly higher setting than the pressure required in Sentence (2) shall be provided on the downstream side of the regulator or on the tank.

4) Means of automatically shutting off the gas supply and bleeding the gas pressure in the event of fire shall be provided on all inert gas transfer systems referred to in Sentence (1).

4.5.9.7. Non-Inert Gas Transfer

1) Except as permitted in Sentence (2), the transfer of *flammable liquids* or *combustible liquids* in a closed piping system by means of compressed air or other non-inert gas pressure shall not be permitted.

2) A non-inert gas pressure is permitted to be used in a closed piping system referred to in Sentence (1), provided

a) it is the vapour or gas of the *flammable liquid* or *combustible liquid* being transferred, or
b) it is a vapour or gas that will not support combustion reaction and is non-reactive with the *flammable liquid* or *combustible liquid* being transferred.

4.5.10. Operating Procedures for Piping Systems

4.5.10.1. Procedures

1) Standard procedures for normal operation and for emergencies shall be given in printed form to all employees engaged in the operation of equipment for the transfer of *flammable liquids* or *combustible liquids* and shall be posted for convenient reference.

4.5.10.2. Training

1) All employees concerned with transfer operations involving *flammable liquids* or *combustible liquids* shall be trained in

a) the procedures referred to in Article 4.5.10.1.,
b) the importance of constant attendance during all loading or unloading operations,
c) extinguishing procedures for fires involving *flammable liquids* and *combustible liquids*, and
d) the *flammable liquid* and *combustible liquid* colour coding and identification system required in Article 4.5.7.6.

2) Employees engaged in the operation of equipment for the transfer of *flammable liquids* or *combustible liquids* shall be trained in the location, function and operation of valves used for the operation of fire protection equipment and manual emergency shut-off valves.

4.5.10.3. Emergency Valves

1) Signs indicating the location of valves used for the operation of fire protection equipment and manual emergency shut-off valves shall be posted in conspicuous locations.

4.5.10.4. Portable Extinguishers

1) At least one portable extinguisher having a rating of 80-B:C shall be provided in the vicinity of pumps and ancillary equipment used for the transfer of *flammable liquids* or *combustible liquids*.

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4.5.10.5. Visual Inspections

1) A visual inspection routine for the prompt detection of obviously abnormal conditions shall be established and shall be performed at least once each shift.

2) A visual inspection shall be made at least once during each day of operation of all aboveground piping systems, pumps and other ancillary equipment to detect leakage, and any leakage shall be repaired as quickly as practicable.

3) Where necessary, flammable vapour indicators shall be used to detect leakage.

4) Open flames and spark-producing devices shall not be used for leakage detection referred to in Sentence (2).

4.5.10.6. Operational Tests

1) To ensure proper operation, monthly inspections and tests shall be made of all safety shut-off valves and other fire safety devices, with particular attention directed to normally open, fusible-link-operated valves, float valves and automatic controls.

4.5.10.7. Maintenance

1) Except as provided in Sentence (6), maintenance shall not be carried out on piping systems while they are under pressure.

2) If connections or piping are to be opened, the system shall be drained of *flammable liquids* and *combustible liquids*.

3) Where equipment for handling *flammable liquids* or *combustible liquids* has to be repaired, it shall be removed and taken to maintenance areas when possible.

4) Tags shall be attached to all valves on piping systems that are shut off for maintenance purposes to indicate that such valves are not to be opened.

5) Piping that has been used for the transfer of *flammable liquids* or *combustible liquids* shall be removed or capped when it is no longer intended to be used.

6) The maintenance of pressurized piping systems shall be carried out in conformance with good engineering practice. (See Note A-4.5.10.7.(6).)

Section 4.6. Fuel-Dispensing Stations

4.6.1. Scope

4.6.1.1. Application

(See Note A-4.6.1.1.)

1) This Section applies to the storage, handling and use of *flammable liquids*, *combustible liquids* and *dangerous goods* classified as flammable gases at *fuel-dispensing stations*.

2) Except as provided in this Section, the storage and dispensing of *dangerous goods* classified as flammable gases at *fuel-dispensing stations* shall conform to

a) CSA B108, "Liquefied natural gas refuelling stations installation code,"
b) CSA B149.1, "Natural gas and propane installation code," and
c) CSA B149.2, "Propane storage and handling code."

3) Requirements of this Section that pertain to the location of dispensers, *storage tanks*, pumps, piping and their ancillary equipment inside *buildings* shall not apply to a canopy that is open on not less than 75% of its perimeter.

4.6.2. Storage and Handling

4.6.2.1. Outside Aboveground Storage Tanks

1) Except as provided in Sentences (2) to (5), the installation of outside aboveground *storage tanks* at *fuel-dispensing stations* shall be in conformance with Subsection 4.3.2.

2) Except as permitted in Sentence (3), outside aboveground *storage tanks* at *fuel-dispensing stations* shall have an individual capacity of not more than 80 000 L, and their aggregate capacity shall not exceed 200 000 L.

3) The individual capacity of outside aboveground *storage tanks* at *fuel-dispensing stations* is permitted to exceed the individual capacity limit of 80 000 L required in Sentence (2), provided

a) they conform to CAN/ULC-S655, "Standard for Aboveground Protected Tank Assemblies for Flammable and Combustible Liquids," and
b) their aggregate capacity does not exceed 200 000 L.

4) Outside aboveground *storage tanks* at *fuel-dispensing stations* shall be provided with

a) physical protection against collision damage,
b) measures to prevent unauthorized access to the *storage tank* and its ancillary equipment,
c) measures to contain accidental spillage in conformance with Subsection 4.3.7.,
d) an *overfill protection device* in conformance with Sentence 4.3.1.8.(2), where a tight-filled connection is provided, and
e) where the piping is connected to the *storage tank* at a point that is lower than the maximum fill level, an external valve to prevent gravity discharge in the event the piping is severed.

5) In cases where a compartmentalized tank is used, the entire tank shall be treated as one tank with the aggregate of all compartments totaling the total capacity of that tank.

4.6.2.2. Containers

1) All packaged *flammable liquid* and *combustible liquid* products stored or sold at a *fuel-dispensing station* shall be in *closed containers* conforming to Article 4.2.3.1., distinctly marked with the generic name of the liquid they contain.

4.6.2.3. Piping

1) All piping for *flammable liquids* or *combustible liquids* at a *fuel-dispensing station* shall be in conformance with Article 4.5.2.1.

2) Joints in piping systems shall comply with Subsection 4.5.5.

3) Underground piping systems shall comply with Sentence 4.5.6.1.(1).

4) Piping shall be supported and backfilled in accordance with the manufacturer's instructions.

5) In the design of the piping system, provisions shall be made for the expansion, contraction, vibration, settling and temperature changes of piping in accordance with Article 4.5.6.14.

4.6.2.4. Corrosion Protection for Piping

1) All piping, valves and fittings at a *fuel-dispensing station* shall be protected against corrosion in conformance with Article 4.5.3.1.

4.6.2.5. Piping Supports and Guards

1) Piping shall be firmly supported and protected by means of guarding devices where necessary to prevent vehicular, watercraft or aircraft impact damage, or other physical damage.

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4.6.2.6. Pits

1) Pits for subsurface pumps or for piping connected to submersed pumps shall conform to Article 4.5.9.3.

4.6.3. Dispensing Systems

4.6.3.1. Dispensers

1) Fixed dispensers for *flammable liquids* or *combustible liquids* shall conform to CSA B346-M, "Power-Operated Dispensing Devices for Flammable Liquids."

4.6.3.2. Dispenser Sumps

1) *Dispenser sumps* shall conform to the construction and performance requirements of CAN/ULC-S664, "Standard for Containment Sumps, Sump Fittings, and Accessories for Flammable and Combustible Liquids."

4.6.3.3. Location

1) Fixed dispensers for Class I liquids shall be installed outside *buildings* and not less than

a) 3 m from any right-of-way and any property line,
b) 3 m from any propane gas dispenser,
c) 1.5 m from any natural gas dispenser,
d) 6 m horizontally from any fixed source of ignition,
e) 6 m horizontally from any liquefied petroleum gas cylinder or *storage tank*,
f) 3 m from any *building* openings, other than those that serve as shelter for operating personnel and in which electrical installations conform to Article 4.1.4.1., and
g) 6 m from any manhole or sewer opening (see Note A-4.6.3.3.(1)(g)).

2) Fixed dispensers for Class II or IIIA liquids are permitted to be installed inside a *building* when

a) the *building* is not open to the public,
b) the dispensers are located on the *first storey*,
c) drainage is provided, and
d) ventilation is provided in conformance with Subsection 4.1.7. and with the requirements for storage garages in Subsection 6.3.1. of Division B of the NBC(AE).

3) The location of dispensers of Class I liquids within a *building* shall conform to Subsection 3.3.5. of Division B of the NBC(AE).

4.6.3.4. Protection against Collision Damage

1) Fixed dispensers shall be protected against collision damage by

a) a concrete island not less than 100 mm high, or
b) posts or guardrails.

4.6.3.5. Marine Fuel-Dispensing Stations

1) Dispensers at *marine fuel-dispensing stations* shall be in a location that will prevent watercraft or aircraft impact, or other physical damage.

4.6.4. Shut-off Devices

4.6.4.1. Location and Identification

1) A device to shut off power to all dispensers and pumps shall be provided at a location not less than 6 m and not more than 30 m away from the dispensers and pumps. (See Note A-4.6.4.1.(1) and (2).)

2) The device required in Sentence (1) shall be clearly identified and readily accessible to attendants and emergency responders. (See Note A-4.6.4.1.(1) and (2).)

3) Steel shut-off valves shall be provided at connecting outlets on aboveground *storage tanks*.

4.6.4.2. Self-service Outlets

1) Except as provided in Sentence (2) and Sentences 4.6.8.2.(5) to (8) and in addition to the device required by Sentence 4.6.4.1.(1), an emergency shut-off switch to simultaneously stop the flow of fuel at all dispensers at *self-service outlets* shall be located at the central control console described in Sentence 4.6.8.2.(2) so that it is readily accessible to the attendant.

2) At card- or key-activated *self-service outlets*, the emergency shut-off switch required in Sentence (1) shall be readily accessible to the customer. (See Note A-4.6.4.2.(2).)

3) Reset capability for emergency shut-off switches required by Sentence (1) shall be restricted to manual operations.

4.6.4.3. Marine Fuel-Dispensing Stations

1) At *marine fuel-dispensing stations*, a readily accessible valve shall be provided in each pipeline at or within 7.5 m of the pier to shut off the supply from shore.

4.6.5. Delivery Hose and Nozzles

4.6.5.1. Delivery Hose

1) Delivery hose shall conform to CAN/ULC-S612, "Standard for Hose and Hose Assemblies for Flammable and Combustible Liquids."

2) Except as permitted in Sentences (3) and (4), hose through which *flammable liquids* or *combustible liquids* are dispensed at a *fuel-dispensing station* shall be restricted to a maximum extended length of 4.5 m.

3) Where a retracting mechanism is used, a maximum extended length of 6 m shall be permitted.

4) At *marine fuel-dispensing stations* or at card- or key-activated dispensers, the length of extended hose is permitted to exceed the values in Sentences (2) and (3).

4.6.5.2. Hose Nozzle Valves

1) Every hose nozzle valve through which a Class I or II liquid is dispensed by a motorized dispenser into a vehicle tank shall

a) be automatic closing, as required in Sentence (2), and
b) conform to CAN/ULC-S620, "Standard for Hose Nozzle Valves for Flammable and Combustible Liquids."

2) Except as provided in Sentences (3) to (5), a hose nozzle valve shall be constructed so that the valve

a) can be kept open only by the continuous application of manual pressure, or
b) is equipped with a hold-open device that is an integral part of the nozzle and that will
   i) allow automatic dispensing,
   ii) automatically shut off when the vehicle tank is filled, and
   iii) shut off if the nozzle is dropped or falls from the fill pipe.

3) A hose nozzle valve at a *marine fuel-dispensing station* shall be of the type without a hold-open device, in conformance with Clause (2)(a).

4) When a hose nozzle valve with a hold-open device is used at an attended *self-service outlet*, a break-away coupling conforming to CAN/ULC-S644, "Standard for Emergency Breakaway Fittings for Flammable and Combustible Liquids," shall be provided.

5) When the flow of liquid can be stopped other than by the hose nozzle valve, a hose nozzle valve with a hold-open device is permitted to be used only if it is provided

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with a device that will automatically close the hose nozzle valve upon a drop of pressure in the dispensing hose.

4.6.6. Remote Pumping Systems

4.6.6.1. Application

1) This Subsection shall apply to systems for dispensing *flammable liquids* or *combustible liquids* where such liquids are transferred from bulk storage to individual or multiple dispensers by pumps located elsewhere than at the dispensers.

4.6.6.2. Pumps and Control Equipment

1) Pumps, including associated control equipment, shall be designed so that the system will not be subject to pressures above the design working pressure.

2) Pumps shall be securely anchored and protected against damage from vehicles.

4.6.6.3. Emergency Valves

1) An emergency valve conforming to CAN/ULC-S651, "Standard for Emergency Valves for Flammable and Combustible Liquids," shall be installed in the supply line so that the shear point of the valve is at a level not higher than the base of the dispenser nor more than 25 mm below it.

2) The emergency valve required in Sentence (1) shall be maintained in operating condition and serviced at intervals not greater than 12 months.

4.6.6.4. Pump Location

1) Pumps installed aboveground and outside *buildings* shall be located not less than

a) 3 m from any property line, and
b) 1.5 m from any *building* opening.

2) When an outside pump location is impractical, pumps are permitted to be installed inside *buildings* or in pits as provided in Article 4.6.2.6.

4.6.6.5. Marine Fuel-Dispensing Stations

1) Except as permitted in Sentence (2), tanks and pumps not integral with the dispenser at *marine fuel-dispensing stations* shall be located on the shore or on a pier of the solid-fill type.

2) Where shore locations would result in excessively long supply lines to the dispenser, *storage tanks* are permitted to be installed on a pier, provided that

a) the applicable portions of Subsection 4.3.7. relating to spacing, *secondary containment* and piping are complied with, and
b) the quantity stored does not exceed 5 000 L aggregate capacity.

3) No *storage tank* at a *marine fuel-dispensing station* shall be located closer than 4.5 m horizontally from the normal annual high-water mark.

4) *Storage tanks* located on shore and supplying *marine fuel-dispensing stations* are permitted to be located aboveground where rock or a high water table make underground tanks impracticable.

5) Where *storage tanks* at a *marine fuel-dispensing station* are elevated above the dispenser, an automatically operated valve that is designed to open only when the dispenser is being operated, so as to prevent gravity draining of the tank in the event of a rupture of the supply line to the dispenser, shall be provided at the *storage tank* outlet, positioned adjacent to and outside the valve specified in Article 4.3.6.1.

6) Piping between *storage tanks* located on shore and dispensers at a *marine fuel-dispensing station* shall conform to Section 4.5., except that where dispensing is from a floating structure, it is permitted to use suitable lengths of flexible hose designed in conformance with good engineering practice between the piping on shore and the piping on the floating structure. (See Note A-4.8.8.1.(1)(a).)

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4.6.7. Spill Control

4.6.7.1. Spill Control

1) Areas where *flammable liquids* or *combustible liquids* are dispensed shall be designed to

a) be able to handle accidental spillage in conformance with Subsection 4.1.6., and
b) control a spill of not less than 1 000 L.

4.6.8. Supervision and Dispensing Procedures

4.6.8.1. Attendants

1) Except as provided in Sentences (2) and (5), every *fuel-dispensing station* shall have at least one attendant referred to in Article 4.6.8.5. on duty when the station is open for business.

2) *Fuel-dispensing stations* that do not serve the general public do not require an attendant.

3) Except as permitted at *self-service outlets*, a qualified attendant shall be in constant control of the dispensing of Class I and II liquids into the fuel tanks of motor vehicles, watercraft or floatplanes, or into containers.

4) Duties of attendants and fuel-dispensing procedures, as stated in Articles 4.6.8.5. and 4.6.8.6., shall be posted at every *fuel-dispensing station*.

5) At *fuel-dispensing stations* that offer both attended service and self-service, the attendant required in Sentence (1) is permitted to dispense *flammable liquids* or *combustible liquids* at an attended service dispenser, provided that there is an additional attendant supervising the activities at the self-service dispensers from a location within 25 m of one of the emergency shut-off devices required in Sentences 4.6.4.1.(1) and 4.6.4.2.(1) and that the attendant has a direct view of all fuelling positions at the *fuel-dispensing station*.

4.6.8.2. Self-service Outlets

1) Instructions for the operation of dispensers at *self-service outlets* shall be posted in a conspicuous location.

2) A control console shall be provided at *self-service outlets* within 25 m of all dispensers so that the attendant has an unobstructed view of all units at the same time.

3) The control console referred to in Sentence (2) shall be equipped to regulate the operation of each dispenser.

4) A 2-way communication system between the control console and each pump island shall be provided at *self-service outlets*.

5) *Self-service outlets* are permitted to operate as unattended *self-service outlets* in conformance with all relevant Sections of this Part and Sentences (6), (7) and (8).

6) An unattended *self-service outlet* shall be provided with the following safety features:

a) a video recording surveillance system connected to a monitoring facility (see Note A-4.6.8.2.(6)(a)),
b) a manually actuated emergency shut-off switch that
   i) shuts off power to the individual dispensing unit, and
   ii) can be actuated from both sides of the dispensing unit,
c) a readily accessible, manually actuated, master emergency shut-off switch that
   i) is located more than 6 m but less than 10 m from the dispensing island, and
   ii) shuts off power to all dispensing units at the station,
d) dispensing devices that can only be reset by trained personnel in attendance at the site in the event that an emergency shut-off switch has been actuated,

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e) a public pay telephone or other means of direct communication with the fire department, provided in a location acceptable to the *authority having jurisdiction*,
f) an audible alarm actuated by the emergency shut-off switches which can be heard throughout the site,
g) a strobe light actuated by an emergency shut-off switch in Clause (b) or (c) in a visible location,
h) dispensing pump cabinets and panels monitored with intrusion alarm devices connected to the monitoring facility in Clause (a),
i) pump control and accessory *buildings* that are protected with intrusion alarm devices and smoke and heat detection devices connected to the monitoring facility in Clause (a), and
j) electronic *storage tank* monitoring for inventory control.

7) Dispensing units at an unattended *self-service outlet* shall be such that the maximum quantity of *flammable liquids* and *combustible liquids* dispensed at one time is 200 L, after which
a) the dispensing unit will automatically shut down, and
b) further dispensing will not occur until the dispensing unit has been reset and the customer has initiated the starting sequence.

8) In addition to the requirements of Articles 4.6.8.6. to 4.6.8.8., an unattended *self-service outlet* shall have weather-resistant signs acceptable to the *authority having jurisdiction* conspicuously posted in the dispensing area indicating
a) the location and use of the dispenser emergency shut-off switch,
b) the location and use of the master emergency shut-off switch,
c) that the user must stay outside their vehicle in view of the fuelling nozzle during dispensing,
d) emergency instructions in the event of an accident or spill, and
e) telephone numbers for the fire department.

4.6.8.3. Special Dispensers

1) Except as provided in Article 4.6.8.4. for card- or key-activated equipment, special dispensers, including coin-operated, card-operated and preset units, shall not be permitted at *self-service outlets* unless there is at least one qualified attendant on duty for each 12 hoses that can be operated simultaneously while the outlet is open to the public.

4.6.8.4. Card- or Key-Activated Dispensers

1) Card- or key-activated dispensers are permitted at unattended *self-service outlets* and *fuel-dispensing stations* that are not open to the general public, in conformance with Sentences (2) to (6). (See Note A-4.6.8.4.(1).)

2) Except as provided in Sentences (3) to (6), the installation of card- or key-activated dispensers shall conform to the requirements for *self-service outlets* and *fuel-dispensing stations* in this Section.

3) Operation of card- or key-activated dispensers shall be restricted to persons authorized by the supply agent to possess a card or key to operate the dispensers.

4) Clearly legible operating instructions, visible at all times, shall be posted at every dispenser island.

5) A telephone or other clearly identified means to notify the fire department shall be provided in a location readily accessible to the user.

6) Emergency instructions, including the telephone number of the local fire department, shall be conspicuously posted to advise the user, in the event of a spill or accident,
a) to use the emergency shut-off switch required in Article 4.6.4.2., and
b) to call the fire department.

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4.6.8.5. Duties of Attendants

1) Attendants on duty at *fuel-dispensing stations* shall
a) supervise the dispensing of *flammable liquids* and *combustible liquids*,
b) activate the controls to permit the dispensing of fuel at an individual dispenser only after the customer at the unit is ready to activate the nozzle,
c) prevent the dispensing of *flammable liquids* and *combustible liquids* into containers that
   i) do not conform to Article 4.2.3.1., or
   ii) are in a vehicle,
d) take appropriate measures to prevent sources of ignition from creating a hazard at the dispensers,
e) take appropriate action in the event of a spill to reduce the risk of fire,
f) shut off the power to all dispensers in the event of a spill or fire, and
g) perform routine visual inspections in accordance with Article 4.5.10.5.

2) In addition to the requirements in Sentence (1), attendants on duty at *marine fuel-dispensing stations* shall
a) activate the controls to permit the dispensing of fuel at an individual dispenser only after all ports and hatches on the watercraft have been closed, and
b) ensure that containers for *flammable liquids* and *combustible liquids*,
   i) are not filled beyond their safe filling level, and
   ii) are filled only after they have been removed from the watercraft or aircraft.

3) Attendants shall be trained on how to conduct their duties.

4.6.8.6. Fuel-Dispensing Procedures

1) Except as provided in Sentence (2), *flammable liquids* and *combustible liquids* shall not be dispensed into the fuel tank of a motor vehicle, watercraft or aircraft while the engine is running.

2) A Class II or IIIA liquid is permitted to be dispensed into the fuel tank of a motor vehicle while its engine is running, provided the liquid is dispensed not less than 6 m away from any Class I liquid dispenser. (See Note A-4.6.8.6.(2).)

3) Class I and II liquids shall not be dispensed at a *fuel-dispensing station* into the fuel tank of a motor vehicle while any part of the motor vehicle or any vehicle attached to it is on a *street*.

4) Every person dispensing *flammable liquids* and *combustible liquids* shall
a) take precautions to prevent overflow or spillage of the liquid being dispensed,
b) not knowingly overfill the fuel system,
c) except as otherwise stated in Article 4.6.8.5., in the event of spillage, immediately apply an absorbent material to soak up the spillage in conformance with Article 4.1.6.3.,
d) not dispense Class I or II liquids in proximity to open sources of ignition,
e) not use any object or device that is not an integral part of the hose nozzle valve assembly to maintain the flow of fuel, and
f) not dispense the liquids into containers that are in a vehicle, watercraft or aircraft.

4.6.8.7. Sources of Ignition

1) Smoking and non-fixed sources of ignition shall not be permitted within 7.5 m of a dispenser at a *fuel-dispensing station*.

4.6.8.8. Signs

1) At least one weather-resistant sign conforming to Sentences (2) to (4) shall be provided for each dispenser in a location visible to every driver approaching the dispenser.

2) The sign required in Sentence (1) shall indicate that smoking is not permitted in the vicinity of the dispenser and that the ignition must be turned off while the vehicle is being refuelled. (See Note A-4.6.8.8.(2).)

3) The sign required in Sentence (1) shall
a) have a minimum dimension of 200 mm, and
b) except as permitted in Sentence (4), have letters not less than 25 mm high.

4) The sign required in Sentence (1) is permitted to display the international "No Smoking – Ignition Off" symbol not less than 100 mm in diameter.

4.6.8.9. Training Procedures

1) Personnel involved in the transfer operations of *flammable liquids* or *combustible liquids* shall be trained in accordance with Article 4.5.10.2.

4.6.9. Fire Prevention and Protection

4.6.9.1. Portable Extinguishers

1) At least 2 portable extinguishers, each having a rating of not less than 40-B:C, shall be provided at every *fuel-dispensing station*.

4.6.9.2. Absorbent Materials

1) Absorbent material to soak up liquid spillage shall be provided for use by attendants at *fuel-dispensing stations* in conformance with Article 4.1.6.3.

Section 4.7. Bulk Plants

4.7.1. Scope

4.7.1.1. Application

1) This Section shall apply to that portion of a property where *flammable liquids* or *combustible liquids* are received in bulk quantities and are stored or handled for the purpose of being distributed.

4.7.2. Storage

4.7.2.1. Storage

1) *Flammable liquids* and *combustible liquids* shall be stored in
a) *closed containers*, in conformance with Article 4.7.2.4., or
b) *storage tanks*, in conformance with Section 4.3.

4.7.2.2. Storage Tanks

1) At bulk plant rail loading and unloading facilities, the minimum distance from a *storage tank* to a railway line shall be in conformance with TC General Order No. O-32, C.R.C., c. 1148, "Flammable Liquids Bulk Storage Regulations."

4.7.2.3. Hydraulic Pressure Shock

1) Bulk *storage tanks*, piping, pumps, valves and associated components shall be designed, installed and maintained to accommodate hydraulic pressure shock on the system.

4.7.2.4. Container Storage

1) Containers for *flammable liquids* or *combustible liquids* stored indoors shall be stored in conformance with Subsection 4.2.7.

2) Containers for *flammable liquids* or *combustible liquids* stored outdoors shall be stored in conformance with Subsection 4.2.11., except that the distance between

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the piles and property lines and the distance between piles need not apply when the containers are stored in an area that does not present a hazard to neighbouring property.

4.7.2.5. Spill Control

1) An outdoor storage area shall be designed to accommodate accidental spillage in conformance with Subsection 4.1.6.

4.7.2.6. Fencing

1) The outdoor area occupied by aboveground *storage tanks*, container storage, ancillary equipment and unloading facilities shall be fenced in conformance with Article 3.3.2.6.

4.7.3. Dispensing

4.7.3.1. Interconnection

1) Dispensing systems for Class I liquids shall not be interconnected with dispensing systems for Class II and IIIA liquids.

4.7.3.2. Dispensing into Vehicles

1) Dispensers used by the general public to dispense *flammable liquids* or *combustible liquids* into the fuel tanks of vehicles shall not be located at a bulk plant unless separated by a fence or equivalent barrier from the area in which the bulk storage operations are conducted.

2) Where a dispenser referred to in Sentence (1) is supplied from an aboveground *storage tank*,

a) an automatically operated valve that is designed to open only when the dispenser is being operated shall be provided at the tank outlet, and
b) an emergency valve shall be provided for the dispenser in conformance with Sentence 4.6.6.3.(1).

4.7.3.3. Dispensing into Metal Containers or Tanks

1) Class I liquids shall not be dispensed into a metal container or *storage tank* unless it is electrically connected in conformance with Article 4.1.8.2.

4.7.4. Loading and Unloading Facilities

(See Note A-4.7.4.)

4.7.4.1. Clearances

1) At a loading or unloading facility for *tank vehicles* or tank cars, the horizontal distance from the fill stem to an aboveground *storage tank*, a *building* or a property line shall be not less than

a) 7.5 m for Class I liquids, and
b) 4.5 m for Class II and IIIA liquids.

2) At bulk plant rail loading and unloading facilities, the minimum distance from a loading structure to a railway line shall be in conformance with TC General Order No. O-32, C.R.C., c. 1148, "Flammable Liquids Bulk Storage Regulations."

3) *Buildings* for the shelter of personnel or pumps shall be considered a part of the loading or unloading facility.

4.7.4.2. Multi-purpose Facilities

1) When piping and pumping systems have been used for the transfer of either *flammable liquids* or *combustible liquids* at loading or unloading facilities, the system shall be cleaned of vapours before the other class of liquid is introduced.

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4.7.4.3. Check Valves

1) Systems through which tank cars or *tank vehicles* discharge into aboveground *storage tanks* by means of pumps shall be provided with check valves to prevent backflow and the inadvertent mixing of liquids.

2) Systems referred to in Sentence (1) shall be designed, installed and maintained to prevent leakage or spillage.

4.7.4.4. Control Valves

1) Valves installed to control the filling of *tank vehicles* or tank cars shall be of the self-closing type.

2) Control valves referred to in Sentence (1) shall be held open manually, except where automatic devices are provided for shutting off the flow in order to prevent the overfilling of *tank vehicle* or tank car compartments. (See Note A-4.7.4.4.(2).)

4.7.4.5. Bonding and Grounding

(See Note A-4.7.4.5.)

1) Bonding, grounding and isolation components for protection against static charges during the loading or unloading of *tank vehicles* or tank cars shall be provided when transferring *flammable liquids* or *combustible liquids*.

2) Where *flammable liquids* or *combustible liquids* are transferred from or into railway tank cars, the railway tracks shall be bonded throughout their length and permanently grounded in conformance with TC SOR/82-1015, "Railway Prevention of Electric Sparks Regulations."

3) Bonding required in Sentence (1) shall consist of a metallic bond wire connected to the fill stem or to some part of the loading or unloading structure that is in electrical contact with the fill stem in conformance with Subsection 4.1.4.

4) Bonding wires for *tank vehicles* shall be provided with a pull-off connector attached so as to be in electrical contact with the cargo tank of the *tank vehicle*.

5) The bonding connection required in Sentence (1) shall be fixed to the *tank vehicle* or *storage tank* before dome covers are raised and shall remain in place until filling is completed and all dome covers have been closed and secured.

4.7.4.6. Downspouts

1) Except as provided in Sentence 4.1.8.2.(3), when *tank vehicles* or tank cars are filled with Class I or II liquids through the top of the tank, the fill pipe shall terminate within 150 mm of the bottom of the tank.

4.7.5. Fire Protection

4.7.5.1. Portable Extinguishers

1) At least 2 portable extinguishers, each having a rating of not less than 80-B:C, shall be provided at hazardous locations in bulk storage plants for *flammable liquids* and *combustible liquids*.

4.7.6. Spill Control

4.7.6.1. Spill Control

1) Facilities to control possible spills of *flammable liquids* or *combustible liquids* shall be provided at loading and unloading points, in conformance with Subsection 4.1.6.

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Section 4.8. Piers and Wharves

4.8.1. Scope

4.8.1.1. Application

1) This Section applies to *flammable liquid* and *combustible liquid* installations on piers and wharves, but does not include *marine fuel-dispensing stations*.

4.8.2. General

4.8.2.1. Clearances

1) Piers and wharves where cargos of *flammable liquids* or *combustible liquids* are transferred in bulk quantities to or from tanks of marine vessels shall be not less than 30 m from

a) any bridge over a navigable waterway, and
b) an entrance to a superstructure of any vehicular or railroad tunnel under a waterway.

2) The termination of fixed piping for loading and unloading *flammable liquids* or *combustible liquids* shall be not less than 60 m from a bridge or from an entrance to a tunnel.

4.8.2.2. Construction

1) The substructure and deck of a pier or wharf shall be designed for its intended use and shall be constructed of heavy timber or material that will provide adequate flexibility, resistance to shock, durability, strength and fire resistance.

4.8.3. Storage Tanks

4.8.3.1. Installation

1) Except as permitted in Sentences (2) and (3), *storage tanks* shall be installed on shore in conformance with Subsections 4.3.2. to 4.3.7.

2) *Storage tanks* are permitted to be located in *buildings* on piers and wharves of solid-fill or *noncombustible construction*, provided they conform to Subsections 4.3.13. to 4.3.15.

3) *Storage tanks* are permitted to be buried in piers and wharves of the solid-fill type, provided they conform to Subsections 4.3.8. to 4.3.12.

4.8.4. Piping, Valves and Fittings

4.8.4.1. Installation and Materials

1) The method of installation and materials used for piping, valves and fittings shall conform to Section 4.5.

4.8.4.2. Pipe Supports

1) Piping shall be properly supported and arranged to prevent excessive vibration or strain on equipment connected to it.

2) Piping supports shall consist of

a) wood having no dimension less than 140 mm,
b) steel, or
c) concrete.

3) Where pipe is supported more than 1.2 m above the pier deck, piping supports shall have a minimum *fire-resistance rating* of 2 h.

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4.8.4.3. Guards

1) In areas where general cargo is handled or where piping might be subject to physical damage from vehicles, watercraft or aircraft, the piping shall be protected by means of guarding devices.

4.8.4.4. Flexible Connections

1) Piping between the shore and piers or wharves shall be provided with swing joints or flexible connections designed in conformance with good engineering practice to permit the independent movement of the pier or wharf and shore piping without strain on the pipe.

4.8.4.5. Shut-off Valves

1) A readily accessible valve to shut off the supply from shore shall be provided in each pipeline within 7.5 m of piers and wharves.

4.8.4.6. Access Openings for Inspection

1) Access openings for inspection purposes below deck shall be provided for valves required in Article 4.8.4.5. and for connections to pipelines, and suitable signs shall be posted indicating their locations.

2) No freight or materials shall be placed on piers and wharves in such a manner as to obstruct the access openings required in Sentence (1).

4.8.4.7. Identification

1) Identification tags or labels of metal or other material impervious to water and to the *flammable liquids* or *combustible liquids* being transferred shall be attached to and maintained on all pipelines and control valves to designate their use.

4.8.4.8. Leakage Testing

1) Piping systems shall be tested for leakage in conformance with Section 4.4. before being put into service and before reactivation when used on a seasonal basis.

2) Underground piping systems referred to in Sentence (1) shall be tested at intervals no greater than 12 months.

4.8.5. Bonding and Grounding

4.8.5.1. Bonding and Grounding

1) Railway tracks on piers and wharves shall be bonded throughout their length and permanently grounded in conformance with TC SOR/82-1015, "Railway Prevention of Electric Sparks Regulations."

2) Insulating joints shall be placed in all rails where entering upon the pier or wharf.

4.8.6. Fire Protection

4.8.6.1. Portable Extinguishers

1) Portable extinguishers having a rating of 40-B:C shall be provided in the vicinity of Class I liquid pumps and fuel dispensers.

2) Portable extinguishers shall be kept in the pump house or other suitable location where they will be accessible in the event of an emergency, but not accessible to the public.

3) Where marine vessels are loading or unloading *flammable liquids* or *combustible liquids* or are being refuelled, portable extinguishers with a rating of not less than 40-B:C shall be placed on the pier or wharf in the vicinity of loading or unloading operations so that they are accessible in the event of a fire emergency.

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4) Portable extinguishers provided in conformance with Sentence (3) shall be in addition to those provided on board the marine vessels.

4.8.6.2. Training

1) Operating personnel shall be trained on how to summon the nearest fire department in the event of fire.

4.8.7. Bulk Transfer Stations

4.8.7.1. Location

1) Except as permitted in Sentence (2), the bulk transfer of *flammable liquids* or *combustible liquids* shall be permitted only on piers and wharves used exclusively for that purpose.

2) Where it is not practicable to locate bulk transfer stations on separate piers and wharves, such stations are permitted to be located on general purpose piers and wharves, provided that guards or fences are installed around valves or pumping equipment to prevent entry of unauthorized personnel.

4.8.7.2. Leakage and Spill Control

1) Measures to accommodate possible leakage or spillage from hose couplings shall be provided in conformance with Subsection 4.1.6.

2) Provision shall be made to prevent spillage resulting from the disconnection of hoses.

4.8.7.3. Hose Connections

1) Except as provided in Sentence (2), hose connections on piping shall be of the bolted flange type, and all such connections shall be provided with shut-off valves.

2) The use of cam-locking connections up to 105 mm in size shall be permitted.

3) Hose connections shall not project beyond the face of piers and wharves.

4.8.8. Cargo Hose

4.8.8.1. Cargo Hose

1) The transfer of *flammable liquids* or *combustible liquids* between tanks of marine vessels and piers or wharves shall be through

a) flexible cargo hose designed in conformance with good engineering practice (see Note A-4.8.8.1.(1)(a)), or
b) jointed tubing or piping
   i) suitable for the cargo to be transferred, and
   ii) designed to withstand the maximum design working pressure.

4.8.8.2. Maintenance and Testing

1) Cargo hose shall be maintained in satisfactory operating condition and be pressure tested at intervals not greater than 12 months to 1.5 times the maximum working pressure but not less than 350 kPa (gauge).

4.8.8.3. Supports

1) Cargo hose shall be supported where it is not run on a solid foundation.

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4.8.9. Cargo Pumps

4.8.9.1. Pressure Relief

1) Cargo pumps capable of producing pressures in excess of the safe working pressure of the cargo hose shall be provided with pressure relief devices, such as return lines or relief valves.

4.8.9.2. Location

1) Except as permitted in Sentence (2), cargo pumps shall be located
a) on shore or on piers and wharves either of *noncombustible construction* or of the solid-fill type, and
b) not less than 3 m from other *buildings* or structures.

2) Where it is not practicable to install cargo pumps as required in Sentence (1), they are permitted to be installed on piers and wharves of *combustible construction* if located in pump houses
a) conforming to Subsection 4.8.10., and
b) located not less than 3 m from other *buildings*.

4.8.10. Pump Houses

4.8.10.1. Construction

1) Pump houses shall be of *noncombustible construction* with floors that are chemically resistant to the liquid being handled, liquid-tight and equipped with curbs or flashings around the base of the wall not less than 100 mm in height to contain any spilled liquid.

4.8.11. Transfer Operations

4.8.11.1. Supervision

1) Transfer operations shall be carried out only under the continuous supervision of a person qualified to supervise such operations.

2) Cargo shall not be transferred to or from the tank of a marine vessel unless sufficient personnel are on board to control the operation.

3) The person responsible for directing the operations shall
a) prior to the transfer of cargo, ascertain that no unauthorized repair work is being carried out on the pier or wharf and that there are no open flames in the vicinity,
b) during the transfer of cargo, monitor the progress of the loading and unloading to prevent overflow, and
c) inspect the hose and connections for leakage and, if leakage occurs, stop the operations.

4.8.11.2. Bonding and Grounding

1) Tanks of marine vessels shall be electrically connected to the shore piping prior to the connection of cargo hose, except when cathodic protection facilities are operating.

2) Electrical connections to tanks of marine vessels shall be maintained until the cargo hose has been disconnected and any spillage has been removed.

4.8.11.3. Equipment

1) Cargo hose shall be of adequate length to allow for movement of the marine vessel.

2) Gaskets shall be used in all hose joints and pipe couplings to prevent leakage.

3) Flanged joints shall be tightly bolted to prevent leakage.

4) Drip pans shall be placed under hose connections on piers and wharves, except where a sump pit or settling basin is provided.

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4.8.11.4. Spill Control

1) When transfer operations are completed,
a) the valves on the hose connections shall be closed, and
b) unless the cargo hose is equipped with a device that automatically prevents liquid from draining from the hose upon its disconnection, the hose shall be drained so as not to create a fire or explosion hazard.

2) Care shall be taken that no liquid is discharged on a pier or wharf or overboard during draining and emptying operations.

Section 4.9. Process Plants

4.9.1. Scope

4.9.1.1. Application

1) Except as provided in Sentence (2), this Section applies to *process plants*, including *refineries*, that contain industrial processes involving *flammable liquids* or *combustible liquids*.

2) This Section does not apply to *distilleries* covered in Section 4.10.

4.9.2. Outdoor Processing Equipment

4.9.2.1. Location

1) The location of outdoor processing equipment in *process plants* shall be based on its *flammable liquid* or *combustible liquid* capacity as described in Sentences (2) to (4).

2) Except as provided in Sentence (4), outdoor processing equipment having emergency relief venting and a working pressure of not more than 17 kPa (gauge) shall be separated from property lines and *buildings* on the same property by distances
a) equal to those in Table 4.3.2.1. for stable liquids, and
b) 2.5 times those in Table 4.3.2.1. for *unstable liquids*.

3) Except as provided in Sentence (4), outdoor processing equipment having emergency relief venting and a working pressure more than 17 kPa (gauge) shall be separated from property lines and *buildings* on the same property by distances
a) 1.5 times those in Table 4.3.2.1. for stable liquids, and
b) 4 times those in Table 4.3.2.1. for *unstable liquids*.

4) Where protection is not provided against fires or explosions in processing equipment, the distances in Sentences (2) and (3) shall be doubled. (See Sentence 4.3.2.5.(2).)

4.9.3. Processing Buildings

4.9.3.1. Explosion Venting

1) Except as provided in Article 4.9.4.2., where Class IA liquids or *unstable liquids* are processed within a room or a *building*, the room or *building* shall be designed to prevent critical structural and mechanical damage from an internal explosion in conformance with NFPA 68, "Standard on Explosion Protection by Deflagration Venting." (See Note A-3.2.8.2.(1)(d).)

4.9.3.2. Fire Separations

1) Areas where *unstable liquids* are handled or where small scale unit chemical processes occur shall conform to Article 3.3.6.8. of Division B of the NBC(AE).

4.9.3.3. Basements and Pits

1) *Process plants* where Class I and II liquids are handled shall not have *basements* or covered pits.

4.9.3.4. Ventilation

1) Equipment used in a *building* and the ventilation of the *building* shall be designed so as to limit flammable vapour-air mixtures under normal operating conditions to the interior of equipment, and to not more than 1.5 m from such equipment. (See Note A-4.9.3.4.(1).)

4.9.4. Fire Prevention and Protection

4.9.4.1. Spill and Vapour Control

1) Processing equipment shall be designed and arranged to
a) prevent the unintentional escape of liquids and vapours, and
b) minimize the quantity escaping in the event of accidental release.

4.9.4.2. Explosion Protection

1) Processing equipment where an explosion hazard is present shall be
a) designed to withstand the explosion pressure without damage to the equipment,
b) provided with explosion venting in conformance with NFPA 68, "Standard on Explosion Protection by Deflagration Venting," or
c) provided with an explosion prevention system in conformance with NFPA 69, "Standard on Explosion Prevention Systems."

4.9.4.3. Fire Protection

1) The risks of fire and explosion at *process plants* shall be evaluated based on
a) material properties,
b) material quantities,
c) operating conditions,
d) arrangement of stored materials,
e) transportation of materials,
f) process design, and
g) operating and maintenance procedures.

2) Based on the evaluation required in Sentence (1), measures to minimize the occurrence of fires and explosions and to mitigate their effects shall be identified.

3) Where the process warrants protection, *process plants* shall be supplied with
a) water supplies of adequate pressure and quantity to meet the probable fire demands,
b) hydrants,
c) hoses connected to a permanent water supply and located so that all equipment containing *flammable liquids* or *combustible liquids*, including pumps, can be reached with at least one hose stream, and
d) fire protection systems conforming to Part 2.

4.9.4.4. Emergency Procedures

1) Emergency procedures conforming to Article 4.1.5.5. shall be established for *refineries* and *process plants*.

Section 4.10. Distilleries

4.10.1. Scope

4.10.1.1. Application

1) This Section applies only to those areas or *buildings* in *distilleries* where *distilled beverage alcohols* are concentrated, blended, mixed, stored or packaged. (See Note A-4.10.1.1.(1).)

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2) The storage, handling and use of *flammable liquids* or *combustible liquids* other than *distilled beverage alcohols* in a *distillery* shall conform to Part 4.

3) Where there is a conflict between the requirements of this Section and other requirements in Part 4, this Section shall govern.

4.10.2. General

4.10.2.1. Building Classification

1) Except as provided in Sentence (2), *buildings* or parts of *buildings* in which *distilled beverage alcohol* is distilled, processed or stored in bulk shall be classified as *high-hazard industrial occupancies*.

2) *Buildings* or parts of *buildings* used for the storage of *closed containers* of *distilled beverage alcohols* shall be classified as *medium-hazard industrial occupancies*.

4.10.3. Storage Tanks and Containers

4.10.3.1. Design, Fabrication and Testing

1) *Storage tanks*, wooden vats, barrels, drums or containers used for the storage or processing of *distilled beverage alcohols* shall be designed, fabricated and tested for the anticipated maximum working pressure, operating temperature, internal corrosion conditions and structural stresses to which they could be subjected.

4.10.3.2. Supports, Foundations and Anchorage

(See Note A-4.10.3.2.)

1) Supports, foundations and anchorage of *storage tanks* shall comply with Subsection 4.3.3., except that timber supports shall be permitted.

2) *Storage tank* supports having less than a 2 h *fire-resistance rating* shall be protected by an automatic fire suppression system.

3) The area underneath any *storage tank* greater than 1.2 m in diameter shall be protected by an automatic fire suppression system.

4.10.3.3. Storage Tank Vents

1) Normal and emergency vents shall be provided on *storage tanks* in conformance with good engineering practice. (See Note A-4.10.3.3.(1).)

4.10.4. Storage

4.10.4.1. Storage Tanks, Drums and Barrels

1) Where more than 25 000 L of *distilled beverage alcohol* in *storage tanks*, drums or barrels are stored inside *buildings*, such *buildings* shall be *sprinklered*.

4.10.4.2. Closed Containers and Storage Aids

1) Storage of *closed containers* of *distilled beverage alcohols*, packaging materials and empty bottles, drums, barrels and pallets shall be in conformance with Part 3.

4.10.5. Piping and Pumping Systems

4.10.5.1. Design and Installation

1) The design, fabrication, assembly and inspection of piping and pumping systems containing *distilled beverage alcohols* shall be suitable for the anticipated maximum working pressures, operating temperatures, internal corrosion conditions and structural stresses to which they could be subjected. (See Note A-4.10.5.1.(1).)

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4.10.6. Ventilation

4.10.6.1. Ventilation

1) Natural or mechanical ventilation shall be provided for all areas where alcohol vapours are released from *storage tanks* or process equipment under normal operating conditions, to prevent the concentration of vapours from exceeding 25% of the *lower explosive limit*, measured 1.5 m from any equipment or from any opening subject to vapour release.

4.10.7. Spill Control

4.10.7.1. Spill Control

1) Emergency drainage systems shall be provided to direct any spilled or leaked *distilled beverage alcohol* to a safe location.

4.10.8. Fire Protection

4.10.8.1. Portable Extinguishers

1) Except as permitted in Sentence (2), in maturing warehouses, at least one portable extinguisher having a rating of 4-A:30-B:C shall be located adjacent to each *exit*.

2) Hose stations are permitted to be installed in lieu of portable extinguishers at locations required in Sentence (1), and spaced so that the travel distance to the nearest hose is not greater than 25 m.

3) At least one portable extinguisher having a rating of 30-B:C shall be located on each industrial lift truck.

4.10.8.2. Standpipe and Hose Systems

1) Except as provided in Sentence (2), standpipe and hose systems shall be provided and installed in *distilleries* in conformance with Article 2.1.3.1.

2) Where a *building* is *sprinklered* in conformance with Sentence 2.1.3.1.(1), small hose (38 mm) stations are permitted to be supplied from interior sprinkler piping.

Section 4.11. Tank Vehicles

4.11.1. Scope

4.11.1.1. Application

1) This Section applies to *tank vehicles* when located on a property covered in this Code.

4.11.2. General

4.11.2.1. Portable Extinguishers

1) A *tank vehicle* shall be provided with at least one portable extinguisher having a minimum rating of 80-B:C.

2) Portable extinguishers on a *tank vehicle* shall be readily accessible.

4.11.2.2. Hot Works

1) Hot works performed on or in close proximity to a *tank vehicle* shall conform to Section 5.2.

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4.11.2.3. Parking inside Buildings

1) A *tank vehicle* shall not be parked inside a *building* unless
a) the *building* is specifically designed for that purpose,
b) there is sufficient space in the *tank vehicle* compartment to accommodate the thermal expansion of the *flammable liquid* or *combustible liquid*, and
c) the *tank vehicle* has no leaks of *flammable liquid* or *combustible liquid*.

4.11.2.4. Parking outside Buildings

1) Except as provided in Sentence (2), a *tank vehicle* is permitted to be left unattended by the vehicle operator outside a *building* for not more than 1 h.

2) A *tank vehicle* is permitted to be left unattended by the vehicle operator outside a *building* for more than 1 h, but only in a parking space
a) that is located not less than 15 m from a *building*, and
b) where the *tank vehicle* is not exposed to undue hazard from accident or collision.

4.11.2.5. Repair and Servicing

1) No person shall repair or service the cargo tank of a *tank vehicle* in a *building* unless
a) all *flammable liquids* and *combustible liquids* have been removed from the cargo tank and stored in a *storage tank* or container constructed and installed in accordance with this Part,
b) the cargo tank has been purged with steam of flammable vapours or combustible vapours, outside the *building* or in a well-ventilated area, to less than 10% of the lower explosive limit, and
c) while the cargo tank is being repaired, it is monitored for the presence of flammable vapours and combustible vapours using combustible gas detection equipment.

2) No person shall repair, service or store a *tank vehicle* in a *building* other than for repairs conducted in conformance with Article 4.11.2.2. and Sentence (1), unless
a) the *building* is acceptable to the *authority having jurisdiction*, or
b) all *flammable liquids* and *combustible liquids* have been removed from the cargo tank and the tank has been purged of flammable vapours or combustible vapours, outside the *building* or in a well-ventilated area, to less than 10% of the *lower explosive limit*.

4.11.2.6. Damaged or Leaking Containers

1) Containers or tanks that leak or that have become damaged shall not be used to transport *flammable liquids* or *combustible liquids*.

4.11.3. Loading, Unloading and Dispensing from Tank Vehicles

4.11.3.1. Loading and Unloading

1) Unless otherwise stated in this Subsection, the loading and unloading of *tank vehicles* shall be conducted in conformance with the applicable provisions in Subsection 4.7.4.

4.11.3.2. Ignition Sources

1) During loading and unloading operations, a *tank vehicle* and its delivery equipment shall be separated from ignition sources by distances conforming to the requirements for dispensers in Articles 4.6.3.3. and 4.6.8.7.

4.11.3.3. Static Electric Charges

1) During loading and unloading of a *tank vehicle*, measures shall be taken against static electric charges in conformance with Articles 4.1.8.2. and 4.7.4.5.

4.11.3.4. Supervision

1) During loading and unloading of a *tank vehicle*, trained personnel shall be in a position to shut off the flow of liquid in an emergency.

4.11.3.5. Multi-use Compartments

1) When a compartment of a *tank vehicle* has been used to carry a Class I liquid, the compartment, piping and accessory delivery equipment shall be drained of liquid before a Class II or IIIA liquid is loaded.

4.11.3.6. Engine

1) When the loading or unloading of Class I liquids is done without the use of the engine of the *tank vehicle*, the engine ignition shall be shut off during the transfer operations.

4.11.3.7. Unloading

1) Before a *tank vehicle* is unloaded, the volume of liquid in the receiving tank shall be measured to ensure that the tank can accept the volume to be unloaded.

2) If the vents of the receiving or delivery tank are obstructed, the transfer of liquid shall be stopped.

3) A *tank vehicle* shall not be parked on a *street*, shoulder or sidewalk while unloading at a *fuel-dispensing station*.

4.11.3.8. Dispensing into Vehicles

1) Dispensing Class I liquids into the fuel tank of vehicles directly from a *tank vehicle* shall not be permitted.

2) Dispensing Class II or IIIA liquids into the fuel tank of vehicles directly from a *tank vehicle* having a capacity greater than 3 000 L shall be permitted only if

a) the vehicles are located outdoors on a property where they are
   i) not less than 6 m away from any *building*, and
   ii) not exposed to undue hazard from accident or collision,
b) at least 2 portable extinguishers having a minimum rating of 80-B:C are provided on the *tank vehicle*,
c) the delivery hoses and automatically closing hose nozzle valves used for the fuel-dispensing operations conform to Subsection 4.6.5.,
d) the *tank vehicle* operator is given training and equipment for controlling any spillage that may occur during the fuel-dispensing operations, and
e) in cases where fuel-dispensing operations are carried out at a site not conforming to Subsection 4.1.6., measures are in place to control a spill of not less than 1 000 L.

Section 4.12. Objectives and Functional Statements

4.12.1. Objectives and Functional Statements

4.12.1.1. 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 Table 4.12.1.1. (See Note A-1.1.2.1.(1).)

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Table 4.12.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 4
Forming Part of Sentence 4.12.1.1.(1)

Provision	Functional Statements and Objectives[1]
4.1.3.1. Determination of Flash Point	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
(4)	[F01-OS1.1]
4.1.4.1. Hazardous Locations	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
4.1.5.1. Additional Fire Protection Equipment	
(1)	[F02,F03-OS1.2]
	[F02,F03-OP1.2]
4.1.5.2. Ignition Sources	
(1)	[F01-OS1.1] Applies to portion of Code text: "… a device, operation or activity that produces open flames, sparks or heat shall not be permitted in an area described in Article 4.1.1.1."
	[F01-OS1.1] Applies to portion of Code text: "Unless controlled in a manner that will not create a fire or explosion hazard …"
4.1.5.3. Smoking	
(1)	[F01-OS1.1]
4.1.5.4. Removal of Combustibles	
(1)	[F01-OS1.1]
4.1.5.6. Access for Firefighting	
(1)	[F12-OS1.2]
	[F12-OP1.2]
	[F12-OP3.1]
4.1.5.8. Basement Storage	
(1)	[F43,F01-OS1.1]
(2)	[F02,F43-OS1.1]
4.1.6.1. Spill Control	
(1)	[F44-OS1.1,OS1.2] Applies to preventing spills from flowing outside the spill area.
	[F44-OP1.1,OP1.2] Applies to preventing spills from flowing outside the spill area.
	[F44-OH5]
(3)	[F44-OH5]
	[F44-OS1.1,OS1.2]
4.1.6.2. Drainage Systems	
(1)	(a) [F44-OH5] Applies to the termination of the drainage system where it will not create a risk to public health.
	[F44-OS1.1,OS1.2,OS1.4]
	[F44-OP1.1,OP1.2]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F03-OS1.2]
4.1.6.3. Spills and Leaks	
(1)	[F82,F44-OS1.1,OS1.2]
	[F82,F44-OP1.1,OP1.2]
(2)	[F44-OP1.1,OP1.2]
	[F44-OS1.1,OS1.2]
	[F44-OH5]
(3)	(a) [F01,F02-OS1.1] (b) [F02-OS1.1,OS1.2]
	(a) [F44-OP1.1,OP1.2] (b) [F02-OP1.1,OP1.2]
4.1.7.1. Rooms or Enclosed Spaces	
(1)	[F01-OS1.1] Applies to conformance to the appropriate provincial or territorial legislation.
	[F01-OS1.1] Applies to portion of Code text: "… shall conform … to this Part and the NBC."
4.1.7.2. Ventilation Measures	
(1)	[F01-OS1.1]
(2)	[F43-OS1.1]
(3)	[F01-OS1.1]
(4)	[F01-OS1.1]
	[F01-OP1.1]
(5)	(a) [F01-OS1.1]
	(b) [F11-OS1.1]
	(c) [F01,F02-OS1.1,OS1.2]
	(c) [F02-OP1.2]
4.1.7.3. Location of Air Inlets and Outlets	
(1)	[F01-OS1.1]
(3)	[F01-OS1.1]
(4)	[F01-OS1.1]
4.1.7.4. Location of Mechanical Ventilation Exhaust Air Outlets	
(1)	(a) [F01-OS1.1]
	(b) [F03-OP1.2]
	(b) [F03-OP3.1]
	(b) [F01-OS1.1] [F03-OS1.2]
4.1.7.5. Make-up Air	
(1)	[F01-OS1.1]
(2)	[F01,F44-OS1.2]
(3)	[F03-OS1.2]
	[F03-OP1.2]
4.1.7.6. Recirculating Ventilation Systems	
(1)	[F01-OS1.1]
	(a),(b),(b)(i) [F11,F01-OS1.1]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
4.1.7.7. Exclusive Use of Ducts	
(1)	[F01,F44-OS1.1,OS1.2] [F03-OS1.2]
	[F01,F44-OP1.1,OP1.2] [F03-OP1.2]
4.1.7.8. Maintenance	
(1)	[F82-OS1.1]
4.1.8.1. Containers and Storage Tanks	
(2)	[F43-OS1.1]
(3)	[F43-OS1.1]
(4)	[F01,F43,F82-OS1.1]
	[F01,F43,F82-OP1.1]
	[F43-OH5]
4.1.8.2. Control of Static Electric Charge	
(1)	(b) [F01-OS1.1]
	[F01-OS1.1]
(2)	[F01-OS1.1]
(4)	[F22-OS1.1]
4.1.8.3. Transfer	
(1)	(b) [F43-OS1.1]
	(c) [F43-OS1.1]
(2)	[F20,F81,F01-OS1.1]
4.1.8.4. Fuel Tanks of Vehicles	
(1)	[F01,F43,F81-OS1.1]
(2)	[F43-OS1.1]
4.2.2.1. Prohibited Locations	
(1)	[F10,F12,F05,F06-OS1.5] Applies to storage in or adjacent to *exits* or principal routes that provide *access to exits*.
	[F03-OS1.2] Applies to storage near elevators.
4.2.2.2. Storage Arrangement and Conditions	
(1)	[F01,F43-OS1.1]
	[F43-OS3.4]
	[F10,F30-OS3.7]
	[F01,F43-OP1.1]
	[F43-OH5]
(2)	(a) [F43-OS3.4]
	(b) [F01,F43-OS1.1]
	(a) [F43-OH5]
	(b) [F01,F43-OP1.1]
4.2.3.1. Design and Construction	
(1)	[F20,F43,F80,F81-OH5]
	(d) [F01,F43,F04-OS1.1]
	[F20,F43,F80,F81,F01-OS1.1]
4.2.3.2. Markings or Labels	
(1)	[F81-OS1.1] [F12-OS1.1,OS1.2]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
(2)	[F81-OS1.1] [F12-OS1.1,OS1.2]
4.2.4.2. Maximum Quantities	
(2)	[F02-OS1.2]
	[F02-OP1.2]
(3)	[F02-OS1.2]
	[F02-OP1.2]
(4)	(b) [F03-OS1.2]
	(a) [F02-OS1.2]
	[F02,F03-OS1.2]
	(a) [F02-OP1.2] Applies to storage in cabinets not exceeding the quantity permitted for one cabinet.
	[F02,F03-OP1.2]
4.2.4.3. Storage Cabinets and Storage Rooms	
(1)	[F12-OS1.2] [F01-OS1.1]
	[F12-OP1.2] [F01-OP1.1]
4.2.4.4. Exterior Balconies	
(1)	[F03-OS1.2]
	[F03-OP1.2]
4.2.4.5. Dwelling Units	
(1)	[F02-OS1.2] Applies to portion of Code text: "Not more ... than 10 L shall be Class I liquids, are permitted to be stored in each *dwelling unit*."
	[F02-OS1.2]
	[F02-OP1.2]
	[F02-OP1.2] Applies to portion of Code text: "Not more … than 10 L shall be Class I liquids, are permitted to be stored in each *dwelling unit*."
4.2.4.6. Attached Garages and Sheds	
(1)	[F02-OS1.2]
	[F02-OP1.2]
4.2.5.2. Maximum Quantities	
(2)	[F02-OS1.2]
	[F02-OP1.2]
(3)	[F02-OS1.2]
	[F02-OP1.2]
(5)	[F02,F03-OS1.2]
	[F02,F03-OP1.2]
4.2.5.3. Containers	
(1)	[F01,F43-OS1.1]
(2)	[F20-OS1.1,OS1.2] [F04-OS1.5]
	[F20-OH5]
	[F04-OP1.2]
(3)	[F01,F43-OS1.2]
4.2.5.4. Transfer	
(1)	[F01,F43-OS1.1]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.2.6.2. Storage Cabinets and Storage Rooms	
(1)	(a) [F02-OS1.2] Applies to storage in cabinets not exceeding the quantity permitted for one cabinet.
	(b) [F03-OS1.2]
	[F02,F03-OS1.2]
	[F01,F43-OS1.1] Applies to portion of Code text: "Except as permitted in Article 4.2.6.3., *flammable liquids* and *combustible liquids* shall be kept in *closed containers* ..."
	(a) [F02-OP1.2] Applies to storage in cabinets not exceeding the quantity permitted for one cabinet.
	[F02,F03-OP1.2]
4.2.6.3. Maximum Quantities	
(1)	[F02,F03-OS1.2]
	[F02,F03-OP1.2]
(2)	[F02-OS1.2]
	[F02-OP1.2]
4.2.6.4. Containers	
(1)	[F04,F43,F01-OS1.1] [F02-OS1.2]
4.2.6.5. Separation of Dangerous Goods	
(1)	[F03-OS1.2]
4.2.7.2. Storage Facilities	
(1)	[F02,F03-OS1.2]
	[F02,F03-OP1.2]
4.2.7.3. Fire Compartments	
(1)	[F03-OS1.2]
	[F03-OP1.2]
4.2.7.4. Dispensing and Transfer	
(1)	[F01,F02,F03-OS1.2]
	[F01,F02,F03-OP1.2]
(2)	[F02,F01-OS1.2,OS1.1]
	[F01,F02-OP1.1,OP1.2]
4.2.7.5. Maximum Quantities	
(1)	[F03,F02-OS1.2]
	[F43,F01-OS1.1]
	[F20-OS1.1,OS1.2] [F04-OS1.2,OS1.5]
	[F04-OP1.2]
	[F20-OH5]
	[F03,F02-OP1.2]
(2)	[F03-OS1.2]
	[F03-OP1.2]
4.2.7.6. Fire Suppression Systems	
(1)	[F02-OS1.2]
	[F02-OP1.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.2.7.7. Clearances	
(1)	[F04-OS1.3]
	[F04-OP1.3]
(2)	[F02-OS1.2]
	[F02-OP1.2]
(3)	[F81,F82-OS1.1] [F10-OS1.5]
4.2.7.10. Separation from Combustible Products	
(1)	[F03-OS1.2]
4.2.8.2. Maximum Quantities	
(1)	[F02-OS1.2]
	[F02-OP1.2]
(2)	[F02-OS1.2]
	[F02-OP1.2]
(3)	[F02-OS1.2]
	[F02-OP1.2]
4.2.8.3. Handling	
(1)	[F01-OS1.1]
4.2.8.4. General Storage Areas	
(1)	[F02,F03-OS1.2]
	[F02,F03-OP1.2]
(4)	[F02-OS1.2]
	[F02-OP1.2]
4.2.9.1. Maximum Quantities	
(1)	[F02-OS1.2] Applies to storage densities averaged over the total room area.
	[F02-OS1.2] Applies to the total quantities of *flammable liquids* and *combustible liquids*.
	[F03-OS1.2] Applies to the *fire-resistance ratings* of *fire separations* .
	[F02-OP1.2] Applies to storage densities averaged over the total room area.
	[F02-OP1.2] Applies to the total quantities of *flammable liquids* and *combustible liquids*.
	[F03-OP1.2] Applies to the *fire-resistance ratings* of *fire separations*.
(2)	[F02-OS1.2]
	[F02-OP1.2]
4.2.9.2. Spill Control	
(1)	[F44-OS1.1,OS1.2]
	[F44-OP1.2]
	[F44-OH5]
4.2.9.3. Aisles	
(1)	[F81,F82-OS1.1,OS1.2] [F12-OS1.2] [F10-OS1.5]
	[F12-OP1.2]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
4.2.9.4. Dispensing	
(1)	[F43,F01-OS1.1]
4.2.10.1. Containers	
(1)	[F43,F01-OS1.1] Applies to storage in *closed containers*.
4.2.10.2. Maximum Quantity per Cabinet	
(1)	[F02-OS1.2]
	[F02-OP1.2]
4.2.10.3. Maximum Quantity per Fire Compartment	
(1)	[F02-OS1.2]
	[F02-OP1.2]
(2)	[F02-OS1.2]
	[F02-OP1.2]
(3)	[F02-OS1.2]
	[F02-OP1.2]
4.2.10.4. Labelling	
(1)	[F01-OS1.1]
4.2.10.5. Fire Endurance	
(1)	[F01-OS1.1]
	[F44-OS1.1]
	[F03-OS1.2]
	[F03-OP1.2]
	[F44-OP1.1]
	[F44-OH5]
4.2.10.6. Ventilation	
(1)	(a) [F01-OS1.1,OS1.2] Applies to materials providing equivalent fire protection. (b) [F01-OS1.1,OS1.2] Applies to the vent piping providing equivalent fire protection.
	(a) [F01-OS1.1] Applies to portion of Code text: "… the ventilation openings shall be sealed …" (b) [F01-OS1.1] Applies to portion of Code text: "… the cabinet shall be vented outdoors …"
4.2.11.1. Quantities and Clearances	
(1)	[F03,F02-OS1.2]
	[F03,F02-OP3.1]
(2)	(a),(b) [F03,F02-OS1.2]
	(a),(b) [F03,F02-OP3.1]
4.2.11.3. Fire Department Access	
(1)	[F12-OP3.1]
4.2.12.2. Maximum Quantities	
(1)	[F02-OS1.2]
	[F02-OP1.2]
4.2.12.3. Dispensing and Handling	
(1)	[F01,F43-OS1.1]
	[F01,F43-OP1.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
4.3.1.2. Atmospheric Storage Tanks	
(1)	[F20,F80,F43,F81,F01-OS1.1]
	[F20,F80,F43,F81-OH5]
(2)	(b) [F04,F81-OS1.1]
(4)	[F01,F20,F81-OS1.1]
	[F20,F81-OH5]
4.3.1.3. Low Pressure Storage Tanks and Pressure Vessels	
(1)	[F43,F80,F81,F20,F01-OS1.1]
	[F43,F80,F81,F20-OH5]
(2)	[F81,F80,F43,F01,F20-OS1.1]
	[F43,F81,F80,F20-OH5]
4.3.1.4. Operating Pressure	
(1)	[F81,F20-OS1.1]
	[F81,F20-OH5]
4.3.1.5. Corrosion Protection	
(1)	[F80-OS1.1]
	[F80-OH5]
4.3.1.6. Floating Roofs	
(1)	[F04-OS1.1]
4.3.1.7. Identification	
(1)	[F81-OS1.1] [F12-OS1.2]
	[F12-OP1.2]
4.3.1.8. Overfill Protection	
(1)	[F43-OS1.1]
	[F43-OH5]
	[F43-OP1.1]
(2)	[F43-OS1.1]
	[F43-OH5]
	[F43-OP1.1]
(3)	[F43-OS1.1]
	[F43-OP1.1]
	[F43-OH5]
4.3.1.9. Installation and Use	
(1)	[F81,F80,F43,F01,F20-OS1.1]
	[F81,F80,F43,F01,F20-OH5]
4.3.1.10. Reuse	
(1)	(b) [F01,F20,F43,F80,F81-OS1.1]
	(b) [F20,F43,F80,F81-OH5]
(2)	[F20,F43,F01-OS1.1]
	[F20,F43-OH5]
(3)	[F20,F43,F01-OS1.1]
	[F20,F43-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(4)	[F81-OH5]
	[F81-OS1.1]
4.3.2.1. Location	
(2)	[F03-OP3.1]
	[F03-OS1.2]
(3)	[F03-OP3.1]
	[F03-OS1.2]
(4)	[F03-OP3.1]
	[F03-OS1.2]
(5)	[F03-OP3.1]
	[F03-OS1.2]
(6)	(a) [F03-OP3.1]
	(b) [F01,F02-OP3.1]
	(a) [F03-OS1.2]
	(b) [F01,F02-OS1.2]
(7)	[F04,F02-OP3.1]
	[F04,F02-OS1.2]
(8)	[F02-OP3.1]
4.3.2.2. Spacing between Storage Tanks	
(1)	[F03,F12-OP1.2] Applies to the minimum distance being 0.25 times the sum of the tanks' diameters.
	[F82-OS1.1] Applies to the minimum distance of 1 m between the *storage tanks*.
	[F82-OP1.2] Applies to the minimum distance of 1 m between the *storage tanks* .
	[F82-OH5] Applies to the minimum distance of 1 m between the *storage tanks*.
(2)	[F03-OP1.2]
(3)	[F03-OP1.2]
4.3.2.3. Clearances from Liquefied Petroleum Gas Cylinders and Tanks	
(1)	[F03-OP1.2]
(2)	[F02,F03-OP1.2]
4.3.2.4. Fire Department Access	
(1)	[F12-OP1.2]
(2)	[F12-OP1.2]
(3)	[F02,F03-OP1.2]
4.3.2.5. Fire Protection Systems	
(2)	[F02,F03-OP1.2]
	[F02-OS1.2]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.3.1. Foundations and Supports	
(1)	[F02-OS1.2] Applies to the requirement that *storage tanks* rest on the ground or on foundations, supports or piling made of concrete, masonry or steel.
	[F22,F81,F20-OS1.1]
	[F22,F81,F20-OH5]
(2)	[F22-OS1.1] Applies to the installation of tank supports on firm foundations designed to minimize uneven settling of the tank.
	[F80-OS1.1] Applies to the minimizing of corrosion of the part of the tank resting on the foundation.
	[F22-OH5] Applies to the installation of tank supports on firm foundations designed to minimize uneven settling of the tank.
	[F80-OH5] Applies to the installation of tank supports on firm foundations designed to minimize corrosion of the part of the tank resting on the foundation.
(3)	[F04-OS1.2]
(4)	[F20,F81-OS1.1]
	[F20,F81-OH5]
4.3.3.2. Earthquake Protection	
(1)	[F22-OS1.1]
	[F22-OH5]
4.3.3.3. Protection against Flooding	
(1)	[F22-OS1.1]
	[F22-OH5]
4.3.4.1. Design and Installation	
(1)	[F20,F81-OS1.1] Applies to the requirement for normal venting.
	[F04,F81-OS1.1] Applies to the requirement for emergency venting.
	[F20,F81-OH5] Applies to the requirement for normal venting.
4.3.4.2. Unstable Liquids	
(1)	[F20,F81,F04-OS1.1]
	[F20,F81,F04-OH5]
4.3.5.2. Location of Vent Pipe Outlets	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
4.3.5.3. Interconnection of Vent Piping	
(1)	[F20,F81-OS1.1]
	[F20,F81-OH5]
(2)	[F01-OS1.1]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
4.3.6.1. Provision of Valves	
(1)	[F44-OS1.1]
	[F44-OP1.1]
	[F44-OH5]
(2)	[F44-OS1.1]
	[F44-OP1.1]
	[F44-OH5]
4.3.6.2. Materials	
(1)	[F04,F20-OS1.1] Applies to portion of Code text: "Valves and their connections to a *storage tank* shall be made of steel ..."
	[F04,F20-OH5] Applies to portion of Code text: "Valves and their connections to a *storage tank* shall be made of steel ..."
(2)	[F20,F04-OS1.1]
	[F20,F04-OH5] Applies to the materials for valves and their connections to a *storage tank* being suitable for the pressures, stresses and temperatures.
4.3.6.3. Openings for Liquid Level Measurements	
(1)	[F43,F01,F81,F34-OS1.1]
	[F43,F81,F34-OH5]
4.3.6.4. Connections for Filling and Emptying	
(1)	(a),(b) [F01-OS1.1]
	(a),(c) [F01-OS1.1]
(2)	[F43,F01,F81,F34-OS1.1]
	[F43,F81,F34-OH5]
(3)	[F01-OS1.1]
(4)	[F01,F43-OS1.1]
	[F01,F43-OP1.1]
	[F43-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
4.3.7.2. Construction	
(1)	[F04-OS1.1] Applies to the construction of the base and walls of secondary containments with noncombustible materials.
	(a) [F20-OS1.1] Applies to the base and walls of secondary containments being designed, constructed and maintained to withstand full hydrostatic head.
	(b) [F44-OS1.1] Applies to the base and walls of secondary containments being designed, constructed and maintained to provide the stated permeability.
	[F04-OP1.1] Applies to the construction of the base and walls of secondary containments with noncombustible materials.
	(a) [F20-OP1.1] Applies to the base and walls of secondary containments being designed, constructed and maintained to withstand full hydrostatic head.
	(a) [F20-OH5] Applies to the base and walls of secondary containments being designed, constructed and maintained to withstand full hydrostatic head.
	(b) [F44-OP1.1] Applies to the base and walls of secondary containments being designed, constructed and maintained to provide the stated permeability.
	(b) [F44-OH5] Applies to the base and walls of secondary containments being designed, constructed and maintained to provide the stated permeability.
(2)	[F43,F44-OS1.1]
	[F43,F44-OP1.1]
	[F43,F44-OH5]
(3)	[F44-OS1.1]
	[F44-OH5]
	[F44-OP1.1]
4.3.7.3. Capacity	
(1)	[F44-OS1.1]
	[F44-OP1.1]
	[F44-OH5]
(2)	[F44-OS1.1]
	[F44-OP1.1]
	[F44-OH5]
(3)	[F44-OS1.1]
	[F44-OP1.1]
	[F44-OH5]
4.3.7.4. Clearances	
(1)	[F01,F82-OS1.1] [F12-OS1.2]
	[F82-OH5]
	[F01,F82-OP1.1] [F12-OP1.2]
(3)	[F43,F81-OS1.1]
	[F43,F81-OP1.1]
	[F43,F81-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.7.5. Access to Storage Tanks and Ancillary Equipment	
(1)	(a) [F82-OS1.1] [F12-OS1.2]
	(b) [F10-OS1.5]
	(c) [F12-OS1.2]
	(c) [F12-OP1.2]
	(a) [F82-OP1.1] [F12-OP1.2]
	(a) [F82,F12-OH5]
	(b) [F10-OS3.4]
(2)	[F12-OS1.1]
	[F12-OP1.1]
	[F12-OH5]
4.3.7.6. Emergency Venting	
(1)	[F04-OS1.1]
	[F04-OP1.1]
4.3.7.7. Leak Detection	
(1)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
4.3.7.8. Drainage	
(1)	[F81,F44-OS1.1] [F12-OS1.2]
	[F01,F02-OS1.1] Applies to the accumulation of liquids and debris.
	[F81,F44-OH5]
	[F81,F44-OP1.1] [F12-OP1.2]
(3)	(a) [F44-OS1.1]
	(b),(c) [F12-OS1.1]
	(b),(c) [F12-OP1.1]
	(a) [F44-OP1.1]
	(a) [F44-OH5]
(4)	[F40-OH5]
4.3.7.9. Use of Secondary Containment	
(1)	[F81,F44,F01,F02-OS1.1] [F12-OS1.2]
	[F81,F44,F01,F02-OP1.1] [F12-OP1.2]
	[F81,F44,F01,F02,F12-OH5]
4.3.8.1. Construction	
(1)	[F43,F44-OH5]
	[F43,F44-OS3.4]
	[F01,F43,F44-OS1.1]
	[F01,F43,F44-OP1.1]
4.3.8.2. Location	
(1)	[F81,F20-OS1.1]
	[F81,F20-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	(a) [F20,F21-OS1.1] (b) [F20,F21-OS1.1] Applies to the distance from a *building* foundation.
	(b) [F01-OS1.1] Applies to the distance from a *building* foundation.
	(b) [F81-OS1.1] Applies to the distance from *street* lines. (c) [F81-OS1.1]
	(a) [F20,F21-OH5] (b) [F20,F21-OH5] Applies to the distance from a *building* foundation.
	(b) [F01-OP3.1] Applies to the distance from a *building* foundation.
	(b) [F81-OH5] Applies to the distance from *street* lines. (c) [F81-OH5]
4.3.8.3. Ground Cover	
(1)	[F20,F81-OS1.1]
	[F20,F81-OH5]
(2)	[F20,F81-OS1.1]
	[F20,F81-OH5]
(3)	[F20,F81-OS1.1]
	[F20,F81-OH5]
(4)	[F81,F04,F20-OS1.1]
	[F81,F04,F20-OH5]
4.3.8.4. Damage Repair	
(1)	[F82-OH5]
	[F82-OS1.1]
(2)	[F82-OS1.1]
	[F82-OH5]
4.3.8.5. Damage Prevention	
(1)	[F81-OS1.1]
	[F81-OH5]
(2)	[F81-OS1.1]
	[F81-OH5]
4.3.8.6. Installation	
(1)	[F81-OS1.1]
	[F81-OH5]
(2)	[F81-OS1.1]
	[F81-OH5]
(3)	[F20-OS1.1]
	[F20-OH5]
4.3.8.7. Filling	
(1)	[F43-OS1.1]
	[F43-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.8.9. Anchorage	
(1)	[F22-OS1.1]
	[F22-OH5]
(2)	[F81-OS1.1]
	[F81-OH5]
4.3.9.1. Installation	
(1)	[F44-OH5]
	[F44-OS3.4]
	[F01,F44-OS1.1]
	[F01,F44-OP1.1]
(2)	[F43,F44-OH5]
	[F43,F44-OS3.4]
	[F01,F43,F44-OS1.1]
	[F01,F43,F44-OP1.1]
(3)	[F43,F44-OH5]
	[F30,F43,F44-OS3.4]
	[F01,F43,F44-OS1.1]
	[F01,F43,F44-OP1.1]
(4)	[F44,F82-OH5]
	[F44,F82-OS3.4]
	[F01,F44,F82-OS1.1]
	[F01,F44,F82-OP1.1]
4.3.9.2. Construction	
(1)	[F20,F44,F80,F81-OH5]
	[F20,F44,F80,F81-OS3.4]
	[F20,F01,F44,F80,F81-OS1.1]
	[F20,F01,F44,F80,F81-OP1.1]
4.3.9.3. Leak Detection Monitoring	
(1)	[F43,F82-OS1.1]
	[F43,F82-OS3.4]
	[F43,F82-OP1.1]
	[F43,F82-OH5]
4.3.10.1. Corrosion Protection	
(1)	[F80-OS1.1]
	[F80-OH5]
4.3.11.1. Vent Design	
(1)	[F20,F81-OS1.1]
	[F20,F81-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.11.3. Installation	
(1)	[F01-OS1.1]
	(a) [F43-OS1.1] Applies to the vent pipe outlets being higher than the fill pipe openings.
	(a) [F43-OH5] Applies to the vent pipe outlets being higher than the fill pipe openings.
(2)	[F01-OS1.1] Applies to portion of Code text: "Vent pipe outlets from underground *storage tanks* for Class II or IIIA liquids shall be located outside *buildings* ..."
	[F43-OS1.1] Applies to the requirement for vent pipe outlets to be located outside *buildings* at a height that is above the fill pipe opening.
	[F01-OS1.1] Applies to the requirement for vent pipe outlets to be located outside *buildings* at not less than 2 m above finished ground level.
	[F43-OH5] Applies to the requirement for the vent pipe outlets to be located outside *buildings* at a height that is above the fill pipe opening.
(3)	[F20,F81-OS1.1] Applies to the requirement for vent pipes to not be obstructed by any device that may cause excessive back pressure.
	[F20,F81-OH5] Applies to the requirement for vent pipes to not be obstructed by any device that may cause excessive back pressure.
(4)	[F20,F81-OS1.1]
	[F20,F81-OH5]
(5)	(a),(b),(c) [F81,F20-OS1.1]
	(d) [F81-OS1.1]
	(a),(b),(c) [F81,F20-OH5]
	(d) [F81-OH5]
4.3.11.4. Interconnection of Vent Pipes	
(1)	[F20,F81-OS1.1]
	[F20,F81-OH5]
(2)	[F20-OS1.1]
	[F20-OH5]
(3)	[F01-OS1.1]
4.3.12.1. Connections	
(1)	[F43,F01-OS1.1]
	[F43-OH5]
4.3.12.2. Openings for Measuring Liquid Level	
(1)	[F43,F01,F81,F34-OS1.1]
	[F43,F81,F34-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.12.3. Fill Piping and Discharge Piping	
(1)	[F43-OS1.1] Applies to portion of Code text: "Fill piping and discharge piping shall enter underground *storage tanks* only through the top of the tank ..."
	[F43-OS1.1] Applies to portion of Code text: "... discharge piping used in suction systems shall be sloped toward the *storage tanks*."
	[F43-OH5] Applies to portion of Code text: "Fill piping and discharge piping shall enter underground *storage tanks* only through the top of the tank ..."
	[F43-OH5] Applies to portion of Code text: "... discharge piping used in suction systems shall be sloped toward the *storage tanks*".
(2)	[F43-OS1.1]
	[F43-OH5]
(3)	(a),(b) [F01-OS1.1]
	(a),(c) [F01-OS1.1]
(4)	[F43,F01-OS1.1]
	[F43-OH5]
(5)	[F01-OS1.1]
(6)	(a) [F43,F44,F82-OH5]
	(a) [F43,F44,F82-OS3.4]
	(a) [F01,F43,F44,F82-OS1.1]
	(a) [F01,F43,F44,F82-OP1.1]
	(b) [F01,F43-OS1.1]
	(b) [F01,F43-OP1.1]
	(b) [F43-OH5]
	(c) [F43,F44,F82-OS3.4]
	(c) [F01,F43,F44,F82-OP1.1]
	(c) [F43,F44,F82-OH5]
(7)	[F01,F43-OS1.1]
	[F01,F43-OS3.4]
	[F01,F43-OH5]
4.3.13.1. Occupancy	
(1)	[F01,F02-OS1.1]
	[F01,F02-OP1.1]
4.3.13.2. Stationary Combustion Engines	
(1)	[F01,F02,F03,F04,F43,F81-OS1.1,OS1.2]
4.3.13.3. Maximum Static Head	
(1)	[F20-OS1.1]
	[F20-OH5]
4.3.13.4. Maximum Quantities and Location	
(1)	(b) [F01-OS1.1] [F02-OS1.2]
	(b) [F01-OP1.1] [F02-OP1.2]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.13.5. Storage Tank Construction	
(1)	(a) [F01,F20,F43,F80,F81-OS1.1]
	(a) [F01,F20,F43,F80,F81-OP1.1]
	(b) [F01,F43,F82-OS1.1]
	(b) [F01,F43,F82-OP1.1]
	(b) [F20,F43,F80,F81-OH5]
(2)	(b) [F01,F43,F82-OS1.1]
	(b) [F01,F43,F82-OP1.1]
	(b) [F20,F43,F80,F81-OH5]
4.3.13.6. Piping Systems	
(1)	[F01-OS1.1]
	[F01-OP1.1]
4.3.13.7. Fire Compartments	
(1)	[F03-OP1.2]
	[F03-OS1.2]
4.3.13.8. Mixed Storage	
(1)	[F01-OS1.1] [F02-OS1.2]
	[F01-OP1.1] [F02-OP1.2]
4.3.13.9. Storage Tanks outside Storage Rooms	
(1)	(a) [F44-OS1.1]
	(a) [F44-OP1.1]
	(a) [F44-OH5]
	[F01-OS1.1]
4.3.13.10. Vents	
(2)	[F01-OS1.1]
4.3.13.11. Supports, Foundations and Anchorage	
(2)	[F22,F81,F20,F80,F04-OS1.1]
	[F22,F81,F04,F80,F20-OH5]
4.3.13.12. Bonding and Grounding	
(1)	[F01-OS1.1]
4.3.14.1. Design and Construction	
(1)	(a) [F03-OP1.2]
	(a) [F03-OS1.2]
	(c) [F44-OS1.1,OS1.2]
	(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]
	(b) [F44-OP1.1] Applies to portion of Code text: "... designed to contain ... 100% of the volume of the largest *storage tank* ..."
	(b) [F44-OH5] Applies to portion of Code text: "... designed to contain ... 100% of the volume of the largest *storage tank* ..."

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.14.2. Clearances	
(1)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
4.3.14.3. Explosion Venting	
(1)	[F02-OS1.3]
	[F02-OP1.3]
	[F02-OP3.1]
4.3.14.4. Placards	
(1)	[F12-OS1.2]
	[F12-OP1.2]
4.3.15.1. Connections	
(1)	[F43,F01-OS1.1]
	[F43-OH5]
(2)	[F44-OS1.1]
	[F44-OH5]
	[F44-OP1.1]
4.3.15.2. Openings for Liquid Level Measurement	
(1)	[F43,F01,F81,F34-OS1.1]
	[F43,F81-OH5]
(2)	[F20,F81-OS1.1]
	[F20,F81-OH5]
4.3.16.1. Underground Storage Tanks	
(1)	[F82,F01,F43,F81-OS1.1]
	[F82,F81-OH5]
(2)	[F34,F80-OH5]
(3)	[F34,F80-OH5]
4.3.16.2. Aboveground Storage Tanks	
(1)	[F34-OS1.1]
	[F34-OH5]
(2)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
(3)	[F43,F01-OS1.1]
	[F43-OH5]
(4)	[F43,F80-OH5]
4.3.16.3. Disposal	
(1)	[F81-OS1.1]
	[F81-OH5]
4.3.16.4. Underground Piping Systems	
(1)	[F01,F43,F81,F82-OS1.1]
	[F43,F81,F82-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.3.16.5. Corrosion Protection	
(1)	[F01,F43,F81,F82-OS1.1]
	[F43,F81,F82-OH5]
4.3.17.1. Removal	
(1)	[F01-OS1.1]
	[F40-OH5]
(2)	[F40-OH5]
4.3.17.2. Abandonment in Place	
(4)	[F01-OS1.1]
	[F40-OH5]
(5)	[F40-OH5]
4.4.1.2. Frequency and Methods of Leak Detection Testing and Monitoring	
(1)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
(3)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
(6)	[F43,F44-OS3.4]
	[F01,F43,F44-OS1.1]
	[F01,F43,F44-OP1.1]
4.4.1.3. Remedial Action	
(1)	[F01,F44,F82-OS1.1]
	[F44,F82-OH5]
	[F01,F44,F82-OP1.1]
4.4.2.1. Definition and Performance of Leak Detection Testing and Monitoring Methods	
(2)	[F82,F01-OS1.1]
	[F82,F01-OP1.1]
	[F82,F43-OH5]
(3)	[F01-OS1.1]
	[F43-OH5]
	[F01-OP1.1]
(4)	[F01-OP1.1]
	[F01-OS1.1]
	[F43-OH5]
(5)	[F01,F43,F82-OS1.1]
	[F01,F43,F82-OP1.1]
	[F43,F82-OH5]
(6)	[F01,F82-OS1.1]
	[F01,F82-OP1.1]
	[F43,F82-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(7)	[F01,F43,F82-OS1.1]
	[F01,F43,F82-OP1.1]
	[F43,F82-OH5]
(8)	[F82,F81-OS1.1]
	[F43,F82-OH5]
	[F82-OP1.1]
(10)	[F01,F82-OS1.1]
	[F82-OH5]
(11)	[F01,F82-OS1.1]
	[F82-OH5]
	[F01,F82-OP1.1]
(12)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
4.4.3.1. Leak Detection Tests	
(1)	[F01,F82-OS1.1]
	[F01,F82-OP1.1]
	[F43,F82-OH5]
(3)	[F20,F81-OS1.1]
4.4.3.2. Pneumatic Leak Detection Tests	
(1)	[F01-OS1.1]
(2)	[F81-OS1.1]
	[F81-OH5]
	[F81-OP1.1]
(4)	[F20,F81-OS1.1]
	[F20,F81-OS3.4]
(5)	[F20,F81-OS1.1]
	[F20,F81-OS3.4]
(6)	[F01-OS1.1]
4.4.3.3. Protocols for Pneumatic Leak Detection Testing of Piping Systems	
(3)	[F43-OS1.1]
	[F43-OH5]
(4)	[F43-OS1.1]
	[F43-OH5]
(5)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
(6)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(7)	[F82-OP1.1]
	[F82-OH5]
	[F82-OS1.1]
4.4.3.4. Protocols for Liquid Media Leak Detection Testing of Piping Systems	
(2)	[F01,F82-OS1.1]
	[F01,F82-OP1.1]
(3)	[F01,F82-OS1.1]
	[F01,F82-OP1.1]
	[F43,F82-OH5]
(4)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
(5)	[F20,F81-OS1.1]
(7)	[F81-OS1.1]
	[F81-OP1.1]
	[F81-OH5]
(8)	[F43-OS1.1]
4.4.3.5. Protocols for Leak Detection Testing of Sumps	
(3)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
(4)	[F82-OS1.1]
	[F82-OH5]
4.4.4.1. Inventory Reconciliation	
(1)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
(2)	[F82-OS1.1]
	[F82-OH5]
(3)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
4.4.4.2. Leakage Detection	
(1)	[F81,F82-OS1.1]
	[F81,F82-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.5.2.1. Materials	
(1)	[F20-OS1.1] This applies to the suitability of materials for the maximum anticipated working pressures and operating temperatures.
	[F20-OH5] This applies to the suitability of materials for the maximum anticipated working pressures and operating temperatures.
	[F80-OS1.1] Applies to the suitability of materials for the chemical properties of the contained liquid.
	[F80-OH5] Applies to the suitability of materials for the chemical properties of the contained liquid.
	[F20-OP1.1] This applies to the suitability of materials for the maximum anticipated working pressures and operating temperatures.
	[F80-OP1.1] Applies to the suitability of materials for the chemical properties of the contained liquid.
(2)	(a) [F20-OS1.1]
	(a) [F20-OH5]
	(b) [F04-OS1.1]
	(b) [F04-OH5]
	(a) [F20-OP1.1]
	(b) [F04-OP1.1]
(3)	[F20,F80-OS1.1]
	[F20,F80-OP1.1]
	[F20,F80-OH5]
(4)	[F20,F43,F80,F81-OS1.1]
	[F20,F43,F80,F81-OP1.1]
	[F20,F43,F80,F81-OH5]
(5)	[F20,F43,F80,F81-OS1.1]
	[F20,F43,F80,F81-OP1.1]
	[F20,F43,F80,F81-OH5]
4.5.2.2. Special Materials	
(1)	[F80,F81,F20-OS1.1]
	[F80,F81,F20-OP1.1]
	[F80,F81,F20-OH5]
4.5.3.1. Corrosion Protection	
(1)	[F80-OP1.1]
	[F80-OS1.1]
	[F80-OH5]
4.5.4.1. Identification	
(1)	[F81-OS1.1] [F12-OS1.2]
(2)	[F81-OS1.1]
	[F81-OH5]
(3)	[F81-OS1.1] [F12-OS1.2]
	[F12-OP1.2]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.5.4.2. Documentation	
(1)	[F12-OS1.2]
	[F12-OH5]
	[F12-OP1.2]
(2)	[F12-OS1.2]
	[F12-OP1.2]
	[F12-OH5]
4.5.5.1. Threaded Joints	
(1)	[F43-OP1.1]
	[F43-OS1.1]
	[F43-OH5]
4.5.5.2. Welded Piping	
(1)	[F20-OP1.1] Applies to conformance to provincial or territorial regulations or municipal by-laws.
	[F20-OH5] Applies to conformance to provincial or territorial regulations or municipal by-laws.
	[F20-OS1.1] Applies to conformance to provincial or territorial regulations or municipal by-laws.
(2)	[F01-OS1.1]
4.5.5.3. Flanged Joints	
(1)	[F20,F43,F80,F81-OP1.1]
	[F20,F43,F80,F81-OS1.1]
	[F20,F43,F80,F81-OH5]
4.5.5.4. Bolting Materials	
(1)	[F04-OP1.1]
	[F04-OS1.1]
	[F04-OH5]
4.5.5.5. Gaskets	
(1)	[F20,F04-OP1.1]
	[F04,F20-OS1.1]
	[F04,F20-OH5] Applies to portion of Code text: “Gaskets in flanged connections shall be of a material resistant to the liquid being carried ...”
4.5.5.6. Mechanical Connections	
(1)	(a) [F82-OS1.1] (b) [F80-OS1.1]
	(a) [F82-OP1.1] (b) [F80-OP1.1]
	(a) [F82-OH5] (b) [F80-OH5]
	(c) [F43,F44-OH5]
	(c) [F01,F43,F44-OS3.4]
	(c) [F01,F43,F44-OS1.1]
	(c) [F01,F43,F44-OP1.1]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.5.5.7. Penetrations into Sumps	
(1)	[F43,F81-OH5]
	[F43,F81-OS3.4]
	[F01,F43-OS1.1]
	[F01,F43-OP1.1]
4.5.6.1. Construction	
(1)	[F43,F44-OH5]
	[F43,F44-OS3.4]
	[F01,F43,F44-OS1.1]
	[F01,F43,F44-OP1.1]
4.5.6.2. Location	
(1)	[F43-OS1.1]
	[F43-OP1.1]
(2)	[F43-OS1.1]
	[F43-OP1.1]
	[F43-OH5]
(3)	[F81-OS1.1]
	[F81-OP1.1]
	[F81-OH5]
4.5.6.3. Supports for Aboveground Outdoor Piping	
(1)	[F20,F22-OH5]
	[F20,F22-OP1.1]
	[F20,F22-OS1.1]
(2)	[F80-OS1.1]
	[F80-OH5]
	[F80-OP1.1]
(3)	[F80,F82-OS1.1]
	[F80,F82-OP1.1]
	[F80,F82-OH5]
4.5.6.4. Arrangement of Aboveground Outdoor Piping	
(1)	(a) [F01-OS1.1,OS1.2]
	(a) [F01-OP1.1,OP1.2]
	(b) [F01,F04-OS1.1]
	(b) [F01,F04-OP1.1]
(2)	[F44-OS1.1] Applies to the requirement for impermeable construction.
	[F44-OP1.1] Applies to the requirement for impermeable construction.
	[F02-OP1.2] Applies to the requirement for *noncombustible construction*.
	[F02-OS1.2] Applies to the requirement for *noncombustible construction*.

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(3)	[F81-OS1.1]
	[F81-OP1.1]
	[F81-OH5]
(4)	[F21,F04-OS1.1]
	[F04,F21-OP1.1]
	[F04,F21-OH5] Applies to designing to prevent excessive stress resulting from settlement.
4.5.6.5. Arrangement of Underground Piping	
(1)	[F81,F21-OS1.1]
	[F81,F21-OP1.1]
	[F81,F21-OH5]
(2)	[F81,F20-OS1.1]
	[F81,F20-OP1.1]
	[F81,F20-OH5]
(3)	[F81,F21-OH5]
	[F81,F21-OS1.1]
	[F81,F21-OP1.1]
(4)	[F81,F21-OH5]
	[F81,F21-OS1.1]
	[F81,F21-OP1.1]
4.5.6.6. Installation of Underground Piping	
(1)	(a) [F20,F22-OH5]
	(a) [F20,F22-OS1.1]
	(a) [F20,F22-OP1.1]
	(b) [F21,F81,F20-OP1.1]
	(b) [F21,F81,F20-OH5]
	(b) [F21,F81,F20-OS1.1]
4.5.6.7. Piping in Service Tunnels	
(1)	[F43-OS1.1]
4.5.6.8. Piping at Entrances to Buildings	
(1)	[F82,F21-OS1.1]
	[F82,F21-OH5]
	[F82,F21-OP1.1]
(2)	[F44-OS1.1]
	[F44-OH5]
	[F44-OP1.1]
(3)	[F21-OS1.1]
	[F21-OH5]
	[F21-OP1.1]
4.5.6.9. Indoor Piping	
(1)	[F81-OS1.1] Applies to indoor piping being supported overhead or being located in trenches.
	[F81-OP1.1] Applies to the requirement for indoor piping to be supported overhead or located in trenches.

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F02-OS1.2] [F04-OS1.1]
	[F02-OP1.2] [F04-OP1.1]
(3)	[F02,F03-OS1.2]
	[F02,F03-OP1.2]
4.5.6.11. Overhead Piping	
(1)	[F81-OS1.1]
	[F81-OP1.1]
(2)	[F20-OS1.1]
	[F20-OP1.1]
(3)	[F20-OS1.1]
	[F20-OP1.1]
(4)	[F20-OS1.1]
	[F20-OP1.1]
4.5.6.12. Supports for Overhead Piping	
(1)	[F20-OS1.1]
	[F20-OP1.1]
(2)	[F20-OS1.1]
	[F20-OP1.1]
4.5.6.13. Protection of Pipe Risers	
(1)	[F81-OS1.1]
	[F81-OP1.1]
4.5.6.14. Provision for Expansion and Contraction	
(1)	[F21-OP1.1]
	[F21-OH5]
	[F21-OS1.1]
(2)	[F20,F21,F81-OS1.1]
	[F20,F21,F81-OP1.1]
	[F20,F21,F81-OH5]
4.5.7.1. Design	
(1)	[F20,F81-OS1.1]
	[F20,F81-OH5]
	[F81,F20-OP1.1]
(2)	[F81,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F20-OP1.1]
(3)	[F81,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F20-OP1.3]
4.5.7.2. Shut-off Valves	
(1)	[F44-OS1.1]
	[F44-OH5]
	[F44-OP1.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F44,F12-OS1.1]
	[F44,F12-OH5]
	[F44,F12-OP1.1]
(3)	(a),(b),(c),(d),(e) [F12,F44-OS1.1] Applies to the requirement for shut-off valves.
	[F04,F20-OP1.1] Applies to the requirement for steel shut-off valves.
	(a),(b),(c),(d),(e) [F12,F44-OH5] Applies to the requirement for shut-off valves.
	(a),(b),(c),(d),(e) [F12,F44-OP1.1] Applies to the requirement for shut-off valves.
	[F04,F20-OS1.1] Applies to the requirement for steel shut-off valves.
	[F04,F20-OH5] Applies to the requirement for steel shut-off valves.
(4)	[F81,F04,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F04,F20-OP1.1]
4.5.7.3. Diaphragm Valves	
(1)	[F43-OS1.1]
	[F43-OP1.1]
4.5.7.4. Globe Valves	
(1)	[F20-OS1.1]
	[F20-OH5]
	[F20-OP1.1]
4.5.7.5. Indicating Valves	
(1)	[F12-OS1.1]
	[F12-OH5]
	[F12-OP1.1]
4.5.7.6. Identification	
(1)	[F12,F81-OS1.1]
	[F12-OH5]
	[F12,F81-OP1.1]
(2)	[F12,F81-OS1.1]
	[F12-OH5]
	[F12,F81-OP1.1]
4.5.8.1. Design	
(1)	[F01,F81,F20-OS1.1]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.5.8.2. Steam Heating	
(1)	[F20,F81-OS1.1] Applies to the minimum steam temperature needed to make the liquid being used fluid.
	[F20,F81-OS1.1] Applies to the minimum steam pressure needed to make the liquid being used fluid.
	[F20,F81-OH5] Applies to the minimum steam pressure needed to make the liquid being used fluid.
	[F20,F81-OP1.1] Applies to the minimum steam temperature needed to make the liquid being used fluid.
	[F20,F81-OP1.1] Applies to the minimum steam pressure needed to make the liquid being used fluid.
(2)	[F81,F20-OP1.1]
	[F81,F20-OH5]
	[F81,F20-OS1.1]
(3)	[F01,F81-OS1.1]
	[F01,F81-OP1.1]
4.5.8.4. Thermal Electrical Conduction Heating	
(2)	(a),(b),(c) [F01-OS1.1]
	(b) [F81,F20-OS1.1]
	(d) [F01-OS1.1]
	(b) [F81,F20-OP1.1]
(3)	[F82,F01,F20-OS1.1]
	[F82,F20-OP1.1]
4.5.8.5. Open Flames	
(1)	[F01-OS1.1]
4.5.9.1. Location of Outdoor Pumps	
(1)	(a) [F01-OP3.1]
	(b) [F01-OS1.1]
	(b) [F01-OP3.1]
	(a) [F01-OS1.1]
4.5.9.2. Pump Houses and Pump Rooms	
(2)	[F01-OS1.1] [F02-OS1.2]
	[F01-OP1.1] [F02-OP1.2]
4.5.9.3. Pits	
(1)	[F20,F81-OS1.1]
	[F20,F81-OH5]
(2)	[F01-OS1.1] [F02-OS1.2] Applies to the size of pits not being larger than required for inspection and maintenance.
	[F81-OS1.1] Applies to the requirement for the pits to be provided with a cover.
	[F01-OP1.1] [F02-OP1.2] Applies to the size of pits not being larger than required for inspection and maintenance.

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.5.9.4. Control Switches	
(1)	[F44-OS1.1] Applies to the requirement to have control switches to shut down the pumps in case of emergency.
	[F44-OP1.1] Applies to the requirement to have control switches to shut down the pumps in case of emergency.
	[F44-OH5] Applies to the requirement to have control switches to shut down the pumps in case of emergency.
	[F12-OP1.1] Applies to the requirement to locate one of the 2 control switches in the operating area and the other at a remote location.
	[F12-OH5] Applies to the requirement to locate one of the 2 control switches in the operating area and the other at a remote location.
	[F12-OS1.1] Applies to the requirement to locate one of the 2 control switches in the operating area and the other at a remote location.
4.5.9.5. Hydraulic Transfer Systems	
(1)	[F81-OS1.1]
	[F81-OH5]
	[F81-OP1.1]
(2)	[F81,F20,F82-OS1.1]
	[F81,F20,F82-OH5]
	[F81,F82,F20-OP1.1]
(3)	[F81,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F20-OP1.1]
(4)	[F81,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F20-OP1.1]
(5)	[F81,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F20-OP1.1]
(6)	[F81-OS1.1]
	[F81-OH5]
	[F81-OP1.1]
4.5.9.6. Inert Gas Transfer Systems	
(1)	[F81,F82,F20-OS1.1]
	[F81,F82,F20-OH5]
	[F81,F82,F20-OP1.1]
(2)	[F81,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F20-OP1.1]
(3)	[F81,F20-OS1.1]
	[F81,F20-OH5]
	[F81,F20-OP1.1]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(4)	[F81,F04-OS1.1]
	[F81,F04-OH5]
	[F81,F04-OP1.1]
4.5.9.7. Non-Inert Gas Transfer	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
4.5.10.1. Procedures	
(1)	[F12-OS1.1]
	[F12-OH5]
	[F12-OP1.1]
4.5.10.2. Training	
(1)	(b) [F12-OS1.1]
	(b) [F12-OP1.1]
	(b) [F12-OH5]
	(c) [F12-OS1.2]
	(c) [F12-OP1.2]
	(d) [F12,F81-OS1.1]
	(d) [F12,F81-OP1.1]
	(d) [F12-OH5]
	(a) [F12-OS1.1]
	(a) [F12-OP1.1]
	(a) [F12-OH5]
(2)	[F12-OS1.2] Applies to the training of employees in the location, function and operation of valves used for the operation of fire protection equipment.
	[F12-OS1.1] Applies to the training of employees in the location, function and operation of valves used for the operation of manual emergency shut-off valves.
	[F12-OP1.2] Applies to the training of employees in the location, function and operation of valves used for the operation of fire protection equipment.
	[F12-OP1.1] Applies to the training of employees in the location, function and operation of valves used for the operation of the manual emergency shut-off valves.
	[F12-OH5] Applies to the training of employees in the location, function and operation of valves used for the operation of the manual emergency shut-off valves.
4.5.10.3. Emergency Valves	
(1)	[F12-OS1.2,OS1.1]
	[F12-OH5] Applies to the requirement for signs indicating the location of valves used for the operation of manual emergency shut-off valves.
	[F12-OP1.2,OP1.1]
4.5.10.4. Portable Extinguishers	
(1)	[F12,F02-OS1.2]
	[F12,F02-OP1.2]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.5.10.5. Visual Inspections	
(1)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
(2)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
(3)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
(4)	[F01-OS1.1]
4.5.10.6. Operational Tests	
(1)	[F82-OS1.1]
	[F82-OH5]
	[F82-OP1.1]
4.5.10.7. Maintenance	
(1)	[F01,F43-OS1.1]
	[F43-OH5]
(2)	[F43-OS1.1]
	[F43-OH5]
(3)	[F01-OS1.1]
(4)	[F81-OS1.1]
	[F81-OH5]
(5)	[F43-OS1.1]
	[F43-OH5]
(6)	[F43,F01-OS1.1]
	[F43-OH5]
4.6.1.1. Application	
(2)	[F01,F02,F03,F81-OS1.1]
4.6.2.1. Outside Aboveground Storage Tanks	
(2)	[F02-OS1.2]
	[F02-OP1.2]
(3)	[F02-OS1.2]
	[F02-OP1.2]
(4)	(a) [F81-OS1.1]
	(b) [F34-OS1.1]
	(a) [F81-OH5]
	(b) [F34-OH5]
	(e) [F43,F81-OS1.1]
	(e) [F43,F81-OP1.1]
	(e) [F43,F81-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.6.2.2. Containers	
(1)	[F81,F12-OS1.1] [F12-OS1.2] Applies to the requirement for products stored or sold at *fuel-dispensing stations* to be in *closed containers* distinctly marked with the generic name of the liquid they contain.
4.6.2.3. Piping	
(4)	[F20,F22-OH5] Applies to the supported portion of the piping.
	[F20,F22-OS1.1] Applies to the supported portion of the piping.
	[F20,F22-OP1.1] Applies to the supported portion of the piping.
	[F21,F81,F20-OP1.1] Applies to the backfilled portion of the piping.
	[F21,F81,F20-OH5] Applies to the backfilled portion of the piping.
	[F21,F81,F20-OS1.1] Applies to the backfilled portion of the piping.
4.6.2.5. Piping Supports and Guards	
(1)	[F81,F22-OS1.1]
	[F81,F22-OH5]
	[F81,F22-OP1.1]
4.6.3.1. Dispensers	
(1)	[F01,F43-OS1.1]
	[F43-OH5]
4.6.3.2. Dispenser Sumps	
(1)	[F01,F20,F44,F80,F81-OS1.1]
	[F20,F44,F80,F81-OS3.4]
	[F01,F20,F44,F80,F81-OP1.1]
	[F20,F44,F80,F81-OH5]
4.6.3.3. Location	
(1)	(f) [F43,F01-OS1.1]
	(f) [F01-OS1.1] Applies to the minimum distance from any *building* opening.
	(a) [F01-OP3.1]
	(b),(c) [F01,F81-OS1.1]
	(d) [F01-OS1.1]
	(f) [F01-OS1.1] Applies to location with respect to openings in *buildings* for the shelter of operating personnel and in which there are electrical installations.

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	(a) [F34-OS1.1]
	(b) [F12,F01-OS1.1]
	(d) [F01-OS1.1] Applies to portion of Code text: "… ventilation is provided in conformance … with the requirements for storage garages in Subsection 6.3.1. of Division B of the NBC."
	(d) [F40-OS3.4] Applies to portion of Code text: "… ventilation is provided in conformance … with the requirements for storage garages in Subsection 6.3.1. of Division B of the NBC."
(3)	[F01,F43-OS1.1]
4.6.3.4. Protection against Collision Damage	
(1)	[F81-OS1.1]
	[F81-OH5]
4.6.3.5. Marine Fuel-Dispensing Stations	
(1)	[F81-OS1.1]
	[F81-OH5]
4.6.4.1. Location and Identification	
(1)	[F44-OS3.4]
	[F02-OS1.1] Applies to the requirement to provide shut-off devices to all dispensers and pumps.
	[F06-OS1.1] Applies to the requirement to locate the shut-off devices within the specified minimum and maximum distances away from the dispensers and pumps.
	[F02-OP1.1] Applies to the requirement to provide shut-off devices to all dispensers and pumps.
	[F06-OP1.1] Applies to the requirement to locate the shut-off devices within the specified minimum and maximum distances away from the dispensers and pumps.
(2)	[F12-OS1.1,OS1.2]
	[F12-OP1.1,OP1.2]
	[F12-OH5]
(3)	[F44-OS3.4] Applies to the requirement for shut-off valves.
	[F04,F20-OP1.1]
	[F44-OH5] Applies to the requirement for shut-off valves.
	[F04,F20-OS1.1]
4.6.4.2. Self-service Outlets	
(1)	[F12,F44-OS1.1,OS1.2]
	[F12,F44-OP1.1,OP1.2]
	[F12,F44-OH5]
(2)	[F12-OH5]
	[F12-OP1.1,OP1.2]
	[F12-OS1.1,OS1.2]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.6.4.3. Marine Fuel-Dispensing Stations	
(1)	[F12-OS1.1]
	[F12-OH5]
	[F12-OP1.1]
4.6.5.1. Delivery Hose	
(1)	[F81,F20,F43,F01-OS1.1]
	[F81,F20,F43-OP1.1]
	[F81,F20,F43-OH5]
(2)	[F43-OS1.1]
	[F43-OP1.1]
	[F43-OH5]
(3)	[F43-OS1.1]
	[F43-OH5]
	[F43-OP1.1]
4.6.5.2. Hose Nozzle Valves	
(1)	(b) [F81,F43,F01,F20-OS1.1]
	(b) [F81,F43,F20-OP1.1]
	(b) [F81,F43,F20-OH5]
(2)	(a) [F43-OS1.1]
	(b) [F43-OS1.1]
	(a) [F43-OP1.1]
	(b) [F43-OP1.1]
	(a) [F43-OH5]
	(b) [F43-OH5]
(3)	[F43-OH5]
	[F43-OP1.1]
	[F43-OS1.1]
(4)	[F81-OS1.1]
	[F81-OP1.1]
	[F81-OH5]
(5)	[F43-OS1.1]
	[F43-OP1.1]
	[F43-OH5]
4.6.6.2. Pumps and Control Equipment	
(1)	[F20,F81-OS1.1]
	[F20,F81-OP1.1]
	[F20,F81-OH5]
(2)	[F81,F20,F22-OS1.1]
	[F81,F20,F22-OP1.1]
	[F81,F20,F22-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.6.6.3. Emergency Valves	
(1)	[F81,F04,F43-OS1.1]
	[F81,F04,F43-OP1.1]
	[F81,F43-OH5]
(2)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
4.6.6.4. Pump Location	
(1)	(a) [F01-OP3.1]
	(b) [F01-OP3.1]
	(a) [F01-OS1.1]
	(b) [F01-OS1.1]
4.6.6.5. Marine Fuel-Dispensing Stations	
(1)	[F81,F12,F20,F22-OS1.1]
	[F81,F12,F20,F22-OP1.1]
	[F81,F12,F20,F22-OH5]
(2)	[F44,F02-OS1.1]
	[F44,F02-OP1.1]
	[F44-OH5]
(3)	[F22-OS1.1]
	[F22-OP1.1]
	[F22-OH5]
(5)	[F81,F43-OS1.1]
	[F81,F43-OP1.1]
	[F81,F43-OH5]
(6)	[F43,F01-OP1.1] Applies where dispensing is from a floating structure.
	[F43-OH5] Applies where dispensing is from a floating structure.
	[F43,F01-OS1.1] Applies where dispensing is from a floating structure.
4.6.7.1. Spill Control	
(1)	(b) [F44-OS1.1,OS1.2]
	(b) [F44-OP1.1,OP1.2]
	(b) [F44-OH5]
4.6.8.1. Attendants	
(1)	[F43,F01,F44-OS1.1]
	[F43,F44,F01-OP1.1]
	[F43,F44-OH5]
(2)	[F43,F01,F34-OS1.1]
	[F43,F34-OH5]
	[F43,F01,F34-OP1.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(3)	[F43-OH5]
	[F43,F01-OS1.1]
	[F43,F01-OP1.1]
(4)	[F81-OS1.1]
	[F81-OH5]
	[F81-OP1.1]
(5)	[F43,F44,F12,F01,F02-OS1.1]
	[F43,F44,F12,F01,F02-OP1.1]
	[F43,F44,F12-OH5]
4.6.8.2. Self-service Outlets	
(1)	[F81-OS1.1]
	[F81-OP1.1]
	[F81-OH5]
(2)	[F43,F44,F12,F01-OS1.1]
	[F43,F44,F12,F01-OH5]
	[F43,F44,F12,F01-OP1.1]
(3)	[F44-OS1.1,OS1.2]
	[F44-OH5]
	[F44-OP1.1,OP1.2]
(4)	[F43,F44,F01-OS1.1]
	[F43,F44,F01-OP1.1]
	[F43,F44-OH5]
(5)	[F43,F44,F12,F01-OS1.1]
	[F43,F44,F01-OP1.1]
	[F43,F44-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(6)	(a) [F81-OS3.4]
	(b) [F06,F44-OH5] Applies to a device to shut off power to all dispensers and pumps at a remote location and shielded from fire that may occur at the pumps.
	(b) [F06,F44-OP1.1] Applies to a device to shut off power to all dispensers and pumps at a remote location and shielded from fire that may occur at the pumps.
	(b) [F06,F44-OS1.1] Applies to a device to shut off power to all dispensers and pumps at a remote location and shielded from fire that may occur at the pumps.
	(c) [F06,F44-OH5]
	(c) [F06,F44-OP1.1]
	(c) [F06,F44-OS1.1]
	(d) [F81-OS3.4]
	(e) [F13-OH5]
	(e) [F13-OS1.1,OS1.2]
	(f) [F11-OS3.7]
	(g) [F11-OS3.7]
	(h) [F34-OS3.4]
	(i) [F34-OS3.4]
	(j) [F43-OS3.4]
(7)	[F43-OH5]
	[F02-OS3.4]
(8)	[F11,F12,F13-OS1.1]
4.6.8.3. Special Dispensers	
(1)	[F12,F44,F01-OS1.1]
	[F12,F44-OH5]
	[F12,F44,F01-OP1.1]
4.6.8.4. Card- or Key-Activated Dispensers	
(3)	[F34-OH5]
	[F34-OS1.1]
	[F34-OP1.1]
(4)	[F81-OS1.1]
	[F81-OH5]
	[F81-OP1.1]
(5)	[F13-OS1.1,OS1.2]
	[F13-OH5]
	[F13-OP1.1,OP1.2]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(6)	(a) [F12-OS1.1,OS1.2] Applies to the requirement that the emergency instructions be conspicuously posted to advise the user, in the event of a spill or accident.
	(b) [F13-OH5]
	(b) [F13-OP1.1,OP1.2]
	(a) [F12-OP1.1,OP1.2] Applies to the requirement that the emergency instructions be conspicuously posted to advise the user, in the event of a spill or accident.
	(a) [F12-OH5] Applies to the requirement that the emergency instructions be conspicuously posted to advise the user, in the event of a spill or accident.
	(b) [F13-OS1.1,OS1.2]
4.6.8.5. Duties of Attendants	
(1)	(d) [F01-OS1.1]
	(e) [F01-OS1.1]
	(a),(b),(c) [F44-OP1.1,OP1.2]
	(f) [F44-OS1.1,OS1.2]
	(a),(b),(c) [F44-OS1.1,OS1.2]
	(e) [F01-OP1.1]
	(a),(b),(c) [F44-OH5]
	(f) [F44-OP1.1,OP1.2]
	(f) [F44-OH5]
	(c) [F01,F44-OS1.1] Applies to containers that are located in a vehicle.
(2)	(b) [F43-OS1.1] Applies to containers not being filled beyond their safe filling level.
	(a) [F44,F01-OS1.1] (b) [F44,F01-OS1.1] Applies to containers being filled only after having been removed from the aircraft or watercraft.
	(b) [F43-OH5] Applies to containers not being filled beyond their safe filling level.
	(b) [F44-OS1.1] Applies to the removal of containers from watercraft or aircraft.
(3)	[F12-OS1.1,OS1.2]
4.6.8.6. Fuel-Dispensing Procedures	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01,F43,F44,F81-OS1.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(4)	(c) [F44-OS1.1] Applies to the requirement to immediately apply an absorbent material.
	(c) [F44-OH5] Applies to the requirement to immediately apply an absorbent material.
	(d) [F01-OS1.1]
	(a),(b),(e) [F43-OS1.1]
	(c) [F44-OP1.1] Applies to the requirement to immediately apply an absorbent material.
	(a),(b),(e) [F43-OH5]
	(f) [F01,F44-OS1.1]
4.6.8.7. Sources of Ignition	
(1)	[F01-OS1.1]
4.6.8.8. Signs	
(1)	[F01-OS1.1] Applies to portion of Code text: "At least one … sign … shall be provided for each dispenser in a location visible to every driver approaching the dispenser."
	[F80-OS1.1] Applies to the portion of Code text: "At least one weather-resistant sign …"
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
(4)	[F01-OS1.1]
4.6.9.1. Portable Extinguishers	
(1)	[F12,F02-OP1.2]
	[F12,F02-OS1.2]
4.7.2.2. Storage Tanks	
(1)	[F03-OP1.2]
	[F22,F21,F81-OH5]
	[F03-OP3.1]
	[F22,F21,F81-OS1.1] [F03-OS1.2]
4.7.2.3. Hydraulic Pressure Shock	
(1)	[F20,F82-OH5]
	[F20,F82-OP1.1]
	[F20,F82-OS1.1]
4.7.3.1. Interconnection	
(1)	[F01-OS1.1]
4.7.3.2. Dispensing into Vehicles	
(1)	[F34-OS1.1]
	[F34-OH5]
(2)	(a) [F81,F43-OS1.1]
	(a) [F81,F43-OP1.1]
	(a) [F81,F43-OH5]
4.7.4.1. Clearances	
(1)	[F01-OS1.1] [F03-OS1.2]
	[F01,F03-OP3.1]
	[F03-OP1.2]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F03-OP1.2]
	[F22,F21,F81-OS1.1] [F03-OS1.2]
	[F03-OP3.1]
	[F21,F22,F81-OH5]
4.7.4.2. Multi-purpose Facilities	
(1)	[F01-OS1.1]
4.7.4.3. Check Valves	
(1)	[F43-OH5]
	[F43-OS1.1]
(2)	[F43,F82-OS1.1]
	[F43,F82-OH5]
4.7.4.4. Control Valves	
(1)	[F43-OH5]
	[F43-OS1.1]
(2)	[F43,F81-OS1.1]
	[F43,F81-OH5]
4.7.4.5. Bonding and Grounding	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
(4)	[F01-OS1.1]
(5)	[F01-OS1.1]
4.7.4.6. Downspouts	
(1)	[F01-OS1.1]
4.7.5.1. Portable Extinguishers	
(1)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
4.8.2.1. Clearances	
(1)	[F03-OP3.1]
	[F03-OS1.2]
(2)	[F03-OS1.2]
	[F03-OP3.1]
4.8.2.2. Construction	
(1)	[F20,F04,F80-OH5]
	[F20,F04,F80-OS1.1]
	[F20,F04,F80-OP1.1]
4.8.3.1. Installation	
(1)	[F04,F20-OS1.1] Applies to portion of Code text: "Except as permitted in Sentences (2) and (3), *storage tanks* shall be installed on shore ..."
	[F04,F20-OH5] Applies to portion of Code text: "Except as permitted in Sentences (2) and (3), *storage tanks* shall be installed on shore ..."

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F04,F43,F20-OS1.1]
	[F04,F20,F43-OH5]
(3)	[F20,F43,F04-OS1.1]
	[F20,F43,F04-OH5]
4.8.4.2. Pipe Supports	
(1)	[F20,F22-OS1.1]
	[F20,F22-OH5]
	[F20,F22-OP1.1]
(2)	[F02-OS1.2]
	[F02-OP1.2]
	[F02-OH5]
(3)	[F04-OS1.2]
	[F04-OH5]
	[F04-OP1.2]
4.8.4.3. Guards	
(1)	[F81-OS1.1]
	[F81-OP1.1]
	[F81-OH5]
4.8.4.4. Flexible Connections	
(1)	[F21-OS1.1]
	[F21-OP1.1]
	[F21-OH5]
4.8.4.5. Shut-off Valves	
(1)	[F12,F44-OS1.1,OS1.2]
	[F12,F44-OP1.1,OP1.2]
	[F12,F44-OH5]
4.8.4.6. Access Openings for Inspection	
(1)	[F12-OS1.2,OS1.1] [F82-OS1.1]
	[F12-OP1.1,OP1.2] [F82-OP1.1]
	[F12,F82-OH5]
(2)	[F12-OS1.1,OS1.2] [F82-OS1.1]
	[F12-OP1.1,OP1.2] [F82-OP1.1]
	[F12,F82-OH5]
4.8.4.7. Identification	
(1)	[F81-OS1.1] [F12-OS1.2,OS1.1]
	[F81-OP1.1] [F12-OP1.1,OP1.2]
	[F12-OH5]
4.8.4.8. Leakage Testing	
(2)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
4.8.5.1. Bonding and Grounding	
(1)	[F01-OS1.1]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F01-OS1.1]
4.8.6.1. Portable Extinguishers	
(1)	[F12,F02-OS1.2] Applies to the requirement for portable extinguishers with a rated capacity.
	[F12,F02-OP1.2] Applies to the requirement for portable extinguishers with a rated capacity.
(2)	[F12-OS1.2] Applies to the placement and accessibility of portable extinguishers.
	[F34-OS1.2] Applies to the placement of portable extinguishers so they are not accessible to the public.
	[F12-OP1.2] Applies to the placement and accessibility of portable extinguishers.
	[F34-OP1.2] Applies to the placement of portable extinguishers so they are not accessible to the public.
(3)	[F12,F02-OS1.2]
	[F12,F02-OP1.2]
4.8.6.2. Training	
(1)	[F12,F13-OS1.2]
	[F12,F13-OP1.2]
4.8.7.1. Location	
(1)	[F01,F81-OS1.1]
	[F01,F81-OP1.1]
	[F01,F81-OH5]
(2)	[F34-OS1.1]
	[F34-OP1.1]
	[F34-OH5]
4.8.7.2. Leakage and Spill Control	
(2)	[F43-OS1.1]
	[F43-OH5]
4.8.7.3. Hose Connections	
(1)	[F22,F43-OS1.1] Applies to portion of Code text: "Except as provided in Sentence (2), hose connections on piping shall be of the bolted flange type ..."
	[F22,F43-OP1.1] Applies to portion of Code text: "Except as provided in Sentence (2), hose connections on piping shall be of the bolted flange type ..."
	[F44-OP1.1,OP1.2] Applies to the requirement for shut-off valves.
	[F44-OH5] Applies to the requirement for shut-off valves.
	[F22,F43-OH5] Applies to portion of Code text: "Except as provided in Sentence (2), hose connections on piping shall be of the bolted flange type ..."
	[F44-OS1.1,OS1.2] Applies to the requirement for shut-off valves.
(2)	[F22,F43-OS1.1]
	[F22,F43-OP1.1]
	[F22,F43-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(3)	[F81-OH5]
	[F81-OP1.1]
	[F81-OS1.1]
4.8.8.1. Cargo Hose	
(1)	[F81,F20,F22-OS1.1]
	[F81,F20,F22-OP1.1]
	[F81,F20,F22-OH5]
4.8.8.2. Maintenance and Testing	
(1)	[F82-OS1.1]
	[F82-OP1.1]
	[F82-OH5]
4.8.8.3. Supports	
(1)	[F20,F22-OS1.1]
	[F20,F22-OP1.1]
	[F20,F22-OH5]
4.8.9.1. Pressure Relief	
(1)	[F20,F81-OS1.1]
	[F20,F81-OP1.1]
	[F20,F81-OH5]
4.8.9.2. Location	
(1)	(b) [F01,F03-OS1.1,OS1.2]
	(a) [F02-OP1.2]
	(a) [F02-OS1.2]
	(b) [F03,F01-OP3.1]
(2)	[F44,F02,F03,F01-OS1.1,OS1.2]
	[F44,F02,F03-OP3.1]
4.8.10.1. Construction	
(1)	[F02-OS1.2] Applies to portion of Code text: "Pump houses shall be of *noncombustible construction* ..."
	[F02-OP3.1] Applies to portion of Code text: "Pump houses shall be of *noncombustible construction* ..."
	[F44-OP3.1] Applies to the construction of the floors.
	[F44-OH5] Applies to the construction of the floors.
	[F44-OS1.1] Applies to the construction of the floors.
4.8.11.1. Supervision	
(1)	[F44,F12,F43,F01-OS1.1,OS1.2]
	[F44,F43,F12-OH5]
	[F44,F12-OP1.1,OP1.2]
(2)	[F43,F44,F12-OS1.1]
	[F43,F44,F12-OP1.1]
	[F43,F44,F12-OH5]

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Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(3)	(c) [F44-OH5] Applies to portion of Code text: "… if leakage occurs, stop the operations."
	(a) [F01-OS1.1]
	(b) [F43-OS1.1] (c) [F43-OS1.1] Applies to portion of Code text: "… inspect the hose and connections for leakage …"
	(b) [F43-OH5] (c) [F43-OH5] Applies to portion of Code text: "… inspect the hose and connections for leakage …"
	(c) [F44-OS1.1] Applies to portion of Code text: "… if leakage occurs, stop the operations."
	(c) [F44-OP1.1] Applies to portion of Code text: "… if leakage occurs, stop the operations."
4.8.11.2. Bonding and Grounding	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
4.8.11.3. Equipment	
(1)	[F21-OS1.1]
	[F21-OP1.1]
	[F21-OH5]
(2)	[F43-OS1.1]
	[F43-OH5]
	[F43-OP1.1]
(3)	[F43-OS1.1]
	[F43-OH5]
	[F43-OP1.1]
(4)	[F44-OS1.1]
	[F44-OH5]
	[F44-OP1.1]
4.8.11.4. Spill Control	
(1)	[F43-OS1.1]
	[F43-OH5]
(2)	[F43-OS1.1]
	[F43-OH5]
4.9.2.1. Location	
(2)	[F03-OS1.2]
	[F03-OP3.1]
(3)	[F03-OS1.2]
	[F03-OP3.1]
(4)	[F03-OS1.2]
	[F03-OP3.1]
4.9.3.1. Explosion Venting	
(1)	[F02-OS1.3]
	[F02-OP1.3]
	[F02-OP3.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.9.3.3. Basements and Pits	
(1)	[F01-OS1.1]
4.9.3.4. Ventilation	
(1)	[F01-OS1.1]
4.9.4.1. Spill and Vapour Control	
(1)	(a) [F43,F01-OS1.1]
	(b) [F44-OH5]
	(b) [F44-OP1.1]
	(a) [F43-OH5]
	(b) [F44-OS1.1]
4.9.4.2. Explosion Protection	
(1)	[F01-OS1.1] [F02-OS1.3]
	(a),(b) [F02-OS1.2]
	(a),(b) [F02-OP1.3]
	[F02-OP1.3]
	(c) [F01-OS1.1]
4.9.4.3. Fire Protection	
(3)	[F03,F12-OS1.2]
	[F03,F12-OP1.2]
4.10.3.1. Design, Fabrication and Testing	
(1)	[F20,F80,F43-OH5]
	[F20,F80,F43,F01-OS1.1]
4.10.3.2. Supports, Foundations and Anchorage	
(1)	[F02,F04-OS1.2] Applies to the use of timber supports.
(2)	[F02-OS1.2] Applies to supports having less than a 2 h *fire-resistance rating* being protected by an automatic fire suppression system.
(3)	[F02-OS1.2] Applies to the protection of the area underneath any *storage tank* that is greater than 1.2 m in diameter.
4.10.3.3. Storage Tank Vents	
(1)	[F81,F20,F04,F01-OS1.1]
	[F81,F20,F04-OH5]
4.10.4.1. Storage Tanks, Drums and Barrels	
(1)	[F02-OS1.2]
	[F02-OP1.2]
4.10.5.1. Design and Installation	
(1)	[F20,F80-OS1.1]
	[F20,F80-OH5]
	[F20,F80-OP1.1]
4.10.6.1. Ventilation	
(1)	[F01-OS1.1]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.10.7.1. Spill Control	
(1)	[F44-OS1.1,OS1.2]
	[F44-OH5]
4.10.8.1. Portable Extinguishers	
(1)	[F12,F02-OS1.2]
	[F12,F02-OP1.2]
(2)	[F12,F02-OS1.2]
	[F12,F02-OP1.2]
(3)	[F12,F02-OS1.2]
	[F12,F02-OP1.2]
4.10.8.2. Standpipe and Hose Systems	
(1)	[F12,F02-OS1.2]
	[F12,F02-OP1.2]
(2)	[F02-OS1.2]
	[F02-OP1.2]
4.11.2.1. Portable Extinguishers	
(1)	[F02,F12-OS1.1]
	[F02,F12-OP1.2]
(2)	[F12-OS1.2]
	[F12-OP1.2]
4.11.2.3. Parking inside Buildings	
(1)	(a) [F01,F44-OS1.1] (a) [F02,F03-OS1.2]
	(a) [F01,F44-OP1.1] (a) [F02,F03-OP1.2]
	(a) [F44-OH5]
	(b) [F43,F01-OS1.1]
	(c) [F43,F01-OS1.1]
4.11.2.4. Parking outside Buildings	
(1)	[F81,F34-OS1.1] [F02-OS1.2]
	[F02-OP3.1]
(2)	[F81-OS1.1] [F03-OS1.2]
	[F81,F03-OP3.1]
4.11.2.5. Repair and Servicing	
(1)	[F01,F02,F43-OS1.1,OS1.2]
	[F01,F02,F43-OP1.1,OP1.2]
(2)	[F01,F02,F43-OS1.1,OS1.2]
	[F01,F02,F43-OP1.2]
4.11.2.6. Damaged or Leaking Containers	
(1)	[F01,F43,F82-OS1.1]
	[F01,F43,F82-OP1.1]
	[F43-OH5]

Table 4.12.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
4.11.3.2. Ignition Sources	
(1)	[F01-OS1.1]
	[F20,F81-OS1.1]
4.11.3.3. Static Electric Charges	
(1)	[F01-OS1.1]
4.11.3.4. Supervision	
(1)	[F44-OS1.1,OS1.2]
	[F44-OH5]
	[F44-OP1.1,OP1.2]
4.11.3.5. Multi-use Compartments	
(1)	[F01-OS1.1]
4.11.3.6. Engine	
(1)	[F01-OS1.1]
4.11.3.7. Unloading	
(1)	[F43-OS1.1]
	[F43-OH5]
(2)	[F81,F20,F43-OS1.1]
	[F81,F20,F43-OH5]
(3)	[F81,F01,F02-OS1.1]
4.11.3.8. Dispensing into Vehicles	
(1)	[F01,F43-OS1.1]
	[F43,F01-OP1.1]
	[F43-OH5]
(2)	(a) [F01-OS1.1] (a) [F03-OS1.2]
	(a) [F01,F03-OP3.1]
	(b) [F02,F12-OS1.2]
	(d) [F43,F44-OS1.1]
	(e) [F44-OS1.1]
	(e) [F44-OH5]

Notes to Table 4.12.1.1.:

[1] See Parts 2 and 3 of Division A.

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Notes to Part 4
Flammable and Combustible Liquids

A-4.1.1.1.(1) The all-inclusive phrase "buildings, structures and open areas" includes, but is not limited to, tank farms, bulk plants, fuel-dispensing stations, industrial plants, refineries, process plants, distilleries, and to piers, wharves and airports that are not subject to overriding federal control.

Part 4 applies wherever flammable or combustible liquids are used or stored, except as specifically exempted in Sentences 4.1.1.1.(2) and (3). In addition, Section 4.6. applies to dangerous goods classified as flammable gases at fuel-dispensing stations.

Part 4 contains both general and occupancy-specific provisions. While general provisions apply to all occupancies or operations identified within the scope of Subsection 4.1.1., occupancy-specific provisions apply only to the specific occupancy or operation stated.

To determine the provisions that apply to a given situation, the first step is to confirm which Section or Subsection corresponds to the operation or occupancy: this will help identify the occupancy-specific provisions that apply. The next step is to ensure that all general requirements that apply to the operation or occupancy are also identified.

A-4.1.1.1.(2) Certain areas in refineries, chemical plants and distilleries will not meet all Code requirements because of extraordinary conditions. Design should be based on good engineering practice and on such factors as manual fire suppression equipment, daily inspections, automated transfer systems, location of processing units, and special containment systems, piping, controls and materials used. NFPA 30, "Flammable and Combustible Liquids Code," and NFPA 36, "Standard for Solvent Extraction Plants," are examples of good engineering practice and can be referred to by the designer and the authority having jurisdiction.

A-4.1.1.1.(3)(b) Ancillary equipment covered in CSA B139 Series, "Installation code for oil-burning equipment," includes storage tanks and piping that supply oil-burning equipment, diesel-engine-driven emergency generators and fire pumps. Part 4 of the NFC(AE) does not apply to such tanks and piping systems.

A-4.1.2.1. The classification system for flammable liquids used by TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)," differs from the NFPA classification system used in the NFC(AE). In the NFC(AE), only liquids with a flash point below 37.8°C are referred to as "flammable liquids," whereas liquids having a flash point at or above 37.8°C are "combustible liquids." The TDGR do not include Class IIIA liquids, which have a flash point above 60°C.

For the purpose of comparing the TDGR classification system with the NFC(AE) system, the difference between 60.5°C (TDGR) and 60°C (NFC(AE)) may be ignored. The results of closed-cup flash point tests may vary by as much as 1°C, so nothing is gained by unnecessary precision.

A-4.1.2.1.(3)(b) The NFPA classification system for flammable and combustible liquids includes Class IIIB liquids, which have flash points at or above 93.3°C. These liquids are not regulated by Part 4 of the NFC(AE) because they are deemed to represent no greater fire hazard than other combustibles, such as wood or paper products. However, Article 4.1.2.3. clarifies that such liquids are effectively Class I liquids when heated to their flash point temperature.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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A-4.1.2.2. According to research and test results, mixtures containing less than 20% by volume methanol, ethanol or 2-propanol, less than 5% by volume acetone, or less than 8% by volume acetic acid in water are unlikely to present a fire hazard. While these water-miscible liquid mixtures still have flash points, they may not be able to develop sustained burning because of the presence of water in the mixtures. Therefore, these mixtures are not classified as flammable or combustible liquids. They may, however, be classified as dangerous goods to which the requirements of Part 3 would apply.

The flash points and fire points of water-miscible liquid mixtures depend on the concentration of the water-miscible liquid. The classifications noted in Article 4.1.2.2. for mixtures of methanol, ethanol, 2-propanol, acetone or acetic acid and water, which are summarized in Table A-4.1.2.2., take into account the flash points and fire points of the mixtures at various concentrations of the water-miscible liquid, as well as their unique fire and chemical properties.

Table A-4.1.2.2.
Classification of Mixtures of a Water-Miscible Liquid and Water
Forming Part of Note A-4.1.2.2.

Volume Concentration of the Water-Miscible Liquid, %	Classification		
	Class IB	Class IC	Class II
Methanol			
≥ 90	✓	—	—
≥ 30 and < 90	—	✓	—
≥ 20 and < 30	—	—	✓
Ethanol			
≥ 90	✓	—	—
≥ 30 and < 90	—	✓	—
≥ 20 and < 30	—	—	✓
2-Propanol			
≥ 20	—	✓	—
Acetone			
≥ 5	✓	—	—
Acetic acid			
≥ 8	✓	—	—

It is impractical for every type and concentration of water-miscible liquid mixture to be classified in the Code. The classification of a mixture not covered in Article 4.1.2.2. can be determined by measuring its fire point using the open-cup test described in ASTM D92, "Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester," and then classifying it in accordance with Sentences 4.1.2.1.(2) and (3) by treating the measured fire point as the flash point of the mixture. This procedure should also be followed to determine the classification of a mixture containing multiple water-miscible liquids and water, as the flash point and fire point of the mixture are likely to differ from those of each water-miscible liquid in water. (Note that closed-cup tests are used to determine the flash points of pure liquids.)

A-4.1.2.4. Used automotive lubricating oil may contain both oil and more volatile Class I liquids, such as gasoline. Tests of representative samples have demonstrated that the flash point of such used oil consistently exceeds 60°C, with an average above 93.3°C. When Class I or II liquids are added to such used oil, the flash point of the resulting mixture will vary with the percentage and flammability of the contaminating liquid and shall be determined by tests.

A-4.1.3.1. The kinematic viscosity of a liquid influences the choice of test most appropriate for measuring its flash point. In the ASTM standards, kinematic viscosity is measured in stokes (St) or centistokes (cSt).

For purposes of comparison, the kinematic viscosity of water is 1.0038 cSt at 20°C; of glycerine (100%), approximately 648 cSt at 20°C; and of some common motor oils, near 1 295 cSt at –18°C. Some paints, lacquers and glues have much higher kinematic viscosities, as indicated by the upper limit of 150 St in ASTM D3278, "Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus."

A substance should be treated as a liquid if it has a fluidity greater than that of 300 penetration asphalt, when tested in accordance with ASTM D5/D5M, "Standard Test Method for Penetration of Bituminous Materials." A

viscous substance for which a specific melting point cannot be determined, but that is designated as a liquid in accordance with ASTM D4359, "Standard Test Method for Determining Whether a Material Is a Liquid or a Solid," should also be considered as a liquid.

A-4.1.4.1.(1) Additional information on determining the extent of Division 1 or 2 zones in Class I locations can be found in the following documents:

- CSA PLUS 2203, "Hazardous Locations: A Guide for the Design, Testing, Construction, and Installation of Equipment in Explosive Atmospheres,"
- NFPA 30, "Flammable and Combustible Liquids Code," and
- NFPA 497, "Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas."

A-4.1.5.2.(1) Sources of ignition include, but are not limited to, open flames, smoking, cutting and welding, hot surfaces, frictional heat, static, electrical and mechanical sparks, spontaneous ignition, heat-producing chemical reactions, and radiant heat.

A-4.1.5.8. Limited quantities of Class I liquids are permitted to be stored or used in basements where it is clear they will not create a fire hazard. Such factors as the size of the basement, ventilation, wiring, and proximity to sources of ignition should be taken into account in determining whether an unsafe condition exists.

A-4.1.6.1.(1) A spill containment system is intended to capture the maximum credible spill of a flammable or combustible liquid. This can be achieved by safely containing the liquid or having it drain to a safe location. Water used for firefighting need not be taken into consideration when determining the capacity of the primary spill containment or drainage system required by Sentence 4.1.6.1.(1).

Once a fire is associated with a spill, water from hose streams, suppression systems, etc. used for firefighting becomes a concern. The quantity of water involved is highly variable as it will depend on the fire conditions and the duration of the fire. As a result, the fire safety plan must address spill management associated with the application of water during firefighting operations.

Estimating credible spill capacity

The capacity of a credible spill must be based on the maximum quantity that can be released from containers located in the storage area.

- Where the storage—inside and/or outside—is in drums or small containers (not large vessels, Intermediate Bulk Containers (IBC), tote bins or tanks), the capacity of a credible spill should be at least 1 000 L. This will accommodate a spill in the event that lift truck forks spear a single pallet load containing four drums or drop the load. Where drums are not handled on pallets and hand trucks or clamp-type lift trucks are used, the capacity of credible spill may be reduced, but not to less than the capacity of the largest container used.
- For storage in IBC, tote bins or other bulk containers inside or outside buildings, and in tanks inside buildings, the credible spill capacity must be at least equal to the capacity of the largest container in the storage area.
- Outside storage tanks must comply with the provisions of Subsection 4.3.7.

Consideration for the fire safety plan

The fire safety plan must ensure that all critical areas, such as buildings, means of egress, fire department access, control valves, fire alarm panels, etc., in the path of a potential overflow remain accessible during the fire emergency and that the flow of liquid is directed away from such areas. The plan must allow for reliable and immediate notification of an emergency, such as by providing an automatic notification system, which will facilitate early intervention by the fire department. The plan must incorporate measures, including design features, that will minimize the impact of effluent on adjoining property and the environment.

The owner of the building is responsible for developing the fire safety plan. The owner may require assistance from the fire department, which can provide some of the relevant information necessary to develop a workable plan. The owner is also responsible for having the plan approved by the chief fire official and for ensuring the approved plan is implemented. Periodic (e.g. annual) testing of the plan would help identify any limitations of the plan and familiarize staff who have been assigned duties in the plan. The fire safety plan must be modified when original assumptions and conditions change.

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Where small quantities are present

- Where only small quantities (up to 5 000 L) of flammable or combustible liquids are present, acceptable measures to control a spill of the liquids and the water used for firefighting include the provision of manhole or catch-basin covers, sorbent materials and portable dikes. Such measures can prevent contaminated effluents from entering sewers or flowing to other areas.
- For additional information on controlling a spill, reference should be made to NFPA 30, NFPA 15, FM Global Data Sheet 7-83, the SFPE, "Handbook of Fire Protection Engineering" and other industry-specific publications on the subject.

Where large quantities are present

- Where a facility stores, handles or processes significant quantities (exceeding 5 000 L) of flammable or combustible liquids, a high level of expertise may be required to develop an appropriate fire safety plan. In such cases, the owner must ensure that professionals who have expertise in this area play a lead role in developing and implementing the fire safety plan.
- Where the application of a fire suppression medium, either manual or automatic, may result in significant adverse impact on the community and/or the environment, a controlled burn is an option to consider. Evaluating this option should involve key stakeholders such as the owner, fire department, provincial and/or federal department responsible for the environment, and insurers.

A-4.1.6.2.(2) The National Plumbing Code defines a trap as a fitting or device that is designed to hold a liquid seal that will prevent the passage of gas but will not materially affect the flow of a liquid.

A-4.1.6.3.(3)(b) Information on the compatibility and reactivity of liquids can be found in the Safety Data Sheets for each liquid.

An absorbent material conforming to ULC/ORD-C410A, "Absorbents for Flammable and Combustible Liquids," is acceptable.

A-4.1.7.1.(1) Article 3.3.1.21. of Division B of the NBC(AE) specifies that ventilation must be provided in conformance with Part 6 of that Code if flammable vapour, gas, or dust could create a fire or explosion hazard. However, Part 6 of Division B of the NBC(AE) does not provide specific information on the design of ventilation systems to prevent an accumulation of dangerous concentrations of flammable vapours. It refers instead to "good engineering practice" and directs the user to a number of NFPA standards for examples of good practice, which varies according to the nature of the vapours or dusts. Subsection 4.1.7. of the NFC(AE) represents a minimum level of good practice for preventing the accumulation of explosive concentrations of vapours from flammable or combustible liquids.

In the phrase "rooms or enclosed spaces," the word "rooms" does not only designate small and confined areas of a building; it includes large open areas of a building as well as smaller rooms.

A-4.1.7.2.(3) Natural ventilation is normally adequate for the storage of flammable liquids and combustible liquids, or the dispensing of Class II and IIIA liquids. Such ventilation should consist of permanent openings at ceiling and floor levels leading to the outside. At least 0.1 m^2 each of free inlet and outlet openings per 50 m^2 of floor area should be provided. A mechanical ventilation rate of at least 18 m^3/h per square metre of floor area, but not less than 250 m^3/h, is normally adequate for rooms with a low floor-to-ceiling height or small enclosed spaces where Class I liquids are dispensed. Ventilation for process areas must be designed to suit the nature of the hazard in accordance with good engineering practice.

A-4.1.8.2.(1)(b) Build-up of static electric charges near the surface of liquids being poured into non-conducting containers can be controlled or eliminated by: limiting the filling rate to velocities less than 1 m/s, using a grounded lance or nozzle extension to the bottom of the container, limiting free fall, or using antistatic additives.

A-4.1.8.2.(3)(b) It is generally considered that liquids with a conductivity greater than 50 pS/m (pico Siemens per metre) will dissipate static charges so that they will not accumulate to a hazardous potential. Experience indicates that most water-miscible liquids, crude oils, residual oils and asphalts do not accumulate static charges.

A-4.1.8.3.(1) Products tested and listed by recognized agencies are considered to be designed in conformance with good engineering practice. Underwriters Laboratories Inc., ULC and FM Global are currently listing the products as required by Sentence 4.1.8.3.(1).

A-4.1.8.4.(1) The use of movable tanks relates to the use of such tanks in buildings and facilities for the fuelling of industrial floor cleaners, industrial trucks, or equipment used in manufacturing facilities that requires the use of flammable liquids and/or combustible liquids to operate in addition to the use of such tanks at construction or earth-moving sites.

A-4.2.2.3.(2) Flammable and combustible liquids are classified as Class 3 flammable liquids in TC SOR/2001-286, "Transportation of Dangerous Goods Regulations (TDGR)." Class 3 flammable liquids include liquids with flash points up to 60°C using the closed-cup test method or 65.6°C using the open-cup test method. This means that Class IIIA liquids with a flash point above 60°C are not usually treated as dangerous goods.

Flammable and combustible liquids are classified as flammable liquids belonging to Categories 1 to 4 of HC SOR/2015-17, "Hazardous Products Regulations." A Category 1 flammable liquid is any liquid with a flash point less than 23°C and an initial boiling point less than or equal to 35°C; a Category 2 flammable liquid is any liquid with a flash point less than 23°C and an initial boiling point greater than 35°C; a Category 3 flammable liquid is any liquid with a flash point greater than or equal to 23°C and less than or equal to 60°C; a Category 4 flammable liquid is any liquid with a flash point greater than 60°C and less than or equal to 93°C when tested in accordance with the applicable method specified in Part 7 of HC SOR/2015-17.

For the purpose of Article 4.2.2.3., Class IIIA and B3 liquids are treated as dangerous goods classified as flammable liquids.

A-4.2.5.4.(1) Article 4.2.5.4. addresses the potential hazard where flammable vapours are released during transfer operations in an improperly ventilated area, and where sources of ignition may not be adequately controlled.

A-4.2.7.5.(2) Sentence 4.2.7.5.(2) sets no limit on the total quantity of flammable and combustible liquids permitted to be stored in a separate or detached storage building. Although total quantity limits of Tables 4.2.7.5.-A and 4.2.7.5.-B do not apply, the quantity and height limitations specified for the individual storage areas must be complied with in order to take advantage of the exemption for total quantity limits. Requirements pertaining to the spatial separation of buildings are found in Subsection 3.2.3. of Division B of the NBC(AE). The requirements in this Code for the storage of flammable and combustible liquids must be read in conjunction with applicable provisions in the NBC(AE) that impose restrictions on the design of a storage building. For example, the size and height of a building, type of construction, automatic fire suppression and street access are governed in part by Subsection 3.2.2. of Division B of the NBC(AE). Environmental protection regulations may contain additional requirements that should be considered in the design of a storage building for flammable and combustible liquids.

A-4.2.7.6.(1) Options for fixed fire suppression systems for the protection of flammable or combustible liquid storage areas include: automatic sprinkler, foam sprinkler, water spray, carbon dioxide, dry chemical or halon systems. Examples of good engineering practice for the design of sprinkler or foam water systems for flammable and combustible liquid storage areas can be found in NFPA 30, "Flammable and Combustible Liquids Code."

A-4.2.7.7.(3) Containers of flammable or combustible liquids could be punctured or deformed if pushed up against a protrusion from a wall. The required wall clearance is intended to prevent such damage, and to permit visual inspection of the sides of the individual storage area. The clearance need not be provided for narrow shelves along a wall, where the backs of the shelves can be inspected from the aisle.

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A-4.2.8.1.(1) Subsection 4.2.8. applies to those portions of an industrial occupancy where the use, storage and handling of flammable and combustible liquids is only incidental, or secondary to the principal activity. The word "incidental" does not imply "small quantity" or "insignificant amount." Manufacturers of electronic equipment, furniture and reinforced plastic boats, and automobile assembly plants are typical examples of locations where the use of flammable and combustible liquids is secondary to the principal activity of manufacturing consumer products. In storage areas otherwise governed by Part 3 of this Code, Subsection 4.2.8. applies to the "incidental" storage of flammable and combustible liquids that is deemed to be secondary to the principal activity of storing commodities covered in Part 3. This includes the storage of used lubricating oil in the warehouse portion (industrial occupancy) of a retail outlet. Subsection 4.2.8. also applies to the storage of used lubricating oil at motor vehicle repair and service garages because such storage is secondary to the principal activity of repairing and servicing motor vehicles.

A-4.2.8.3.(1) The fire separation required by this Sentence should also prevent the passage of vapours.

A-4.3.1.2.(2)(b) The contents of a tank that is exposed to an external fire can be heated to the point of boiling. Under such circumstances, the normal vent for the tank may not be of sufficient size to release the vapours created by the boiling contents; emergency venting is therefore required to prevent damage to the tank's shell or roof resulting from an explosion within the tank.

Tanks conforming to API SPEC 12B, "Specification for Bolted Tanks for Storage of Production Liquids," API SPEC 12D, "Specification for Field Welded Tanks for Storage of Production Liquids," and API SPEC 12F, "Specification for Shop Welded Tanks for Storage of Production Liquids," are typically used by oil field companies involved in the exploration, production and transmission of natural gas and oil. These API specifications allow tanks that are used in remote locations to be constructed without emergency venting. However, these tanks are also installed in built-up areas to store production liquids, in which case, they must comply with Clause 4.3.1.2.(2)(b).

A-4.3.1.2.(3) Some flammable and combustible liquids are corrosive, which can cause steel tanks to prematurely corrode and leak. Storage tanks should therefore be specifically selected while taking into consideration the potential for aggressive internal corrosion. Storage solutions for corrosive materials include the following:

- a double-walled aboveground tank with an interstitial space that is continuously monitored
- a single-walled aboveground tank that is installed in a secondary containment system in accordance with Subsection 4.3.7. and has a protective coating or lining that is compatible with the liquid being stored

A-4.3.1.8.(1)(b) Examples of devices to prevent overfill include automatic sensing devices for interconnection with shut-off equipment at the supply vehicle, automatic overfill shut-off devices of a float valve or other mechanical type, and overfill alarm devices of the audible or visual type.

A-4.3.1.8.(2) A tight-fill operation means that a mechanical, liquid-tight connection is used at the fill point.

A-4.3.1.10.(3) Storage tanks can also be refurbished for underground use in conformance with CAN/ULC-S669, "Standard for Internal Retrofit Systems for Underground Tanks for Flammable and Combustible Liquids." The process outlined in this document is applicable in a limited number of cases, such as when the storage tank is in a location that is hard to reach.

A-4.3.2.1.(4) Boil-over is an event in the burning of certain oils in an open top tank when, after a long period of quiescent burning, there is a sudden increase in fire intensity associated with expulsion of burning oil from the tank. Boil-over occurs when the residues from surface burning become more dense than the unburned oil and sink below the surface to form a hot layer, which progresses downward much faster than the regression of the liquid surface. When this hot layer, called a "heat wave," reaches water or water-in-oil emulsion in the bottom of the tank, the water is first superheated and subsequently boils almost explosively, overflowing the tank. Oils subject to boil-over consist of both light ends and viscous residues. These characteristics are present in most crude oils and can be produced in synthetic mixtures.

Note: A boil-over is an entirely different phenomenon from a slop-over or a froth-over. Slop-over involves a minor frothing that occurs when water is sprayed onto the hot surface of a burning oil. Froth-over is not associated with a fire but results when water is present or enters a tank containing hot viscous oil. Upon mixing, the sudden conversion of water to steam causes a portion of the tank contents to overflow.

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A-4.3.2.5. Guidelines for the protection of storage tanks can also be found in standards published by the NFPA and FM Global. Such guidelines are considered as good engineering practice in assessing the protection necessary for tanks.

A-4.3.7.4. The primary function of a diked enclosure is to contain the maximum anticipated liquid spill, but sufficient distance between dike and tank shell is also required so that a jet of liquid issuing from a puncture will not overshoot the dike. The reduction of the tank-to-dike distance should be made only after consideration of such factors as the proximity of the tanks to buildings and other hazards, the risk associated with the product in the tanks, the location of sewers or water courses and the height of the tank.

A-4.3.7.5.(1) When the height of a secondary containment wall exceeds 1.8 m, there is an increased potential for heavier-than-air vapour to accumulate at ground level within the contained area. Depending on the nature of such a vapour accumulation, it may be explosive or sufficiently toxic to seriously endanger personnel. Entry into such a contained area should always be preceded by testing for such a vapour accumulation.

A-4.3.7.5.(2) Vapours from Class I liquids may reach unsafe concentrations when confined in the small space between the tank and the secondary containment wall. Remotely operated valves or elevated walkways eliminate the need for personnel to enter the bottom of the contained area to operate a valve.

A-4.3.8.4.(2) Where applicable, CAN/ULC-S676, "Standard for Refurbishing of Storage Tanks for Flammable and Combustible Liquids," shall be used to repair structural damage to underground storage tanks.

A-4.3.8.9.(1) The purpose of anchoring or providing overburden on top of underground storage tanks is to prevent them from lifting out of the ground in the event of a rise in the water table or a flood. Any proposed means of anchorage or overburden must be sufficient to resist the uplift forces on tanks when they are empty and completely submerged.

Means that have been successfully employed to protect tanks against uplift are
(a) anchor straps to concrete supports beneath them,
(b) ground anchors, and
(c) reinforced concrete slabs or planks on top of them.

A-4.3.12.3.(6) A fill pipe (i.e. remote fill piping) is considered offset if it has a non-vertical component.

Special care must be taken during remote fill operations because the fill pipe acts as a pressure line and a build-up of pressure in the fill piping system could result in an unexpected release of liquid if a check valve is provided in the fill piping system.

A-4.3.13.4.(1)(b) Table 4.3.13.4.-B deals with storage tanks that are outside the scope of CSA B139 Series, "Installation code for oil-burning equipment" (which limits the capacity of individual storage tanks to 2 500 L and their aggregate capacity to 5 000 L) and harmonizes requirements for all occupancies using oil-burning equipment, emergency generators and fire pumps.

A-4.3.13.9.(1)(b) The area that should be considered for ventilation is the space occupied by the tanks and extending to a distance that is classified electrically as Class I, Zone 2, when no ventilation is provided.

A-4.3.13.10.(1) For the design of normal and emergency venting of indoor storage tanks, Sentence 4.3.13.10.(1) refers to Subsection 4.3.4., which in turn refers to API STD 2000, "Venting Atmospheric and Low-Pressure Storage Tanks." However, API STD 2000 is intended for outdoor tanks rather than indoor tanks. The venting rate reduction factors for water spray on the tank surface, or drainage rates for spilled liquids, should not be used to calculate the emergency venting rate of a storage tank installed inside a building. The effects of water spray cooling and room drainage on the calculated emergency venting rate must be worked out according to good engineering practice. Increased emergency venting capacity may be required.

A-4.3.13.11.(2) Good engineering practice for the design of supports for suspended storage tanks should meet the intent of Subsection 4.3.3. as much as possible. Such factors as the provision of adequate fire resistance for supports, the need to prevent over-stressing of the tank shell or its supports, and resistance to earthquake forces in areas subject to such forces should be taken into consideration.

A-4.3.16.1.(1) The following documents are examples of good engineering practice for the activities listed in Sentence 4.3.16.1.(1):

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- Annex C of NFPA 30, "Flammable and Combustible Liquids Code"
- API RP 1604, "Closure of Underground Petroleum Storage Tanks"
- CCME PN 1326, "Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products"

A-4.3.17.1.(1)(c) Under certain circumstances, the removal of all flammable and combustible vapours and residue from an underground storage tank before its removal from the ground may not be possible. Under these circumstances, accepted precautions in cooperation with local fire officials may be necessary to ensure removal operations are conducted in a safe manner.

A-4.4.1.2.(1) In the context of Sentence 4.4.1.2.(1) and Table 4.4.1.2.-E, the annual inspection and testing of sumps involves gaining access to the sumps, inspecting them at regular intervals throughout the year, assessing whether any problems exist, and ensuring any problems are addressed. In general, the annual inspection of sumps should ensure that:

- the lids to the sumps are tight and correctly sealed,
- the walls of the sumps are intact and are not slumping or warping,
- the sumps are free of debris, liquid and ice,
- the sumps are free of cracks and holes,
- the piping, fittings, and connections are not leaking or dripping liquid,
- no new stains have developed since the last inspection,
- the sensors are correctly positioned,
- all penetrations into the sumps are in good condition,
- the test boots (if provided) are in good condition, not cracked or torn, correctly positioned in the sumps, and open so liquid can drain by gravity back into the sump, and
- the piping and other equipment in the sumps are in good condition.

A-4.4.1.2.(7) Owners and operators of systems can use a number of methodologies to meet or exceed the leak detection requirements in Section 4.4. A list of leak detection technologies is available from the National Work Group on Leak Detection Evaluations (NWGLDE). The United States Environmental Protection Agency (EPA) has delegated authority to the NWGLDE to determine which test methodologies meet the testing protocol of the EPA.

A-4.4.2.1.(2) Inventory reconciliation leak detection methods used for a storage tank should follow an established procedure in order to minimize errors and reveal any trend that indicates a loss of product from the tank. Several documents deal with inventory reconciliation such as the booklet entitled EPA 510-B-93-004, "Doing Inventory Control Right for Underground Storage Tanks," which also allows calculations for the inventory reconciliation procedure to be carried out using an electronic methodology referred to as automatic tank gauging.

A-4.4.2.1.(3) Vapour monitors sense and measure product vapour in the soil around the tank and piping to determine the presence of a leak. Groundwater monitoring devices sense the presence of liquid product floating on the groundwater. Both methods require the installation of carefully placed monitoring wells in the ground near the tank and along the piping runs. Examples of good engineering practice for the location and installation of monitoring wells can be found in CCME PN 1326, "Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products." In either case, a professionally conducted site assessment is critical for determining site-specific conditions such as groundwater level and flow direction, background contamination, stored product type, and soil type.

All equipment and devices used for automated or manually operated vapour or groundwater monitoring systems that are tested in conformance with EPA 530/UST-90/008, "Standard Test Procedures For Evaluating Leak Detection Methods: Vapor-Phase Out-of-Tank Product Detectors," or EPA 530/UST-90/009, "Standard Test Procedures For Evaluating Leak Detection Methods: Liquid-Phase Out-of-Tank Product Detectors," are deemed to meet the intent of Sentence 4.4.2.1.(3).

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A-4.4.2.1.(4) The Statistical Inventory Reconciliation (SIR) leak detection method uses sophisticated computer software to determine whether a storage tank system is leaking. The software performs a statistical analysis of inventory, delivery, and dispensing data collected over a period of time and provided by the operator to a vendor. SIR can allow the owner or operator to meet leak detection requirements using only the equipment that most facilities have readily at hand (i.e. a tank stick and a tank chart used for inventory control). As an example, the booklet EPA 510-B-95-009, "Introduction To Statistical Inventory Reconciliation For Underground Storage Tanks," provides basic information to determine if SIR is the appropriate leak detection method to be used for a particular installation.

Additionally, to ensure that the collection of data for SIR purposes meets the intent of the leak detection, the SIR method also needs to be evaluated following a protocol such as the one defined in EPA 530/UST-90/007, "Standard Test Procedures For Evaluating Leak Detection Methods: Statistical Inventory Reconciliation Methods."

A-4.4.2.1.(5) Automatic tank gauging systems use monitors that are permanently installed in the tank. These monitors are linked electronically to a nearby control device to provide information on product level and temperature. The gauging system can automatically calculate the changes in product volume, which can indicate a leaking tank. For inventory control, the automatic tank gauging system replaces the use of the gauge stick to measure product level. It records the activities of an in-service tank, including deliveries.

All equipment used for automatic tank gauging systems that meets the requirements of CAN/ULC-S675.1, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids," is deemed to comply with this Sentence.

A-4.4.2.1.(6) A continuous in-tank leak detection system involves a combination of statistical inventory reconciliation (SIR) techniques and good quality liquid level and temperature data, which can be obtained from tank gauging systems or probes. It may involve monitoring only a storage tank, but when the piping system is part of the delivery system, it should include the entire system.

This system provides increased sensitivity and accuracy for the following reasons:

- it incorporates the temperature characteristic and an increased frequency of readings into the data, and
- inventory reconciliation may be conducted after each dispensing operation.

The system is designed to meet the monitoring performance standard of detecting a leak rate of 0.76 L/h with a 95% probability of detection and a maximum false positive of 5%.

A-4.4.2.1.(7) Low-tech secondary containment monitoring involves a visual examination of the containment area, including conventional open dyke areas or a contiguous interstitial space. Some designs may use visual examination of the liquid gauges, sumps and collection pits.

All equipment and devices used in conformance with CAN/ULC-S675.1, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids," and CAN/ULC-S675.2, "Standard for Nonvolumetric Precision Leak Detection Devices for Underground and Aboveground Storage Tanks and Piping for Flammable and Combustible Liquids," are deemed to comply with Sentence 4.4.2.1.(7).

A-4.4.2.1.(8)(b)(ii) The presence or location of leaks in aboveground tanks can be determined through various testing methods, including ultrasonic, magnetic particle and video graphic testing. The location of leaks in the bottom of a tank shell can also be determined by vacuum testing. All testing should be conducted by individuals or companies trained in the proper care and use of the testing equipment. The choice of test methodology should be appropriate for the application.

A-4.4.2.1.(10)(a) The performance requirements of CAN/ULC-S675.1, "Standard for Volumetric Leak Detection Devices for Underground and Aboveground Storage Tanks for Flammable and Combustible Liquids," and CAN/ULC-S675.2, "Standard for Nonvolumetric Precision Leak Detection Devices for Underground and Aboveground Storage Tanks and Piping for Flammable and Combustible Liquids," are deemed to meet the intent of Clause 4.4.2.1.(10)(a).

The location of leaks in underground storage tanks can be determined through non-volumetric testing, which includes acoustical, tracer and external product detection methods. The location of leaks in the bottom of a tank shell can also be determined by vacuum testing. All testing should be conducted by individuals or companies trained in the proper care and use of the testing equipment. The choice of test methodology shall be appropriate for the application.

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A-4.4.2.1.(12) Locating the single check valve anywhere other than immediately under the pump will require an alternative method of line leak detection for the piping system.

In such cases, when the piping system is not operating, a positive pressure is created by trapping the flammable liquid or combustible liquid in the pipe. The piping system should therefore be considered as a pressure piping system and the applicable provisions of the NFC(AE) should be applied.

A-4.4.4.1. Inventory reconciliation and liquid level measurements can only be conducted on storage tanks that have a metered pump, dispenser or some other type of measuring device that can determine the amount of product withdrawn over a specific period of time. Other leak detection methods must be used for piping systems and storage tanks without meters or measuring devices.

Inventory reconciliation leak detection methods used for a storage tank should follow an established procedure in order to minimize errors and determine any trend that indicates a loss of product from the tank.

The recording of pump meter readings, shipments, internal transfers, product delivery receipts or measurements of the level of contents of a storage tank shall not in and of itself constitute a record as required by Article 4.4.4.1. In addition, suppliers of flammable and combustible liquids should provide their customers with sufficient data to conduct proper inventory reconciliation. Inventories, which have been adjusted for volume through temperature compensation, must also be available to operators by volume according to meter measurements.

Inventory reconciliation is not to be confused with statistical inventory reconciliation (SIR), which is a third-party computerized analysis of tank operator inventory data.

Indications of a potential leak from inventory reconciliation practice include:

(a) any unexplained loss or gain of 0.5 percent or more of the throughput from an underground storage tank or a loss of 1.0 percent or more of the throughput from an aboveground storage tank noted for each stored product in a calendar month, as indicated by the recording and reconciliation of inventory records,
(b) inventory reconciliations showing five consecutive days of unexplained product losses,
(c) inventory reconciliations showing 18 days of unexplained losses in one calendar month, or
(d) the level of water at the bottom of an underground storage tank exceeding 50 mm.

A-4.5.5.6. Mechanical connections include flanged, bolted and threaded piping connections and compression fittings, but not welded, glued and fused connections.

A-4.5.5.7.(1) All penetrations into sumps, including those for electrical cables, should be minimized and, where possible, should be brought into the sump from the top.

A-4.5.6.1.(1) It should be noted that this requirement applies to new and upgraded piping systems. A common practice in Alberta is the installation of aboveground storage tanks that supply remote dispensers by the use of underground piping. This requirement would apply to all such installations.

A-4.5.6.12.(1) It is good practice to space hangers for pipe having a nominal diameter of 50 mm or less not more than 3.5 m apart.

A-4.5.9.2.(1) Sentence 4.5.9.2.(1) is not intended to apply to small-capacity pumps that operate at low pressures, such as those normally associated with waste oil tanks. Safety measures should nevertheless be taken to protect the pump from mechanical and collision damage, and to control any spillage of liquid resulting from pump damage or failure.

A-4.5.10.7.(6) The following documents contain examples of good engineering practice as regards the maintenance of pressurized piping systems:

- API STD 1104, "Welding of Pipelines and Related Facilities,"
- API RP 2200, "Repairing Crude Oil, Liquefied Petroleum Gas, and Product Pipelines," and
- API RP 2201, "Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries."

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A-4.6.1.1. Section 4.6. applies only to the portion of a property where fuel-dispensing operations are conducted. When a facility combines fuel-dispensing operations with other types of business (motor vehicle repair garage, convenience store, restaurant, etc.), Section 4.6. is intended to apply only to the fuel-dispensing operations and the adjacent business shall conform to other Sections of this Code based on its occupancy classification (assembly occupancy for a restaurant, mercantile occupancy for a convenience store, industrial occupancy for a repair garage, etc.).

A-4.6.3.3.(1)(g) The intent of this Clause is to ensure a spatial separation between dispensers and manhole openings for sanitary or storm water sewers. This distance is intended to prevent spilled flammable liquid or combustible liquid from accidentally entering or being flushed into sewer systems and creating a potential fire and explosion hazard. This reflects Subsection 4.1.6., Spill Control and Drainage Systems, and is to prohibit the entry of flammable liquids and combustible liquids into sewer systems, tunnels or underground structures.

The intent is not to prohibit openings to oil and water separators that capture and separate product before wastewater is discharged into a sanitary sewer being placed in appropriate locations.

A-4.6.4.1.(1) and (2) The emergency shut-off device required by Sentence 4.6.4.1.(1) allows power to all dispensers and pumps to be rapidly shut off in the event of a spill, fire or other dangerous situation. A circuit breaker on an electrical panel is not considered to be such a device.

The shut-off device can be located indoors or outdoors, but should be placed close enough to the dispensers and pumps to allow it to be quickly located and activated.

The shut-off device is primarily intended for use by station attendants and emergency responders. Nevertheless, the owner of a fuel-dispensing station may choose to install the shut-off device in a location where it is accessible to the public.

A-4.6.4.2.(2) The emergency shut-off switch would normally be located a minimum of 6 m and a maximum of 10 m from dispensers to get the public away from the likely location of a fire but not so distant that the switch is difficult to find or access. The location of the switch should consider such factors as an available power source, visibility of signage directing the public to the switch, and yard lighting.

A-4.6.8.2.(6)(a) Video surveillance equipment at an unattended self-service outlet provides the owner and the authority having jurisdiction with the ability to monitor accidents, spills or vandalism that may occur at the site. The authority having jurisdiction may accept a variety of surveillance monitoring methods using technologies other than those described in proprietary or central station monitoring systems. Although live continuous surveillance is an ideal method, the intent of this Clause is to allow flexibility in the type of system used. A video surveillance tape of an accident, spill or vandalism will assist the owner and the authority having jurisdiction in identifying the cause of an incident.

A monitoring facility may include a ULC-listed monitoring service company, a security monitoring service company or monitoring equipment connected to the owner's security monitoring service, which may be located at a corporate office or refinery. The authority having jurisdiction should be consulted regarding the acceptability of the monitoring facility.

A-4.6.8.4.(1) The authorized holder of a card or key who has received adequate training in the safe and responsible operation of the equipment is not considered a member of the "general public." Such is not the case for coin-operated or preset dispensers, which can be operated by anyone.

A-4.6.8.6.(2) When gasoline vapour is allowed to enter into a diesel-fuelled engine through the air intake, there is a potential for the diesel engine to run away. In a runaway condition, a diesel engine would accelerate in an uncontrolled manner even if the ignition were switched off, resulting in damage to the engine and potentially causing a fire.

A-4.6.8.8.(2) Figure A-4.6.8.8.(2) shows two examples of signs that indicate that smoking is not permitted and that the engine ignition must be turned off while the vehicle is being refuelled.

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Figure A-4.6.8.8.(2)
Fuel-dispensing station signs

A-4.7.4. When used in this Subsection, the terms "loading" and "unloading" shall mean the loading and unloading of tank vehicles or tank cars.

A-4.7.4.4.(2) Loading racks using bottom loading often load at high flow rates. The thermal expansion capacity at the top of the compartment is often insufficient to prevent an overfill if the requested volume does not fit the compartment (operator error or retain in the compartment). Overfill sensors must be designed to allow adequate time for the control valves to close before the compartment overfills. Retain sensors and/or a well-established operator training program could achieve the same result.

A-4.7.4.5. API RP 2003, "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents," is an example of good engineering practice for the activities described in Article 4.7.4.5.

A-4.8.8.1.(1)(a) TC SOR/2012-69, "Vessel Pollution and Dangerous Chemicals Regulations," may apply to flexible cargo hoses described in this Code. The following documents are considered good engineering practice for this application:

- OCIMF 2009, "Guide to Manufacturing and Purchasing Hoses for Offshore Moorings," and
- ARPM IP-2, "Hose Handbook."

A-4.9.3.4.(1) Examples of equipment that meets the requirements of Sentence 4.9.3.4.(1) are dispensing stations, open centrifuges, plate and frame filters, open vacuum filters and surfaces of open equipment.

A-4.10.1.1.(1) Beer, wine, and spirits that contain less than 20% by volume alcohol are not considered to be flammable liquids and are not regulated by this Section. Section 4.10. does not apply to wineries where distilled beverage alcohol is used to fortify wine.

A-4.10.3.2. Exposed steel supports do not have a 2 h fire-resistance rating, and need protection as much as timber supports for tanks. Due to the water miscibility of beverage alcohols, automatic sprinklers provide an effective means of achieving the necessary protection, provided there is sufficient space under the tank to permit their installation.

A-4.10.3.3.(1) The use of "good engineering practice" in the design of normal and emergency venting is intended to prevent an accumulation of flammable vapours inside the building that may present an explosion hazard. For new tank installations, this can be achieved by directing breather vents and emergency vents equipped with flame arrestors or pressure/vacuum valves to the outside of the building. However, on existing tank installations, installation of such vents may be impractical. Venting into the interior space may not constitute an undue hazard where certain measures are taken to ensure an adequate degree of fire safety. Such measures include, but are not limited to:

- the installation of automatic sprinklers throughout the tank room and under any raised tanks greater than 1.2 m in diameter,
- the classification of electrical equipment and wiring according to the zone classifications of CSA C22.1, "Canadian Electrical Code, Part I,"
- the provision of adequate natural or mechanical ventilation meeting the objectives of Article 4.10.6.1., and
- the training of personnel in safe operating procedures.

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A-4.10.5.1.(1) Piping and pumping systems should be designed to recognized engineering standards and accepted industry practice.

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Hazardous Processes and Operations

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Part 5
Hazardous Processes and Operations

Section 5.1. General

(See Articles 2.1.2.1., 2.1.2.5. and 2.2.2.2. of Division C.)

5.1.1. Scope

5.1.1.1. Application

1) This Part applies to processes and operations that involve a risk from explosion, high flammability or related conditions that create a hazard to life safety.

5.1.1.2. Explosives

1) The manufacturing, handling, transportation, sale and use of *dangerous goods* classified as explosives shall be in conformance with NRCan R.S.C. 1985, c. E-17, "Explosives Act," and its Regulations.

5.1.1.3. Display Fireworks

1) The handling and discharge of fireworks shall conform to NRCan 2010, "Display Fireworks Manual."

5.1.2. Electrical Installations

5.1.2.1. Hazardous Locations

1) Where wiring or electrical equipment is located in areas in which flammable gases or vapours, *combustible dusts* or *combustible fibres* are present in quantities sufficient to create a hazard, such wiring and electrical equipment shall conform to CSA C22.1, "Canadian Electrical Code, Part I," for hazardous locations. (See Note A-5.1.2.1.(1).)

5.1.2.2. General

1) Electrical installations shall conform to the appropriate provincial or territorial regulations or municipal bylaws, or in the absence of such regulations, to CSA C22.1, "Canadian Electrical Code, Part I," except that alternatives to these requirements are permitted as described in Clause 1.2.1.1.(1)(b) of Division A in areas other than those described in Article 5.1.2.1.

5.1.3. Ventilation

5.1.3.1. Ventilation

1) Ventilation shall be provided for hazardous locations and processes in conformance with the NBC(AE) and with this Part.

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5.1.4. Flash Point

5.1.4.1. Flash Point

1) The *flash points* of *flammable liquids* and *combustible liquids* shall be determined in conformance with Subsection 4.1.3.

5.1.5. Fire Safety Plan

5.1.5.1. Fire Safety Plan

1) A fire safety plan conforming to Section 2.8. shall be prepared.

Section 5.2. Hot Works

5.2.1. General

5.2.1.1. Application

1) This Section applies to hot works involving open flames or producing heat or sparks, including but not limited to, cutting, welding, soldering, brazing, grinding, adhesive bonding, roofing operations, thermal spraying and thawing pipes.

2) Except as provided in this Section, hot works described in Sentence (1) shall conform to CSA W117.2, "Safety in welding, cutting and allied processes."

5.2.1.2. Training

1) Hot works shall be performed only by personnel trained in the safe use of equipment in conformance with this Section.

5.2.2. Hot Work Equipment

5.2.2.1. Maintenance

1) Hot work equipment shall be maintained in good operating condition.

5.2.2.2. Inspection

1) Hot work equipment shall be examined for leakage or defects prior to each use.

2) Leaks or defects found in hot work equipment shall be repaired prior to use.

5.2.2.3. Equipment Not in Use

1) All valves shall be closed and gas lines bled when hot work equipment using *dangerous goods* classified as compressed gases is not in use.

2) Electric hot work equipment shall be de-energized when not in use.

5.2.2.4. Compressed Gas Equipment

1) The design and installation of oxygen-fuel gas equipment shall conform to NFPA 51, "Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes."

2) Unalloyed copper piping shall not be used for acetylene gas.

3) Oil or grease shall not be used with equipment for oxygen.

4) Cylinders of *dangerous goods* classified as compressed gases shall conform to Part 3.

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5.2.3. Prevention of Fires

5.2.3.1. Location of Operations

1) Except as provided in Sentence (2), hot work shall be carried out in an area free of combustible and flammable contents, with walls, ceilings and floors of *noncombustible construction* or lined with noncombustible materials.

2) When it is not practicable to undertake hot work in an area described in Sentence (1),

a) combustible and flammable materials within a 15 m distance from the hot work shall be protected against ignition in conformance with Article 5.2.3.2.,
b) a continuous fire watch shall be provided during the hot work and for a period of not less than 60 min after its completion in conformance with Article 5.2.3.3., and
c) a final inspection of the hot work area and adjacent exposed areas shall be conducted
   i) 4 h after completion of the work, or
   ii) after completion of the fire watch required in Clause (b), in which case, a more comprehensive inspection shall be conducted (see Note A-5.2.3.1.(2)(c)(ii)).

3) When there is a possibility of sparks or open flames reaching combustible materials in areas adjacent to the area where hot work is carried out,

a) openings in walls, floors or ceilings shall be covered or closed to prevent the passage of sparks or open flames to such adjacent areas, or
b) Sentence (2) shall apply to such adjacent areas.

5.2.3.2. Protection of Combustible and Flammable Materials

1) Any combustible and flammable material, dust or residue shall be

a) removed from the area where hot work is carried out, or
b) except as provided in Sentence (2), protected against ignition by the use of noncombustible materials.

2) Combustible materials or *building* surfaces that cannot be removed or protected against ignition as required in Clause (1)(b) shall be thoroughly wetted where hot work is carried out.

3) The fire watch described in Clauses 5.2.3.1.(2)(b) and (c) shall be carried out by more than one person if combustible materials are exposed to the hot work operations but cannot be directly observed by the initial person performing the fire watch.

4) Any process or activity that produces flammable gases or vapours, *combustible dusts* or *combustible fibres* in quantities sufficient to create a fire or explosion hazard shall be interrupted and the hazardous conditions shall be removed before any hot work is carried out.

5.2.3.3. Fire Watch

1) The exposed areas described in Sentences 5.2.3.1.(2) and (3) shall be continuously examined for ignition of combustible materials by personnel equipped with and trained in the use of fire extinguishing equipment. (See Note A-5.2.3.3.(1).)

5.2.3.4. Work on Containers, Equipment or Piping

1) Hot work shall not be performed on containers, equipment, or piping containing *flammable liquids*, *combustible liquids* or *dangerous goods* classified as flammable gases unless

a) they have been cleaned and tested with a gas detector to ascertain that they are free of explosive vapours, or
b) safety measures are taken in conformance with good engineering practice (see Note A-5.2.3.4.(1)(b)).

2) Hot work shall not be performed on a totally enclosed container.

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3) Hot work shall not be performed on metal objects that are in contact with combustible materials unless safety precautions are taken to prevent their ignition by conduction.

5.2.3.5. Work Adjacent to Piping

1) When hot work is to be carried out near piping containing *dangerous goods* classified as flammable gases, the piping shall

a) conform to Sentence 5.2.3.4.(1), or
b) be protected by a thermal barrier against the passage of heat.

5.2.3.6. Fire Extinguishing Equipment

1) At least one portable fire extinguisher shall be provided in the hot work area.

5.2.3.7. Fire Safety Plan

1) A fire safety plan conforming to Section 2.8. shall be prepared for *buildings* and areas described in Article 2.8.1.1. where hot works are conducted. (See Note A-5.2.3.7.(1).)

Section 5.3. Dust-Producing Processes

5.3.1. General

5.3.1.1. Application

1) This Section shall apply to *buildings* or parts of *buildings* where *combustible dusts* are produced in quantities or concentrations that create an explosion or fire hazard.

5.3.1.2. Dust Removal

1) *Building* and machinery surfaces shall be kept clean of accumulations of *combustible dusts* using cleaning equipment that

a) is made of materials that will not create electrostatic charges or sparks,
b) is electrically conductive and bonded to ground, and
c) except as permitted in Sentence (3), removes the dust to a safe location by vacuum.

2) Cleaning equipment required in Sentence (1) that is used in an atmosphere containing *combustible dusts* shall conform to CSA C22.1, "Canadian Electrical Code, Part I."

3) Where it is not possible to effectively remove the dust by vacuum, it is permitted to use compressed air or other means that will cause the dust to become suspended in the air during removal if, in the dust removal area,

a) all sources of ignition are eliminated, and
b) all machinery and equipment is de-energized, unless such machinery or equipment is suitable for use in atmospheres containing *combustible dusts*, in conformance with CSA C22.1, "Canadian Electrical Code, Part I."

5.3.1.3. Dust-Collecting Systems

1) Dust-collecting systems shall be provided to prevent the accumulation of dust and keep suspended dusts at a safe concentration inside a *building*.

2) A dust-collecting system required in Sentence (1) shall

a) be designed in conformance with good engineering practice,
b) be made of noncombustible materials, and
c) not create sparks upon physical contact in the fan assembly.

(See Note A-5.3.1.3.(2).)

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5.3.1.4. Dust Collectors

1) Except as provided in Sentence (2), a dust collector having a capacity greater than 2.36 m^3/s shall

a) be located outside of a *building*, and
b) be equipped with explosion venting to the outdoors of not less than 0.1 m^2 of vent area for each cubic metre of dust collector enclosure volume.

2) A dust collector described in Sentence (1) is permitted to be located inside a *building* if it is

a) provided with explosion venting to the outdoors as specified in Clause (1)(b),
b) equipped with an automatic explosion prevention system, or
c) located in a room with *fire separations* having a *fire-resistance rating* of not less than 1 h and provided with explosion venting to the outdoors.

3) When air exhausted by a dust collector described in this Article is returned to a *building*, the dust-collecting system shall be designed so that

a) returned air will not create an explosion hazard inside the *building*, and
b) the exhaust fan and ancillary equipment are automatically shut down in the event of a fire or an explosion inside the dust collector.

5.3.1.5. Bonding and Grounding

1) Electrically conducting parts of conveying systems, dust collectors, dust-producing machines and any equipment capable of accumulating static electricity located in an atmosphere containing *combustible dusts* shall be electrically bonded and grounded.

2) Static electricity shall be prevented from accumulating on machines or equipment subject to static electricity buildup by appropriate bonding, grounding and static eliminating devices.

5.3.1.6. Explosion Venting

1) Except as provided in Article 5.3.1.7., an activity that creates an atmosphere containing significant concentrations of *combustible dusts* shall be located only in a *building* provided with explosion venting to the outdoors.

2) When explosion venting is required in this Section, it shall be designed to prevent critical structural and mechanical damage to the *building* in conformance with good engineering practice such as that described in NFPA 68, "Standard on Explosion Protection by Deflagration Venting." (See Note A-3.2.8.2.(1)(d).)

5.3.1.7. Explosion Prevention Systems

1) In processes where an explosion hazard is present and conditions exist that prevent adequate explosion venting as required in this Section, an explosion prevention system shall be provided.

2) When an explosion prevention system is required in this Section, it shall be designed in conformance with good engineering practice such as that described in NFPA 69, "Standard on Explosion Prevention Systems."

5.3.1.8. Electrical Interlocks

1) Equipment required to have a dust-collecting system shall be interlocked to prevent it from operating if the dust-collecting system is not in operation.

5.3.1.9. Separators

1) Separators shall be provided to prevent the entrance of foreign materials that may cause sparks in conveying equipment, dust collectors, dust-producing machines and any equipment located in an atmosphere containing *combustible dusts*.

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5.3.1.10. Ignition Sources

1) Unless controlled in a manner that will not create a fire or explosion hazard, a device, operation or activity that produces open flames, sparks or heat shall not be permitted. (See Note A-4.1.5.2.(1).)

2) Portable electrical equipment used in atmospheres containing *combustible dusts* shall conform to CSA C22.1, "Canadian Electrical Code, Part I."

3) Smoking shall not be permitted in atmospheres containing *combustible dusts*.

5.3.2. Woodworking Operations

5.3.2.1. Exhaust Systems

1) Every machine that produces wood dust, particles or shavings shall be provided with a blower and exhaust system installed in conformance with NFPA 664, "Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities."

2) Operations or machines that generate sparks or combustible vapours shall not be served by exhaust systems connected to woodworking machines referred to in Sentence (1).

5.3.2.2. Shavings and Sawdust Collection

1) Loose shavings and sawdust shall be collected at frequent intervals and deposited in receptacles described in Article 2.4.1.3.

5.3.2.3. Fire Extinguishers

1) A portable extinguisher shall be provided within 7.5 m of any machine producing wood dust, particles or shavings.

5.3.3. Grain Handling and Storage Facilities

5.3.3.1. Storage Bins and Silos

1) A product subject to spontaneous heating shall be permitted to be stored in silos or bins only if measures are taken to

a) monitor the temperature of the stored product, and
b) prevent overheating of the stored product from creating a fire or explosion hazard.

2) Permanently open vent stacks are permitted to be used for the ventilation of storage bins where mechanical dust-collecting systems are not practical, provided that the vent stacks

a) have a cross-sectional area not less than twice that of all spouts discharging into the bin,
b) are installed not more than 30° from the vertical,
c) extend from the top of the bin to a point not less than 1.2 m above the roof, and
d) are designed to prevent the entry of snow and rain.

5.3.3.2. Conveying Equipment

1) Belt conveyors and bucket elevator legs shall be equipped with safety devices to

a) detect excessive misalignment, blockage, slipping or slow-down of the conveying equipment, and
b) prevent conditions described in Clause (a) from creating a fire or explosion hazard by
   i) alerting personnel trained in taking appropriate actions, or
   ii) automatically stopping the conveying equipment.

2) Conveying equipment belts shall be made of static conductive materials to prevent buildup of static charges. (See Note A-5.3.3.2.(2).)

3) Conveying equipment bearings shall be
a) accessible for inspection and maintenance,
b) lubricated to prevent overheating, and
c) kept free of accumulation of *combustible dusts*.

4) Belt conveyor galleries and tunnels and bucket elevator leg enclosures shall be provided with explosion venting to the outdoors in conformance with Sentence 5.3.1.6.(2).

5.3.3.3. Separators

1) Separators shall be provided at grain receiving points ahead of the conveying equipment. (See Article 5.3.1.9.)

5.3.3.4. Fire Protection

1) Nozzles for standpipe and hose systems shall conform to Sentence 3.2.5.11.(7) of Division B of the NBC(AE).

Section 5.4. Special Processes Involving Flammable and Combustible Liquids and Materials

5.4.1. Baking and Drying Processes

5.4.1.1. Application

1) This Subsection applies to baking and drying processes during which flammable vapours are given off by the products being baked or dried.

5.4.1.2. Design, Operation and Maintenance

1) The design, operation and maintenance requirements relating to baking and drying processes shall conform to NFPA 86, "Standard for Ovens and Furnaces."

5.4.2. Dry Cleaning Plants

5.4.2.1. Dry Cleaning Plants

1) Dry cleaning plants shall conform to NFPA 32, "Standard for Drycleaning Facilities."

5.4.3. Fumigation and Thermal Insecticidal Fogging

5.4.3.1. Application

1) This Subsection applies to the fumigation or thermal insecticidal fogging of *buildings*, including the fumigation of equipment or commodities within structures, tanks or bins or under tarpaulins.

5.4.3.2. Notification

1) The fire department shall be notified before any operation described in Article 5.4.3.1. is conducted.

2) The occupants of any premises adjacent to that in which fumigation or thermal insecticidal fogging is to take place shall be given prior notice.

5.4.3.3. Ignition Sources

1) All flames and other sources of ignition shall be eliminated in any part of a *building* undergoing fumigation or thermal insecticidal fogging.

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5.4.3.4. Electric Power

1) Electric power supply shall be shut off to the premises undergoing fumigation or thermal insecticidal fogging.

5.4.3.5. Air Temperature

1) The air temperature in the part of a *building* undergoing fumigation or thermal insecticidal fogging shall be kept sufficiently low to prevent the actuation of any sprinkler or fire alarm system.

5.4.3.6. Access to Premises

1) No unauthorized person shall be permitted to enter a premise undergoing fumigation or thermal insecticidal fogging until the premise has been ventilated and is safe.

2) Warning signs shall be posted in a conspicuous location near every entrance to the premises being fumigated.

3) One person shall be on duty at each entrance to the premises undergoing fumigation or thermal insecticidal fogging to prevent any unauthorized person from entering until such premises have been ventilated.

5.4.4. Floor Finishing

5.4.4.1. Application

1) Floor finishing operations involving the use of *flammable liquids* or *combustible liquids* shall conform to Part 4 and this Subsection.

5.4.4.2. Public Access

1) Any part of a *building* where floor finishing operations are done shall not be open to the public.

5.4.4.3. Ventilation

1) Ventilation shall be provided in areas where floor finishing operations are done to prevent the accumulation of flammable vapours.

2) Ventilation required in Sentence (1) is permitted to be provided by mechanical systems if their use does not constitute a source of ignition.

5.4.4.4. Sources of Ignition

1) All mechanical systems, electric motors and other equipment that might be a source of ignition shall be shut down, and smoking and the use of open flames shall be prohibited during the application of Class I liquids and for at least 1 h after such application.

5.4.4.5. Waste Receptacles

1) A receptacle conforming to Article 2.4.1.3. shall be provided for all waste rags and materials used in operations involving *flammable liquids* or *combustible liquids*, and the contents shall be removed daily and disposed of in a manner that will not create a fire hazard.

5.4.5. Spray Coating Processes

5.4.5.1. Application

1) This Subsection applies to spray coating processes involving the use of combustible dry powders, *flammable liquids* or *combustible liquids*.

5.4.5.2. Design, Operation and Maintenance

1) The design, operation and maintenance requirements relating to spray coating processes shall conform to NFPA 33, "Standard for Spray Application Using Flammable or Combustible Materials."

5.4.6. Dipping and Coating Processes

5.4.6.1. Application

1) This Subsection applies to

a) processes in which products or materials are immersed in a dip tank containing *flammable liquids* or *combustible liquids*, and

b) the unatomized application of *flammable liquids* or *combustible liquids*, such as by flow coating or roll coating processes.

5.4.6.2. Design, Operation and Maintenance

1) The design, operation and maintenance requirements relating to dipping and coating processes shall conform to NFPA 34, "Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids."

5.4.7. Production of Ethanol for Fuel

5.4.7.1. Application

1) This Subsection applies to *process plants* where ethanol is produced for fuel purposes.

2) For the purpose of applying this Subsection, ethanol concentrations greater than or equal to 20% by volume of ethanol in water shall be considered as a *flammable liquid*.

5.4.7.2. Use, Handling and Storage

1) The use, handling and storage of *dangerous goods*, excluding *flammable liquids* and *combustible liquids*, shall conform to Part 3.

Section 5.5. Laboratories

5.5.1. Scope

5.5.1.1. Application

1) This Section applies to laboratories where *dangerous goods*, including *flammable liquids* and *combustible liquids*, are used. (See Note A-5.5.1.1.(1).)

2) Except as otherwise specified in this Section, the use, handling and storage of *dangerous goods*, including *flammable liquids* and *combustible liquids*, shall conform to Parts 3, 4 and 5.

5.5.2. Construction

5.5.2.1. Interior Finish Materials

1) Interior finish materials, floors, fixed furniture and equipment shall be chemically resistant to *dangerous goods* being used in a laboratory to minimize their deterioration, in conformance with Articles 3.2.7.7. and 3.2.7.8.

5.5.2.2. Separation

1) A laboratory shall be separated from other parts of the *building* by *fire separations* conforming to this Code and the NBC(AE), but having a *fire-resistance rating* of not less than 1 h.

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5.5.3. Fire Prevention and Protection

5.5.3.1. Emergency Planning

1) A fire safety plan conforming to Section 2.8. shall be prepared.

2) Except as provided in Sentences (3) to (6), a laboratory shall conform to the requirements for emergency planning stated in Section 2.8.

3) Personnel working in a laboratory shall be trained in the safe handling and use of *dangerous goods*, in conformance with Article 3.2.7.15.

4) *Dangerous goods* shall be identified in conformance with Article 3.2.7.13.

5) The laboratory shall be clearly designated as an area containing *dangerous goods* in conformance with Article 3.2.7.14.

6) Measures shall be taken to prevent access to the laboratory by unauthorized persons.

5.5.3.2. Combustible Materials

1) Where combustible materials, such as packaging materials, are used in a laboratory, their quantity shall not be greater than the supply for one day of normal operation.

2) Combustible materials in excess of those permitted in Sentence (1) shall be stored outside of the laboratory in conformance with Section 3.2.

5.5.3.3. Spill Control

1) Absorbent and neutralizing materials shall be provided in the laboratory and in the *dangerous goods* storage areas in conformance with Sentence 3.2.7.11.(2).

5.5.3.4. Electrical Equipment

1) Except as provided in Sentence 5.5.3.5.(3), electrical equipment located in areas where the concentration of flammable vapours is sufficient to create a hazard shall conform to CSA C22.1, "Canadian Electrical Code, Part I," for the hazardous locations. (See Note A-5.5.3.4.(1).)

2) Electrical equipment located inside a power-ventilated enclosure required in Article 5.5.4.2. and its exhaust duct system shall

a) conform to Sentence (1), and
b) be designed and maintained to prevent the accumulation of combustible or reactive deposits.

5.5.3.5. Ignition Sources

1) Smoking shall not be permitted in a laboratory and signs shall be posted in conformance with Article 2.4.2.2.

2) Where overheating of unattended equipment using heat can cause a fire or an explosion, such equipment shall be equipped with a high temperature limit switch fitted to

a) sound an alarm, and
b) shut off the heat.

3) An ignition source that is an integral part of an operation involving flammable vapours shall be permitted, provided

a) the supply of *flammable liquids* or *combustible liquids* for this operation is controlled and kept to a strict minimum,
b) flammable vapours and combustion fumes are exhausted in conformance with Article 5.5.4.2.,
c) there is no other source of ignition capable of igniting the flammable vapours in an uncontrolled manner, and
d) there is no combustible material in the immediate vicinity of this operation.

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5.5.3.6. Inspection and Maintenance

1) Electrical equipment, mechanical systems, piping, valves, and automatic and manual control and safety devices shall be inspected, tested and maintained in good operating condition at all times.

2) The ventilation systems serving a laboratory shall be inspected and cleaned to prevent the accumulation of combustible or reactive deposits, and the intervals between inspections shall be not greater than

a) 12 months for the ventilation systems of the laboratory and *dangerous goods* storage areas, and
b) 6 months for the ventilation system of a power-ventilated enclosure required in Article 5.5.4.2.

5.5.4. Ventilation

5.5.4.1. General Ventilation

1) A laboratory shall be provided with continuous mechanical ventilation that is

a) designed in conformance with Article 6.3.4.2. of Division B of the NBC(AE), and
b) maintained to ensure it fulfills the function for which it was designed.

5.5.4.2. Power-Ventilated Enclosure

1) The use of *dangerous goods* in a laboratory shall be confined inside a power-ventilated enclosure conforming to Articles 6.3.4.3. and 6.3.4.4. of Division B of the NBC(AE) when

a) their use releases flammable vapours or causes runaway or potentially explosive reactions,
b) liquids are heated to a temperature equal to or greater than their *flash point*, or
c) Class I liquids or *unstable liquids* are used.

2) A power-ventilated enclosure required in Sentence (1) shall not be used for the storage of *dangerous goods*, and any quantity in excess of the supply necessary for normal operations shall conform to Subsection 5.5.5.

5.5.4.3. Enclosure Exhaust Ventilation

1) Except as provided in Sentence (2), the ventilation system for a power-ventilated enclosure required in Article 5.5.4.2. shall conform to Article 6.3.4.3. of Division B of the NBC(AE).

2) The ventilation system described in Sentence (1) shall not be interlocked with a fire detection, fire alarm or make-up air system.

3) Where combustible or reactive deposits can accumulate in the power-ventilated enclosure and its exhaust duct system and create a fire or explosion hazard,

a) provisions shall be made to remove such deposits so they do not create a fire or explosion hazard, or
b) an automatic fire suppression system shall be provided.

5.5.4.4. Enclosure Construction

1) The power-ventilated enclosure required in Article 5.5.4.2. and its exhaust duct system shall conform to Article 6.3.4.4. of Division B of the NBC(AE) and

a) be provided with instructions for its use and the operation of the ventilation system, and
b) be provided with means to control accidental spillage.

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5.5.5. Dangerous Goods

5.5.5.1. Maximum Quantities

1) The quantity of *dangerous goods* kept in a laboratory shall be minimized and shall not exceed the lesser of

a) the supply necessary for normal operation, or
b) when located in
   i) a Group A, Division 2 educational or a Group D *major occupancy*, 300 L of *flammable liquids* and *combustible liquids*, of which not more than 50 L shall be Class I liquids, or
   ii) a Group B *major occupancy*, the quantities of *flammable liquids* and *combustible liquids* permitted in Sentence 4.2.6.3.(1).

(See Note A-5.5.5.1.(1).)

2) Quantities of *flammable liquids* and *combustible liquids* in excess of those permitted in Sentence (1) shall be stored in

a) cabinets conforming to Subsection 4.2.10. except that, in laboratories described in Clause (1)(b), the total quantity of *flammable liquids* and *combustible liquids* stored in such cabinets shall not exceed the quantity permitted for one cabinet, or
b) a room conforming to Subsection 4.2.9.

3) Quantities of *dangerous goods* other than *flammable liquids* and *combustible liquids* in excess of those permitted in Sentence (1) shall be stored outside of the laboratory in conformance with Part 3.

5.5.5.2. Containers for Flammable and Combustible Liquids

1) Except as provided in Sentences (2) and (4), containers used for the storage or dispensing of *flammable liquids* or *combustible liquids* in a laboratory shall conform to Subsection 4.2.3.

2) Where Class I liquids are required to be kept in individual storage or dispensing containers having a capacity greater than 5 L in a laboratory, such containers shall

a) be safety containers conforming to ULC/ORD-C30, "Safety Containers," and
b) have a capacity of not more than 25 L.

3) Containers used for the preservation of animal, human or plant specimens that contain *flammable liquids* or *combustible liquids* shall

a) be properly sized for the specimens,
b) be stored in a room conforming to Subsection 4.2.9., and
c) be protected against breakage and spillage.

4) Containers of *flammable liquids* or *combustible liquids* shall be kept closed when not in use.

5.5.5.3. Compressed Gases

1) Cylinders of *dangerous goods* classified as compressed gases shall not be located in laboratories unless

a) they are in use and connected
   i) to a regulator to deliver gas, or
   ii) to a manifold being used to deliver gas, or
b) one is serving as a single reserve cylinder for a cylinder described in Subclause (a)(i) to which it is firmly secured with a noncombustible attachment.

2) Storage cylinders and piping systems for *dangerous goods* classified as compressed gases used in a laboratory shall be firmly secured with a noncombustible attachment and protected against mechanical damage.

3) Each point of supply and each point of use of cylinders or piping systems for *dangerous goods* classified as compressed gases shall be provided with

a) a label identifying the gas being supplied, and
b) a manual shut-off valve.

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4) Valves on cylinders for *dangerous goods* classified as compressed gases shall be closed when not in use.

5) Except as provided in Sentence (7), where cylinders of *dangerous goods* classified as toxic gases are used in a laboratory,

a) they shall be located in a continuously mechanically ventilated gas storage cabinet,
b) all exhaust shall be directed to a treatment system designed to process the accidental release of gas (see Note A-5.5.5.3.(5)(b) and (7)(b)), and
c) the gas levels in the air shall be monitored by a gas detection system designed to emit an audible and visual signal within the laboratory and at a central station when gas levels exceed the exposure limit values established by provincial or territorial regulations or municipal by-laws or, in the absence of such regulations or bylaws, when they exceed the exposure limit values stated in the Safety Data Sheet.

6) Except as permitted in Sentence (7), cylinders of *dangerous goods* classified as compressed gases of pyrophoric materials shall be located in a gas storage cabinet that is

a) continuously mechanically ventilated, and
b) *sprinklered*.

7) Where lecture bottles of *dangerous goods* classified as toxic gases or as compressed gases of pyrophoric materials are used in a laboratory,

a) they shall be kept in a dedicated continuously mechanically ventilated hood or other continuously mechanically ventilated enclosure, and
b) all exhaust shall be directed to a treatment system designed to process the accidental release of gas (see Note A-5.5.5.3.(5)(b) and (7)(b)).

5.5.5.4. Refrigerated Storage

1) Refrigerators described in Sentence 4.1.4.1.(2) shall be identified in conformance with Article 3.2.7.14.

2) Class I liquids that are stored in refrigerators shall be kept in *closed containers*.

5.5.5.5. Dangerously Reactive Materials

(See Note A-5.5.5.5.)

1) Except as provided in Article 5.5.5.6., the heating of dangerously reactive materials above normal ambient temperature or as specified in the Safety Data Sheet shall be carried out in a separate power-ventilated enclosure

a) conforming to Articles 5.5.4.2. to 5.5.4.4., and
b) displaying conspicuously posted instructions specifying that the enclosure is to be used for this application only.

2) The power-ventilated enclosure required by Sentence (1) as well as its exhaust duct system shall be washed after each use to prevent the possible accumulation of highly reactive or unstable deposits. (See Note A-5.5.5.5.(2).)

5.5.5.6. Perchloric Acid

(See Note A-5.5.5.6.)

1) Where perchloric acid is heated above normal ambient temperature, it shall be done in a separate power-ventilated enclosure

a) conforming to Articles 5.5.4.3. and 5.5.4.4., and
b) displaying conspicuously posted instructions specifying that the enclosure is to be used for this application only.

2) The power-ventilated enclosure required by Sentence (1) as well as its exhaust duct system shall be washed after each use to prevent the accumulation of highly unstable deposits. (See Note A-5.5.5.6.(2).)

3) Perchloric acid shall not be heated with an open flame or in a hot oil bath.

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5.5.5.7. Chemical Wastes

1) Wastes from *dangerous goods* shall be
a) identified to prevent accidental mixing of incompatible chemicals, and
b) included in the quantities specified in Article 5.5.5.1.

Section 5.6. Construction and Demolition Sites

5.6.1. General

5.6.1.1. Application

(See Note A-5.6.1.1.)

1) This Section applies to fire safety for *buildings*, parts of *buildings*, facilities, adjacent *buildings* or facilities, and associated areas undergoing construction, alteration or demolition operations.

5.6.1.2. Measures to Mitigate Fire Spread to Adjacent Buildings

1) Measures shall be taken to mitigate fire spread to adjacent *buildings* and facilities that would be exposed to fire originating from *buildings*, parts of *buildings*, facilities and associated areas undergoing construction, alteration or demolition operations. (See Note A-5.6.1.2.(1).)

5.6.1.3. Fire Safety Plan

(See Sentence 2.2.1.2.(14) of Division C.)

1) A fire safety plan conforming to Section 2.8. shall be prepared.

5.6.1.4. Access for Firefighting

1) Unobstructed access to fire hydrants, portable extinguishers and to fire department connections for standpipe and sprinkler systems shall be maintained.

2) A means shall be provided to allow firefighters to perform their duties on all levels of the *building*.

3) Provision shall be made for the use of existing elevators, hoists or lifts to assist firefighting personnel in reaching all levels of the *building*.

4) Access routes for fire department vehicles shall be provided and maintained to construction and demolition sites. (See Note A-5.6.1.4.(4).)

5) Where a construction or demolition site is fenced so as to prevent general entry, provision shall be made for access by fire department equipment and personnel.

5.6.1.5. Portable Extinguishers

1) In addition to the other requirements of this Code, portable extinguishers shall be provided in unobstructed and easily accessible locations in any areas
a) where hot work operations are carried out,
b) where combustibles are stored,
c) near or on any internal combustion engines,
d) where *flammable liquids* and *combustible liquids* or gases are stored or handled,
e) where temporary fuel-fired equipment is used, or
f) that are designated for smoking.

2) The extinguishers required by Sentence (1) shall have a minimum rating of
a) 3-A:20-B:C on moveable equipment (see Note A-5.6.1.5.(2)(a)), and
b) 4-A:40-B:C in all other locations.

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5.6.1.6. Standpipe Systems

(See Note A-5.6.1.6.)

1) Where a standpipe system is to be installed in a *building* under construction or alteration, the system shall be installed progressively in conformance with Subsection 3.2.5. of Division B of the NBC(AE) in areas permitted to be occupied.

2) Where a standpipe system is to be installed in portions of a *building* under construction or alteration that are not occupied, the following shall apply:

a) a permanent or temporary standpipe system is permitted in accordance with Clauses (b) and (c),
b) the standpipe system shall be provided with conspicuously marked and readily accessible fire department connections on the outside of the *building* at *street* level and shall have at least one hose outlet at each floor,
c) the pipe size, hose valves and water supply shall conform to Subsection 3.2.5. of Division B of the NBC(AE),
d) the standpipe system shall, as a minimum, be securely supported and restrained on alternate floors,
e) at least one hose valve for attaching fire department hose shall be provided at each intermediate landing or floor level in the *exit* stairway,
f) valves shall be kept closed at all times and guarded against mechanical damage,
g) the standpipe shall be not more than one floor below the highest forms, staging, and similar combustible elements at all times, and
h) temporary standpipe systems shall remain in service until the permanent standpipe installation is complete.

3) Where a *building* being demolished floor by floor is equipped with a standpipe system, the system, together with fire department connections and valves, shall be maintained in operable condition on all *storeys* below the one being demolished, except for the *storey* immediately below it.

5.6.1.7. Hot Surface Applications

1) Roofing operations and other surface applications that involve heat sources and hot processes shall be considered hot works and shall conform to the requirements in Sentences (2) and (3) and Section 5.2.

2) Bitumen kettles shall

a) not be located on roofs or inside a *building*,
b) be provided with adequate metal covers that are close-fitting and constructed of steel having a thickness of not less than No. 14 sheet metal gauge thickness,
c) be under constant supervision when in operation, and
d) be maintained free of excessive residue.

3) Mops that have been used for spreading bitumen shall be kept outside the *building* in a safe location when not in use.

5.6.1.8. Ignition Sources

(See Note A-5.6.1.8.)

1) Devices capable of producing ignition, internal combustion engines, temporary heating equipment and associated devices shall be kept at a safe distance from combustible material so as not to cause ignition.

2) The clearance between combustible materials and temporary heating equipment, including *flues*, shall be in conformance with Part 6 of Division B of the NBC(AE) or in conformance with the minimum clearances shown on certified heating equipment.

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5.6.1.9. Building Services at Demolition Sites

1) Except as required in Sentence (3) and except for water supplies for firefighting, *building* services shall be terminated at a point located outside the *building* or part thereof being demolished. (See Note A-5.6.1.9.(1).)

2) The service company whose service connections will be affected shall be notified before any action mentioned in Sentence (1) is taken and, if it is necessary to maintain any service, it shall be

a) relocated as necessary, and
b) protected from damage.

3) Temporary electrical installations shall be installed in conformance with the requirements of CSA C22.1, "Canadian Electrical Code, Part I."

5.6.1.10. Fuel Supply Installation

1) Fuel supplies for heating equipment and internal combustion engines shall conform to

a) CSA B139 Series, "Installation code for oil-burning equipment," or
b) CSA B149.1, "Natural gas and propane installation code."

5.6.1.11. Tank, Piping and Machinery Reservoir Safety at Demolition Sites

1) Tanks, piping and machinery reservoirs at a demolition site shall be taken out of service in conformance with Subsection 4.3.16.

2) Tanks, piping and machinery reservoirs at a demolition site that contain *combustible liquids* or *flammable liquids* or that are likely to contain flammable vapours shall be drained and, except as permitted by Sentence (3), removed prior to the demolition of the *building*.

3) Where it is impracticable to remove tanks, piping or machinery reservoirs from the *building* prior to demolition, such equipment shall be conspicuously identified and removed as soon as conditions permit.

4) Tanks, piping and machinery reservoirs referred to in Sentences (1), (2) and (3) that once contained *combustible liquids*, *flammable liquids* or flammable gases shall be purged with inert materials prior to demolition to prevent an explosion. (See Note A-5.6.1.11.(4).)

5.6.1.12. Fire Separations in Partly Occupied Buildings

1) Where part of a *building* continues to be occupied, the occupied part shall be separated from the part being demolished or constructed by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

5.6.1.13. Protection during Shutdown

1) Except as permitted in Sentence (2), where a fire protection system is provided, it shall remain operational throughout the construction, alteration or demolition area, where reasonably practical.

2) When any portion of a fire protection system is temporarily shut down during construction, alteration or demolition operations, protection during shutdown shall comply with Article 6.1.1.4.

5.6.1.14. Watch

1) A watch, with tours at intervals of not more than 1 h, shall be provided throughout demolition sites when there are occupants in the portion of the *building* not being demolished.

2) Except where a *building* is provided with a fire alarm system or similar equipment, a watch, with tours at intervals of not more than 1 h, shall be provided when a portion of the *building* is occupied while construction operations are taking place.

3) Facilities shall be provided to enable the watcher referred to in Sentences (1) and (2) to

a) ensure a fire warning is sounded to notify occupants, and
b) communicate with the fire department.

5.6.1.15. Smoking Restrictions

1) Smoking shall be permitted only under the conditions stated in Subsection 2.4.2.

5.6.1.16. Provision for Egress

1) In areas of a *building* where construction, alteration or demolition operations are taking place, at least one *exit* shall be accessible and usable at all times.

2) In *buildings* being demolished, at least one stairway shall be maintained in usable condition at all times.

5.6.1.17. Fire Warning

1) A means shall be provided to alert site personnel of a fire and such means shall be capable of being heard throughout the *building* or facility.

5.6.1.18. Storage and Use of Dangerous Goods

1) *Combustible liquids* and *flammable liquids* shall be stored and used in conformance with Part 4.

2) *Dangerous goods* shall be stored in conformance with Part 3.

3) *Dangerous goods* shall be used in conformance with Part 5.

5.6.1.19. Temporary Enclosures

1) Fabrics and films used to temporarily enclose *buildings* shall be securely fastened to prevent them from being blown against heaters or other ignition sources.

5.6.1.20. Disposal of Combustible Refuse

1) Combustible refuse in sufficient quantities to constitute a fire hazard shall be moved to a safe location. (See also Subsection 8.2.5. of Division B of the NBC(AE).)

5.6.2. Excavation

5.6.2.1. Services Shut-off

1) Except as provided in Article 5.6.2.2., before excavation begins, *building* services shall be shut off, terminated and labelled so as to be easily identifiable outside the limits of the excavation. (See also Sentence 5.6.1.9.(1).)

2) The service company whose service connections will be affected shall be notified before any action mentioned in Sentence (1) is taken and, if it is necessary to maintain any service, it shall be

a) relocated as necessary, and
b) protected from damage.

5.6.2.2. Maintaining Existing Services

1) Existing gas, electrical, water, steam and other services are permitted to be left within the area of the excavation, provided that

a) before work begins, the service company concerned has approved the proposed method of operation,
b) the location of the services is determined before excavation commences,
c) a suitable method of excavation is adopted that will ensure that the services are not damaged, and
d) the services are provided with suitable temporary supports.

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5.6.3. Additional Requirements for Residential and Business and Personal Services Occupancies

5.6.3.1. Application

1) This Subsection applies only to *buildings* or parts thereof conforming to Article 3.2.2.48., 3.2.2.51., 3.2.2.57. or 3.2.2.60. of Division B of the NBC(AE).

5.6.3.2. Smoking Restrictions

1) Where smoking is permitted on a construction, alteration, or demolition site, it shall only be permitted in designated smoking areas, which shall

a) be located not less than 3 m away from the *building* or part of the *building* under construction, demolition, or alteration,
b) be identified with appropriate signage,
c) be provided with safe receptacles for the disposal of smoking materials, and
d) have a clearance of not less than 3 m from any combustible storage or combustible refuse maintained at all times.

(See Note A-5.6.3.2.(1).)

5.6.3.3. Site Identification

1) A sign identifying the civic address of the construction or demolition site shall be visible from the access route at the entrance to the site at all times.

2) A sign identifying the floor level, stair location and civic address shall be posted at each floor in a stairway required by Sentence 5.6.3.7.(1).

5.6.3.4. Disposal of Combustible Refuse

1) A clearance of not less than 3 m between *exits* or any portion of the *building* and containers used for the disposal of combustible refuse shall be maintained, or equivalent protection shall be provided as specified in the fire safety plan.

2) Disposal chutes described in Clause 8.2.5.2.(1)(b) of Division B of the NBC(AE) shall

a) be constructed of noncombustible material, or
b) terminate not less than 2 m above the disposal bin they serve.

5.6.3.5. Water Supply

1) An adequate water supply for firefighting shall be provided as soon as *combustible* or *encapsulated mass timber construction* material arrives on the site. (See Note A-5.6.3.5.(1).) (See also Note A-3.2.5.7. of Division B of the NBC(AE).)

5.6.3.6. Hydrant Access

1) Hydrants on a construction, alteration, or demolition site shall

a) be clearly marked with a sign,
b) be accessible, and
c) have an unobstructed clearance of not less than 2 m at all times.

5.6.3.7. Construction Access

1) For *buildings* conforming to Article 3.2.2.51. or 3.2.2.60. of Division B of the NBC(AE), during construction, in addition to the requirements of Sentences 5.6.1.4.(2) and (3), at least one stairway shall be provided that

a) consists of treads and risers complying with the dimensional requirements of Article 3.4.6.8. of Division B of the NBC(AE),
b) is equipped with one handrail conforming to Sentences 3.4.6.5.(5), (6), (7), (11), (13) and (14) of Division B of the NBC(AE),

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c) is not less than 900 mm wide, and
d) is equipped with guards that are
   i) not less than 920 mm high when measured vertically to the top of the guard from a line drawn through the outside edges of the stair nosings, and
   ii) not less than 1 070 mm high around landings.

2) At least one stairway conforming to Sentence (1) shall be
a) extended upward as each floor is installed in new construction, or
b) maintained for each floor still remaining during demolition.

3) For *buildings* or parts thereof conforming to Article 3.2.2.48. or 3.2.2.57. of Division B of the NBC(AE), during construction, in addition to the requirements of Sentences 5.6.1.4.(2) and (3), at least two stairways complying with Sentences (1), (2) and (4) shall be provided. (See Note A-5.6.3.7.(3) to (5).)

4) Stairways referred to in Sentence (3) shall
a) be separated from the remainder of the *storey* by a wall assembly having a *fire-resistance rating* not less than 30 min, and
b) have a doorway on every *storey* that is provided with
   i) 45 mm solid core wood doors,
   ii) hollow metal doors,
   iii) doors constructed of not less than 12.7 mm thick gypsum board mechanically fastened to not less than 12.7 mm thick plywood with the gypsum board facing the floor area, or
   iv) door assemblies having a *fire-protection rating* not less than 20 min.

(See Note A-5.6.3.7.(3) to (5).)

5) Doors for stairways described in Clause (4)(b) shall
a) swing on the vertical axis, and
b) be equipped with
   i) latches, and
   ii) a means to close automatically.

(See Note A-5.6.3.7.(3) to (5).)

5.6.3.8. Site Security

(See also Article 8.2.1.3. of Division B of the NBC(AE).)

1) A strongly constructed fence, boarding or barricade not less than 1.8 m high shall be erected around the perimeter of the construction or demolition site.

2) Barricades shall have
a) a reasonably smooth surface facing the outside, and
b) no openings other than those required for access.

3) Access openings through barricades shall be equipped with gates, which 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.

4) Fencing, boarding and barricades shall be constructed and maintained in a manner that does not restrict access to the construction or demolition site for firefighting purposes or to fire protection equipment.

5.6.4. Additional Requirements for Buildings of Encapsulated Mass Timber Construction

5.6.4.1. Application

1) This Subsection applies to *buildings* or parts thereof conforming to Article 3.2.2.48. or 3.2.2.57. of Division B of the NBC(AE) that are under construction.

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5.6.4.2. Standpipe Installation

1) For each new level at which hose valves are installed, the standpipe system shall be subjected to

a) a pneumatic test at 275 kPa for not less than 24 h, or
b) a hydrostatic test at 1 380 kPa for not less than 2 h.

2) The standpipe system shall be corrected and re-tested if the drop in pressure

a) when tested in accordance with Clause (1)(a), is in excess of 21 kPa, or
b) when tested in accordance with Clause (1)(b), is in excess of 35 kPa.

3) Where a standpipe system is maintained dry,

a) after each test or re-test carried out in accordance with Sentence (1), it shall be provided with supervisory air not greater than 172 kPa and not less than 35 kPa,
b) each fire department connection shall be provided with
   i) an audible warning system that sounds when the supervisory air is less than 35 kPa, or
   ii) an air pressure gauge indicating the supervisory air pressure,
c) a manual air release with one or more valves of a minimum 30 mm in diameter shall be provided immediately adjacent to each fire department connection such that the air pressure from a pneumatic test is released in not more than 3 min,
d) each fire department connection shall be provided with signage
   i) indicating that the dry standpipe system is pressurized with air, and
   ii) showing the location of the manual air release, and
e) provisions shall be made to drain water in any trapped sections of the dry standpipe system that are subject to freezing.

4) Where a standpipe system is maintained wet, each fire department connection shall be provided with a water pressure gauge.

5) The standpipe system, whether a temporary system or a permanent system being installed progressively, shall be in operable condition at all times when it is not actively being worked on, until the permanent standpipe system is completed.

5.6.4.3. Protective Encapsulation

1) Except as provided in Sentences (2) and (3), to address safety during construction, a protective encapsulation material or an assembly of materials providing an *encapsulation rating* of not less than 25 min, as determined in accordance with Sentence 3.1.6.5.(1) of Division B of the NBC(AE), shall be installed

a) such that not more than 20% of the area of the underside of each mass timber floor assembly on each *storey* is exposed during construction,
b) on the interior side of stairways required by Sentence 5.6.3.7.(3) and of *vertical service spaces* where the enclosures are constructed of mass timber elements,
c) on each face of solid lumber or mass timber *partitions* not less than 38 mm thick and on each face of *partitions* containing wood framing as permitted by Article 3.1.6.15. of Division B of the NBC(AE), and
d) such that not more than 35% of the total area of structural mass timber walls within the *storey* is exposed during construction.

(See Note A-5.6.4.3.(1).)

2) Not more than the four uppermost contiguous *storeys* are permitted to be unprotected as required by Sentence (1) during construction.

3) The encapsulation material or assembly of materials used to meet the requirements of Sentence (1) is permitted to consist of a single layer of Type X gypsum board not less than 12.7 mm thick conforming to Clauses 3.1.6.6.(2)(a), (c) and (d) of Division B of the NBC(AE).

Section 5.7. Objectives and Functional Statements

5.7.1. Objectives and Functional Statements

5.7.1.1. 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 Table 5.7.1.1. (See Note A-1.1.2.1.(1).)

Table 5.7.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 5
Forming Part of Sentence 5.7.1.1.(1)

Provision	Functional Statements and Objectives[1]
5.1.1.2. Explosives	
(1)	[F01,F02-OS1.1]
5.1.1.3. Display Fireworks	
(1)	[F01,F02-OS1.1]
5.1.2.1. Hazardous Locations	
(1)	[F01-OS1.1]
5.1.2.2. General	
(1)	[F01-OS1.1]
5.1.3.1. Ventilation	
(1)	[F01-OS1.1]
5.2.1.1. Application	
(2)	[F01-OS1.1] Applies to portion of Code text: "… hot works described in Sentence (1) shall conform to CSA W117.2, "Safety in welding, cutting and allied processes."
5.2.1.2. Training	
(1)	[F81-OS1.1]
5.2.2.1. Maintenance	
(1)	[F82-OS1.1]
5.2.2.2. Inspection	
(1)	[F82-OS1.1]
(2)	[F82-OS1.1]
5.2.2.3. Equipment Not in Use	
(1)	[F43,F01-OS1.1]
(2)	[F01-OS1.1]
5.2.2.4. Compressed Gas Equipment	
(1)	[F81,F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
5.2.3.1. Location of Operations	
(1)	[F01-OS1.1]
(2)	(c) [F01-OS1.1] [F02-OS1.2]
	(c) [F01-OP1.1] [F02-OP1.2]
(3)	(a) [F01-OS1.1]

Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
5.2.3.2. Protection of Combustible and Flammable Materials	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1] [F02-OS1.2]
	[F01-OP1.1] [F02-OP1.2]
(4)	[F01-OS1.1]
5.2.3.3. Fire Watch	
(1)	[F01-OS1.1] [F02-OS1.2]
	[F01-OP1.1] [F02-OP1.2]
5.2.3.4. Work on Containers, Equipment or Piping	
(1)	[F01-OS1.1] Applies to the restriction of hot works.
(2)	[F81,F20-OS3.1]
(3)	[F01-OS1.1] Applies to portion of Code text: "Hot work shall not be performed on metal objects that are in contact with combustible materials unless …"
5.2.3.5. Work Adjacent to Piping	
(1)	(b) [F81-OS1.1]
5.2.3.6. Fire Extinguishing Equipment	
(1)	[F02-OS1.2]
5.3.1.2. Dust Removal	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
5.3.1.3. Dust-Collecting Systems	
(2)	(b) [F02-OS1.2]
	(c) [F01-OS1.1]
	(c) [F01-OP1.1]
	(b) [F02-OP1.2]
	(a) [F01-OS1.1]
	(a) [F01-OP1.1]
5.3.1.4. Dust Collectors	
(1)	[F02-OP1.2]
	[F02-OS1.2]
(2)	[F02,F03-OP1.2] [F01-OP1.1]
	[F02,F03-OS1.2] [F01-OS1.1]

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Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(3)	(b) [F03-OS1.2]
	(b) [F03-OP1.2]
	[F01-OS1.1]
	[F01-OP1.1]
5.3.1.5. Bonding and Grounding	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
5.3.1.6. Explosion Venting	
(1)	[F02-OS1.3]
	[F02-OP1.3]
(2)	[F02-OP1.3]
	[F02-OS1.3]
5.3.1.7. Explosion Prevention Systems	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
5.3.1.8. Electrical Interlocks	
(1)	[F01-OS1.1]
5.3.1.9. Separators	
(1)	[F01-OS1.1]
5.3.1.10. Ignition Sources	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01-OS1.1]
5.3.2.1. Exhaust Systems	
(1)	[F02-OP1.2]
	[F01-OS1.1] [F02-OS1.2]
(2)	[F01-OS1.1]
5.3.2.2. Shavings and Sawdust Collection	
(1)	[F01-OS1.1] Applies to portion of Code text: "Loose shavings and sawdust shall be collected at frequent intervals ..."
5.3.2.3. Fire Extinguishers	
(1)	[F12-OS1.2]
5.3.3.1. Storage Bins and Silos	
(1)	[F01-OS1.1]
5.3.3.2. Conveying Equipment	
(1)	[F81,F11,F01-OS1.1]
(2)	[F01-OS1.1]
(3)	[F01,F82-OS1.1]
5.3.3.3. Separators	
(1)	[F01-OS1.1]

Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
5.4.1.2. Design, Operation and Maintenance	
(1)	[F01,F82-OS1.1] [F02,F03,F82-OS1.2]
	[F01,F82-OP1.1] [F02,F03,F82-OP1.2]
5.4.2.1. Dry Cleaning Plants	
(1)	[F01,F81-OS1.1] [F02,F03,F81-OS1.2]
	[F01,F81-OP1.1] [F02,F03,F81-OP1.2]
5.4.3.2. Notification	
(1)	[F13-OS3.4]
	[F13-OS1.1]
(2)	[F11-OS3.4]
	[F11-OS1.1]
5.4.3.3. Ignition Sources	
(1)	[F01-OS1.1]
5.4.3.4. Electric Power	
(1)	[F01-OS1.1]
5.4.3.5. Air Temperature	
(1)	[F81-OS1.2]
	[F81-OP1.2]
5.4.3.6. Access to Premises	
(1)	[F34-OS3.4]
	[F34-OS1.1]
(2)	[F34-OS3.4]
	[F34-OS1.1]
(3)	[F34-OS3.4]
	[F34-OS1.1]
5.4.4.2. Public Access	
(1)	[F34-OS3.4]
	[F34-OS1.1]
5.4.4.3. Ventilation	
(1)	[F01-OS1.1]
(2)	[F01-OS1.1]
5.4.4.4. Sources of Ignition	
(1)	[F01-OS1.1]
5.4.4.5. Waste Receptacles	
(1)	[F02-OP1.2] Applies to the daily removal of contents.
	[F02-OS1.2] Applies to the daily removal of contents.
	[F01-OS1.1] Applies to the disposal of contents in a manner that will not create a fire hazard.
5.4.5.2. Design, Operation and Maintenance	
(1)	[F01,F82-OS1.1] [F02,F03,F82-OS1.2]
5.4.6.2. Design, Operation and Maintenance	
(1)	[F01,F82-OS1.1] [F02,F03,F82-OS1.2]

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Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
5.5.2.2. Separation	
(1)	[F03-OS1.2]
	[F03-OP1.2]
5.5.3.1. Emergency Planning	
(6)	[F34-OS1.1]
	[F34-OS3.4]
	[F34-OH5]
5.5.3.2. Combustible Materials	
(1)	[F02-OS1.2]
	[F02-OP1.2]
(2)	[F02-OS1.2] Applies to storing outside the laboratory.
	[F02-OP1.2] Applies to storing outside the laboratory.
5.5.3.3. Spill Control	
(1)	[F01-OS1.1] [F02-OS1.2] Applies to portion of Code text: "Absorbent and neutralizing materials shall be provided in the laboratory and in the *dangerous goods* storage areas ..."
	[F01-OP1.1] [F02-OP1.2] Applies to portion of Code text: "Absorbent and neutralizing materials shall be provided in the laboratory and in the *dangerous goods* storage areas ..."
5.5.3.4. Electrical Equipment	
(1)	[F01-OS1.1]
(2)	(b) [F02-OP1.2] [F82-OP1.1]
	(b) [F02-OS1.2] [F82-OS1.1]
5.5.3.5. Ignition Sources	
(1)	[F01-OS1.1] Applies to portion of Code text: "Smoking shall not be permitted in a laboratory ..."
(2)	(a) [F11-OS1.1]
	(a) [F11-OP1.1]
	(b) [F01-OS1.1]
(3)	[F01,F02-OS1.1,OS1.2]
5.5.3.6. Inspection and Maintenance	
(1)	[F82-OS1.1]
	[F82-OS3.4]
	[F82-OH5]
	[F82-OP1.1]
(2)	[F02-OS1.2] [F82-OS1.1]
	[F02-OP1.2]
5.5.4.1. General Ventilation	
(1)	(b) [F81,F82-OS1.1]

Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
5.5.4.2. Power-Ventilated Enclosure	
(2)	[F02-OS1.2] Applies to portion of Code text: "A power-ventilated enclosure required in Sentence (1) shall not be used for the storage of *dangerous goods* ..."
	[F02-OP1.2] Applies to portion of Code text: "A power-ventilated enclosure required in Sentence (1) shall not be used for the storage of *dangerous goods* ..."
5.5.4.3. Enclosure Exhaust Ventilation	
(2)	[F02-OS1.2]
	[F12-OP1.2]
	[F44-OS3.4]
	[F43-OH5]
(3)	(a) [F02-OS1.2] [F82-OS1.1]
	(a) [F02-OP1.2] [F82-OP1.1]
5.5.5.1. Maximum Quantities	
(1)	(a) [F02-OS1.2]
	(a) [F02-OP1.2]
	[F02-OP1.2]
	[F02-OS1.2]
(3)	[F02-OS1.2] Applies to storing outside the laboratory.
	[F02-OP1.2] Applies to storing outside the laboratory.
5.5.5.2. Containers for Flammable and Combustible Liquids	
(2)	[F02,F04-OS1.2] [F43,F01-OS1.1]
	[F02,F04-OP1.2] [F01,F43-OP1.1]
(3)	[F01,F43-OS1.1]
	[F01,F43-OP1.1]
(4)	[F43,F01-OS1.1]
5.5.5.3. Compressed Gases	
(1)	[F02-OS1.2]
	[F02-OP1.2]
(2)	[F81-OS1.1]
	[F81-OS3.4]
(3)	(a) [F81-OS1.1] [F12-OS1.1,OS1.2]
	(b) [F12-OS3.4]
	(b) [F12-OP1.2]
	(a) [F12-OP1.2]
	(a) [F81,F12-OS3.4]
	(b) [F12-OS1.1,OS1.2]
(4)	[F43-OS1.1]
	[F43-OS3.4]
(5)	[F43-OS3.4]
	[F43-OH5]
	(b) [F11,F12,F13-OS3.4]
	(b) [F11,F12,F13-OH5]

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Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(6)	[F01,F02-OS1.1,OS1.2]
	[F01,F02-OP1.1,OP1.2]
(7)	[F44-OS3.4]
	[F44-OH5]
	[F01-OS1.1]
	[F01-OP1.1]
5.5.5.4. Refrigerated Storage	
(2)	[F01,F43-OS1.1]
5.5.5.5. Dangerously Reactive Materials	
(1)	(b) [F81-OS1.1]
(2)	[F01-OS1.1] [F02-OS1.2]
	[F01-OP1.1] [F02-OP1.2]
5.5.5.6. Perchloric Acid	
(1)	(b) [F81-OS1.1]
(2)	[F01-OS1.1] [F02-OS1.2]
	[F01-OP1.1] [F02-OP1.2]
(3)	[F01-OS1.1]
5.5.5.7. Chemical Wastes	
(1)	(a) [F81-OS1.1]
5.6.1.2. Measures to Mitigate Fire Spread to Adjacent Buildings	
(1)	[F02,F03-OP3.1]
5.6.1.4. Access for Firefighting	
(1)	[F12-OS1.2]
	[F12-OP1.2]
(2)	[F12-OS1.2,OS1.5]
	[F12-OP1.2]
(3)	[F12-OS1.2,OS1.5]
	[F12-OP1.2]
(4)	[F12-OS1.2,OS1.5]
	[F12-OP1.2]
(5)	[F12-OS1.2,OS1.5]
	[F12-OP1.2]
5.6.1.5. Portable Extinguishers	
(1)	[F12-OS1.2]
	[F12-OP1.2]
(2)	[F02-OS1.2]
	[F02-OP1.2]
5.6.1.6. Standpipe Systems	
(1)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
(2)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]

Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(3)	[F12,F82-OS1.2]
	[F12,F82-OP1.2]
5.6.1.7. Hot Surface Applications	
(2)	[F01-OS1.1]
	[F01-OP1.1]
(3)	[F01-OS1.2]
	[F01-OP1.2]
5.6.1.8. Ignition Sources	
(1)	[F01-OS1.1]
	[F01-OP1.1]
(2)	[F01-OS1.1,OS1.2]
	[F01-OP1.1]
5.6.1.9. Building Services at Demolition Sites	
(1)	[F01,F43-OS1.1]
	[F01,F43-OP1.1]
	[F32-OS3.3]
(2)	[F81-OS1.1,OS1.2]
	[F81-OP1.1,OP1.2]
(3)	[F32-OS3.4]
	[F01-OS1.1,OS1.2]
5.6.1.10. Fuel Supply Installation	
(1)	[F81,F43-OS1.1]
5.6.1.11. Tank, Piping and Machinery Reservoir Safety at Demolition Sites	
(2)	[F01,F43-OS1.1] [F01-OS1.1]
(3)	[F01,F81-OS1.1]
(4)	[F01,F43-OS1.1]
5.6.1.12. Fire Separations in Partly Occupied Buildings	
(1)	[F03-OS1.2]
	[F03-OP1.2]
5.6.1.13. Protection during Shutdown	
(1)	[F12,F82-OS1.2]
	[F12,F82-OP1.2]
	[F02-OP3.1]
(2)	[F02-OP1.2]
	[F02-OP3.1]
	[F02-OS1.2,OS1.5]
5.6.1.14. Watch	
(1)	[F02-OS1.2,OS1.5]
(2)	[F02-OS1.5,OS1.2]
(3)	[F13-OS1.5,OS1.2]
5.6.1.15. Smoking Restrictions	
(1)	[F01-OS1.1]

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Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
5.6.1.16. Provision for Egress	
(1)	[F10,F82-OS3.7]
(2)	[F10,F82-OS3.7]
5.6.1.17. Fire Warning	
(1)	[F11-OS1.5]
5.6.1.19. Temporary Enclosures	
(1)	[F01-OS1.1,OS1.2]
5.6.1.20. Disposal of Combustible Refuse	
(1)	[F02-OS1.1,OS1.2]
	[F02-OP1.2]
5.6.2.1. Services Shut-off	
(1)	[F01,F43,F81-OS1.1,OS1.2]
	[F01,F43,F81-OP1.1,OP1.2]
	[F32-OS3.3]
(2)	[F81-OS1.1,OS1.2]
	[F81-OP1.1,OP1.2]
5.6.2.2. Maintaining Existing Services	
(1)	[F81-OS1.1,OS1.2]
5.6.3.2. Smoking Restrictions	
(1)	[F01-OS1.1]
	[F01-OP1.1]
	(a),(d) [F01,F03-OS1.1,OS1.2]
	(a),(d) [F01,F03-OP1.1,OP1.2]
5.6.3.3. Site Identification	
(1)	[F12-OS1.2]
	[F12-OP1.2]
(2)	[F12-OP3.1]
5.6.3.4. Disposal of Combustible Refuse	
(1)	[F03,F12-OS1.2] [F05,F10-OS1.5] Applies to portion of Code text: "... between *exits* ... and containers used for the disposal of combustible refuse ..."
	[F03-OS1.2] Applies to portion of Code text: "... between ... any portion of the *building* and containers used for the disposal of combustible refuse ..."
	[F03-OP3.1] Applies to portion of Code text: "... between ... any portion of the *building* and containers used for the disposal of combustible refuse ..."
(2)	[F01,F03-OS1.2]
	[F01,F03-OP1.2]
5.6.3.5. Water Supply	
(1)	[F02-OP3.1]
	[F02-OP1.2]
	[F02-OS1.2]

Table 5.7.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
5.6.3.6. Hydrant Access	
(1)	[F02-OP3.1]
	[F02-OP1.2]
	[F02-OS1.2]
5.6.3.7. Construction Access	
(1)	[F10,F12-OS1.2] [F02-OS1.5]
	[F30-OS3.1]
	[F02,F12-OP1.2]
(2)	[F10,F12-OS1.2] [F02,F12-OS1.5]
	[F02,F12-OP1.2]
(3)	[F10,F12-OS1.2]
(4)	[F12-OS1.2]
	[F10-OS1.5]
	[F02-OP3.1]
(5)	[F12-OS1.2]
	[F10-OS1.5]
	[F02-OP3.1]
5.6.3.8. Site Security	
(1)	[F34-OS1.1,OS1.2]
(2)	[F34-OS1.1,OS1.2]
(3)	[F34-OS1.1,OS1.2]
(4)	[F12-OS1.1,OS1.2]
5.6.4.2. Standpipe Installation	
(1)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
(2)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
(3)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
(4)	[F02,F12-OS1.2]
	[F02,F12-OP1.2]
5.6.4.3. Protective Encapsulation	
(1)	[F02-OS1.2]
	[F02-OP1.2]
	[F02-OP3.1]

Notes to Table 5.7.1.1.:

(1) See Parts 2 and 3 of Division A.

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Notes to Part 5
Hazardous Processes and Operations

A-5.1.2.1.(1) In addition to the general requirements of CSA C22.1, "Canadian Electrical Code, Part I," special attention must be given to Sections 18, 20 and 22: Section 18 specifies wiring requirements for Class I, II and III hazardous locations; Section 20 provides specific requirements for areas where flammable or combustible liquids are stored or dispensed; Section 22 specifies wiring requirements for areas where corrosive liquids or vapours or excessive moisture are present.

A-5.2.3.1.(2)(c)(ii) As a result of roofing operations, sparks and open flames can ignite combustible material in areas that are hidden from plain view, such as concealed spaces in roofs. A comprehensive inspection should include visual inspection of concealed spaces, building equipment, storage arrangements, and combustible refuse within the hot work area and exposed areas adjacent to the hot work area. Equipment such as thermal scanners or infrared thermometers can be used to take temperature readings in areas where visual inspection is impeded by obstructions.

A-5.2.3.3.(1) In areas where the visual inspection of combustible materials is impeded by obstructions, thermal scanners or infrared thermometers can be used to take temperature readings during or after the completion of roofing operations.

NFPA 51B, "Standard for Fire Prevention During Welding, Cutting, and Other Hot Work," may provide information to assist with the requirements of fire watch, the training of persons for fire watch, and information to be included in the fire safety plan while hot works are being performed.

A-5.2.3.4.(1)(b) The following documents are examples of good engineering practice as regards safety measures for the activities described in Clause 5.2.3.4.(1)(b):

- API RP 2009, "Safe Welding, Cutting and Hot Work Practices in the Petroleum and Petrochemical Industries,"
- API 2015, "Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks, Planning and Managing Tank Entry From Decommissioning Through Recommissioning,"
- API RP 2201, "Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries," and
- API RP 2207, "Preparing Tank Bottoms for Hot Work."

A-5.2.3.7.(1) NFPA 51B, "Standard for Fire Prevention During Welding, Cutting, and Other Hot Work," may provide information to assist with the requirements of fire watch, the training of persons for fire watch, and information to be included in the fire safety plan while hot works are being performed.

A-5.3.1.3.(2) NFPA standards on dust explosions include:

- NFPA 61, "Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities,"
- NFPA 91, "Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids,"
- NFPA 120, "Standard for Fire Prevention and Control in Coal Mines,"
- NFPA 484, "Standard for Combustible Metals,"
- NFPA 654, "Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids,"

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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- NFPA 655, "Standard for Prevention of Sulfur Fires and Explosions," and
- NFPA 664, "Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities."

A-5.3.3.2.(2) A conveyor belt having a surface resistivity of less than 300 megaohms is considered to provide protection against electrostatic charge accumulation in a grain handling facility.

A-5.5.1.1.(1) The provisions in Section 5.5. apply only to laboratory operations involving the use of dangerous goods, including flammable or combustible liquids. They do not apply to the incidental use of such substances or to their use for maintenance or cleaning purposes only, in which case, requirements in other Sections of the Code would apply.

A-5.5.3.4.(1) "Electrical equipment" refers to anything—any apparatus, appliance, device, instrument, fitting, fixture, luminaire, machinery, material, etc.—used in or for, or capable of being used in or for, the generation, transformation, transmission, distribution, supply, or utilization of electricity. Electrical equipment manufactured on site must conform to CAN/CSA-C22.2 No. 61010-1, "Safety Requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements (Tri-national standard, with UL 61010-1 and ANSI/ISA-61010-1 (82.02.01)," as stipulated in CSA C22.1, "Canadian Electrical Code, Part I."

A-5.5.5.1.(1) The intent of Sentence 5.5.5.1.(1) is to limit the quantities of dangerous goods that are

(a) stored outside of storage areas and cabinets referred to in Sentences 5.5.5.1.(2) and (3),
(b) kept in the laboratory on a permanent or semi-permanent basis, e.g. dangerous goods that are normally kept out overnight because they are frequently needed, and
(c) connected to equipment and/or devices required to conduct an experiment in the laboratory.

The intent is also to limit the quantities of dangerous goods that are actually "in use" during normal operations and those used for special experiments or processes, which may require that greater quantities be brought into the laboratory for the duration of these operations.

However, the quantities of dangerous goods in a laboratory should be limited to the quantities allowed in a single fire compartment as stated in Part 3, on the basis that they present at least the same level of risk whether they are stored or connected to equipment, i.e. "in use" during normal operations.

A-5.5.5.3.(5)(b) and (7)(b) NFPA 55, "Compressed Gases and Cryogenic Fluids Code," is an example of good engineering practice for the design of a treatment system referred to in Clauses 5.5.5.3.(5)(b) and (7)(b).

A-5.5.5.5. For the purposes of this Code, unstable dangerous goods are determined to be dangerously reactive materials based on their reactive properties. Dangerously reactive materials, such as perchloric acid, include various classes of unstable or reactive dangerous goods, such as flammable solids, pyrophoric materials, oxidizers, corrosives, water-reactive substances and organic peroxides.

A-5.5.5.5.(2) Water can only be used with water-compatible dangerously reactive materials. Refer to the Safety Data Sheet for guidance on all the properties and incompatibilities of the reactive material being used.

A-5.5.5.6. Perchloric acid is the most commonly used unstable substance in laboratories. Although Article 5.5.5.6. deals specifically with perchloric acid, it is intended to also apply to other highly unstable substances having similar properties to perchloric acid, such as hydrazine, peracetic acid, picric acid and sodium hydride. Unstable substances are capable of a rapid release of energy by themselves. They are susceptible to reactions when exposed to air, water, pressure, heat, shock, vibration, light or sound waves. These reactions include vigorous polymerization or self-accelerating decomposition.

These substances must be stored, handled, used and processed in a location and manner that will prevent an undesired reaction. Safety Data Sheets provide guidance based on the properties of the unstable substance.

A-5.5.5.6.(2) Water can only be used if the unstable substance is compatible. (Perchloric acid is an example of a substance that is compatible with water.) Safety Data Sheets indicate whether an unstable substance is compatible with water and provide guidance on the properties and other incompatibilities of the unstable substance.

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A-5.6.1.1. The degree of application of Section 5.6. should be determined in advance in conjunction with the authority having jurisdiction. In construction, alteration or demolition operations that do not pose an exposure hazard to other buildings or to occupants, the degree of application of Section 5.6. may be minimal.

The degree of application of Section 5.6. to each operation should be determined in advance, as part of the fire safety plan for the operation, taking into consideration such issues as the size of the operation, exposure of adjacent buildings or facilities to hazards, and the site conditions. Operations can range from large multi-storey buildings to small single-storey residences and may include additions or alterations to existing buildings.

NFPA 241, "Standard for Safeguarding Construction, Alteration, and Demolition Operations," may provide information to assist in the preparation of a fire safety plan as well as guidance for fire protection during construction, alteration and demolition.

A-5.6.1.2.(1) Methods and materials used to mitigate fire spread to adjacent buildings and facilities that are deemed necessary following a risk assessment can range from active to passive systems such as spatial separation, installing water curtains, using construction methods and materials that include gypsum sheathing, or erecting a temporary fire barrier such as a fire tarpaulin. Materials that may become part of the finished building must conform to the NBC(AE).

A-5.6.1.4.(4) The fire safety plan for the construction or demolition site of buildings conforming to Article 3.2.2.51. or 3.2.2.60. of Division B of the NBC(AE) should take into consideration the design of the access route to the building under construction as well as the elevation of the access route relative to the uppermost floor level to facilitate firefighter access to the roof. (See Sentence 3.2.5.6.(2) of Division B of the NBC(AE).)

A-5.6.1.5.(2)(a) Moveable equipment includes, but is not limited to, cutting and welding equipment.

A-5.6.1.6. Not all aspects of Subsection 3.2.5. of Division B of the NBC(AE) are applicable to unoccupied areas of buildings, parts of buildings, facilities and associated areas undergoing construction, alteration or demolition operations.

When the temperature causes freezing conditions, the standpipe should be drained to prevent damage to the equipment. It is not expected that hoses and nozzles be made available in the building undergoing construction, alteration or demolition operations, as they will be brought to the relevant floor by the responding fire department.

A-5.6.1.8. Minimum clearances shown on certified heating equipment or as described in Part 6 of Division B of the NBC(AE) should be provided between combustible materials and temporary heating equipment, including flues such as exhaust discharges from internal combustion engines.

A-5.6.1.9.(1) A safe area for the location of terminated building services, such as gas and fuel lines, electrical lines, and water and steam piping, is in an area away from the building or part thereof that is safe enough so as not to cause damage to the building or part thereof in the event of their accidental breakage. In some cases, terminated services can be located directly outside the building or part thereof if adequate protection is provided, and in others, they can be located at the property line and/or service connection.

A-5.6.1.11.(4) Guidance on methods of rendering inert tanks, piping and machinery reservoirs is available in NFPA 326, "Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair."

A-5.6.3.2.(1) Note that the intent of Sentence 5.6.3.2.(1) in relation to the alteration of a floor, suite or room in an existing building is not to prevent smoking elsewhere in the building where smoking would normally be permitted.

A-5.6.3.5.(1) The water supply referred to in Sentence 5.6.3.5.(1) may be either natural or developed, and need not be the final water supply for the finished building.

A-5.6.3.7.(3) to (5) It is recognized that, during the construction of a building, one stairway might be out of service at any given time to allow the further construction of the stairway or to accommodate other construction activities. However, this out-of-service period should be kept as short as possible to ensure that workers have two options for evacuation and that emergency responders have two means of access to each floor.

Note that the stairways required by Sentence 5.6.3.7.(3) could be temporary ones, which would, nevertheless, still need to be separated from the remainder of the storey by an assembly that will provide protection from fire

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for a minimum of 30 min. Furthermore, doors must be operable, but should be kept in the closed position at all times, unless they need to be kept open temporarily for operational reasons. Fusible-links or other acceptable means can be used to ensure that doors close automatically.

A-5.6.4.3.(1) The extent to which the structure under construction may need to be protected in accordance with Sentence 5.6.4.3.(1) may vary based on the fire safety plan. The protective encapsulation material or assembly of materials is intended to limit the potential for fire spread within the storey as well as to limit the potential for fire spread to upper storeys, thereby also limiting the potential exposure of adjacent structures to fire.

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Part 6
Fire Protection Equipment

6.1. General
6.1.1. General 6-1

6.2. Portable Extinguishers
6.2.1. General 6-1

6.3. Fire Alarm and Voice Communication Systems
6.3.1. General 6-2

6.4. Water-Based Fire Protection Systems
6.4.1. General 6-2

6.5. Emergency Power Systems, Unit Equipment for Emergency Lighting, and Exit Signs
6.5.1. General 6-3

6.6. Special Fire Suppression Systems
6.6.1. General 6-4

6.7. Smoke Alarms and Carbon Monoxide Alarms
6.7.1. General 6-4

6.8. Integrated Fire Protection and Life Safety Systems
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6.9. Objectives and Functional Statements
6.9.1. Objectives and Functional Statements 6-5

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Part 6
Fire Protection Equipment

Section 6.1. General

6.1.1. General

(See Subsection 2.2.6. of Division C.)

6.1.1.1. Application

1) This Part includes requirements for the inspection, testing, maintenance, and operation of portable extinguishers, water-based fire protection systems, special extinguishing systems, fire alarm systems, emergency electrical power supply systems, emergency lighting, and *exit* signs.

6.1.1.2. Maintenance

1) Fire protection installations shall be maintained in operating condition. (See Note A-6.1.1.2.(1).)

6.1.1.3. Notification

1) Where tests, repairs or alterations are made to fire protection installations, including sprinkler and standpipe systems, a procedure of notification shall be established. (See Note A-6.1.1.3.(1).) (See also Article 2.2.7.2. of Division C.)

6.1.1.4. Protection during Shutdown

1) When any portion of a fire protection system is temporarily shut down, alternative measures shall be taken to ensure that protection is maintained. (See Note A-6.1.1.4.(1).)

Section 6.2. Portable Extinguishers

6.2.1. General

(See Articles 2.2.1.2. and 2.2.4.2. of Division C.)

6.2.1.1. Inspection, Testing and Maintenance

1) Portable extinguishers shall be inspected, tested and maintained in conformance with NFPA 10, "Standard for Portable Fire Extinguishers."

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Section 6.3. Fire Alarm and Voice Communication Systems

6.3.1. General

(See Articles 2.2.4.3., 2.2.7.2. and 2.2.9.2. of Division C.)

6.3.1.1. Maintenance

1) Fire alarm and voice communication systems shall be maintained in operable condition at all times.

6.3.1.2. Inspection and Testing

1) Fire alarm systems shall be inspected and tested in conformance with CAN/ULC-S536, "Standard for Inspection and Testing of Fire Alarm Systems."

2) Fire alarm and detection system components shall be accessible for purposes of inspection or maintenance.

6.3.1.3. Central Stations and Their Fire Protection Signalling Systems

1) Central stations, including their fire protection signalling systems, shall be maintained in conformance with CAN/ULC-S561, "Standard for Installation and Services for Fire Signal Receiving Centres and Systems." (See Note A-6.3.1.3.(1).)

6.3.1.4. Voice Communication Systems

1) Voice communication systems that are integrated with a required fire alarm system shall be tested in conformance with Article 6.3.1.2.

2) Voice communication or public address systems that are part of the *building* evacuation plan and are not electrically supervised shall be tested at intervals not greater than one month in conformance with Sentences (3) and (4). (See Note A-6.3.1.4.(2).)

3) Loudspeakers operated from the central alarm and control facility shall be tested to ensure they can be heard in all parts of the *building*.

4) The 2-way communication system from each *floor area* to the central alarm and control facility shall be tested to ensure proper operation.

Section 6.4. Water-Based Fire Protection Systems

6.4.1. General

(See Articles 2.2.4.4. and 2.2.4.6. of Division C.)

6.4.1.1. Inspection, Testing and Maintenance

1) Water-based fire protection systems shall be inspected, tested and maintained in conformance with NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems." (See Note A-6.4.1.1.(1).)

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Section 6.5. Emergency Power Systems, Unit Equipment for Emergency Lighting, and Exit Signs

6.5.1. General

6.5.1.1. Inspection, Testing and Maintenance

1) Except as provided in Articles 6.5.1.2. to 6.5.1.5., emergency power systems shall be inspected, tested and maintained in conformance with CSA C282, "Emergency electrical power supply for buildings."

2) An emergency electrical power supply system for emergency equipment for healthcare facilities shall be inspected, tested and maintained in conformance with CSA Z32, "Electrical safety and essential electrical systems in health care facilities." (See Note A-6.5.1.1.(2).)

6.5.1.2. Notification

1) When an emergency power system or any part thereof is shut down, the *supervisory staff* shall be notified in conformance with Section 2.8. (See Article 2.2.7.2. of Division C.)

6.5.1.3. Instructions

1) Where an emergency power system is installed, instructions shall be provided for switching on essential loads and for starting the generator when this is not done automatically.

6.5.1.4. Records

1) Written records shall be maintained as required in CSA C282, "Emergency electrical power supply for buildings." (See Article 2.2.1.2. of Division C.)

6.5.1.5. Supply of Fresh Fuel

1) Liquid fuel *storage tanks* shall be drained and refilled with fresh fuel at intervals not greater than 12 months. (See Note A-6.5.1.5.(1).)

6.5.1.6. Inspection of Unit Equipment

1) Self-contained emergency lighting unit equipment shall be inspected at intervals not greater than one month to ensure that

a) pilot lights are functioning and not obviously damaged or obstructed,
b) the terminal connections are clean, free of corrosion and lubricated when necessary,
c) the terminal clamps are clean and tight as per manufacturer's specifications, and
d) the battery surface is kept clean and dry.

2) Self-contained emergency lighting unit equipment shall be tested

a) at intervals not greater than one month to ensure that the emergency lights will function upon failure of the primary power supply, and
b) at intervals not greater than 12 months to ensure that the unit will provide emergency lighting for a duration equal to the design criterion under simulated power failure conditions.

3) After completion of the test required in Clause (2)(b), the charging conditions for voltage and current and the recovery period shall be tested to ensure that the charging system is functioning in accordance with the manufacturer's specifications.

6.5.1.7. Inspection of Emergency Lights

1) Except as provided in Article 6.5.1.6., emergency lights shall be inspected at intervals not greater than 12 months to ensure that they are functional.

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6.5.1.8. Inspection of Exit Signs

(See Note A-6.5.1.8.)

1) Except as provided in Sentence (2), *exit* signs shall be inspected at intervals not greater than 12 months to ensure that the *exit* signs will be visible upon failure of the primary power supply.

2) *Exit* signs provided with a battery back-up shall be inspected at intervals

a) not greater than one month to ensure the *exit* signs will be visible upon failure of the primary power supply, and

b) not greater than 12 months to ensure the *exit* signs will be visible for a duration equal to the design criterion upon failure of the primary power supply.

Section 6.6. Special Fire Suppression Systems

6.6.1. General

(See Articles 2.2.1.2. and 2.2.4.1. of Division C.)

6.6.1.1. Testing, Inspection and Maintenance

1) A special fire suppression system that meets the description given in any one of the standards referenced in Article 2.1.3.5. shall be tested, inspected and maintained in conformance with the appropriate requirements of that standard.

Section 6.7. Smoke Alarms and Carbon Monoxide Alarms

6.7.1. General

(See Sentence 2.2.1.1.(2) and Sentences 2.2.1.2.(1), (4) and (8) of Division C.)

6.7.1.1. Inspection, Testing and Maintenance

1) *Smoke alarms* shall be inspected, tested and maintained in conformance with CAN/ULC-S552, "Standard for the Inspection, Testing and Maintenance of Smoke Alarms."

2) Carbon monoxide alarms shall be inspected, tested and maintained in conformance with the manufacturer's instructions.

3) Residential fire warning systems shall be inspected, tested and maintained in conformance with CAN/ULC-S540, "Standard for Residential Fire and Life Safety Warning Systems: Installation, Inspection, Testing and Maintenance."

4) A record shall be kept of all testing of *smoke alarms*, carbon monoxide alarms and residential fire warning systems installed in hotels and motels and shall be retained in conformance with Article 2.2.1.2. of Division C.

Section 6.8. Integrated Fire Protection and Life Safety Systems

6.8.1. General

(See Articles 2.2.1.2. and 2.2.4.8. of Division C.)

6.8.1.1. Testing and Maintenance

1) Interconnections between fire protection and life safety systems shall be tested and maintained in conformance with CAN/ULC-S1001, "Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems." (See Note A-6.8.1.1.(1).)

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Section 6.9. Objectives and Functional Statements

6.9.1. Objectives and Functional Statements

6.9.1.1. 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 Table 6.9.1.1. (See Note A-1.1.2.1.(1).)

Table 6.9.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 6
Forming Part of Sentence 6.9.1.1.(1)

Provision	Functional Statements and Objectives[1]
6.1.1.2. Maintenance	
(1)	[F82-OP1.2]
	[F82-OP3.1]
	[F82-OS1.2,OS1.5]
6.1.1.3. Notification	
(1)	[F11,F13-OP1.2]
	[F11,F13-OP3.1]
	[F11,F13-OS1.2,OS1.5]
6.1.1.4. Protection during Shutdown	
(1)	[F02-OP1.2]
	[F02-OP3.1]
	[F02-OS1.2,OS1.5]
6.2.1.1. Inspection, Testing and Maintenance	
(1)	[F82-OS3.1,OS3.2,OS3.3,OS3.4]
	[F82-OP1.2]
	[F82-OS1.2]
6.3.1.1. Maintenance	
(1)	[F02,F12-OS1.5,OS1.2]
6.3.1.2. Inspection and Testing	
(1)	[F82-OS1.5,OS1.2]
(2)	[F82-OS1.5,OS1.2]
6.3.1.3. Central Stations and Their Fire Protection Signalling Systems	
(1)	[F82-OS1.2,OS1.5]
6.3.1.4. Voice Communication Systems	
(2)	[F82-OS1.2,OS1.5]
(3)	[F82-OS1.2,OS1.5]
(4)	[F82-OS1.2,OS1.5]
6.4.1.1. Inspection, Testing and Maintenance	
(1)	[F82-OS1.2]
	[F82-OP1.2]
	[F82-OS3.1,OS3.2,OS3.3,OS3.4]

Table 6.9.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
6.5.1.1. Inspection, Testing and Maintenance	
(1)	[F82-OP1.2]
	[F82-OP3.1]
	[F82-OS3.1,OS3.7]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
	[F82-OP1.2]
6.5.1.3. Instructions	
(1)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]
	[F12-OP3.1]
	[F12-OS3.1,OS3.7]
6.5.1.5. Supply of Fresh Fuel	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
	[F82-OP3.1]
	[F82-OS3.1,OS3.7]
6.5.1.6. Inspection of Unit Equipment	
(1)	[F82-OS3.1,OS3.7]
(2)	[F82-OS3.1,OS3.7]
(3)	[F82-OS3.1,OS3.7]
6.5.1.7. Inspection of Emergency Lights	
(1)	[F82-OS3.1,OS3.7]
6.5.1.8. Inspection of Exit Signs	
(1)	[F82-OS3.1,OS3.7]
(2)	[F82-OS3.1,OS3.7]
6.6.1.1. Testing, Inspection and Maintenance	
(1)	[F82-OS1.2]
	[F82-OP1.2]
6.7.1.1. Inspection, Testing and Maintenance	
(1)	[F82-OS1.5,OS1.4]
(2)	[F82-OS1.5,OS1.4]
(3)	[F82-OS1.5,OS1.4]

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Table 6.9.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
6.8.1.1. Testing and Maintenance	
(1)	[F02,F81,F82-OS1.2,OS1.5]
	[F02,F81,F82-OP1.2]

Notes to Table 6.9.1.1.:

[1] See Parts 2 and 3 of Division A.

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Notes to Part 6
Fire Protection Equipment

A-6.1.1.2.(1) Both the NBC(AE) and the NFC(AE) assume that all fire protection systems in a building, whether required by Code or voluntarily installed, will be designed in conformance with good fire protection engineering practice and will meet the appropriate installation requirements in relevant standards. Such good design is necessary to ensure that the level of safety established by the Code requirements is not reduced by a voluntary installation. Thus, a voluntarily installed system should be maintained in operating condition, at least to the extent that it was originally intended to function, in conformance with the applicable installation standards.

A-6.1.1.3.(1) Notification of planned or emergency interruption or curtailment of service of fire protection installations is preferably given in advance when possible. The parties to be notified who could be affected may include, but are not necessarily limited to, the fire department, supervisory staff in the building and the occupants of the building.

A-6.1.1.4.(1) Interruption of normal operation of a fire protection system for any purpose constitutes a "temporary shutdown." Types of interruptions include, but are not limited to, periodic inspection or testing, maintenance, and repairs. During a shutdown, alternative measures are necessary to ensure that the level of safety intended by the Code is maintained.

In the shutdown of a fire alarm system, alternative measures should be worked out in cooperation with the fire department to ensure that all persons in the building can be promptly informed, and the fire department notified, should a fire occur while the alarm system is out of service.

When a sprinkler system is shut down, measures that can be taken include the provision of: emergency hose lines and portable extinguishers, extra fire watch service and, where practicable, temporary water connections to the sprinkler system.

A-6.3.1.3.(1) CAN/ULC-S561, "Standard for Installation and Services for Fire Signal Receiving Centres and Systems," provides for regular testing and review of the central station facilities and of the connections to the premises containing the fire alarm system. The Code does not mandate a particular series of events from initiation of the fire alarm signal circuits in the building to notification of the fire department. In some cases, the signals to the central station are automatically forwarded to the fire department, whereas in others, the central station initiates the notification of the fire department.

A-6.3.1.4.(2) Sentence 6.3.1.4.(2) is intended to ensure that a voice communication system that is not tested as part of an associated fire alarm system, but that will be relied upon during a fire emergency, will be tested periodically.

A-6.4.1.1.(1) Water-based fire protection systems include sprinkler systems, standpipes, private hydrants, hose systems, water spray fixed systems, foam-water sprinkler systems, foam-water spray systems, and fire pumps.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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A-6.5.1.1.(2) CSA Z32, "Electrical safety and essential electrical systems in health care facilities," contains requirements over and above those relating specifically to the inspection, testing and maintenance of emergency equipment: compliance with these other requirements is not intended by the reference in Sentence 6.5.1.1.(2). The standard defines three classes of healthcare facilities—Class A, Class B, and Class C—but applies only to Class A and Class C facilities. Class B facilities, which accommodate people who, as a result of physical or mental disabilities, are unable to function independently and need daily care by healthcare professionals, are covered by CSA C282, "Emergency electrical power supply for buildings."

A-6.5.1.5.(1) If the operation of blower engines in Article 2.9.3.6. and the test program required by Article 6.5.1.1. does not result in the use of appropriate amounts of liquid fuel, it is deemed acceptable to test liquid fuel, and if required,

(a) drain and replenish in accordance with Article 6.5.1.5., or
(b) drain, filter and condition existing fuel in accordance with Table 5 of CSA C282, "Emergency electrical power supply for buildings."

If option (b) is used, the fuel is to be retested in accordance with Clause 11.5.5 of CSA C282.

A-6.5.1.8. Exit signs are to be visible by being unobstructed, illuminated and readily identifiable as indicating the location of the means of egress.

A-6.8.1.1.(1) Building owners must ensure that fire protection and life safety systems and their components (i.e. fire alarm systems, sprinklers, standpipes, smoke control, ventilation, pressurization, door hold-open devices, elevator recalls, smoke and fire shutters and dampers, emergency power, emergency lighting, fire pumps, generators, etc.), including their interconnections with other building systems, are functioning according to the intent of their design. CAN/ULC-S1001, "Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems," provides the methodology for verifying and documenting that interconnections between building systems satisfy the intent of their design and that the systems function as intended by the Code.

Clause 6.1.5 of CAN/ULC-S1001 allows the Integrated Testing Coordinator to accept documented evidence of any tests that have been performed on a system as part of its acceptance testing for the purpose of demonstrating compliance with the integrated testing requirements of that standard, so as to avoid duplication of work.

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Part 7
Fire Emergency Systems in High Buildings

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Part 7
Fire Emergency Systems in High Buildings

Section 7.1. General

7.1.1. General

7.1.1.1. Application

1) This Part provides for the inspection, testing and maintenance of the fire emergency systems installed in high *buildings* as defined in Subsection 3.2.6. of Division B of the NBC(AE).

7.1.1.2. Testing Fire Emergency Systems

1) Except as provided in Sentence (2), fire emergency systems required to be installed in *buildings* in conformance with Subsection 3.2.6. of Division B of the NBC(AE) shall be tested in conformance with Sections 7.2. and 7.3.

2) Any fire emergency system required by Subsection 3.2.6. of Division B of the NBC(AE) that does not conform to a specific measure outlined in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3)" shall be tested to ensure that it operates as intended.

3) Deficiencies noted during the testing described in Sentences (1) and (2) shall be corrected.

7.1.1.3. Records

1) A written record shall be kept of all tests and corrective measures required by Article 7.1.1.2., and such record shall be retained for examination by the *authority having jurisdiction*, in conformance with Article 2.2.1.2. of Division C.

7.1.1.4. Maintenance of Fire Emergency Systems

1) In addition to the requirements of Part 6, components of fire emergency systems shall be maintained in conformance with Sentences (2) to (5).

2) The keys required to recall elevators and to permit independent operation of each elevator shall be kept in the locations required by Subsection 3.2.6. of Division B of the NBC(AE). (See Article 2.2.10.1. of Division C.)

3) Access to windows and panels required to vent *floor areas* and vents to vestibules permitted to be manually openable shall be kept free of obstruction.

4) Windows and panels provided for venting *floor areas* shall be maintained so as to be openable without the use of keys.

5) Vents to vestibules permitted to be manually openable shall be maintained in an operable condition.

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Section 7.2. Inspection, Testing and Maintenance

7.2.1. Intervals between Tests

7.2.1.1. Intervals between Tests

1) Except as specifically prescribed in this Part, all tests specified in this Section and Section 7.3. shall be carried out at intervals not greater than 3 months, except that longer intervals between tests are permitted in conformance with Clause 1.2.1.1.(1)(b) of Division A. (See Note A-7.2.1.1.(1).)

7.2.2. Elevators

7.2.2.1. Testing Elevators

1) Emergency service features of elevators shall be tested to ensure that they operate in conformance with appropriate provincial, territorial or municipal requirements or, in the absence of such requirements, as provided in Sentence (2).

2) Tests to ensure operation in conformance with ASME A17.1/CSA B44, "Safety Code for Elevators and Escalators," shall be performed on

a) in-car emergency service switches,
b) manual key-operated recall switches located outside an elevator shaft, and
c) automatic emergency recall systems.

3) At intervals not greater than 12 months, the *building* emergency power systems shall be operated and all elevators supplied with emergency power shall be tested as provided in Sentence (1) with no other source of electrical power.

7.2.3. Venting to Aid Firefighting

7.2.3.1. Closures

1) The *closures* in vent openings into smoke shafts from each *floor area* shall be tested in conformance with Article 7.2.1.1. to ensure that they will open as required in Chapter 3, Sentence (5) of Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3)."

2) A *closure* in an opening to the outdoors at the top of a smoke shaft shall be tested to ensure that it will open

a) manually from outside the *building*,
b) on a signal from the smoke detector in the smoke shaft, and
c) when a *closure* in an opening between a *floor area* and the smoke shaft opens.

7.2.3.2. Elevator Recall

1) In addition to the procedures described in Article 7.2.3.1., all elevators in an elevator shaft that is designed for use as a smoke shaft shall be tested to ensure that on activation of the fire alarm system they will return to the *street* floor level and remain inoperative.

7.2.3.3. Air-Handling System Controls

1) Controls for air-handling systems used for venting in the event of a fire shall be tested to ensure that air is exhausted from each *floor area* to the outdoors as required in Chapter 3, Sentence (8) of Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3)."

7.2.4. Central Alarm and Control Facility

7.2.4.1. Fan Controls

1) Air moving fans in a system serving more than 2 *storeys* shall be tested to ensure that they will stop on activation of a switch at the central alarm and control facility.

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7.2.4.2. Hold-Open Devices

1) Doors to vestibules that are normally held open by a hold-open device connected to the *building* fire alarm system shall be tested to ensure that they will close on a signal from the central alarm and control facility.

Section 7.3. Inspections and Test Procedures for Smoke Control Measures

7.3.1. General

7.3.1.1. Application

1) The test procedures described in Subsections 7.3.2. to 7.3.15., as appropriate to the fire safety measure being used, shall be carried out in addition to those required by Sections 7.1. and 7.2., unless otherwise specified in the fire safety plan. (See Note A-7.3.1.1.(1).)

7.3.1.2. Doors in Means of Egress

1) Where vestibules or stairshafts are pressurized as a means of smoke control, all doors in the path of *exit* travel shall be tested to ensure that they can be operated as required in Article 2.7.2.1. when the entire smoke control system is being tested.

7.3.2. Measure A

7.3.2.1. Test Procedures

1) Where Measure A is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested to ensure that
   i) *closures* to vent openings in *vertical service spaces* that are required by Sentence (6)* of Measure A open automatically and remain open, and
   ii) the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure A,
b) *closures* in openings to the outdoors in *vertical service spaces* that are required by Sentence (6)* of Measure A shall be tested to ensure that they will operate as required,
c) *closures* in vent openings to the outdoors in above *grade* stairshafts shall be tested to ensure that they can be opened manually and will remain open as provided in Sentence (2)* of Measure A, and
d) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they will open automatically, if such means is provided, and remain open when air is being injected into the stairshaft.

* Sentence numbers refer to Sentences contained in Commentary C of the User's Guide – NBC 1995 (Part 3).

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7.3.3. Measure B

7.3.3.1. Test Procedures

1) Where Measure B is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that
   i) dampers in air-handling systems that serve more than 2 *storeys* close automatically and remain closed as provided in Sentence (7)* of Measure B, and
   ii) *closures* to vent openings in *vertical service spaces* that are required by Sentences (5)* and (6)* of Measure B open automatically and remain open,

b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure B,

c) *closures* in openings to the outdoors in *vertical service spaces* that are required by Sentence (5)* of Measure B shall be tested at intervals conforming to Article 7.2.1.1. to ensure that they will operate as required, and

d) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when air is being injected into the stairshaft as required by Sentence (3)* of Measure B.

7.3.4. Measure C

7.3.4.1. Test Procedures

1) Where Measure C is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure C, and

b) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when air is being injected into the stairshafts.

7.3.5. Measure D

7.3.5.1. Test Procedures

1) Where Measure D is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that
   i) *closures* in vent openings to the outdoors in vestibules, *vertical service spaces* and elevator shafts open automatically and remain open as provided in Sentences (6)*, (10)*, (12)* and (13)* of Measure D, and
   ii) dampers in air-handling systems that serve more than 2 *storeys* close automatically and remain closed as provided in Sentence (16)* of Measure D,

b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to vestibules and below *grade* stairshafts is initiated as provided in Sentence (5)* of Measure D,

c) *closures* in vent openings to the outdoors in *vertical service spaces* or at the top of elevator shafts as required by Sentences (10)*, (12)* and (13)* of Measure

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D shall be tested at intervals conforming to Article 7.2.1.1. to ensure that they will operate as required,

d) *closures* in vent openings to the outdoors in above *grade* stairshafts and at the *street* entrance floor of firefighters' elevator shafts shall be tested to ensure that they can be opened manually and remain open as provided in Sentences (7)* and (11)* of Measure D, and

e) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically, if such means is provided, when air is being injected into the stairshafts as required by Sentence (8)* of Measure D.

2) Pressurized vestibules shall be tested in different seasons by a pressure sensor or by tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that movement of air is from the vestibules to the *floor areas* on all *storeys*.

7.3.6. Measure E

7.3.6.1. Test Procedures

1) Where Measure E is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that *closures* in vent openings to the outdoors in vestibules and firefighters' elevator shafts that are required by Sentences (4)* and (9)* of Measure E will open automatically and remain open,

b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to vestibules and below *grade* stairshafts is initiated as provided in Sentences (4)* and (7)* of Measure E,

c) *closures* in vent openings to the outdoors at the top of firefighters' elevator shafts that are required by Sentence (9)* of Measure E shall be tested to ensure that they will operate as required,

d) *closures* in vent openings to the outdoors in above *grade* stairshafts and at the *street* entrance floor of firefighters' elevator shafts that are required by Sentences (6)* and (10)* of Measure E shall be tested to ensure that they can be opened manually and will remain open, and

e) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they will open automatically, if such means is provided, and remain open when air is being injected into the stairshafts as required by Sentence (7)* of Measure E.

2) Pressurized vestibules shall be tested in different seasons by pressure sensor or by tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that movement of air is from the vestibules to the *floor areas* on all *storeys*.

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7.3.7. Measure F

7.3.7.1. Test Procedures

1) Where Measure F is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that
   i) *closures* to vent openings to the outdoors in *vertical service spaces*, elevator shafts and below *grade floor areas* that are required by Sentences (6)* and (10)* of Measure F open automatically and remain open, and
   ii) dampers in air-handling systems that serve more than 2 *storeys* close automatically and remain closed as provided in Sentence (12)* of Measure F,

b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to stairshafts and elevator shafts is initiated as provided in Sentences (2),* (3)* and (4)* of Measure F,

c) *closures* in vent openings to the outdoors in *vertical service spaces* or elevator shafts that are required by Sentence (12)* of Measure F shall be tested at intervals conforming to Article 7.2.1.1. to ensure that they will operate as required, and

d) *closures* in vent openings to the outdoors in stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when the mechanical air supply to the stairshafts is initiated as provided in Sentences (2)* and (3)* of Measure F.

2) Pressurized stair and elevator shafts shall be tested in different seasons by a pressure sensor or tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that the movement of air is from the stair or elevator shafts to the *floor areas* on all *storeys*.

7.3.8. Measure G

7.3.8.1. Test Procedures

1) Where Measure G is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested to ensure that
   i) *closures* in vent openings to the outdoors in below *grade floor areas* that are required by Sentence (6)* of Measure G open automatically and remain open, and
   ii) the mechanical air supply to stairshafts and elevator shafts is initiated as provided in Sentences (2),* (3)* and (4)* of Measure G, and

b) *closures* in openings to the outdoors in stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when the air supply to the stairshafts is initiated as provided in Sentences (2)* and (3)* of Measure G.

2) Pressurized stair and elevator shafts shall be tested in different seasons by a pressure sensor or tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that the movement of air is from the stair or elevator shafts to the *floor areas* on all *storeys*.

7.3.9. Measure H

7.3.9.1. Test Procedures

1) Where Measure H is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and

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Accessibility (Part 3)," switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that

a) *closures* in vent openings to the outdoors or into smoke shafts on each floor will open automatically and remain open as provided in Sentence (6)* of Measure H,
b) dampers in return air and exhaust ducts will close automatically and remain closed as provided in Sentence (5)* of Measure H,
c) return air and exhaust fans are stopped and supply fans will provide air to all *floor areas* and stairshafts as provided in Sentence (3)* of Measure H, and
d) *closures* in all openings in external walls and roofs will close automatically and remain closed as provided in Sentence (4)* of Measure H.

2) Pressurized vestibules at or near *grade* level shall be tested by a pressure sensor or tracer smoke in different seasons at intervals not greater than 2 years and after any alteration to the *building*, when the *building* is pressurized but without venting of the fire floor, to ensure that the direction of air movement is from the *building* to the outdoors.

7.3.10. Measure I

7.3.10.1. Test Procedures

1) Where Measure I is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3)," switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that

a) dampers in air-handling systems that serve more than 2 *storeys* will close automatically and remain closed as provided in Sentence (8)* of Measure I,
b) *closures* in openings in the walls and roof of the central core and in shafts within the core will close automatically and remain closed as provided in Sentence (3)* of Measure I,
c) return air fans are stopped and supply fans will provide air to the central core as provided in Sentence (2)* of Measure I,
d) *closures* in vent openings to the outdoors and into smoke shafts from each *floor area* will open automatically and remain open as provided in Sentence (4)* of Measure I,
e) air movement is initiated in an exhaust system used for venting as provided in Sentence (4)* of Measure I, and
f) *closures* in vent openings to the outdoors in *vertical service spaces* outside the central core that are required by Sentence (6)* of Measure I will open automatically and remain open.

2) The pressurized core shall be tested at or near *grade* in different seasons by a pressure sensor or tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that movement of air is from the pressurized core to the outdoors on all *storeys*.

7.3.11. Measure J

7.3.11.1. Test Procedures

1) Where Measure J is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3)," switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that

a) *closures* in openings in the walls and roofs of the central core and in shafts within the core will close automatically and remain closed as provided in Sentence (3)* of Measure J, and
b) return-air fans are stopped and supply fans will provide air to the central core as provided in Sentence (2)* of Measure J.

2) The pressurized core shall be tested at or near *grade* in different seasons by a pressure sensor or tracer smoke at intervals not greater than 2 years and after any

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alteration to the *building*, to ensure that the movement of air is from the pressurized core to the outdoors on all *storeys*.

7.3.12. Measure K

7.3.12.1. Test Procedures

1) Where Measure K is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that
   i) the mechanical air supply to vestibules is initiated as provided in Sentences (11)* and (15)* of Measure K, and
   ii) doors to vestibules, if these are normally held open, will close automatically and remain closed as provided in Sentence (1)* of Measure K, and
b) *closures* in vent openings to the outdoors in above *grade* stairshafts and in vented vestibules shall be tested to ensure that they can be opened manually and will remain open as provided in Sentences (11)* and (13)* of Measure K.

2) Pressurized vestibules shall be tested in different seasons by a pressure sensor or tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that the movement of air is from the vestibules to the *floor areas* on all *storeys*.

7.3.13. Measure L

7.3.13.1. Test Procedures

1) Where Measure L is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested at intervals conforming to Article 7.2.1.1. to ensure that
   i) doors to vestibules and areas of refuge, if these are normally held open, will close automatically and remain closed as provided in Sentence (8)* of Measure L, and
   ii) *closures* in vent openings to the outdoors in elevator shafts that are required by Sentence (16)* of Measure L will open automatically and remain open,
b) switches at the central alarm and control facility shall be tested to ensure that the air supply to the areas of refuge, vestibules and below *grade* stairshafts is initiated as provided in Sentences (9),* (10),* (11)* and (14)* of Measure L,
c) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically and remain open when the air is being injected into the stairshaft, and
d) vent openings to the outdoors in above *grade* stairshafts and at the *street* entrance floor of firefighters' elevator shafts shall be tested to ensure that they can be opened manually and will remain open as provided in Sentence (13)* of Measure L.

2) Vestibules and areas of refuge shall be tested in different seasons by a pressure sensor or tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that the movement of air is from the areas of refuge or vestibules to the *floor areas* on all *storeys*.

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7.3.14. Measure M

7.3.14.1. Test Procedures

1) Where Measure M is used to limit smoke movement as provided in Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure M, and

b) vent openings to the outdoors in above *grade* stairshafts shall be tested to ensure that they can be opened manually and will remain open as provided in Sentence (2)* of Measure M.

7.3.15. Measure N

7.3.15.1. Test Procedures

1) Where Measure N is used to limit smoke movement from one *building* to another of connected *buildings* as provided in Measure N of Commentary C of the "User's Guide – NBC 1995 Fire Protection, Occupant Safety and Accessibility (Part 3),"

a) switches to initiate the air supply to the vestibules shall be tested to ensure that the air supply is initiated as provided in Sentence (3)* of Measure N, and

b) *closures* in vent openings to the outdoors in vestibules shall be tested to ensure that they will open as provided in Sentence (3)* of Measure N.

2) Pressurized vestibules shall be tested in different seasons by a pressure sensor or tracer smoke at intervals not greater than 2 years and after any alteration to the *building*, to ensure that the movement of air is from the vestibules to adjacent *floor areas* on all *storeys*.

Section 7.4. Objectives and Functional Statements

7.4.1. Objectives and Functional Statements

7.4.1.1. 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 Table 7.4.1.1. (See Note A-1.1.2.1.(1).)

Table 7.4.1.1.
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 7
Forming Part of Sentence 7.4.1.1.(1)

Provision	Functional Statements and Objectives(1)
7.1.1.2. Testing Fire Emergency Systems	
(2)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(3)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.1.1.4. Maintenance of Fire Emergency Systems	
(2)	[F12-OP1.2]
	[F12-OS1.2,OS1.5]

Table 7.4.1.1. (Continued)

Provision	Functional Statements and Objectives(1)
(3)	[F12-OP1.2]
	[F12-OS1.2]
(4)	[F12-OP1.2]
	[F12-OS1.2]
(5)	[F82-OP1.2]
	[F82-OP3.1]
	[F82-OS1.2,OS1.5]
7.2.1.1. Intervals between Tests	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]

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Table 7.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
7.2.2.1. Testing Elevators	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(3)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.2.3.1. Closures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.2.3.2. Elevator Recall	
(1)	[F82-OS1.2]
7.2.3.3. Air-Handling System Controls	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.2.4.1. Fan Controls	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.2.4.2. Hold-Open Devices	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.3.2.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.3.3.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.3.4.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.3.5.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.6.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.7.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]

Table 7.4.1.1. (Continued)

Provision	Functional Statements and Objectives[1]
(2)	[F82-OS1.2,OS1.5]
7.3.8.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.9.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.10.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.11.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.12.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.13.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
(2)	[F82-OS1.2,OS1.5]
7.3.14.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OS1.2,OS1.5]
7.3.15.1. Test Procedures	
(1)	[F82-OP1.2]
	[F82-OP3.1]
	[F82-OS1.5]
(2)	[F82-OP1.2]
	[F82-OP3.1]
	[F82-OS1.5]

Notes to Table 7.4.1.1.:

[1] See Parts 2 and 3 of Division A.

Notes to Part 7 Fire Emergency Systems in High Buildings

A-7.2.1.1.(1) It is not intended that all equipment be tested on each test occasion. A representative number of devices may be tested on each occasion provided all equipment is tested within the time period agreed to in the fire safety plan.

A-7.3.1.1.(1) The testing required in Section 7.3. is not intended to be a complete assessment of the design of the smoke control system, but only a test of the individual pieces of equipment specified.

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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Division C

Administrative Provisions

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Part 1 General

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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* and facilities 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 and its Regulations, or the meanings 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 2 to 7 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 in this Code, the Safety Codes Act, the NBC(AE) or the NPC, reference should be made to the Oxford University Press 2004, "Canadian Oxford Dictionary, 2nd Edition."

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.

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Administrative Provisions

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Part 2
Administrative Provisions

Section 2.1. Application

2.1.1. Application

2.1.1.1. Application

1) Except as permitted by Sentence (3), this Part applies to all *buildings* and facilities covered in this Code. (See Article 1.1.1.1. of Division A.)

2) The submission of information for any registry or information system established for the purposes of Subsection 2.2.4. shall be mandatory.

3) Where a provision of this Code requires compliance with one or more requirements of the NBC(AE), the provision is deemed to be satisfied if

a) the *building* or fire protection measure was constructed or installed after April 1, 1974, and conforms with regulations in force under the Uniform Building Standards Act or the Safety Codes Act at the time of construction or installation, or
b) the *building* or fire protection measure does not conform to Clause (a) but
   i) meets the requirements of an *approved* guideline issued for a specific *occupancy*, or
   ii) where no *approved* guideline has been issued, the *building* or fire protection measure is constructed or installed in a manner that provides a level of life safety which is acceptable to the *authority having jurisdiction*.

4) *Smoke alarms* are permitted to be battery-operated in dwelling units constructed before July 5, 1977.

2.1.2. Prohibited

2.1.2.1. Firecrackers and Pyrotechnic Devices

1) No person shall have in their possession, sell, offer for sale, give away or otherwise distribute, discharge, fire or set off firecrackers.

2) No person shall purchase, store, use or supervise the use of a pyrotechnic device unless

a) the pyrotechnic device conforms to the requirements of NRCan R.S.C. 1985, c. E-17, "Explosives Act," and its Regulations,
b) the person is certified in accordance with NRCan R.S.C. 1985, c. E-17, "Explosives Act," and its Regulations, and
c) the person has permission from the local *authority having jurisdiction*.

2.1.2.2. Flying or Sky Lanterns

1) No person shall sell or use flying or sky lanterns in Alberta. (See Note A-2.1.2.2.(1).)

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2.1.2.3. Open Air Fires

1) No person shall use a solid-fuel-fired barbecue in a *building* or on the balcony of a *building* containing more than 2 *dwelling units*.

2.1.2.4. Exit Doors and Door Release Hardware

1) An *exit* door shall not be bolted, barred or locked other than with a device that complies with the NBC(AE). In addition, all door release hardware, latches and locks shall be maintained in good working condition at all times.

2.1.2.5. Storage in 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.

2.1.2.6. Fuel Delivery or Removal from Storage Tanks

1) Except for *storage tanks* being withdrawn from service in accordance with Subsections 4.3.16. and 4.3.17. of Division B, no person shall deliver or remove *flammable liquids* or *combustible liquids* to or from a *storage tank*, unless the *storage tank* meets the permit and approval requirements prescribed by the *authority having jurisdiction* or Alberta Safety Codes Authority.

2.1.2.7. Fire Protection Equipment

1) No person shall tamper with or vandalize portable extinguishers, water-based fire protection systems, special fire extinguishing systems, fire alarm systems, emergency electrical power supply systems, emergency lighting or fire protection equipment.

2) Portable extinguishers, water-based fire protection systems, special fire extinguishing systems, fire alarm systems, emergency electrical power supply systems, emergency lighting and fire protection equipment shall be unobstructed and accessible at all times.

3) No portable fire extinguishers shall be allowed for sale, distribution, use or servicing in Alberta unless they are listed and labelled in accordance with NFPA 10, "Standard for Portable Fire Extinguishers." (See Note A-2.1.2.7.(3).)

4) No portable fire extinguishers shall be allowed for sale, distribution, use or servicing in Alberta unless they comply with all of the following:

a) labels shall have metric measures and may have imperial equivalents,
b) labels shall be bilingual in English and French and may include additional languages,
c) labels shall indicate which CAN/ULC standard the portable extinguisher is in conformance with (e.g. CAN/ULC-S504, "Standard for Dry Chemical Fire Extinguishers"), and
d) extinguishers shall exhibit the mark of a certification body as being in conformance with one of the referenced national standards (CAN/ULC) and this mark will most typically be that of ULC.

Section 2.2. Administration

(See Note A-2.2.)

2.2.1. General

2.2.1.1. Responsibility

1) Unless otherwise specified, the owner or the owner's authorized agent shall be responsible for carrying out the provisions of this Code.

2) The owner of a leased *dwelling unit* shall
a) ensure *smoke alarms* within the *dwelling unit* are tested and cleaned prior to *occupancy*, and
b) provide tenants information concerning ongoing *smoke alarm* cleaning, testing and maintenance.

2.2.1.2. Records

1) Where this Code requires that audits be performed, plans be provided, or tests, inspections, maintenance or operational procedures be performed on a fire safety system, records shall be made and the original or a copy shall be retained at the premises for examination by the *authority having jurisdiction*.

2) The initial verification, integrated systems testing reports or test reports for each system shall be retained throughout the life of the systems.

3) Records of tests, inspections, maintenance or operational procedures undertaken after the initial tests referred to in Sentence (2) shall be retained so that at least the current and the immediately preceding records are available.

4) Notwithstanding the conditions stated in Sentence (3), no record shall be destroyed within five years of having been prepared and records shall be retained on site.

5) Records of fire evacuations and fire safety drills shall be retained at the premises for examination by the *authority having jurisdiction*.

6) Upon request by the *authority having jurisdiction*, the record referred to in Sentence 4.4.4.1.(4) shall be the subject of an audit performed in a manner acceptable to the *authority having jurisdiction*.

7) Records acceptable to the *authority having jurisdiction* of maintenance and inspections of *self-service outlets*, *fuel-dispensing stations* and *marine fuel-dispensing stations* required by Article 2.2.9.1. shall be retained in conformance with this Article.

8) Unless otherwise stated in Part 6, records indicating inspection, testing and maintenance of fire protection equipment shall be on appropriate forms in conformance with Sentence (9) and be retained in conformance with this Article.

9) Appropriate forms required by Sentence (8) and acceptable to the *authority having jurisdiction* are included in
a) CAN/ULC-S536, "Standard for Inspection and Testing of Fire Alarm Systems,"
b) CAN/ULC-S537, "Standard for the Verification of Fire Alarm Systems," or
c) CAN/ULC-S1001, "Standard for Integrated Systems Testing of Fire Protection and Life Safety Systems."

10) Except as permitted by Sentences (11) or (12), each portable extinguisher shall have a tag securely attached to it showing
a) the type of extinguisher,
b) the size of extinguisher,
c) the serial number of extinguisher,
d) the date of last annual inspection,
e) the date of last recharge,
f) a five-year monthly inspection and annual maintenance record,
g) the name of the owner of the extinguisher,
h) the name, address and telephone number of the service agency,
i) the certification number of the *approved* testing agency, and
j) the printed name and signature of the service person.

11) For portable fire extinguishers, bar coding and other technologies acceptable to the *authority having jurisdiction* are permitted to be used as a means of record-keeping, provided
a) an information record in accordance with Sentence (10) is available at the premises where the portable extinguisher is located, and
b) the tag on the extinguisher contains information indicating
    i) a five-year monthly inspection record for use by the owner,

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ii) the name of the owner of the extinguisher,
iii) the name, address and telephone number of the service agency,
iv) the certification number of an *approved* testing agency, and
v) the printed name and signature of the service person.

12) Adhesive labels with information specified in Sentence (10) are permitted to be used for portable fire extinguishers that are rated 40B:C or 80B:C and that are solely used on commercial equipment located outdoors. (See Note A-2.2.1.2.(12).)

13) Service information that is required to be placed monthly or annually on the tag referred to in Sentences (10), (11) and (12) shall be handwritten.

14) The fire safety plan required for construction and demolition sites in accordance with Article 2.8.1.1. of Division B shall be accepted in writing by the fire department and the *authority having jurisdiction*.

2.2.1.3. Intervals Between Inspections and Tests

1) Longer intervals between the inspections and tests specified in this Code may be permitted provided the *authority having jurisdiction* is satisfied that such intervals do not reduce the reliability of the system or equipment requiring inspection or testing.

2.2.2. Interpretations and Variances

2.2.2.1. Interpretations

1) A person may apply to the *Provincial Fire 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 referred to in Sentence (1) has been reviewed, the *Provincial Fire Administrator* may issue a written interpretation.

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

2.2.2.2. Variances

(See Note A-2.2.2.2.)

1) A written request for a variance may be submitted to the *Provincial Fire Administrator*.

2) A request referred to in Sentence (1) shall conform with the requirements stated in Section 2.3.

3) After a request referred to in Sentence (1) has been reviewed, the *Provincial Fire Administrator* may issue a written variance.

4) The *Provincial Fire Administrator* may include terms or conditions in the variance referred to in Sentence (3).

5) A variance referred to in Sentence (3) is applicable throughout Alberta.

2.2.3. Approvals

2.2.3.1. Storage Tank Systems

1) Only individuals *approved* by the *Provincial Fire Administrator* are permitted to install, remove, repair or maintain aboveground or *underground storage tank systems*. (See Note A-2.2.3.1.(1).)

2) *Approved* persons are considered qualified to install, remove, repair and maintain aboveground and *underground storage tank systems* when they have received certification from
a) the Canadian Petroleum Contractors Association (CPCA),

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b) the Technical Standards and Safety Authority (TSSA), or
c) the Petroleum Tank Management Association of Alberta (PTMAA) (see Note A-2.2.3.1.(2)(c)).

3) Any person who feels they have an equivalent certification to the certifications listed in Sentence (2) should submit a request to the Safety Codes Council for an equivalency review.

4) No person shall install or alter any outside aboveground *storage tank system* referred to in Part 4, unless
a) required permits or approvals have been obtained from the *authority having jurisdiction*,
b) plans, drawings and specifications of the system or equipment have been examined and accepted by the *authority having jurisdiction*, and
c) all on-site individual *storage tanks* do not exceed a capacity of 8 000 L and their aggregate capacity does not exceed 20 000 L.
(See Note A-2.2.3.1.(4).)

5) Except as permitted by Sentence (4) for outside aboveground *storage tank systems*, no person shall install or alter any storage tank system referred to in Part 4, unless
a) required permits or approvals have been obtained from the *authority having jurisdiction*,
b) plans, drawings and specifications of the system or equipment have been examined and accepted by the *authority having jurisdiction*, and
c) the plans, drawings and specifications referred to in Clause (b) be authenticated by a registered engineering professional as defined in the NBC(AE).

6) *Storage tank systems* containing *combustible liquids* used to supply fuel to equipment installed in conformance with CSA B139 Series, "Installation code for oil-burning equipment," must comply with Part 4 where the requirements are not included in CSA B139 Series (See Note A-2.2.3.1.(6).)

7) In accordance with the Safety Codes Act and its Regulations, permits shall be required for the installation, alteration or removal of *storage tank systems* in conformance with CSA B139 Series, "Installation code for oil-burning equipment."

2.2.3.2. Fire Extinguishers

1) All agencies servicing, recharging or carrying out the repair and overhaul of fire extinguishing equipment shall have their facilities and equipment certified
a) annually by an *approved* fire testing agency, and
b) by Transport Canada or its appointee for high-pressure hydrostatic testing equipment.

2.2.4. Qualifications

2.2.4.1. Special Fire Suppression Systems

(See Note A-2.2.4.1.)

1) Only qualified persons shall install special fire suppression systems when they have acquired a certificate of training from a manufacturer and on a specific system from the manufacturer.

2) A qualified individual for the installation of a special fire suppression system is a person who has received
a) training from a manufacturer, and
b) training on each specific system that a manufacturer provides before it can be installed.

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3) Only qualified persons shall test or perform maintenance on a special fire suppression system when
- a) they have acquired an *approved* certificate of training from a public post-secondary educational institution, or
- b) they have acquired a certificate of training from a manufacturer for each of their specific systems.

2.2.4.2. Portable Fire Extinguishers

1) Only qualified persons shall install, test or perform maintenance on portable extinguishers. (See Note A-2.2.4.2.(1).)

2) Persons are considered qualified in the installation and maintenance of portable fire extinguishers when they have acquired an *approved* certificate of training from a public post-secondary educational institution, and they own or are employed by an agency that is certified annually by a recognized certification body as being compliant with CAN/ULC-S532, "Standard for the Regulation of the Servicing of Portable Fire Extinguishers."

3) Monthly inspections required by NFPA 10, "Standard for Portable Fire Extinguishers," shall be completed by
- a) the owner,
- b) an employee designated by the owner, or
- c) a designated representative (e.g. service provider).

(See Note A-2.2.4.2.(3).)

2.2.4.3. Fire Alarm and Voice Communication Systems

1) Persons are considered qualified in the installation of fire alarm and voice communication systems when they have acquired
- a) a journeyperson's electrician certificate on or after September 1, 1991, or
- b) a journeyperson's electrician certificate prior to September 1, 1991, and have completed a fire alarm course recognized by the *Provincial Fire Administrator*.

(See Note A-2.2.4.3.(1).)

2) Persons are considered qualified to make operational, inspect, test and maintain fire alarm and voice communication systems and sign applicable documentation when they have acquired
- a) a certificate of training in this area of study from a public post-secondary educational institution, including
  - i) a journeyperson's electrician certificate on or after September 1, 1991, or
  - ii) a journeyperson's electrician certificate prior to September 1, 1991, and a fire alarm course recognized by the *Provincial Fire Administrator*, or
- b) Fire Alarm Technician certification issued by the Canadian Fire Alarm Association (CFAA) and that certification shall be maintained as per the CFAA's certification policy.

3) An apprentice electrician may complete all the work a journeyperson electrician is able to, provided
- a) the apprentice is competent to complete the work, and
- b) the apprentice is under the supervision of a journeyperson electrician in accordance with the Designated Trades and Restricted Activities Regulation.

4) A CFAA fire alarm student or trainee may complete all of the work a certified technician is able to, provided
- a) the CFAA fire alarm student or trainee is actively enrolled in the CFAA Fire Alarm Technician program, and
- b) the CFAA fire alarm student or trainee is competent to complete the work and is supervised on site by a certified CFAA technician.

(See Note A-2.2.4.3.(4).)

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5) A person who assists with the verification, annual inspection, testing and maintenance of a fire alarm system at the control panel shall meet the qualifications outlined in Sentences (1) to (4).

6) The daily and monthly inspections and tests required by CAN/ULC-S536, "Standard for Inspection and Testing of Fire Alarm Systems," may be completed by
a) the owner, or
b) the owner's representative.

7) The owner and owner's representative referred to in Sentence (6) shall receive training by the manufacturer or service provider on the required procedures for their specific fire alarm system.

2.2.4.4. Sprinkler Systems

1) Only qualified persons shall install, alter, test or perform maintenance and repairs on automatic fire sprinkler systems.

2) Except as required by Sentence (3), persons are only considered qualified in the installation and alteration of automatic fire sprinkler systems in conformance with NFPA 13, "Standard for the Installation of Sprinkler Systems," NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," and NFPA 13R, "Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies," when they have acquired a journeypersons's certificate of training as a sprinkler system installer recognized in Alberta.

3) Only persons who have acquired a journeyperson's certificate of training as a plumber are considered qualified in the installation and alteration of a residential partial or full flow-through fire sprinkler system in accordance with NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

4) Persons are considered qualified in the inspection, testing, maintenance and repair of automatic fire sprinkler systems installed in conformance with NFPA 13, "Standard for the Installation of Sprinkler Systems," and NFPA 13R, "Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies," in accordance with NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," when they have acquired a journeyperson's certificate of training as a sprinkler system installer recognized in Alberta.

5) Persons are considered qualified in the inspection, testing and maintenance of automatic fire sprinkler systems installed in conformance with NFPA 13, "Standard for the Installation of Sprinkler Systems," and NFPA 13R, "Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies," in accordance with NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," when they have acquired an *approved* certificate of training in the inspection, testing and maintenance of automatic fire sprinkler systems in accordance with NFPA 25.

6) An apprentice sprinkler systems installer may complete all of the work a journeyperson sprinkler systems installer is able to, provided
a) the apprentice is competent to complete the work, and
b) the apprentice is under the direct supervision of a journeyperson sprinkler systems installer in accordance with the Designated Trades and Restricted Activities Regulation.

7) An apprentice plumber may complete all of the work a journeyperson plumber is able to, provided
a) the apprentice is competent to complete the work, and
b) the apprentice is under the direct supervision of a journeyperson plumber with formal sprinkler system training in accordance with the Designated Trades and Restricted Activities Regulation.

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2.2.4.5. Commercial Cooking Equipment Exhaust Systems

1) Except as provided in Sentence (2), only qualified persons shall perform maintenance on commercial cooking equipment exhaust systems when they have obtained a certificate verifying that they have completed an *approved* course of training in duct-cleaning procedures.

2) A person may clean a commercial cooking equipment exhaust system while under the supervision of a person who has obtained an *approved* certificate of training with the following stipulations:

a) a certified person must be on site for the duration of the cleaning process,
b) a certified person may only have up to two persons "in training" working under them on site, and
c) the person "in training" must be in the process of completing their practicum hours and must be a registered student with a recognized training facility.

2.2.4.6. Water-Based Fire Protection Systems

1) Persons are considered qualified to install water-based fire protection systems to the applicable standard if they have completed a certificate of training as a journeyperson sprinkler systems installer recognized in Alberta. (See also Note A-6.4.1.1.(1).)

2) Persons are considered qualified to inspect, test, maintain and repair water-based fire protection systems in conformance with NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," when they have completed a certificate of training as a journeyperson sprinkler systems installer recognized in Alberta.

3) Persons are considered qualified to inspect, test and maintain water-based fire protection systems in conformance with NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," when they have acquired an *approved* certificate of training in the inspection, testing and maintenance of water-based fire protections systems in accordance with NFPA 25.

4) An apprentice sprinkler systems installer may complete all of the work a journeyperson sprinkler systems installer is able to, provided

a) the apprentice is competent to complete the work, and
b) the apprentice is under the direct supervision of a journeyperson sprinkler systems installer in accordance with the Designated Trades and Restricted Activities Regulation.

5) The *authority having jurisdiction* may accept one or all of the following persons as qualified to inspect, test, maintain and repair hydrants, including private hydrants:

a) a person appointed to the position to administer and enforce the provisions of the municipal bylaw pursuant to the Municipal Government Act and its Regulations,
b) a journeyperson sprinkler system installer recognized in Alberta, or
c) a person who has acquired the Water and Wastewater Operators' Certification, as issued through Alberta Environment and Protected Areas, which certifies operators to operate, test and maintain water systems and related appurtenances in Alberta (see Note A-2.2.4.6.(5)(c)).

6) The *authority having jurisdiction* may accept a person who has acquired an *approved* certificate of training in the inspection, testing and maintenance of water-based fire protection systems to NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems," to inspect, test and maintain hydrants, including private hydrants.

2.2.4.7. Emergency Power Systems

1) Persons are considered qualified to perform the inspection, testing and maintenance of emergency power systems installed in conformance with CSA C282, "Emergency electrical power supply for buildings," when they have received training on the required procedures from a generator manufacturer and be provided with a certificate of training or certification.

2) An owner or owner's representative is considered qualified to perform the weekly and monthly inspection, testing and maintenance of emergency power systems installed in conformance with CSA C282, "Emergency electrical power supply for buildings," when they have received training on the required procedures from a generator service provider or generator manufacturer.

2.2.4.8. Integrated Fire Protection and Life Safety Systems

1) A person qualified to be an integrated testing coordinator shall be a registered engineering professional knowledgeable and experienced in the design, installation and operation of fire protection and life safety systems and in the fire protection and life safety functions of *building* systems. (See Note A-2.2.4.8.(1).)

2.2.4.9. Approved Certificate of Training

1) Certificates of training or courses provided by public post-secondary educational institutions or other training providers for persons to install, make operational, inspect, test or maintain fire and life safety systems shall be *approved* by the *Provincial Fire Administrator*. (See Note A-2.2.4.9.(1).)

2.2.4.10. Qualifications and Certifications

1) Persons who have acquired *approved* training shall present a copy of their transcript or proof of certification upon request.

2.2.5. Storage Tank Inventory Control

2.2.5.1. Application

1) This Subsection does not apply to
a) an aboveground *storage tank* with a capacity of less than 2 500 L,
b) a *storage tank* in an industrial *process plant*, a *refinery* or a *distillery*,
c) a flow-through *storage tank* used as part of the process of an industrial *process plant*, *refinery* or *distillery*,
d) aboveground *storage tanks* that are used at a temporary location for less than 1 year, or
e) a *pressure vessel* that is used as a *storage tank* and is registered in accordance with the boiler and *pressure vessel* regulations made pursuant to the Safety Codes Act.

2) This Subsection applies to accredited and unaccredited areas in Alberta.

2.2.5.2. General

1) No person shall use or fill a *storage tank* unless they verify with the *authority having jurisdiction* that the tank meets the appropriate requirements of that jurisdiction.

2) No person shall install, remove or abandon a *storage tank* or *storage tank system* before contacting the *authority having jurisdiction* for accredited areas or the ASCA for unaccredited areas to ensure the NFC(AE) and any permit requirements are met.

3) Owners of *storage tanks* or *storage tank systems* shall contact the local *authority having jurisdiction* or the ASCA for the enrolment process regarding the inventory control requirements for maintaining the certification of the *storage tank* or *storage tank system* for that area.

2.2.6. Hose for Firefighting

2.2.6.1. Hose for Firefighting

1) No person shall use, sell, offer for sale, purchase, lease or otherwise distribute 65 mm or 38 mm hose couplings or fittings intended for use on firefighting hose or fire hydrants by a municipal fire department or fire crew, unless the couplings and fittings comply with this Subsection. (See Note A-2.2.6.1.(1).)

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2) Threaded firefighting hose couplings and fittings shall have threads that are
a) 38 mm straight iron pipe thread, also known as iron pipe thread (IPT) or National Pipe Straight Hose (NPSH), on 38 mm couplings, or
b) Alberta Mutual Aid (AMA) thread, which has 3.15 threads per cm, with a major thread diameter between 75.95 mm and 75.69 mm for male threads and 76.45 mm for female threads, on 65 mm hose couplings and hydrant connections.

3) All firefighting hose couplings shall meet the requirements of CAN/ULC-S513, "Standard for Threaded Couplings for 38 mm and 65 mm Fire Hose," including Appendix A.

4) All firefighting hose with internal lug quick-connect couplings, commonly referred to as Storz couplings, shall be in conformance with CAN/ULC-S543, "Standard for Internal Lug Quick-connect Couplings for Fire Hose."

5) All firefighting hose shall be listed.

6) All firefighting hose shall be inspected, tested and maintained in accordance with NFPA 1962, "Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances."

2.2.7. Notification

(See Clause 1.1.1.1.(2)(g) of Division A.)

2.2.7.1. Spills and Leaks

1) When a loss of *flammable liquid* or *combustible liquid* occurs from a spill, leak, or as indicated by any of the leak detection measures in Section 4.4., the owner shall ensure that
a) appropriate action is taken as required in Sentences 4.1.6.3.(2) and (3) and Sentence 4.4.1.3.(1), and
b) if the quantity of *flammable liquid* or *combustible liquid* spilled or leaked exceeds 200 L in aggregate or is sufficient to cause a sheen on nearby surface water,
   i) the fire department shall be notified immediately, and
   ii) the *authority having jurisdiction* shall be notified in writing within 24 h.

(See Note A-2.2.7.1.(1) to (3).)

2) A person shall notify the *authority having jurisdiction* and the fire department if they have knowledge about a leak of *flammable liquid* or *combustible liquid* that
a) is based on analysis or other evidence of *flammable liquid* or *combustible liquid* in a water well, or
b) indicates the presence of free or dissolved *flammable liquid* or *combustible liquid* in soil, groundwater, surface water, sewer lines, utility lines, water supply lines, *basements*, crawl spaces or on the ground's surface.

(See Note A-2.2.7.1.(1) to (3).)

3) Attendants on duty at *fuel-dispensing stations* shall notify the fire department forthwith in accordance with Sentence (1) when a spill or accident occurs that involves *flammable liquids* or *combustible liquids*. (See Note A-2.2.7.1.(1) to (3).)

4) The operator of a *self-service outlet*, a *fuel-dispensing station* or a *marine fuel-dispensing station* shall ensure that immediate corrective action is taken when a condition is identified that contravenes Sentences 2.2.9.1.(1) and (2).

2.2.7.2. "NFC(AE)" Fire Protection Equipment

1) In addition to the requirements of Sentence 6.1.1.3.(1), before repairs or alterations are made to fire protection installations, including but not limited to fire extinguishing systems and fire alarm and detection systems, a procedure of notification acceptable to the fire department shall be established, and the procedure may include the notification of the fire department and the *building* occupants. (See Note A-6.1.1.3.(1).)

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2) If a fire alarm and detection system, or part thereof, is inoperative for more than 2 h for any reason, the owner shall notify the fire department and, when directed, provide acceptable surveillance within the *building* continuously until the fire alarm and detection system is restored to operating condition.

3) Procedures acceptable to the fire department shall be developed to notify occupants if a fire or other emergency occurs while the fire alarm and detection system is inoperative. (See Note A-2.2.7.2.(3).)

4) If a person who carries out the maintenance of fire protection installations, including but not limited to portable fire extinguishers, fire extinguishing systems, fire alarm systems or fire alarm devices, discovers that a device or system is inoperative or defective and the owner or their authorized agent is unwilling or unable to correct the defect, the person carrying out the maintenance shall forthwith notify, in writing, the fire department and the owner or their authorized agent of that notification.

5) A person involved in the alteration, repair, shutdown or impairment of a hydrant, which affects its operation, shall ensure that

a) the fire department is notified,
b) the fire department approves the alteration, repair, shutdown or impairment, and
c) the affected hydrant is identified in a manner acceptable to the fire department.

(See Note A-2.2.7.2.(5).)

2.2.8. Reserved

2.2.9. Inspection and Maintenance

2.2.9.1. Self-service Outlets, Fuel-dispensing Stations and Marine Fuel-dispensing Stations

1) Operators of *self-service outlets*, *fuel-dispensing stations* and *marine fuel-dispensing stations* shall ensure that a weekly inspection is conducted of

a) dispensing unit hoses and nozzles to ensure safe operation,
b) dispensing unit pumps and fittings to determine if there are any leaks,
c) fill boxes and fill pipe areas for product spillage, and
d) *storage tank* vents to ensure piping or openings are not blocked or damaged.

2) Operators of *self-service outlets*, *fuel-dispensing stations* and *marine fuel-dispensing stations* shall ensure that electronic liquid measuring or leak detection equipment is inspected each business day to confirm that the equipment is functioning as intended.

3) Operators of *self-service outlets*, *fuel-dispensing stations* and *marine fuel-dispensing stations* shall inspect and maintain the cathodic protection systems on underground *storage tanks* and piping in conformance with

a) CAN/ULC-S603.1, "Standard for External Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids," for sacrificial anode systems, or
b) CFA PACE Report 87-1, "Impressed Current Method of Cathodic Protection of Underground Storage Tanks," Clause 5.5(c) and Part 6.0 for impressed current systems.

4) Impressed current cathodic protection systems shall be supplied with electrical power on a continuous basis and the power supply shall be inspected at least weekly.

2.2.9.2. Fire Alarm and Voice Communication System Audits

1) When an existing fire alarm system has not been subjected to an initial verification as required by CAN/ULC-S524, "Standard for Installation of Fire Alarm Systems," and described in CAN/ULC-S537, "Standard for the Verification of Fire Alarm Systems," the *authority having jurisdiction* may require the system to be audited in conformance with CAN/ULC-S536, "Standard for Inspection and Testing of Fire Alarm Systems," unless the *authority having jurisdiction* is satisfied that the system has been maintained and is functioning in a manner acceptable to the *authority having jurisdiction*.

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2.2.10. Fire Department Building Access

2.2.10.1. Fire Department Building Access

1) A *building* that incorporates any of the features outlined in Sentence (2) shall be provided with a key box that

a) contains a set or sets of keys or devices required to be used in an emergency, and
b) is constructed, keyed, and located in a manner acceptable to the *authority having jurisdiction*.

(See Note A-2.2.10.1.(1).)

2) A fire department key box shall be installed and provided with keys and devices in conformance with Sentence (1) in a *building* equipped with

a) a fire alarm system whose control features, including those for emergency voice communication systems, are located behind a locked panel,
b) a fire alarm system in which manually operated devices require a key or device in order to be reset,
c) a fire alarm system in which the electrical circuit breaker is located within a locked panel or room,
d) an automatic sprinkler system in which the main control valve is locked in the open position,
e) an automatic sprinkler system in which the main control valve is located within a locked room or enclosure,
f) firefighting standpipe and water supply connections in a locked room or area,
g) a key-operated elevator control feature that will permit exclusive use of elevators by firefighting personnel only,
h) a key-operated elevator control feature that will switch selected elevators to operate on emergency power,
i) stairway doors that have been locked on the stairway side in conformance with the NBC(AE),
j) locked access doors to a roof provided for firefighting purposes, or
k) sleep or resting facilities for employees.

3) Keys or devices provided in conformance with Sentence (2) shall be affixed to a key ring or rings and identified with tags indicating their function.

4) If a fire alarm system or sprinkler system is required to transmit a signal to the fire department in conformance with the NBC(AE), a key box shall be installed on the exterior wall of the *building* in proximity to the principal entrance.

5) A key box installed in conformance with Sentence (4) shall contain an entrance door key with a tag affixed to this key in conformance with Sentence (3).

6) Any keys or special devices needed to operate the fire alarm system or provide access to any fire protection systems or equipment shall be readily available to on-duty *supervisory staff* or located in fire department key boxes conforming to this Article.

7) The keys required to recall elevators and to permit independent operation of each elevator shall be kept in the locations required by Sentence (1).

2.2.11. Storage of Medical Oxygen in Residential Buildings and Health Care Facilities

2.2.11.1. Storage of Medical Oxygen in Residential Buildings and Health Care Facilities

1) Storage, handling and use of portable oxygen systems used for medical purposes in residential occupancies and health care facilities shall be in conformance with CSA Z305.12, "Safe storage, handling, and use of portable oxygen systems in residential buildings and health care facilities."

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Section 2.3. Alternative Solutions

2.3.1. Documentation of Alternative Solutions

(See Note A-2.3.1.)

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 the 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 component commissioning requirements, that are necessary for the alternative solution to achieve compliance with the Code after the *building* or facility 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 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* or facility 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 coordinate the preparation of the design, Code analysis and documentation referred to in this Subsection.

2.3.1.2. Retention of Documentation

1) Documentation conforming to Article 2.3.1.1. shall be retained on the premises to which it pertains for each measure that has been approved by the *authority having jurisdiction* and implemented as an alternative solution to acceptable solutions

a) in this Code, or

b) in the NBC(AE) that are attributed to the objectives Fire Safety (OS1), Safety in Use (OS3), Fire Protection of the Building (OP1), or Protection of Adjacent Buildings from Fire (OP3).

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Notes to Part 2 Administrative Provisions

A-2.1.2.2.(1) A flying or sky lantern resembles a small paper hot-air balloon that is fuelled by an open flame. When the fuel source is ignited, the hot air produced by the fuel source can lift the lantern to extreme heights and allows it to drift long distances until the fuel supply is depleted. These lanterns are often released in large numbers to generate an impressive visual effect. Due to their uncontrolled and unpredictable flight path, they can land in trees, on building rooftops or on other combustible properties while still ignited and have significant potential to cause a fire.

Flying or sky lanterns do not meet the intent of Sentence 2.4.3.3.(1) of Division B and their use creates a potentially uncontrolled, unsafe condition. As these products do not meet the requirements of the NFC(AE) or Section 9 of the Safety Codes Act, flying or sky lanterns are not acceptable for sale or use in Alberta.

Fire officials who come across these products being sold or used are requested to advise those involved that these products are not acceptable for sale or use and that these products must be removed from sale and returned to the supplier or destroyed.

A-2.1.2.7.(3) There are aerosol, point-and-spray extinguishing devices and portable fire extinguishers on the market that only have ULC certification for the wetting agent and not for the extinguisher as a whole. These devices are not considered certified or listed with ULC and are not acceptable for sale, use and servicing within Alberta.

Listed equipment are subject to periodic evaluation and must meet the designated tests and standards set forth by the National Standards of Canada and Underwriters Laboratories of Canada (ULC).

Labelled equipment have marks to indicate that the device is compliant with such designated tests and standards and will perform safely, effectively and reliably in the advertised manner.

A-2.2. Administration. The NFC(AE) is established as a regulation under the Safety Codes Act, and the Safety Codes Council is responsible for recommending changes. The 2023 edition of the NFC(AE) is based on the 2020 edition of the National Fire Code of Canada with Alberta-specific amendments approved by the Safety Codes Council. This edition is an objective-based Code that includes objectives and functional statements supporting each of the technical requirements.

The NFC(AE) is administered uniformly in Alberta through a system of accredited municipalities, agencies and corporations. These accredited organizations are given powers to interpret, apply and enforce the provisions of the Code. An accredited authority does not have the power to waive, change or alter the Code but may accept "alternative solutions" proposed under Division A and documented under Division C of the Code. An alternative solution must be registered as a variance with the Safety Codes Council.

Application

The application of the NFC(AE) to the upgrading of existing facilities to provide an acceptable degree of life safety should be based on the judgment of the of the authority having jurisdiction, who must deal with each case on its own merits.

The NFC(AE) relies on the owner or the owner's authorized representative to comply with Code requirements. Division C of the Code provides direction for owners and authorities on applying retroactive

These Notes are included for explanatory purposes only and do not form part of the requirements. The number that introduces each Note corresponds to the applicable requirement in this Part.

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and upgrading provisions. An owner is expected to communicate with the authority having jurisdiction prior to proceeding with upgrading, at which time the authority may use discretion to accept alternative solutions.

Authority Having Jurisdiction

The NFC(AE) defines the term "authority having jurisdiction" and identifies what powers are assigned under the Safety Codes Act. The Act requires the authority having jurisdiction to have appropriate certification and designation of powers in order to administer the Code.

The term "authority having jurisdiction" refers to a safety codes officer as the individual responsible for decision making in a number of areas. In most cases, this will be a member of an accredited municipal fire department. In municipalities that use accredited agencies for inspection and enforcement, the fire department may not be directly involved. All safety codes officers receive their designation of powers from the Safety Codes Council and must conduct their duties in accordance with the accredited organizations' approved quality management plan.

Enforcement Options

There are four areas of concern related to the enforcement of the NFC(AE):

1. the inspection of premises,
2. acceptances (including licenses and permits),
3. offences and penalties, and
4. remedial orders.

In Alberta, enforcement provisions are set out in the Safety Codes Act and municipalities are prohibited from enacting bylaws that purport to regulate a matter regulated by the Safety Codes Act.

Inspection of Premises

Fire safety laws usually include provision for the inspection of premises, the relevant issues of which are as follows:

1. whether all premises or only some may be entered by an authority having jurisdiction
2. whether an authority having jurisdiction must have a warrant or a court order before entering any premises without the consent of the owner or occupant
3. for what purposes premises may be inspected
4. at what times an authority having jurisdiction may inspect premises
5. what person, if any, may accompany the authority having jurisdiction
6. whether the authority having jurisdiction should have the power to conduct any tests on the premises relevant to the purposes of the inspection
7. whether the authority having jurisdiction should have the power to collect and take away for analysis anything relevant to the purpose of the inspection and, if so, what obligation the authority having jurisdiction may have with respect to the return thereof
8. what obligation should be imposed upon persons such as the owner or the occupant of the premises to provide information and assistance to the authority having jurisdiction
9. whether it should be an offence for any person to obstruct the authority having jurisdiction in the performance of their duties

Acceptances (Including Licences and Permits)

The NFC(AE) considers that fire safety plans and some activities, materials, devices, processes, products, procedures or structures will require acceptance by an authority having jurisdiction. In some cases the acceptance process may be formalized by a licence or permit; in other cases, the acceptance may be less formal.

Where the Safety Codes Act and its Regulations and NFC(AE) require an acceptance, the relevant considerations are:

1. what formalities should be prescribed for application
2. what information or materials must accompany the application
3. what criteria should be prescribed for acceptance in specific cases (for example, the minimum performance characteristics of an extinguisher, or the minimum length of apprenticeship required for a licence to carry on a particular trade)
4. what conditions may be attached to the acceptance
5. the circumstances, if any, in which an acceptance may be suspended or cancelled

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6. the rights of appeal, if any, in case of a refusal, suspension or revocation of an acceptance
7. the legal consequences of not having an acceptance when so required by the fire safety law

The NFC(AE) assumes that acceptance in the form of a permit or licence may be required under a municipal bylaw for some of the following:

1. open air fires
2. the operation of fuel-dispensing stations and bulk plants
3. the transportation of flammable and combustible liquids
4. fireworks displays
5. activities that create a hazard not anticipated in the original design of a building or facility

The NFC(AE) requires that personnel involved in the installation and maintenance of fire alarm, fire detection and fire suppression systems, the recharging of portable extinguishers and the cleaning of kitchen exhaust systems will be qualified and licenced to perform such activities.

Offences and Penalties

The Safety Codes Act identifies the following as offences:

- when a person interferes or hinders an Administrator or authority having jurisdiction (i.e. safety codes officer)
- when a person knowingly makes false or misleading statements
- when a person fails to prepare, submit or retain any information required by the Safety Codes Act
- when a person
  - contravenes the Safety Codes Act
  - contravenes a condition of a permit, certificate or variance
  - fails to carry out an action required in an order by a specific time

The Safety Codes Act assigns penalties for first and second offences and makes provisions for fines, imprisonment or both.

Remedial Orders

The Safety Codes Act contains provisions for authorities to issue orders requiring that premises be closed or that activities cease, that the building be evacuated where an immediate danger to life or property exists, or even that an act already done be undone. The relevant considerations in provisions regarding the issuing of remedial orders are:

1. in what circumstances and by whom can a remedial order be issued
2. what can be ordered and in what circumstances
3. in what circumstances, if any, an order shall take immediate effect
4. except for those cases where an order is to take immediate effect, when the order should take effect
5. what person may be required to comply with a remedial order
6. the rights of appeal in respect of remedial orders
7. the consequences of failure to comply with a remedial order

Notification

The NFC(AE) establishes conditions that require the owner to notify the authority having jurisdiction when certain activities or processes are undertaken. The following are examples of conditions where notification is required:

1. when activities that could lead to a fire or an explosion are to be undertaken
2. when fire protection equipment is to be taken out of service
3. prior to the resurfacing of bowling alleys
4. when a loss is detected from a storage tank containing flammable liquids or combustible liquids
5. prior to the removal from service of an underground storage tank for flammable liquids or combustible liquids
6. prior to fumigation being carried out in a building

A-2.2.1.2.(12) To help alleviate the issue of tags being damaged or destroyed due to weather exposure, companies that have fire extinguishers that are rated 40B:C or higher that are located outdoors on their commercial equipment may request that their extinguisher servicing company use adhesive labels that meet the requirements of Sentence 2.2.1.2.(10). Adhesive labels can only be utilized on fire extinguishers that are directly subjected to the weather elements. Any extinguisher rated for less than 40B:C or located inside building structures will continue to require a securely attached tag.

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More specifically, adhesive labels are to be placed on the "back" of the fire extinguisher only. Labels are never to be placed on the front of a fire extinguisher. The new label shall be affixed to the shell by a heatless process, and any old maintenance labels shall be removed. The labels shall be of the self-destructive type when their removal from a fire extinguisher is attempted. Records shall be kept on a tag or label attached to the fire extinguisher, on an inspection checklist maintained on file, or by using an electronic method that provides a permanent record.

A-2.2.2.2. The Provincial Fire Administrator and safety codes officer 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 Provincial Fire Administrator under Article 2.2.2.2. is applicable throughout the province and is published on the Alberta Municipal Affairs website. The application to the Provincial Fire Administrator must show that the issue is province-wide and is not applicable to only a single location or project. The Provincial Fire 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.

A-2.2.3.1.(1) The powers, duties and functions of the Provincial Fire Administrator in Sentence 2.2.3.1.(1) are delegated to the Safety Codes Council's Administrator of Certification.

A-2.2.3.1.(2)(c) PTMAA certification will no longer be recognized after December 31, 2025. Anyone who has certification through the PTMAA will need to gain their certification through the C.P.C.A. or TSSA before December 31, 2025.

A-2.2.3.1.(4) This Sentence only applies to storage tank systems where all storage tanks and piping are aboveground and visible. Plans, drawings and specifications are to be submitted in a form that is acceptable to the authority having jurisdiction, and if the installation is deemed by the authority having jurisdiction to be of a complex nature, they may be required to be authenticated by a licensed engineering professional registered to practice in Alberta. A post-installation inspection cannot be done on components of the system that are buried or normally not visible. It would not be practical, for example, to inspect an aboveground storage tank system with a secondary containment system that incorporates a liner that has been buried. Plans, drawings and specifications for all storage tank system installations must include sufficient information to allow a safety codes officer to complete an examination that shows full compliance with the NFC(AE).

A-2.2.3.1.(6) Installations must be inspected according to CSA B139 Series, "Installation code for oil-burning equipment," first and then the NFC(AE) for those requirements not included in CSA B139 Series.

A-2.2.4.1. Proof of training from the manufacturer is provided via an issued certificate with the following information:

(a) certificate holder,
(b) certificate holder company,
(c) date of certification,
(d) type of certification, including the manufacturer and type of system, and
(e) expiry date, if applicable.

Typically, certification must be updated following a change of employment or change of manufacturer. It is the responsibility of the certificate holder to contact the manufacturer regarding any changes in their employment.

Currently, there is only one approved course at a public post-secondary institution, which is provided by the Southern Alberta Institute of Technology (SAIT). The SAIT program material only covers pre-engineered kitchen suppression systems. Once a person graduates, the expectation is that they gain practical experience while working under the supervision of an experienced, qualified person.

A-2.2.4.2.(1) The intent is that all staff engaged in the installation, testing and maintenance of fire extinguishers be qualified.

A-2.2.4.2.(3) If the owner is in any doubt about the condition of a fire extinguisher following an inspection, they should contact a certified fire extinguisher servicing company to evaluate the operational integrity of the fire extinguisher.

A-2.2.4.3.(1) The types of training provided and other provincial legislation may limit the scope of activities a qualified person may perform on such systems.

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Fire alarm system verifications are generally the responsibility of a licensed engineering professional. In Alberta, this must be the registered professional who will complete a Schedule C under the NBC(AE).

The NFC(AE) states that a person who has acquired an approved certificate of training from a post-secondary educational institution may also inspect, test and maintain fire alarm and voice communication systems. Prior to the NFC(AE), Division C Appendix (A-2.2.4.3.(1)) stated a "Fire Alarm Technician certification issued by the Canadian Fire Alarm Association (CFAA) or the Northern & Southern Alberta Institutes of Technology." This information was not included in the current Notes to Division C for the NFC(AE).

Those persons who have Fire Alarm Technician certification from the Northern Alberta Institute of Technology or Southern Alberta Institute of Technology are still qualified to inspect, test and maintain fire alarm and voice communication systems until December 31, 2026. To continue to inspect, test and maintain these systems after this date, persons must obtain a certificate of training from the CFAA.

Prior to 2000, Alberta Labour issued a "P" ticket number or a personal identification number (PIN) card to certified electricians, manufacturer-trained technicians, electronics technicians, electrical engineering technologists, and professional electrical engineers. This P card was to confirm that the individual had successfully passed their training to conduct work on fire alarm systems.

In 2000, the practice of issuing a P ticket or PIN was discontinued. As Alberta Municipal Affairs no longer has the Alberta Labour program in place, the confirmation of a P ticket or PIN can no longer be provided. Anyone still in possession of their laminated P card should note that the card is still valid until December 31, 2026.

Cards issued by the Alberta Fire Safety Association (AFSA) will no longer be recognized as proof of certification effective December 31, 2026.

Electrical Contractors Association of Alberta (ECAA)

To obtain proof of certification in lieu of the above-mentioned cards, there are two options to obtain qualification:
Option 1: Electricians can obtain qualification by providing proof of certification and documentation of a 40-hour fire alarm upgrade course offered by ECAA to obtain a PIN.
Option 2: Individuals must contact the CFAA for required courses and exams and the registration process.

The ECAA has implemented a new PIN program. Journeypersons who have lost, misplaced or had their Alberta Labour P ticket or PIN card stolen will need to work with the ECAA to obtain a PIN card if they still wish to carry this card.

A-2.2.4.3.(4) A CFAA fire alarm student or trainee is someone who is actively enrolled in the CFAA Fire Alarm Technology Education program.

A-2.2.4.6.(5)(c) The certified operator in charge of the water system supplying a hydrant must be aware of and included in any activity affecting the water system to ensure proper operation, testing, maintenance and repair of the hydrant. In a case where the water supply system is privately owned and operated, and not dependent on an Alberta Environment and Protected Areas regulated water system, it is up to the system owner to ensure the proper inspection, testing, maintenance, operation and repair of the system hydrants.

A-2.2.4.8.(1) A non-registered engineering professional may do the groundwork for the integrated systems testing, provided that the registered engineering professional supervises, approves and officially signs off on that work.

A-2.2.4.9.(1) An approved certificate of training or an approved course of training at a public post-secondary educational institution or other training provider means that the curriculum has been submitted to and approved by the Provincial Fire Administrator.

To have an education program assessed, educational institutions and other training providers must submit a complete curriculum, including lesson plans with durations, to the Provincial Fire Administrator for review.

The two types of programs that may be delivered by a training provider other than a public post-secondary educational institution are

- courses on the inspection, testing and maintenance of water-based fire protection systems, and
- commercial cooking equipment exhaust cleaning courses.

A-2.2.6.1.(1) Couplings and fittings includes, but are not limited to, hose couplings, hydrant outlets, fire department connections, nozzles and appliances.

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A-2.2.7.1.(1) to (3) The local fire or emergency response department is the owner's first contact for any flammable liquid or combustible liquid leak or spill that requires immediate action to lessen the risk of fire or explosion, after which the authority having jurisdiction must be notified.

As indicated in Clause 1.1.1.1.(2)(f) of Division A, Part 4 does not apply to the storage and handling of raw production flammable liquids or combustible liquids and the incidental storage and handling of hydrocarbon-based chemicals resulting from or used during crude oil or natural gas exploration, production or transmission as mandated under the scope of AER Directive 055, "Storage Requirements for the Upstream Petroleum Industry." This includes the notifications of spills from that storage and handling.

Spills and leaks pertaining to products other than flammable liquids and combustible liquids that do not fall within the requirements of Section 4.3., are not enforceable by the NFC(AE). However, there may be requirements under other legislation (i.e. Pipeline Act, Environmental Protection and Enhancement Act) requiring that the owner report the spill or leak. Information on those requirements may be found on the Alberta Energy Regulator website, Release Reporting, and on the Alberta Hazardous Waste Spills website.

It is important to note that some oil and gas facilities (petrochemical, chemical and other facilities that are under the jurisdictional regulations of Alberta Environment and Protected Areas, Alberta Energy Regulator, etc.) may include the neighbouring fire departments for firefighting or rescue services through mutual aid contracts or have other means of notification for various loss scenarios. The provisions above should not detract from that mutual aid or mutual understanding from the partners and partnerships involved.

A-2.2.7.2.(3) Interruption of normal automatic operation of the fire alarm system for periodic testing purposes constitutes a "temporary shutdown." Appropriate alternative measures for informing building occupants and the fire department of a fire during a shutdown of a fire alarm system should be worked out in cooperation with the local fire department. The alternative measures decided upon should be recorded as part of the building fire safety plan.

A-2.2.7.2.(5) Water supply systems, whether municipally or privately owned, form an essential component of most fire suppression systems. When planning firefighting strategies and tactics, fire departments place a great deal of reliance on an adequate and dependable supply of water.

The responsibility for the inspection and maintenance of these water supply systems often rests with persons outside the control of the fire department. In many cases, the system is maintained and serviced by a water works or engineering department or by an outside agency.

No matter who is responsible for the system, it is essential that the agencies develop a cooperative approach and that they work together to ensure the best possible protection for the public. Failure to notify the fire department that a hydrant is out of service or that a water main has broken can cause delays, which may result in the loss of lives or excessive damage to property. Such neglect may also expose a municipality or an individual to litigation, which could otherwise be avoided.

A-2.2.10.1.(1) The authority having jurisdiction may accept alternatives to the installation of a key box at buildings containing fire protection equipment, elevator control or door access, as outlined in Sentence 2.2.10.1.(2), where measures have been taken to provide entry to the building on a 24 h basis. Buildings that have on-site security personnel, on-site staff or alternative access provisions acceptable to the authority having jurisdiction meet the requirements of this Sentence.

This Code allows for access to the key box by fire department personal in an emergency. Any other emergency response access is at the exclusive discretion of the authority having jurisdiction and the owner.

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 the building or facility:

- Most jurisdictions require that a building or facility 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 or facilities before they are sold and informs current owners or prospective buyers of existing buildings or facilities of any limitations pertaining to their future use or development.

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- Documentation provides design professionals with the basic information necessary to design changes to an existing building or facility.
- An alternative solution could be invalidated by a proposed alteration to a building or facility. 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 or facilities 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 on the CBHCC's website.

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[A]– Reference occurs in Division A. [C]– Reference occurs in Division C. All other references occur in Division B.

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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.^{2} (psi)	0.1450
kPa	lbf/ft.^{2}	20.88
L	gal. (imp.)	0.2200
L/s	gal./min (gpm)	13.20
L/h	gal./min (gpm)	0.00367
L/m^2	gal./ft.^{2}	0.0204
m	ft.	3.281
m^2	ft.^{2}	10.76
m^3	ft.^{3}	35.314475
mm	in.	0.03937
m/s	ft./min	196.8

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