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From Discovery to Innovation...

2010 NATIONAL MODEL CONSTRUCTION CODES

# Windows, Doors, Skylights and Sealants


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NRC Canadian Codes Centre
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# Introduction

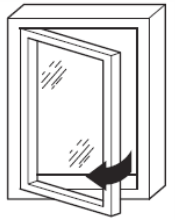
- Presentation is part of a series on the 2010 National Model Construction Codes
- Model codes developed by Canadian Commission on Building and Fire Codes
- These codes must be adopted by provincial/territorial authorities to become law

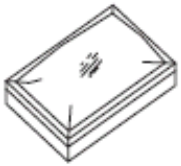
# Key Messages

- Technical changes for windows, doors and skylights address:
  - Referencing a harmonized North American Fenestration Standard (NAFS)
  - Adding Subsection 5.10.2. and restructuring Sections 9.6. and 9.7.
  - Identifying performance targets in Part 9
  - Identifying quantitative minimum thermal characteristics in Part 9
- Technical changes for sealants address:
  - Referencing up-to-date standards for sealant products
  - Relevant and new sealant product categories
  - A standard for backer rods

# Windows, Doors and Skylights

- Standards and code requirements
  - AAMA/WDMA/CSA 101/I.S.2/A440
    NAFS – North American Fenestration Standard
    Specification for Windows, Doors, and Skylights - 2008
    - US-only requirements
    - Canada-only requirements
  - CSA A440S1 Canadian Supplement
    - Snow loads
    - Air leakage
    - Marking (secondary designator)
    - Insect screens
  - Subsection 5.10.2.
  - Section 9.7

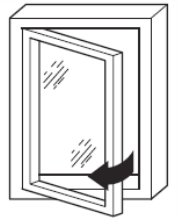


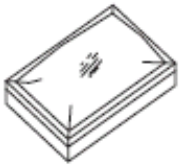


# Harmonized Standard

- Compare old fenestration standards with NAFS 2008
  - Ensure same level of performance
  - Replace 5 standards
    - ~~CSA A440-2000~~
    - ~~CSA A440.2 User Selection Guide~~
    - ~~CGSB 63.14 Plastic Skylights~~
    - ~~CSA 82.1 Sliding Doors~~
    - ~~CSA 82.5 Insulated Steel Doors~~

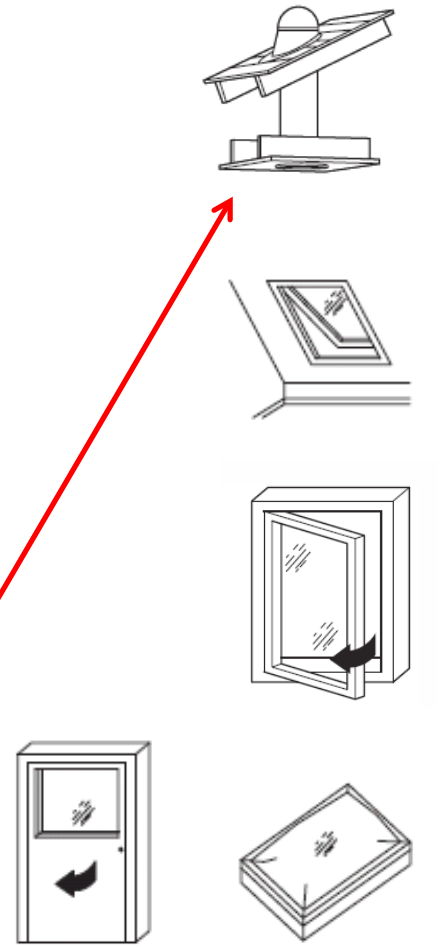
    with NAFS-2008 & Canadian Supplement
    - AAMA/WDMA/CSA 101/I.S.2/A440
    - CSA A440S1





# Harmonized Standard – Equivalency

- Compare old fenestration standards with NAFS 2008
  - Key similarities
    - Uses same test procedures
    - Canadian material standards are included
    - Similar auxiliary tests (optional)
  - Key differences
    - Different rating presentation
    - 5 performance classes & maximum test size
    - More fenestration styles or types + skylights, glass doors, entry doors, tubular daylighting devices



# Harmonized Standard – Marking

## Class R PG1200: Size tested 760 × 1250 mm – Casement

- Class R
  - Indicates performance class
  - R is minimum (NBC requirement)
- PG 1200
  - Indicates performance grade
  - Tested and passed at 1200 Pa design pressure
- Size tested 760 x 1250 mm
  - Indicates maximum product size tested
- Casement
  - Indicates product type

| **Class R PG1200: Size tested 760 × 1520 mm - Casement** | |
|---|---|
| Positive Design Pressure (DP) | = 2400 Pa |
| Negative Design Pressure (DP) | = –2880 Pa |
| Water Penetration Resistance Test Pressure | = 180 Pa |
| Canadian Air Infiltration/Exfiltration | = A3 Level |

# NBC Part 5

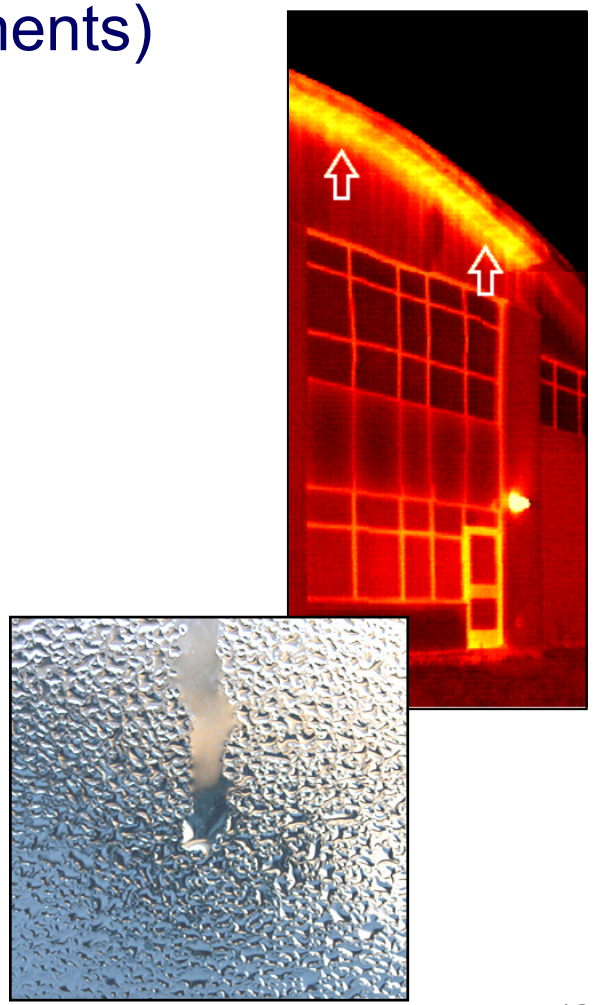
- 5.10.2. Windows, Doors & Skylights (new)
- 5.10.2.1. Application
  - Windows, doors and skylights
  - Separating interior space from
    - exterior space or
    - environmentally dissimilar interior spaces
  - “Skylights” = unit skylights, roof windows and tubular daylighting devices
- 5.10.2.2. Applicable Standards
- 5.10.2.3. Structural Loads, Air Leakage and Water Penetration Compliance
- 5.10.2.4. Heat Transfer Compliance

# Standards & Compliance

- 5.10.2.2. Windows, doors and skylights covered in NAFS
  - Reference NAFS and Canadian Supplement
  - Selection of performance grade
    - According to Canadian Supplement
    - Appropriate for the conditions and geographic location
  - Selection of fenestration product
    - Meeting required performance grade
    - When tested in accordance with the NAFS
- 5.10.2.3 … not covered in NAFS
  - Article 5.1.4.1. (Structural and Environmental Loads)
  - Sections 5.4. (Air Leakage) and 5.6. (Precipitation)

# 5.10.2.4 Heat Transfer Compliance

- Heat transfer (moved existing requirements)
  - Metal frames require a thermal break to minimize condensation
- Thermal breaks are NOT required in
  - storm windows or doors, or
  - windows or doors required to have a fire protection rating



# NBC Part 9

- Overview Part 9 changes
  - Section 9.7. Windows, Doors, Skylights
  - Section 9.6. Glass ~~Doors~~
  - Moved area & design, guard, egress requirements into Section 9.5., 9.8. and 9.9.
  - CSA A440.4 Installation Standard referenced
  - Replaced 5 standards with NAFS-2008

# 9.6. Glass

- Section 9.6. applies to glass in:
  - Interior doors and interior windows and their sidelights
  - Clothes closets
  - Site-built exterior windows, doors and skylights
  - Shower or bathtub enclosures
  - Glazed panels and partitions
- No new requirements, just reorganized
- Requirements deal with:
  - Glass material standards
  - Structural design of glass
  - Protection of glass

# 9.7. Windows, Doors and Skylights

- Organization of Section 9.7.

| | |
|---|---|
| 9.7.1. General | |
| 9.7.2. Required Windows, Doors and Skylights | |
| 9.7.3. Performance of Windows, Doors and Skylights | |
| 9.7.4. **Manufactured** Windows, Doors and Skylights | 9.7.5. **Site-built** Windows, Doors and Skylights |
| 9.7.6. Installation of Windows, Doors and Skylights | |

# 9.7.1. General

- Application, scope and entrance doors
  - Windows, doors and skylights
    - Separating conditioned space from unconditioned space
    - Including main entrance doors
- Clarifications that
  - “Doors” include glazing in doors and sidelites for doors
  - “Skylight” means unit skylights, roof windows and tubular daylighting devices

# 9.7.2. General Requirements

- Entrance doors
  - An entrance door is required for each dwelling unit
  - Requirements also include suite entry doors that do not separate inside from outside
  - Entrance doors need a door viewer or transparent glazing
- Other requirements for windows, doors and skylights
  - Minimum size of doorways and doors 9.5.
  - Guards, fall prevention 9.8.
  - Egress & windows and doors within exits 9.9.
  - Firefighting, spread of fire, flame spread 9.10.
  - Non-heating season ventilation 9.32.

# 9.7.3. General Performance

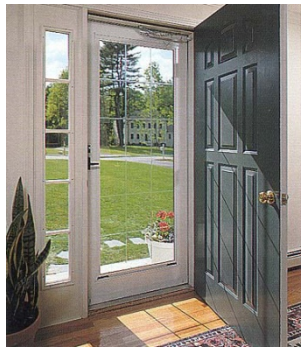
- Design and construction of exterior windows, doors and skylights in closed positions shall:
  - Resist ingress of precipitation into interior space
  - Resist wind loads
  - Control air leakage
  - Resist ingress of insects and vermin
  - Where required, resist forced entry
  - Be easily operable

- Skylights shall:
  - … resist snow load

# 9.7.3. General Performance

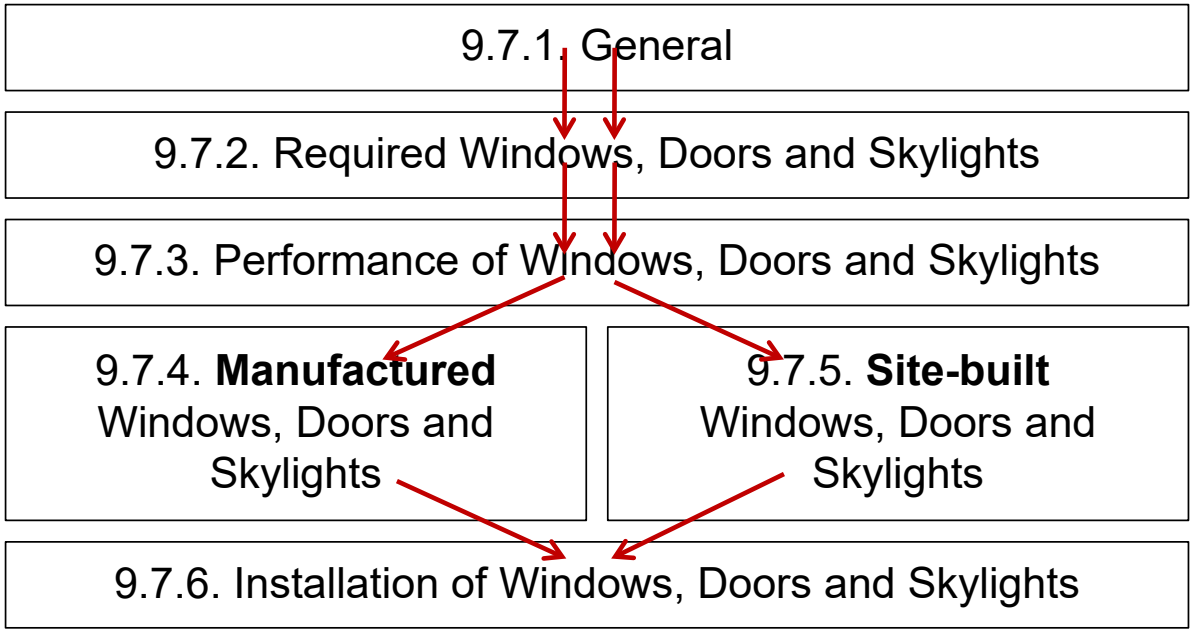
- Main entrance doors shall:
  - Control air leakage
  - Resist ingress of insects and vermin
  - Resist forced entry
  - Be easily operable

- Storm doors shall:
  - Resist wind loads
  - Control air leakage (min. 5 $m^3/h$ to max 8.35 $m^3/h$)
  - Resist ingress of insects and vermin
  - Be easily operable



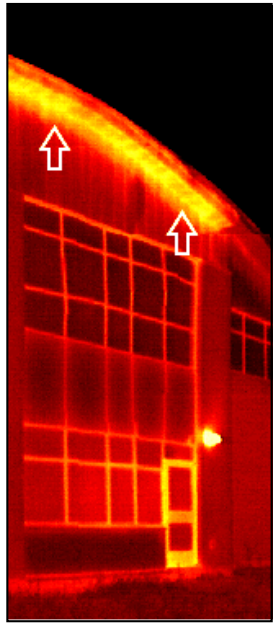
# 9.7.3. Compliance

- Compliance with performance requirements
  - Comply with Subsection 9.7.4 or 9.7.5, and then 9.7.6 or
  - Design and construction conforming to Part 5



# 9.7.3. Heat Transfer Performance

- Windows, doors and skylights shall:
  - Minimize surface condensation on the warm side
  - Ensure comfortable conditions for occupants during summer and winter
- Compliance with
  - Requirements in Article 9.7.3.3, or
  - Design and construction conforming to Part 5
- Some existing requirements remain:
  - Metal frames and sash need a thermal break
  - Except for garage doors, storm or fire-rated products



# 9.7.3. Thermal Characteristics

- New approach for basic thermal performance
  - In “normal conditions” need to conform to Table 9.7.3.3.
    - U-value – Maximum thermal transmittance
    - I factor – condensation resistance
      - Does not apply to sloped glazing
      - Can be tested according to CSA A440.2

| Component | 2.5% January Design Temperature | | | | | |
|---|---|---|---|---|---|---|
| | Warmer than –15°C | | Between –15°C and –30°C | | Colder than –30°C | |
| | max. U-value, W/m²K | min. I | max. U-value, W/m²K | min. I | max. U-value, W/m²K | min. I |
| Windows and doors | 2.5 | 54 | 2.0 | 68 | 1.7 | 77 |
| Skylights | 3.5 | (2) | 3.0 | (2) | 2.7 | (2) |

  - In “high moisture” conditions need to conform to Section 5.3.

# 9.7.4. Manufactured Products

- Application
  - Windows, doors, and skylights covered in scope of harmonized standard
- Compliance path
  - This Subsection and applicable requirements in Subsection 9.7.6.
  - Determine appropriate loads from Canadian supplement for service conditions and geographic location
  - Select product meeting required performance grade in NAFS
- Minimum level of performance is performance class R
- Exterior wood flush doors shall conform to CSA O132.2

# 9.7.5. Site-Built Products

- Application
  - Windows, doors, and skylights not covered in scope of AAMA/WDMA/CSA 101/I.S. 2/A440 NAFS North American Fenestration Standard/Specification for Windows, Doors and Skylights
- Compliance path
  - Subsections 9.7.5. and 9.7.6., or
  - Subsections 9.7.4. and 9.7.6, or
  - Design to Part 5
- Glass for site-built products shall comply with Section 9.6

# 9.7.5. Resistance to Forced Entry

- Resistance to forced entry for doors (existing requirements)
  - Applies to swinging doors
    - Entrance to dwelling units
    - Between dwelling units and attached garages
    - Access from a storage garage to a dwelling unit
  - Types of doors, hardware, deadbolts etc.
- Resistance to forced entry for windows
  - Windows within 2 m from the ground
  - Shall conform to Clause 5.3.5 NAFS
    - References ASTM F 588 for primary window (without screens)
    - Requires minimum Grade 10 restraint

# 9.7.6. Installation

- All fenestration products have to conform with CSA A440.4
  - Plywood shims can be used
  - Follow 9.27. for proper detailing of
    - flashing and
    - wall-window junctions
- Manufactured, pre-assembled and field-assembled products shall conform to manufacturer's instructions (i.e. not site-built)
- Seal fenestration products to air barriers and vapour barriers

# 9.7.6. Sealants, Trim and Flashing

- All existing requirements
- Now apply to all windows, doors and skylights
  - Compatibility of sealant materials required
  - Construct flashing according to 9.27.
  - Apply sealants between windows and cladding according to 9.27.
  - Protect aluminum parts in contact with edges of masonry, concrete, stucco or plaster with alkali-resistant coating

# 9.27.4. and 5.10. Sealants

- No testing and certification available
- Liability for industry
- Deletion of out-dated CGSB standards
  - ~~CGSB 9-GP-5M "Sealing Compound, One Component, Acrylic Base, Solvent Curing"~~
  - ~~CAN/CGSB-19.13-M "Sealing Compound, One-Component, Elastomeric, Chemical Curing"~~
  - ~~CGSB 19-GP-14M "Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing"~~
  - ~~CAN/CGSB-19.24-M "Multicomponent, Chemical-Curing Sealing Compound"~~
- Ensuring equivalent performance

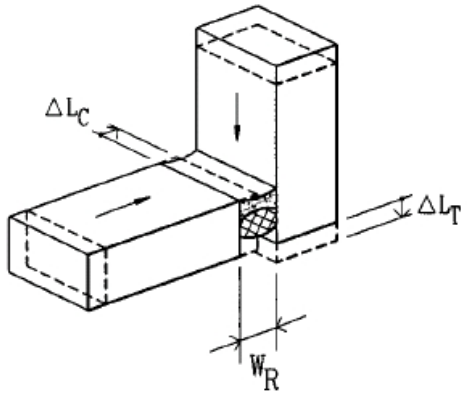
# 9.27.4. and 5.10. Sealants

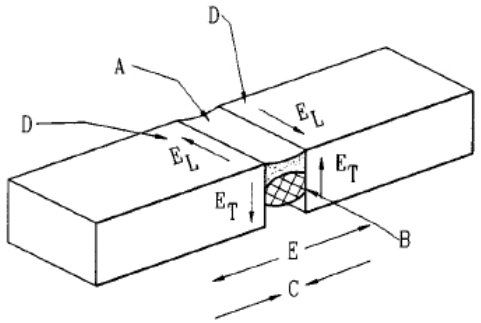
- Addition of ASTM standards
  - ASTM C 834 “Latex Sealing Compounds”
  - ASTM C 920 “Elastomeric Joint Sealants”
  - ASTM C 1184 “Structural Silicone Sealants”
  - ASTM C 1311 “Solvent Release Sealants”
  - ASTM C 1330 “Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants”

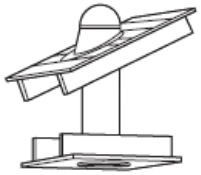
- Referencing up-to-date standards for sealant products
- Relevant and new sealant product categories
- A standard for backer rods

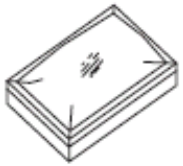
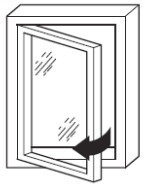
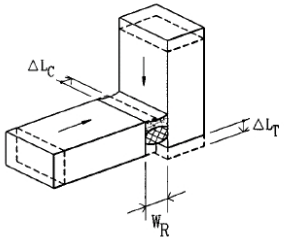
# 9.27.4. and 5.10. Sealants

- Addition of Appendix Notes
  - Reference guides
    - ASTM C 1193 Use of Joint Sealants
    - ASTM C 1299 Selection of Liquid-Applied Sealants
    - ASTM C 1472 Calculating Movement and Other Effects When Establishing Sealant Joint Width
  - Provide guidance on
    - joint preparation
    - sealants installation
    - application of sealants in unprotected environments
  - Emphasize importance of manufacturers' literature on materials and procedures



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