

# Checklist for converting a single family dwelling unit to two units

## Ontario Building Code (OBC) Compliance

The following items should be checked when preparing an application for a second dwelling unit. Although every application is different, this list should represent the bulk of the items that are to be checked.

**Note: Where compliance cannot be attained through OBC Part 9, OBC Part 11 can be utilized if the dwelling has been in existence for 5yrs or more.**

ITEM	PART 9 - OBC	CODE REFERENCE	PART 11 – CA
<b>Fire Resistance Rating</b>			
1.	<b>Floor</b> assembly between the two dwelling units is to be a <b>45 min</b> fire rated separation	9.10.9.14 9.10.8.1	C152 C147
2.	<b>Structural elements supporting fire rated assemblies</b> are to have a <b>45 min</b> fire rating	9.10.8.3.	C147
3.	<b>Walls</b> assemblies around the <b>furnace and other common areas (i.e. – public corridor, common laundry room)</b> are to be a <b>45 min</b> fire rated separation	9.10.9.14 9.10.9.15	C152
4.	<b>Exit enclosure</b> is to be a 45 min fire rated separation	9.9.4.2.	C121
<b>Sound Transmission Rating</b>			
1.	<b>Wall</b> and <b>floor</b> assemblies separating the two dwelling units are to have a 50 STC	9.11.2.1.	n/a
<b>Number of Exits and Exposure</b>			
1.	Minimum of <b>one exit</b> to the exterior is to be provided	9.9.8.2 9.9.9.1 9.9.9.3.	C134 C136
2.	Exit stair to be protected from <b>fire exposure</b>	9.9.4.4 9.9.4.6.	n/a
<b>Room Size and Dimensions</b>			
1.	<b>Room</b> sizes, <b>doorway</b> sizes and <b>ceiling heights</b>	9.5.	C102 C103 C104
<b>Windows and Spatial Separation</b>			
1.	<b>Window sizes</b>	9.7.	C107 C108
2.	<b>Bedroom windows</b>	9.9.10.1.	C137
3.	<b>Spatial Separation</b>	9.10.15.	C171 C172
<b>Alarms</b>			
1.	<b>Smoke Alarms</b>	9.10.19.	C175
2.	<b>Carbon Monoxide Alarms</b>	9.33.4.	C197
<b>Flame Spread Ratings</b>			
1.	Interior finish, wall and ceilings	9.10.17	n/a
<b>Electrical Facilities</b>			
1.	Electrical facilities	9.34.	n/a
<b>Laundry Fixtures</b>			
1.	Laundry fixtures	9.31.4.2.	n/a

# **Checklist for converting a single family dwelling unit to two units**

## **Ontario Building Code (OBC) Compliance - Mechanical**

### **A) House has been in existence for less than 5yrs and Brand New House**

One HVAC system for each apartment – shall comply with OBC 9.32 Ventilation

Return-air from a dwelling unit shall not be recirculated to any other dwelling unit-6.2.4.7 (10)

#### **Wall and Ceiling Assemblies:**

- 1) Permitted Openings 9.10.5.1(1), 9.10.5.1(4)
- 2) Protection of Openings–Fire Dampers 9.10.13.13

#### **Ceiling assembly is determined in conformance with the component additive method of the SB-2 and SB-3:**

- 1) Permitted Openings in Membrane Ceiling SB-2; 2.3.10; 2.3.11, 2.3.12
- 2) Protection of Openings in Membrane Ceiling- Fire Stop Flaps SB-2; 2.3.10; 2.3.11

#### **Ceiling assembly is determined in conformance with the listed ULC assembly:**

- 1) Permitted Openings in Membrane Ceiling ULC listing books
- 2) Protection of Openings in Membrane Ceiling -Fire Dampers and Fire Stop Flaps - 9.10.13.13(1) and 9.10.13.13(2)

### **B) House has been in existence for 5yrs or more**

Where compliance cannot be attained through OBC Part 9, OBC Part 11 can be utilized.

#### **Table 11.5.1.1.C:**

**C93-6.2.4.2(1), 6.2.4.3 (1) to (3), (5), (11) and (12); C94-6.2.4.3(10); C95-6.2.4.7(10); C168-9.10.13.13.(1); C169-9.10.13.14 and 9.10.5.1; C170- 9.10.13.14 and 9.10.5.1; C194-9.32; C195-9.33.1.1; C196-9.33.1.2; C197-9.33.4.3.(1)**

In addition, ensure:

#### **Ventilation**

- 1) Rooms 9.32  
-WR and Cooking Appliance Ventilation 9.32.3.4; 9.32.3.5
- 2) Solid Fuel Burning Appliance - HRV 9.32.3.11
- 3) Electric Heating - HRV 9.32.3.11

#### **Separation of Service Room**

- 1) Protection of Openings -Fire Dampers 9.10.13.13

### 8.9.3.2. General

- (1) Every *sewage system* shall be maintained so that,
- (a) the *construction* of the *sewage system* remains in accordance with,
    - (i) the basis on which the *construction* and use of the *sewage system* was approved or required under the Act or predecessor legislation, as the case may be, and
    - (ii) the requirements of the manufacturer of the *sewage system*, and
  - (b) all components of the *sewage system* function in their intended manner.
- (2) The land in the vicinity of a *sewage system* shall be maintained in a condition that will not cause damage to, or impair the functioning of, the *sewage system*.

### 8.9.3.3. Interceptors

(1) Every grease *interceptor* referred to in Article 8.1.3.1. shall be maintained in accordance with CAN/CSA-B481.4, “Maintenance of Grease Interceptors”.

### 8.9.3.4. Class 4 Sewage Systems

(1) *Septic tanks* and other *treatment units* shall be cleaned whenever sludge and scum occupy one-third of the *working capacity* of the tank.

### 8.9.3.5. Pressurized Distribution Systems

(1) The pressure head at the furthest point from the pump in all *distribution pipes* shall be checked for compliance with Articles 8.7.6.1. and 8.7.8.2. and the design specification at least every 36 months.

O. Reg. 332/12, Division B, Part 8.

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## Section 9.1. General

### 9.1.1. Application

#### 9.1.1.1. Scope

(1) The scope of this Part shall be as described in Subsection 1.1.2. of Division A.

#### 9.1.1.2. Signs

(1) Signs shall conform to the requirements in Section 3.15.

#### 9.1.1.3. Self-Service Storage Buildings

(1) *Self-service storage buildings* shall conform to the requirements in Section 3.10.

#### 9.1.1.4. Tents and Air-Supported Structures

(1) Tents shall conform to the requirements in Subsection 3.14.1.

(2) *Air-supported structures* shall conform to the requirements in Subsection 3.14.2.

#### 9.1.1.5. Proximity to Existing above Ground Electrical Conductors

(1) Where a *building* is constructed in close proximity to existing above ground electrical conductors, the requirements of Subsection 3.1.19. shall apply.

#### 9.1.1.6. Food Premises

(1) The requirements of Subsection 3.7.6. apply to all *food premises*.

#### 9.1.1.7. Radon

(1) In addition to all other requirements, a *building* in the following designated areas shall be designed and constructed so that the annual average concentration of radon 222 does not exceed 200 Bq/m<sup>3</sup> of air and the annual average concentration of the short lived daughters of radon 222 does not exceed 0.02 working levels inside the *building* for,

- (a) the City of Elliot Lake in the Territorial District of Algoma,
- (b) the Township of Faraday in the County of Hastings, and
- (c) the geographic Township of Hyman in the Territorial District of Sudbury.

#### 9.1.1.8. Building in Flood Plains



- (1) *Buildings* constructed on flood plains shall,
  - (a) be designed and constructed in accordance with good engineering practice to withstand anticipated vertical and horizontal hydrostatic pressures acting on the structure, and
  - (b) incorporate floodproofing measures that will preserve the integrity of *exits* and *means of egress* during times of flooding.

#### **9.1.1.9. Site Assembled and Factory-Built Buildings**

(1) Except as provided in Sentence (2), a manufactured *building* intended for *residential occupancy* is deemed to comply with this Code if it is designed and constructed in compliance with,

- (a) CAN/CSA-Z240.2.1, “Structural Requirements for Manufactured Homes”, if the *building* is constructed in sections not wider than 4.88 m, or
- (b) CSA A277, “Procedures for Factory Certification of Buildings”.

(2) The requirements of this Code shall apply to,

- (a) *building* components designed and constructed outside the place of manufacture, and
- (b) site installation of such *buildings*.

#### **9.1.1.10. Public Pools and Public Spas**

(1) *Public pools* shall conform to the requirements of Section 3.11. and *public spas* shall conform to the requirements of Section 3.12.

#### **9.1.1.11. Shelf and Rack Storage Systems**

(1) *Shelf and rack storage systems* shall conform to the requirements of Section 3.16.

### **Section 9.2. Reserved**

### **Section 9.3. Materials, Systems and Equipment**

#### **9.3.1. Concrete**

##### **9.3.1.1. General**

(1) Except as provided in Sentence (2), unreinforced and nominally reinforced concrete shall be designed, mixed, placed, cured and tested in accordance with the requirements for “R” class concrete stated in Clause 8.13 of CSA A23.1, “Concrete Materials and Methods of Concrete Construction”.

(2) Unreinforced and nominally reinforced site-batched concrete shall be designed, mixed, placed and cured in accordance with Articles 9.3.1.2. to 9.3.1.9.

(3) Except as provided in Sentence (4), Subsection 9.15.4. and Section 9.39., reinforced concrete shall be designed to conform to the requirements of Part 4.

(4) For flat insulating concrete form walls not exceeding 2 *storeys* in *building height*, and having a maximum floor to floor height of 3 m, in *buildings* of light-frame construction containing only a single *dwelling unit*, the concrete and reinforcing shall comply with Part 4 or,

- (a) the concrete shall conform to CSA A23.1, “Concrete Materials and Methods of Concrete Construction”, with a maximum aggregate size of 19 mm, and
- (b) the reinforcing shall,
  - (i) conform to CAN/CSA-G30.18-M, “Billet - Steel Bars for Concrete Reinforcement”,
  - (ii) have a minimum specified yield strength of 400 MPa, and
  - (iii) be lapped a minimum of 450 mm for 10M bars and 650 mm for 15M bars.

##### **9.3.1.2. Cement**

(1) Cement shall meet the requirements of CAN/CSA-A3001, “Cementitious Materials for Use in Concrete”.

##### **9.3.1.3. Concrete in Contact with Sulfate Soil**

(1) Concrete in contact with sulfate *soil*, which is deleterious to normal cement, shall conform to the requirements in Clause 4.1.1.6. of CSA A23.1, “Concrete Materials and Methods of Concrete Construction”.

##### **9.3.1.4. Aggregates**

(1) Aggregates shall,

- (a) consist of sand, gravel, crushed rock, crushed air-cooled blast furnace slag, expanded shale or expanded clay conforming to CSA A23.1, “Concrete Materials and Methods of Concrete Construction”, and
- (b) be clean, well-graded and free of injurious amounts of organic and other deleterious material.

**9.3.1.5. Water**

(1) Water shall be clean and free of injurious amounts of oil, organic matter, sediment or any other deleterious material.

**9.3.1.6. Compressive Strength**

(1) Except as provided elsewhere in this Part, the compressive strength of unreinforced concrete after 28 days shall be not less than,

- (a) 32 MPa for garage floors, carport floors and all exterior flatwork,
- (b) 20 MPa for interior floors other than those for garages and carports, and
- (c) 15 MPa for all other applications.

(2) Concrete used for garage and carport floors and exterior steps shall have air entrainment of 5 to 8%.

**9.3.1.7. Concrete Mixes**

(1) For site-batched concrete, the concrete mixes described in Table 9.3.1.7. shall be considered acceptable if the ratio of water to cementing materials does not exceed,

- (a) 0.45 for garage floors, carport floors and all exterior flatwork,
- (b) 0.65 for interior floors other than those for garages and carports, and
- (c) 0.70 for all other applications.

(2) The size of aggregate in unreinforced concrete mixes referred to in Sentence (1) shall not exceed,

- (a) 1/5 the distance between the sides of vertical forms, or
- (b) 1/3 the thickness of flatwork.

**Table 9.3.1.7.  
Concrete Mixes**

Forming Part of Sentence 9.3.1.7.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
	Maximum Size of Coarse Aggregate, mm	Materials, volume					
		Cement		Fine Aggregate (damp average coarse sand)		Coarse Aggregate (gravel or crushed stone)	
		Parts	L <sup>(1)</sup>	Parts	L	Parts	L
1.	14	1	28	1.75	49	2	56
2.	20	1	28	1.75	49	2.5	70
3.	28	1	28	2	56	3	84
4.	40	1	28	2	56	3.5	98

Notes to Table 9.3.1.7.:

<sup>(1)</sup> A 40 kg bag of cement contains 28 L.

**9.3.1.8. Admixtures**

(1) Admixtures shall conform to ASTM C260, “Air-Entraining Admixtures for Concrete”, or ASTM C494 / C494M, “Chemical Admixtures for Concrete”, as applicable.

**9.3.1.9. Cold Weather Requirements**

- (1) When the air temperature is below 5°C, concrete shall be,
  - (a) kept at a temperature of not less than 10°C or more than 25°C while being mixed and placed, and
  - (b) maintained at a temperature of not less than 10°C for 72 h after placing.
- (2) No frozen material or ice shall be used in concrete described in Sentence (1).

**9.3.2. Lumber and Wood Products**

**9.3.2.1. Grade Marking**

(1) Lumber for joists, rafters, trusses and beams and for the uses listed in Table 9.3.2.1. shall be identified by a grade stamp to indicate its grade as determined by the NLGA, “Standard Grading Rules for Canadian Lumber”.

**Table 9.3.2.1.**  
**Minimum Lumber Grades for Specific End Uses**  
 Forming Part of Sentences 9.3.2.1.(1) and 9.3.2.2.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Use	Boards			Framing
		Paragraph in the NLGA Grading Rules Under Which Boards are Graded			
		All Species		Eastern White Pine & Red Pine	All Species
		Para 113	Para 114	Para 118	
1.	Stud wall framing ( <i>loadbearing</i> members)	—	—	—	Stud, Standard, No. 2
2.	Stud wall framing ( <i>non-loadbearing</i> members)	—	—	—	Stud, Utility, No. 3
3.	Plank frame construction ( <i>loadbearing</i> members)	No. 3 Common	—	No. 3 Common	No. 2
4.	Plank frame construction ( <i>non-loadbearing</i> members)	No. 5 Common	—	No. 5 Common	Economy, No. 3
5.	Post and beams less than 114 mm in thickness	—	—	—	Standard, No.2
6.	Post and beams not less than 114 mm in thickness	—	—	—	Standard
7.	Roof sheathing	No. 3 Common	Standard	No. 4 Common	—
8.	Subflooring	No. 3 common	Standard	No. 3 Common	—
9.	Wall sheathing when required as a nailing base	No. 4 Common	Utility	No. 4 Common	—
10.	Wall sheathing not required as a nailing base	No. 5 Common	Economy	No. 5 Common	—

**9.3.2.2. Lumber Grades**

(1) Except for joists, rafters, trusses and beams, visually graded lumber shall conform to the grades in Table 9.3.2.1.

**9.3.2.3. Machine Stress Rated Lumber**

(1) Machine stress rated lumber shall conform to the requirements of Subsection 4.3.1.

**9.3.2.4. OSB, Waferboard and Plywood Marking**

(1) OSB, waferboard and plywood used for roof sheathing, wall sheathing and subflooring shall be legibly identified on the face of the material indicating,

- (a) the manufacturer of the material,
- (b) the standard to which it is produced, and
- (c) that the material is of an exterior type.

**9.3.2.5. Moisture Content**

(1) Moisture content of lumber shall be not more than 19% at the time of installation.

**9.3.2.6. Lumber Dimensions**

(1) Lumber dimensions referred to in this Part are actual dimensions determined in conformance with CSA O141, “Softwood Lumber”.

**9.3.2.7. Panel Thickness Tolerances**

(1) The thickness specified in this Part for plywood, hardboard, particleboard, OSB and waferboard shall be subject to the tolerances permitted in the standards referenced for these products unless specifically indicated in this Part.

**9.3.2.8. Undersized Lumber**

(1) Joist, rafter, lintel and beam members up to 5% less than the actual Canadian standard sizes are permitted to be used provided the allowable spans for the grade and species of lumber under consideration are reduced 5% from those shown in the span tables for full size members.

**9.3.2.9. Termite and Decay Protection**

- (1) In localities where termites are known to occur,
  - (a) clearance between structural wood elements and the finished ground level directly below them shall be not less than 450 mm and, except as provided in Sentence (2), all sides of the supporting elements shall be visible to permit inspection, or
  - (b) structural wood elements, supported by elements in contact with the ground or exposed over bare soil, shall be pressure-treated with a chemical that is toxic to termites.

(2) In localities where termites are known to occur and *foundations* are insulated or otherwise finished in a manner that could conceal a termite infestation,

- (a) a metal or plastic barrier shall be installed through the insulation and any other separation or finish materials above finished ground level to control the passage of termites behind or through the insulation, separation or finish materials, and
- (b) all sides of the finished supporting assembly shall be visible to permit inspection.

(3) Structural wood elements shall be pressure-treated with a preservative to resist decay, where the vertical clearance between structural wood elements and the finished ground level is less than 150 mm.

(4) In localities where termites are known to occur and where windows or other openings at or below *grade* contain wood elements, the bottom of window wells or adjacent ground shall be at least 150 mm below the nearest wood unless the wood is pressure-treated with a chemical toxic to termites.

(5) Structural wood elements used in retaining walls and cribbing shall be pressure-treated with a preservative to resist decay, where,

- (a) the retaining wall or cribbing supports ground that is critical to the stability of *building foundations*, or
- (b) the retaining wall or cribbing is greater than 1.2 m in height.

(6) Where wood is required by this Article to be treated to resist termites or decay, such treatment shall be in accordance with Table 2, "Use Categories for Specific Products, Uses, and Exposures", of CAN/CSA-O80.1, "Specification of Treated Wood", as follows:

- (a) Use Category 1, where the wood member is used in,
  - (i) interior construction,
  - (ii) above-ground applications, and
  - (iii) applications where the wood member remains dry,
- (b) Use Category 2, where the wood member is used in,
  - (i) interior construction,
  - (ii) above-ground applications, and
  - (iii) applications where the wood member may be subjected to occasional sources of moisture,
- (c) Use Category 3.2, where the wood member is used in,
  - (i) exterior construction,
  - (ii) above-ground applications, and
  - (iii) applications where the wood member is uncoated or is used in a configuration conducive to moisture accumulation,
- (d) Use Category 4.1, where,
  - (i) the wood member is used in contact with the ground,
  - (ii) the wood member is used in contact with fresh water, or
  - (iii) the vertical clearance between the wood element and the finished ground level is less than 150 mm and the wood elements are not separated from permeable supporting materials by a moisture barrier, or
- (e) Use Category 4.2, where the wood member is used in critical structural components, including permanent wood *foundations*.

(7) Where wood is protected in accordance with Use Category 1 or Use Category 2 using an inorganic boron preservative, the wood shall be,

- (a) protected from direct exposure to water during and after the completion of construction, and
- (b) separated from permeable supporting materials by a moisture barrier that is resistant to all expected mechanisms of deterioration in the service environment if the vertical clearance to the ground is less than 150 mm.

(8) Wood that is required by this Article to be treated to resist termites or decay shall be identified by a mark to indicate the type of preservative used and conformance to the relevant required Use Category.

### 9.3.3. Metal

#### 9.3.3.1. Sheet Metal Thickness

(1) Minimum thicknesses for sheet metal material required in this Part refer to the actual minimum base metal thicknesses measured at any point of the material, and in the case of galvanized steel described in Sentence 9.3.3.2.(1), include the thickness of the galvanizing coating unless otherwise indicated.

#### 9.3.3.2. Galvanized Sheet Steel

(1) Where sheet steel is required to be galvanized, it shall be metallic-coated with zinc or an alloy of 55% aluminium-zinc meeting the requirements of,

- (a) ASTM A653 / A653M, “Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process”, or
- (b) ASTM A792 / A792M, “Sheet Steel, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process”.

(2) Where galvanized sheet steel is intended for use in locations exposed to the weather or as a flashing material, it shall have a zinc coating not less than the G90 (Z275) coating designation or an aluminum-zinc alloy coating not less than the AZM150 coating designation, as referred to in Sentence (1).

### Section 9.4. Structural Requirements

#### 9.4.1. Structural Design Requirements and Application Limitations

##### 9.4.1.1. General

(1) Subject to the application limitations defined elsewhere in this Part, structural members and their connections shall,

- (a) conform to requirements provided elsewhere in this Part,
- (b) be designed according to good engineering practice such as provided in the CWC, “Engineering Guide for Wood Frame Construction”, or
- (c) be designed according to Part 4 using the loads and deflection and vibration limits specified in,
  - (i) this Part, or
  - (ii) Part 4.

(2) Where floor framing is designed in accordance with Clause (1)(b) or (c) and where supporting wall framing and fastenings or footings are designed according to Clause (1)(a), the specified *live load* on the floor shall not exceed 2.4 kPa.

(3) Location-specific information for structural design, including snow and wind loads and seismic spectral response accelerations, shall be determined according to MMAH Supplementary Standard SB-1, “Climatic and Seismic Data”.

#### 9.4.2. Specified Loads

##### 9.4.2.1. Application

(1) This Subsection applies to light-frame construction whose wall, floor and roof planes are generally comprised of frames of small repetitive structural members, and where,

- (a) the roof and wall planes are clad, sheathed or braced on at least one side,
- (b) the small repetitive structural members are spaced not more than 610 mm o.c.,
- (c) the clear span of any structural member does not exceed 12.20 m,
- (d) the maximum deflection of the structural roof members conforms to Article 9.4.3.1.,
- (e) the maximum total roof area, notwithstanding any separation of adjoining *buildings* by *firewalls*, is 4 550 m<sup>2</sup>, and
- (f) for flat roofs, there are no significant obstructions on the roof, such as parapet walls, spaced closer than the distance calculated by,

$$D_o = 10(H_o - 0.8 S_s / \gamma)$$

where,

$D_o$  = minimum distance between obstructions, m,

$H_o$  = height of the obstruction above the roof, m,

$S_s$  = ground snow load, kPa, and

$\gamma$  = unit weight of snow, kN/m<sup>3</sup>.

##### 9.4.2.2. Specified Design Snow Loads

(1) Except as provided in Sentences (2) and (3), specified snow loads shall be not less than those calculated using the following formula:

$$S = C_b \cdot S_s + S_r$$

where,

S = specified snow load,

$C_b$  = basic snow load roof factor, which is 0.45 where the entire width of a roof does not exceed 4.3 m and 0.55 for all other roofs,

$S_s$  = 1-in-50 year ground snow load in kPa, determined according to MMAH Supplementary Standard SB-1, “Climatic and Seismic Data”, and

$S_r$  = associated 1-in-50 year rain load in kPa, determined according to MMAH Supplementary Standard SB-1, “Climatic and Seismic Data”.

(2) In no case shall the specified snow load be less than 1 kPa.

(3) Bow string, arch or semi-circular roof trusses having an unsupported span greater than 6 m shall be designed in conformance with the snow load requirements in Subsection 4.1.6.

#### 9.4.2.3. Platforms Subject to Snow and Occupancy Loads

(1) Balconies, decks and other accessible exterior platforms intended for an *occupancy* and subject to snow loads shall be designed to carry the specified roof snow load or 1.9 kPa, whichever is greater, where the platform, or each segregated area of the platform, serves a single *dwelling unit*.

#### 9.4.2.4. Attics and Roof Spaces

(1) Ceiling joists or truss bottom chords in residential *attic or roof spaces* having limited accessibility that precludes the storage of equipment or material shall be designed for a total specified load of not less than 0.35 kPa, where the total specified load is the sum of the specified *dead load* plus the specified *live load* of the ceiling.

### 9.4.3. Deflections

#### 9.4.3.1. Deflections

(1) The maximum deflection of structural members shall conform to Table 9.4.3.1.

(2) *Dead loads* need not be considered in computing deflections referred to in Sentence (1).

**Table 9.4.3.1.  
Maximum Deflections**

Forming Part of Sentence 9.4.3.1.(1)

Item	Column 1	Column 2	Column 3
	Structural Members	Type of Ceiling Supported	Max. Allowable Deflection as an Expressed Ratio of the Clear Span
1.	Roof rafters, roof joists and roof beams	No ceiling	1/180
		Other than plaster or gypsum board	1/240
		Plaster or gypsum board	1/360
2.	Ceiling joists	Other than plaster or gypsum board	1/240
		Plaster or gypsum board	1/360
3.	Floor beams, floor joists and floor decking	All cases	1/360
4.	Beams, joists and decking for balconies, decks and other accessible exterior platforms	Serving a single <i>dwelling unit</i>	1/240
		Other	1/360

### 9.4.4. Foundation Conditions

#### 9.4.4.1. Allowable Bearing Pressures

(1) Footing sizes for *shallow foundations* shall be,

(a) determined in accordance with Section 9.15., or

(b) designed in accordance with Section 4.2. using,

(i) the maximum *allowable bearing pressures* in Table 9.4.4.1., or

(ii) *allowable bearing pressures* determined from *subsurface investigation*.

**Table 9.4.4.1.  
Allowable Bearing Pressure for Soil or Rock**

Forming Part of Sentence 9.4.4.1.(1)

Item	Column 1	Column 2
	Type and Condition of <i>Soil</i> or <i>Rock</i>	Maximum <i>Allowable Bearing Pressure</i> , kPa
1.	Dense or compact sand or gravel	150
2.	Loose sand or gravel	50
3.	Dense or compact silt	100
4.	Stiff clay	150
5.	Firm clay	75
6.	Soft clay	40
7.	Till	200
8.	Clay shale	300
9.	Sound <i>rock</i>	500

(2) The design procedures described in Section 4.2. are permitted to be used in lieu of the design procedures in this Subsection.

(3) The design procedures described in Section 4.2. shall be used where,

- (a) *deep foundations* are used,
- (b) the footing size falls outside the scope of this Section, or
- (c) the *foundation* is constructed on peat, filled ground or on sensitive clays as described in Article 9.15.1.1.

#### 9.4.4.2. Foundation Capacity in Weaker Soil and Rock

(1) Where a *soil* or *rock* within a distance equal to twice the footing width below the *bearing surface* has a lower *allowable bearing pressure* than that at the *bearing surface* as shown in Article 9.4.4.1., the design capacity of the *foundation* shall not be greater than would cause the weakest *soil* or *rock* to be stressed beyond its *allowable bearing pressure*.

(2) In calculating subsurface pressures referred to in Sentence (1), the loads from the footings shall be assumed to be distributed uniformly over a horizontal plane within a frustum extending downward from the footing at an angle of 60° to the horizontal.

#### 9.4.4.3. High Water Table

(1) Where a *foundation* bears on gravel, sand or silt, and the water table is within a distance below the *bearing surface* equal to the width of the *foundation*, the *allowable bearing pressure* shall be 50% of that determined in Article 9.4.4.1.

#### 9.4.4.4. Soil Movement

(1) Where a *foundation* is located in an area where *soil* movement caused by changes in *soil* moisture content, freezing, or chemical-microbiological oxidation is known to occur to the extent that it will damage a *building*, measures shall be taken to preclude such movement or to reduce the effects on the *building* so that the *building's* stability and the performance of assemblies will not be adversely affected.

#### 9.4.4.5. Reserved

#### 9.4.4.6. Walls Supporting Drained Earth

(1) Except where constructed in accordance with Section 9.15., walls supporting drained earth shall be designed,

- (a) for a pressure equivalent to that exerted by a fluid with a density of not less than 480 kg/m<sup>3</sup> and a depth equal to that of the retained earth, or
- (b) in accordance with Section 4.2. so as to be able to resist the loads and effects described in Article 4.1.2.1.

(2) Walls supporting other than drained earth shall be designed,

- (a) for the pressure described in Clause (1)(a) plus the fluid pressure of the surcharge, or
- (b) in accordance with Section 4.2. so as to be able to resist the loads and effects described in Article 4.1.2.1.

### Section 9.5. Design of Areas, Spaces and Doorways

#### 9.5.1. General

##### 9.5.1.1. Application

(1) Except as otherwise specified in this Part, this Section applies only to *dwelling units* that are intended for use on a continuing or year-round basis as the principal residence of the occupant.

##### 9.5.1.2. Method of Measurement

(1) Except as otherwise specified in this Part, the areas, dimensions and heights of rooms or spaces shall be measured between finished wall surfaces and between finished floor and ceiling surfaces.

**9.5.1.3. Floor Areas**

(1) Minimum floor areas specified in this Section do not include closets or built-in bedroom cabinets unless otherwise indicated.

**9.5.1.4. Combination Rooms**

(1) Two or more areas may be considered as a combination room if the opening between the areas occupies the larger of 3 m<sup>2</sup> or 40% or more of the wall measured on the side of the dependent area.

(2) Where the dependent area is a bedroom, direct passage shall be provided between the two areas.

(3) The opening required in Sentence (1) shall not contain doors or windows.

**9.5.1.5. Lesser Areas and Dimensions**

(1) Areas of rooms and spaces are permitted to be less than required in this Section provided it can be shown that the rooms and spaces are adequate for their intended use, such as by the provision of built-in furniture to compensate for reduced sizes.

**9.5.2. Barrier-Free Design**

**9.5.2.1. General**

(1) Except as provided in Sentence (2) and Article 3.8.1.1., every *building* shall be designed in conformance with Section 3.8.

(2) The requirements of Section 3.8. need not be provided for houses, including semi-detached houses, duplexes, triplexes, town houses, row houses and boarding or rooming houses with fewer than eight boarders or roomers.

**9.5.2.2. Protection on Floor Areas with a Barrier-Free Path of Travel**

(1) Where a *barrier-free* path of travel required in Article 9.5.2.1. is provided to any *storey* above the *first storey*, the requirements in Article 3.3.1.7. shall apply.

**9.5.2.3. Stud Wall Reinforcement**

(1) If wood wall studs or sheet steel wall studs enclose the main bathroom in a *dwelling unit*, reinforcement shall be installed to permit the future installation of a grab bar on a wall adjacent to,

(a) a water closet in the location required by Clause 3.8.3.8.(1)(d), and

(b) a shower or bathtub in the location required by Clause 3.8.3.13.(1)(f).

**9.5.3. Ceiling Heights**

**9.5.3.1. Ceiling Heights of Rooms or Spaces**

(1) The ceiling heights of rooms or spaces in *residential occupancies* and *live/work units* shall conform to Table 9.5.3.1.

(2) Areas in rooms or spaces over which ceiling height is not less than the minimum specified in Table 9.5.3.1. shall be contiguous with the entry or entries to those rooms or spaces.

**Table 9.5.3.1.  
Room Ceiling Heights**

Forming Part of Sentences 9.5.3.1.(1) and (2)

Item	Column 1	Column 2
	Room or Space	Minimum Heights <sup>(1)</sup>
1.	Living room or space, dining room or space, kitchen or kitchen space	2 300 mm over at least 75 % of the required floor area with a clear height of 2 100 mm at any point over the required area
2.	Bedroom or bedroom space	2 300 mm over at least 50 % of the required area or 2 100 mm over all of the required floor area. Any part of the floor having a clear height of less than 1 400 mm shall not be considered in computing the required floor area
3.	<i>Basement</i> space	2 100 mm over at least 75 % of the <i>basement</i> area except that under beams and ducts the clearance is permitted to be reduced to 1 950 mm
4.	Bathroom, water closet room or laundry area above <i>grade</i>	2 100 mm in any area where a person would normally be in a standing position
5.	Passage, hall or main entrance vestibule and finished rooms not specifically mentioned above	2 100 mm



Notes to Table 9.5.3.1.:

(1) Area of the space shall be measured at floor level.

#### **9.5.3.2. Mezzanines**

(1) The ceiling height above and below a *mezzanine* floor assembly in all *occupancies* shall be not less than 2 100 mm.

#### **9.5.3.3. Storage Garages**

(1) The clear height in a *storage garage* shall be not less than 2 000 mm.

### **9.5.4. Living Rooms or Spaces within Dwelling Units**

#### **9.5.4.1. Areas of Living Rooms and Spaces**

(1) Living areas within *dwelling units*, either as separate rooms or in combination with other spaces, shall have an area not less than 13.5 m<sup>2</sup>.

(2) Where the area of a living space is combined with a kitchen and dining area, the living area alone in a *dwelling unit* that contains sleeping accommodation for not more than two persons shall be not less than 11 m<sup>2</sup>.

### **9.5.5. Dining Rooms or Spaces within Dwelling Units**

#### **9.5.5.1. Area of Dining Rooms or Spaces**

(1) A dining space in combination with other space shall have an area of not less than 3.25 m<sup>2</sup>.

(2) Dining rooms not combined with other space shall have a minimum area of 7 m<sup>2</sup>.

### **9.5.6. Kitchens within Dwelling Units**

#### **9.5.6.1. Kitchen Areas**

(1) Kitchen areas within *dwelling units* either separate from or in combination with other spaces, shall have an area of not less than 4.2 m<sup>2</sup> including the area occupied by the base cabinets, except that in *dwelling units* containing sleeping accommodation for not more than two persons, the minimum area shall be 3.7 m<sup>2</sup>.

### **9.5.7. Bedrooms or Spaces in Dwelling Units and Dormitories**

#### **9.5.7.1. Areas of Bedrooms**

(1) Except as provided in Articles 9.5.7.2. and 9.5.7.3., bedrooms in *dwelling units* shall have an area not less than 7 m<sup>2</sup> where built-in cabinets are not provided and not less than 6 m<sup>2</sup> where built-in cabinets are provided.

#### **9.5.7.2. Areas of Master Bedrooms**

(1) Except as provided in Article 9.5.7.3., at least one bedroom in every *dwelling unit* shall have an area of not less than 9.8 m<sup>2</sup> where built-in cabinets are not provided and not less than 8.8 m<sup>2</sup> where built-in cabinets are provided.

#### **9.5.7.3. Areas of Combination Bedrooms**

(1) Bedroom spaces in combination with other spaces in *dwelling units* shall have an area not less than 4.2 m<sup>2</sup>.

#### **9.5.7.4. Areas of Other Sleeping Rooms**

(1) Sleeping rooms other than in *dwelling units* shall have an area not less than 7 m<sup>2</sup> per person for single *occupancy* and 4.6 m<sup>2</sup> per person for multiple *occupancy*.

#### **9.5.7.5. Recreational Camps**

(1) *Recreational camps* shall have an area in the sleeping quarters of at least 3.72 m<sup>2</sup> per camper or, if double or triple tier bunk units are used, 2.79 m<sup>2</sup> per camper.

#### **9.5.7.6. Camps for Housing Workers**

(1) A *camp for housing of workers* shall have a minimum area of 3.72 m<sup>2</sup> per employee in every room used for sleeping purposes.

### **9.5.8. Combined Spaces**

#### **9.5.8.1. Combined Living, Dining, Bedroom and Kitchen Spaces**

(1) Despite Subsections 9.5.4. to 9.5.7., where living, dining, bedroom and kitchen spaces are combined in a *dwelling unit* that contains sleeping accommodation for not more than two persons, the area of the combined spaces shall be not less than 13.5 m<sup>2</sup>.

### **9.5.9. Bathrooms and Water Closet Rooms**

#### **9.5.9.1. Space to Accommodate Fixtures**

(1) In every *dwelling unit* an enclosed space of sufficient size shall be provided to accommodate a water closet, lavatory and bathtub or shower stall.

**9.5.9.2. Doors to Rooms Containing Water Closets**

(1) A door shall be provided to each room containing a water closet within a *dwelling unit*.

**9.5.10. Hallways**

**9.5.10.1. Hallway Width**

(1) The unobstructed width of a hallway within a *dwelling unit* shall be not less than 860 mm, except that the hallway width is permitted to be 710 mm, where,

- (a) there are only bedrooms and bathrooms at the end of the hallway furthest from the living area, and
- (b) a second *exit* is provided,
  - (i) in the hallway near the end furthest from the living area, or
  - (ii) in each bedroom served by the hallway.

**9.5.11. Doorway Sizes**

**9.5.11.1. Doorway Opening Sizes**

(1) Except as provided in Articles 9.5.11.3., 9.9.6.2. and 9.9.6.3., doorway openings within *dwelling units* shall be designed to accommodate at least the door sizes in Table 9.5.11.1. for swing-type doors or folding doors.

**Table 9.5.11.1.  
Minimum Door Sizes**

Forming Part of Sentence 9.5.11.1.(1)

Item	Column 1	Column 2	Column 3
	At Entrance to:	Minimum Width, mm	Minimum Height, mm
1.	<i>Dwelling unit</i> (required entrance) Vestibule or entrance hall	810	1 980
2.	Stairs to a floor level that contains a finished space All doors in at least one line of passage from the exterior to the <i>basement</i> Utility rooms	810	1 980
3.	Walk-in closet	610	1 980
4.	Bathroom, water closet room, shower room <sup>(1)</sup>	610	1 980
5.	Rooms located off hallways that are permitted to be 710 mm wide	610	1 980
6.	Rooms not mentioned above, exterior balconies	760	1 980

Notes to Table 9.5.11.1.:

<sup>(1)</sup> See Article 9.5.11.3.

**9.5.11.2. Doors to Public Water Closet Rooms**

(1) Doors to public water closet rooms shall be not less than 810 mm wide and 2 030 mm high.

**9.5.11.3. Doors to Bathrooms**

(1) Where a *barrier-free* path of travel conforming to Section 3.8. is provided into a *suite* of *residential occupancy* and where a bathroom within the *suite* is at the level of the *suite* entrance door, the doorway to such bathroom and to each bedroom at the same level as such bathroom shall have, when the door is in the open position, a clear width of not less than,

- (a) 760 mm where the door is served by a corridor or space not less than 1 060 mm wide, and
- (b) 810 mm where the door is served by a corridor or space less than 1 060 mm wide.

**Section 9.6. Glass**

**9.6.1. General**

**9.6.1.1. Application**

- (1) This Section applies to,
- (a) glass in,
    - (i) interior windows and interior doors and their sidelights,
    - (ii) clothes closets,

- (iii) site-built exterior windows, doors and skylights,
- (iv) shower or bathtub enclosures,
- (v) glazed panels and *partitions*, and

(b) the protection of glass.

**9.6.1.2. Material Standards for Glass**

- (1) Glass shall conform to,
  - (a) CAN/CGSB-12.1-M, “Tempered or Laminated Safety Glass,”
  - (b) CAN/CGSB-12.2-M, “Flat, Clear Sheet Glass”,
  - (c) CAN/CGSB-12.3-M, “Flat, Clear Float Glass”,
  - (d) CAN/CGSB-12.4-M, “Heat-Absorbing Glass,”
  - (e) CAN/CGSB-12.8, “Insulating Glass Units”,
  - (f) CAN/CGSB-12.10-M, “Glass, Light and Heat Reflecting”,
  - (g) CAN/CGSB-12.11-M, “Wired Safety Glass”, or
  - (h) ASTM E2190, “Insulating Glass Unit Performance and Evaluation”.

(2) Mirrored glass doors are permitted to be used only at the entrance to clothes closets and shall conform to the requirements of CAN/CGSB-82.6-M, “Doors, Mirrored Glass, Sliding or Folding, Wardrobe”.

(3) Mirrored glass doors reinforced with a film backing shall meet the impact resistance requirements specified in CAN/CGSB-12.5-M, “Mirrors, Silvered”.

**9.6.1.3. Structural Sufficiency of Glass**

- (1) Glass shall be designed in conformance with CAN/CGSB-12.20-M, “Structural Design of Glass for Buildings”.
- (2) The maximum area of individual panes of glass for doors shall conform to Table 9.6.1.3.

**Table 9.6.1.3.  
Maximum Glass Area for Doors**

Forming Part of Sentence 9.6.1.3.(2)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Glass Thickness, mm	Maximum Glass Area, m <sup>2</sup>						
		Type of Glass						
		Annealed	Annealed Multiple-Glazed Factory-Sealed Units	Laminated	Wired	Heat Strengthened	Fully Tempered	Fully Tempered Multiple-Glazed Factory-Sealed Units
1.	3	0.50	0.70	<sup>(1)</sup>	<sup>(1)</sup>	1.00	1.00	2.00
2.	4	1.00	1.50	<sup>(1)</sup>	<sup>(1)</sup>	1.50	4.00	4.00
3.	5	1.50	1.50	<sup>(1)</sup>	<sup>(1)</sup>	1.50	No limit	No limit
4.	6	1.50	1.50	1.20	1.00	1.50	No limit	No limit

Notes to Table 9.6.1.3.:

<sup>(1)</sup> Not generally available.

**9.6.1.4. Types of Glass and Protection of Glass**

(1) Glass sidelights greater than 500 mm wide that could be mistaken for doors, glass in storm doors and glass in sliding doors within or at every entrance to a *dwelling unit* and in public areas shall be,

- (a) safety glass of the tempered or laminated type conforming to CAN/CGSB-12.1-M, “Tempered or Laminated Safety Glass”, or
- (b) wired glass conforming to CAN/CGSB-12.11-M, “Wired Safety Glass”.

(2) Except as provided in Sentence (4), glass in entrance doors to *dwelling units* and in public areas, other than the entrance doors described in Sentence (1), shall be safety glass or wired glass of the type described in Sentence (1) where the glass area exceeds 0.5 m<sup>2</sup> and extends to less than 900 mm from the bottom of the door.

(3) Except as provided in Sentence (4), transparent panels that could be mistaken as a *means of egress* shall be protected by barriers or railings.

(4) Sliding glass *partitions* that separate a *public corridor* from an adjacent *occupancy* and that are open during normal working hours need not conform to Sentences (2), (3) and (5), except that such *partitions* shall be suitably marked to indicate their existence and position.

(5) Except as provided in Sentence (4), every glass or transparent door accessible to the public shall be equipped with hardware, bars or other permanent fixtures designed so that the existence and position of such doors is readily apparent.

(6) Glass, other than safety glass, shall not be used for a shower or bathtub enclosure.

**Section 9.7. Windows, Doors and Skylights**

**9.7.1. General**

**9.7.1.1. Application**

(1) This Section applies to,

- (a) windows, doors and skylights separating *conditioned space* from unconditioned space or the exterior, and
- (b) main entrance doors.

(2) For the purpose of this Section, the term “skylight” refers to unit skylights, roof windows and tubular daylighting devices.

(3) For the purpose of this Section, the term “doors” includes glazing in doors and sidelights for doors.

**9.7.2. Required Windows, Doors and Skylights**

**9.7.2.1. Entrance Doors**

(1) A door shall be provided at each entrance to a *dwelling unit*.

(2) Main entrance doors to *dwelling units* shall be provided with,

- (a) a door viewer or transparent glazing in the door, or
- (b) a sidelight.

**9.7.2.2. Other Requirements for Windows, Doors and Skylights**

(1) Windows and skylights installed to provide required non-heating season ventilation shall conform to Article 9.32.2.1.

(2) Windows and doors installed to provide the required *means of egress* from bedrooms shall conform to Subsection 9.9.10.

(3) Windows and doors installed to provide the required access to a *building* for firefighting purposes shall conform to Subsection 9.10.20.

(4) The protection of window and door openings against persons falling through the window or door opening shall conform to Article 9.8.8.1.

(5) Minimum sizes of doorways and doors within a *barrier-free* path of travel shall conform to Section 9.5.

(6) The location and protection of windows, doors and skylights in order to control the spread of fire shall conform to Subsection 9.10.12.

(7) Doors between *dwelling units* and attached garages shall conform to Article 9.10.13.15.

(8) The surface *flame-spread rating* for doors and skylights shall conform to Article 9.10.17.1.

(9) Properties of windows and doors within *exits* shall conform to Section 9.9.

**9.7.2.3. Minimum Window Areas**

(1) Except as required in Article 9.9.10.1. and Sentence (3), the minimum window glass area for rooms in *buildings* of *residential occupancy* or rooms that are used for sleeping shall conform to Table 9.7.2.3.

**Table 9.7.2.3.  
Glass Areas for Rooms of Residential Occupancy**

Forming Part of Sentence 9.7.2.3.(1)

Item	Column 1	Column 2	Column 3
	Location	Minimum Unobstructed Glass Area With No Electric Lighting	Minimum Unobstructed Glass Area With Electric Lighting
1.	Laundry, <i>basement</i> recreation room, unfinished <i>basement</i>	4% of area served	Windows not required

2.	Water closet room	0.37 m <sup>2</sup>	Windows not required
3.	Kitchen, kitchen space, kitchen alcove	10% of area served	Windows not required
4.	Living rooms and dining rooms	10% of area served	10% of area served
5.	Bedrooms and other finished rooms not mentioned above	5% of area served <sup>(1)</sup>	5% of area served <sup>(1)</sup>

Notes to Table 9.7.2.3.:

<sup>(1)</sup> See Subsection 9.9.10.

(2) The unobstructed glass area of a door or skylight is considered equivalent to that of a window.

(3) Work areas in *live/work units* shall conform to Clause 3.7.2.1.(2)(a).

(4) Where rooms with different requirements for window glass area are combined as described in Sentence 9.5.1.4.(1), the more restrictive requirement shall govern.

### 9.7.3. Performance of Windows, Doors and Skylights

#### 9.7.3.1. General Performance Criteria

(1) Except as provided in Sentences (2) to (4), windows, doors and skylights and their components separating *conditioned space* from unconditioned space or the exterior shall be designed, constructed and installed so that, when in the closed position, they,

- (a) resist the ingress of precipitation into interior space,
- (b) resist wind loads,
- (c) control air leakage,
- (d) resist the ingress of insects and vermin,
- (e) where required, resist forced entry, and
- (f) are easily operable, unless they are fixed units.

(2) Skylights and their components shall be designed, constructed and installed so that, when in the closed position, they resist snow loads.

(3) Main entrance doors and their components shall be designed, constructed and installed so that, when in the closed position, they,

- (a) control air leakage,
- (b) resist the ingress of insects and vermin,
- (c) resist forced entry, and
- (d) are easily operable.

(4) Storm doors for sliding doors and their components shall be designed, constructed and installed so that, when in the closed position, they,

- (a) resist wind loads,
- (b) control air leakage to a minimum allowable 5 m<sup>3</sup>/h/m and a maximum allowable 8.35 m<sup>3</sup>/h/m,
- (c) resist the ingress of insects and vermin, and
- (d) are easily operable.

(5) Compliance with the performance requirements described in Sentences (1) to (4) shall be demonstrated by,

- (a) compliance with the requirements in,
  - (i) Subsection 9.7.4. or 9.7.5., and
  - (ii) Subsection 9.7.6., or

(b) design and construction conforming to Part 5.

#### 9.7.3.2. Heat Transfer Performance

(1) Windows, doors and skylights described in Clause 9.7.1.1.(1)(a) and their components shall be designed, constructed and installed to,

- (a) minimize surface condensation on the warm side of the component, and

- (b) ensure comfortable conditions for the occupants.
- (2) Compliance with the heat transfer performance requirements described in Sentence (1) shall be demonstrated by,
  - (a) compliance with the requirements in Article 9.7.3.3., or
  - (b) design and construction conforming to Part 5.

**9.7.3.3. Thermal Characteristics of Windows, Doors and Skylights**

- (1) Except as permitted in Sentence (2), metal frames and sash of windows, doors and skylights shall incorporate a thermal break.
- (2) Windows and doors described in Sentence (1) do not require a thermal break where they are installed as,
  - (a) vehicular access doors,
  - (b) storm windows and doors, or
  - (c) windows and doors that are required to have a *fire-resistance rating*.
- (3) Windows, doors and skylights, with or without storm doors or sash, that are installed in *buildings* where the intended use of the interior space will not result in high moisture generation shall have a maximum thermal transmittance (U-value) or minimum temperature index (I) in accordance with Table 9.7.3.3.
- (4) Windows, doors and skylights, with or without storm doors or sash, that are installed in portions of *buildings* where the intended use of the interior space will result in high moisture generation shall be designed in conformance with Subsection 5.3.

**Table 9.7.3.3.  
Maximum U-value or Minimum Temperature Index (I) for Windows, Doors and Skylights <sup>(1) (2) (3)</sup>**

Forming Part of Sentence 9.7.3.3.(3)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Component	2.5% January Design Temperature			
		Between -15°C and -30°C		Colder than -30°C	
		max. U-value, W/m <sup>2</sup> K	min. I	max. U-value, W/m <sup>2</sup> K	min. I
1.	Windows and Doors	2.0	68	1.7	77
2.	Skylights	3.0	<sup>(2)</sup>	2.7	<sup>(2)</sup>

**Notes to Table 9.7.3.3.:**

- <sup>(1)</sup> U-values for specific products can be determined according to measures referenced in AAMA/WDMA/CSA 101/I.S.2/A440, “NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights”. Temperature index (I) is determined according to the physical test procedure given in CSA A440.2/A440.3, “Fenestration Energy Performance/User Guide to CSA A440.2-09, Fenestration Energy Performance”.
- <sup>(2)</sup> There is no appropriate test procedure available for testing the condensation resistance of sloped glazing.
- <sup>(3)</sup> Where the U-value in this Table differs from the U-value provided in MMAH Supplementary Standard SB-10, “Energy Efficiency Requirements” or MMAH Supplementary Standard SB-12, “Energy Efficiency for Housing”, the most restrictive U-value shall apply.

**9.7.4. Manufactured Windows, Doors and Skylights**

**9.7.4.1. Application**

(1) This Subsection applies to windows, doors and skylights that are within the scope of AAMA/WDMA/CSA 101/I.S.2/A440, “NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights”.

**9.7.4.2. General**

- (1) Manufactured and pre-assembled windows, doors and skylights and their installation shall conform to,
  - (a) AAMA/WDMA/CSA 101/I.S.2/A440, “NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights”,
  - (b) CSA A440S1, “Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights”,
  - (c) this Subsection, and
  - (d) the applicable requirements in Subsection 9.7.6.

**9.7.4.3. Performance Requirements**

(1) Performance grades for windows, doors and skylights shall be selected according to CSA A440S1, “Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights” so as to be appropriate for the conditions and geographic location in which the window, door or skylight will be installed.

(2) Windows, doors and skylights shall conform to the performance grades selected under Sentence (1) when tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, “NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights”.

(3) The minimum level of performance required for windows, doors and skylights shall be that of the Performance Class R.

(4) Exterior wood doors shall conform to CAN/CSA-O132.2 Series, “Wood Flush Doors” and shall have legibly indicated on them,

- (a) the name of the manufacturer,
- (b) the standard to which they were produced, and
- (c) that they are of an exterior type.

### **9.7.5. Site-Built Windows, Doors and Skylights**

#### **9.7.5.1. Application and Compliance**

(1) Materials, design, construction and installation of windows, doors and skylights that separate *conditioned space* from unconditioned space or the exterior but that are not within the scope of AAMA/WDMA/CSA 101/I.S.2/A440, “NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights” shall,

- (a) conform to,
  - (i) this Subsection or Subsection 9.7.4., and
  - (ii) the applicable requirements in Subsection 9.7.6., or
- (b) conform to Part 5.

(2) Glass for site-built windows, doors, sidelights for doors, and skylights shall comply with Section 9.6.

#### **9.7.5.2. Resistance to Forced Entry for Doors**

(1) Except for exterior doors to garages and to other ancillary spaces, this Article applies to,

- (a) swinging entrance doors to *dwelling units*,
- (b) swinging doors between *dwelling units* and attached garages or other ancillary spaces, and
- (c) swinging doors that provide access directly or indirectly from a *storage garage* to a *dwelling unit*.

(2) Doors, frames and hardware that conform to a security level of at least Grade 10 as described in the Annex to ASTM F476, “Security of Swinging Door Assemblies”, are not required to conform to Sentences (3) to (7).

(3) Except as provided in Sentence (2), wood doors described in Sentence (1) shall,

- (a) be solid core or stile-and-rail type,
- (b) be not less than 45 mm thick, and
- (c) if of the stile-and-rail panel type, have a panel thickness of not less than 19 mm, with a total panel area not more than half of the door area.

(4) Except as provided in Sentence (2), doors described in Sentence (1) shall be provided with,

- (a) a deadbolt lock with a cylinder having no fewer than five pins, and
- (b) a bolt throw not less than 25 mm long, protected with a solid or hardened free-turning ring or bevelled cylinder housing.

(5) Except as provided in Sentence (2), an inactive leaf in double doors used in locations specified in Sentence (1) shall be provided with heavy-duty bolts top and bottom having an engagement of not less than 15 mm.

(6) Except as provided in Sentence (2), hinges for doors described in Sentence (1) shall be fastened,

- (a) to wood doors with wood screws not less than 25 mm long and to wood frames with wood screws such that at least two screws per hinge penetrate not less than 30 mm into solid wood, or
- (b) to metal doors and metal frames with machine screws not smaller than No. 10 and not less than 10 mm long.

(7) Except as provided in Sentence (2), strikeplates for deadbolts described in Sentence (4) shall be fastened,

- (a) to wood frames with wood screws that penetrate not less than 30 mm into solid wood, or
- (b) to metal frames with machine screws not smaller than No. 8 and not less than 10 mm long.

(8) Except for storm doors or screen doors, doors described in Sentence (1) that swing outward shall be provided with hinges or pins so that the doors cannot be removed when they are in the closed position.

(9) Solid blocking shall be provided on both sides at the lock height between the jambs for doors described in Sentence (1) and the structural framing so that the jambs will resist spreading by force.

### **9.7.5.3. Resistance to Forced Entry for Windows**

(1) In *dwelling units*, windows, any part of which is located within 2 m of adjacent ground level, shall conform to the requirements for resistance to forced entry as described in Clause 5.3.5 of AAMA/WDMA/CSA 101/I.S.2/A440, “NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights”.

### **9.7.6. Installation**

#### **9.7.6.1. Installation of Windows, Doors and Skylights**

(1) The installation of windows, doors and skylights shall conform to CAN/CSA-A440.4, “Window, Door and Skylight Installation”, except that,

- (a) shims used to support windows, doors and skylights are permitted to be of treated plywood, and
- (b) protection from precipitation for walls incorporating windows or doors and for roofs incorporating skylights, and the interfaces of these walls with windows or doors and of roofs with skylights, shall conform to Section 9.27.

(2) The installation of manufactured and pre-assembled windows, doors and skylights and the field assembly of manufactured window and door combination units shall conform to the manufacturer’s instructions.

(3) Windows, doors and skylights shall be sealed to air barriers and *vapour barriers*.

#### **9.7.6.2. Sealants, Trim and Flashing**

(1) The sealing compound used to seal the glass component of an insulating glazing unit to the sash component shall be compatible with the sealing compound used to edge seal the glass component.

(2) Flashing used to protect openings shall conform to Articles 9.27.3.7. and 9.27.3.8.

(3) Sealants shall be applied between window frames or trim and the exterior cladding or masonry in conformance with Subsection 9.27.4.

(4) All unfinished portions of the frame and other components of aluminum windows, doors or skylights in contact with the edges of masonry, concrete, stucco or plaster shall be protected with an alkali-resistant coating.

## **Section 9.8. Stairs, Ramps, Handrails and Guards**

### **9.8.1. Application**

#### **9.8.1.1. General**

(1) This Section applies to the design and construction of interior and exterior stairs, steps, ramps, handrails and *guards*.

#### **9.8.1.2. Stairs, Ramps, Landings, Handrails and Guards in Garages**

(1) Except as provided in Sentence 9.8.6.2. (3), stairs, ramps, landings, handrails and *guards* in a garage that serves a single *dwelling unit* shall conform to the requirements for stairs, ramps, landings, handrails and *guards* within a *dwelling unit*.

#### **9.8.1.3. Exit Stairs, Ramps and Landings**

(1) Where a stair, ramp or landing forms part of an *exit*, the appropriate requirements in Sections 9.9. and 9.10. shall also apply.

#### **9.8.1.4. Escalators and Moving Walks**

(1) Escalators and moving walks shall conform to the appropriate requirements in Part 3.

### **9.8.2. Stair Dimensions**

#### **9.8.2.1. Stair Width**

(1) Except as provided in Sentence (2), required *exit* stairs and public stairs serving *buildings of residential occupancy* shall have a width, measured between wall faces or *guards*, of not less than 900 mm.

(2) At least one stair between each floor level within a *dwelling unit*, and exterior stairs and required *exit* stairs serving a single *dwelling unit*, shall have a width of not less than 860 mm.



(3) Required *exit* stairs and public stairs serving *buildings* of other than *residential occupancy* shall have a width of not less than the greater of,

- (a) 900 mm, or
- (b) 8 mm per person based on the *occupant load* limits specified in Table 3.1.17.1.

**9.8.2.2. Height over Stairs**

- (1) The clear height over stairs shall be,
  - (a) measured vertically, over the clear width of the stair, from a straight line tangent to the tread and landing nosings to the lowest point above, and
  - (b) not less than,
    - (i) 1 950 mm for stairs serving a single *dwelling unit*, and
    - (ii) 2 050 mm for stairs not serving a single *dwelling unit*.

**9.8.3. Stair Configurations**

**9.8.3.1. Straight and Curved Runs in Stairs**

- (1) Except as provided in Sentence (2), stairs shall consist of,
  - (a) straight-runs, or
  - (b) curved-runs.
- (2) Stairs within *dwelling units* shall consist of,
  - (a) straight-runs,
  - (b) curved-runs,
  - (c) straight-runs with winders, or
  - (d) straight-runs with curved-runs.

**9.8.3.2. Minimum Number of Risers**

- (1) Except for stairs within a *dwelling unit*, at least three risers shall be provided in interior flights.

**9.8.3.3. Maximum Height of Stairs**

- (1) The vertical height between any landings shall not exceed 3.7 m.

**9.8.4. Step Dimensions**

**9.8.4.1. Dimensions for Risers**

- (1) The rise, which is measured as the vertical nosing-to-nosing distance, shall conform to Table 9.8.4.1.

**Table 9.8.4.1.  
Rise, Run and Tread Depth for Rectangular Treads**

Forming Part of Sentences 9.8.4.1.(1) and 9.8.4.2.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
	Stair Type	All Steps		Rectangular Treads			
		Rise, mm		Run, mm		Tread Depth, mm	
		max.	min.	max.	min.	max.	min.
1.	Service and <i>mezzanines</i> in <i>live/work units</i> <sup>(1)</sup>	no limit	125	355	no limit	355	no limit
2.	Private <sup>(2)</sup>	200	125	355	210	355	235
3.	Public <sup>(3)</sup>	180	125	no limit	280	no limit	280

Notes to Table 9.8.4.1.:

<sup>(1)</sup> Service stairs are stairs that serve areas used only as *service rooms* or *service spaces* and stairs that serve *mezzanines* not exceeding 20 m<sup>2</sup> within *live/work units*.

<sup>(2)</sup> Private stairs are interior stairs within *dwelling units* and exterior stairs serving a single *dwelling unit* or a garage that serves a single *dwelling unit*.

<sup>(3)</sup> Public stairs are all stairs not described as service stairs or private stairs.

**9.8.4.2. Dimensions for Rectangular Runs and Treads**

(1) The run, which is measured as the horizontal nosing-to-nosing distance, and the tread depth of rectangular treads shall conform to Table 9.8.4.1.

(2) The depth of a rectangular tread shall be not less than its run and not more than its run plus 25 mm.

#### 9.8.4.3. Dimensions for Angled Treads

(1) Angled treads in required *exit* stairs shall conform to the requirements in Article 3.4.6.9.

(2) Except as provided in Article 9.8.4.5., angled treads in other than required *exit* stairs shall have an average run, which is measured as the horizontal nosing-to-nosing distance, of not less than 200 mm and a minimum run of 150 mm.

(3) The depth of an angled tread shall be not less than its run, measured as the horizontal nosing-to-nosing distance, at any point and not more than its run at any point plus 25 mm.

#### 9.8.4.4. Uniformity and Tolerances for Risers and Treads

(1) Except as provided in Sentence (2), risers shall be of uniform height in any one flight with a maximum tolerance of,

- (a) 5 mm between adjacent treads or landings, and
- (b) 10 mm between the tallest and shortest risers in a flight.

(2) Except for required *exit* stairs, where the top or bottom riser in a stair adjoins a sloping finished walking surface such as a garage floor, driveway or sidewalk, the height of the riser across the stair shall vary by not more than 1 in 12.

(3) Treads shall have uniform run with a maximum tolerance of,

- (a) 5 mm between adjacent treads, and
- (b) 10 mm between the deepest and shallowest treads in a flight.

(4) Where angled treads or winders are incorporated into a stair, the treads in all sets of angled treads or winders within a flight shall turn in the same direction.

(5) The slope of treads shall not exceed 1 in 50.

#### 9.8.4.5. Winders

(1) Stairs within *dwelling units* are permitted to contain winders that converge to a centre point provided,

- (a) the winders turn through an angle of not more than 90°,
- (b) individual treads turn through an angle of not less than 30° or not more than 45°, and
- (c) adjacent winders turn through the same angle.

(2) Where more than one set of winders described in Sentence (1) is provided in a single stairway between adjacent floor levels, such winders shall be separated in plan by at least 1 200 mm.

#### 9.8.4.6. Leading Edges of Treads

(1) Leading edges of treads that are bevelled or rounded shall,

- (a) not reduce the required tread depth by more than 15 mm, and
- (b) not, in any case, exceed 25 mm horizontally.

#### 9.8.4.7. Interior Stairs Extending through the Roof

(1) Interior stairways extending through the roof of a *building* shall be protected from ice and snow.

### 9.8.5. Ramps

#### 9.8.5.1. Application

(1) This Subsection applies to pedestrian ramps except ramps in a *barrier-free* path of travel.

(2) Ramps in a *barrier-free* path of travel shall conform to the requirements in Article 3.8.3.4.

#### 9.8.5.2. Ramp Width

(1) Except as provided in Sentence (2), *exit* ramps and public ramps serving *buildings* of *residential occupancy* shall have a clear width of not less than 900 mm.

(2) A ramp serving a single *dwelling unit* shall have a width of not less than 860 mm.

(3) *Exit* ramps and public ramps serving *buildings* of other than *residential occupancy* shall have a clear width of not less than the greater of,

- (a) 900 mm, or

(b) 8 mm per person based on the *occupant load* limits specified in Table 3.1.17.1.

**9.8.5.3. Height over Ramps**

- (1) The clear height over ramps shall be not less than,
  - (a) 1 950 mm for ramps serving a single *dwelling unit*, and
  - (b) 2 050 mm for ramps not serving a single *dwelling unit*.

**9.8.5.4. Slope**

- (1) The slope of ramps shall be not more than,
  - (a) 1 in 10 for exterior ramps,
  - (b) 1 in 10 for interior ramps serving *residential occupancies*,
  - (c) 1 in 6 for *mercantile* or *industrial occupancies*, and
  - (d) 1 in 8 for all other *occupancies*.

**9.8.5.5. Maximum Rise**

(1) Where the slope of the ramp is greater than 1 in 12, the maximum rise between floors or landings shall be 1 500 mm.

**9.8.6. Landings**

**9.8.6.1. Application**

- (1) This Subsection applies to landings, except landings for ramps in a *barrier-free* path of travel.
- (2) Landings for ramps in a *barrier-free* path of travel shall conform to the requirements in Article 3.8.3.4.
- (3) Finished floors, and ground surfaces with a slope not exceeding 1 in 50, at the top and bottom of stairs or ramps shall be considered as landings.

**9.8.6.2. Required Landings**

- (1) Except as provided in Sentences (2) to (4) and Sentence 9.9.6.6.(2), a landing shall be provided,
  - (a) at the top and bottom of each flight of interior and exterior stairs, including stairs in garages,
  - (b) at the top and bottom of every ramp with a slope greater than 1 in 50, and
  - (c) where a doorway opens onto a stair or ramp.
- (2) Where a door at the top of a stair in a *dwelling unit* swings away from the stair, no landing is required between the doorway and the stair.
- (3) A landing may be omitted at the top of an exterior stair serving a garage or a secondary entrance to a single *dwelling unit*, including an entrance from an attached garage, provided,
  - (a) the stair does not contain more than three risers,
  - (b) except as provided in Clause (c), the door is a sliding door or swings away from the stair, and
  - (c) where a storm or screen door is provided, it may swing over the stair if it is equipped with hardware to hold it open.
- (4) A landing may be omitted at the bottom of an exterior stair or ramp provided there is no obstruction, such as a gate or door, within the lesser of the width of the stair or ramp, or,
  - (a) 900 mm for stairs or ramps serving a single *dwelling unit*, and
  - (b) 1100 mm for stairs or ramps not serving a single *dwelling unit*.

**9.8.6.3. Dimensions of Landings**

(1) Except as provided in Sentences (3) to (6), the width and length of landings shall comply with Table 9.8.6.3.

**Table 9.8.6.3.  
Dimensions of Landings**

Forming Part of Sentence 9.8.6.3.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Application	Landing Configuration	Minimum Width, mm	Length, mm
1.	Stairs and ramps serving a single <i>dwelling unit</i>	In straight-run stair or ramp, or landing turning through less than 30°, within a <i>dwelling unit</i>	Width of stair or ramp	Not less than 860

		In straight-run exterior stair or ramp, or exterior landing turning through less than 30°	Width of stair or ramp	Not less than 900
		Landing turning through an angle of 30° or more, but less than 90°	Width of stair or ramp measured at right angle to path of travel	(a) Not less than 230 measured at the inside edge of the landing, and (b) Not less than 370 measured 230 from the inside edge of landing or handrail
		Landing turning through not less than 90°	Width of stair or ramp measured at right angle to path of travel	Not less than width of stair or ramp landing
2.	Stairs and ramps serving other than single <i>dwelling units</i>	In straight-run stair or ramp, or landing turning through less than 30°	Width of stair or clear width of ramp	Lesser of required width of stair or clear width of ramp, or 1 100
		Landing turning through 30° or more	Width of stair or clear width of ramp measured at right angle to path of travel	Not less than width of stair or clear width of ramp

(2) Reserved

(3) Where stairs or ramps of different widths adjoin a single landing, the minimum width of the landing shall be,

- (a) not less than the greater required stair or ramp width, where one or more of the stair or ramp widths do not exceed their respective required widths, or
- (b) not less than the lesser actual stair or ramp width, where all of the widths of the stairs or ramps exceed their respective required widths.

(4) Where a door swings toward a stair, the full arc of the swing shall be over the landing.

(5) The slope of landings shall not exceed 1 in 50.

(6) Where a doorway or stairway opens onto the side of a ramp, the landing shall extend for a distance of not less than 300 mm on either side of the doorway or stairway, except on a side abutting an end wall.

#### 9.8.6.4. Height over Landings

- (1) The clear height over landings shall be not less than,
  - (a) 1 950 mm for landings serving a single *dwelling unit*, and
  - (b) 2 050 mm for landings not serving a single *dwelling unit*.

#### 9.8.7. Handrails

##### 9.8.7.1. Required Handrails

(1) Except as provided in Sentences (2) to (4), a handrail shall be installed on stairs and ramps in conformance with Table 9.8.7.1.

**Table 9.8.7.1.  
Handrails for Stairs and Ramps**

Forming Part of Sentence 9.8.7.1.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Location of Stair or Ramp	Handrails Serving Stairs			Handrails Serving Ramps	
		Stairs < 1 100 mm Required Width		Stairs ≥ 1 100 mm Required Width	Ramps < 1 100 mm Required Width	Ramps ≥ 1 100 mm Required Width
		Straight	Curved	All	Straight or Curved	All
		Number of Sides Required to have a Handrail				
1.	Within a <i>dwelling unit</i>	1	1	1	1	2
2.	All other locations	1	2	2	2	2

(2) Where a stair or a ramp is required to be at least 2 200 mm wide due to the *occupant load*, a handrail shall be installed such that no position on the stair or ramp is more than 825 mm from a handrail.

(3) A handrail is not required for stairs and ramps serving a single *dwelling unit*, where,

- (a) interior stairs have not more than two risers,
- (b) exterior stairs have not more than three risers, or
- (c) ramps rise not more than 400 mm.

(4) Only one handrail is required on exterior stairs having more than three risers, provided such stairs serve a single *dwelling unit*.

#### **9.8.7.2. Continuity of Handrails**

(1) Except as provided in Sentence (2), at least one required handrail shall be continuous throughout the length of the stair or ramp, including landings, except where interrupted by,

- (a) doorways, or
- (b) newel posts at changes in direction.

(2) For stairs or ramps serving a single *dwelling unit*, at least one required handrail shall be continuous throughout the length of the stair or ramp, except where interrupted by,

- (a) doorways,
- (b) landings, or
- (c) newel posts at changes in direction.

#### **9.8.7.3. Termination of Handrails**

(1) Handrails shall be terminated in a manner that will not obstruct pedestrian travel or create a hazard.

(2) Except for stairs and ramps serving a single *dwelling unit*, at least one handrail at the sides of a stair or ramp shall extend horizontally not less than 300 mm beyond the top and bottom of each stair or ramp.

#### **9.8.7.4. Height of Handrails**

(1) The height of handrails on stairs and ramps shall be measured vertically from the top of the handrail to,

- (a) a straight line drawn tangent to the tread nosings of the stair served by the handrail, or
- (b) the surface of the ramp, floor or landing served by the handrail.

(2) Except as provided in Sentences (3) and (4), the height of handrails on stairs and ramps shall be,

- (a) not less than 865 mm, and
- (b) not more than 965 mm.

(3) Where *guards* are required, handrails required on landings shall be not more than 1 070 mm in height.

(4) Handrails installed in addition to required handrails need not comply with Sentence (2).

#### **9.8.7.5. Ergonomic Design**

(1) A clearance of not less than 50 mm shall be provided between a handrail and any surface behind it.

(2) All handrails shall be constructed so as to be continually graspable along their entire length with no obstruction on or above them to break a handhold, except where the handrail is interrupted by newels at changes in direction.

#### **9.8.7.6. Projections into Stairs and Ramps**

(1) Handrails and projections below handrails, including handrail supports and stair stringers, shall not project more than 100 mm into the required width of a stair or ramp.

#### **9.8.7.7. Design and Attachment of Handrails**

(1) Handrails and any *building* element that could be used as a handrail shall be designed and attached in such a manner as to resist,

- (a) a concentrated load at any point of not less than 0.9 kN, and
- (b) for handrails other than those serving a single *dwelling unit*, a uniformly distributed load of 0.7 kN/m.

(2) Where a handrail serving a single *dwelling unit* is attached to wood studs or blocking, the attachment shall be deemed to comply with Sentence (1), where,

- (a) the attachment points are spaced not more than 1.2 m apart,
- (b) the first attachment point at either end is located not more than 300 mm from the end of the handrail, and

(c) the fasteners consist of no fewer than two wood screws at each point, penetrating not less than 32 mm into solid wood.

### 9.8.8. Guards

#### 9.8.8.1. Required Guards

(1) Except as provided in Sentences (2) and (3), every surface to which access is provided for other than maintenance purposes, including but not limited to flights of steps and ramps, exterior landings, porches, balconies, *mezzanines*, galleries and raised walkways, shall be protected by a *guard* on each side that is not protected by a wall for the length, where,

- (a) there is a difference in elevation of more than 600 mm between the walking surface and the adjacent surface, or
- (b) the adjacent surface within 1.2 m from the walking surface has a slope of more than 1 in 2.

(2) *Guards* are not required,

- (a) at loading docks,
- (b) at floor pits in *repair garages*, or
- (c) where access is provided for maintenance purposes only.

(3) When an interior stair has more than two risers or an interior ramp rises more than 400 mm, the sides of the stair or ramp and the landing or floor level around the stairwell or ramp shall be protected by a *guard* on each side that is not protected by a wall.

(4) Doors in *buildings of residential occupancy*, where the finished floor on one side of the door is more than 600 mm above the floor or other surface or ground level on the other side of the door, shall be protected by,

- (a) a *guard* in accordance with this Subsection, or
- (b) a mechanism capable of controlling the free swinging or sliding of the door so as to limit any clear unobstructed opening to not more than 100 mm.

(5) Except as provided in Sentence (6), openable windows in *buildings of residential occupancy* shall be protected by,

- (a) a *guard* in accordance with this Subsection, or
- (b) a mechanism capable of controlling the free swinging or sliding of the openable part of the window so as to limit any clear unobstructed opening to not more than 100 mm measured either vertically or horizontally where the other dimension is greater than 380 mm.

(6) Windows need not be protected in accordance with Sentence (5), where,

- (a) the window serves a *dwelling unit* that is not located above another *suite*,
- (b) the only opening greater than 100 mm by 380 mm is a horizontal opening at the top of the window,
- (c) the top surface of the window sill is located more than 480 mm above the finished floor on one side of the window, or
- (d) the window is located in a room or space with the finished floor described in Clause (c) located less than 1 800 mm above the floor or ground on the other side of the window.

(7) Except as provided in Sentence (8), glazing installed over stairs, ramps and landings that extends to less than 1 070 mm above the surface of the treads, ramp or landing shall be,

- (a) protected by *guards* in accordance with this Subsection, or
- (b) non-openable and designed to withstand the specified lateral loads for *guards* as provided in Article 4.1.5.14.

(8) In *dwelling units*, glazing installed over stairs, ramps and landings that extends to less than 900 mm above the surface of the treads, ramp or landing shall be,

- (a) protected by *guards* in accordance with this Subsection, or
- (b) non-openable and designed to withstand the specified lateral loads for *guards* as provided in Article 4.1.5.14.

(9) Glazing installed in public areas that extends to less than 1 000 mm from the floor and is located above the second *storey* in *buildings of residential occupancy* shall be,

- (a) protected by *guards* in accordance with this Subsection, or
- (b) non-openable and designed to withstand the specified lateral loads for *guards* as provided in Article 4.1.5.14.

#### 9.8.8.2. Loads on Guards

(1) Except as provided in Sentence (5), *guards* shall be designed to resist the specified loads prescribed in Table 9.8.8.2.

**Table 9.8.8.2.  
Specified Loads for Guards**

Forming Part of Sentence 9.8.8.2.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Location of <i>Guard</i>	Minimum Specified Loads		
		Horizontal Load Applied Inward or Outward at any Point at the Minimum Required Height of the <i>Guard</i>	Horizontal Load Applied Inward or Outward on Elements Within the <i>Guard</i> , Including Solid Panels and Pickets	Evenly Distributed Vertical Load Applied at the Top of the <i>Guard</i>
1.	<i>Guards</i> within <i>dwelling units</i> and exterior <i>guards</i> serving not more than 2 <i>dwelling units</i>	0.5 kN/m or concentrated load of 1.0 kN applied at any point <sup>(1)</sup>	0.5 kN applied over a maximum width of 300 mm and a height of 300 mm <sup>(2)</sup>	1.5 kN/m
2.	<i>Guards</i> serving access walkways to equipment platforms, contiguous stairs and similar areas	Concentrated load of 1.0 kN applied at any point	Concentrated load of 0.5 kN applied at any point on individual elements	1.5 kN/m
3.	All other <i>guards</i>	0.75 kN/m or concentrated load of 1.0 kN applied at any point <sup>(1)</sup>	Concentrated load of 0.5 kN applied at any point on individual elements	1.5 kN/m

**Notes to Table 9.8.8.2.:**

(1) The load that creates the most critical condition shall apply.

(2) See Sentence (2).

(2) Where the width and spacing of balusters in *guards* within *dwelling units* and in exterior *guards* serving not more than two *dwelling units* is such that three balusters can be engaged by a load imposed over a 300 mm width, the load shall be imposed so as to engage three balusters.

(3) None of the specified loads prescribed in Table 9.8.8.2. need be considered to act simultaneously.

(4) For *guards* within *dwelling units* and for exterior *guards* serving not more than 2 *dwelling units*, Table 9.8.8.2. need not apply where the *guard* construction has been demonstrated to provide effective performance.

(5) *Guards* constructed in accordance with the requirements in MMAH Supplementary Standard SB-7, “Guards for Housing and Small Buildings” shall be deemed to satisfy the requirements of Sentence (1).

**9.8.8.3. Height of Guards**

(1) Except as provided in Sentences (2) to (6), all *guards* shall be not less than 1 070 mm high.

(2) All *guards* within *dwelling units* shall be not less than 900 mm high.

(3) Exterior *guards* serving not more than one *dwelling unit* shall be not less than 900 mm high where the walking surface served by the *guard* is not more than 1 800 mm above the finished ground level.

(4) *Guards* for flights of steps, except in required *exit* stairs, shall be not less than 900 mm high.

(5) Except as provided in Sentence (6), the height of *guards* shall be not less than,

(a) 920 mm for required *exit* stairs, and

(b) 1 070 mm around landings.

(6) The height of *guards* for exterior stairs and landings more than 10 m above adjacent ground level shall be not less than 1 500 mm.

(7) The height of *guards* for stairs and landings shall be measured vertically from the top of the *guard* to,

(a) a straight line drawn tangent to the tread nosings of the stair, or

(b) the surface of the landing.

**9.8.8.4. Guards for Floors and Ramps in Garages**

(1) Except for floors of garages referred to in Section 9.35., where garage floors or ramps are 600 mm or more above the adjacent ground or floor level, every opening through a garage floor and the perimeter of floors and ramps that have no exterior walls shall be provided with,

(a) a continuous curb not less than 150 mm in height, and

(b) a *guard* not less than 1 070 mm above the floor level.

(2) Vehicle guardrails shall be designed for a concentrated horizontal load of 22 kN applied outward at any point 500 mm above the floor surface.

#### **9.8.8.5. Openings in Guards**

(1) Except as provided in Sentence (2), openings through any *guard* that is required by Article 9.8.8.1. shall be of a size that will prevent the passage of a spherical object having a diameter of 100 mm unless it can be shown that the location and size of openings that exceed this limit do not represent a hazard.

(2) Openings through any *guard* that is required by Article 9.8.8.1. and that is installed in a *building of industrial occupancy* shall be of a size that will prevent the passage of a spherical object having a diameter of 200 mm, unless it can be shown that the location and size of openings that exceed this limit do not represent a hazard.

(3) Unless it can be shown that the location and size of openings that do not comply with the following limits do not represent a hazard, openings through any *guard* that is not required by Article 9.8.8.1. and that serves a *building of other than industrial occupancy*, shall be of a size that,

- (a) will prevent the passage of a spherical object having a diameter of 100 mm, or
- (b) will permit the passage of a spherical object having a diameter of 200 mm.

#### **9.8.8.6. Guards Designed Not to Facilitate Climbing**

(1) *Guards* required by Article 9.8.8.1., except those in *industrial occupancies* and where it can be shown that the location and size of openings do not represent a hazard, shall be designed so that no member, attachment or opening located between 140 mm and 900 mm above the floor or walking surface protected by the *guard* will facilitate climbing.

#### **9.8.8.7. Glass in Guards**

(1) Glass in *guards* shall be,

- (a) safety glass of the laminated or tempered type conforming to CAN/CGSB-12.1-M, “Tempered or Laminated Safety Glass”, or
- (b) wired glass conforming to CAN/CGSB-12.11-M, “Wired Safety Glass”.

### **9.8.9. Construction**

#### **9.8.9.1. Loads on Stairs and Ramps**

(1) Except as required in Articles 9.8.9.4. and 9.8.9.5., stairs and ramps shall be designed for strength and rigidity under uniform loading criteria to support specified loads of,

- (a) 1.9 kPa for stairs and ramps serving a single *dwelling unit*, and
- (b) 4.8 kPa for other stairs and ramps.

#### **9.8.9.2. Exterior Concrete Stairs**

(1) Exterior concrete stairs with more than two risers and two treads shall be,

- (a) supported on unit masonry or concrete walls or piers not less than 150 mm in cross-section, or
- (b) cantilevered from the main *foundation* wall.

(2) Stairs described in Sentence (1), when cantilevered from the *foundation* wall, shall be constructed and installed in conformance with Subsection 9.8.10.

(3) The depth below ground level for *foundations* for exterior steps shall conform to the requirements in Section 9.12.

#### **9.8.9.3. Exterior Wood Steps**

(1) Exterior wood steps shall not be in direct contact with the ground unless suitably treated with a wood preservative.

#### **9.8.9.4. Wooden Stair Stringers**

(1) Wooden stair stringers shall,

- (a) have a minimum effective depth of 90 mm, measured perpendicularly to the bottom of the stringer at the point of minimum cross-section, and an overall depth of not less than 235 mm,
- (b) be supported and secured top and bottom,
- (c) be not less than 25 mm actual thickness if supported along their length and 38 mm actual thickness if unsupported along their length, and
- (d) except as permitted in Sentence (2), be spaced not more than 900 mm o.c. for stairs serving not more than one *dwelling unit*, and 600 mm o.c. in other stairs.



(2) For stairs serving not more than one *dwelling unit*, where risers support the front portion of the tread, the space between stringers shall be not more than 1 200 mm.

#### **9.8.9.5. Treads**

(1) Stair treads of lumber, plywood or O-2 grade OSB within *dwelling units* shall be not less than 25 mm actual thickness, except that if open risers are used and the distance between stringers exceeds 750 mm, the treads shall be not less than 38 mm actual thickness.

(2) Stair treads of plywood or OSB, that are not continuously supported by the riser shall have their face grain or direction of face orientation at right angles to the stringers.

#### **9.8.9.6. Finish for Treads, Landings and Ramps**

(1) Except as required in Sentence (4), the finish for treads, landings and ramps shall be,

- (a) wear-resistant,
- (b) slip-resistant, and
- (c) smooth, even and free from open defects.

(2) The finish for treads, landings and ramps in *dwelling units*, including those from an attached garage serving a single *dwelling unit*, shall be deemed to comply with Sentence (1) where these treads, landings or ramps are finished with,

- (a) hardwood,
- (b) vertical grain softwood,
- (c) resilient flooring,
- (d) low-pile carpet,
- (e) mat finish ceramic tile,
- (f) concrete, or
- (g) for stairs to unfinished *basements* and to garages, plywood.

(3) Stairs and ramps, except those serving a single *dwelling unit* or *service rooms* or *service spaces*, shall have either a colour contrast or a distinctive pattern to demarcate,

- (a) the leading edge of the treads,
- (b) the leading edge of the landing, and
- (c) the beginning and end of a ramp.

(4) Treads and landings of interior and exterior stairs and ramps, other than those within *dwelling units*, shall have a slip-resistant finish or be provided with slip-resistant strips that extend not more than 1 mm above the surface.

#### **9.8.10. Cantilevered Precast Concrete Steps**

##### **9.8.10.1. Design**

(1) Exterior concrete steps and their anchorage system that are cantilevered from a *foundation* wall shall be designed and installed to support the loads to which they may be subjected.

##### **9.8.10.2. Anchorage**

(1) Cantilevered concrete steps referred to in Article 9.8.10.1. shall be anchored to concrete *foundation* walls at least 200 mm thick.

##### **9.8.10.3. Prevention of Damage Due to Frost**

(1) Suitable precautions shall be taken during backfilling and grading operations to ensure that subsequent freezing of the *soil* will not cause uplift forces on the underside of cantilevered concrete steps to the extent that the steps or the walls to which they are attached will be damaged.

### **Section 9.9. Means of Egress**

#### **9.9.1. General**

##### **9.9.1.1. Application**

(1) Stairways, handrails and *guards* in a *means of egress* shall conform to the requirements in Section 9.8. as well as to the requirements in this Section.

##### **9.9.1.2. Fire Protection**

(1) In addition to the fire protection requirements provided in Subsection 9.9.4., *flame-spread ratings*, *fire-resistance ratings* and *fire-protection ratings for means of egress* shall conform to Section 9.10.

#### **9.9.1.3. Occupant Load**

(1) The *occupant load* of a *floor area* or part of a *floor area*, or of a *building* or part of a *building* not having a *floor area*, shall be based on,

- (a) two persons per sleeping room or sleeping area in a *dwelling unit* or *suite*, and
- (b) for *occupancies* other than as described in Clause (a), the number of persons,
  - (i) for which the area is designed, or
  - (ii) determined from Table 3.1.17.1.

#### **9.9.2. Types and Purpose of Exits**

##### **9.9.2.1. Types of Exits**

(1) Except as otherwise provided in this Section, an *exit* from any *floor area* shall be one of the following used singly or in combination:

- (a) an exterior doorway,
- (b) an exterior passageway,
- (c) an exterior ramp,
- (d) an exterior stairway,
- (e) a fire escape (as described in Subsection 3.4.7.),
- (f) a *horizontal exit*,
- (g) an interior passageway,
- (h) an interior ramp, or
- (i) an interior stairway.

(2) Fire escapes are permitted to be used as *exits* on existing *buildings* provided they are designed and installed in conformance with Subsection 3.4.7.

(3) Fire escapes shall not be installed on any new *building*.

(4) Where a *horizontal exit* is used, it shall conform to Sentence 3.4.1.6.(1) and Article 3.4.6.10.

##### **9.9.2.2. Purpose of Exits**

(1) An *exit* shall be designed for no purpose other than for exiting, except that an *exit* may also serve as an access to a *floor area*.

##### **9.9.2.3. Elevators, Slide Escapes and Windows as Means of Egress**

(1) Elevators, slide escapes or windows shall not be considered as part of a required *means of egress*.

(2) Except for *floor areas of mercantile occupancy*, casement windows not less than 1 060 mm high, 560 mm wide, with a sill height not more than 900 mm above the inside floor, are permitted to be considered part of a required *means of egress* to provide access to fire escapes, when fire escapes are permitted.

##### **9.9.2.4. Principal Entrances**

(1) Except for doors serving a single *dwelling unit*, at least one door at every principal entrance to a *building* providing access from the exterior at ground level shall be designed in accordance with the requirements for *exits*.

##### **9.9.2.5. Front Edge of Stair Treads**

(1) Except for curved stairs, the front edge of stair treads in *exits* and *access to exits* shall be at right angles to the direction of *exit* travel.

##### **9.9.2.6. Exterior Exit Stairs that Serve a Hotel**

(1) Treads and landings of exterior *exit* stairs that serve a *hotel* shall be designed to be free from ice and snow accumulation.

#### **9.9.3. Dimensions of Means of Egress**

##### **9.9.3.1. Application**

(1) This Subsection applies to every *means of egress* except *exits* that serve not more than one *dwelling unit* and *access to exits* within *dwelling units*.

#### 9.9.3.2. Exit Width

(1) Except for doors and corridors, the width of every *exit* facility shall be not less than 900 mm.

#### 9.9.3.3. Width of Corridors

(1) The width of every *public corridor*, corridor used by the public, and *exit* corridor shall be not less than 1 100 mm.

#### 9.9.3.4. Clear Height

(1) Except for stairways, doorways and *storage garages*, the minimum clear height in *exits* and *access to exits* shall be 2 100 mm.

(2) The clear height in *exits* and *access to exits* in a *storage garage* shall be not less than 2 000 mm.

### 9.9.4. Fire Protection of Exits

#### 9.9.4.1. Application

(1) Except as provided in Articles 9.9.4.4. and 9.9.4.6., this Subsection applies to the fire protection of all *exits* except *exits* serving a single *dwelling unit*.

#### 9.9.4.2. Fire Separation for Exits

(1) Except as provided in Sentence (5) and Article 9.9.8.5., every *exit* other than an *exit* doorway shall be separated from each adjacent *floor area* or from another *exit* by a *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly above the *floor area*.

(2) Where there is no floor assembly above, the *fire-resistance rating* required in Sentence (1) shall not be less than that required by Subsection 9.10.8. for the floor assembly below, but in no case shall the *fire-resistance rating* be less than 45 min.

(3) A *fire separation* common to two *exits* shall be smoke-tight and not be pierced by doorways, duct work, piping or any other opening that may affect the continuity of the separation.

(4) A *fire separation* that separates an *exit* from the remainder of the *building* shall have no openings except those for electrical wiring, *noncombustible* conduit and *noncombustible* piping that serve only the *exit*, and for standpipes, sprinkler piping, *exit* doorways and wired glass and glass block permitted in Article 9.9.4.3.

(5) The requirements in Sentence (1) do not apply to an exterior *exit* passageway provided the passageway has at least 50 per cent of its exterior sides open to the outdoors and is served by an *exit* stair at each end of the passageway.

#### 9.9.4.3. Wired Glass or Glass Block

(1) This Article applies to wired glass in doors, and wired glass or glass block in sidelights, where these are installed in *fire separations* between *exit* enclosures and *floor areas*.

(2) Except as provided in Sentence (3), the combined area of glazing in doors and sidelights shall not exceed 0.8 m<sup>2</sup>.

(3) Where an *exit* enclosure connects with a *floor area* through an enclosed vestibule or corridor separated from the *floor area* by *fire separations* having not less than a 45 min *fire-resistance rating*, the glazed areas described in Sentence (1) need not be limited as required in Sentence (2).

#### 9.9.4.4. Openings Near Unenclosed Exit Stairs and Ramps

(1) Where an unenclosed exterior *exit* stair or ramp provides the only *means of egress* from a *suite*, and is exposed to fire from openings in the exterior walls of another *fire compartment*, the openings in the exterior walls of the *building* shall be protected with wired glass in fixed steel frames or glass block conforming to Articles 9.10.13.5. and 9.10.13.7. when the openings in the exterior walls of the *building* are within 3 m horizontally and less than 10 m below or less than 5 m above the *exit* stair or ramp.

#### 9.9.4.5. Openings in Exterior Walls of Exits

(1) Either openings in the exterior walls of an *exit* or openings in adjacent exterior walls of the *building* the *exit* serves shall be protected with wired glass in fixed steel frames or glass block installed in accordance with Articles 9.10.13.5. and 9.10.13.7., where,

(a) the *exit* enclosure has exterior walls that intersect the exterior walls of the *building* at an angle of less than 135° measured on the outside of the *building*, and

(b) the openings in the exterior walls of the *building* are within 3 m horizontally and less than 2 m above the openings in the exterior walls of the *exit*.

#### 9.9.4.6. Openings near Exit Doors

(1) This Article applies to,

- (a) *exit* doors serving other than single *dwelling units*, and
- (b) *exit* doors serving single *dwelling units* where there is no second and separate *exit* from the *dwelling unit*.

(2) Where an exterior *exit* door described in Sentence (1) in one *fire compartment* is within 3 m horizontally of an *unprotected opening* in another *fire compartment* and the exterior walls of these *fire compartments* intersect at an exterior angle of less than 135°, the opening shall be protected with wired glass in fixed steel frames or glass block conforming to Articles 9.10.13.5. and 9.10.13.7. or with a rated *closure* conforming to Table 9.10.13.1. with respect to the rating of the *fire separation* between the two compartments.

#### **9.9.4.7. Stairways in Group D or E Buildings**

(1) Notwithstanding the requirements of Sentences 9.9.4.2.(1), 9.9.8.2.(1) and Article 9.10.9.5., where a *suite* of Group D or E *occupancy* is located partly on the *first storey* and partly on the second *storey* or partly on the second *storey* and partly on the third *storey*, stairways serving that *suite* need not be constructed as *exit* stairs, provided,

- (a) the *building* is not greater than three *storeys* in *building height*,
- (b) the *suite* is separated from other *occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 45 min,
- (c) the area occupied by the *suite* is not greater than 100 m<sup>2</sup> per *storey*, other than the *exit level storey*,
- (d) the maximum travel distance from any point in the *suite* to an exterior *exit* is not greater than 25 m,
- (e) the floor assemblies have a *fire-resistance rating* of not less than 45 min or are of *noncombustible construction*,
- (f) the *basement* and *first storey* are separated by a *fire separation* having a *fire-resistance rating* of not less than 45 min, and
- (g) a *smoke alarm* is installed on each floor of the *suite*, including the *basement*, in accordance with Subsection 9.10.19.

(2) The requirements of Article 9.10.12.1., for separation of exterior openings, do not apply to an *occupancy* conforming with Sentence (1).

#### **9.9.5. Obstructions and Hazards in Means of Egress**

##### **9.9.5.1. Application**

(1) This Subsection applies to obstructions and hazards in every *means of egress* except those within a *dwelling unit* or serving a single *dwelling unit*.

##### **9.9.5.2. Occupancies in Corridors**

(1) Where a corridor contains an *occupancy*, the *occupancy* shall not reduce the unobstructed width of the corridor to less than the required width of the corridor.

##### **9.9.5.3. Obstructions in Public Corridors**

(1) Except as permitted in Sentence (2), obstructions located within 1 980 mm of the floor shall not project horizontally more than 100 mm into *exit* passageways, corridors used by the public or *public corridors* in a manner that would create a hazard for persons with no or low vision travelling adjacent to walls.

(2) The horizontal projection of an obstruction in Sentence (1) is permitted to exceed 100 mm where the obstruction extends to less than 680 mm above the floor.

##### **9.9.5.4. Obstructions in Exits**

(1) Except as permitted in Subsection 9.9.6. and Article 9.8.7.6., no fixture, turnstile or construction shall project within the required width of an *exit*.

##### **9.9.5.5. Obstructions in Means of Egress**

(1) No obstructions such as posts or turnstiles shall be placed so as to restrict the width of a required *means of egress* from a *floor area* or part of a *floor area* to less than 750 mm unless an alternate unobstructed *means of egress* is provided adjacent to and plainly visible from the restricted egress.

(2) Except as provided in Sentence (3), no obstructions, such as counter gates, that do not meet the requirements for *exit* doors, shall be placed in a required *means of egress* from a *floor area* or part of a *floor area* unless an alternate unobstructed *means of egress* is provided adjacent to and plainly visible from the restricted egress.

(3) Obstructions, such as counter gates, that do not satisfy Sentence (2), are permitted to be placed in a required *means of egress* from a part of a *floor area* in *mercantile occupancies* and *business and personal services occupancies*, provided that the part of the *floor area* served by the obstructed *means of egress* is not generally accessible to the public.

#### 9.9.5.6. Mirrors or Draperies

(1) No mirror shall be placed in or adjacent to any *exit* so as to cause confusion regarding the direction of *exit*, and no mirror or draperies shall be placed on or over *exit* doors.

#### 9.9.5.7. Fuel-Fired Appliances

(1) Fuel-fired *appliances* shall not be installed in an *exit* or corridor serving as an *access to exit*.

#### 9.9.5.8. Service Rooms

(1) *Service rooms* containing equipment subject to possible explosion, such as *boilers* designed to operate at a pressure in excess of 100 kPa, and certain types of refrigerating and transformer equipment, shall not be located under required *exits*.

#### 9.9.5.9. Ancillary Rooms

(1) Ancillary rooms such as storage rooms, washrooms, toilet rooms, laundry rooms and *service rooms* shall not open directly into an *exit*.

### 9.9.6. Doors in a Means of Egress

#### 9.9.6.1. Obstructions by Doors

(1) Except as provided in Sentence (4), swinging doors in their swing shall conform to Sentences (2) and (3),

(a) at *exit* doors,

(b) at doors that open into or are located within a *public corridor*, and

(c) at doors that open into or are located within another facility that provides *access to exit* from a *suite*.

(2) When fully open, doors described in Sentence (1) shall not decrease the required *exit* width by more than,

(a) 100 mm in *exit* corridors, and

(b) 50 mm for other *exit* facilities.

(3) The swing of doors described in Sentence (1) shall not reduce the width of the path of travel to less than,

(a) the required *exit* width in *exit* corridors and passageways, and

(b) 750 mm on *exit* stairs or landings.

(4) Doors serving a single *dwelling unit* need not comply with Sentences (2) and (3).

#### 9.9.6.2. Clear Opening Height at Doorways

(1) Except as provided in Sentences (2) and (3), the clear opening height of doorways shall be not less than 2 030 mm high at,

(a) *exit* doors,

(b) doors that open into or are located within a *public corridor*, and

(c) doors that open into or are located within another facility that provides *access to exit* from a *suite*.

(2) The clear opening height under door closers and other devices in doorways described in Sentence (1) shall be not less than 1 980 mm.

(3) Doorways serving a single *dwelling unit* need not comply with Sentences (1) and (2).

#### 9.9.6.3. Clear Opening Width at Doorways

(1) Except as provided in Sentence (4), the clear opening width of doorways shall comply with Sentence (2) at,

(a) *exit* doors, and

(b) doors that open into or are located,

(i) within a *public corridor*, or

(ii) within another facility that provides *access to exit* from a *suite*.

(2) Doorways described in Sentence (1) shall be not less than,

(a) 800 mm wide where there is only one door leaf,

(b) 800 mm wide where multiple-leaf doors are installed with only one active leaf with a latching mechanism described in Article 9.9.6.7., and

(c) 1210 mm wide where multiple-leaf doors are installed with two active leaves.

- (3) In doorways described in Sentence (1) that have multiple-leaf doors installed,
  - (a) no active leaf shall be less than 810 mm wide where only one leaf is active, and
  - (b) no single leaf shall be less than 610 mm wide where two leaves are active.
- (4) Doorways serving a single *dwelling unit* need not comply with Sentence (2).

#### 9.9.6.4. Door Action

- (1) Except as provided in Sentences (4) and (5), required *exit* doors and doors in required *means of egress*, except doors in *means of egress* within *dwelling units*, shall swing on the vertical axis.
- (2) Except as provided in Sentence (5), breakaway sliding doors, installed as required *exit* doors or required doors in *means of egress*, shall be identified as swinging doors by means of a label or decal affixed to the door.
- (3) Revolving doors shall comply with Article 3.4.6.15.
- (4) Movable *partitions* used to separate a *public corridor* from an adjacent *business and personal services occupancy* or a *mercantile occupancy* need not conform to Sentence (1), provided the *partitions* are not located in the only *means of egress*.
- (5) *Exit* doors need not conform to Sentence (1) or (2), where,
  - (a) the doors serve accessory *buildings* where life safety is not adversely affected, or
  - (b) the doors serve *storage garages* or other accessory *buildings* serving a single *dwelling unit*.

#### 9.9.6.5. Direction of Door Swing

- (1) Except as permitted by Sentence (2) and except for doors serving a single *dwelling unit*, *exit* doors that are required to swing shall swing in the direction of *exit* travel.
- (2) An *exit* door need not swing in the direction of *exit* travel where it serves,
  - (a) a room, *suite* or *floor area* having an *occupant load* of not more than 60 persons, or
  - (b) as part of a *means of egress* from more than one *floor area* and the *floor areas* so served have a total *occupant load* of not more than 60 persons.
- (3) Doors that open onto a corridor or other facility that provides *access to exit* from a room or *suite* having an *occupant load* of more than 60 persons shall swing on the vertical axis in the direction of *exit* travel.
- (4) Doors that divide a corridor that is not wholly contained within a *suite* shall swing in the direction of *exit* travel.
- (5) Where a pair of doors is installed in a corridor that provides *access to exit* in both directions, the doors shall,
  - (a) swing in opposite directions, with the door on the right hand side swinging in the direction of *exit* travel, or
  - (b) swing in both directions.

#### 9.9.6.6. Proximity of Doors to Stairs

- (1) Except as provided in Sentence (2), the distance between a stair riser and the leading edge of a door in its swing, except for doors serving a single *dwelling unit*, shall be not less than 300 mm.
- (2) Where there is a danger of blockage from ice or snow, an *exit* door, including a door serving a single *dwelling unit*, may open onto not more than one step provided the riser of such step does not exceed 150 mm.

#### 9.9.6.7. Door Latching, Locking and Opening Mechanisms

- (1) Principal entrance doors, *exit* doors and doors to *suites*, including exterior doors to *dwelling units*, and other doors in an *access to exit* shall,
  - (a) be openable from the inside or in travelling to an *exit* without requiring keys, special devices or specialized knowledge of the door opening mechanism, or
  - (b) in the case of *exit* doors, be controlled by electromagnetic locking mechanisms in accordance with Sentence 3.4.6.16.(4).
- (2) Except for doors serving a single *dwelling unit* and doors to accessory *buildings* and to garages serving a single *dwelling unit*, door release hardware on doors in a *means of egress* shall be operable with one hand and the door shall be openable with not more than one releasing operation.
- (3) Door release hardware on doors in a *means of egress* shall be installed not more than 1 200 mm above the finished floor.
- (4) Except for *hotels*, a door opening onto a *public corridor* that provides *access to exit* from *suites* shall be designed not to lock automatically when such doors are equipped with an automatic self-closing device.

**9.9.6.8. Effort Required to Open**

(1) Except as required by Sentence 3.8.3.3.(7), every *exit* door, except doors serving a single *dwelling unit*, shall be designed and installed so that when the latch is released the door will open in the direction of *exit* travel under a force of not more than 90 N applied to the door release hardware.

**9.9.7. Access to Exits**

**9.9.7.1. Egress from Roof Area, Podiums, Terraces, Platforms and Contained Open Spaces**

(1) An *access to exit* shall be provided from every roof intended for *occupancy* and from every podium, terrace, platform or contained open space.

(2) Where a roof is intended for an *occupant load* of more than 60 persons, at least two separate *means of egress* shall be provided from the roof to stairs designed in conformance with the requirements for *exit* stairs and located remote from each other.

(3) Where a podium, terrace, platform or contained open space is provided, egress requirements shall conform to the appropriate requirements for rooms or *suites* in Article 9.9.7.4.

**9.9.7.2. Means of Egress from Suites**

(1) Except as required by Sentence 9.9.9.3.(1), each *suite* in a *floor area* occupied by more than one *suite* shall have,

- (a) an exterior *exit* doorway,
- (b) a doorway to a *public corridor*, or
- (c) a doorway to an exterior passageway.

(2) Except as provided in Sentences 9.9.7.3.(1) and 9.9.8.2.(2), from the point where a doorway described in Clause (1)(b) or (c) enters the *public corridor* or exterior passageway, it shall be possible to go in opposite directions to each of two separate *exits*.

**9.9.7.3. Dead-End Corridors**

(1) A dead-end *public corridor* is permitted in an *occupancy* shown in Table 9.9.7.3., where,

- (a) the dead-end corridor,
  - (i) does not exceed the distance of travel measured from the most remote point of the dead-end to a point where it is possible to go in opposite directions to each of two separate *exits*, and
  - (ii) is provided with doors equipped with self-closing devices, or
- (b) there is a second and separate egress doorway from each room or *suite* not leading into the dead-end corridor.

**Table 9.9.7.3.  
Dead-End Public Corridors**

Forming Part of Sentence 9.9.7.3.(1)

Item	Column 1	Column 2	Column 3
	<i>Occupancy</i>	Maximum Length of Dead-End <i>Public Corridor</i> , m	Maximum <i>Occupant Load</i> or <i>Suites</i> Served by Dead-End <i>Public Corridor</i>
1.	Group C	6	4 <i>suites</i>
2.	Group D	6	30
3.	Group E	9	30
4.	Group F	9	30

(2) Dead-end *public corridors* in *residential occupancies* and *business and personal services occupancies* shall contain only *suite* door openings arranged so that not more than two such doors have to be passed to reach the nearest *exit*.

(3) The area of wired glass in doors required by Sentence (2) shall not exceed 645 cm<sup>2</sup>.

**9.9.7.4. Number and Spacing of Egress Doors**

(1) Except for *dwelling units*, at least two egress doors shall be provided where,

- (a) the area of a room or *suite* exceeds 200 m<sup>2</sup> in a Group D, E, F2 and F3 *occupancy*, or 150 m<sup>2</sup> in a Group C *occupancy*, or
- (b) the distance measured from any point within a room or *suite* to the nearest egress door exceeds 25 m.

(2) Doors required in Sentence (1) shall be spaced so that in the event one door is made inaccessible by a fire within such a room or *suite*, the other door will provide safe egress.

**9.9.7.5. Independent Access to Exit**

(1) Required *access to exit* from *suites* shall not be through any other *dwelling unit, service room* or other *occupancy*.

#### **9.9.7.6. Travel Distance within Rooms and Suites**

(1) Except for *dwelling units*, the travel distance from any point within the room or *suite* to the nearest egress door shall not exceed the maximum travel distance in Article 9.9.8.2.

#### **9.9.8. Exits from Floor Areas**

##### **9.9.8.1. Measurement of Travel Distance**

(1) Except as provided in Sentences (2) and (3), for the purposes of this Subsection, travel distance means the distance from any point in the *floor area* to an *exit* measured along the path of *exit* travel.

(2) Where a room or *suite* is separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* of at least 45 min, or in a *sprinklered building*, by a *fire separation* that is not required to have a *fire-resistance rating*, the travel distance is permitted to be measured from an egress door of the room or *suite* to the nearest *exit*.

(3) Where a *public corridor* is not less than 9 m wide and conforms to Clause 3.4.2.5.(1)(d), the travel distance is permitted to be determined in accordance with that Clause.

##### **9.9.8.2. Number of Required Exits**

(1) Except as provided in Sentences (2) and (3) and Subsection 9.9.9., at least two *exits* shall be provided from every *floor area*, spaced so that the travel distance to the nearest *exit* is not more than,

- (a) 40 m in the case of *business and personal services occupancies*,
- (b) 45 m for all *occupancies* where the *floor area* is *sprinklered*, and
- (c) 30 m for all other *occupancies*.

(2) Except as provided in Subsection 9.9.9., a single *exit* is permitted from each *storey* in *buildings* of 1 and 2 *storeys* in *building height* provided the *floor area* and travel distance requirements conform to those required in Article 9.9.7.4. and the total *occupant load* served by an *exit* facility does not exceed 60 persons.

(3) In *boarding, lodging or rooming houses*,

- (a) where sleeping accommodation is provided for not more than eight persons, a single *exit* is permitted from each *floor area*, or
- (b) where sleeping accommodation is not provided in the *basement*, a single *exit* is permitted from the *basement floor area*.

##### **9.9.8.3. Contribution of Each Exit**

(1) Where more than one *exit* is required from a *floor area*, each *exit* shall be considered as contributing not more than half the required *exit* width.

##### **9.9.8.4. Location of Exits**

(1) Where more than one *exit* is required from a *floor area*, at least two *exits* shall be independent of each other and be placed remote from each other along the path of travel between them.

##### **9.9.8.5. Exiting through a Lobby**

(1) Not more than one *exit* from a *floor area* is permitted to lead through a lobby.

(2) The floor of the lobby referred to in Sentence (1) shall be not more than 4.5 m above *grade*, and the path of travel through the lobby to the outdoors shall not exceed 15 m.

(3) The lobby referred to in Sentence (1) shall conform in all respects to the requirements for *exits*, except that rooms other than *service rooms*, storage rooms and rooms of *residential* or *industrial occupancy* are permitted to open directly onto such lobby.

(4) Except as provided in Sentence (6), an *exit* is permitted to lead through a lobby referred to in Sentence (1) provided the lobby is not located within an *interconnected floor space* other than as described in Sentence 3.2.8.2.(6).

(5) Passenger elevators are permitted to open onto the lobby referred to in Sentence (1) provided the elevator doors are designed to remain closed except while loading and unloading.

(6) An *exit* that serves a *hotel* is permitted to lead through a lobby referred to in Sentence (1) provided the lobby is not located within an *interconnected floor space*.

(7) Where the lobby referred to in Sentence (1) and adjacent *occupancies* that are permitted to open into the lobby are *sprinklered*, the *fire separation* between such *occupancies* and the lobby need not have a *fire-resistance rating*.

##### **9.9.8.6. Mezzanine Means of Egress**



(1) Except as provided by Sentences (2) and (3), the space above a *mezzanine* shall be served by at least two *means of egress* leading to *exits* accessible at the *mezzanine* level on the same basis as *floor areas*.

(2) One *means of egress* from a *mezzanine* is permitted, where,

(a) the *mezzanine* is not required to terminate at a vertical *fire separation*, as permitted by Sentence 9.10.12.1.(2),

(b) the *occupant load* of the *mezzanine* is not more than 60,

(c) the area of the *mezzanine* does not exceed the area limits of Clause 9.9.7.4.(1)(a), and

(d) the distance limits of Clause 9.9.7.4.(1)(b) measured along the path of travel, are not exceeded from any point on the *mezzanine* to,

(i) an egress door serving the space that the *mezzanine* overlooks if the space is served by a single egress door, or

(ii) an egress stairway leading to an *access to exit* in the space below if that space is required to be served by two or more egress doorways in conformance with Sentence 9.9.7.4.(1).

(3) One of the *means of egress* from a *mezzanine* that is not required to terminate at a *fire separation* as permitted by Sentence 9.10.12.1.(2) and that exceeds the limits of Sentence (2), is permitted to lead through the room in which the *mezzanine* is located provided all other *means of egress* from that *mezzanine* lead to *exits* accessible at the *mezzanine* level.

(4) Except as provided in Sentence (2), the maximum travel distance from any point on a *mezzanine* to the nearest *exit* shall be not more than,

(a) 40 m in a *business and personal services occupancy*,

(b) 45 m in a *floor area* that is *sprinklered* provided it does not contain a *high hazard industrial occupancy*, or

(c) 30 m in any *floor area* not referred to in Clause (a) or (b).

### 9.9.9. Egress from Dwelling Units

#### 9.9.9.1. Travel Limit to Exits or Egress Doors

(1) Except as provided in Sentences (2) and (3), every *dwelling unit* containing more than 1 *storey* shall have *exits* or egress doors located so that it shall not be necessary to travel up or down more than 1 *storey* to reach a level served by,

(a) an egress door to a *public corridor*, enclosed *exit* stair or exterior passageway, or

(b) an *exit* doorway not more than 1 500 mm above adjacent ground level.

(2) Where a *dwelling unit* is not located above or below another *suite*, the travel limit from a floor level in the *dwelling unit* to an *exit* or egress door is permitted to exceed 1 *storey* where that floor level is served by an openable window or door,

(a) providing an unobstructed opening of not less than 1 000 mm in height and 550 mm in width, and

(b) located so that the sill is not more than,

(i) 1 000 mm above the floor, and

(ii) 7 m above adjacent ground level.

(3) The travel limit from a floor level in a *dwelling unit* to an *exit* or egress door is permitted to exceed 1 *storey* where that floor level has direct access to a balcony.

#### 9.9.9.2. Two Separate Exits

(1) Except as provided in Sentence 9.9.7.3.(1), where an egress door from a *dwelling unit* opens onto a *public corridor* or exterior passageway it shall be possible from the location where the egress door opens onto the corridor or exterior passageway to go in opposite directions to two separate *exits* unless the *dwelling unit* has a second and separate *means of egress*.

#### 9.9.9.3. Shared Egress Facilities

(1) A *dwelling unit* shall be provided with a second and separate *means of egress* where an egress door from the *dwelling unit* opens onto,

(a) an *exit* stairway serving more than one *suite*,

(b) a *public corridor*,

(i) serving more than one *suite*, and

(ii) served by a single *exit*,

(c) an exterior passageway,

- (i) serving more than one *suite*,
- (ii) served by a single *exit* stairway or ramp, and
- (iii) more than 1.5 m above adjacent ground level, or
- (d) a balcony,
  - (i) serving more than one *suite*,
  - (ii) served by a single *exit* stairway or ramp, and
  - (iii) more than 1.5 m above adjacent ground level.

### 9.9.10. Egress from Bedrooms

#### 9.9.10.1. Egress Windows or Doors for Bedrooms

(1) Except where a door on the same floor level as the bedroom provides direct access to the exterior, every floor level containing a bedroom in a *suite* shall be provided with at least one outside window that,

- (a) is openable from the inside without the use of tools,
- (b) provides an individual, unobstructed open portion having a minimum area of 0.35 m<sup>2</sup> with no dimension less than 380 mm, and
- (c) maintains the required opening described in Clause (b) without the need for additional support.

(2) Except for *basement* areas, the window required in Sentence (1) shall have a maximum sill height of 1 000 mm above the floor.

(3) When sliding windows are used, the minimum dimension described in Sentence (1) shall apply to the openable portion of the window.

(4) Where the sleeping area within a *live/work unit* is on a *mezzanine* with no obstructions more than 1 070 mm above the floor, the window required in Sentence (1) may be provided on the main level of the *live/work unit* provided the *mezzanine* is not more than 25% of the area of the *live/work unit* or 20 m<sup>2</sup>, whichever is less, and an unobstructed direct path of travel is provided from the *mezzanine* to this window.

(5) Where a window required in Sentence (1) opens into a window well, a clearance of not less than 550 mm shall be provided in front of the window.

(6) Where the sash of a window referred to in Sentence (5) swings towards the window well, the operation of the sash shall not reduce the clearance in a manner that would restrict escape in an emergency.

(7) Where a protective enclosure is installed over the window well referred to in Sentence (5), such enclosure shall be openable from the inside without the use of keys, tools or special knowledge of the opening mechanism.

### 9.9.11. Signs

#### 9.9.11.1. Application

(1) This Subsection applies to all *exits* except those serving not more than one *dwelling unit*.

#### 9.9.11.2. Visibility of Exits

(1) *Exits* shall be located so as to be clearly visible or their locations shall be clearly indicated.

#### 9.9.11.3. Exit Signs

(1) Except as required in Sentence (7), every *exit* door shall have an *exit* sign placed over it or adjacent to it if the *exit* serves,

- (a) a *building* that is 3 *storeys* in *building height*,
- (b) a *building* having an *occupant load* of more than 150, or
- (c) a room or *floor area* that has a fire escape as part of a required *means of egress*.

(2) Except as required in Sentence (6), every *exit* sign shall,

- (a) be visible on approach to the *exit*,
- (b) except as provided in Sentence (3), consist of a green pictogram and a white or lightly tinted graphical symbol meeting the colour specifications referred to in ISO 3864-1, “Graphical Symbols – Safety Colours and Safety Signs – Part 1: Design Principles for Safety Signs in Workplaces and Public Areas”, and
- (c) conform to the dimensions indicated in ISO 7010, “Graphical Symbols – Safety Colours and Safety Signs – Safety Signs Used in Workplaces and Public Areas”, for the following symbols:

- (i) E001 emergency exit left,
  - (ii) E002 emergency exit right,
  - (iii) E005 90-degree directional arrow, and
  - (iv) E006 45-degree directional arrow.
- (3) Internally illuminated *exit* signs shall be continuously illuminated, and,
- (a) where illumination of the sign is powered by an electrical circuit, be constructed in conformance with CSA 22.2 No. 141, “Emergency Lighting Equipment”, or
  - (b) where illumination of the sign is not powered by an electrical circuit, be constructed in conformance with CAN/ULC-S572, “Photoluminescent and Self-Luminous Signs and Path Marking Systems”.
- (4) Externally illuminated *exit* signs shall be illuminated at all times by a light fixture supplied by an electrical circuit.
- (5) The circuitry serving lighting for externally and internally illuminated *exit* signs shall,
- (a) serve no equipment other than emergency lighting in the area where the *exit* signs are installed, and
  - (b) be connected to an emergency power supply as described in Sentences 9.9.12.3.(2), (3) and (7).
- (6) An *exit* sign conforming to Clauses (2)(b) and (c) with an arrow or other indicator pointing at the direction of egress shall be provided where no *exit* is visible from,
- (a) a *public corridor*,
  - (b) a corridor used by the public, or
  - (c) a principal route serving an open *floor area* having an *occupant load* of more than 150.
- (7) Except for *suite* doors opening directly to the exterior, every *exit* serving a *hotel* shall have an *exit* sign placed over it or adjacent to it.

#### 9.9.11.4. Signs for Stairs and Ramps at Exit Level

(1) In *buildings* that are 3 *storeys* in *building height*, any part of an *exit* ramp or stairway that continues up or down past the lowest *exit level* shall be clearly marked to indicate that it does not lead to an *exit* where the portion below *exit level* may be mistaken as the direction of *exit* travel.

#### 9.9.11.5. Floor Numbering

- (1) Arabic numerals indicating the assigned floor number shall be,
- (a) except in *hotels*, mounted permanently on the stair side of the wall at the latch side of doors to *exit* stair shafts,
  - (b) in *hotels*, mounted permanently on each side of the *exit* doors to the *exit* stair shaft,
  - (c) not less than 60 mm high, raised approximately 0.8 mm above the surface,
  - (d) located 1 500 mm from the finished floor and not more than 300 mm from the door, and
  - (e) contrasting in colour with the surface on which they are applied.

#### 9.9.12. Lighting

##### 9.9.12.1. Application

(1) This Subsection applies to the lighting of all *means of egress* except those within *dwelling units*.

##### 9.9.12.2. Required Lighting in Egress Facilities

(1) Every *exit*, *public corridor* or corridor providing *access to exit* for the public shall be equipped to provide illumination to an average level of not less than 50 lx at floor or tread level and at all points such as angles and intersections at changes of level where there are stairs or ramps.

(2) The minimum value of the illumination required by Sentence (1) shall be not less than 10 lx.

##### 9.9.12.3. Emergency Lighting

- (1) Emergency lighting shall be provided in,
- (a) *exits*,
  - (b) principal routes providing *access to exit* in an open *floor area*,
  - (c) corridors used by the public,
  - (d) underground walkways, and

(e) *public corridors*.

(2) Emergency lighting required in Sentence (1) shall be provided from a source of energy separate from the electrical supply for the *building*.

(3) Lighting required in Sentence (1) shall be designed to be automatically actuated for a period of not less than 30 min when the electric lighting in the affected area is interrupted.

(4) Illumination from lighting required in Sentence (1) shall be provided to average levels of not less than 10 lx at floor or tread level.

(5) The minimum value of the illumination required by Sentence (4) shall be not less than 1 lx.

(6) Where incandescent lighting is provided, lighting equal to 1 W/m<sup>2</sup> of *floor area* shall be considered to meet the requirement in Sentence (4).

(7) Where self-contained emergency lighting units are used, they shall conform to CSA C22.2 No. 141, "Emergency Lighting Equipment".

## Section 9.10. Fire Protection

### 9.10.1. Definitions and Application

#### 9.10.1.1. Support of Noncombustible Construction

(1) Where an assembly is required to be of *noncombustible construction* and to have a *fire-resistance rating*, it shall be supported by *noncombustible construction*.

#### 9.10.1.2. Sloped Roofs

(1) For the purposes of this Section, roofs with slopes of 60° or more to the horizontal and that are adjacent to a room or space intended for *occupancy* shall be considered as a wall.

#### 9.10.1.3. Items Under Part 3 Jurisdiction

(1) Tents, *air-supported structures*, transformer vaults, *walkways*, elevators and escalators shall conform to Part 3.

(2) Where rooms or spaces are intended for an *assembly occupancy*, such rooms or spaces shall conform to Part 3.

(3) *Basements* containing more than 1 *storey* or exceeding 600 m<sup>2</sup> in area shall conform to Part 3.

(4) Where rooms or spaces are intended for the storage, manufacture or use of hazardous or explosive material, such rooms or spaces shall conform to Part 3.

(5) Reserved

(6) Openings through floors that are not protected by shafts or *closures* shall be protected in conformance with Subsection 3.2.8.

(7) Chutes and shafts shall conform to Subsection 3.6.3. except where they are contained entirely within a *dwelling unit*.

(8) Sprinkler systems shall be designed, constructed and installed in conformance with Sentence 3.2.5.7.(1), Articles 3.2.5.13. to 3.2.5.16. and Article 3.2.5.18.

(9) Standpipe and hose systems shall be designed, constructed and installed in conformance with Article 3.2.5.18. and Subsection 3.2.9.

(10) Fire pumps shall be installed in conformance with Articles 3.2.5.18. and 3.2.5.19.

#### 9.10.1.4. Items Under Part 6 Jurisdiction

(1) In kitchens containing commercial cooking equipment used in processes producing grease-laden vapours, the equipment shall be designed and installed in conformance with Part 6.

(2) Where fuel-fired *appliances* are installed on a roof, such *appliances* shall be installed in conformance with Part 6.

### 9.10.2. Occupancy Classification

#### 9.10.2.1. Occupancy Classification

(1) Every *building* or part of it shall be classified according to its *major occupancy* as belonging to one of the groups or divisions described in Table 9.10.2.1.

**Table 9.10.2.1.  
Occupancy Classifications**

Forming Part of Sentence 9.10.2.1.(1)

Item	Column 1	Column 2	Column 3
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	Group	Division	Description of <i>Major Occupancies</i>
1.	C	—	<i>Residential occupancies</i>
2.	D	—	<i>Business and personal services occupancies</i>
3.	E	—	<i>Mercantile occupancies</i>
4.	F	2	<i>Medium hazard industrial occupancies</i>
5.	F	3	<i>Low hazard industrial occupancies (Does not include storage garages serving individual dwelling units)</i>

#### 9.10.2.2. Reserved

#### 9.10.2.3. Major Occupancies above Other Major Occupancies

(1) Except as permitted in Article 9.10.2.4., in any *building* containing more than 1 *major occupancy* in which one *major occupancy* is located entirely above another, the requirements of Article 9.10.8.1. for each portion of the *building* containing a *major occupancy* shall be applied to that portion as if the entire *building* was of that *major occupancy*.

#### 9.10.2.4. Buildings Containing More Than One Major Occupancy

(1) In a *building* containing more than 1 *major occupancy*, where the aggregate area of all *major occupancies* in a particular group or division does not exceed 10% of the *floor area* on the *storey* on which they are located, they need not be considered as *major occupancies* for the purposes of Articles 9.10.2.3. and 9.10.8.1. provided they are not classified as Group F, Division 2 *occupancies*.

### 9.10.3. Ratings

#### 9.10.3.1. Fire-Resistance and Fire-Protection Ratings

(1) Where a *fire-resistance rating* or a *fire-protection rating* is required in this Section for an element of a *building*, such rating shall be determined in conformance with the test methods described in Part 3, or in accordance with MMAH Supplementary Standard SB-2, “Fire Performance Ratings”, or MMAH Supplementary Standard SB-3, “Fire and Sound Resistance of Building Assemblies”.

#### 9.10.3.2. Flame-Spread Rating

(1) Where a *flame-spread rating* is required in this Section for an element of a *building*, such rating shall be determined in accordance with the test methods described in Part 3, or in accordance with MMAH Supplementary Standard SB-2, “Fire Performance Ratings”.

(2) Unless the *flame-spread rating* is referred to in this Part as a “surface *flame-spread rating*”, it shall apply to any surface of the element being considered that would be exposed by cutting through it as well as to the exposed surface of the element.

#### 9.10.3.3. Fire Exposure

(1) Floor, roof and ceiling assemblies shall be rated for exposure to fire on the underside.

(2) Exterior walls shall be rated for exposure to fire from inside the *building*, except that such walls need not comply with the temperature rise limitations required by the standard tests referred to in Article 9.10.3.1. if such walls have a *limiting distance* of not less than 1.2 m, and due allowance is made for the effects of heat radiation in accordance with the requirements in Part 3.

(3) *Firewalls* and interior vertical *fire separations* required to have *fire-resistance ratings* shall be rated for exposure to fire on each side.

#### 9.10.3.4. Suspended Membrane Ceiling

(1) Where a ceiling construction has a suspended membrane ceiling with lay-in panels or tiles that contribute to the required *fire-resistance rating*, hold down clips or other means shall be provided to prevent the lifting of such panels or tiles in the event of a fire.

### 9.10.4. Building Size Determination

#### 9.10.4.1. Mezzanines not Considered as Storeys

(1) *Mezzanines* shall not be considered as *storeys* for the purpose of determining *building height* where the aggregate area of *mezzanine* floors does not exceed 10% of,

- (a) the *suite* in which it is located, where there is more than one *suite* in the *storey*, or
- (b) the *storey* in which it is located, in all other cases.

(2) *Mezzanines* shall not be considered as *storeys* for the purpose of determining *building height* where they occupy an aggregate area not exceeding 40% of the area of the room or the *storey* in which they are located provided the space above the *mezzanine* floor has no visual obstructions more than 1 070 mm above such floors.

#### 9.10.4.2. More Than One Level of Mezzanine

(1) Where more than 1 level of *mezzanine* is provided in a *storey*, each level additional to the first shall be considered as a *storey*.

**9.10.4.3. Basement Storage Garages**

(1) Where a *basement* is used primarily as a *storage garage*, the *basement* is permitted to be considered as a separate *building* for the purposes of this Section provided the floor above the *basement* and the exterior walls of the *basement* above the adjoining ground level are constructed as *fire separations* of masonry or concrete having a *fire-resistance rating* of not less than 2 h.

**9.10.4.4. Roof-Top Enclosures**

(1) Roof-top enclosures provided for elevator machinery, stairways and *service rooms*, used for no purpose other than for service to the *building*, shall not be considered as a *storey* in calculating the *building height*.

**9.10.5. Permitted Openings in Wall and Ceiling Assemblies**

**9.10.5.1. Permitted Openings in Wall and Ceiling Membranes**

(1) Except as permitted in Sentences (2) and (4), a membrane forming part of an assembly required to have a *fire-resistance rating* shall not be pierced by openings into the assembly unless the assembly has been tested and rated for such openings.

(2) A wall or ceiling membrane forming part of an assembly required to have a *fire-resistance rating* is permitted to be pierced by openings for electrical and similar service outlet boxes provided such outlet boxes are tightly fitted.

(3) Where boxes referred to in Sentence (2) are located on both sides of walls required to provide a *fire-resistance rating*, they shall be offset where necessary to maintain the integrity of the *fire separation*.

(4) A membrane ceiling forming part of an assembly assigned a *fire-resistance rating* on the basis of Table 2 of MMAH Supplementary Standard SB-3, “Fire and Sound Resistance of Building Assemblies”, is permitted to be pierced by openings leading to ducts within the ceiling space provided the ducts, the amount of openings and their protection conform to the requirements in MMAH Supplementary Standard SB-2, “Fire Performance Ratings”.

**9.10.6. Construction Types**

**9.10.6.1. Combustible Elements in Noncombustible Construction**

(1) Where a *building* or part of a *building* is required to be of *noncombustible construction*, *combustible* elements shall be limited in conformance with the requirements in Subsection 3.1.5.

**9.10.6.2. Heavy Timber Construction**

(1) *Heavy timber construction* shall be considered to have a 45 min *fire-resistance rating* when it is constructed in accordance with the requirements for *heavy timber construction* in Article 3.1.4.7.

**9.10.7. Steel Members**

**9.10.7.1. Protection of Structural Steel Members**

(1) Except as provided in Article 3.2.2.3., structural steel members used in construction required to have a *fire-resistance rating* shall be protected to provide the required *fire-resistance rating*.

**9.10.8. Fire-Resistance and Combustibility in Relation to Occupancy, Height and Supported Elements**

**9.10.8.1. Fire-Resistance Ratings for Floors and Roofs**

(1) Except as otherwise provided in this Subsection, the *fire-resistance ratings* of floors and roofs shall conform to Table 9.10.8.1.

**Table 9.10.8.1.  
Fire Resistance Ratings for Structural Members and Assemblies**

Forming Part of Sentence 9.10.8.1.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	<i>Major Occupancy</i>	Maximum <i>Building Height</i> , <i>Storeys</i>	Minimum <i>Fire-Resistance Rating</i> by <i>Building Element</i> , min Floors Except Floors over Crawl Spaces	<i>Mezzanine Floors</i>	Roofs
1.	<i>Residential (Group C)</i>	3	45	45	—
2.	<i>All other occupancies</i>	2	45	—	—
		3	45	45	45

**9.10.8.2. Fire-Resistance Ratings in Sprinklered Buildings**

(1) Except for roofs that support an *occupancy*, the requirements in Table 9.10.8.1. for roof assemblies to have a *fire-resistance rating* are permitted to be waived in *sprinklered buildings* where,

- (a) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.10.(3), and
- (b) the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.8.(4).

#### **9.10.8.3. Fire-Resistance Ratings for Walls, Columns and Arches**

(1) Except as otherwise provided in this Subsection, all *loadbearing* walls, columns and arches in the *storey* immediately below a floor or roof assembly shall have a *fire-resistance rating* of not less than that required for the supported floor or roof assembly.

#### **9.10.8.4. Reserved**

#### **9.10.8.5. Service Rooms**

(1) Construction supporting a *service room* need not conform to Article 9.10.8.3.

#### **9.10.8.6. Mezzanines**

(1) *Mezzanines* required to be counted as *storeys* in Articles 9.10.4.1. and 9.10.4.2. shall be constructed in conformance with the requirements for “Floors Except Floors over Crawl Spaces” in Table 9.10.8.1.

#### **9.10.8.7. Roofs Supporting an Occupancy**

(1) Where a portion of a roof supports an *occupancy*, that portion shall be constructed as a *fire separation* having a *fire-resistance rating* conforming to the rating for “Floors Except Floors over Crawl Spaces” in Table 9.10.8.1.

#### **9.10.8.8. Floors of Exterior Passageways**

(1) Except as provided in Sentences (2) and (3), the floor assembly of every exterior passageway used as part of a *means of egress* shall have a *fire-resistance rating* of not less than 45 min or be of *noncombustible construction*.

(2) No *fire-resistance rating* is required for floors of exterior passageways serving *buildings* of Group D, E or F *major occupancy* that are not more than 2 *storeys* in *building height*.

(3) No *fire-resistance rating* is required for floors of exterior passageways serving a single *dwelling unit* where no *suite* is located above or below the *dwelling unit*.

#### **9.10.8.9. Crawl Spaces**

(1) Where a crawl space exceeds 1 800 mm in height or is used for any *occupancy* or as a *plenum* in *combustible construction* or for the passage of *flue pipes*, it shall be considered as a *basement* in applying the requirements in Article 9.10.8.1.

#### **9.10.8.10. Application to Houses**

(1) Table 9.10.8.1. does not apply to a *dwelling unit* that has no other *dwelling unit* above or below it or to a *dwelling unit* that is not above or below another *major occupancy*.

#### **9.10.8.11. Part 3 as an Alternative**

(1) The *fire-resistance ratings* of floors, roofs, *loadbearing* walls, columns and arches need not conform to this Subsection if such assemblies conform in all respects to the appropriate requirements in Section 3.2.

### **9.10.9. Fire Separations Between Rooms and Spaces Within Buildings**

#### **9.10.9.1. Application**

(1) This Subsection applies to *fire separations* required between rooms and spaces in *buildings* except between rooms and spaces within a *dwelling unit*.

#### **9.10.9.2. Continuous Barrier**

(1) Except as permitted in Article 9.10.9.3., a wall or floor assembly required to be a *fire separation* shall be constructed as a continuous barrier against the spread of fire.

(2) The continuity of a *fire separation* shall be maintained where it abuts another *fire separation*, a floor, a ceiling, a roof or an exterior wall assembly.

#### **9.10.9.3. Openings to be Protected With Closures**

(1) Except as permitted in Articles 9.10.9.5. to 9.10.9.7., openings in required *fire separations* shall be protected with *closures* conforming to Subsection 9.10.13.

#### **9.10.9.4. Floor Assemblies**

- (1) Except as permitted in Sentences (2) to (4), all floor assemblies shall be constructed as *fire separations*.
- (2) Floor assemblies contained within *dwelling units* need not be constructed as *fire separations*.
- (3) Floor assemblies for which no *fire-resistance rating* is required by Subsection 9.10.8. and floors of *mezzanines* not required to be counted as *storeys* in Articles 9.10.4.1. and 9.10.4.2. need not be constructed as *fire separations*.
- (4) Where a crawl space is not required by Article 9.10.8.9. to be constructed as a *basement*, the floor above it need not be constructed as a *fire separation*.

#### **9.10.9.5. Interconnected Floor Spaces**

- (1) Except as permitted in Article 9.9.4.7., *interconnected floor spaces* shall conform to the requirements of Subsection 3.2.8.

#### **9.10.9.6. Penetration of Fire Separations**

- (1) Piping, tubing, ducts, *chimneys*, wiring, conduit, electrical outlet boxes and other similar service equipment that penetrate a required *fire separation* shall be tightly fitted or fire stopped to maintain the integrity of the separation.

- (2) Penetrations of a *firewall* shall be sealed at the penetration by a *fire stop* that, when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems", has an FT rating not less than the *fire-resistance rating* for the *fire separation*.

- (3) Except as provided in Sentences (4) to (12) and Article 9.10.9.7., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that partly or wholly penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible* unless the assembly has been tested incorporating such equipment.

- (4) Electrical wires or other similar wiring enclosed in *noncombustible* totally enclosed raceways are permitted to partly or wholly penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (3).

- (5) Single conductor metal-sheathed cables with *combustible* jacketing that are more than 25 mm in overall diameter are permitted to penetrate a *fire separation* required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (3), provided the cables are not grouped and are spaced a minimum of 300 mm apart.

- (6) Electrical wires or cables, single or grouped, with *combustible* insulation or jacketing that is not totally enclosed in raceways of *noncombustible* material, are permitted to partly or wholly penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (3), provided the overall diameter of the wiring is not more than 25 mm.

- (7) *Combustible* totally enclosed raceways that are embedded in a concrete floor slab are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (3), where the concrete provides at least 50 mm of cover between the raceway and the bottom of the slab.

- (8) *Combustible* outlet boxes are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (3), provided the opening through the membrane into the box does not exceed 160 cm<sup>2</sup>.

- (9) *Combustible* water distribution piping is permitted to partly or wholly penetrate a *fire separation* that is required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (3), provided the piping is protected with a *fire stop* in conformance with Sentence 3.1.9.4.(4).

- (10) *Combustible* sprinkler piping is permitted to penetrate a *fire separation* provided the *fire compartments* on each side of the *fire separation* are *sprinklered*.

- (11) Sprinklers are permitted to penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* without having to meet the *fire stop* requirements of Sentence (1), provided the annular space created by the penetration of a fire sprinkler is covered by a metal escutcheon plate in accordance with NFPA 13, "Installation of Sprinklers".

- (12) *Combustible* piping for central vacuum systems is permitted to penetrate a *fire separation* provided the installation conforms to the requirements that apply to *combustible* piping in Sentences 9.10.9.7.(2) to (6).

- (13) *Fire dampers* are permitted to penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* without having to meet the *fire stop* requirements of Sentence (1), provided the *fire damper* is,

- (a) installed in conformance with NFPA 80, "Fire Doors and Other Opening Protectives," or
- (b) designed specifically with a *fire stop*.

#### **9.10.9.7. Combustible Piping**



(1) Except as permitted in Sentences (2) to (6), *combustible* piping shall not be used where any part of a piping system partly or wholly penetrates a *fire separation* required to have a *fire-resistance rating* or penetrates a membrane that contributes to the required *fire-resistance rating* of an assembly.

(2) *Combustible* piping not located in a vertical shaft is permitted to penetrate a *fire separation* required to have a *fire-resistance rating* or a membrane that forms part of an assembly required to have a *fire-resistance rating*, provided the piping is sealed at the penetration by a firestop system that has an F rating not less than the *fire-resistance rating* required for the *fire separation*.

(3) The rating referred to in Sentence (2) shall be based on CAN/ULC-S115, “Fire Tests of Firestop Systems”, with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side.

(4) *Combustible* drain piping is permitted to penetrate a horizontal *fire separation* or a membrane that contributes to the required *fire-resistance rating* of a horizontal *fire separation*, provided it leads directly from a *noncombustible* water closet through a concrete floor slab.

(5) *Combustible* piping is permitted,

(a) on one side of a vertical *fire separation* provided it is not located in a vertical shaft, and

(b) to penetrate a vertical or horizontal *fire separation* when the *fire compartment* on each side of the *fire separation* is *sprinklered*.

(6) In *buildings* containing 2 *dwelling units* only, *combustible* piping is permitted on one side of a horizontal *fire separation*.

#### **9.10.9.8. Collapse of Combustible Construction**

(1) *Combustible construction* that abuts on or is supported by a *noncombustible fire separation* shall be constructed so that its collapse under fire conditions will not cause collapse of the *fire separation*.

#### **9.10.9.9. Reduction in Thickness of Fire Separation by Beams and Joists**

(1) Where pockets for the support of beams or joists are formed in a masonry or concrete *fire separation*, the remaining total thickness of solid masonry and/or grout and/or concrete shall be not less than the required equivalent thickness shown for Type S monolithic concrete in Table 2.1.1. of MMAH Supplementary Standard SB-2, “Fire Performance Ratings”, for the required *fire-resistance rating*.

#### **9.10.9.10. Concealed Spaces above Fire Separations**

(1) Except as provided in Sentence (2), a *horizontal service space* or other concealed space located above a required vertical *fire separation* shall be divided at the *fire separation* by an equivalent *fire separation* within the space.

(2) Where a *horizontal service space* or other concealed space is located above a required vertical *fire separation* other than a vertical shaft, such space need not be divided as required in Sentence (1) provided the construction between such space and the space below is constructed as a *fire separation* having a *fire-resistance rating* not less than that required for the vertical *fire separation*, except that where the vertical *fire separation* is not required to have a *fire-resistance rating* greater than 45 min, the *fire-resistance rating* of the ceiling is permitted to be reduced to 30 min.

#### **9.10.9.11. Separation of Residential Occupancies**

(1) Except as provided in Sentences (2) and (4), *residential occupancies* shall be separated from all other *major occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

(2) Except as provided in Sentence (3), a *major occupancy* classified as a *residential occupancy*, including *live/work units*, shall be separated from other *major occupancies* classified as *mercantile* or *medium hazard industrial occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

(3) Where not more than 2 *dwelling units* or *live/work units* are located in a *building* containing a *mercantile occupancy*, such *mercantile occupancy* shall be separated from the *dwelling units* or *live/work units* by a *fire separation* having not less than 1 h *fire-resistance rating*.

(4) The requirement for *fire separations* between *major occupancies* in Sentence (1) is waived for the *occupancies* allowed within *live/work units*.

#### **9.10.9.12. Residential Suites, Live/Work Units and Industrial Buildings**

(1) Except as provided in Sentence (2), not more than 1 *suite* of *residential occupancy* shall be contained within a *building* classified as a Group F, Division 2 *major occupancy*.

(2) Except where a Group F Division 2 *major occupancy* is directly related to *live/work units*, not more than one *suite* of *residential occupancy* shall be contained within a *building* classified as Group F, Division 2 *major occupancy*.

#### **9.10.9.13. Separation of Suites**

(1) Except as required in Article 9.10.9.14. and as permitted by Sentence (2), each *suite* in other than *business and personal services occupancies* shall be separated from adjoining *suites* by a *fire separation* having a *fire-resistance rating* of not less than 45 min.

(2) In *sprinklered buildings*, *suites of business and personal services occupancy* and *mercantile occupancy* that are served by *public corridors* conforming with Sentence 3.3.1.4.(4) are not required to be separated from each other by *fire separations*.

#### **9.10.9.14. Separation of Residential Suites**

(1) Except as provided in Sentences (2) and (3) and Article 9.10.21.2., *suites in residential occupancies* shall be separated from adjacent rooms and *suites* by a *fire separation* having a *fire-resistance rating* of not less than 45 min.

(2) Sleeping rooms in *boarding, lodging or rooming houses* where sleeping accommodation is provided for not more than 8 boarders or lodgers shall be separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* of not less than 30 min where the sleeping rooms form part of the proprietor's residence and do not contain cooking facilities.

(3) *Dwelling units* that contain 2 or more *storeys* including *basements* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h.

#### **9.10.9.15. Separation of Public Corridors**

(1) Except as provided in Sentences (2) and (3), *public corridors* shall be separated from the remainder of the *building* by a *fire separation* having not less than a 45 min *fire-resistance rating*.

(2) In other than *residential occupancies*, no *fire-resistance rating* is required for *fire separations* between a *public corridor* and the remainder of the *building* if,

- (a) the *floor area* is *sprinklered*,
- (b) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.10.(3), and
- (c) the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.8.(4).

(3) In other than *residential occupancies*, no *fire separation* is required between a *public corridor* and the remainder of the *building* if,

- (a) the *floor area* is *sprinklered*,
- (b) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.10.(3),
- (c) the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.8.(4), and
- (d) the corridor exceeds 5 m in width.

#### **9.10.9.16. Separation of Storage Garages**

(1) Except as provided in Sentences (2) and (3), a *storage garage* shall be separated from other *occupancies* by a *fire separation* having not less than a 1.5 h *fire-resistance rating*.

(2) Except as permitted in Sentence (3), *storage garages* containing 5 motor vehicles or fewer shall be separated from other *occupancies* by a *fire separation* of not less than 1 h.

(3) Where a *storage garage* serves only the *dwelling unit* it is attached to or built into, it shall be considered as part of that *dwelling unit* and the *fire separation* required in Sentence (2) need not be provided between the garage and the *dwelling unit*.

(4) Where a *storage garage* is attached to or built into a *building of residential occupancy*,

- (a) an *air barrier system* conforming to Subsection 9.25.3. shall be installed between the garage and the remainder of the *building* to provide an effective barrier to gas and exhaust fumes, and
- (b) every door between the garage and the remainder of the *building* shall conform to Article 9.10.13.15.

(5) Where membrane materials are used to provide the required airtightness in the *air barrier system*, all joints shall be sealed and structurally supported.

#### **9.10.9.17. Separation of Repair Garages**

(1) Except as provided in Sentences (2) and (3), a *repair garage* shall be separated from other *occupancies* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

(2) Ancillary spaces directly serving a *repair garage*, including waiting rooms, reception rooms, tool and parts storage areas and supervisory office space, need not be separated from the *repair garage* but shall be separated from other *occupancies* as required in Sentence (1).

(3) The *fire separation* referred to in Sentence (1) shall have a *fire-resistance rating* of not less than 1 h, where,

- (a) the *building* is not more than one *storey* in *building height*,
- (b) the *building* is operated as a single *suite*, and
- (c) the only *occupancy* other than the *repair garage* is a *mercantile occupancy*.

(4) Where a *building* containing a *repair garage* also contains a *dwelling unit*, an *air barrier system* conforming to Subsection 9.25.3. shall be installed between the *dwelling unit* and the *suite* containing the garage to provide an effective air barrier to gas and exhaust fumes.

(5) Where membrane materials are used to provide the required airtightness in the *air barrier system*, all joints shall be sealed and structurally supported.

#### **9.10.9.18. Exhaust Ducts Serving More Than One Fire Compartment**

(1) Where a *vertical service space* contains an *exhaust duct* that serves more than one *fire compartment*, the duct shall have a fan located at or near the exhaust outlet to ensure that the duct is under negative pressure.

(2) Individual *fire compartments* referred to in Sentence (1) shall not have fans that exhaust directly into the duct in the *vertical service space*.

#### **9.10.9.19. Central Vacuum Systems**

(1) Except as permitted by Sentence 9.10.18.7.(1), a central vacuum system shall serve not more than one *suite*.

#### **9.10.10. Service Rooms**

##### **9.10.10.1. Application**

(1) This Subsection applies to *service rooms* in all *buildings* except rooms located within a *dwelling unit*.

##### **9.10.10.2. Service Room Floors**

(1) The *fire-resistance rating* requirements in this Subsection do not apply to the floor assembly immediately below a *service room*.

##### **9.10.10.3. Separation of Service Rooms**

(1) Except as provided in Sentence (2) and Articles 9.10.10.5. and 9.10.10.6., *service rooms* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h when the *floor area* containing the *service room* is not *sprinklered*.

(2) Where a room contains a limited quantity of service equipment and the service equipment does not constitute a fire hazard, the requirements in Sentence (1) shall not apply.

##### **9.10.10.4. Appliances and Equipment to be Located in a Service Room**

(1) Except as provided in Sentences (2) and (3) and Article 9.10.10.5., fuel-fired *appliances* shall be located in a *service room* separated from the remainder of the *building* by a *fire separation* having not less than a 1 h *fire-resistance rating*.

(2) Except as required in the *appliance* installation standards referenced in Sentences 6.2.1.4.(1) and 9.33.1.2.(1), fuel-fired *space-heating appliances*, *space-cooling appliances* and *service water heaters* need not be separated from the remainder of the *building* as required in Sentence (1) where the equipment serves,

- (a) not more than one room or *suite*, or
- (b) a *building* with a *building area* of not more than 400 m<sup>2</sup> and a *building height* of not more than 2 *storeys*.

(3) Sentence (1) does not apply to fireplaces and cooking *appliances*.

##### **9.10.10.5. Incinerators**

(1) *Service rooms* containing incinerators shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 2 h.

(2) The design, construction, installation and alteration of each indoor incinerator shall conform to NFPA 82, “Incinerators, Waste and Linen Handling Systems and Equipment”.

(3) Every incinerator shall be connected to a *chimney flue* conforming to the requirements in Section 9.21. and serving no other *appliance*.

(4) An incinerator shall not be located in a room with other fuel-fired *appliances*.

##### **9.10.10.6. Storage Rooms**

(1) Rooms for the temporary storage of *combustible* refuse in all *occupancies* or for public storage in *residential occupancies* shall be separated from the remainder of the *building* by a *fire separation* having not less than a 1 h *fire-*

*resistance rating*, except that a 45 min *fire separation* is permitted where the *fire-resistance rating* of the floor assembly is not required to exceed 45 min, or where such rooms are *sprinklered*.

#### **9.10.10.7. Emergency Power Installations**

(1) Where a generator intended to supply emergency power for lighting, fire safety and life safety systems is located in a *building*, it shall be located in a room that,

- (a) is separated from the remainder of the *building* by a *fire separation* with a *fire-resistance rating* not less than,
  - (i) 1 h, if the floor assembly is not required to have a *fire-resistance rating* of more than 1 h, and
  - (ii) 2 h, if the floor assembly is required to have a *fire-resistance rating* of more than 1 h, and
- (b) contains only the generating set and equipment that is related to the emergency power supply system.

#### **9.10.11. Firewalls**

##### **9.10.11.1. Required Firewalls**

(1) Except as provided in Articles 9.10.11.2. and 9.10.11.4., a *party wall* on a property line shall be constructed as a *firewall*.

##### **9.10.11.2. Firewalls Not Required**

(1) In a *building of residential occupancy* in which there is no *dwelling unit* above another *dwelling unit*, a *party wall* on a property line between *dwelling units* need not be constructed as a *firewall* provided it is constructed as a *fire separation* having not less than a 1 h *fire-resistance rating*.

(2) The wall described in Sentence (1) shall provide continuous protection from the top of the footings to the underside of the roof deck.

(3) Any space between the top of the wall described in Sentence (1) and the roof deck shall be tightly filled with mineral wool or *noncombustible* material.

##### **9.10.11.3. Construction of Firewalls**

(1) Where *firewalls* are used, the requirements in Part 3 shall apply.

##### **9.10.11.4. Firewalls in Detached Garages**

(1) Where a garage is detached from the *dwelling unit* but attached to another garage on the adjacent property, the *party wall* so formed shall be constructed as a *fire separation* having a *fire-resistance rating* of not less than 45 min.

#### **9.10.12. Prevention of Fire Spread at Exterior Walls and Between Storeys**

##### **9.10.12.1. Termination of Floors or Mezzanines**

(1) Except as provided in Sentence (2) and in Articles 9.10.1.3. and 9.10.9.5., the portions of a *floor area* or *mezzanine* that do not terminate at an exterior wall, a *firewall* or a vertical shaft, shall terminate at a vertical *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly that terminates at the separation.

(2) A *mezzanine* need not terminate at a vertical *fire separation* where the *mezzanine* is not required to be considered as a *storey* in Articles 9.10.4.1. and 9.10.4.2.

##### **9.10.12.2. Location of Skylights**

(1) Where a wall in a *building* is exposed to a fire hazard from an adjoining roof of a separate unsprinklered *fire compartment* in the same *building*, the roof shall contain no skylights within a horizontal distance of 5 m of the windows in the exposed wall.

##### **9.10.12.3. Exterior Walls Meeting at an Angle**

(1) Except as provided in Article 9.9.4.5., where exterior walls of a *building* meet at an external angle of less than 135°, the horizontal distance from an opening in one wall to an opening in the other wall shall be not less than 1.2 m where the openings are in different *fire compartments*.

(2) The exterior wall of each *fire compartment* referred to in Sentence (1) within the 1.2 m distance, shall have a *fire-resistance rating* not less than that required for the interior vertical *fire separation* between the compartment and the remainder of the *building*.

##### **9.10.12.4. Protection of Soffits**

(1) This Article applies to the portion of any soffit enclosing a projection that is,

- (a) less than 2.5 m vertically above a window or door, and
- (b) less than 1.2 m from either side of the window or door.

(2) Except as provided in Sentences (4) and (5), the soffit described in Sentence (1) shall be protected in accordance with Sentence (3) where the soffit encloses,

- (a) a common *attic or roof space* that spans more than 2 *suites* of *residential occupancy* and projects beyond the exterior wall of the *building*,
- (b) a floor space where an upper *storey* projects beyond the exterior wall of a lower *storey* and a *fire separation* is required at the floor between the two *storeys*, or
- (c) a floor space where an upper *storey* projects beyond the exterior wall of a lower *storey*, and the projection is continuous across a vertical *fire separation* separating two *suites*.

(3) Protection required by Sentence (2) shall be provided by,

- (a) *noncombustible* material having a minimum thickness of 0.38 mm and a melting point not below 650°C,
- (b) not less than 12.7 mm thick gypsum soffit board or gypsum wallboard installed according to CSA A82.31-M, “Gypsum Board Application,”
- (c) not less than 11 mm thick plywood,
- (d) not less than 12.5 mm thick OSB or waferboard, or
- (e) not less than 11 mm thick lumber.

(4) In the case of a soffit described in Sentence (1) that is at the edge of an *attic or roof space*, and completely separated from the remainder of the *attic or roof space* by *fire blocks*, the requirements in Sentence (2) do not apply.

(5) Where all *suites* spanned by a common *attic or roof space* or situated above or below the projecting floor are *sprinklered*, the requirements in Sentence (2) do not apply provided that all rooms, including closets and bathrooms, having openings in the wall beneath the soffit are *sprinklered*, notwithstanding any exceptions in the sprinkler standards referenced in Article 3.2.5.13.

### 9.10.13. Doors, Dampers and Other Closures in Fire Separations

#### 9.10.13.1. Closures

(1) Except as provided in Article 9.10.13.2., openings in required *fire separations* shall be protected with a *closure* conforming to Table 9.10.13.1. and shall be installed in conformance with NFPA 80, “Fire Doors and Other Opening Protectives”, unless otherwise specified in this Part.

**Table 9.10.13.1.**  
**Fire-Protection Ratings for Closures**  
Forming Part of Sentence 9.10.13.1.(1)

Item	Column 1	Column 2
	Required Fire-Resistance Rating of Fire Separation	Required Fire-Protection Rating of Closure
1.	30 or 45 min	20 min <sup>(1)</sup>
2.	1 h	45 min <sup>(1)</sup>
3.	1.5 h	1 h
4.	2 h	1.5 h
5.	3 h	2 h
6.	4 h	3 h

Notes to Table 9.10.13.1.:

<sup>(1)</sup> See Article 9.10.13.2.

#### 9.10.13.2. Solid Core Wood Door as a Closure

(1) A 45 mm thick solid core wood door is permitted to be used where a minimum *fire-protection rating* of 20 min is permitted or between a *public corridor* and a *suite* provided the door conforms to CAN/ULC-S113, “Wood Core Doors Meeting the Performance Required by CAN/ULC-S104 for Twenty Minute Fire Rated Closure Assemblies”.

(2) Doors described in Sentence (1) shall have not more than a 6 mm clearance beneath and not more than 3 mm at the sides and top.

#### 9.10.13.3. Unrated Wood Door Frames

(1) Doors required to provide a 20 min *fire-protection rating* or permitted to be 45 mm solid core wood shall be mounted in a wood frame of at least 38 mm thickness where the frame has not been tested and rated.

#### 9.10.13.4. Doors as a Means of Egress

(1) Doors forming part of an *exit* or a *public means of egress* shall conform to Subsection 9.9.6. in addition to this Subsection.

#### **9.10.13.5. Wired Glass as a Closure**

(1) Wired glass conforming to Article 9.6.1.2. that has not been tested in accordance with Article 9.10.3.1. is permitted as a *closure* in a vertical *fire separation* required to have a *fire-resistance rating* of not more than 1 h provided such glass is not less than 6 mm thick and is mounted in conformance with Sentence (2).

(2) Wired glass described in Sentence (1) shall be mounted in fixed steel frames having a minimum metal thickness of not less than 1.35 mm and a glazing stop of not less than 20 mm on each side of the glass.

(3) Individual panes of glass described in Sentence (1) shall not exceed 0.8 m<sup>2</sup> in area or 1.4 m in height or width, and the area of glass not structurally supported by mullions shall not exceed 7.5 m<sup>2</sup>.

#### **9.10.13.6. Steel Door Frames**

(1) Steel door frames forming part of a *closure* in a *fire separation*, including anchorage requirements, shall conform to CAN4-S105-M, “Fire Door Frames Meeting the Performance Required by CAN4-S104”.

#### **9.10.13.7. Glass Block as a Closure**

(1) Glass block that has not been tested in accordance with Article 9.10.3.1. is permitted as a *closure* in a *fire separation* required to have a *fire-resistance rating* of not more than 1 h.

#### **9.10.13.8. Maximum Size of Opening**

(1) The size of an opening in an interior *fire separation*, even where protected with a *closure*, shall not exceed 11 m<sup>2</sup>, with no dimension greater than 3.7 m, if a *fire compartment* on either side of the *fire separation* is not *sprinklered*.

(2) The size of an opening in an interior *fire separation*, even where protected with a *closure*, shall not exceed 22 m<sup>2</sup>, with no dimension greater than 6 m, when the *fire compartments* on both sides of the *fire separation* are *sprinklered*.

#### **9.10.13.9. Door Latch**

(1) Every swing type door in a *fire separation* shall be equipped with a latch.

#### **9.10.13.10. Self-Closing Device**

(1) Except as described in Sentence (2), every door in a *fire separation* shall have a self-closing device.

(2) Self-closing devices are not required between *public corridors* and *suites* in *business and personal services occupancies*, except in,

- (a) dead-end corridors, or
- (b) a corridor that serves a *hotel*.

#### **9.10.13.11. Hold-Open Devices**

(1) Where hold-open devices are used on doors in required *fire separations*, they shall be installed in accordance with Article 3.1.8.12.

#### **9.10.13.12. Service Room Doors**

(1) Swing-type doors shall open into *service rooms* containing fuel-fired equipment where such doors lead to *public corridors* or rooms used for assembly but shall swing outward from such rooms in all other cases.

#### **9.10.13.13. Fire Dampers**

(1) Except as permitted in Sentences (2) to (5) and Sentence 9.10.5.1.(4), a duct that penetrates an assembly required to be a *fire separation* with a *fire-resistance rating* shall be equipped with a *fire damper* in conformance with Articles 3.1.8.4. and 3.1.8.9.

(2) A *fire damper* is not required where a *noncombustible* branch duct pierces a required *fire separation* provided the duct,

- (a) has a melting point not below 760°C,
- (b) has a cross-sectional area less than 130 cm<sup>2</sup>, and
- (c) supplies only *air-conditioning* units or combined *air-conditioning* and heating units discharging air at not more than 1.2 m above the floor.

(3) A *fire damper* is not required where a *noncombustible* branch duct pierces a required *fire separation* around an *exhaust duct* riser in which the air flow is upward provided,

- (a) the melting point of the branch duct is not below 760°C,
- (b) the branch duct is carried up inside the riser at least 500 mm, and

(c) the *exhaust duct* is under negative pressure as described in Article 9.10.9.18.

(4) *Noncombustible* ducts that penetrate a *fire separation* separating a *vertical service space* from the remainder of the *building* need not be equipped with a *fire damper* at the *fire separation* provided,

(a) the ducts have a melting point above 760°C, and

(b) each individual duct exhausts directly to the outside at the top of the *vertical service space*.

(5) A duct serving commercial cooking equipment and piercing a required *fire separation* need not be equipped with a *fire damper* at the *fire separation*.

#### **9.10.13.14. Fire Stop Flaps**

(1) *Fire stop flaps* in ceiling membranes required in Sentence 9.10.5.1.(4) shall be constructed in conformance with MMAH Supplementary Standard SB-2, “Fire Performance Ratings”.

#### **9.10.13.15. Doors Between Garages and Dwelling Units**

(1) A door between an attached or built-in garage and a *dwelling unit* shall be tight-fitting and weatherstripped to provide an effective barrier against the passage of gases and exhaust fumes and shall be fitted with a self-closing device.

(2) A doorway between an attached or built-in garage and a *dwelling unit* shall not be located in a room intended for sleeping.

#### **9.10.13.16. Door Stops**

(1) Where a door is installed so that it may damage the integrity of a *fire separation* if its swing is unrestricted, door stops shall be installed to prevent such damage.

#### **9.10.14. Spatial Separation Between Buildings**

##### **9.10.14.1. Application**

(1) Except as permitted in Subsection 9.10.15., this Subsection applies to all *buildings*.

##### **9.10.14.2. Area and Location of Exposing Building Face**

(1) The area of an *exposing building face* shall be,

(a) taken as the exterior wall area facing in one direction on any side of a *building*, and

(b) calculated as,

(i) the total area measured from the finished ground level to the uppermost ceiling, or

(ii) the area for each *fire compartment*, where a *building* is divided into *fire compartments* by *fire separations* with *fire-resistance ratings* not less than 45 min.

(2) For the purpose of using Table 9.10.14.4. to determine the maximum aggregate area of *unprotected openings* permitted in an irregularly-shaped or skewed exterior wall, the location of the *exposing building face* shall be taken as a vertical plane located so that there are no *unprotected openings* between the vertical plane and the line to which *limiting distance* is measured.

(3) For the purpose of using Table 9.10.14.5. to determine the required type of construction, cladding and *fire-resistance rating* for an irregularly-shaped or skewed exterior wall,

(a) the *exposing building face* is permitted to be divided into any number of portions and the *fire-resistance rating*, type of cladding and percentage of *unprotected openings* limitations is permitted to be determined individually for each portion based on the *limiting distance* for each portion so divided,

(b) the *exposing building face* shall be taken as the projection of the exterior wall onto a vertical plane located so that no portion of the exterior wall of the *building* is between the vertical plane and the line to which the *limiting distance* is established in Clause (a), and

(c) for the purpose of determining the actual area of *unprotected openings* permitted in an exterior wall, the *unprotected openings* shall be projected onto the vertical plane established in Clause (b).

(4) The required *limiting distance* for an *exposing building face* is permitted to be measured to a point beyond the property line that is not the centre line of a *street*, lane or public thoroughfare if,

(a) the owners of the properties on which the *limiting distance* is measured and the *municipality* enter into an agreement in which such owners agree that,

(i) each owner covenants that, for the benefit of land owned by the other covenantors, the owner will not *construct* a *building* on his or her property unless the *limiting distance* for *exposing building faces* in respect of the proposed *construction* is measured in accordance with the agreement,

- (ii) the covenants contained in the agreement are intended to run with the lands, and the agreement shall be binding on the parties and their respective heirs, executors, administrators, successors and assigns,
- (iii) the agreement shall not be amended or deleted from title without the consent of the *municipality*, and
- (iv) they will comply with such other conditions as the *municipality* considers necessary, including indemnification of the *municipality* by the other parties, and

(b) the agreement referred to in Clause (a) is registered against the title of the properties to which it applies.

(5) Where an agreement referred to in Sentence (4) is registered against the title of a property, the *limiting distance* for *exposing building faces* in respect of the *construction* of any *buildings* on the property shall be measured to the point referred to in the agreement.

**9.10.14.3. Inadequate Firefighting Facilities**

(1) Where there is no fire department or where a fire department is not organized, trained and equipped to meet the needs of the community, the required *limiting distance* determined from Sentences 9.10.14.4.(2), (5) and (6) and Sentence 9.10.14.5.(6), shall be doubled for a *building* that is not *sprinklered*.

**9.10.14.4. Openings in Exposing Building Face**

(1) Except as provided in Sentences (3) to (7) and Sentence 9.10.14.6.(1), the maximum aggregate area of *unprotected openings* in an *exposing building face* shall,

- (a) conform to Table 9.10.14.4.,
- (b) conform to Subsection 3.2.3., or
- (c) where the limiting distance is not less than 1.2 m, be equal to or less than,
  - (i) the *limiting distance* squared, for *residential occupancies, business and personal services occupancies and low hazard industrial occupancies*, and
  - (ii) half the *limiting distance* squared, for *mercantile occupancies and medium hazard industrial occupancies*.

**Table 9.10.14.4.  
Maximum Aggregate Area of Unprotected Openings in Exterior Walls**

Forming Part of Sentence 9.10.14.4.(1)

Item	Column 1	Column 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	<i>Occupancy Classification of Building</i>	Maximum Total Area of <i>Exposing Building Face</i> , m <sup>2</sup>	Maximum Aggregate Area of <i>Unprotected Openings</i> , % of <i>Exposing Building Face Area</i>													
			<i>Limiting Distance</i> , m													
			Less than 1.2	1.2	1.5	2	2.5	3	4	6	8	10	12	16	20	25
1.	<i>Residential, business and personal services, and low-hazard industrial</i>	10	0	8	12	21	33	55	96	100	—	—	—	—	—	—
		15	0	8	10	17	25	37	67	100	—	—	—	—	—	—
		20	0	8	10	15	21	30	53	100	—	—	—	—	—	—
		25	0	8	9	13	19	26	45	100	—	—	—	—	—	—
		30	0	7	9	12	17	23	39	88	100	—	—	—	—	—
		40	0	7	8	11	15	20	32	69	100	—	—	—	—	—
		50	0	7	8	10	14	18	28	57	100	—	—	—	—	—
		100	0	7	8	9	11	13	18	34	56	84	100	—	—	—
		Over 100	0	7	7	8	9	10	12	19	28	40	55	92	100	—
2.	<i>Mercantile and medium-hazard industrial</i>	10	0	4	6	10	17	25	48	100	—	—	—	—	—	—
		15	0	4	5	8	13	18	34	82	100	—	—	—	—	—
		20	0	4	5	7	11	15	27	63	100	—	—	—	—	—
		25	0	4	5	7	9	13	22	51	94	100	—	—	—	—
		30	0	4	4	6	9	12	20	44	80	100	—	—	—	—
		40	0	4	4	6	8	10	16	34	61	97	100	—	—	—
		50	0	4	4	5	7	9	14	29	50	79	100	—	—	—
		100	0	4	4	4	5	6	9	17	28	42	60	100	—	—
		Over 100	0	4	4	4	4	5	6	10	14	20	27	46	70	100

(2) Except as provided in Sentence 9.10.14.6.(1), openings in a wall having a *limiting distance* of less than 1.2 m shall be protected by *closures*, of other than wired glass or glass block, whose *fire protection rating* is in conformance with the *fire-resistance rating* required for the wall.

(3) The maximum aggregate area of *unprotected openings* shall be not more than twice the area determined according to Sentence (1) where the *unprotected openings* are glazed with,



- (a) wired glass in steel frames as described in Article 9.10.13.5., or
- (b) glass blocks, as described in Article 9.10.13.7.

(4) Where the *building* is *sprinklered*, the maximum aggregate area of *unprotected openings* shall be not more than twice the area determined according to Sentence (1) provided all rooms, including closets and bathrooms, that are adjacent to the *exposing building face* and that have *unprotected openings* are *sprinklered*, notwithstanding any exemptions in the sprinkler standards referenced in Article 3.2.5.13.

(5) The maximum aggregate area of *unprotected openings* in an *exposing building face* of a *storage garage* need not comply with Sentence (1) where,

- (a) all *storeys* are constructed as *open-air storeys*, and
- (b) the *storage garage* has a *limiting distance* of not less than 3 m.

(6) The maximum aggregate area of *unprotected openings* in an *exposing building face* of a *storey* that faces a *street* and is the same level as the *street* need not comply with Sentence (1) where the *limiting distance* is not less than 9 m.

(7) The limits on the area of *unprotected openings* need not apply to the *exposing building face* of a detached garage or accessory *building* facing a *dwelling unit*, where,

- (a) the detached garage or accessory *building* serves a single *dwelling unit*,
- (b) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
- (c) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

**9.10.14.5. Construction of Exposing Building Face and Walls above Exposing Building Face**

(1) Except as provided in Sentences (2) to (7), each *exposing building face* and any exterior wall located above an *exposing building face* that encloses an *attic or roof space* shall be constructed in conformance with Table 9.10.14.5. and Subsection 9.10.8.

**Table 9.10.14.5.  
Minimum Construction Requirements for Exposing Building Faces**

Forming Part of Sentences 9.10.14.5.(1) to (3)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	<i>Occupancy Classification of Building</i>	<i>Maximum Area of Unprotected Openings Permitted, % of Exposing Building Face Area</i>	<i>Minimum Required Fire-Resistance Rating</i>	<i>Type of Construction Required</i>	<i>Type of Cladding Required</i>
1.	<i>Residential, business and personal services, and low-hazard industrial</i>	0 - 10	1 h	<i>Noncombustible</i>	<i>Noncombustible</i>
		>10 but ≤25	1 h	<i>Combustible or noncombustible</i>	<i>Noncombustible</i>
		>25 but <100	45 min	<i>Combustible or noncombustible</i>	<i>Combustible or noncombustible</i>
2.	<i>Mercantile and medium-hazard industrial</i>	0 - 10	2 h	<i>Noncombustible</i>	<i>Noncombustible</i>
		>10 but ≤25	2 h	<i>Combustible or noncombustible</i>	<i>Noncombustible</i>
		>25 but <100	1 h	<i>Combustible or noncombustible</i>	<i>Combustible or noncombustible</i>

(2) Cladding on *exposing building faces* and exterior walls located above *exposing building faces* need not conform to the type of cladding required by Table 9.10.14.5. where,

- (a) the *exposing building face* is constructed with no *unprotected openings*,
- (b) the *limiting distance* is not less than 0.6 m, and
- (c) the cladding,
  - (i) conforms to Subsection 9.27.12.,
  - (ii) is installed without furring members over not less than 12.7 mm thick gypsum sheathing or over masonry,
  - (iii) has a *flame-spread rating* not more than 25 when tested in accordance with Sentence 3.1.12.1.(2), and
  - (iv) is not more than 2 mm in thickness exclusive of fasteners, joints and local reinforcements.

(3) Except as provided in Sentence (4), where a garage or accessory *building* serves a single *dwelling unit* and is detached from any *building*, the *exposing building face*,

- (a) need not conform to the minimum required *fire-resistance rating* in Table 9.10.14.5., where the *limiting distance* is 0.6 m or more,

- (b) shall have a *fire-resistance rating* of not less than 45 min where the *limiting distance* is less than 0.6 m, and
- (c) need not conform to the type of cladding required in Table 9.10.14.5. regardless of the *limiting distance*.
- (4) The requirements for *fire-resistance rating*, type of construction and type of cladding need not apply to the *exposing building faces* of a *dwelling unit* and a detached garage or accessory *building* that face each other, where,
  - (a) the detached garage or accessory *building* serves a single *dwelling unit*,
  - (b) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
  - (c) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.
- (5) Except for *buildings* containing 1 or 2 *dwelling units* only, *combustible* projections on the exterior of a wall that are more than 1 000 mm above ground level, such as balconies, platforms, *canopies*, eave projections and stairs, and that could expose an adjacent *building* to fire spread, shall not be permitted within,
  - (a) 1.2 m of a property line or the centre line of a *public way*, or
  - (b) 2.4 m of a *combustible* projection on another *building* on the same property.
- (6) Heavy timber and steel columns need not conform to the requirements of Sentence (1) provided the *limiting distance* is not less than 3 m.
- (7) Non-loadbearing wall components need not have a minimum *fire-resistance rating* where,
  - (a) the *building* is 1 storey in *building height*,
  - (b) the *building* is of *noncombustible construction*,
  - (c) the *building* is classified as *low hazard industrial occupancy* and is used only for low *fire load occupancies* such as power generating plants or plants for the manufacture or storage of *noncombustible* materials, and
  - (d) the *exposing building face* has a limiting distance of 3 m or more.

#### 9.10.14.6. Minor Openings in Exposing Building Face

- (1) An opening in an *exposing building face* not more than 130 cm<sup>2</sup> shall not be considered an *unprotected opening*.

### 9.10.15. Spatial Separation Between Houses

#### 9.10.15.1. Application

- (1) This Subsection applies to *buildings* that,
  - (a) contain only *dwelling units* and have no *dwelling unit* above another *dwelling unit*, and
  - (b) are not designed in accordance with Subsection 9.10.14.

#### 9.10.15.2. Area and Location of Exposing Building Face

- (1) The area of an *exposing building face* shall be,
  - (a) taken as the exterior wall area facing in one direction on any side of a *building*, and
  - (b) calculated as,
    - (i) the total area measured from the finished ground level to the uppermost ceiling,
    - (ii) the area for each *fire compartment* where a *building* is divided into *fire compartments* by *fire separations* with *fire-resistance ratings* not less than 45 min, or
    - (iii) where Table 9.10.15.4. is used to determine maximum area of glazed openings, the area of any number of individual vertical portions of the wall measured from the finished ground level to the uppermost ceiling.
- (2) For the purpose of using Table 9.10.15.4. to determine the maximum permitted area of glazed openings in an irregularly-shaped or skewed exterior wall, the location of the *exposing building face* shall be taken as a vertical plane located so that there are no glazed openings between the vertical plane and the line to which the *limiting distance* is measured.
- (3) In determining the required cladding-sheathing assembly and *fire-resistance rating* for an irregularly-shaped or skewed exterior wall, the location of the *exposing building face* shall be taken as a vertical plane located so that no portion of the actual *exposing building face* is between the vertical plane and the line to which the *limiting distance* is measured.
- (4) The required *limiting distance* for an *exposing building face* is permitted to be measured to a point beyond the property line that is not the centre line of a *street*, lane or public thoroughfare if,
  - (a) the owners of the properties on which the *limiting distance* is measured and the *municipality* enter into an agreement in which such owners agree that,

- (i) each owner covenants that, for the benefit of land owned by the other covenantors, the owner will not *construct a building* on his or her property unless the *limiting distance* for *exposing building faces* in respect of the proposed *construction* is measured in accordance with the agreement,
- (ii) the covenants contained in the agreement are intended to run with the lands, and the agreement shall be binding on the parties and their respective heirs, executors, administrators, successors and assigns,
- (iii) the agreement shall not be amended or deleted from title without the consent of the *municipality*, and
- (iv) they will comply with such other conditions as the *municipality* considers necessary, including indemnification of the *municipality* by the other parties, and

(b) the agreement referred to in Clause (a) is registered against the title of the properties to which it applies.

(5) Where an agreement referred to in Sentence (4) is registered against the title of a property, the *limiting distance* for *exposing building faces* in respect of the *construction* of any *buildings* on the property shall be measured to the point referred to in the agreement.

**9.10.15.3. Inadequate Firefighting Facilities**

(1) Where there is no fire department or where a fire department is not organized, trained and equipped to meet the needs of the community, the required *limiting distance* determined from Sentences 9.10.15.4.(2) and (5) and Sentence 9.10.15.5.(6), shall be doubled for a *building* that is not *sprinklered*.

**9.10.15.4. Glazed Openings in Exposing Building Face**

- (1) Except as provided in Sentences (3) to (5), the maximum area of glazed openings in an *exposing building face* shall,
  - (a) conform to Table 9.10.15.4.,
  - (b) conform to Subsection 3.2.3. as if the glazed openings were *unprotected openings*, or
  - (c) where the *limiting distance* is not less than 1.2 m, be equal to or less than the *limiting distance* squared.

**Table 9.10.15.4.  
Maximum Area of Glazed Openings in Exterior Walls of Houses**

Forming Part of Sentences 9.10.15.4.(1) and (2)

Item	Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Maximum Total Area of Exposing Building Face, m <sup>2</sup>	Maximum Aggregate Area of Glazed Openings, % of Exposing Building Face Area													
		<i>Limiting Distance, m</i>													
		Less than 1.2	1.2	1.5	2	2.5	3	4	6	8	10	12	16	20	25
1.	10	0	8	12	21	33	55	96	100	—	—	—	—	—	—
2.	15	0	8	10	17	25	37	67	100	—	—	—	—	—	—
3.	20	0	8	10	15	21	30	53	100	—	—	—	—	—	—
4.	25	0	8	9	13	19	26	45	100	—	—	—	—	—	—
5.	30	0	7	9	12	17	23	39	88	100	—	—	—	—	—
6.	40	0	7	8	11	15	20	32	69	100	—	—	—	—	—
7.	50	0	7	8	10	14	18	28	57	100	—	—	—	—	—
8.	100	0	7	8	9	11	13	18	34	56	84	100	—	—	—
9.	Over 100	0	7	7	8	9	10	12	19	28	40	55	92	100	—

(2) Where the limits on the area of glazed openings are determined for individual portions of the exterior wall, as described in Subclause 9.10.15.2.(1)(b)(iii), the maximum aggregate area of glazed openings for any portion shall not exceed the values in the row of Table 9.10.15.4. for the total area of the entire *exposing building face* based on the *limiting distance* of the individual portion.

(3) The limits on the area of glazed openings shall not apply to the *exposing building face* of a *dwelling unit* facing a detached garage or accessory *building*, where,

- (a) the detached garage or accessory *building* serves only one *dwelling unit*,
- (b) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
- (c) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

(4) Except as provided in Sentence (5), openings in a wall having a *limiting distance* of less than 1.2 m shall be protected by *closures*, of other than wired glass or glass block, whose *fire-protection rating* is in conformance with the *fire-resistance rating* required for the wall.

(5) An opening in an *exposing building face* not more than 130 cm<sup>2</sup> shall not be considered an *unprotected opening*.

#### 9.10.15.5. Construction of Exposing Building Face of Houses

(1) Except as provided in Sentences (2) to (4) and (6), each *exposing building face* and any exterior wall located above an *exposing building face* that encloses an *attic or roof space* shall be constructed in conformance with Subsection 9.10.8.,

- (a) for the *exposing building face* as a whole, or
- (b) for any number of separate portions of the *exposing building face*.

(2) Sentence (1) does not apply where,

- (a) the *limiting distance* is not less than 1.2 m,
- (b) the *limiting distance* is less than 1.2 m but not less than 0.6 m, provided that the *exposing building face* has a *fire-resistance rating* of not less than 45 min, or
- (c) the *limiting distance* is less than 0.6 m, provided that the *exposing building face* has a *fire-resistance rating* of not less than 45 min and is clad with *noncombustible* material.

(3) Where the *limiting distance* is less than 0.6 m, cladding on the *exposing building face* and on exterior walls located above the *exposing building face* that enclose an *attic or roof spaces* need not be *noncombustible*, provided the cladding,

- (a) conforms to Subsection 9.27.12.,
- (b) is installed without furring members over not less than 12.7 mm thick gypsum sheathing or over masonry,
- (c) has a *flame-spread rating* not more than 25 when tested in accordance with Sentence 3.1.12.1.(2), and
- (d) is not more than 2 mm in thickness exclusive of fasteners, joints and local reinforcements.

(4) The requirements for *fire-resistance rating*, type of construction and type of cladding need not apply to the *exposing building faces* of a *dwelling unit* and a detached garage or accessory *building* that face each other, where,

- (a) the detached garage or accessory *building* serves a single *dwelling unit*,
- (b) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
- (c) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

(5) Except for *buildings* containing 1 or 2 *dwelling units* only, *combustible* projections on the exterior of a wall that are more than 1 000 mm above ground level, such as balconies, platforms, *canopies*, eave projections and stairs, and that could expose an adjacent *building* to fire spread, shall not be permitted within,

- (a) 1.2 m of a property line or the centre line of a *public way*, or
- (b) 2.4 m of a *combustible* projection on another *building* on the same property.

(6) Heavy timber and steel columns need not conform to the requirements of Sentence (1) provided the *limiting distance* is not less than 3 m.

#### 9.10.16. Fire Blocks

##### 9.10.16.1. Required Fire Blocks in Concealed Spaces

(1) Concealed spaces in interior walls, ceilings, floors and crawl spaces shall be separated by *fire blocks* from concealed spaces in exterior walls and *attic or roof spaces*.

(2) *Fire blocks* shall be provided at all interconnections between concealed vertical and horizontal spaces in interior coved ceilings, drop ceilings and soffits where the exposed construction materials within the concealed spaces have a surface *flame-spread rating* greater than 25.

(3) *Fire blocks* shall be provided at the top and bottom of each run of stairs where they pass through a floor containing concealed space in which the exposed construction materials within the space have a surface *flame-spread rating* greater than 25.

(4) In unsprinklered *buildings* of *combustible construction*, every concealed space created by a ceiling, roof space or unoccupied attic space shall be separated by *fire blocks* into compartments of not more than 300 m<sup>2</sup> in area where such space contains exposed construction materials having a surface *flame-spread rating* greater than 25.

(5) No dimension of the concealed space described in Sentence (4) shall exceed 20 m.

(6) Concealed spaces in mansard or gambrel style roofs, exterior cornices, balconies and canopies of *combustible construction* in which the exposed construction materials within the space have a surface *flame-spread rating* exceeding 25 shall have vertical *fire blocks* at intervals of not more than 20 m and at points where such concealed spaces extend across the ends of required vertical *fire separations*.

##### 9.10.16.2. Required Fire Blocks in Wall Assemblies

(1) Except as permitted in Sentence (2), *fire blocks* shall be provided to block off concealed spaces within wall assemblies, including spaces created by furring,

- (a) at each floor level,
- (b) at each ceiling level where the ceiling contributes to part of the required *fire-resistance rating*, and
- (c) at other locations within the wall, so that the distance between *fire blocks* does not exceed 20 m horizontally and 3 m vertically.

(2) *Fire blocks* required in Sentence (1) need not be provided, if,

- (a) the insulated wall assembly contains not more than one concealed air space and the horizontal thickness of that air space is not more than 25 mm,
- (b) the exposed construction materials within the space are *noncombustible*, or
- (c) the exposed construction materials within the space, including insulation, but not including wiring, piping or similar services, have a *flame-spread rating* of not more than 25.

#### 9.10.16.3. Fire Block Materials

(1) Except as permitted in Sentences (2) and (3), *fire blocks* shall be constructed of materials that will remain in place and prevent the passage of flames for not less than 15 min when subjected to the standard fire exposure in CAN/ULC-S101, “Fire Endurance Tests of Building Construction and Materials”.

(2) *Fire blocks* are deemed to comply with Sentence (1), if they are constructed of not less than,

- (a) 0.38 mm sheet steel,
- (b) 12.7 mm gypsum wallboard,
- (c) 12.5 mm plywood, OSB or waferboard, with joints having continuous supports,
- (d) 2 layers of 19 mm lumber with joints staggered, or
- (e) 38 mm lumber.

(3) In a *building* permitted to be of *combustible construction*, semi-rigid fibre insulation board produced from glass, rock or slag, is permitted to be used to block the vertical space in a double-frame wall assembly formed at the intersection of the floor assembly and the walls, provided the width of the vertical space is not more than 25 mm and the insulation board,

- (a) has a density not less than 45 kg/m<sup>3</sup>,
- (b) is securely fastened to one set of studs,
- (c) extends from below the bottom of the top plates in the lower *storey* to above the top of the bottom plate in the upper *storey*, and
- (d) completely fills the nominal gap of 25 mm between the headers and between the wall plates.

#### 9.10.16.4. Penetration of Fire Blocks

(1) Where *fire blocks* are pierced by pipes, ducts or other elements, the effectiveness of the *fire blocks* shall be maintained around such elements.

### 9.10.17. Flame Spread Limits

#### 9.10.17.1. Flame-Spread Rating of Interior Surfaces

(1) Except as otherwise provided in this Subsection, the exposed surface of every interior wall and ceiling, including skylights and glazing, shall have a surface *flame-spread rating* of not more than 150.

(2) Except as permitted in Sentence (3), doors need not conform to Sentence (1) provided they have a surface *flame-spread rating* of not more than 200.

(3) Doors within *dwelling units*, other than vehicle garage doors, need not conform to Sentences (1) and (2).

#### 9.10.17.2. Ceilings in Exits or Public Corridors

(1) At least 90% of the exposed surface of every ceiling in an *exit* or unsprinklered ceiling in a *public corridor* shall have a surface *flame-spread rating* of not more than 25.

#### 9.10.17.3. Walls in Exits

(1) Except as provided in Sentence (2), at least 90% of the exposed surfaces of every wall in an *exit* shall have a surface *flame-spread rating* of not more than 25.

(2) At least 75% of the wall surface of a lobby used as an *exit* in Article 9.9.8.5. shall have a surface *flame-spread rating* of not more than 25.

#### **9.10.17.4. Exterior Exit Passageways**

(1) Where an exterior *exit* passageway provides the only *means of egress* from the rooms or *suites* it serves, the wall and ceiling finishes of that passageway, including the soffit beneath and the *guard* on the passageway, shall have a surface *flame-spread rating* of not more than 25, except that up to 10% of the total wall area and 10% of the total ceiling area is permitted to have a surface *flame-spread rating* of not more than 150.

#### **9.10.17.5. Walls in Public Corridors**

(1) At least 90% of the total wall surface in any unsprinklered *public corridor* shall have a surface *flame-spread rating* of not more than 75, or at least 90% of the upper half of such walls shall have a surface *flame-spread rating* of not more than 25.

#### **9.10.17.6. Calculation of Wall and Ceiling Areas**

(1) Skylights, glazing, *combustible* doors, and *combustible* light diffusers and lenses shall not be considered in the calculation of wall and ceiling areas in this Subsection.

#### **9.10.17.7. Corridors Containing an Occupancy**

(1) Where a *public corridor* or a corridor used by the public contains an *occupancy*, the interior finish materials used on the walls or ceiling of such *occupancy* shall have a surface *flame-spread rating* in conformance with that required for *public corridors*.

#### **9.10.17.8. Light Diffusers and Lenses**

(1) Light diffusers and lenses having *flame-spread ratings* that exceed those permitted for the ceiling finish, shall conform to the requirements of Sentence 3.1.13.4.(1).

#### **9.10.17.9. Combustible Skylights**

(1) Individual *combustible* skylights in corridors required to be separated from the remainder of the *building* by *fire separations* shall not exceed 1 m<sup>2</sup> in area and shall be spaced not less than 1.2 m apart.

#### **9.10.17.10. Protection of Foamed Plastics**

(1) Except as provided in Sentence (2), foamed plastics that form part of a wall or ceiling assembly in *combustible construction* shall be protected from adjacent space in the *building*, other than adjacent concealed spaces within *attic* or *roof spaces*, crawl spaces and wall assemblies, by,

- (a) one of the finishes described in Subsections 9.29.4. to 9.29.9.,
- (b) sheet metal mechanically fastened to the supporting assembly independent of the insulation and having a thickness of not less than 0.38 mm and a melting point not below 650 °C provided the *building* does not contain a Group C *major occupancy*, or
- (c) any thermal barrier that meets the requirements of Clause 3.1.5.12.(2)(e).

(2) Foamed plastic insulation having a *flame-spread rating* of not more than 500 is permitted to be used in factory-assembled doors in *storage garages* serving *buildings* of *residential occupancy* provided that,

- (a) the insulation is covered on the interior with a metallic foil,
- (b) the assembly has a surface *flame-spread rating* of not more than 200, and
- (c) the assembly incorporates no air spaces.

#### **9.10.17.11. Walls and Ceilings in Bathrooms**

(1) The interior finish of walls and ceilings in bathrooms within *suites* of *residential occupancy* shall have a surface *flame-spread rating* of not more than 200.

#### **9.10.17.12. Coverings or Linings of Ducts**

(1) Where a covering or a lining is used with a duct, such lining or covering shall have a *flame-spread rating* conforming to Part 6.

### **9.10.18. Alarm and Detection Systems**

#### **9.10.18.1. Access Provided through a Firewall**

(1) Where access is provided through a *firewall*, the requirements in this Subsection shall apply to the *floor areas* on both sides of the *firewall* as if they were in the same *building*.

#### **9.10.18.2. Fire Alarm System Required**

- (1) Except as provided in Sentence (2), a fire alarm system shall be installed,
- (a) in every *building* that contains more than 3 *storeys*, including *storeys* below the *first storey*,
  - (b) where the total *occupant load* exceeds 300, or
  - (c) when the *occupant load* for any *major occupancy* in Table 9.10.18.2. is exceeded.
- (2) A fire alarm system is not required in a *residential occupancy* where an *exit* or *public corridor* serves not more than 4 *suites* or where each *suite* has direct access to an exterior *exit* facility leading to ground level.

**Table 9.10.18.2.**  
**Maximum Occupant Load for Buildings without Fire Alarm Systems**

Forming Part of Sentence 9.10.18.2.(1)

Item	Column 1	Column 2
	<i>Major Occupancy</i> Classification	<i>Occupant Load</i> Above which Fire Alarm System is Required
1.	<i>Residential</i>	10 (sleeping accommodation)
2.	<i>Business and personal services, mercantile</i>	150 above or below the <i>first storey</i>
3.	<i>Low- or medium-hazard industrial</i>	75 above or below the <i>first storey</i>

**9.10.18.3. Design and Installation Requirements**

(1) Except as provided in Sentence (2), fire alarm, fire detection and smoke detection devices and systems, and their installation, shall conform to Subsection 3.2.4. and Articles 3.2.7.8. and 3.2.7.10.

(2) Articles 3.2.4.1., 3.2.4.11., 3.2.4.12., 3.2.4.13., 3.2.4.14., 3.2.4.22. and 3.2.4.23. do not apply to Part 9 *buildings*.

**9.10.18.4. Rooms and Spaces Requiring Heat Detectors or Smoke Detectors**

(1) Where a fire alarm system is required, every *public corridor* in *buildings* of *residential occupancy* and every *exit* stair shaft shall be provided with *smoke detectors*.

(2) Except as provided in Sentence (3), if a fire alarm system is required in a *building*, *fire detectors* shall be installed in the following spaces:

- (a) storage rooms not within *dwelling units*,
- (b) *service rooms* not within *dwelling units*,
- (c) janitors' rooms,
- (d) rooms in which hazardous substances are to be used or stored,
- (e) elevator hoistways, chutes and dumbwaiter shafts, and
- (f) laundry rooms in *buildings* of *residential occupancy*, except those within *dwelling units*.

(3) Except as required in Sentence (4), *heat detectors* and *smoke detectors* described in Sentence (2), are not required in *dwelling units* or in *sprinklered buildings* in which the sprinkler system is electrically supervised and equipped with a water flow alarm.

(4) Where a fire alarm system is required in a *hotel*, *heat detectors* shall be installed in every room in a *suite* and in every room not located in a *suite* in a *floor area* containing a *hotel*, other than washrooms within a *suite*, saunas, refrigerated areas and swimming pools.

**9.10.18.5. Smoke Detectors in Recirculating Air Handling Systems**

(1) Except for a recirculating air system serving not more than one *dwelling unit*, where a fire alarm system is required to be installed, every recirculating air handling system shall be designed to prevent the circulation of smoke upon a signal from a duct-type *smoke detector* where such system supplies more than one *suite* on the same floor or serves more than 1 *storey*.

**9.10.18.6. Portions of Buildings Considered as Separate Buildings**

(1) Except as provided in Sentence (2), where a vertical *fire separation* having a *fire-resistance rating* of at least 1 h separates a portion of a *building* from the remainder of the *building* and there are no openings through the *fire separation* other than those for piping, tubing, wiring and conduit, the requirements for fire alarm and detection systems is permitted to be applied to each portion so separated as if it were a separate *building*.

(2) The permission in Sentence (1) to consider separated portions of a *building* as separate *buildings* does not apply to *service rooms* and storage rooms.

**9.10.18.7. Central Vacuum Systems**

(1) A central vacuum cleaning system serving more than one *suite* or *storey* in a *building* equipped with a fire alarm system shall be designed to shut down upon activation of the fire alarm system.

#### **9.10.18.8. Open-Air Storage Garages**

(1) Except as required in Article 9.10.18.1., a fire alarm system is not required in a *storage garage* conforming to Article 3.2.2.83. provided there are no other *occupancies* in the *building*.

#### **9.10.18.9. Fire Alarm System in a Hotel**

(1) If a fire alarm system is required in a *building* containing a *hotel*, a single stage fire alarm system shall be provided.

#### **9.10.18.10. Commissioning of Life Safety and Fire Protection Systems**

(1) Where life safety and fire protection systems are installed to comply with the provisions of this Code or the Fire Code made under the *Fire Protection and Prevention Act, 1997*, the commissioning of these integrated systems must be performed as a whole to ensure the proper operation and inter-relationship of the systems.

(2) Sentence (1) does not apply to a *building* that contains only *dwelling units* and has no *dwelling unit* above another *dwelling unit*.

#### **9.10.19. Smoke Alarms**

##### **9.10.19.1. Required Smoke Alarms**

(1) *Smoke alarms* conforming to CAN/ULC-S531, “Smoke Alarms”, shall be installed in each *dwelling unit* and in each sleeping room not within a *dwelling unit*.

##### **9.10.19.2. Sound Patterns of Smoke Alarms**

- (1) The sound patterns of *smoke alarms* shall,
- (a) meet the temporal patterns of *alarm signals*, or
  - (b) be a combination of temporal pattern and voice relay.

##### **9.10.19.3. Location of Smoke Alarms**

(1) Within *dwelling units*, sufficient *smoke alarms* shall be installed so that,

- (a) there is at least one *smoke alarm* installed on each *storey*, including *basements*, and
- (b) on any *storey* of a *dwelling unit* containing sleeping rooms, a *smoke alarm* is installed,
  - (i) in each sleeping room, and
  - (ii) in a location between the sleeping rooms and the remainder of the *storey*, and if the sleeping rooms are served by a hallway, the *smoke alarm* shall be located in the hallway.

(2) A *smoke alarm* required in Sentence (1) shall be installed in conformance with CAN/ULC-S553, “Installation of Smoke Alarms”.

(3) *Smoke alarms* required in Article 9.10.19.1. and Sentence (1) shall be installed on or near the ceiling.

##### **9.10.19.4. Power Supply**

(1) Except as provided in Sentences (2) and (3), *smoke alarms* required in Sentence 9.10.19.1.(1) shall,

- (a) be installed with permanent connections to an electrical circuit,
- (b) have no disconnect switch between the overcurrent device and the *smoke alarm*, and
- (c) in case the regular power supply to the *smoke alarm* is interrupted, be provided with a battery as an alternative power source that can continue to provide power to the *smoke alarm* for a period of not less than 7 days in the normal condition, followed by 4 min of alarm.

(2) Where the *building* is not supplied with electrical power, *smoke alarms* are permitted to be battery operated.

(3) *Suites of residential occupancy* are permitted to be equipped with *smoke detectors* in lieu of *smoke alarms*, provided the *smoke detectors*,

- (a) are capable of independently sounding audible signals within the individual *suites*,
- (b) except as provided by Sentence (4), are installed in conformance with CAN/ULC-S524, “Installation of Fire Alarm Systems”, and
- (c) form part of the fire alarm system.

(4) *Smoke detectors* permitted to be installed in lieu of *smoke alarms* as provided in Sentence (3) are permitted to sound localized alarms within individual *suites*, and need not sound an alarm throughout the rest of the *building*.

##### **9.10.19.5. Interconnection of Smoke Alarms**



(1) Where more than one *smoke alarm* is required in a *dwelling unit*, the *smoke alarms* shall be wired so that the activation of one alarm will cause all alarms within the *dwelling unit* to sound.

#### **9.10.19.6. Silencing of Smoke Alarms**

(1) Except as permitted in Sentence (2), a manually operated device shall be incorporated within the circuitry of a *smoke alarm* installed in a *dwelling unit* so that the signal emitted by the *smoke alarm* can be silenced for a period of not more than 10 min, after which the *smoke alarm* will reset and sound again if the level of smoke in the vicinity is sufficient to reactuate it.

(2) *Suites of residential occupancy* equipped with *smoke detectors* installed to CAN/ULC-S524, “Installation of Fire Alarm Systems”, which are part of the fire alarm system in lieu of *smoke alarms* as permitted in Sentence 9.10.19.4.(3), need not incorporate the manually operated device required in Sentence (1).

#### **9.10.19.7. Instructions for Maintenance and Care**

(1) Where instructions are necessary to describe the maintenance and care required for *smoke alarms* to ensure continuing satisfactory performance, they shall be posted in a location where they will be readily available to the occupants for reference.

#### **9.10.20. Firefighting**

##### **9.10.20.1. Windows or Access Panels Required**

(1) Except as provided in Sentence (3), a window or access panel providing an opening not less than 1 100 mm high and 550 mm wide and having a sill height of not more than 900 mm above the floor shall be provided on the second and third *storeys* of every *building* in at least one wall facing on a *street* if such *storeys* are not *sprinklered*.

(2) Access panels required in Sentence (1) shall be readily openable from both inside and outside or be glazed with plain glass.

(3) Access panels required in Sentence (1) need not be provided in *buildings* containing only *dwelling units* where there is no *dwelling unit* above another *dwelling unit*.

##### **9.10.20.2. Access to Basements**

(1) Except in *basements* serving not more than one *dwelling unit*, each unsprinklered *basement* exceeding 25 m in length or width shall be provided with direct access to the outdoors to at least one *street*.

(2) Access required in Sentence (1) is permitted to be provided by a door, window or other means that provides an opening not less than 1 100 mm high and 550 mm wide, the sill height of which shall not be more than 900 mm above the floor.

(3) Access required in Sentence (1) is also permitted to be provided by an interior stair accessible from the outdoors.

##### **9.10.20.3. Fire Department Access to Buildings**

(1) Access for fire department equipment shall be provided to each *building* by means of a *street*, private roadway or yard.

(2) Where access to a *building* as required in Sentence (1) is provided by means of a roadway or yard, the design and location of such roadway or yard shall take into account connection with public thoroughfares, weight of firefighting equipment, width of roadway, radius of curves, overhead clearance, location of fire hydrants, location of fire department connections and vehicular parking.

##### **9.10.20.4. Portable Extinguishers**

(1) Portable extinguishers shall be installed in all *buildings*, except within *dwelling units*, in conformance with the provisions of the Fire Code made under the *Fire Protection and Prevention Act, 1997*.

##### **9.10.20.5. Freeze Protection for Fire Protection Systems**

(1) Equipment forming part of a fire protection system that may be adversely affected by freezing temperatures and that is located in an unheated area shall be protected from freezing.

#### **9.10.21. Fire Protection for Construction Camps**

##### **9.10.21.1 Requirements for Construction Camps**

(1) Except as provided in Articles 9.10.21.2. to 9.10.21.9., *camp* for housing of workers shall conform to Subsections 9.10.1. to 9.10.20.

##### **9.10.21.2. Separation of Sleeping Rooms**

(1) Except for sleeping rooms within *dwelling units*, sleeping rooms in a *building* in a *camp* for housing of workers shall be separated from each other and from the remainder of the *building* by a *fire separation* having not less than a 30 min *fire-resistance rating*.

### **9.10.21.3. Floor Assemblies Between the First and Second Storey**

(1) Except in a *dwelling unit*, a floor assembly in a *building* in a *camp for housing of workers* separating the *first storey* and the second *storey* shall be constructed as a *fire separation* having not less than a 30 min *fire-resistance rating*.

### **9.10.21.4. Walkways Connecting Buildings**

(1) *Walkways* of *combustible construction* connecting *buildings* shall be separated from each connected *building* by a *fire separation* having not less than a 45 min *fire-resistance rating*.

### **9.10.21.5. Spatial Separations**

(1) *Buildings* in a *camp for housing of workers* shall be separated from each other by a distance of not less than 10 m unless otherwise permitted in Subsection 9.10.14.

### **9.10.21.6. Flame-Spread Ratings**

(1) Except in *dwelling units* and except as provided in Sentence (2), the surface *flame-spread rating* of wall and ceiling surfaces in corridors and *walkways*, exclusive of doors, shall not exceed 25 over not less than 90 per cent of the exposed surface area and not more than 150 over the remaining surface area.

(2) Except within *dwelling units*, corridors that provide *access to exit* from sleeping rooms and that have a *fire-resistance rating* of not less than 45 min shall have a *flame-spread rating* conforming to the appropriate requirements in Subsection 9.10.17.

### **9.10.21.7. Smoke Detectors**

(1) Except in *dwelling units*, corridors providing *access to exit* from sleeping rooms in every *building* in a *camp for housing of workers* with sleeping accommodation for more than 10 persons shall have a *smoke detector* connected to the *building* alarm system.

### **9.10.21.8. Portable Fire Extinguishers**

(1) Each *building* in a *camp for housing of workers* shall be provided with portable fire extinguishers in conformance with the provisions of the Fire Code made under the *Fire Protection and Prevention Act, 1997*.

### **9.10.21.9. Hose Stations**

(1) Every *building* in a *camp for housing of workers* providing sleeping accommodation for more than 30 persons shall be provided with a hose station that is protected from freezing and equipped with a hose of sufficient length so that every portion of the *building* is within the range of a hose stream.

(2) Hose stations required in Sentence (1) shall be located near an *exit*.

(3) Hoses referred to in Sentence (1) shall be not less than 19 mm inside diam and shall be connected to a central water supply or to a storage tank having a capacity of at least 4 500 L with a pumping system capable of supplying a flow of at least 5 L/s at a gauge pressure of 300 kPa.

## **9.10.22. Fire Protection for Gas, Propane and Electric Cooktops**

### **9.10.22.1. Installation of Ranges**

(1) Reserved

(2) Clearances for and protection around gas, propane and electric ranges shall be not less than those provided in Articles 9.10.22.2. and 9.10.22.3.

### **9.10.22.2. Vertical Clearances above Cooktops**

(1) Except as provided in Sentence (2), framing, finishes and cabinetry installed directly above the location of the *cooktop* shall be not less than 750 mm above the level of *cooktop* burners or elements.

(2) The vertical clearance described in Sentence (1) for framing, finishes and cabinets located directly above the location of the *cooktop* is permitted to be reduced to 600 mm above the level of the elements or burners provided the framing, finishes and cabinets,

(a) are *noncombustible*, or

(b) are protected by,

(i) asbestos millboard not less than 6 mm thick, covered with sheet metal not less than 0.33 mm thick, or

(ii) a metal hood with a 125 mm projection beyond the framing, finishes and cabinets.

### **9.10.22.3. Protection Around Cooktops**

(1) Except as provided in Sentences (2) and (3), *combustible* wall framing, finishes or cabinets within 450 mm of the area where the *cooktop* is to be located shall be protected above the level of the heating elements or burners by material providing fire resistance not less than that of a 9.5 mm thickness of gypsum board.

(2) Countertop splash boards or back plates that extend above the level of the heating elements or burners need not be protected as described in Sentence (1).

(3) Except for cabinetry described in Article 9.10.22.2., cabinetry located not less than 450 mm above the level of the heating elements or burners need not be protected as described in Sentence (1).

## **Section 9.11. Sound Control**

### **9.11.1. Sound Transmission Class Rating (Airborne Sound)**

#### **9.11.1.1. Determination of Sound Transmission Class Ratings**

(1) Sound transmission class ratings shall be determined in accordance with ASTM E413, "Classification for Rating Sound Insulation", using results from measurements in accordance with,

- (a) ASTM E90, "Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements", or
- (b) ASTM E336, "Measurement of Airborne Sound Attenuation Between Rooms in Buildings".

### **9.11.2. Required Sound Control Locations (Airborne Sound)**

#### **9.11.2.1. Minimum Sound Transmission Class Ratings**

(1) Except as provided in Sentence (2), every *dwelling unit* and every *suite* in *hotels* shall be separated from every other space in a *building* in which noise may be generated, by a construction providing a sound transmission class rating of at least 50, measured in accordance with Subsection 9.11.1. or as listed in Tables 1 and 2 of MMAH Supplementary Standard SB-3, "Fire and Sound Resistance of Building Assemblies".

(2) Where a *dwelling unit* or *suite* in a *hotel* is adjacent to an elevator shaft or a refuse chute, the separating construction shall have a sound transmission class rating of at least 55, measured in accordance with Subsection 9.11.1. or as listed in Tables 1 and 2 of MMAH Supplementary Standard SB-3, "Fire and Sound Resistance of Building Assemblies".

#### **9.11.2.2. Building Services in an Assembly**

(1) *Building* services located in an assembly required to have a sound transmission class rating shall be installed in a manner that will not decrease the required rating of the assembly.

## **Section 9.12. Excavation**

### **9.12.1. General**

#### **9.12.1.1. Removal of Topsoil and Organic Matter**

- (1) The topsoil and vegetable matter in all unexcavated areas under a *building* shall be removed.
- (2) In localities where termite infestation is known to be a problem, all stumps, roots and other wood debris shall be removed from the *soil* to a depth of not less than 300 mm in unexcavated areas under a *building*.
- (3) The bottom of every *excavation* shall be free of all organic material.

#### **9.12.1.2. Standing Water**

- (1) *Excavations* shall be kept free of standing water.

#### **9.12.1.3. Protection from Freezing**

- (1) The bottom of *excavations* shall be kept from freezing throughout the entire construction period.

#### **9.12.1.4. Precautions During Excavation**

- (1) Every *excavation* shall be undertaken in such a manner to prevent damage to adjacent property, existing structures, utilities, roads and sidewalks at all stages of construction.
- (2) Material shall not be placed nor shall equipment be operated or placed in or adjacent to an *excavation* in a manner that may endanger the integrity of the *excavation* or its supports.

### **9.12.2. Depth**

#### **9.12.2.1. Excavation to Undisturbed Soil**

- (1) *Excavations* for *foundations* shall extend to undisturbed *soil*.

#### **9.12.2.2. Minimum Depth of Foundations**

(1) Except as provided in Sentences (4) and (5), the minimum depth of *foundations* below finished ground level shall conform to Table 9.12.2.2.

**Table 9.12.2.2.  
Minimum Depths of Foundations**

Forming Part of Sentence 9.12.2.2.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Type of <i>Soil</i>	Minimum Depth of <i>Foundation</i> Containing Heated <i>Basement</i> or <i>Crawl Space</i> <sup>(1)</sup>		Minimum Depth of <i>Foundation</i> Containing no Heated Space <sup>(2)</sup>	
		Good <i>Soil Drainage</i>	Poor <i>Soil Drainage</i>	Good <i>Soil Drainage</i>	Poor <i>Soil Drainage</i>
1.	<i>Rock</i>	No limit	No limit	No limit	No limit
2.	Coarse grained <i>soils</i>	No limit	No limit	No limit	Below the depth of frost penetration
3.	Silt	No limit	No limit	Below the depth of frost penetration <sup>(3)</sup>	Below the depth of frost penetration
4.	Clay or <i>soils</i> not clearly defined	1.2 m <sup>(3)</sup>	1.2 m	1.2 m but not less than the depth of frost penetration <sup>(3)</sup>	1.2 m but not less than the depth of frost penetration

**Notes to Table 9.12.2.2.:**

<sup>(1)</sup> *Foundation* not insulated to reduce heat loss through the footings.

<sup>(2)</sup> Including *foundations* containing heated space insulated to reduce heat loss through the footings.

<sup>(3)</sup> Good *soil* drainage to not less than the depth of frost penetration.

(2) Where a *foundation* is insulated in a manner that will reduce the heat flow to the *soil* beneath the footings, the *foundation* depth shall conform to that required for *foundations* containing no heated space.

(3) The minimum depth of *foundations* for exterior concrete steps with more than 2 risers shall conform to Sentences (1), (2) and (5).

(4) Concrete steps with 1 and 2 risers are permitted to be laid on ground level.

(5) The *foundation* depths required in Sentence (1) are permitted to be decreased where experience with local *soil* conditions shows that lesser depths are satisfactory, or where the *foundation* is designed for lesser depths.

(6) The *foundation* depths required in Sentence (1) do not apply to *foundations* for,

(a) *buildings*,

(i) that are not of masonry or masonry veneer construction, and

(ii) whose superstructure conforms with the requirements of the deformation resistance test in CAN/CSA-Z240.2.1, “Structural Requirements for Manufactured Homes”, or

(b) accessory *buildings*,

(i) that are not of masonry or masonry veneer construction,

(ii) not more than 1 *storey* in *building height*,

(iii) not more than 55 m<sup>2</sup> in *building area*, and

(iv) where the distance from the finished ground to the underside of the floor joists is not more than 600 mm.

(7) The *foundation* depths required in Sentence (1) do not apply to *foundations* for decks and other accessible exterior platforms,

(a) that are of not more than 1 *storey*,

(b) that are not more than 55 m<sup>2</sup> in area,

(c) where the distance from the finished ground to the underside of the floor joists is not more than 600 mm,

(d) that are not supporting a roof, and

(e) that are not attached to another structure, unless it can be demonstrated that differential movement will not adversely affect the performance of that structure.

### 9.12.3. Backfill

#### 9.12.3.1. Placement of Backfill

(1) Backfill shall be placed to avoid damaging the *foundation* wall, the drainage tile, drainage layer, externally applied thermal insulation, waterproofing and dampproofing of the wall.

#### **9.12.3.2. Grading of Backfill**

(1) Backfill shall be graded to prevent drainage towards the *foundation* after settling.

#### **9.12.3.3. Deleterious Debris and Boulders**

(1) Backfill within 600 mm of the *foundation* shall be free of deleterious debris and boulders larger than 250 mm diam.

(2) Except as permitted in Sentence (3), backfill shall not contain pyritic material or material that is susceptible to ice lensing in concentrations that will damage the *building* to a degree that would adversely affect its stability or the performance of assemblies separating dissimilar environments.

(3) Backfill with material of any concentration that is susceptible to ice lensing is permitted where *foundation* walls are cast-in-place concrete, concrete block insulated on the exterior or concrete block protected from the backfill by a material that serves as a slip plane.

#### **9.12.3.4. Lateral Support of Foundation Wall**

(1) Where the height of *foundation* wall is such that lateral support is required, or where the required concrete strength of the wall has not been reached, the wall shall be braced or laterally supported before backfilling.

#### **9.12.4. Trenches Beneath Footings**

##### **9.12.4.1. Compacting or Filling With Concrete**

(1) The *soil* in trenches beneath footings for sewers and watermains shall be compacted by tamping up to the level of the footing base, or shall be filled with concrete having a strength not less than 10 MPa to support the footing.

### **Section 9.13. Dampproofing, Waterproofing and Soil Gas Control**

#### **9.13.1. General**

##### **9.13.1.1. Application**

(1) This Section applies to the control of moisture and *soil* gas ingress through walls, floors, and roofs in contact with the ground.

#### **9.13.2. Dampproofing**

##### **9.13.2.1. Dampproofing**

(1) Except as provided in Article 9.13.3.1., where the exterior finished ground level is at a higher elevation than the ground level inside the *foundation* walls, exterior surfaces of *foundation* walls below ground level shall be dampproofed.

(2) Except as provided in Sentence (3) and Article 9.13.3.1., floors-on-ground shall be dampproofed.

(3) Floors in garages, floors in unenclosed portions of *buildings* and floors installed over granular *fill* in conformance with Article 9.16.2.1. need not be dampproofed.

(4) Dampproofing in Sentence (1) is not required where the exterior surfaces of *foundation* walls below ground level are waterproofed.

##### **9.13.2.2. Material Standards**

(1) Except as otherwise specified in this Section, materials used for exterior dampproofing shall conform to,

- (a) CAN/CGSB-37.1-M, “Chemical Emulsified Type, Emulsified Asphalt for Dampproofing”,
- (b) CAN/CGSB-37.2-M, “Emulsified Asphalt, Mineral Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings”,
- (c) CGSB 37-GP-6Ma, “Asphalt, Cutback, Unfilled, for Dampproofing”,
- (d) CAN/CGSB-37.16-M, “Filled, Cutback Asphalt for Dampproofing and Waterproofing”,
- (e) CGSB 37-GP-18Ma, “Tar, Cutback, Unfilled, for Dampproofing”,
- (f) CAN/CGSB-51.34-M, “Vapour Barrier, Polyethylene Sheet, for Use in Building Construction”,
- (g) CAN/CSA-A123.4, “Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems,” or
- (h) CGSB 37-GP-56M, “Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing”.

##### **9.13.2.3. Standards for Application**

(1) The method of application of all bituminous dampproofing materials shall conform to,

- (a) CAN/CGSB-37.3-M, “Application of Emulsified Asphalts for Dampproofing or Waterproofing”,
- (b) CGSB 37-GP-12Ma, “Application of Unfilled Cutback Asphalt for Dampproofing”, or
- (c) CAN/CGSB-37.22-M, “Application of Unfilled, Cutback Tar Foundation Coating for Dampproofing”.

#### **9.13.2.4. Preparation of Surface**

- (1) Unit masonry walls to be dampproofed shall be,
  - (a) parged on the exterior face below ground level with not less than 6 mm of mortar conforming to Section 9.20., and
  - (b) coved over the footing when the first course of block is laid.
- (2) Concrete walls to be dampproofed shall have holes and recesses resulting from the removal of form ties sealed with cement mortar or dampproofing material.
- (3) The surface of insulating concrete form walls to be dampproofed shall be repaired and free of projections and depressions that could be detrimental to the performance of the membrane to be applied.

#### **9.13.2.5. Application of Dampproofing Material**

- (1) Dampproofing material shall be applied over the parging or concrete below ground level.

#### **9.13.2.6. Moisture Protection for Interior Finishes**

- (1) The interior surface of *foundation* walls below ground level shall be protected by means that minimize the ingress of moisture from the *foundation* wall into interior spaces where,
  - (a) a separate interior finish is applied to a concrete or unit masonry wall that is in contact with the *soil*, or
  - (b) wood members are placed in contact with such walls for the installation of insulation or finish.
- (2) Except as provided in Sentence (3), where the protection of interior finishes required in Sentence (1) consists of membranes or coatings,
  - (a) the membrane or coating shall extend from the *basement* floor surface up to the highest extent of the interior insulation or finish, but not higher than the exterior finished ground level, and
  - (b) no membrane or coating with a permeance less than  $170 \text{ ng}/(\text{Pa} \cdot \text{s} \cdot \text{m}^2)$  shall be applied to the interior surface of the *foundation* wall above ground level between the insulation and the *foundation* wall.
- (3) Where insulation functions as both moisture protection for interior finishes and as a *vapour barrier* in accordance with Subsection 9.25.4., it shall be applied over the entire interior surface of the *foundation* wall.

#### **9.13.2.7. Dampproofing of Floors-on-Ground**

- (1) Where floors are dampproofed, the dampproofing shall be installed below the floor, except that where a separate floor is provided over a slab, the dampproofing is permitted to be applied to the top of the slab.
- (2) Where installed below the floor, dampproofing membranes shall consist of polyethylene not less than 0.15 mm thick, or Type S roll roofing.
- (3) Joints in dampproofing membranes described in Sentence (2) shall be lapped not less than 100 mm.
- (4) Where installed above the slab, dampproofing shall consist of,
  - (a) no fewer than 2 mopped-on coats of bitumen,
  - (b) not less than 0.05 mm polyethylene, or
  - (c) other material providing equivalent performance.

#### **9.13.2.8. Dampproofing of Preserved Wood Foundation Walls**

- (1) Preserved wood *foundation* walls shall be dampproofed as described in CAN/CSA-S406, “Construction of Preserved Wood Foundations”.

### **9.13.3. Waterproofing**

#### **9.13.3.1. Required Waterproofing**

- (1) Where hydrostatic pressure occurs, waterproofing is required for exterior surfaces of,
  - (a) floors-on-ground, and
  - (b) below ground walls, where the exterior finished ground level is at a higher elevation than the ground level inside the *foundation* walls.
- (2) Roofs of underground structures shall be waterproofed to prevent the entry of water into the structure.

### 9.13.3.2. Material Standards

- (1) Except as otherwise specified in this Section, materials used for exterior waterproofing shall conform to,
  - (a) CAN/CGSB-37.2-M, “Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings”,
  - (b) CAN/CGSB-37.16-M, “Filled, Cutback Asphalt for Dampproofing and Waterproofing”,
  - (c) CAN/CSA-A123.4, “Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems”, or
  - (d) CGSB 37-GP-56M, “Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing”.

### 9.13.3.3. Standards for Application

(1) The method of application of all bituminous waterproofing materials shall conform to CAN/CGSB-37.3-M, “Application of Emulsified Asphalts for Dampproofing or Waterproofing”.

### 9.13.3.4. Preparation of Surface

(1) Unit masonry walls that are to be waterproofed shall be parged on exterior surfaces below ground level with not less than 6 mm of mortar conforming to Section 9.20.

(2) Concrete walls that are to be waterproofed shall have all holes and recesses resulting from removal of form ties sealed with mortar or waterproofing material.

(3) The surface of insulating concrete form walls that are to be waterproofed shall be repaired and free of projections and depressions that could be detrimental to the performance of the membrane to be applied.

### 9.13.3.5. Application of Waterproofing Membranes

(1) Concrete or unit masonry walls to be waterproofed shall be covered with no fewer than 2 layers of bitumen-saturated membrane, with each layer cemented in place with bitumen and coated overall with a heavy coating of bitumen.

### 9.13.3.6. Floor Waterproofing System

(1) *Basement* floors-on-ground to be waterproofed shall have a system of membrane waterproofing provided between 2 layers of concrete, each of which shall be not less than 75 mm thick, with the floor membrane mopped to the wall membrane to form a complete seal.

## 9.13.4. Soil Gas Control

### 9.13.4.1. Soil Gas Control

(1) Where methane or radon gases are known to be a problem, construction shall comply with the requirements for *soil* gas control in MMAH Supplementary Standard SB-9, “Requirements for Soil Gas Control”.

### 9.13.4.2. Required Soil Gas Control

(1) Except as provided in Sentence (2), all wall, roof and floor assemblies in contact with the ground shall be constructed to resist the leakage of *soil* gas from the ground into the *building*.

(2) Construction to resist leakage of *soil* gas into the *building* is not required for,

- (a) garages and unenclosed portions of *buildings*,
- (b) *buildings* constructed in areas where it can be demonstrated that *soil* gas does not constitute a hazard, or
- (c) *buildings* that contain a single *dwelling unit* and are constructed to provide for subfloor depressurization in accordance with MMAH Supplementary Standard SB-9, “Requirements for Soil Gas Control”.

(3) Where *soil* gas control is required, a *soil* gas barrier shall be installed at walls and roofs in contact with the ground according to MMAH Supplementary Standard SB-9, “Requirements for Soil Gas Control”.

(4) Where *soil* gas control is required, it shall consist of one of the following at floors in contact with the ground:

- (a) a *soil* gas barrier installed according to MMAH Supplementary Standard SB-9, “Requirements for Soil Gas Control”, or
- (b) where the *building* contains a single *dwelling unit* only, a subfloor depressurization system installed according to MMAH Supplementary Standard SB-9, “Requirements for Soil Gas Control”.

### 9.13.4.3. Material Standards

(1) Materials used to provide a barrier to *soil* gas ingress through floors-on-ground shall conform to CAN/CGSB-51.34-M, “Vapour Barrier, Polyethylene Sheet, for Use in Building Construction”.

## Section 9.14. Drainage

### **9.14.1. Scope**

#### **9.14.1.1. Application**

(1) This Section applies to subsurface drainage and to surface drainage.

#### **9.14.1.2. Crawl Spaces**

(1) Drainage for crawl spaces shall conform to Section 9.18.

#### **9.14.1.3. Floors-on-Ground**

(1) Drainage requirements beneath floors-on-ground shall conform to Section 9.16.

### **9.14.2. Foundation Drainage**

#### **9.14.2.1. Foundation Wall Drainage**

(1) Unless it can be shown to be unnecessary, drainage shall be provided at the bottom of every *foundation* wall that contains the *building* interior.

(2) Except as provided in Sentences (4) and (5), where the insulation on a *foundation* wall extends to more than 900 mm below the adjacent exterior ground level,

(a) a drainage layer shall be installed adjacent to the exterior surface of a *foundation* wall consisting of,

- (i) not less than 19 mm mineral fibre insulation with a density of not less than 57 kg/m<sup>3</sup>, or
- (ii) not less than 100 mm of free draining granular material, or

(b) a system shall be installed that can be shown to provide equivalent performance to that provided by the materials described in Clause (a).

(3) Where mineral fibre insulation, crushed rock backfill or other drainage layer medium is provided adjacent to the exterior surface of a *foundation* wall,

- (a) the insulation, backfill or other drainage layer medium shall extend to the footing level to facilitate drainage of ground water to the *foundation* drainage system, and
- (b) any pyritic material in the crushed rock shall be limited to a concentration that will not damage the *building* to a degree that would adversely affect its stability or the performance of assemblies separating dissimilar environments.

(4) Except when the insulation provides the drainage layer required in Clause (2)(a), when exterior insulation is provided, the drainage layer shall be installed on the exterior face of the insulation.

(5) The drainage layer required in Sentence (2) is not required,

- (a) when the *foundation* wall is not required to be dampproofed, or
- (b) when the *foundation* wall is waterproofed.

(6) Where drainage is required in Sentence (1), the drainage shall conform to Subsection 9.14.3. or 9.14.4.

### **9.14.3. Drainage Tile and Pipe**

#### **9.14.3.1. Material Standards**

(1) Drain tile and drain pipe for *foundation* drainage shall conform to,

- (a) ASTM C4, “Clay Drain Tile and Perforated Clay Drain Tile”,
- (b) ASTM C412M, “Concrete Drain Tile (Metric)”,
- (c) ASTM C444M, “Perforated Concrete Pipe (Metric)”,
- (d) ASTM C700, “Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated”,
- (e) CAN/CGSB-34.22, “Asbestos-Cement Drain Pipe”,
- (f) CAN/CSA-B182.1, “Plastic Drain and Sewer Pipe and Pipe Fittings”,
- (g) CAN/CSA-G401, “Corrugated Steel Pipe Products”, or
- (h) BNQ 3624-115, “Polyethylene (PE) Pipe Fittings – Flexible Pipes for Drainage – Characteristics and Test Methods”.

#### **9.14.3.2. Minimum Size**

(1) Drain tile or pipe used for *foundation* drainage shall be not less than 100 mm in diam.

#### **9.14.3.3. Installation**



(1) Drain tile or pipe shall be laid on undisturbed or well-compacted *soil* so that the top of the tile or pipe is below the bottom of the floor slab or the ground cover of the crawl space.

(2) Drain tile or pipe with butt joints shall be laid with 6 mm to 10 mm open joints.

(3) The top half of joints referred to in Sentence (2) shall be covered with sheathing paper, 0.10 mm polyethylene or No. 15 asphalt or tar-saturated felt.

(4) The top and sides of drain pipe or tile shall be covered with not less than 150 mm of crushed stone or other coarse clean granular material containing not more than 10% of material that will pass a 4 mm sieve.

#### **9.14.4. Granular Drainage Layer**

##### **9.14.4.1. Type of Granular Material**

(1) Granular material used to drain the bottom of a *foundation* shall consist of a continuous layer of crushed stone or other coarse clean granular material containing,

(a) not more than 10% of material that will pass a 4 mm sieve, and

(b) no pyritic material in a concentration that would adversely affect its stability or the performance of assemblies separating dissimilar environments.

##### **9.14.4.2. Installation**

(1) Granular material described in Article 9.14.4.1. shall be laid on undisturbed or compacted *soil* to a minimum depth of not less than 125 mm beneath the footing of the *building* and extend not less than 300 mm beyond the outside edge of the footings.

##### **9.14.4.3. Grading**

(1) The bottom of an *excavation* drained by a granular layer shall be graded so that the entire area described in Article 9.14.4.2. is drained to a sump conforming to Article 9.14.5.2.

##### **9.14.4.4. Wet Site Conditions**

(1) Where because of wet site conditions *soil* becomes mixed with the granular drainage material, sufficient additional granular material shall be provided so that the top 125 mm is kept free of *soil*.

#### **9.14.5. Drainage Disposal**

##### **9.14.5.1. Drainage Disposal**

(1) *Foundation* drains shall drain to a sewer, drainage ditch or dry well.

##### **9.14.5.2. Sump Pits**

(1) Where gravity drainage is not practical, a covered sump with an automatic pump shall be installed to discharge the water into a sewer, drainage ditch or dry well.

(2) Covers for sump pits shall be,

(a) designed to resist removal by children, and

(b) sealed in accordance with Sentence 9.25.3.3.(16).

##### **9.14.5.3. Dry Wells**

(1) Dry wells are permitted to be used only when located in areas where the natural *groundwater* level is below the bottom of the dry well.

(2) Dry wells shall be not less than 5 m from the *building foundation* and located so that drainage is away from the *building*.

#### **9.14.6. Surface Drainage**

##### **9.14.6.1. Surface Drainage**

(1) The *building* shall be located or the *building* site graded so that water will not accumulate at or near the *building* and will not adversely affect adjacent properties.

##### **9.14.6.2. Drainage away from Wells or Leaching Beds**

(1) Surface drainage shall be directed away from the location of a water supply well or *leaching bed*.

##### **9.14.6.3. Window Wells**

(1) Every window well shall be drained to the footing level or other suitable location.

##### **9.14.6.4. Catch Basin**

(1) Where runoff water from a driveway is likely to accumulate or enter a garage, a catch basin shall be installed to provide adequate drainage.

#### **9.14.6.5. Downspouts**

(1) Downspouts shall conform to Article 9.26.18.2.

### **Section 9.15. Footings and Foundations**

#### **9.15.1. Application**

##### **9.15.1.1. General**

(1) Except as provided in Articles 9.15.1.2. and 9.15.1.3., this Section applies to,

(a) concrete or unit masonry *foundation* walls and concrete footings not subject to surcharge,

(i) on stable *soils* with an *allowable bearing pressure* of 75 kPa or greater, and

(ii) for *buildings* of wood frame or masonry construction,

(b) wood frame *foundation* walls and wood or concrete footings not subject to surcharge,

(i) on stable *soils* with an *allowable bearing pressure* of 75 kPa or greater, and

(ii) for *buildings* of wood frame construction, and

(c) flat insulating concrete form *foundation* walls and concrete footings not subject to surcharge,

(i) on stable *soils* with an *allowable bearing pressure* of 75 kPa or greater, and

(ii) for *buildings* of light frame or flat insulating concrete form construction that are not more than 2 *storeys* in *building height*, with a maximum floor to floor height of 3 m, and containing only a single *dwelling unit*.

(2) *Foundations* for applications other than as described in Sentence (1) shall be designed in accordance with Section 9.4.

(3) Where a *foundation* is erected on filled ground, peat or sensitive clay, the footing sizes shall be designed in conformance with Section 4.2.

(4) For the purpose of Sentence (3), sensitive clay means the grain size of the majority of the particles is smaller than 0.002 mm, including leda clay.

##### **9.15.1.2. Permafrost**

(1) *Buildings* erected on permafrost shall have *foundations* designed by a *designer* competent in this field in accordance with the appropriate requirements of Part 4.

##### **9.15.1.3. Foundations for Deformation Resistant Buildings**

(1) Where the superstructure of a detached *building* conforms to the requirements of the deformation resistance test in CAN/CSA-Z240.2.1, “Structural Requirements for Manufactured Homes”, the *foundation* shall be constructed in conformance with,

(a) this Section, or

(b) CSA Z240.10.1, “Site Preparation, Foundation, and Anchorage of Manufactured Homes”.

#### **9.15.2. General**

##### **9.15.2.1. Concrete**

(1) Concrete shall conform to Section 9.3.

##### **9.15.2.2. Unit Masonry Construction**

(1) Concrete block shall conform to CAN/CSA-A165.1, “Concrete Block Masonry Units”, and shall have a compressive strength over the average net cross-sectional area of the block of not less than 15 MPa.

(2) Mortar, grout, mortar joints, corbelling and protection for unit masonry shall conform to Section 9.20.

(3) For concrete block *foundation* walls required to be reinforced,

(a) mortar shall be Type S, conforming to CAN/CSA-A179, “Mortar and Grout for Unit Masonry”,

(b) grout shall be coarse, conforming to CAN/CSA-A179, “Mortar and Grout for Unit Masonry”, and

(c) placement of grout shall conform to CAN/CSA-A371, “Masonry Construction for Buildings”.

##### **9.15.2.3. Pier Type Foundations**

(1) Where pier type *foundations* are used, the piers shall be designed to support the applied loads from the superstructure.

(2) Where piers are used as a *foundation* system in a *building* of 1 storey in *building height*, the piers shall be installed to support the principal framing members and shall be spaced not more than 3.5 m apart along the framing, unless the piers and their footings are designed for larger spacings.

(3) The height of piers described in Sentence (2) shall not exceed 3 times their least dimension at the base of the pier.

(4) Where concrete block is used for piers described in Sentence (2), they shall be laid with cores placed vertically, and where the width of the *building* is 4.3 m or less, placed with their longest dimension at right angles to the longest dimension of the *building*.

**9.15.2.4. Wood Frame Foundations**

(1) *Foundations* of wood frame construction shall conform to,

- (a) CAN/CSA-S406, “Construction of Preserved Wood Foundations”, or
- (b) Part 4.

**9.15.3. Footings**

**9.15.3.1. Footings Required**

(1) Footings shall be provided under walls, pilasters, columns, piers, fireplaces and *chimneys* that bear on *soil* or *rock*, except that footings are permitted to be omitted under piers or monolithic concrete walls if the safe *loadbearing* capacity of the *soil* or *rock* is not exceeded.

**9.15.3.2. Support of Footings**

(1) Footings shall rest on undisturbed *soil*, *rock* or compacted granular *fill*.

(2) Granular *fill* shall not contain pyritic material in a concentration that would adversely affect its stability or the performance of assemblies separating dissimilar environments.

**9.15.3.3. Application of Footing Width and Area Requirements**

(1) Except as provided in Sentence 9.15.3.4.(2), the minimum footing width or area requirements provided in Articles 9.15.3.4. to 9.15.3.7. shall apply to footings where,

- (a) the footings support,
  - (i) *foundation* walls of masonry, concrete, or flat insulating concrete form walls,
  - (ii) above ground walls of masonry, flat insulating concrete form walls or light wood frame construction, and
  - (iii) floors and roofs of light wood frame construction,
- (b) the span of supported joists does not exceed 4.9 m, and
- (c) the specified *live load* on any floor supported by the footing does not exceed 2.4 kPa.

(2) Except as provided in Sentence 9.15.3.4.(2), where the span of the supported joists exceeds 4.9 m, footings shall be designed in accordance with Section 4.2.

(3) Where the specified *live load* exceeds 2.4 kPa footings shall be designed in accordance with Section 4.2.

**9.15.3.4. Basic Footing Widths and Areas**

(1) Except as provided in Sentences (2) and (3) and in Articles 9.15.3.5. to 9.15.3.7., the minimum footing width or area shall comply with Table 9.15.3.4.

**Table 9.15.3.4.  
Minimum Footing Sizes**

Forming Part of Sentence 9.15.3.4.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Number of Floors Supported	Minimum Width of Strip Footings, mm		Minimum Footing Area for Columns Spaced 3 m o.c. <sup>(1)</sup> , m <sup>2</sup>
		Supporting Exterior Walls <sup>(2)</sup>	Supporting Interior Walls <sup>(3)</sup>	
1.	1	250	200	0.40
2.	2	350	350	0.75
3.	3	450	500	1.0

**Notes to Table 9.15.3.4.:**

<sup>(1)</sup> See Sentence 9.15.3.7.(1).

<sup>(2)</sup> See Sentences 9.15.3.5.(1).

<sup>(3)</sup> See Sentence 9.15.3.6.(1).

(2) Where the supported joist span exceeds 4.9 m in *buildings* with light wood frame walls, floors and roofs, footing widths shall be determined according to,

- (a) Section 4.2., or
- (b) the following formula:

$$W = w \cdot [\sum sjs / (\text{storeys} \cdot 4.9)]$$

where,

W = minimum footing width,

w = minimum width of footings supporting joists not exceeding 4.9 m, as defined by Table 9.15.3.4.,

$\sum sjs$  = the sum of the supported joist spans on each *storey* whose load is transferred to the footing, and

*storeys* = number of *storeys* supported by the footing.

(3) Where a *foundation* rests on gravel, sand or silt in which the water table level is less than the width of the footings below the *bearing surface*,

- (a) the footing width for walls shall be not less than twice the width required by Sentences (1) and (2), and Articles 9.15.3.5. and 9.15.3.6., and
- (b) the footing area for columns shall be not less than twice the area required by Sentences (1) and (2), and Article 9.15.3.7.

#### **9.15.3.5. Adjustments to Footing Widths for Exterior Walls**

(1) The strip footing widths for exterior walls shown in Table 9.15.3.4. shall be increased by,

- (a) 65 mm for each *storey* of masonry veneer over wood frame construction supported by the *foundation* wall,
- (b) 130 mm for each *storey* of masonry construction supported by the *foundation* wall, and
- (c) 150 mm for each *storey* of flat insulating concrete form wall construction supported by the *foundation* wall.

#### **9.15.3.6. Adjustments to Footing Widths for Interior Walls**

(1) The minimum strip footing widths for interior *loadbearing* masonry walls shown in Table 9.15.3.4. shall be increased by 100 mm for each *storey* of masonry construction supported by the footing.

(2) Footings for interior non-*loadbearing* masonry walls shall be not less than 200 mm wide for walls up to 5.5 m high and the width shall be increased by 100 mm for each additional 2.7 m of height.

#### **9.15.3.7. Adjustments to Footing Area for Columns**

(1) The footing area for column spacings other than shown in Table 9.15.3.4. shall be adjusted in proportion to the distance between columns.

#### **9.15.3.8. Footing Thickness**

(1) Footing thickness shall be not less than the greater of,

- (a) 100 mm, or
- (b) the width of the projection of the footing beyond the supported element.

#### **9.15.3.9. Step Footings**

(1) Where step footings are used,

- (a) the vertical rise between horizontal portions shall not exceed 600 mm, and
- (b) the horizontal distance between risers shall be not less than 600 mm.

### **9.15.4. Foundation Walls**

#### **9.15.4.1. Permanent Form Material**

(1) Insulating concrete form units shall be manufactured of polystyrene conforming to the performance requirements of CAN/ULC-S701, “Thermal Insulation, Polystyrene, Boards and Pipe Covering”, for Type 2, 3 or 4 polystyrene.

#### **9.15.4.2. Foundation Wall Thickness and Required Lateral Support**

(1) Except as required in Sentence (2), the thickness of *foundation* walls made of unreinforced concrete block or solid concrete and subject to lateral earth pressure shall conform to Table 9.15.4.2.A. for walls not exceeding 3.0 m in unsupported height.

**Table 9.15.4.2.A.**  
**Thickness of Solid Concrete and Unreinforced Concrete Block Foundation Walls**

Forming Part of Sentence 9.15.4.2.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Type of <i>Foundation</i> Wall	Minimum Wall Thickness, mm	Maximum Height of Finish Ground Above <i>Basement</i> Floor or Crawl Space Ground Cover, m			
			Height of <i>Foundation</i> Wall Laterally Unsupported at the Top <sup>(1)(2)</sup>	Height of <i>Foundation</i> Wall Laterally Supported at the Top <sup>(1)(2)</sup>		
			≤ 3.0 m	≤ 2.5 m	>2.5 m and ≤ 2.75 m	>2.75 m and ≤ 3.0 m
1.	Solid concrete, 15 MPa min. strength	150	0.8	1.5	1.5	1.4
		200	1.2	2.15	2.15	2.1
		250	1.4	2.3	2.6	2.5
		300	1.5	2.3	2.6	2.85
2.	Solid concrete, 20 MPa min. strength	150	0.8	1.8	1.6	1.6
		200	1.2	2.3	2.3	2.2
		250	1.4	2.3	2.6	2.85
		300	1.5	2.3	2.6	2.85
3.	Unreinforced concrete block	140	0.6	0.8	-	-
		190	0.9	1.2	<sup>(3)</sup>	<sup>(3)</sup>
		240	1.2	1.8	<sup>(3)</sup>	<sup>(3)</sup>
		290	1.4	2.2	-	-

**Note to Table 9.15.4.2.A.:**

<sup>(1)</sup> See Article 9.15.4.3.

<sup>(2)</sup> See Article 9.15.4.6.

<sup>(3)</sup> See Table 9.15.4.2.B.

**(2)** The thickness of concrete in flat insulating concrete form *foundation* walls shall be not less than the greater of,

- (a) 140 mm, or
- (b) the thickness of the concrete in the wall above.

**(3)** *Foundation* walls made of flat insulating concrete form units shall be laterally supported at the top and at the bottom.

**(4)** The thickness and reinforcing of *foundation* walls made of reinforced concrete block and subject to lateral earth pressure shall conform to Table 9.15.4.2.B. and Sentences (5) to (8) where,

- (a) the walls are laterally supported at the top,
- (b) average stable *soils* are encountered, and
- (c) wind loads on the exposed portion of the *foundation* are no greater than 0.70 kPa.

**Table 9.15.4.2.B.**  
**Reinforced Concrete Block Foundation Walls Laterally Supported at the Top<sup>(1)</sup>**

Forming Part of Sentence 9.15.4.2.(4)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
	Maximum Height of Finished Ground above <i>Basement</i> Floor or Crawl Space Ground Cover, m <sup>(2)</sup>	Size and Spacing of Continuous Vertical Reinforcement, M at mm o.c.					
		190 mm Minimum Wall Thickness			240 mm Minimum Wall Thickness		
		<i>Foundation</i> Wall Height			<i>Foundation</i> Wall Height		
		≤ 2.5 m	≤ 2.75 m	≤ 3.0 m	≤ 2.5 m	≤ 2.75 m	≤ 3.0 m
1.	0.8	<sup>(3)</sup>	<sup>(3)</sup>	<sup>(3)</sup>	<sup>(3)</sup>	<sup>(3)</sup>	<sup>(3)</sup>
2.	1.0	<sup>(3)</sup>	1-15M at 1 800	1-15M at 1 800	<sup>(3)</sup>	<sup>(3)</sup>	<sup>(3)</sup>
3.	1.2	<sup>(3)</sup>	1-15M at 1 600	1-15M at 1 600	<sup>(3)</sup>	1-20M at 2 000	1-20M at 2 000
4.	1.4	1-15M at 1 600	1-15M at 1 600	1-15M at 1 600	<sup>(3)</sup>	1-20M at 1 800	1-20M at 1 800
5.	1.6	1-15M at 1 400	1-15M at 1 400	1-15M at 1 400	<sup>(3)</sup>	1-20M at 1 600	1-20M at 1 600
6.	1.8	1-15M at 1 400	1-15M at 1 400	1-15M at 1 200	<sup>(3)</sup>	1-20M at 1 600	1-20M at 1 600

7.	2.0	1-15M at 1 200	1-15M at 1 000 or 1-20M at 1 200	2-15M at 1 200	1-20M at 1 600	1-20M at 1 600	1-20M at 1 600
8.	2.2	2-15M at 1 200	2-15M at 1 000	2-15M at 1 000	1-20M at 1 400	1-20M at 1 400	1-20M at 1 400
9.	2.4	2-15M at 1 000	2-15M at 1 000	2-15M at 800	1-20M at 1 400	1-20M at 1 400	1-20M at 1 200
10.	2.6	N/A	2-15M at 800 or 1-25M at 1 000	2-15M at 800 or 1-25M at 1 000	N/A	1-20M at 1 000	1-20M at 1 000
11.	2.8	N/A	N/A	1-20M at 600	N/A	N/A	1-20M at 800 or 2-15M at 1 000
12.	3.0	N/A	N/A	1-20M at 400 or 1-25M at 600	N/A	N/A	2-15M at 800

**Notes to Table 9.15.4.2.B.:**

(1) See Article 9.15.4.3.

(2) See Article 9.15.4.6.

(3) No reinforcement required.

(5) For concrete block walls required to be reinforced, continuous vertical reinforcement shall,

(a) be provided at wall corners, wall ends, wall intersections, at changes in wall height, at the jambs of all openings and at movement joints,

(b) extend from the top of the footing to the top of the *foundation* wall, and

(c) where *foundation* walls are laterally supported at the top, have not less than 50 mm embedment into the footing, if the floor slab does not provide lateral support at the wall base.

(6) For concrete block walls required to be reinforced, a continuous horizontal bond beam containing at least one 15M bar shall be installed,

(a) along the top of the wall,

(b) at the sill and head of all openings greater than 1.2 m in width, and

(c) at structurally connected floors.

(7) In concrete block walls required to be reinforced, all vertical bar reinforcement shall be installed along the centre line of the wall.

(8) In concrete block walls required to be reinforced, ladder or truss type lateral reinforcement not less than 3.8 mm in diameter (No. 9 ASWG) shall be installed in the bed joint of every second masonry course.

**9.15.4.3. Foundation Walls Considered to be Laterally Supported at the Top**

(1) Sentences (2) to (4) apply to lateral support for walls described in Sentence 9.15.4.2.(1).

(2) *Foundation* walls shall be considered to be laterally supported at the top if,

(a) such walls support solid masonry superstructure,

(b) the floor joists are embedded in the top of the *foundation* walls, or

(c) the floor system is anchored to the top of the *foundation* walls with anchor bolts, in which case the joists may run either parallel or perpendicular to the *foundation* walls.

(3) Unless the wall around an opening is reinforced to withstand earth pressure, the portion of the *foundation* wall beneath an opening shall be considered laterally unsupported, if,

(a) the opening is more than 1.2 m wide, or

(b) the total width of the openings in the *foundation* wall constitutes more than 25% of the length of the wall.

(4) For the purposes of Sentence (3), the combined width of the openings shall be considered as a single opening if the average width is greater than the width of solid wall between them.

(5) Flat insulating concrete form *foundation* walls shall be considered to be laterally supported at the top if the floor joists are installed according to Article 9.20.17.5.

**9.15.4.4. Foundation Walls Considered to be Laterally Supported at the Bottom**

(1) Flat insulating concrete form *foundation* walls shall be considered to be laterally supported at the bottom where the *foundation* wall,

(a) supports backfill not more than 1.2 m in height,

(b) is supported at the footing by a shear key and is supported at the top by the ground floor framing, or

(c) is dowelled to the footing with not less than 15M bars spaced not more than 1.2 m o.c.

#### 9.15.4.5. Reinforcement for Flat Insulating Concrete Form Foundation Walls

(1) Horizontal reinforcement in flat insulating concrete form *foundation* walls shall,

(a) consist of,

- (i) one 10M bar placed not more than 300 mm from the top of the wall, and
- (ii) 10M bars spaced not more than 600 mm o.c., and

(b) be located,

- (i) in the inside half of the wall section, and
- (ii) with a minimum cover of 30 mm from the inside face of the concrete.

(2) Vertical wall reinforcement in flat insulating concrete form *foundation* walls shall,

(a) conform to,

- (i) Table 9.15.4.5.A. for 140 mm walls,
- (ii) Table 9.15.4.5.B. for 190 mm walls, and
- (iii) Table 9.15.4.5.C. for 240 mm walls,

(b) be located in the inside half of the wall section with a minimum cover of 30 mm from the inside face of the concrete wall, and

(c) where interrupted by wall openings, be placed not more than 600 mm from each side of the openings.

(3) Cold joints in flat insulating concrete form *foundation* walls shall be reinforced with at least one 15M bar spaced not more than 600 mm o.c. and embedded not less than 300 mm on both sides of the joint.

(4) Reinforcing around openings in flat insulating concrete form *foundation* walls shall comply with Article 9.20.17.3. or 9.20.17.4.

**Table 9.15.4.5.A.  
Vertical Reinforcement for 140 mm Flat Insulating Concrete Form Foundation Walls**

Forming Part of Sentence 9.15.4.5.(2)

Item	Column 1	Column 2	Column 3	Column 4
	Maximum Height of Finished Ground Above Finished <i>Basement</i> Floor, m	Minimum Vertical Reinforcement		
		Maximum Unsupported <i>Basement</i> Wall Height		
		2.44 m	2.75 m	3.00 m
1.	1.35	10M at 400 mm o.c.	10M at 400 mm o.c.	10M at 400 mm o.c.
2.	1.60	10M at 400 mm o.c.	10M at 380 mm o.c.	10M at 380 mm o.c.
3.	2.00	10M at 380 mm o.c.	10M at 380 mm o.c.	10M at 380 mm o.c.
4.	2.20	10M at 250 mm o.c.	10M at 250 mm o.c.	10M at 250 mm o.c.
5.	2.35	n/a	10M at 250 mm o.c.	10M at 250 mm o.c.
6.	2.60	n/a	10M at 250 mm o.c.	10M at 250 mm o.c.
7.	3.00	n/a	n/a	10M at 250 mm o.c.

**Table 9.15.4.5.B.  
Vertical Reinforcement for 190 mm Flat Insulating Concrete Form Foundation Walls**

Forming Part of Sentence 9.15.4.5.(2)

Item	Column 1	Column 2	Column 3	Column 4
	Maximum Height of Finished Ground Above Finished <i>Basement</i> Floor, m	Minimum Vertical Reinforcement		
		Maximum Unsupported <i>Basement</i> Wall Height		
		2.44 m	2.75 m	3.00 m
1.	2.20	none required	10M at 400 mm o.c.	10M at 400 mm o.c.
2.	2.35	n/a	10M at 300 mm o.c.	10M at 300 mm o.c.
3.	2.60	n/a	10M at 300 mm o.c.	15M at 400 mm o.c.
4.	3.00	n/a	n/a	15M at 400 mm o.c.

**Table 9.15.4.5.C.  
Vertical Reinforcement for 240 mm Flat Insulating Concrete Form Foundation Walls**

Forming Part of Sentence 9.15.4.5.(2)

Item	Column 1	Column 2	Column 3	Column 4
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	Maximum Height of Finished Ground Above Finished <i>Basement</i> Floor, m	Minimum Vertical Reinforcement		
		Maximum Unsupported <i>Basement</i> Wall Height		
		2.44 m	2.75 m	3.00 m
1.	2.20	none required	none required	none required
2.	2.60	n/a	15M at 400 mm o.c.	15M at 400 mm o.c.
3.	3.00	n/a	n/a	15M at 400 mm o.c.

#### 9.15.4.6. Extension above Ground Level

(1) Exterior *foundation* walls shall extend not less than 150 mm above finished ground level.

#### 9.15.4.7. Reduction in Thickness

(1) Where the top of a *foundation* wall is reduced in thickness to permit the installation of floor joists, the reduced section shall be not more than 350 mm high and not less than 90 mm thick.

(2) Where the top of a *foundation* wall is reduced in thickness to permit the installation of a masonry exterior facing, the reduced section shall be,

- (a) not less than 90 mm thick, and
- (b) tied to the facing material with metal ties conforming to Sentence 9.20.9.4.(3) spaced not more than,
  - (i) 200 mm o.c. vertically, and
  - (ii) 900 mm o.c. horizontally.

(3) The space between wall and facing described in Sentence (2) shall be filled with mortar.

#### 9.15.4.8. Corbelling

(1) Corbelling of masonry *foundation* walls supporting *cavity walls* shall conform to Article 9.20.12.2.

#### 9.15.4.9. Crack Control Joints

(1) Crack control joints shall be provided in *foundation* walls more than 25 m long at intervals of not more than 15 m.

(2) Joints required in Sentence (1) shall be designed to resist moisture penetration and shall be keyed to prevent relative displacement of the wall portions adjacent to the joint.

#### 9.15.4.10. Interior Masonry Walls

(1) Interior masonry *foundation* walls not subject to lateral earth pressure shall conform to Section 9.20.

### 9.15.5. Support of Joists and Beams on Masonry Foundation Walls

#### 9.15.5.1. Support of Floor Joists

(1) Except as permitted in Sentence (2), *foundation* walls of hollow unit masonry supporting floor joists shall be,

- (a) capped with not less than 50 mm of solid masonry or concrete, or
- (b) have the top course filled with mortar or concrete.

(2) Capping required in Sentence (1) is permitted to be omitted,

- (a) in localities where termites are not known to occur,
- (b) when the joists are supported on a wood plate not less than 38 mm by 89 mm, and
- (c) when the siding overlaps the *foundation* wall not less than 12 mm.

#### 9.15.5.2. Support of Beams

(1) Not less than a 190 mm depth of solid masonry shall be provided beneath beams supported on masonry.

(2) Where the beam referred to in Sentence (1) is supported below the top of the *foundation* walls, the ends of such beams shall be protected from the weather.

#### 9.15.5.3. Pilasters

(1) Pilasters shall be provided under beams that frame into unit masonry *foundation* walls 140 mm or less in thickness.

(2) Pilasters required in Sentence (1) shall be not less than 90 mm by 290 mm and shall be bonded or tied into the wall.

(3) The top 200 mm of pilasters required in Sentence (1) shall be solid.

### 9.15.6. Parging and Finishing of Foundation Walls

#### 9.15.6.1. Foundation Walls Below Ground



(1) Concrete block *foundation* walls shall be parged on the exterior face below ground level as required in Section 9.13.

#### **9.15.6.2. Foundation Walls Above Ground**

(1) Exterior surfaces of concrete block *foundation* walls above ground level shall have tooled joints, or shall be rendered, parged or otherwise suitably finished.

#### **9.15.6.3. Form Ties**

(1) All form ties shall be removed at least flush with the concrete surface.

### **Section 9.16. Floors-on-Ground**

#### **9.16.1. Scope**

##### **9.16.1.1. Application**

(1) This Section applies to floors that are supported on ground or granular *fill* and that do not provide structural support for the superstructure.

##### **9.16.1.2. Structural Floor Slabs**

(1) Floors-on-ground that support loads from the superstructure shall be designed in conformance with Part 4.

##### **9.16.1.3. Required Floors-on-Ground**

(1) All spaces within *dwelling units*, except crawl spaces, shall be provided with a floor-on-ground, where,

- (a) access is provided to the space, and
- (b) a floor supported by the structure is not provided.

##### **9.16.1.4. Dampproofing and Waterproofing**

(1) Dampproofing and waterproofing shall conform to Section 9.13.

#### **9.16.2. Material Beneath Floors**

##### **9.16.2.1. Required Installation of Granular Fill**

(1) Except as provided in Sentence (2), not less than 100 mm of coarse clean granular material containing not more than 10% of material that will pass a 4 mm sieve shall be placed beneath floors-on-ground.

(2) Granular material need not be installed under,

- (a) slabs in garages, carports or accessory *buildings*, or
- (b) *buildings* of *industrial occupancy* where the nature of the process contained in the *occupancy* permits or requires the use of large openings in the *building* envelope even during the winter.

##### **9.16.2.2. Support of Floors**

(1) Material that is susceptible to changes in volume due to variations in moisture content or chemical-microbiological oxidation shall not be used as *fill* beneath floors-on-ground in a concentration that will damage the *building* to a degree that would adversely affect its stability or the performance of assemblies separating dissimilar environments.

(2) Material that is susceptible to changes in volume due to freezing shall not be used as *fill* beneath floors-on-ground that will be subjected to freezing temperatures.

(3) Except as provided in Sentence (4), *fill* beneath floors-on-ground shall be compacted.

(4) *Fill* beneath floors-on-ground need not be compacted where the material is clean coarse aggregate containing not more than 10% of material that will pass a 4 mm sieve.

#### **9.16.3. Drainage**

##### **9.16.3.1. Control of Water Ingress**

(1) Except as provided in Article 9.16.3.2. or where it can be shown to be unnecessary, ingress of water underneath a floor-on-ground shall be prevented by grading or drainage.

##### **9.16.3.2. Hydrostatic Pressure**

(1) Where *groundwater* levels may cause hydrostatic pressure beneath a floor-on-ground, the floor-on-ground shall be,

- (a) a cast-in-place concrete slab, and
- (b) designed to resist such pressures.

##### **9.16.3.3. Floor Drains**

- (1) When floor drains are required, the floor surface shall be sloped so that no water can accumulate.

#### **9.16.4. Concrete**

##### **9.16.4.1. Surface Finish**

- (1) The finished surface of concrete floor slabs shall be trowelled smooth and even.
- (2) Dry cement shall not be added to the floor surfaces to absorb surplus water.

##### **9.16.4.2. Topping Course**

- (1) Where a topping course is provided for a concrete floor slab, it shall consist of 1 part cement to 2.5 parts clean, well graded sand by volume, with a water/cement ratio approximately equal to that of the base slab.
- (2) When concrete topping is provided it shall not be less than 20 mm thick.

##### **9.16.4.3. Thickness**

- (1) Concrete slabs shall be not less than 75 mm thick exclusive of concrete topping.

##### **9.16.4.4. Bond Break**

- (1) A bond-breaking material shall be placed between the slab and footings or *rock*.

##### **9.16.4.5. Compressive Strength**

- (1) Where dampproofing is not provided, the concrete used for floors-on-ground shall have a compressive strength of not less than 25 MPa after 28 days.
- (2) Where dampproofing is provided as described in Article 9.13.2.7., the concrete used for floors-on-ground shall have a compressive strength of not less than 15 MPa after 28 days.

#### **9.16.5. Wood**

##### **9.16.5.1. Wood Frame Floors**

- (1) Floors-on-ground constructed of wood shall conform to CAN/CSA-S406, "Construction of Preserved Wood Foundations".

#### **Section 9.17. Columns**

##### **9.17.1. Scope**

###### **9.17.1.1. Application**

- (1) This Section applies to columns used to support,
  - (a) beams carrying loads from not more than 2 wood frame floors where,
    - (i) the supported length of joists bearing on such beams does not exceed 5 m, and
    - (ii) the *live load* on any floor does not exceed 2.4 kPa,
  - (b) beams or header joists carrying loads from not more than 2 levels of wood frame balconies, decks or other accessible exterior platforms, or 1 level and the roof, where,
    - (i) the supported length of joists bearing on such beams or joists does not exceed 5 m,
    - (ii) the sum of the specified snow load and the load due to use and *occupancy* does not exceed 4.8 kPa, and
    - (iii) the platform serves only a single *suite of residential occupancy*, or
  - (c) carport roofs.
- (2) Columns for applications other than as described in Sentence (1) shall be designed in accordance with Part 4.

##### **9.17.2. General**

###### **9.17.2.1. Location**

- (1) Columns shall be centrally located on a footing conforming to Section 9.15.

###### **9.17.2.2. Lateral Support**

- (1) Columns shall be securely fastened to the supported member to reduce the likelihood of lateral differential movement between the column and the supported member.
- (2) Except as permitted by Sentence (3), columns shall be laterally supported,
  - (a) directly, or

(b) by connection to the supported members.

(3) Columns need not be provided with lateral support as described in Sentence (2) where,

(a) the length of the columns are not more than 600 mm measured from the finished ground to the underside of the supported member, and

(b) the columns support a deck with no superstructure.

### **9.17.3. Steel Columns**

#### **9.17.3.1. Size and Thickness**

(1) Except as permitted by Sentence (2), steel pipe columns shall have an outside diameter of not less than 73 mm and a wall thickness of not less than 4.76 mm.

(2) Columns of sizes other than as specified in Sentence (1) are permitted to be used where the *loadbearing* capacities are shown to be adequate.

#### **9.17.3.2. End Bearing Plates**

(1) Except as permitted in Sentence (2), steel columns shall be fitted with not less than 100 mm by 100 mm by 6.35 mm thick steel plates at each end, and where the column supports a wooden beam, the top plate shall extend across the full width of the beam.

(2) The top plate required in Sentence (1) need not be provided where a column supports a steel beam and provision is made for the attachment of the column to the beam.

#### **9.17.3.3. Paint**

(1) Exterior steel columns susceptible to corrosion shall be treated on the outside surface with at least one coat of rust-inhibitive paint.

#### **9.17.3.4. Design of Adjustable Steel Columns**

(1) Where the imposed load does not exceed 36 kN, adjustable steel columns shall conform to CAN/CGSB-7.2, "Adjustable Steel Columns".

(2) Adjustable steel columns other than those described in Sentence (1) shall be designed in accordance with Part 4.

### **9.17.4. Wood Columns**

#### **9.17.4.1. Column Sizes**

(1) The width or diameter of a wood column shall be not less than the width of the supported member.

(2) Except as provided in Article 9.35.4.2., columns shall be not less than 184 mm for round columns and 140 mm by 140 mm for rectangular columns, unless calculations are provided to show that lesser sizes are adequate.

#### **9.17.4.2. Materials**

(1) Wood columns shall be either solid, glue-laminated or built-up.

(2) Built-up columns shall consist of not less than 38 mm thick full-length members,

(a) bolted together with not less than 9.52 mm diam bolts spaced not more than 450 mm o.c., or

(b) nailed together with not less than 76 mm nails spaced not more than 300 mm o.c.

(3) Glued-laminated columns shall conform to Section 4.3.

#### **9.17.4.3. Columns in Contact with Concrete**

(1) Wood columns shall be separated from concrete in contact with the ground by 0.05 mm polyethylene film or Type S roll roofing.

#### **9.17.4.4. Wood Column Termite Protection**

(1) Where termites are known to exist, exterior wood columns, such as porch supports, shall be,

(a) pressure-treated with a chemical that is toxic to such termites, in accordance with Article 9.3.2.9., or

(b) supported on non-cellulosic material extending not less than 150 mm above the finished ground and shall be located not less than 50 mm from the exterior wall of an adjacent *building*.

### **9.17.5. Unit Masonry Columns**

#### **9.17.5.1. Materials**

(1) Unit masonry columns shall be built of masonry units,

- (a) conforming to CAN/CSA-A165.1, “Concrete Block Masonry Units”, and
- (b) having a compressive strength over the net area of the block of not less than 15 MPa.

#### **9.17.5.2. Sizes**

- (1) Unit masonry columns shall be not less than 290 mm by 290 mm or 240 mm by 380 mm in size.

### **9.17.6. Solid Concrete Columns**

#### **9.17.6.1. Materials**

- (1) Concrete shall conform to Section 9.3.

#### **9.17.6.2. Sizes**

- (1) Concrete columns shall be not less than 200 mm by 200 mm for rectangular columns and 230 mm diam for circular columns.

## **Section 9.18. Crawl Spaces**

### **9.18.1. General**

#### **9.18.1.1. Application**

- (1) In this Section, a crawl space refers to an enclosed space between the underside of a floor assembly and the ground cover directly below, with a clearance less than 1 800 mm in height.

#### **9.18.1.2. Foundations**

- (1) *Foundation* walls enclosing crawl spaces shall conform to Section 9.15.

#### **9.18.1.3. Heated and Unheated Crawl Spaces**

- (1) Crawl spaces shall be considered to be heated where the space,

- (a) is used as a warm air *plenum*,
- (b) contains heating ducts or heating pipes that are not sealed and insulated to minimize heat loss to the space, or
- (c) is not separated from heated space in accordance with Section 9.25.

- (2) Heating of heated crawl spaces shall conform to Section 9.33.

- (3) Insulation, an *air barrier system* and a *vapour barrier* shall be installed in the walls of heated crawl spaces in accordance with Section 9.25.

### **9.18.2. Access**

#### **9.18.2.1. Access Openings**

- (1) An access opening of not less than 500 mm by 700 mm shall be provided to each crawl space where the crawl space serves a single *dwelling unit*, and not less than 550 mm by 900 mm for other crawl spaces.

- (2) Access openings shall be fitted with a door or hatch, except when the crawl space is heated and the access opening into the crawl space is from the adjacent heated space.

### **9.18.3. Ventilation**

#### **9.18.3.1. Ventilation of Unheated Crawl Spaces**

- (1) Unheated crawl spaces shall be ventilated by natural or mechanical means.

- (2) Where an unheated crawl space is ventilated by natural means, ventilation shall be provided to the outside air by not less than 0.1 m<sup>2</sup> of unobstructed vent area for every 50 m<sup>2</sup> of *floor area*.

- (3) Vents shall be,

- (a) uniformly distributed on opposite sides of the *building*, and
- (b) designed to prevent the entry of snow, rain and insects.

#### **9.18.3.2. Ventilation of Heated Crawl Spaces**

- (1) Heated crawl spaces shall be ventilated in accordance with Section 9.32.

### **9.18.4. Clearance**

#### **9.18.4.1. Access Way to Services**

(1) Where equipment requiring service such as plumbing cleanouts, traps and burners is located in crawl spaces, an access way with a height and width of not less than 600 mm shall be provided from the access door to the equipment and for a distance of 900 mm on the side or sides of the equipment to be serviced.

#### **9.18.5. Drainage**

##### **9.18.5.1. Drainage**

(1) Except where it can be shown to be unnecessary, the ingress of water into a crawl space shall be controlled by grading or drainage.

(2) Drainage of *foundation* walls shall conform to Article 9.14.2.1.

(3) Drainage of the ground cover or floor-on-ground in the crawl space shall conform to Subsection 9.16.3.

(4) Drains shall conform to Section 9.14.

#### **9.18.6. Ground Cover**

##### **9.18.6.1. Ground Cover in Unheated Crawl Spaces**

(1) Where a crawl space is unheated, a ground cover shall be provided consisting of not less than,

- (a) 50 mm of asphalt paving material,
- (b) 100 mm of 15 MPa Portland cement concrete,
- (c) Type S roll roofing, or
- (d) 0.10 mm polyethylene.

(2) Joints in sheet-type ground cover required in Sentence (1) shall be lapped not less than 100 mm and weighted down.

##### **9.18.6.2. Ground Cover in Heated Crawl Spaces**

(1) Where a crawl space is heated, a ground cover consisting of not less than 0.15 mm polyethylene sheet conforming to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet, for Use in Building Construction", shall be installed as part of an *air barrier system* in accordance with Subsection 9.25.3.

(2) The ground cover required in Sentence (1) shall,

- (a) have its joints lapped not less than 300 mm, and sealed and weighted down, or
- (b) be covered with a concrete skim coat not less than 50 mm thick.

(3) The perimeter of the ground cover required in Sentence (1) shall be sealed to the *foundation* wall.

#### **9.18.7. Fire Protection**

##### **9.18.7.1. Crawl Spaces as Warm Air Plenums**

(1) Only crawl spaces under 1-storey portions of *dwelling units* shall be used as warm air *plenums*.

(2) Enclosing material in crawl spaces described in Sentence (1), including insulation, shall have a surface *flame-spread rating* not greater than 150.

(3) *Combustible* ground cover used as enclosing material in Sentence (2) shall be covered with *noncombustible* material.

#### **Section 9.19. Roof Spaces**

##### **9.19.1. Venting**

###### **9.19.1.1. Required Venting**

(1) Except where it can be shown to be unnecessary, where insulation is installed between a ceiling and the underside of the roof sheathing, a space shall be provided between the insulation and the sheathing, and vents shall be installed to permit the movement of air from the space to the exterior.

###### **9.19.1.2. Vent Requirements**

(1) Except as provided in Sentence (2), the unobstructed vent area shall be not less than 1/300 of the insulated ceiling area.

(2) Where the roof slope is less than 1 in 6 or in roofs that are constructed with roof joists, the unobstructed vent area shall be not less than 1/150 of the insulated ceiling area.

(3) Required vents are permitted to be roof type, eave type, gable-end type or any combination of them, and shall be distributed,

- (a) uniformly on opposite sides of the *building*,

- (b) with not less than 25% of the required openings located at the top of the space, and
- (c) with not less than 25% of the required openings located at the bottom of the space.
- (4) Except where each roof joist space referred to in Sentence (2) is separately vented, roof joist spaces shall be interconnected by installing purlins not less than 38 mm by 38 mm on the top of the roof joists.
- (5) Vents shall comply with CAN3-A93-M, “Natural Airflow Ventilators for Buildings”.

#### 9.19.1.3. Clearances

- (1) Except as provided in Sentence (2), where venting is provided to a roof joist space, not less than 63 mm of space shall be provided between the top of the insulation and the underside of the roof sheathing.
- (2) Where venting is provided at the junction of sloped roofs and exterior walls and where preformed baffles are used to contain the insulation, the baffles shall,
  - (a) provide an unobstructed air space between the insulation and the underside of the roof sheathing, that is,
    - (i) not less than 25 mm in dimension, and
    - (ii) of sufficient cross area to meet the *attic or roof space* venting requirements of Article 9.19.1.2., and
  - (b) extend vertically not less than 50 mm above the top of the insulation.
- (3) Ceiling insulation shall be installed in a manner that will not restrict a free flow of air through roof vents or through any portion of the *attic or roof space*.

#### 9.19.1.4. Mansard or Gambrel Roof

- (1) The lower portion of a mansard or gambrel style roof need not be ventilated.
- (2) The upper portion of roofs described in Sentence (1) shall be ventilated in conformance with the requirements in Articles 9.19.1.1. to 9.19.1.3.

### 9.19.2. Access

#### 9.19.2.1. Access

- (1) Every *attic or roof space* shall be provided with an access hatch where the *attic or roof space*,
  - (a) measures not less than,
    - (i) 10 m<sup>2</sup> in area,
    - (ii) 1 000 mm in length or width, and
    - (iii) 600 mm in height over at least the area described in Subclauses (i) and (ii), or
  - (b) contains a fuel-fired *appliance*.
- (2) Except where an *attic or roof space* contains a fuel-fired *appliance*, the hatch required in Sentence (1) shall be not less than 550 mm by 900 mm except that, where the hatch serves a single *dwelling unit*, the hatch may be reduced to,
  - (a) 0.32 m<sup>2</sup> in area with no dimension less than 545 mm, or
  - (b) 500 mm by 700 mm.
- (3) Hatchways to *attic or roof spaces* shall be fitted with doors or covers.

## Section 9.20. Masonry and Insulating Concrete Form Walls Not in Contact with the Ground

### 9.20.1. Application

#### 9.20.1.1. General

- (1) Except as provided in Article 9.20.1.2., this Section applies to,
  - (a) unreinforced masonry and masonry veneer walls not in contact with the ground, where,
    - (i) the height of the walls constructed on the *foundation* walls does not exceed 11 m, and
    - (ii) the roof or floor assembly above the *first storey* is not of concrete construction, and
  - (b) flat insulating concrete form walls not in contact with the ground that,
    - (i) have a maximum floor to floor height of 3 m,
    - (ii) are erected in *buildings* not more than 2 *storeys* in *building height* and containing only a single *dwelling unit*, and
    - (iii) are erected in locations where the seismic spectral response acceleration,  $S_a(0.2)$ , is not greater than 0.4.

(2) For walls other than those described in Sentence (1), or where the masonry walls or insulating concrete form walls not in contact with the ground are designed for specified loads on the basis of ultimate and serviceability limit states, Subsection 4.3.2. shall apply.

**9.20.1.2. Earthquake Reinforcement**

(1) In locations where the seismic spectral response acceleration,  $S_a(0.2)$ , is greater than 0.55, *loadbearing* elements of masonry *buildings* more than 1 *storey* in *building height* shall be reinforced with not less than the minimum amount of reinforcement as required in Subsection 9.20.15.

(2) In locations where the seismic spectral response acceleration,  $S_a(0.2)$ , is greater than 0.35, but less than or equal to 0.55, *loadbearing* elements of masonry *buildings* 3 *storeys* in *building height* shall be reinforced with not less than the minimum amount of reinforcement as required in Subsection 9.20.15.

**9.20.2. Masonry Units**

**9.20.2.1. Masonry Unit Standards**

(1) Masonry units shall comply with,

- (a) ASTM C73, “Calcium Silicate Brick (Sand-Lime Brick)”
- (b) ASTM C126, “Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units”
- (c) ASTM C212, “Structural Clay Facing Tile”
- (d) CAN/CSA-A82.1-M, “Burned Clay Brick (Solid Masonry Units Made from Clay or Shale)”
- (e) CSA A82.4-M, “Structural Clay Load-Bearing Wall Tile”
- (f) CSA A82.5-M, “Structural Clay Non-Load-Bearing Tile”
- (g) CAN3-A82.8-M, “Hollow Clay Brick”
- (h) CAN/CSA-A165.1, “Concrete Block Masonry Units”
- (i) CAN/CSA-A165.2, “Concrete Brick Masonry Units”
- (j) CAN/CSA-A165.3, “Prefaced Concrete Masonry Units”, or
- (k) CAN3-A165.4-M, “Autoclaved Cellular Units”.

**9.20.2.2. Used Brick**

(1) Used bricks shall be free of old mortar, soot or other surface coating and shall conform to Article 9.20.2.1.

**9.20.2.3. Glass Blocks**

(1) Glass blocks shall not be used as *loadbearing* units or in the construction of fireplaces or *chimneys*.

**9.20.2.4. Cellular Concrete**

(1) Masonry made with cellular concrete shall not be used in contact with the *soil* or exposed to the weather.

**9.20.2.5. Stone**

(1) Stone shall be sound and durable.

**9.20.2.6. Concrete Units Exposed to the Weather**

(1) Concrete blocks exposed to the weather shall have weight and water absorption characteristics conforming to Classes A, B, C or D, described in CAN/CSA-A165.1, “Concrete Block Masonry Units”.

**9.20.2.7. Compressive Strength**

(1) The compressive strength of concrete blocks shall conform to Table 9.20.2.7.

**Table 9.20.2.7.  
Compressive Strength of Concrete Blocks**

Forming Part of Sentence 9.20.2.7.(1)

Item	Column 1	Column 2	Column 3
	Type of Block	Minimum Compressive Strength Over Net Area, MPa	
		Exposed to Weather	Not Exposed to Weather
1.	Solid or hollow concrete blocks	15	10
2.	Solid <i>loadbearing</i> cellular blocks	Not permitted	5
3.	Solid non- <i>loadbearing</i> cellular blocks	Not permitted	2

**9.20.3. Mortar**

**9.20.3.1. Mortar Materials**

(1) Cementitious materials and aggregates for mortar and grout shall comply with CAN/CSA-A179, “Mortar and Grout for Unit Masonry”.

(2) Water and aggregate shall be clean and free of significant amounts of deleterious materials.

(3) Lime used in mortar shall be hydrated.

(4) If lime putty is used in mortar, it shall be made by slaking quicklime in water for not less than 24 h or soaking hydrated lime in water for not less than 12 h.

**9.20.3.2. Mortar and Grout Mixes**

(1) Mortar types shall conform to Table 9.20.3.2.A.

(2) Mortar for glass block masonry shall be,

(a) Type S Portland cement-lime where exposed to the exterior, or

(b) Type S or N where protected from the exterior.

(3) Mortar mix proportions shall conform to Table 9.20.3.2.B., with sufficient water to bring the mixture to a consistency adequate for laying masonry units.

(4) Grout mix proportions shall conform to Table 9.20.3.2.C., with sufficient water to provide a suitable flow to fill all voids completely, without excessive segregation or bleeding.

(5) Except as provided in Sentence (6), mortar shall be used and placed in final position,

(a) within 1.5 h after mixing when the air temperature is 25°C or higher, and

(b) within 2.5 h after mixing when the air temperature is less than 25°C.

(6) Mortar and grout containing a set-control admixture shall be manufactured off-site in a batching plant and shall be used and placed in final position within a time not exceeding the useful life as stipulated by the manufacturer.

(7) Grout used for reinforced masonry shall be placed in accordance with the requirements of CAN/CSA-A371, “Masonry Construction for Buildings”.

**Table 9.20.3.2.A.  
Mortar Use**

Forming Part of Sentence 9.20.3.2.(1)

Item	Column 1	Column 2	Column 3
	Location	<i>Building</i> Element	Mortar Type
1.	Exterior, above ground	<i>Loadbearing</i> walls and columns	S
		<i>Non-loadbearing</i> walls and columns	N or S
		Parapets, <i>chimneys</i> and masonry veneer	N or S
2.	Exterior, at or below ground	<i>Foundation</i> walls and <i>chimneys</i>	S
3.	Interior	<i>Loadbearing</i> walls and columns	N
		<i>Non-loadbearing</i> walls and columns	N

**Table 9.20.3.2.B.  
Mortar Mix Proportions (by Volume)**

Forming Part of Sentence 9.20.3.2.(3)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Mortar Type	Portland Cement	Lime	Masonry Cement Type N	Masonry Cement Type S	Fine Aggregate (damp, loose-state sand)
1.	S	1	½	-	-	3½ - 4½
		-	-	-	1	2¼ - 3
		½	-	1	-	3½ - 4½
2.	N	1	1	-	-	4½ - 6
		-	-	1	-	2¼ - 3

**Table 9.20.3.2.C.  
Grout Mix Proportions (by Volume)**

Forming Part of Sentence 9.20.3.2.(4)

Column 1	Column 2	Column 3	Column 4
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Portland Cement	Lime	Fine Aggregate (sand)	Coarse Aggregate
1	0 to 1/10	2¼ to 3 times the sum of the cement and lime volumes	1 to 2 times the sum of the cement and lime volumes

#### 9.20.4. Mortar Joints

##### 9.20.4.1. Thickness

(1) Except as provided in Sentence (2), mortar joint thickness for burned clay brick and concrete masonry units shall be 10 mm.

(2) Permitted tolerances in head and bed joints shall be -5 mm to +10 mm.

##### 9.20.4.2. Solid Masonry Units

(1) Except for head joints left open for weep holes and ventilation, solid masonry units shall be laid with full head and bed joints.

##### 9.20.4.3. Hollow Masonry Units

(1) Hollow masonry units shall be laid with mortar applied to head and bed joints of both inner and outer face shells.

(2) Vertically aligned webs of hollow masonry units shall be laid in a full bed of mortar,

(a) under the starting course,

(b) in all courses of columns, and

(c) where adjacent to cells or cavities that are to be filled with grout.

#### 9.20.5. Masonry Support

##### 9.20.5.1. Masonry Support

(1) All masonry shall be supported on masonry, concrete or steel, except that masonry veneer walls are permitted to be supported on *foundations* of wood frame constructed in conformance with Sentence 9.15.2.4.(1).

(2) Every masonry wall shall be at least as thick as the wall it supports, except as otherwise permitted in Article 9.20.12.2.

##### 9.20.5.2. Lintels or Arches

(1) Masonry over openings shall be supported by steel, reinforced concrete lintels or masonry arches designed to support the imposed loads.

(2) Except as provided in Sentences (3) and (6), steel angle lintels supporting masonry above openings shall conform to Table 9.20.5.2.A.

(3) Steel angle lintels supporting masonry veneer above openings shall conform to Table 9.20.5.2.B.

(4) Steel lintels described in Sentences (2) and (3) shall,

(a) have even and level bearing and shall have not less than 150 mm length of bearing at end supports, and

(b) bear on masonry, concrete or steel.

(5) Steel angle lintels supporting masonry shall be primed or painted or otherwise protected from corrosion.

(6) Steel beams supporting masonry veneer and wood stud walls above openings shall conform to Table 9.20.5.2.C.

(7) Steel beams described in Sentence (6) shall be supported at each end by a steel column, and have a minimum 6 mm plate welded to the flange to support the masonry veneer.

**Table 9.20.5.2.A.**  
**Loose Steel Lintels for Masonry – No. & Size of Angles Required<sup>(6)(7)</sup>**

Forming Part of Sentence 9.20.5.2.(2)

Item	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
	Clear Span <sup>(1)(3)</sup>	Exterior Angles, mm		Wall Thickness, mm	Interior Angles, mm						
		For Brick	For Stone		Maximum Floor Loads per Metre of Span in Newtons <sup>(2)(4)(5)</sup>						
		100 mm	100 mm + 50 mm stone facing		None	3 650	7 300	10 950	14 600	18 250	21 900
		No Floor Load									
1.	1.2 m or less	L-89 × 89 × 6.4	L-127 × 89 × 7.9	203	L-89 × 89 × 6.4	L-89 × 89 × 6.4	L-89 × 89 × 7.9	L-102 × 89 × 7.9	L-127 × 89 × 7.9	L-127 × 89 × 11	L-127 × 89 × 13
				305	2Ls-89	2Ls-89	2Ls-89	2Ls-89	2Ls-89	2Ls-102	2Ls-102

					× 89 × 7.9	× 89 × 7.9	× 89 × 7.9	× 89 × 7.9	× 89 × 7.9	× 89 × 7.9	× 89 × 7.9
2.	1.5 m	L-89 × 89 × 7.9	L-127 × 89 × 7.9	203	L-89 × 89 × 7.9	L-89 × 89 × 7.9	L-127 × 89 × 7.9	L-127 × 89 × 11	L-127 × 89 × 13	L-152 × 89 × 11	
				305	2Ls-89 × 89 × 7.9	2Ls-89 × 89 × 7.9	2Ls-89 × 89 × 7.9	2Ls-127 × 89 × 7.9	2Ls-127 × 89 × 7.9	2Ls-127 × 89 × 7.9	2Ls-127 × 89 × 11
3.	1.8 m	L-102 × 89 × 7.9	L-127 × 127 × 7.9	203	L-102 × 89 × 7.9	L-127 × 89 × 7.9	L-127 × 89 × 7.9	L-152 × 102 × 11			
				305	2Ls-102 × 89 × 7.9	2Ls-102 × 89 × 7.9	2Ls-127 × 89 × 7.9	2Ls-127 × 89 × 7.9	2Ls-127 × 89 × 11	2Ls-152 × 102 × 11	2Ls-152 × 102 × 11
4.	2.1 m	L-102 × 89 × 7.9	L-127 × 127 × 7.9	203	L-102 × 89 × 7.9	L-127 × 89 × 11	L-152 × 102 × 11				
				305	2Ls-102 × 89 × 7.9	2Ls-127 × 89 × 11	2Ls-127 × 89 × 11	2Ls-152 × 102 × 11	2Ls-152 × 102 × 11		
5.	2.4 m	L-127 × 89 × 7.9	L-127 × 127 × 7.9	203	L-127 × 89 × 7.9	L-152 × 102 × 11					
				305	2Ls-127 × 89 × 7.9	2Ls-127 × 89 × 13	2Ls-152 × 102 × 11				
6.	2.7 m	L-127 × 89 × 11	L-127 × 127 × 11	203	L-127 × 89 × 11						
				305	2Ls-127 × 152 × 11	2Ls-152 × 102 × 11					
7.	3.0 m	L-152 × 102 × 11	L-127 × 127 × 13	203	L-152 × 102 × 11						
				305	2Ls-152 × 102 × 11						

**Notes to Table 9.20.5.2.A.:**

- (1) See Sentence 9.20.5.2.(4).
- (2) Omit floor load in lintel when distance to bottom of floor construction is greater than width of opening.
- (3) Interior and exterior angles in 200 mm walls and interior angles in 300 mm walls are bolted together when clear span is over 1 800 mm.
- (4) When masonry lighter than brick is used over interior angles floor load may be increased by the difference in weight per square metre times the width of the opening. Not generally available.
- (5) Interior angles have been designed for floor load plus brick masonry of height equal to width of opening.
- (6)  $f_s = 138 \text{ MPa}$ ., Deflection maximum =  $1/700$  span.
- (7) The figures in the Table indicating wall thickness and angle cross-section are in mm.

**Table 9.20.5.2.B.  
Maximum Allowable Spans for Steel Lintels Supporting Masonry Veneer, m**

Forming Part of Sentence 9.20.5.2.(3)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Minimum Angle Size, mm			Maximum Allowable Spans, m		
	Vertical Leg	Horizontal Leg	Thickness	70 mm Brick	90 mm Brick	100 mm Stone
1.	89	76	6.4	2.55	—	—
2.	89	89	6.4	2.59	2.47	2.30
3.	102	89	6.4	2.79	2.66	2.48
4.	127	89	7.9	3.47	3.31	3.08

5.	127	89	11	3.64	3.48	3.24
6.	127	89	13	3.82	3.59	3.33
7.	152	89	11	4.06	3.82	3.54
8.	152	89	13	4.32	4.07	3.77
9.	152	102	13	4.37	4.12	3.82
10.	178	102	11	4.57	4.30	3.99
11.	178	102	13	4.87	4.59	4.25

**Table 9.20.5.2.C.**  
**Maximum Allowable Spans for Steel Beams Supporting Masonry Veneer, m<sup>(1), (2)</sup>**

Forming Part of Sentence 9.20.5.2.(6)

Item	Column 1	Column 2	Column 3	Column 4
	Section	70 mm Brick	90 mm Brick	100 mm Stone
1.	W 150 × 22	4.23	4.09	3.92
2.	W 150 × 30	4.68	4.52	4.32
3.	W 200 × 27	5.26	5.08	4.84
4.	W 200 × 31	5.57	5.37	5.11
5.	W 200 × 36	5.70	5.49	5.23

**Notes to Table 9.20.5.2.C.:**

<sup>(1)</sup> These spans assume that the beam supports the veneer, a wood stud wall and a maximum specified roof live load of 2.3 kN/m.

<sup>(2)</sup> Where the steel beam carries floor loads or larger roof loads, refer to Article 9.23.4.3.

## 9.20.6. Thickness and Height

### 9.20.6.1. Thickness of Exterior Walls

(1) Masonry exterior walls, other than *cavity walls*, in 1 *storey buildings* and the top *storeys* of 2 and 3 *storey buildings* shall be not less than 140 mm thick provided the walls are not more than 2.8 m high at the eaves and 4.6 m high at the peaks of gable ends.

(2) The exterior walls of the bottom *storeys* of 2 *storey buildings*, and exterior walls of the bottom 2 *storeys* of 3 *storey buildings* shall be not less than 190 mm thick.

(3) In exterior walls composed of more than one wythe, each wythe shall be not less than 90 mm thick.

### 9.20.6.2. Cavity Walls

(1) *Cavity walls* shall be made with not less than 90 mm wide units if the joints are raked and not less than 75 mm wide units if the joints are not raked.

(2) The width of a cavity in a *cavity wall* shall be not less than 50 mm and not greater than 150 mm.

(3) The minimum thickness of *cavity walls* above the supporting base shall be 230 mm for the top 7.6 m and 330 mm for the remaining portion, except that where 75 mm wide units are used, the wall height above the top of the *foundation wall* shall not exceed 6 m.

### 9.20.6.3. Thickness of Interior Walls

(1) The thickness of *loadbearing* interior walls shall be determined on the basis of the maximum lateral support spacing as provided in Sentences 9.20.10.1.(2) and (3).

(2) The thickness of interior non-*loadbearing* walls shall be,

- (a) determined on the basis of the maximum lateral support spacing as provided in Sentences 9.20.10.1.(2) and (3), and
- (b) in any case, not less than 65 mm.

### 9.20.6.4. Masonry Veneer

(1) Except for masonry veneer where each masonry unit is supported individually by the structural backing, masonry veneer shall be of solid units not less than 70 mm thick.

(2) Veneer described in Sentence (1) over wood frame walls shall have not less than a 25 mm air space behind the veneer.

(3) Masonry veneer less than 90 mm thick shall have unraked joints.

(4) Masonry veneer shall conform to Subsection 4.3.2. where the masonry units are required to be individually supported by the structural backing.

### 9.20.6.5. Parapet Walls

(1) The height of parapet walls above the adjacent roof surface shall be not more than three times the parapet wall thickness.

(2) Parapet walls shall be solid from the top of the parapet to not less than 300 mm below the adjacent roof level.

#### **9.20.6.6. Stone or Concrete Facings**

(1) Slab and panel facings of precast concrete and natural or artificial stone shall conform to Subsection 4.3.2.

#### **9.20.7. Chases and Recesses**

##### **9.20.7.1. Maximum Dimensions**

(1) Except as provided in Sentence 9.20.7.2.(2) and Article 9.20.7.4., the depth of any chase or recess shall not exceed one-third the thickness of the wall, and the width of the chase or recess shall not exceed 500 mm.

##### **9.20.7.2. Minimum Wall Thickness**

(1) Except as provided in Sentence (2) and Article 9.20.7.4., no chase or recess shall be constructed in any wall 190 mm or less in thickness.

(2) Recesses may be constructed in 190 mm walls provided they do not exceed 100 mm in depth, 750 mm in height and 500 mm in width.

##### **9.20.7.3. Separation of Chases and Recesses**

(1) Chases and recesses shall be not less than,

(a) four times the wall thickness apart, and

(b) 600 mm away from any pilaster, cross wall, buttress or other vertical element providing required lateral support for the wall.

##### **9.20.7.4. Non-Conforming Chases or Recesses**

(1) Chases or recesses that do not conform to the limits specified in Articles 9.20.7.1. to 9.20.7.3. shall be considered as openings, and any masonry supported above such a chase or recess shall be supported by a lintel or arch as provided in Article 9.20.5.2.

##### **9.20.7.5. Chases or Recesses Cut into Walls**

(1) Chases or recesses shall not be cut into walls made with hollow units after the masonry units are in place.

#### **9.20.8. Support of Loads**

##### **9.20.8.1. Capping of Hollow Masonry Walls**

(1) Except as permitted in Sentence (2), *loadbearing* walls of hollow masonry units supporting roof or floor framing members shall be capped with not less than 50 mm of solid masonry or have the top course filled with concrete.

(2) Capping required in Sentence (1) may be omitted where the roof framing is supported on a wood plate not less than 38 mm by 89 mm.

##### **9.20.8.2. Cavity Walls Supporting Framing Members**

(1) Floor joists supported on *cavity walls* shall be supported on solid units not less than 57 mm high.

(2) Floor joists described in Sentence (1) shall not project into the cavity.

(3) Roof and ceiling framing members bearing on *cavity walls* shall be supported on,

(a) not less than 57 mm of solid masonry, bridging the full thickness of the wall, or

(b) a wood plate not less than 38 mm thick, bearing not less than 50 mm on each wythe.

##### **9.20.8.3. Bearing of Beams and Joists**

(1) The bearing area under beams and joists shall be sufficient to carry the supported load.

(2) In no case shall the minimum length of end bearing of beams supported on masonry be less than 90 mm.

(3) The length of end bearing of floor, roof or ceiling joists supported on masonry shall be not less than 40 mm.

##### **9.20.8.4. Support of Beams and Columns**

(1) Beams and columns supported on masonry walls shall be supported on pilasters where the thickness of the masonry wall or wythe is less than 190 mm.

(2) Not less than 190 mm depth of solid masonry or concrete shall be provided under the beam or column referred to in Sentence (1).

- (3) Pilasters required in Sentence (1) shall be bonded or tied to masonry walls.
- (4) Concrete pilasters required in Sentence (1) shall be not less than 50 mm by 300 mm.
- (5) Unit masonry pilasters required in Sentence (1) shall be not less than 100 mm by 290 mm.

#### **9.20.8.5. Distance to Edge of Supporting Members**

- (1) Masonry veneer of hollow units resting on bearing support shall not project more than,
  - (a) 30 mm beyond the supporting base where the veneer is not less than 90 mm thick, and
  - (b) 12 mm beyond the supporting base where the veneer is less than 90 mm thick.
- (2) Masonry veneer of solid units resting on bearing support shall not project more than one-third of the width of the veneer.
- (3) Where the masonry veneer described in Sentence (2) is rough stone masonry,
  - (a) the projection shall be measured as the average projection of the units, and
  - (b) the width of the veneer shall be measured as the average width of the veneer.

#### **9.20.9. Bonding and Tying**

##### **9.20.9.1. Joints to be Offset or Reinforced**

- (1) Vertical joints in adjacent masonry courses shall be offset unless each wythe of masonry is reinforced with the equivalent of no fewer than two corrosion-resistant steel bars of 3.76 mm diam placed in the horizontal joints at vertical intervals not exceeding 460 mm.
- (2) Where joints in the reinforcing referred to in Sentence (1) occur, the bars shall be lapped not less than 150 mm.

##### **9.20.9.2. Bonding or Tying of Other than Masonry Veneer**

- (1) Except as provided in Article 9.20.9.5 for masonry veneer, masonry walls that consist of two or more wythes shall have the wythes bonded or tied together with masonry bonding units as described in Article 9.20.9.3. or with metal ties as described in Articles 9.20.9.4.

##### **9.20.9.3. Bonding**

- (1) Where wythes are bonded together with masonry units, the bonding units shall comprise not less than 4 per cent of the wall surface area.
- (2) Bonding units described in Sentence (1) shall be spaced not more than 600 mm vertically and horizontally in the case of brick masonry and 900 mm o.c. in the case of block or tile.
- (3) Units described in Sentence (1) shall extend not less than 90 mm into adjacent wythes.

##### **9.20.9.4. Tying**

- (1) Where two or more wythes are tied together with metal ties of the individual rod type, the ties shall conform to the requirements in Sentences (3) to (6).
- (2) Other ties may be used where it can be shown that such ties provide walls that are at least as strong and as durable as those made with the individual rod type.
- (3) Metal ties of the individual rod type shall,
  - (a) be corrosion-resistant,
  - (b) have a minimum cross-sectional area of not less than 17.8 mm<sup>2</sup>, and
  - (c) have not less than a 50 mm portion bent at right angles at each end.
- (4) Metal ties of the individual rod type shall,
  - (a) extend from within 25 mm of the outer face of the wall to within 25 mm of the inner face of the wall,
  - (b) be completely embedded in mortar except for the portion exposed in *cavity walls*, and
  - (c) be staggered from course to course.
- (5) Where two or more wythes in walls other than *cavity walls* and masonry veneer/masonry back-up walls are tied together with metal ties of the individual rod type, the space between wythes shall be completely filled with mortar.
- (6) Ties described in Sentence (5) shall be,
  - (a) located within 300 mm of openings and spaced not more than 900 mm apart around openings, and
  - (b) spaced not more than 900 mm apart horizontally and 460 mm apart vertically at other locations.

(7) Except as required in Sentences (8) and (9), where the inner and outer wythes of *cavity walls* are tied with individual wire ties, the ties shall be spaced not more than 900 mm apart horizontally and 400 mm apart vertically.

(8) Within 100 mm of the bottom of each floor or roof assembly where the cavity extends below the assemblies, the ties described in Sentence (7) shall be spaced not more than 600 mm apart horizontally.

(9) Within 300 mm of any openings, the ties described in Sentence (7) shall be spaced not more than 900 mm apart.

**9.20.9.5. Ties for Masonry Veneer**

(1) Masonry veneer 70 mm or more in thickness and resting on a bearing support shall be tied to masonry back-up or to wood framing members with straps that are,

- (a) corrosion-resistant,
- (b) not less than 0.76 mm thick,
- (c) not less than 22 mm wide,
- (d) shaped to provide a key with the mortar, and
- (e) spaced in accordance with Table 9.20.9.5.

**Table 9.20.9.5.  
Veneer Tie Spacing**

Forming Part of Sentence 9.20.9.5.(1)

Item	Column 1	Column 2
	Maximum Vertical Spacing, mm	Maximum Horizontal Spacing, mm
1.	400	800
2.	500	600
3.	600	400

(2) The straps described in Sentence (1) that are fastened to the wood framing members shall be,

- (a) bent at a right angle within 6 mm from the fastener, and
- (b) fastened with corrosion resistant 3.18 mm diam screws or spiral nails having a wood penetration of not less than 30 mm.

(3) Masonry veneer individually supported by masonry or wood frame back-up shall be secured to the back-up in conformance with Subsection 4.3.2.

(4) The straps described in Sentence (1) may be installed against one of the sheathings listed in Table 9.23.16.2.A. provided that,

- (a) the tie is in contact with the exterior surface of the sheathing, and
- (b) the sheathing beneath the tie is not compressed.

**9.20.9.6. Reinforcing for Glass Block**

(1) Glass block shall have horizontal joint reinforcement of two corrosion-resistant bars of not less than 3.76 mm diam or expanded metal strips not less than 75 mm wide,

- (a) spaced at vertical intervals of not more than 600 mm for units 190 mm or less in height, and
- (b) installed in every horizontal joint for units higher than 190 mm.

(2) Reinforcement required in Sentence (1) shall be lapped not less than 150 mm.

**9.20.10. Lateral Support**

**9.20.10.1. Lateral Support Required**

(1) Masonry walls shall be laterally supported by floor or roof construction or by intersecting masonry walls or buttresses.

(2) The spacing of supports required in Sentence (1) shall be not more than,

- (a) 20 times the wall thickness for all *loadbearing* walls and exterior non-*loadbearing* walls, and
- (b) 36 times the wall thickness for interior non-*loadbearing* walls.

(3) In applying Sentence (2), the thickness of *cavity walls* shall be taken as the greater of,

- (a) two-thirds of the sum of the thicknesses of the wythes, or
- (b) the thickness of the thicker wythe.

(4) Floor and roof structural elements providing lateral support for walls as required in Sentence (1) shall be constructed to transfer lateral loads to walls or buttresses approximately at right angles to the laterally supported walls.

#### **9.20.11. Anchorage of Roofs, Floors and Intersecting Walls**

##### **9.20.11.1. Anchorage of Floor or Roof Assemblies**

(1) Where required to receive lateral support, masonry walls shall be anchored to each floor or roof assembly at maximum intervals of 2 m, except that anchorage of floor joists not more than 1 m above grade may be omitted.

(2) Anchors required in Sentence (1) shall be corrosion-resistant and be not less than the equivalent of 40 mm by 4.76 mm thick steel straps.

(3) Anchors required in Sentence (1) shall be shaped to provide a mechanical key with the masonry and shall be securely fastened to the horizontal support to develop the full strength of the anchor.

(4) When joists are parallel to the wall, anchors required in Sentence (1) shall extend across no fewer than three joists.

##### **9.20.11.2. Bonding and Tying of Intersecting Walls**

(1) Where required to provide lateral support, intersecting walls shall be bonded or tied together.

(2) Where bonding is used to satisfy the requirements of Sentence (1), 50% of the adjacent masonry units in the intersecting wall, distributed uniformly over the height of the intersection, shall be embedded in the laterally supported wall.

(3) Where tying is used to satisfy the requirements of Sentence (1), the ties shall be,

- (a) corrosion-resistant metal,
- (b) equivalent to not less than 4.76 mm by 40 mm steel strapping,
- (c) spaced not more than 800 mm o.c. vertically, and
- (d) shaped at both ends to provide sufficient mechanical key to develop the strength of the ties.

##### **9.20.11.3. Wood Frame Walls Intersecting Masonry Walls**

(1) Wood frame walls shall be tied to intersecting masonry walls with not less than 4.76 mm diam corrosion-resistant steel rods spaced not more than 900 mm o.c. vertically.

(2) Ties required in Sentence (1) shall be anchored to the wood framing at one end and shaped to provide a mechanical key at the other end to develop the strength of the tie.

##### **9.20.11.4. Wood Frame Roof Systems**

(1) Except as permitted in Sentence (2), roof systems of wood frame construction shall be tied to exterior masonry walls by not less than 12.7 mm diam anchor bolts,

- (a) spaced not more than 2.4 m apart,
- (b) embedded not less than 90 mm into the masonry, and
- (c) fastened to a rafter plate of not less than 38 mm thick lumber.

(2) The roof system described in Sentence (1) is permitted to be anchored by nailing the wall furring strips to the side of the rafter plate.

##### **9.20.11.5. Cornices, Sills and Trim**

(1) Cornices, sills or other trim of masonry material that project beyond the wall face shall have not less than 65% of their mass, but not less than 90 mm, within the wall or shall be adequately anchored to the wall with corrosion-resistant anchors.

##### **9.20.11.6. Piers**

(1) Where anchor bolts are to be placed in the top of a masonry pier, the pier shall conform to the requirements of Sentence 9.15.2.3.(4) and shall be capped with concrete or reinforced masonry not less than 200 mm thick.

#### **9.20.12. Corbelling**

##### **9.20.12.1. Corbelling**

(1) All corbelling shall consist of solid units.

(2) The units referred to in Sentence (1) shall be corbelled so that the horizontal projection of any unit does not exceed 25 mm and the total projection does not exceed one-third of the total wall thickness.

##### **9.20.12.2. Corbelling for Cavity Walls**

(1) *Cavity walls* of greater thickness than the *foundation* wall on which they rest shall not be corbelled but may project 25 mm over the outer face of the *foundation* wall disregarding parging.

(2) Where the *foundation* wall referred to in Sentence (1) is unit masonry, it is permitted to be corbelled to meet flush with the inner face of a *cavity wall* provided,

- (a) the projection of each course does not exceed half the height or one-third the width of the corbelled unit, and
- (b) the total corbel does not exceed one-third of the *foundation* wall thickness.

**9.20.12.3. Corbelling for Masonry Veneer**

(1) Masonry veneer resting on a bearing support shall not project more than 25 mm beyond the supporting base where the veneer is at least 90 mm thick, and 12 mm beyond the supporting base where the veneer is less than 90 mm thick.

(2) In the case of rough stone veneer, the projection, measured as the average projection of the stone units, shall not exceed one-third the bed width beyond the supporting base.

**9.20.13. Control of Rain Water Penetration**

**9.20.13.1. Materials for Flashing**

(1) Materials used for flashing shall conform to Table 9.20.13.1.

(2) Aluminum flashing in contact with masonry or concrete shall be effectively coated or separated from the masonry or concrete by an impervious membrane.

**Table 9.20.13.1.  
Flashing Materials**

Forming Part of Sentence 9.20.13.1.(1)

Item	Column 1	Column 2	Column 3
	Material	Minimum Thickness, mm	
		Exposed Flashing	Concealed Flashing
1.	Aluminum	0.48	—
2.	Copper	0.46	0.46
3.	Copper or aluminum laminated to felt or kraft paper	—	0.05
4.	Hot dipped or galvanized steel	0.33	0.33
5.	Lead sheet	1.73	1.73
6.	Polyethylene	—	0.50
7.	Roll roofing, Type S	—	standard
8.	Zinc	0.46	0.46

**9.20.13.2. Fastening of Flashing**

(1) Fastening devices for flashing shall be corrosion-resistant and, where metal flashing is used, shall be compatible with the flashing with respect to galvanic action.

**9.20.13.3. Location of Flashing**

(1) Flashing shall be installed in masonry and masonry veneer walls,

- (a) beneath jointed masonry window sills,
- (b) over the back and top of parapet walls,
- (c) over the heads of glass block panels,
- (d) beneath weep holes, and
- (e) over the heads of window and door openings in exterior walls when the vertical distance between the top of a window or door frame and the bottom edge of the eave exceeds one-quarter of the horizontal eave overhang.

(2) Throughwall flashing shall be provided in a masonry veneer wall such that any moisture that accumulates in the air space will be directed to the exterior of the *building*.

**9.20.13.4. Extension of Flashing**

(1) When installed beneath jointed masonry window sills and jointed masonry copings or over the heads of openings, flashing shall extend from the front edge of the masonry up behind the sill or lintel.

(2) A flashing may be omitted when the masonry at the sill of a wall opening or the top of a wall is protected by an impervious non-jointed masonry coping that conforms to Article 9.20.13.12.

**9.20.13.5. Flashing for Weep Holes in Masonry Veneer/Masonry Walls**

(1) Flashing beneath weep holes in *cavity walls* and masonry veneer/masonry back-up walls shall,

- (a) be bedded not less than 25 mm in the inside wythe,



- (b) extend to not less than 5 mm beyond the outer face of the *building* element below the flashing, and
- (c) be installed with a nominally horizontal slope toward the outside wythe.

#### **9.20.13.6. Flashing for Weep Holes in Masonry Veneer**

(1) Flashing beneath weep holes in masonry veneer over masonry back-up walls shall conform to the flashing requirements for *cavity walls* and masonry veneer/masonry back-up walls in Article 9.20.13.5.

(2) Flashing beneath weep holes in masonry veneer over wood frame walls shall be installed so that it extends from a point not less than 5 mm beyond the outer face of the *building* element below the flashing to a point 150 mm up the wood frame wall.

(3) Where the frame wall is sheathed with a sheathing membrane, a non-wood-based rigid exterior insulating sheathing or a semi-rigid insulating sheathing with an integral sheathing membrane, the flashing shall be installed behind the sheathing membrane or insulating sheathing.

(4) Flashing described in Sentence (2) is permitted to conform to the requirements for concealed flashing in Table 9.20.13.1.

#### **9.20.13.7. Flashing Joints**

- (1) Joints in flashing shall be made watertight.

#### **9.20.13.8. Required Weep Holes**

- (1) Weep holes spaced not more than 800 mm apart shall be provided at the bottom of,

- (a) cavities in *cavity walls*, and
- (b) cavities or air spaces in masonry veneer walls.

(2) The cavities or air spaces described in Sentence (1) shall include those above lintels over window and door openings required to be flashed in conformance with Article 9.20.13.3.

(3) The weep holes required in Sentence (1) shall be in a location such that any water that collects in the cavity or space will be directed to the exterior of the *building*.

#### **9.20.13.9. Protection of Interior Finish**

(1) Except as provided in Sentence (3), where the interior finish of the exterior walls of a *building* is a type that may be damaged by moisture, exterior masonry walls, other than *cavity walls* or walls that are protected for their full height by a roof of a carport or porch, shall be,

- (a) parged on the interior surface, and
- (b) covered with No. 15 breather-type asphalt-saturated paper conforming to CAN/CGSB-51.32-M, “Sheathing, Membrane, Breather Type”, and shall be lapped not less than 100 mm at the joints.

(2) In situations described in Sentence (1), flashing shall be provided where water will accumulate, to lead it to the exterior.

(3) Where the insulation effectively limits the passage of water vapour and is applied by a waterproof adhesive or by mortar directly to the masonry, the requirements for sheathing paper do not apply.

#### **9.20.13.10. Mortar Droppings**

(1) *Cavity walls* shall be constructed so that mortar droppings are prevented from forming a bridge to allow the passage of rain water across the cavity.

#### **9.20.13.11. Caulking at Door and Window Frames**

- (1) The junction of door and window frames with masonry shall be caulked in conformance with Subsection 9.27.4.

#### **9.20.13.12. Drips Beneath Window Sills**

(1) Except for wall openings located less than 150 mm above ground level, where a concealed flashing is not installed beneath window and door sills, such sills shall be provided with an outward slope and a drip located not less than 25 mm from the wall surface.

#### **9.20.14. Protection During Work**

##### **9.20.14.1. Laying Temperature of Mortar and Masonry**

(1) Mortar and masonry shall be maintained at a temperature not below 5°C during installation and for not less than 48 h after installation.

- (2) No frozen material shall be used in the mortar mix.

### 9.20.14.2. Protection from Weather

(1) The top surface of uncompleted masonry exposed to the weather shall be completely covered with a waterproofing material when construction is not in progress.

### 9.20.15. Reinforcement for Earthquake Resistance

#### 9.20.15.1. Amount of Reinforcement

(1) Where reinforcement is required in this Section, masonry walls shall be reinforced horizontally and vertically with steel having a total cross-sectional area of not less than 0.002 times the horizontal cross-sectional area of the wall, so that not less than one-third of the required steel area is installed either horizontally or vertically and the remainder in the other direction.

#### 9.20.15.2. Installation Standard

(1) Where reinforcement for masonry is required in this Section, it shall be installed in conformance with the requirements for reinforced masonry as contained in CAN/CSA-A371, "Masonry Construction for Buildings".

### 9.20.16. Corrosion Resistance

#### 9.20.16.1. Corrosion Resistance of Connectors

(1) Carbon steel connectors required to be corrosion-resistant shall be galvanized to at least the minimum standards in Table 9.20.16.1.

**Table 9.20.16.1.**  
**Minimum Requirements for Galvanizing**

Forming Part of Sentence 9.20.16.1.(1)

Item	Column 1	Column 2	Column 3
	Connector Material	ASTM Standard	Coating Class
1.	Wire ties and continuous reinforcing (hot-dipped galvanizing)	A153 / A153M	Class B2 or 458 g/m <sup>2</sup>
2.	Hardware and bolts	A153 / A153M	See A153 / A153M
3.	Strip, plate, bars, and rolled sections (not less than 3.18 mm thick)	A123 / A123M	610 g/m <sup>2</sup>
4.	Sheet (less than 3.18 mm thick)	A123 / A123M	305 g/m <sup>2</sup> on material 0.76 mm thick <sup>(1)</sup>

Notes to Table 9.20.16.1.:

<sup>(1)</sup> ASTM A123 / A123M does not apply to metal less than 3.18 mm thick. Galvanizing coatings may be interpolated for thicknesses between 3.18 mm and 0.76 mm.

### 9.20.17. Above-Ground Flat Insulating Concrete Form Walls

#### 9.20.17.1. Thickness of Flat Insulating Concrete Form Walls

- (1) The thickness of concrete in flat insulating concrete form walls not in contact with the ground shall be,
- (a) not less than 140 mm, and
  - (b) constant for the entire height of the wall.

#### 9.20.17.2. Reinforcement for Flat Insulating Concrete Form Walls

- (1) Horizontal reinforcement in above-grade flat insulating concrete form walls shall,
- (a) consist of,
    - (i) one 10M bar placed not more than 300 mm from the top of the wall, and
    - (ii) 10M bars spaced not more than 600 mm o.c., and
  - (b) be placed in the middle third of the wall section.
- (2) Vertical reinforcement in above-grade flat insulating concrete form walls shall,
- (a) consist of 10M bars spaced not more than 400 mm o.c., and
  - (b) be placed in the middle third of the wall section.
- (3) Vertical reinforcement required in Sentence (2) and interrupted by wall openings shall be placed not more than 600 mm from each side of the opening.

#### 9.20.17.3. Openings in Non-Loadbearing Flat Insulating Concrete Form Walls

(1) No openings shall occur within 1.2 m of interior and exterior corners of exterior non-loadbearing flat insulating concrete form walls.

(2) Portions of walls over openings in non-*loadbearing* flat insulating concrete form walls shall have a minimum depth of concrete of not less than 200 mm over the width of the opening.

(3) Openings more than 600 mm but not more than 3 m in width in non-*loadbearing* flat insulating concrete form walls shall be reinforced at the top and bottom with one 10M bar.

(4) Openings more than 3 m in width in non-*loadbearing* flat insulating concrete form walls shall be reinforced on all four sides with two 10M bars.

(5) Reinforcing bars described in Sentences (3) and (4) shall extend not less than 600 mm beyond the edges of the opening.

(6) The cumulative width of openings in non-*loadbearing* flat insulating concrete form walls shall be not more than 70% of the length of any wall.

**9.20.17.4. Openings in Loadbearing Flat Insulating Concrete Form Walls**

(1) No openings shall occur within 1.2 m of interior and exterior corners of exterior *loadbearing* flat insulating concrete form walls.

(2) In *loadbearing* flat insulating concrete form walls, lintels shall be provided over all openings wider than 900 mm.

(3) Lintels described in Sentence (2) shall be constructed in accordance with Tables A-17, A-18 or A-19.

(4) Lintels described in Sentence (2) over openings wider than 1.2 m shall be reinforced for shear with 10M stirrups at a maximum spacing of half the distance from the bottom reinforcing bar to the top of the lintel.

**9.20.17.5. Framing Supported on Flat Insulating Concrete Form Walls**

(1) Floor joists supported on the side of flat insulating concrete form walls shall be supported with joist hangers secured to wood ledger boards.

(2) The ledger boards described in Sentence (1) shall be not less than,

- (a) 38 mm thick, and
- (b) the depth of the floor joists.

(3) Anchor bolts shall be used to secure ledger boards to flat insulating concrete form walls and shall be,

- (a) embedded in the wall to a depth not less than 100 mm, and
- (b) spaced in accordance with Table 9.20.17.5.

(4) Floor joists and *building* frames supported on top of flat insulating concrete form walls shall be anchored in conformance with Article 9.23.6.1.

**Table 9.20.17.5.  
Maximum Anchor Bolt Spacing for the Connection of Ledger Boards to Flat Insulating Concrete Form Walls**

Forming Part of Sentence 9.20.17.5.(3)

Item	Column 1	Column 2	Column 3
	Maximum Clear Floor Span, m	Maximum Anchor Bolt Spacing, mm	
		Staggered 12.7 mm Diameter Anchor Bolts	Staggered 16 mm Diameter Anchor Bolts
1.	2.44	450	500
2.	3.00	400	450
3.	4.00	300	400
4.	5.00	275	325

**9.20.17.6. Anchoring of Roof Framing to Top of Flat Insulating Concrete Form Walls**

(1) Roof framing supported on the top of flat insulating concrete form walls shall be fixed to the top plates, which shall be anchored to the wall with anchor bolts,

- (a) not less than 12.7 mm in diameter, and
- (b) spaced not more than 1.2 m o.c.

(2) The anchor bolts described in Sentence (1) shall be placed in the centre of the flat insulating concrete form wall and shall be embedded not less than 100 mm into the concrete.

(3) Attachment of roof framing to wood top plates shall be in accordance with Table 9.23.3.4.

**9.20.17.7. Protection from Precipitation and Damage**

(1) Above ground flat insulating concrete form walls shall be protected from precipitation and damage in conformance with Section 9.27.

## Section 9.21. Masonry and Concrete Chimneys and Flues

### 9.21.1. General

#### 9.21.1.1. Application

(1) This Section applies to,

(a) rectangular *masonry or concrete chimneys* not more than 12 m in height serving fireplaces or serving *appliances* having a combined total rated heat output of 120 kW or less, and

(b) *flue pipes* serving solid fuel-burning *appliances*.

(2) Except as provided in Sentence 9.21.1.3.(1), *chimneys* (other than those described in Sentence (1) and Sentence 9.21.1.2.(1)), *gas vents* and *flue pipes* serving gas-, oil- or solid fuel-burning *appliances* and associated equipment shall conform to Section 6.3.

#### 9.21.1.2. Factory-Built Chimneys

(1) *Factory-built chimneys* serving solid fuel-burning *appliances*, and their installation, shall conform to CAN/ULC-S629-M, “650°C Factory-Built Chimneys”.

#### 9.21.1.3. Flue Pipes

(1) *Flue pipes* serving solid fuel-burning *stoves, cooktops* and *space heaters* shall conform to CAN/CSA-B365, “Installation Code for Solid-Fuel Burning Appliances and Equipment”.

#### 9.21.1.4. Chimney or Flue Pipe Walls

(1) The walls of any *chimney* or *flue pipe* shall be constructed to be smoke- and flame-tight.

### 9.21.2. Chimney Flues

#### 9.21.2.1. Chimney Flue Limitations

(1) A *chimney flue* that serves a fireplace or incinerator shall not serve any other *appliance*.

(2) A *chimney flue* that serves a solid fuel-burning *appliance* shall not be connected to a natural gas- or propane-fired *appliance*.

(3) A *chimney flue* that serves a solid fuel-burning *appliance* shall not be connected to an oil-burning *appliance* unless the solid fuel-burning *appliance* is *listed* for such installation and the installation of both *appliances* meets their respective installation requirements.

#### 9.21.2.2. Connections of More Than One Appliance

(1) Except as required in Article 9.21.2.1., two or more fuel-burning *appliances* are permitted to be connected to the same *chimney flue* provided adequate draft is maintained for the connected *appliances* and the connections are made as described in Sentences (2) and (3).

(2) Where two or more solid fuel-burning *appliances* are connected to the same *chimney flue*, the *appliances* must be located on the same *storey*.

(3) The connection referred to in Sentence (2) for a solid fuel-burning *appliance* shall be made below connections for *appliances* burning other fuels.

#### 9.21.2.3. Inclined Chimney Flues

(1) *Chimney flues* shall not be inclined more than 45° to the vertical.

#### 9.21.2.4. Size of Chimney Flues

(1) Except for *chimneys* serving fireplaces, the size of a *chimney flue* shall conform to the requirements of the solid fuel-burning *appliance* installation standard referenced in Sentence 6.2.1.4.(1) and Article 9.33.1.2.

(2) Where a *chimney flue* serves only one solid fuel-burning *appliance*, the *flue* area shall be at least equal to that of the *flue pipe* connected to it.

#### 9.21.2.5. Fireplace Chimneys

(1) The size of a *chimney flue* serving a masonry fireplace shall be within the allowable range specified in Table 9.21.2.5.A. or Table 9.21.2.5.B.

**Table 9.21.2.5.A.  
Diameter of Round Flues for Fireplace Chimneys**

Forming Part of Sentence 9.21.2.5.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
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	Fireplace Opening, m <sup>2</sup>	Chimney Height, m							
		3.0 to 4.5		> 4.5 to 5.9		> 5.9 to 8.9		> 8.9 to 12	
		Flue diameter, mm							
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1.	Up to 0.150	110	170	100	160	90	150	90	150
2.	0.151 to 0.250	150	210	130	190	130	190	120	180
3.	0.251 to 0.350	180	240	160	220	150	210	140	200
4.	0.351 to 0.500	220	280	200	260	190	250	170	230
5.	0.501 to 0.650	260	320	230	290	220	280	200	260
6.	0.651 to 0.800	290	350	260	320	240	300	220	280
7.	0.801 to 1.00	330	390	290	350	270	330	250	310
8.	1.01 to 1.20	360	420	320	380	300	360	270	330
9.	1.21 to 1.40	390	450	350	410	330	390	300	360
10.	1.41 to 1.60	420	480	380	440	350	410	320	380
11.	1.61 to 1.80	—	—	400	460	370	430	340	400
12.	1.81 to 2.00	—	—	—	—	400	460	360	420
13.	2.01 to 2.20	—	—	—	—	—	—	380	440

**Table 9.21.2.5.B.  
Rectangular Flue Sizes for Fireplace Chimneys**

Forming Part of Sentence 9.21.2.5.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
	Fireplace Opening, m <sup>2</sup>	Chimney Height, m							
		3.0 to 4.5		> 4.5 to 5.9		> 5.9 to 8.9		> 8.9 to 12	
		Flue Size, mm							
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1.	Up to 0.150	200 × 200	200 × 200	100 × 200	100 × 200	100 × 200	100 × 200	100 × 200	100 × 200
2.	0.151 to 0.250	200 × 200	200 × 200	200 × 200	200 × 200	200 × 200	200 × 200	200 × 200	200 × 200
3.	0.251 to 0.350	200 × 300	200 × 300	200 × 200	200 × 300	200 × 200	200 × 200	200 × 200	200 × 200
4.	0.351 to 0.500	300 × 300	300 × 300	200 × 300	200 × 300	200 × 300	200 × 300	200 × 200	200 × 300
5.	0.501 to 0.650	300 × 300	300 × 400	300 × 300	300 × 300	300 × 300	300 × 300	200 × 300	200 × 300
6.	0.651 to 0.800	300 × 400	300 × 400	300 × 300	300 × 400	300 × 300	300 × 300	300 × 300	300 × 300
7.	0.801 to 1.00	400 × 400	400 × 400	300 × 400	300 × 400	300 × 400	300 × 400	300 × 300	300 × 300
8.	1.01 to 1.20	400 × 400	400 × 400	400 × 400	400 × 400	300 × 400	300 × 400	300 × 400	300 × 400
9.	1.21 to 1.40	—	—	400 × 400	400 × 400	400 × 400	400 × 400	300 × 400	300 × 400
10.	1.41 to 1.60	—	—	—	—	400 × 400	400 × 400	400 × 400	400 × 400
11.	1.61 to 1.80	—	—	—	—	—	—	400 × 400	400 × 400
12.	1.81 to 2.00	—	—	—	—	—	—	400 × 400	400 × 400

#### 9.21.2.6. Oval Chimney Flues

(1) The width of an oval *chimney flue* shall be not less than two-thirds its breadth.

#### 9.21.3. Chimney Lining

##### 9.21.3.1. Lining Materials

(1) Every *masonry or concrete chimney* shall have a lining of clay, concrete, firebrick or metal.

##### 9.21.3.2. Joints in Chimney Liners

(1) Joints of *chimney liners* shall be sealed to provide a barrier to the passage of flue gases and condensate into the cavity between the liner and the surrounding masonry.

(2) Joints of clay, concrete or firebrick *chimney liners* shall be struck flush to provide a straight, smooth, aligned *chimney flue*.

##### 9.21.3.3. Clay Liners

(1) Clay liners shall conform to CAN/CSA-A324-M, “Clay Flue Liners”.

(2) Liners referred to in Sentence (1) shall be not less than 15.9 mm thick and shall be capable of resisting, without softening or cracking, a temperature of 1100°C.

##### 9.21.3.4. Firebrick Liners

(1) Firebrick liners shall conform to ASTM C27, “Classification of Fireclay and High Alumina Refractory Brick”.

(2) Firebrick liners shall be laid with high temperature cement mortar conforming to CAN/CGSB-10.3, “Air Setting Refractory Mortar”.

#### **9.21.3.5. Concrete Liners**

(1) Concrete *flue* liners shall conform to Clause 4.2.6.4. of CAN/CSA-A405-M, “Design and Construction of Masonry Chimneys and Fireplaces”.

#### **9.21.3.6. Metal Liners**

(1) Metal liners shall be constructed of at least 0.3 mm thick stainless steel.

(2) Except as provided in Sentence 9.22.10.2.(3), metal liners referred to in Sentence (1) shall only be used in *chimneys* serving gas- or oil-burning *appliances*.

#### **9.21.3.7. Installation of Chimney Liners**

(1) *Chimney liners* shall be installed when the surrounding masonry or concrete is placed.

#### **9.21.3.8. Spaces Between Liners and Surrounding Masonry**

(1) A space not less than 10 mm wide shall be left between a *chimney liner* and the surrounding masonry.

(2) The space required in Sentence (1) shall not be filled with mortar.

#### **9.21.3.9. Mortar for Chimney Liners**

(1) *Chimney liners* used in *chimneys* for solid fuel-burning *appliances* shall be laid in a full bed of,

(a) high temperature cement mortar conforming to CAN/CGSB-10.3, “Air Setting Refractory Mortar”, or

(b) mortar consisting of one part Portland cement to three parts sand by volume.

(2) *Chimney liners* used in *chimneys* for oil- or gas-burning *appliances* shall be laid in a full bed of mortar consisting of one part Portland cement to three parts sand by volume.

#### **9.21.3.10. Extension of Chimney Liners**

(1) *Chimney liners* shall extend from a point not less than 200 mm below the lowest *flue pipe* connection to a point not less than 50 mm or more than 100 mm above the *chimney* cap.

### **9.21.4. Masonry and Concrete Chimney Construction**

#### **9.21.4.1. Unit Masonry**

(1) Unit masonry shall conform to Section 9.20.

#### **9.21.4.2. Concrete**

(1) Concrete shall conform to Section 9.3.

#### **9.21.4.3. Footings**

(1) Footings for masonry *chimneys* and concrete *chimneys* shall conform to the requirements in Section 9.15.

#### **9.21.4.4. Height of Chimney Flues**

(1) A *chimney flue* shall extend not less than,

(a) 900 mm above the highest point at which the *chimney* comes in contact with the roof, and

(b) 600 mm above the highest roof surface or structure within 3 m of the *chimney*.

#### **9.21.4.5. Lateral Stability**

(1) Except as provided in Sentence (2), *chimneys* shall be braced in accordance with Subsection 4.3.2. to provide stability under wind loads.

(2) A *chimney* need not be laterally braced provided,

(a) no horizontal outside dimension is less than 400 mm, and

(b) the *chimney* extends not more than 3.6 m above a roof or the masonry wall of which it forms a part.

#### **9.21.4.6. Chimney Caps**

(1) The top of a *chimney* shall have a waterproof cap of reinforced concrete, masonry or metal.

(2) The cap required in Sentence (1) shall slope from the lining and be provided with a drip not less than 25 mm from the *chimney* wall.

(3) Cast-in-place concrete caps shall be separated from the *chimney liner* by a bond break and be sealed at that location.

(4) Jointed precast concrete or masonry *chimney* caps shall have flashing installed beneath the cap extending from the liner to the drip edge.

#### **9.21.4.7. Cleanout**

(1) Except for a *chimney flue* constructed to serve a masonry fireplace, a cleanout opening with a metal frame and tight-fitting metal door shall be installed near the base of the *chimney flue*.

#### **9.21.4.8. Wall Thickness**

(1) The walls of a masonry *chimney* shall be built of solid units not less than 70 mm thick.

#### **9.21.4.9. Separation of Flue Liners**

(1) *Flue* liners in the same *chimney* shall be separated by not less than 70 mm of masonry or concrete exclusive of liners where clay liners are used, or 90 mm of firebrick where firebrick liners are used.

(2) *Flue* liners referred to in Sentence (1) shall be installed to prevent significant lateral movement.

#### **9.21.4.10. Flashing**

(1) Junctions with adjacent materials shall be adequately flashed to shed water.

### **9.21.5. Clearance from Combustible Construction**

#### **9.21.5.1. Clearance from Combustible Materials**

(1) The clearance between *masonry or concrete chimneys* and *combustible* framing material shall be not less than,

(a) 50 mm for interior *chimneys*, and

(b) 12 mm for exterior *chimneys*.

(2) A clearance of not less than 150 mm shall be provided between a cleanout opening and *combustible* material.

(3) *Combustible* flooring, subflooring and ceiling finishes shall have not less than a 12 mm clearance from *masonry or concrete chimneys*.

#### **9.21.5.2. Sealing of Spaces**

(1) All spaces between *masonry or concrete chimneys* and *combustible* material shall be sealed top or bottom with *noncombustible* material.

#### **9.21.5.3. Support of Joists or Beams**

(1) Joists or beams may be supported on masonry walls that enclose *chimney flues* provided the *combustible* members are separated from the *flue* by a minimum of 290 mm of solid masonry.

## **Section 9.22. Fireplaces**

### **9.22.1. General**

#### **9.22.1.1. Application**

(1) Except as otherwise specifically stated in this Part, this Section applies to masonry fireplaces constructed on site.

#### **9.22.1.2. Masonry and Concrete**

(1) Except as otherwise stated in this Section, unit masonry shall conform to Section 9.20. and concrete to Section 9.3.

(2) Masonry above openings shall be supported by steel lintels conforming to Sentence 9.20.5.2.(2), reinforced concrete or a masonry arch.

#### **9.22.1.3. Footings**

(1) Footings for masonry and concrete fireplaces shall conform to Section 9.15.

#### **9.22.1.4. Combustion Air**

(1) Every solid fuel-fired fireplace, including a factory-built fireplace, shall have a supply of combustion air from outdoors in accordance with Sentences (2) to (7).

(2) The combustion air shall be supplied by a *noncombustible* and corrosion-resistant supply duct.

(3) The supply duct shall have,

(a) a diameter of not less than 100 mm or equivalent area, and

(b) an exterior intake for entry of air from the outdoors.

(4) The supply duct shall contain a tight-fitting damper that shall be located close to the interior outlet and be operable from the room containing the fireplace.

(5) The operating mechanism shall clearly indicate the actual position of the damper.

- (6) The interior outlet shall,
  - (a) be located as close as possible to the opening in the face of the fireplace, and
  - (b) be designed to prevent embers from entering the supply duct.

(7) Where a supply of combustion air is provided directly to the fire chamber of a fireplace, including a factory-built fireplace or a steel fireplace liner, the installation shall comply with the “Outdoor Air Supply” requirements provided in CAN/CSA-A405-M, “Design and Construction of Masonry Chimneys and Fireplaces”.

## **9.22.2. Fireplace Liners**

### **9.22.2.1. Brick or Steel Liners**

- (1) Except where a fireplace is equipped with a steel liner, every fireplace shall have a firebrick liner.

### **9.22.2.2. Firebrick Liners**

- (1) Fireplace liners shall be not less than,
  - (a) 50 mm thick for the sides and back, and
  - (b) 25 mm thick for the floor.
- (2) Firebrick liners shall be laid with high temperature cement mortar conforming to CAN/CGSB-10.3, “Air Setting Refractory Mortar”.
- (3) Joints between a firebrick liner and the adjacent back-up masonry shall be offset.

### **9.22.2.3. Steel Liners**

(1) Steel liners for fireplaces shall conform to CAN/ULC-S639M, “Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplaces”, and shall be installed in accordance with the installation instructions in that standard.

## **9.22.3. Fireplace Walls**

### **9.22.3.1. Thickness of Walls**

- (1) Except as provided in Sentence (2), the thickness of the back and sides of a fireplace, including the thickness of any firebrick liner, shall be not less than 190 mm where a metal liner or a firebrick liner less than 51 mm thick is used.
- (2) When a steel fireplace liner is used with an air circulating chamber surrounding the firebox, the back and sides of the fireplace shall consist of,
  - (a) solid masonry units not less than 90 mm thick, or
  - (b) hollow masonry units not less than 190 mm thick.

## **9.22.4. Fire Chamber**

### **9.22.4.1. Fire Chamber Dimensions**

- (1) The distance from the back of the fire chamber to the plane of the fireplace opening shall be not less than 300 mm.

## **9.22.5. Hearth**

### **9.22.5.1. Hearth Extension**

- (1) Except as required in Sentence (2), fireplaces shall have a *noncombustible* hearth extending not less than 400 mm in front of the fireplace opening measured from the facing, and not less than 200 mm beyond each side of the fireplace opening.
- (2) Where the fire chamber floor is elevated more than 150 mm above the hearth, the dimension of the hearth measured perpendicular to the plane of the fireplace opening shall be increased by not less than,
  - (a) 50 mm for an elevation above 150 mm and not more than 300 mm, and
  - (b) an additional 25 mm for every 50 mm in elevation above 300 mm.

### **9.22.5.2. Support of Hearth**

- (1) Except as permitted in Sentence (2), the fire chamber floor and hearth shall be supported on a reinforced concrete slab not less than a 100 mm thick at its supports and, if cantilevered, not less than 50 mm thick at its unsupported edge.
- (2) A hearth for a fireplace with an opening raised not less than 200 mm from a *combustible* floor is permitted to be supported on that floor provided the requirements of Clauses 5.3.6.5. to 5.3.6.7. of CAN/CSA-A405-M, “Design and Construction of Masonry Chimneys and Fireplaces”, are followed.

## **9.22.6. Damper**

### **9.22.6.1. Required Damper and Size**



(1) The throat of every fireplace shall be equipped with a metal damper sufficiently large to cover the full area of the throat opening.

#### **9.22.7. Smoke Chamber**

##### **9.22.7.1. Slope of Smoke Chamber**

(1) The sides of the smoke chamber connecting a fireplace throat with a *flue* shall not be sloped at an angle greater than 45° to the vertical.

##### **9.22.7.2. Wall Thickness**

(1) The thickness of masonry walls surrounding the smoke chamber shall be not less than 190 mm at the sides, front and back, except that the portions of the back exposed to the outside may be 140 mm thick.

#### **9.22.8. Factory-Built Fireplaces**

##### **9.22.8.1. Conformance to Standard**

(1) Factory-built fireplaces and their installation shall conform to CAN/ULC-S610-M, “Factory-Built Fireplaces”.

#### **9.22.9. Clearance of Combustible Material**

##### **9.22.9.1. Clearance to the Fireplace Opening**

(1) *Combustible* material shall not be placed on or near the face of a fireplace within 150 mm of the fireplace opening, except that where the *combustible* material projects more than 38 mm out from the face of the fireplace above the opening, such material shall be at least 300 mm above the top of the opening.

##### **9.22.9.2. Metal Exposed to the Interior**

(1) Metal exposed to the interior of a fireplace such as the damper control mechanism shall have at least a 50 mm clearance from any *combustible* material on the face of the fireplace where such metal penetrates through the face of the fireplace.

##### **9.22.9.3. Clearance to Combustible Framing**

(1) Not less than a 100 mm clearance shall be provided between the back and sides of a solid fuel-burning fireplace and *combustible* framing, except that a 50 mm clearance is permitted where the fireplace is located in an exterior wall.

(2) Not less than a 50 mm clearance shall be provided between the back and sides of the smoke chamber of a solid fuel-burning fireplace and *combustible* framing, except that a 25 mm clearance is permitted where the fireplace is located in an exterior wall.

##### **9.22.9.4. Heat Circulating Duct Openings**

(1) The clearance of *combustible* material above heat circulating duct openings from those openings shall be not less than,

- (a) 300 mm where the *combustible* material projects not less than 38 mm from the face, and
- (b) 150 mm where the projection is less than 38 mm.

#### **9.22.10. Fireplace Inserts and Hearth-Mounted Stoves**

##### **9.22.10.1. Appliance Standard**

(1) Fireplace inserts and hearth mounted *stoves* vented through the throat of a fireplace shall conform to ULC-S628, “Fireplace Inserts”.

##### **9.22.10.2. Installation**

(1) The installation of fireplace inserts and hearth mounted *stoves* vented through the throat of a fireplace shall conform to CAN/CSA-B365, “Installation Code for Solid-Fuel Burning Appliances and Equipment”.

(2) Fireplace inserts and hearth mounted *stoves* vented through the throat of a fireplace described in Sentence (1) may be installed in existing fireplaces only if a minimum thickness of 190 mm of solid masonry is provided between the smoke chamber and any existing *combustible* materials, unless the insert is *listed* for lesser clearances.

(3) A fireplace insert installed in a masonry fireplace shall have,

- (a) a *listed* metal *chimney* liner installed from the insert collar to the top of the *chimney*, or
- (b) a direct sealed connection to the *chimney flue* where such provision is part of an insert conforming to Sentence 9.22.10.1.(1).

### **Section 9.23. Wood Frame Construction**

#### **9.23.1. Application**

### 9.23.1.1. Limitations

(1) This Section applies where wall, floor and roof planes are generally comprised of lumber frames of small repetitive structural members, or engineered components, and where,

- (a) roof and wall planes are clad, sheathed or braced on at least one side,
- (b) the small repetitive structural members are spaced not more than 610 mm o.c.,
- (c) the walls do not serve as *foundations*,
- (d) the specified *live load* on supported subfloors and floor framing does not exceed 2.4 kPa, and
- (e) the span of any structural member does not exceed 12.20 m.

(2) Where the conditions in Sentence (1) are exceeded for wood construction, the design of the framing and fastening shall conform to Subsection 4.3.1.

### 9.23.2. General

#### 9.23.2.1. Strength and Rigidity

(1) All members shall be so framed, anchored, fastened, tied and braced to provide the necessary strength and rigidity.

#### 9.23.2.2. Protection from Decay

(1) Ends of wood joists, beams and other members framing into masonry or concrete shall be treated to prevent decay where the bottom of the member is at or below ground level, or a 12 mm air space shall be provided at the end and sides of the member.

(2) Air spaces required in Sentence (1) shall not be blocked by insulation, *vapour barriers* or air tight materials.

#### 9.23.2.3. Protection from Dampness

(1) Except as permitted in Sentence (2), wood framing members that are not pressure-treated with a wood preservative and that are supported on concrete in contact with the ground or *fill* shall be separated from the concrete by not less than 0.05 mm polyethylene film or Type S roll roofing.

(2) Dampproofing material referred to in Sentence (1) is not required where the wood member is at least 150 mm above the ground.

#### 9.23.2.4. Lumber

(1) Lumber shall conform to the appropriate requirements in Subsection 9.3.2.

#### 9.23.2.5. Termite Protection

(1) Where termites are known to exist, unless pressure-treated with a chemical that is toxic to such termites in accordance with Article 9.3.2.9., wood steps shall rest on a non-cellulosic base or apron extending at least 150 mm above the ground.

(2) Wood lattice or skirting around porches shall be separated from piers and *soil* by at least 50 mm.

### 9.23.3. Fasteners

#### 9.23.3.1. Standards for Nails and Screws

(1) Unless otherwise indicated, nails specified in this Section shall be common steel wire nails or common spiral nails, conforming to CSA B111, “Wire Nails, Spikes and Staples”.

(2) Wood screws specified in this Section shall conform to ANSI/ASME B18.6.1., “Wood Screws (Inch Series)”.

#### 9.23.3.2. Length of Nails

(1) All nails shall be long enough so that not less than half their required length penetrates into the second member.

#### 9.23.3.3. Prevention of Splitting

(1) Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from the edges.

#### 9.23.3.4. Nailing of Framing

(1) Except as provided in Sentence (2), nailing of framing shall conform to Table 9.23.3.4.

**Table 9.23.3.4.  
Nailing for Framing**

Forming Part of Sentence 9.23.3.4.(1)

Item	Column 1	Column 2	Column 3
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	Construction Detail	Minimum Length of Nails, mm	Minimum Number or Maximum Spacing of Nails
1.	Floor joist to plate – toe nail	82	2
2.	Wood or metal strapping to underside of floor joists	57	2
3.	Cross bridging to joists	57	2 at each end
4.	Double header or trimmer joists	76	300 mm (o.c.)
5.	Floor joist to stud (balloon construction)	76	2
6.	Ledger strip to wood beam	82	2 per joist
7.	Joist to joist splice (See also Table 9.23.13.8.)	76	2 at each end
8.	Header joist end nailed to joists along perimeter	101	3
9.	Tail joist to adjacent header joist (end nailed) around openings	82 101	5 3
10.	Each header joist to adjacent trimmer joist (end nailed) around openings	82 101	5 3
11.	Stud to wall plate (each end) toe nail or end nail	62 82	4 2
12.	Doubled studs at openings, or studs at walls or wall intersections and corners	76	750 mm (o.c.)
13.	Doubled top wall plates	76	600 mm (o.c.)
14.	Bottom wall plate or sole plate to joists or blocking (exterior walls) <sup>(1)</sup>	82	400 mm (o.c.)
15.	Interior walls to framing or subflooring	82	600 mm (o.c.)
16.	Horizontal member over openings in non-loadbearing walls – each end	82	2
17.	Lintels to studs	82	2 at each end
18.	Ceiling joist to plate – toe nail each end	82	2
19.	Roof rafter, roof truss or roof joist to plate – toe nail	82	3
20.	Rafter plate to each ceiling joist	101	2
21.	Rafter to joist (with ridge supported)	76	3
22.	Rafter to joist (with ridge unsupported)	76	See Table 9.23.13.8.
23.	Gusset plate to each rafter at peak	57	4
24.	Rafter to ridge board – toe nail – end nail	82	3
25.	Collar tie to rafter – each end	76	3
26.	Collar tie lateral support to each collar tie	57	2
27.	Jack rafter to hip or valley rafter	82	2
28.	Roof strut to rafter	76	3
29.	Roof strut to loadbearing wall – toe nail	82	2
30.	38 mm × 140 mm or less plank decking to support	82	2
31.	Plank decking wider than 38 mm × 140 mm to support	82	3
32.	38 mm edge laid plank decking to support (toe nail)	76	1
33.	38 mm edge laid plank to each other	76	450 mm (o.c.)

**Notes to Table 9.23.3.4.:**

<sup>(1)</sup> See Sentence 9.23.3.4.(2).

(2) Where the bottom wall plate or sole plate of an exterior wall is not nailed to joists or blocking in conformance with Table 9.23.3.4., the exterior wall may be fastened to the floor framing by,

- (a) having plywood, OSB or waferboard sheathing extend down over floor framing and fastened to the floor framing by nails or staples conforming to Article 9.23.3.5., or
- (b) tying the wall framing to the floor framing by 50 mm wide galvanized-metal strips,
  - (i) not less than 0.41 mm in thickness,
  - (ii) spaced not more than 1.2 m apart, and
  - (iii) fastened at each end with at least two 63 mm nails.

**9.23.3.5. Fastening for Sheathing or Subflooring**

(1) Except as required by Sentence (5), fastening of sheathing and subflooring shall conform to Table 9.23.3.5.

**Table 9.23.3.5.  
Fasteners for Sheathing and Subflooring**

Forming Part of Sentence 9.23.3.5.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Element	Minimum Length of Fasteners, mm			Minimum	

		Common or Spiral Nails	Ring Thread Nails or Screws	Roofing Nails	Staples	Number or Maximum Spacing of Fasteners
1.	Board lumber 184 mm or less wide	51	45	N/A	51	2 per support
2.	Board lumber more than 184 mm wide	51	45	N/A	51	3 per support
3.	Fibreboard sheathing up to 13 mm thick	N/A	N/A	44	28	150 mm (o.c.) along edges and 300 mm (o.c.) along intermediate supports
4.	Gypsum sheathing up to 13 mm thick	N/A	N/A	44	N/A	
5.	Plywood, OSB or waferboard up to 10 mm thick	51	45	N/A	38	
6.	Plywood, OSB or waferboard over 10 mm and up to 20 mm thick	51	45	N/A	51	
7.	Plywood, OSB or waferboard over 20 mm and up to 25 mm thick	57	51	N/A	N/A	

(2) Staples shall not be less than 1.6 mm in diameter or thickness, with not less than a 9.5 mm crown driven with the crown parallel to framing.

(3) Roofing nails for the attachment of fibreboard or gypsum sheathing shall not be less than 3.2 mm in diameter with a minimum head diameter of 11.1 mm.

(4) Flooring screws shall not be less than 3.2 mm in diameter.

(5) Where roof sheathing supports are spaced at more than 406 mm o.c., the maximum spacing of fasteners for roof sheathing shall be 150 mm along edges and intermediate supports.

#### 9.23.4. Maximum Spans

##### 9.23.4.1. Application

(1) Spans provided in this Subsection for joists, beams and lintels supporting floors shall apply only where,

(a) the floors serve residential areas as described in Table 4.1.5.3., or

(b) the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.

(2) Spans for joists, beams and lintels supporting floors shall be determined according to Subsection 4.1.3. where the supported floors,

(a) serve other than residential areas, or

(b) support a uniform *live load* in excess of that specified for residential areas.

##### 9.23.4.2. Spans for Joists, Rafters and Beams

(1) Except as required in Sentence (2) and Article 9.23.13.10., the spans for wood joists and rafters shall conform to the spans shown in Tables A-1 to A-7 for the uniform *live loads* shown in the Tables.

(2) Spans for floor joists that are not selected from Tables A-1 and A-2 and that are required to be designed for the same loading conditions, shall not exceed the design requirements for uniform loading and vibration criteria.

(3) Spans for built-up wood and glued-laminated timber floor beams shall conform to the spans in Tables A-8 to A-11.

(4) Spans for roof ridge beams shall conform to the spans in Table A-12 for the uniform snow load shown.

##### 9.23.4.3. Steel Beams

(1) The spans for steel beams with laterally supported top flanges shall conform to Table 9.23.4.3. for floors and Tables A-20 to A-29 for roofs and floors.

**Table 9.23.4.3.  
Maximum Spans for Steel Beams Supporting Floors in Dwelling Units**

Forming Part of Sentence 9.23.4.3 (1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
		Supported Joist Length, m (Half the sum of joist spans on both sides of the beam)						
		2.4	3.0	3.6	4.2	4.8	5.4	6.0
	Section	One Storey Supported						
1.	W150 × 22	5.5	5.2	4.9	4.8	4.6	4.5	4.3
2.	W200 × 21	6.5	6.2	5.9	5.7	5.4	5.1	4.9
3.	W200 × 27	7.3	6.9	6.6	6.3	6.1	5.9	5.8
4.	W200 × 31	7.8	7.4	7.1	6.8	6.6	6.4	6.2

5.	W250 × 24	8.1	7.6	7.3	7.0	6.6	6.2	5.9
6.	W250 × 33	9.2	8.7	8.3	8.0	7.7	7.5	7.3
7.	W250 × 39	10.0	9.4	9.0	8.6	8.4	8.1	7.9
8.	W310 × 31	10.4	9.8	9.4	8.9	8.4	8.0	7.6
9.	W310 × 39	11.4	10.7	10.2	9.8	9.5	9.2	9.0
	Section	Two Storeys Supported						
10.	W150 × 22	4.9	4.4	4.1	3.8	3.5	3.4	3.2
11.	W200 × 21	5.6	5.1	4.6	4.3	4.1	3.8	3.7
12.	W200 × 27	6.4	6.1	5.6	5.3	4.9	4.7	4.4
13.	W200 × 31	6.9	6.5	6.2	5.8	5.4	5.1	4.9
14.	W250 × 24	6.8	6.1	5.6	5.2	4.9	4.6	4.4
15.	W250 × 33	8.2	7.7	7.0	6.5	6.1	5.8	5.5
16.	W250 × 39	8.8	8.3	7.8	7.2	6.8	6.4	6.1
17.	W310 × 31	8.7	7.8	7.2	6.7	6.2	5.9	5.6
18.	W310 × 39	10.0	9.3	8.5	7.9	7.4	7.0	6.7

(2) Beams described in Sentence (1) shall at least meet the requirements for Grade 350 W steel in CSA G40.21, “Structural Quality Steel”.

(3) A beam may be considered to be laterally supported if,

- (a) the wood joists bear on its top flange at intervals of 610 mm or less over its entire length,
- (b) the load being applied to this beam is transmitted through the joists, and
- (c) 19 mm by 38 mm wood strips in contact with the top flange are nailed on both sides of the beam to the bottom of the joist supported.

#### 9.23.4.4. Concrete Topping

(1) Except as permitted in Sentence (2), where a floor is required to support a concrete topping, the joist spans shown in Table A-1 or the spacing of the members shall be reduced to allow for the loads due to the topping.

(2) Where a floor is required to support a concrete topping, joist spans are permitted to be selected from Table A-2 provided the concrete,

- (a) is 38 to 51 mm thick,
- (b) is normal weight,
- (c) is placed directly on the subflooring, and
- (d) has not less than 20 MPa compressive strength after 28 days.

(3) Where a floor is required to support a concrete topping not more than 51 mm thick, the beam spans shown in Tables A-8 to A-11 shall be multiplied by 0.8 or the supported length of the floor joists shall be reduced to allow for the loads due to the topping.

#### 9.23.4.5. Heavy Roofing Materials

(1) Where a roof is required to support an additional uniform *dead load* from roofing materials such as concrete roofing tile, or materials other than as specified in Section 9.26., such as clay roofing tiles, the additional load shall be allowed for by reducing,

- (a) the spans for roof joists and rafters in Tables A-4 to A-7, or the spacing of the members, and
- (b) the spans for ridge beams and lintels in Tables A-12 to A-16.

#### 9.23.5. Notching and Drilling

##### 9.23.5.1. Holes Drilled in Framing Members

(1) Holes drilled in roof, floor or ceiling framing members shall be not larger than one-quarter the depth of the member and shall be located not less than 50 mm from the edges, unless the depth of the member is increased by the size of the hole.

##### 9.23.5.2. Notching of Framing Members

(1) Floor, roof and ceiling framing members are permitted to be notched provided the notch is located on the top of the member within half the joist depth from the edge of bearing and is not deeper than one-third the joist depth, unless the depth of the member is increased by the size of the notch.

##### 9.23.5.3. Wall Studs

(1) Wall studs shall not be notched, drilled or otherwise damaged so that the undamaged portion of the stud is less than two-thirds the depth of the stud if the stud is *loadbearing* or 40 mm if the stud is *non-loadbearing*, unless the weakened studs are suitably reinforced.

#### **9.23.5.4. Top Plates**

(1) Top plates in walls shall not be notched, drilled or otherwise weakened to reduce the undamaged width to less than 50 mm unless the weakened plates are suitably reinforced.

#### **9.23.5.5. Roof Trusses**

(1) Roof truss members shall not be notched, drilled or otherwise weakened unless such notching or drilling is allowed for in the design of the truss.

#### **9.23.6. Anchorage**

##### **9.23.6.1. Anchorage of Building Frames**

(1) *Building* frames shall be anchored to the *foundation* unless a structural analysis of wind and earth pressures shows anchorage is not required.

(2) Except as provided in Article 9.23.6.3., anchorage shall be provided by embedding the ends of the first floor joists in concrete, or fastening the sill plate to the *foundation* with not less than 12.7 mm diam anchor bolts spaced not more than 2.4 m o.c.

(3) Anchor bolts referred to in Sentence (2) shall be fastened to the sill plate with nuts and washers and shall be embedded not less than 100 mm in the *foundation* and so designed that they may be tightened without withdrawing them from the *foundation*.

##### **9.23.6.2. Anchorage of Columns and Posts**

(1) Except as provided in Sentences (2) and (3), exterior columns and posts shall be anchored to resist uplift and lateral movement.

(2) Except as provided in Sentence (3), where columns or posts support balconies, decks, verandas and other exterior platforms, and the columns or posts extend not more than 600 mm above finished ground level, the supported joists or beams shall be,

- (a) anchored to a *foundation* to resist uplift and lateral movement, or
- (b) directly anchored to the ground to resist uplift.

(3) Anchorage is not required for platforms described in Sentence (2) that,

- (a) are not more than 1 *storey*,
- (b) are not more than 55 m<sup>2</sup> in area,
- (c) do not support a roof, and
- (d) are not attached to another structure, unless it can be demonstrated that differential movement will not adversely affect the performance of that structure.

##### **9.23.6.3. Anchorage of Smaller Buildings**

(1) *Buildings* not more than 4.3 m wide and not more than 1 *storey* in *building height* are permitted to be anchored in conformance with the requirements of CAN/CSA-Z240.10.1, "Site Preparation, Foundation and Anchorage of Mobile Homes".

#### **9.23.7. Sill Plates**

##### **9.23.7.1. Size of Sill Plates**

(1) Where sill plates provide bearing for the floor system they shall be not less than 38 mm by 89 mm material.

##### **9.23.7.2. Levelling of Sill Plates**

(1) Sill plates shall be,

- (a) levelled by setting them on a full bed of mortar, or
- (b) laid directly on the *foundation* where the top of the *foundation* is level.

(2) The joint between the sill plate for exterior walls and the *foundation* shall be sealed in accordance with Subsection 9.25.3.

#### **9.23.8. Beams to Support Floors**

##### **9.23.8.1. Bearing for Beams**

(1) Beams shall have even and level bearing and shall have not less than 89 mm length of bearing at end supports, except as required in notes to Tables A-8 to A-11.

#### **9.23.8.2. Priming of Steel Beams**

(1) Exterior steel beams susceptible to corrosion shall be shop primed with rust-inhibitive paint.

#### **9.23.8.3. Built-up Wood Beams**

(1) Where a beam is made up of individual pieces of lumber that are nailed together, the individual members shall be 38 mm or greater in thickness and installed on edge.

(2) Except as permitted in Sentence (3), where individual members of a built-up beam are butted together to form a joint, the joint shall occur over a support.

(3) Where a beam is continuous over more than one span, individual members are permitted to be butted together to form a joint at or within 150 mm of the end quarter points of the clear spans, provided the quarter points are not those closest to the ends of the beam.

(4) Members joined at quarter points shall be continuous over adjacent supports.

(5) Joints in individual members of a beam that are located at or near the end quarter points shall not occur in adjacent members at the same quarter point and shall not reduce the effective beam width by more than half.

(6) Not more than one butt joint shall occur in any individual member of a built-up beam within any one span.

(7) Except as provided in Sentence (8), where 38 mm members are laid on edge to form a built-up beam, individual members shall be nailed together with a double row of nails not less than 89 mm in length, spaced not more than 450 mm apart in each row with the end nails located 100 mm to 150 mm from the end of each piece.

(8) Where 38 mm members in built-up wood beams are not nailed together as provided in Sentence (7), they shall be bolted together with not less than 12.7 mm diam bolts equipped with washers and spaced not more than 1.2 m o.c., with the end bolts located not more than 600 mm from the ends of the members.

#### **9.23.9. Floor Joists**

##### **9.23.9.1. End Bearing for Joists**

(1) Except when supported on ribbon boards, floor joists shall have not less than 38 mm length of end bearing.

(2) Ribbon boards referred to in Sentence (1) shall be not less than 19 mm by 89 mm lumber let into the studs.

##### **9.23.9.2. Joists Supported by Beams**

(1) Floor joists may be supported on the tops of beams or may be framed into the sides of beams.

(2) When framed into the side of a wood beam, joists referred to in Sentence (1) shall be supported on,

(a) joist hangers or other acceptable mechanical connectors, or

(b) not less than 38 mm by 64 mm ledger strips nailed to the side of the beam, except that 38 mm by 38 mm ledger strips may be used provided each joist is nailed to the beam by at least four 89 mm nails, in addition to the nailing for the ledger strip required in Table 9.23.3.4.

(3) When framed into the side of a steel beam, joists referred to in Sentence (1) shall be supported on the bottom flange of the beam or on not less than 38 mm by 38 mm lumber bolted to the web with not less than 6.3 mm diam bolts spaced not more than 600 mm apart.

(4) Joists referred to in Sentence (3) shall be spliced above the beam with not less than 38 mm by 38 mm lumber at least 600 mm long to support the flooring.

(5) Not less than a 12 mm space shall be provided between the splice required in Sentence (4) and the beam to allow for shrinkage of the wood joists.

##### **9.23.9.3. Restraint of Joist Bottoms**

(1) Except as provided in Sentence 9.23.9.4.(1), bottoms of floor joists shall be restrained from twisting at each end by toe-nailing to the supports, end-nailing to the header joists or by providing continuous strapping, blocking between the joists or cross-bridging near the supports.

##### **9.23.9.4. Strapping and Bridging in Tables A-1 and A-2**

(1) Except as permitted by Sentence (5), where strapping is specified in Table A-1, it shall be,

(a) not less than 19 mm by 64 mm, nailed to the underside of floor joists,

(b) located not more than 2.1 m from each support or other rows of strapping, and

- (c) fastened at each end to a sill or header.
- (2) Where bridging is specified in Table A-1, it shall consist of not less than 19 mm by 64 mm or 38 mm by 38 mm cross bridging located not more than 2.1 m from each support or other rows of bridging.
- (3) Where bridging and strapping are specified in Table A-1,
  - (a) bridging shall,
    - (i) comply with Sentence (2), or
    - (ii) consist of 38 mm solid blocking located not more than 2.1 m from each support or other rows of bridging and securely fastened between the joists, and
  - (b) except as provided in Sentence (5), strapping shall comply with Sentence (1) and be installed under the bridging.
- (4) Bridging specified in Table A-2 shall consist of,
  - (a) bridging as described in Sentence (2), or
  - (b) 38 mm solid blocking located not more than 2.1 m from each support or other rows of bridging and securely fastened between the joists.
- (5) Strapping described in Sentence (1) and Clause (3)(b) is not required where,
  - (a) furring strips complying with Table 9.29.3.1. are fastened directly to the joists, or
  - (b) a panel-type ceiling finish complying with Subsection 9.29.5., 9.29.6., 9.29.7., 9.29.8., or 9.29.9. is attached directly to the joists.
- (6) Where a ceiling attached to wood furring is specified in Table A-2,
  - (a) the ceiling finish shall consist of gypsum board, plywood or OSB not less than 12.7 mm thick, and
  - (b) the furring shall be,
    - (i) 19 mm by 89 mm wood furring spaced at not more than 610 mm o.c., or
    - (ii) 19 mm by 64 mm wood furring spaced at not more than 406 mm o.c.

#### **9.23.9.5. Header Joists**

- (1) Header joists around floor openings shall be doubled when they exceed 1.2 m in length.
- (2) The size of header joists exceeding 3.2 m in length shall be determined by calculations.

#### **9.23.9.6. Trimmer Joists**

- (1) Trimmer joists around floor openings shall be doubled when the length of the header joist exceeds 800 mm.
- (2) When the header joist exceeds 2 m in length, the size of the trimmer joists shall be determined by calculations.

#### **9.23.9.7. Support of Tail and Header Joists**

(1) When tail joists and header joists are supported by the floor framing, they shall be supported by suitable joist hangers or nailing in accordance with Table 9.23.3.4.

#### **9.23.9.8. Support of Walls**

(1) *Non-loadbearing* walls parallel to the floor joists shall be supported by joists beneath the wall or on blocking between the joists.

(2) Blocking referred to in Sentence (1) for the support of *non-loadbearing* walls shall be not less than 38 mm by 89 mm lumber, spaced not more than 1.2 m apart.

(3) *Non-loadbearing* interior walls at right angles to the floor joists are not restricted as to location.

(4) *Loadbearing* interior walls parallel to floor joists shall be supported by beams or walls of sufficient strength to transfer safely the design loads to vertical supports.

(5) *Loadbearing* interior walls at right angles to floor joists shall be located not more than 900 mm from the joist support when the wall does not support a floor, and not more than 600 mm from the joist support when the wall supports one or more floors, unless the joist size is designed to support such loads.

#### **9.23.9.9. Cantilevered Floor Joists**

(1) Floor joists supporting roof loads shall not be cantilevered more than 400 mm beyond their supports where 38 mm by 184 mm joists are used and not more than 600 mm beyond their supports where 38 mm by 235 mm or larger joists are used.



(2) The cantilevered portions referred to in Sentence (1) shall not support floor loads from other *storeys* unless calculations are provided to show that the design resistances of the cantilevered joists are not exceeded.

(3) Where cantilevered floor joists described in Sentences (1) and (2) are at right angles to the main floor joists, the tail joists in the cantilevered portion shall,

- (a) extend inward away from the cantilever support a distance equal to not less than six times the length of the cantilever, and
- (b) shall be end nailed to an interior doubled header joist in conformance with Table 9.23.3.4.

**9.23.10. Wall Studs**

**9.23.10.1. Stud Size and Spacing**

(1) Except as provided in Sentence (2), the size and spacing of studs shall conform to Table 9.23.10.1.

**Table 9.23.10.1.  
Size and Spacing of Studs**

Forming Part of Sentence 9.23.10.1.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Type of Wall	Supported Loads (including <i>dead loads</i> )	Minimum Stud Size, mm	Maximum Stud Spacing, mm	Maximum Unsupported Height, m
1.	Interior	No load	38 × 38	406	2.4
			38 × 89 flat <sup>(1)</sup>	406	3.6
		Attic not accessible by a stairway	38 × 64	610	3.0
			38 × 64 flat <sup>(1)</sup>	406	2.4
			38 × 89	610	3.6
			38 × 89 flat <sup>(1)</sup>	406	2.4
		Attic accessible by a stairway plus 1 floor Roof load plus 1 floor Attic not accessible by stairway plus 2 floors	38 × 89	406	3.6
		Roof load, Attic accessible by a stairway	38 × 64	406	2.4
			38 × 89	610	3.6
		Attic not accessible by a stairway plus 1 floor	38 × 89	305	3.6
			64 × 89	406	3.6
			38 × 140	406	4.2
		Attic accessible by a stairway plus 2 floors Roof load plus 2 floors	38 × 89	305	4.2
Attic accessible by a stairway plus 3 floors Roof load plus 3 floors	38 × 140	305	4.2		
2.	Exterior	Roof with or without attic storage	38 × 64	406	2.4
			38 × 89	610	3.0
		Roof with or without attic storage plus 1 floor	38 × 89	406	3.0
			38 × 140	610	3.0
		Roof with or without attic storage plus 2 floors	38 × 89	305	3.0
			64 × 89	406	3.0
			38 × 140	406	3.6
		Roof with or without attic storage plus 3 floors	38 × 140	305	1.8

Notes to Table 9.23.10.1.:

<sup>(1)</sup> See Article 9.23.10.3.

(2) Studs for walls not listed in Table 9.23.10.1. and supporting roof loads shall conform to Tables A-30 to A-33, provided,

- (a) the studs are clad with not less than 9.5 mm thick plywood, OSB or waferboard sheathing on the exterior face, and not less than 12.5 mm gypsum board on the interior face,
- (b) solid bridging is provided at not more than 1.2 m o.c,
- (c) the studs are fastened to the top and bottom plates with no fewer than three 82 mm toe-nails,
- (d) the double top plates are fastened together with not less than 76 mm nails spaced not more than 200 mm o.c,
- (e) roof framing members spaced not more than 610 mm are fastened to the top plates with no fewer than four 82 mm toe-nails, and

- (f) the bottom plate is fastened to the floor joists, blocking or rim joist with not less than 82 mm nails spaced not more than 200 mm o.c.

#### **9.23.10.2. Bracing and Lateral Support**

- (1) Except as provided in Sentence (2), each exterior wall in each *storey* shall be braced with at least one diagonal brace conforming to Sentence (3).
- (2) Bracing is not required where the walls,
  - (a) have an interior finish conforming to the requirements of Section 9.29., or
  - (b) where the walls are,
    - (i) clad with panel-type siding,
    - (ii) diagonally sheathed with lumber, or
    - (iii) sheathed with plywood, OSB, waferboard, gypsum or fibreboard sheathing.
- (3) Where bracing is required, it shall,
  - (a) consist of not less than 19 mm by 89 mm wood members,
  - (b) be applied to the studs at an angle of approximately 45° to the horizontal, and
  - (c) extend the full height of the wall on each *storey*.
- (4) Bracing described in Sentence (3) shall be nailed to each stud and wall plate by at least two 63 mm nails.
- (5) Where *loadbearing* interior walls are not finished in accordance with Sentence (2), blocking or strapping shall be fastened to the studs at mid-height to prevent sideways buckling.

#### **9.23.10.3. Orientation of Studs**

- (1) Except as permitted in Sentences (2) and (3), all studs shall be placed at right angles to the wall face.
- (2) Studs on the flat are permitted to be used in gable ends of roofs that contain only unfinished space or in non-*loadbearing* interior walls within the limits described in Article 9.23.10.1.
- (3) Wall studs that support only a load from an attic not accessible by a stairway are permitted to be placed on the flat within the limits permitted in Article 9.23.10.1. provided,
  - (a) the studs are clad on at least one side with plywood, OSB or waferboard sheathing fastened to the face of the studs with a structural adhesive, and
  - (b) the portion of the roof supported by the studs does not exceed 2.1 m in width.

#### **9.23.10.4. Continuity of Studs**

- (1) Wall studs shall be continuous for the full *storey* height except at openings and shall not be spliced except by finger-jointing with a structural adhesive.

#### **9.23.10.5. Support for Cladding Materials**

- (1) Corners and intersections shall be designed to provide adequate support for the vertical edges of interior finishes, sheathing and cladding materials, and in no instance shall exterior corners be framed with less than the equivalent of two studs.
- (2) Where the vertical edges of interior finishes at wall intersections are supported at vertical intervals by blocking or furring, the vertical distance between such supports shall not exceed the maximum distance between supports specified in Section 9.29.

#### **9.23.10.6. Studs at Sides of Openings**

- (1) Except as provided in Sentence (2), studs shall be doubled on each side of openings so that the inner studs extend from the lintel to the bottom wall plate and the outer studs extend from the top wall plates to the bottom wall plate.
- (2) Single studs are permitted to be used on either side of openings,
  - (a) in non-*loadbearing* interior walls not required to have *fire-resistance ratings*, provided the studs extend from the top wall plate to the bottom wall plate, or
  - (b) in *loadbearing* or non-*loadbearing* interior or exterior walls, provided,
    - (i) the opening is less than and within the required stud spacing, and
    - (ii) no two such openings of full stud space width are located in adjacent stud spaces.

#### **9.23.10.7. Stud Posts Built into Walls**

- (1) Except as provided in Sentences (2) and (3), stud posts shall be designed in accordance with Part 4.
- (2) The number of studs in a wall directly below a girder truss or roof beam shall conform to Tables A-34 to A-37, provided,
  - (a) the studs are fastened together to form a post in accordance with Sentence 9.17.4.2.(2),
  - (b) the wall is not less than 1.2 m long and sheathed on at least one side with plywood, OSB, waferboard or gypsum sheathing, and
  - (c) the wall sheathing is fastened to the stud post with at least one row of fasteners conforming to Article 9.23.3.5. and spaced not more than 150 mm o.c.
- (3) The width of the stud post shall be not less than the width of the girder or beam that it supports.

### **9.23.11. Wall Plates**

#### **9.23.11.1. Size of Wall Plates**

- (1) Except as provided in Sentence (2), wall plates shall be,
  - (a) not less than 38 mm thick, and
  - (b) not less than the required width of the wall studs.
- (2) In non-*loadbearing* walls and in *loadbearing* walls where the studs are located directly over framing members, the bottom wall plate may be 19 mm thick.

#### **9.23.11.2. Bottom Wall Plates**

- (1) A bottom wall plate shall be provided in all cases.
- (2) The bottom plate in exterior walls shall not project more than one-third the plate width over the support.

#### **9.23.11.3. Top Plates**

- (1) Except as permitted in Sentences (2) to (4), no fewer than two top plates shall be provided in *loadbearing* walls.
- (2) A single top plate is permitted to be used in a section of a *loadbearing* wall containing a lintel provided the top plate forms a tie across the lintel.
- (3) A single top plate is permitted to be used in *loadbearing* walls where the concentrated loads from ceilings, floors and roofs are not more than 50 mm to one side of the supporting studs and in all non-*loadbearing* walls.
- (4) The top plates need not be provided in a section of *loadbearing* wall containing a lintel provided the lintel is tied to the adjacent wall section with,
  - (a) not less than 75 mm by 150 mm by 0.91 mm thick galvanized steel, or
  - (b) 19 mm by 89 mm by 300 mm wood splice nailed to each wall section with at least three 63 mm nails.

#### **9.23.11.4. Joints in Top Plates**

- (1) Joints in the top plates of *loadbearing* walls shall be staggered not less than one stud spacing.
- (2) The top plates in *loadbearing* walls shall be lapped or otherwise suitably tied at corners and intersecting walls in accordance with Sentence (4).
- (3) Joints in single top plates used with *loadbearing* walls shall be tied in accordance with Sentence (4).
- (4) Ties referred to in Sentences (2) and (3) shall be the equivalent of not less than 75 mm by 150 mm by 0.91 mm thick galvanized steel nailed to each wall with at least three 63 mm nails.

### **9.23.12. Framing Over Openings**

#### **9.23.12.1. Openings in Non-Loadbearing Walls**

- (1) Except as provided in Sentence (2), openings in non-*loadbearing* walls shall be framed with not less than 38 mm material the same width as the studs securely nailed to adjacent studs.
- (2) Openings for doors in non-*loadbearing* walls required to be *fire separations* with a *fire-resistance rating* shall be framed with the equivalent of at least two 38 mm thick members that are the same width as the wall plates.

#### **9.23.12.2. Openings in Loadbearing Walls**

- (1) Openings in *loadbearing* walls greater than the required stud spacing shall be framed with lintels designed to carry the superimposed loads to adjacent studs.
- (2) Except as provided in Sentence 9.23.12.3.(2), where two or more members are used in lintels, they shall be fastened together with not less than 82 mm nails in a double row, with nails not more than 450 mm apart in each row.

(3) Lintel members may be separated by filler pieces.

#### **9.23.12.3. Lintel Spans and Sizes**

(1) Spans and sizes of wood lintels shall conform to the spans shown in Tables A-12 to A-16,

- (a) for *buildings of residential occupancy*,
- (b) where the wall studs exceed 38 mm by 64 mm in size,
- (c) where the spans of supported joists do not exceed 4.9 m, and
- (d) where the spans of trusses do not exceed 9.8 m.

(2) In *loadbearing* exterior and interior walls of 38 mm by 64 mm framing members, lintels shall consist of,

- (a) solid 64 mm thick members on edge, or
- (b) 38 mm thick and 19 mm thick members fastened together with a double row of nails not less than 63 mm long and spaced not more than 450 mm apart.

(3) Lintels referred to in Sentence (2),

- (a) shall be not less than 50 mm greater in depth than those shown in Tables A-12 to A-16 for the maximum spans shown, and
- (b) shall not exceed 2.24 m in length.

#### **9.23.13. Roof and Ceiling Framing**

##### **9.23.13.1. Continuity of Rafters and Joists**

(1) Roof rafters and joists and ceiling joists shall be continuous or shall be spliced over vertical supports that extend to suitable bearing.

##### **9.23.13.2. Framing around Openings**

(1) Roof and ceiling framing members shall be doubled on each side of openings greater than two rafter or joist spacings wide.

##### **9.23.13.3. End Bearing Length**

(1) The length of end bearing of joists and rafters shall be not less than 38 mm.

##### **9.23.13.4. Location and Attachment of Rafters**

(1) Rafters shall be located directly opposite each other and tied together at the peak, or may be offset by their own thickness if nailed to a ridge board not less than 17.5 mm thick.

(2) Except as permitted in Sentence (3), framing members shall be connected by gusset plates or nailing at the peak in conformance with Table 9.23.3.4.

(3) Where the roof framing on opposite sides of the peak is assembled separately, such as in the case of factory-built houses, the roof framing on opposite sides is permitted to be fastened together with galvanized-steel strips not less than 200 mm by 75 mm by 0.41 mm thick spaced not more than 1.2 m apart and nailed at each end to the framing by at least two 63 mm nails.

##### **9.23.13.5. Shaping of Rafters**

(1) Rafters shall be shaped at supports to provide even bearing surfaces and supported directly above the exterior walls.

##### **9.23.13.6. Hip and Valley Rafters**

(1) Hip and valley rafters shall be not less than 50 mm greater in depth than the common rafters and not less than 38 mm thick, actual dimension.

##### **9.23.13.7. Intermediate Support for Rafters and Joists**

(1) Ceiling joists and collar ties of not less than 38 mm by 89 mm lumber are permitted to be assumed to provide intermediate support to reduce the span for rafters and joists where the roof slope is 1 in 3 or greater.

(2) Collar ties referred to in Sentence (1) more than 2.4 m long shall be laterally supported near their centres by not less than 19 mm by 89 mm continuous members at right angles to the collar ties.

(3) Dwarf walls and struts may be used to provide intermediate support to reduce the span for rafters and joists.

(4) When struts are used to provide intermediate support, they shall be not less than 38 mm by 89 mm material extending from each rafter to a *loadbearing* wall at an angle of not less than 45° to the horizontal.

(5) When dwarf walls are used for rafter support, they shall be framed in the same manner as *loadbearing* walls and securely fastened top and bottom to the roof and ceiling framing to prevent overall movement.

(6) Solid blocking shall be installed between floor joists beneath dwarf walls referred to in Sentence (5) that enclose finished rooms.

**9.23.13.8. Ridge Support**

(1) Except as provided in Sentence (4), roof rafters and joists shall be supported at the ridge of the roof by,

- (a) a *loadbearing* wall extending from the ridge to suitable bearing, or
- (b) a ridge beam supported by not less than 89 mm length of bearing.

(2) Except as provided in Sentence (3), the ridge beam referred to in Sentence (1) shall conform to the sizes and spans shown in Table A-12, provided,

- (a) the supported rafter or joist length does not exceed 4.9 m, and
- (b) the roof does not support any concentrated loads.

(3) The ridge beam referred to in Sentence (1) need not comply with Sentence (2) where,

- (a) the beam is of not less than 38 mm by 140 mm material, and
- (b) the beam is supported at intervals not exceeding 1.2 m by not less than 38 mm by 89 mm members extending vertically from the ridge to suitable bearing.

(4) When the roof slope is 1 in 3 or more, ridge support need not be provided when the lower ends of the rafters are adequately tied to prevent outward movement.

(5) Ties required in Sentence (4) are permitted to consist of tie rods or ceiling joists forming a continuous tie for opposing rafters and nailed in accordance with Table 9.23.13.8.

(6) Ceiling joists referred to in Sentence (5) shall be fastened together with at least one more nail per joist splice than required for the rafter to joist connection shown in Table 9.23.13.8.

(7) Members referred to in Sentence (6) are permitted to be fastened together either directly or through a gusset plate.

**Table 9.23.13.8.  
Rafter-to-Joist Nailing (Unsupported Ridge)**

Forming Part of Sentences 9.23.13.8.(5) and (6)

Item	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
	Roof Slope	Rafter Spacing, mm	Minimum Number of Nails not less than 75 mm Long											
			Rafter Tied to every Joist						Rafter Tied to Joist every 1.2 m					
			Building Width up to 8.0 m			Building Width up to 9.8 m			Building Width up to 8.0 m			Building Width up to 9.8 m		
			Roof Snow Load, kPa			Roof Snow Load, kPa			Roof Snow Load, kPa			Roof Snow Load, kPa		
			1.0 or less	1.5	2.0 or more	1.0 or less	1.5	2.0 or more	1.0 or less	1.5	2.0 or more	1.0 or less	1.5	2.0 or more
1.	1 in 3	406	4	5	6	5	7	8	11	—	—	—	—	—
		610	6	8	9	8	—	—	11	—	—	—	—	—
2.	1 in 2.4	406	4	4	5	5	6	7	7	10	—	9	—	—
		610	5	7	8	7	9	11	7	10	—	—	—	—
3.	1 in 2	406	4	4	4	4	4	5	6	8	9	8	—	—
		610	4	5	6	5	7	8	6	8	9	8	—	—
4.	1 in 1.71	406	4	4	4	4	4	4	5	7	8	7	9	11
		610	4	4	5	5	6	7	5	7	8	7	9	11
5.	1 in 1.33	406	4	4	4	4	4	4	4	5	6	5	6	7
		610	4	4	4	4	4	5	4	5	6	5	6	7
6.	1 in 1	406	4	4	4	4	4	4	4	4	4	4	4	5
		610	4	4	4	4	4	4	4	4	4	4	4	5

**9.23.13.9. Restraint of Joist Bottoms**

(1) Roof joists supporting a finished ceiling, other than plywood, OSB or waferboard, shall be restrained from twisting along the bottom edges by means of furring, blocking, cross bridging or strapping conforming to Article 9.23.9.3.

**9.23.13.10. Ceiling Joists Supporting Roof Load**

(1) Except as provided in Sentence (2), ceiling joists supporting part of the roof load from the rafters shall be not less than 25 mm greater in depth than required for ceiling joists not supporting part of the roof load.

(2) When the roof slope is 1 in 4 or less, the ceiling joist sizes referred to in Sentence (1) shall be determined from the span tables for roof joists.

**9.23.13.11. Wood Roof Trusses**

- (1) Roof trusses that are not designed in accordance with Part 4 shall,
  - (a) be capable of supporting a total ceiling load (*dead load plus live load*) of 0.35 kPa plus two and two-thirds times the specified live roof load for 24 h, and
  - (b) not exceed the deflections shown in Table 9.23.13.11. when loaded with the ceiling load plus one and one-third times the specified roof snow load for 1 h.

**Table 9.23.13.11.  
Maximum Roof Truss Deflections**

Forming Part of Sentence 9.23.13.11.(1)

Item	Column 1	Column 2	Column 3
	Truss Span	Type of Ceiling	Maximum Deflection
1.	4.3 m or less	Plaster or gypsum board	1/360 of the span
		Other than plaster or gypsum board	1/180 of the span
2.	Over 4.3 m	Plaster or gypsum board	1/360 of the span
		Other than plaster or gypsum board	1/240 of the span

(2) The joint connections used in trusses described in Sentence (1) shall be designed in conformance with the requirements in Subsection 4.3.1.

(3) Where the length of compression web members in roof trusses described in Sentence (1) exceeds 1.83 m, such web members shall be provided with continuous bracing to prevent buckling.

(4) Bracing required in Sentence (3) shall consist of not less than 19 mm by 89 mm lumber nailed at right angles to the web members near their centres with at least two 63 mm nails for each member.

(5) Where the ability of a truss design to satisfy the requirements of Sentence (1) is demonstrated by testing, it shall consist of a full scale load test carried out in conformance with CSA S307-M, “Load Test Procedure for Wood Trusses for Houses and Small Buildings”.

(6) Where the ability of a truss design to satisfy the requirements of Sentence (1) is demonstrated by analysis, it shall be carried out in accordance with good engineering practice such as described in TPIC, “Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses”.

**9.23.14. Subflooring**

**9.23.14.1. Subflooring Required**

(1) Subflooring shall be provided beneath finish flooring where the finish flooring does not have adequate strength to support the design loads.

**9.23.14.2. Material Standards**

- (1) Except as provided in Sentence (2), wood-based panels for subfloors shall conform to,
  - (a) CSA O121-M, “Douglas Fir Plywood”,
  - (b) CSA O151, “Canadian Softwood Plywood”,
  - (c) CSA O153-M, “Poplar Plywood”,
  - (d) CAN/CSA-O325.0, “Construction Sheathing”, or
  - (e) CSA O437.0, “OSB and Waferboard”.

(2) Particleboard subflooring may be used only where a *building* is constructed in a factory so that the subfloor will not be exposed to the weather.

(3) Subflooring described in Sentence (2) shall conform to grade D-2 or D-3 in ANSI A208.1, “Particleboard”.

(4) Subflooring described in Sentence (2) shall have its upper surface and all edges treated to restrict water absorption where the subfloor is used in bathrooms, kitchens, laundry rooms or other areas subject to periodic wetting.

**9.23.14.3. Edge Support**

(1) Where the edges of panel-type subflooring are required to be supported, such support shall consist of tongue-and-groove panel edges or not less than 38 mm by 38 mm blocking securely nailed between framing members.

**9.23.14.4. Direction of Installation**

(1) Plywood subflooring shall be installed with the surface grain at right angles to the joists and with joints parallel to floor joists staggered.

(2) OSB subflooring conforming to CAN/CSA-O325.0, “Construction Sheathing”, or to O-1 and O-2 grades in CSA O437.0, “OSB and Waferboard”, and waferboard subflooring conforming to R-1 grade in CSA O437.0 shall be installed so that the direction of face orientation is at right angles to the joists and the joints parallel to the floor joists are staggered.

**9.23.14.5. Subfloor Thickness or Rating**

(1) Except as provided in Sentences (2) and (3), subfloors shall conform to Table 9.23.14.5.A. or 9.23.14.5.B.

**Table 9.23.14.5.A.  
Thickness of Subflooring**

Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.7.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Maximum Spacing of Supports, mm	Minimum Thickness, mm			
		Plywood and OSB, O-2 Grade	OSB, O-1 Grade, and Waferboard, R-1 Grade	Particleboard	Lumber
1.	406	15.5	15.9	15.9	17.0
2.	508	15.5	15.9	19.0	19.0
3.	610	18.5	19.0	25.4	19.0

**Table 9.23.14.5.B.  
Rating for Subfloor when Applying CAN/CSA-O325.0**

Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.7.(1)

Item	Column 1	Column 2	Column 3
	Maximum Spacing of Supports, mm	Panel Mark	
		Subfloor	Used with Panel-Type Underlay
1.	406	1F16	2F16
2.	508	1F20	2F20
3.	610	1F24	2F24

(2) Where the finished flooring consists of not less than 19 mm matched wood strip flooring laid at right angles to joists, spaced not more than 610 mm o.c., subflooring shall be permitted to consist of not less than,

- (a) 12.5 mm thick plywood,
- (b) 12.5 mm thick OSB conforming to O-2 grade,
- (c) 12.7 mm thick OSB conforming to O-1 grade,
- (d) 12.7 mm thick waferboard conforming to R-1 grade, or
- (e) OSB conforming to 2R32 / 2F16 grade.

(3) Except where the flooring consists of ceramic tiles applied with adhesive, where a separate panel-type underlay or concrete topping is applied to a subfloor on joists spaced not more than 406 mm o.c., the subfloor may consist of not less than,

- (a) 12.5 mm thick plywood,
- (b) 12.5 mm thick OSB conforming to O-2 grade,
- (c) 12.7 mm thick OSB conforming to O-1 grade,
- (d) 12.7 mm thick waferboard conforming to R-1 grade, or
- (e) OSB conforming to 2R32 / 2F16 grade.

**9.23.14.6. Annular Grooved Nails**

(1) When resilient flooring is applied directly to an OSB, waferboard, particleboard or plywood subfloor, the subfloor shall be fastened to the supports with annular grooved nails.

**9.23.14.7. Lumber Subflooring**

- (1) Lumber subflooring shall be laid at an angle of not less than 45° to the joists.
- (2) Lumber subflooring shall be fully supported at the ends on solid bearing.
- (3) Lumber for subflooring shall be of uniform thickness and not more than 184 mm wide.

**9.23.15. Roof Sheathing**

**9.23.15.1. Required Roof Sheathing**

(1) Except as provided in Section 9.26., continuous lumber or panel-type roof sheathing shall be installed to support the roofing.

**9.23.15.2. Material Standards**

- (1) Wood-based panels used for roof sheathing shall conform to the requirements of,
  - (a) CSA O121-M, “Douglas Fir Plywood”,
  - (b) CSA O151, “Canadian Softwood Plywood”,
  - (c) CSA O153-M, “Poplar Plywood”,
  - (d) CAN/CSA-O325.0, “Construction Sheathing”, or
  - (e) CSA O437.0, “OSB and Waferboard”.

**9.23.15.3. Direction of Installation**

- (1) Plywood roof sheathing shall be installed with the surface grain at right angles to the roof framing.
- (2) OSB roof sheathing conforming to CAN/CSA-O325.0, “Construction Sheathing”, or to O-1 and O-2 grades as specified in CSA O437.0, “OSB and Waferboard”, shall be installed with the direction of face orientation at right angles to the roof framing members.

**9.23.15.4. Joints in Panel-Type Sheathing**

- (1) Panel-type sheathing board shall be applied so that joints perpendicular to the roof ridge are staggered where,
  - (a) the sheathing is applied with the surface grain parallel to the roof ridge, and
  - (b) the thickness of the sheathing is such that the edges are required to be supported.
- (2) A gap of not less than 2 mm shall be left between sheets of plywood, OSB or waferboard.

**9.23.15.5. Lumber Roof Sheathing**

(1) Lumber roof sheathing shall not be more than 286 mm wide and shall be applied so that all ends are supported with end joints staggered.

**9.23.15.6. Edge Support**

- (1) Except as permitted in Sentence (2), where panel-type roof sheathing requires edge support, the support shall consist of,
  - (a) metal H clips, or
  - (b) not less than 38 mm by 38 mm blocking securely nailed between framing members.
- (2) The supports referred to in Sentence (1) are not required when tongued-and-grooved edged panel-type sheathing board is used.

**9.23.15.7. Thickness or Rating**

(1) The thickness or rating of roof sheathing on a flat roof used as a walking deck shall conform to either Table 9.23.14.5.A. or Table 9.23.14.5.B. for subfloors.

(2) The thickness or rating of roof sheathing on a roof not used as a walking deck shall conform to either Table 9.23.15.7.A. or Table 9.23.15.7.B.

**Table 9.23.15.7.A.  
Thickness of Roof Sheathing**

Forming Part of Sentence 9.23.15.7.(2)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Maximum Spacing of Supports, mm	Minimum Thickness, mm				
		Plywood and OSB, O-2 Grade		OSB, O-1 Grade and Waferboard, R-1 Grade		Lumber
		Edges Supported	Edges Unsupported	Edges Supported	Edges Unsupported	
1.	305	7.5	7.5	9.5	9.5	17.0
2.	406	7.5	9.5	9.5	11.1	17.0
3.	610	9.5	12.5	11.1	12.7	19.0



**Table 9.23.15.7.B.  
Rating for Roof Sheathing When Applying CAN/CSA-O325.0**

Forming Part of Sentence 9.23.15.7.(2)

Item	Column 1	Column 2	Column 3
	Maximum Spacing of Supports, mm	Panel Mark	
		Edges Supported	Edges Unsupported
1.	406	2R16	1R16
2.	508	2R20	1R20
3.	610	2R24	1R24

(3) Asphalt-coated or asphalt-impregnated fibreboard not less than 11.1 mm thick conforming to CAN/ULC-S706, “Wood Fibre Thermal Insulation for Buildings”, is permitted to be used as a roof sheathing over supports spaced not more than 406 mm o.c., provided the roofing consists of,

- (a) a continuous sheet of galvanized steel not less than 0.33 mm in thickness, or
- (b) a continuous sheet of aluminum not less than 0.61 mm in thickness.

(4) All edges of sheathing described in Sentence (3) shall be supported by blocking or framing.

**9.23.16. Wall Sheathing**

**9.23.16.1. Required Sheathing**

(1) Exterior walls and gable ends shall be sheathed when the *exterior cladding* requires intermediate fastening between supports or if the *exterior cladding* requires solid backing.

**9.23.16.2. Thickness, Rating and Material Standards**

(1) Where wall sheathing is required for the purpose of complying with this Section, it shall conform to Table 9.23.16.2.A. or Table 9.23.16.2.B.

**Table 9.23.16.2.A.  
Wall Sheathing Thickness and Specifications**

Forming Part of Sentence 9.23.16.2.(1)

Item	Column 1	Column 2	Column 3	Column 4
		Minimum Thickness, mm <sup>(1)</sup>	mm <sup>(1)</sup>	
	Type of Sheathing	With Supports 406 mm o.c.	With Supports 610 mm o.c.	Material Standards
1.	Fibreboard (insulating)	9.5	11.1	CAN/ULC-S706
2.	Gypsum Sheathing	9.5	12.7	CAN/CSA-A82.27-M ASTM C1177 / C1177M ASTM C1396 / C1396M
3.	Lumber	17.0	17.0	See Table 9.3.2.1.
4.	Mineral Fibre, Rigid Board, Type 2	25	25	CAN/ULC-S702
5.	OSB, O-2 Grade	6.0	7.5	CSA O437.0
6.	OSB, O-1 Grade, and Waferboard, R-1 Grade	6.35	7.9	CSA O437.0
7.	Phenolic, faced	25	25	CAN/CGSB-51.25-M
8.	Plywood (exterior type)	6	7.5	CSA O121-M CSA O151 CSA O153-M
9.	Polystyrene, Types 1 and 2	38	38	CAN/ULC-S701
10.	Polystyrene, Types 3 and 4	25	25	CAN/ULC-S701
11.	Polyurethane and Polyisocyanurate Type 1, faced	38	38	CAN/ULC-S704
12.	Polyurethane and Polyisocyanurate Types 2 and 3, faced	25	25	CAN/ULC-S704

Notes to Table 9.23.16.2.A.:

<sup>(1)</sup> See also Sentences 9.27.5.1.(2) to (4).

**Table 9.23.16.2.B.  
Rating For Wall Sheathing When Applying CAN/CSA-O325.0**

Forming Part of Sentence 9.23.16.2.(1)

Item	Column 1	Column 2
	Maximum Spacing of Supports, mm	Panel Mark
1.	406	W16
2.	508	W20

3.	610	W24
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**9.23.16.3. Attachment of Cladding to Sheathing**

- (1) Gypsum sheathing, rigid insulation and fibreboard shall not be used for the attachment of siding materials.
- (2) Nails used in attaching the materials listed in Sentence (1) shall be not less than 3.2 mm diam with a minimum head diameter of 11 mm.

**9.23.16.4. Lumber Sheathing**

- (1) Lumber wall sheathing shall be applied so that all ends are supported.
- (2) Where lumber wall sheathing is required to provide bracing according to Article 9.23.10.2., it shall be applied with end joints staggered.

**9.23.16.5. Joints in Panel-Type Sheathing**

- (1) A gap of not less than 2 mm shall be left between sheets of plywood, OSB, waferboard or fibreboard.

**9.23.16.6. Mansard Style Roofs**

- (1) Where the bottom portions of mansard style roofs are vented, the vertical framing members behind the sloping portions shall be considered on the same basis as exterior wall studs and shall conform to the appropriate requirements in Articles 9.27.3.2. to 9.27.3.6.

**Section 9.24. Sheet Steel Stud Wall Framing**

**9.24.1. General**

**9.24.1.1. Application**

- (1) This Section applies to sheet steel studs for use in non-*loadbearing* exterior and interior walls.
- (2) Where *loadbearing* steel studs are used, they shall be designed in conformance with Part 4.

**9.24.1.2. Material Standards**

- (1) Steel studs and runners shall conform to AISI S201, “North American Standard for Cold Formed Steel Framing – Product Data”.

**9.24.1.3. Metal Thickness**

- (1) Metal thickness specified in this Section shall be the minimum base steel thickness exclusive of coatings.

**9.24.1.4. Screws**

- (1) Screws for the application of cladding, sheathing or interior finish materials to steel studs, runners and furring channels shall conform to,
  - (a) ASTM C954, “Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness”, or
  - (b) ASTM C1002, “Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs”.

**9.24.1.5. Cladding, Sheathing and Interior Finish Required**

- (1) Cladding or sheathing, and interior finish shall be installed on steel stud framing and shall be fastened with screws,
  - (a) spaced at the appropriate spacing described in Section 9.29., and
  - (b) penetrating not less than 10 mm through the metal.

**9.24.2. Size of Framing**

**9.24.2.1. Size and Spacing of Studs in Interior Walls**

- (1) Except as required in Articles 9.24.2.3. and 9.24.2.4., the size and spacing of steel studs for non-*loadbearing* interior walls shall conform to Table 9.24.2.1.

**Table 9.24.2.1.  
Steel Studs for Non-Loadbearing Interior Walls<sup>(1)</sup>**

Forming Part of Sentence 9.24.2.1.(1)

Item	Column 1	Column 2	Column 3
	Minimum Stud Size, mm	Maximum Stud Spacing, mm	Maximum Wall Height, m
1.	32 × 41	406	3.0
		610	2.7

2.	32 × 64	305	4.4
		406	4.0
		610	3.5
3.	32 × 89	305	5.2
		406	4.6
		610	3.9
4.	32 × 152	305	6.6
		406	5.8
		610	4.9

**Notes to Table 9.24.2.1.:**

(1) The values in the Table are based on a single layer of 12.7 mm gypsum panel sheathing installed on each side of the studs. Where one side is not accessible, gypsum panels on only one side will suffice. The values are also based on attaching gypsum panel sheathing using screws not smaller than No. 6 spaced at a maximum of 300 mm at edges and at intermediate supports.

**9.24.2.2. Thickness of Studs**

(1) Except as required in Article 9.24.2.4., steel studs in non-*loadbearing* interior walls shall have a metal thickness of not less than 0.46 mm.

**9.24.2.3. Runners**

(1) Runners for interior and exterior non-*loadbearing* walls shall have a thickness of not less than the thickness of the corresponding studs and shall have not less than 30 mm flanges.

**9.24.2.4. Openings in Fire Separations**

(1) Where openings for doors in non-*loadbearing fire separations* required to have a *fire-resistance rating* do not exceed 1.2 m in width,

- (a) the width of steel studs shall be not less than 63 mm, and
- (b) the steel thickness shall be not less than 0.46 mm.

(2) Where openings described in Sentence (1) exceed 1.2 m in width,

- (a) the width of steel studs shall be not less than 91 mm, and
- (b) the metal thickness shall be not less than 0.85 mm.

(3) The distance to the first stud beyond the jamb of any door opening in a *fire separation* required to have a *fire-resistance rating* shall not exceed 400 mm.

(4) Where the distance between the framing over the opening referred to in Sentence (3) and the top runner exceeds 400 mm in such walls, intermediate support shall be installed at intervals of not more than 400 mm above the opening.

**9.24.2.5. Size and Spacing of Studs in Exterior Walls**

(1) The size and spacing of non-*loadbearing* steel studs for exterior walls shall conform to Table 9.24.2.5.

**Table 9.24.2.5.  
Size and Spacing of Steel Studs for Non-Loadbearing Exterior Walls**

Forming Part of Sentence 9.24.2.5.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Minimum Stud Size, mm	Minimum Metal Thickness, mm	Maximum Stud Length, m		
			Spacing of Studs		
			305 mm (o.c.)	406 mm (o.c.)	610 mm (o.c.)
1.	30 × 91	0.53	3.0	2.4	—
2.	30 × 91	0.69	3.3	2.7	2.4
3.	30 × 91	0.85	3.6	3.0	2.7
4.	30 × 91	1.0	4.0	3.3	3.0

**9.24.3. Installation**

**9.24.3.1. Installation of Runners**

(1) Runners shall be provided at the tops and bottoms of walls.

(2) Runners required in Sentence (1) shall be securely attached to the *building* at approximately 50 mm from the ends, and at intervals of not more than 610 mm o.c. for interior walls and 305 mm o.c. for exterior walls.

(3) Fasteners used for attachment described in Sentence (2) shall consist of the equivalent of 63 mm nails or 25 mm screws.

(4) Studs at openings and that are not full wall height shall be supported by a runner at the ends of the studs, securely fastened to the full length studs at the sides of the opening.

#### **9.24.3.2. Fire-Rated Walls**

(1) Steel studs used in walls required to have a *fire-resistance rating* shall be installed so that there is not less than a 12 mm clearance between the top of the stud and the top of the runner to allow for expansion in the event of fire.

(2) Except as provided in Article 9.24.3.6., studs in walls referred to in Sentence (1) shall not be attached to the runners in a manner that will prevent such expansion.

(3) Framing above doors with steel door frames in *non-loadbearing fire separations* required to have a *fire-resistance rating* shall consist of two runners on the flat fastened back to back.

(4) The lower runner required in Sentence (3) shall be cut through the flanges and be bent at each end to extend upwards at least 150 mm and fastened to the adjacent studs.

#### **9.24.3.3. Orientation of Studs**

(1) Steel studs shall be installed with webs at right angles to the wall face and, except at openings, shall be continuous for the full wall height.

#### **9.24.3.4. Support for Cladding Materials**

(1) Corners and intersections of walls shall be constructed to provide support for the cladding materials.

#### **9.24.3.5. Framing around Openings**

(1) Studs shall be doubled on each side of every opening where such openings involve more than one stud space, and shall be tripled where the openings in exterior walls exceed 2.4 m in width.

(2) Studs described in Sentence (1) shall be fastened together by screws, crimping or welding to act as a single structural unit in resisting transverse loads.

#### **9.24.3.6. Attachment of Studs to Runners**

(1) Studs shall be attached to runners by screws, crimping or welding around wall openings, and elsewhere where necessary to keep the studs in alignment during construction.

(2) Where clearance for expansion is required in Article 9.24.3.2., attachment required in Sentence (1) shall be applied between studs and bottom runners only.

#### **9.24.3.7. Openings for Fire Dampers**

(1) Openings for *fire dampers* in *non-loadbearing fire separations* required to have a *fire-resistance rating* shall be framed with double studs on each side of the opening.

(2) The sill and header for openings described in Sentence (1) shall consist of a runner track with right angle bends made on each end so as to extend 300 mm above the header or below the sill and fastened to the studs.

(3) The openings described in Sentence (1) shall be lined with a layer of gypsum board at least 12.7 mm thick fastened to stud and runner webs.

### **Section 9.25. Heat Transfer, Air Leakage and Condensation Control**

#### **9.25.1. General**

##### **9.25.1.1. Scope and Application**

(1) This Section applies to heat, air and water vapour transfer and measures to control condensation.

(2) All walls, ceilings and floors separating *conditioned space* from unconditioned space, the exterior air or the ground shall be,

(a) provided with,

(i) thermal insulation conforming to Subsection 9.25.2.,

(ii) an *air barrier system* conforming to Subsection 9.25.3., and

(iii) a *vapour barrier* conforming to Subsection 9.25.4., and

(b) constructed in such a way that the properties and relative position of all materials conform to Subsection 9.25.5.

(3) Insulation and sealing of heating and ventilating ducts shall conform to Sections 9.32. and 9.33.

#### **9.25.2. Thermal Insulation**

##### **9.25.2.1. Required Insulation**

(1) All walls, ceilings and floors separating heated space from unheated space, the exterior air or the exterior *soil* shall be provided with thermal insulation in conformance with Section 12.2. to prevent moisture condensation on their room side during the winter and to ensure comfortable conditions for the occupants.

#### 9.25.2.2. Insulation Materials

(1) Except as required in Sentence (2), thermal insulation shall conform to the requirements of,

- (a) CAN/CGSB-51.25-M, “Thermal Insulation, Phenolic, Faced”,
- (b) CGSB 51-GP-27M, “Thermal Insulation, Polystyrene, Loose Fill”,
- (c) CAN/ULC-S701, “Thermal Insulation, Polystyrene, Boards and Pipe Covering”,
- (d) CAN/ULC-S702 “Mineral Fibre Thermal Insulation for Buildings”,
- (e) CAN/ULC-S703, “Cellulose Fibre Insulation (CFI) for Buildings”,
- (f) CAN/ULC-S704, “Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced”,
- (g) CAN/ULC-S705.1, “Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Material – Specification”, or
- (h) CAN/ULC-S706, “Wood Fibre Thermal Insulation for Buildings”.

(2) The *flame-spread rating* requirements contained in the standards listed in Sentence (1) shall not apply.

(3) Insulation in contact with the ground shall be inert to the action of *soil* and water and be such that its insulative properties are not significantly reduced by moisture.

(4) Type 1 expanded polystyrene insulation as described in CAN/ULC-S701, “Thermal Insulation, Polystyrene, Boards and Pipe Covering”, shall not be used as roof insulation applied above the roofing membrane.

#### 9.25.2.3. Installation of Thermal Insulation

(1) Insulation shall be installed so that there is a reasonably uniform insulating value over the entire face of the insulated area.

(2) Insulation shall be applied to the full width and length of the space between furring or framing.

(3) Except where the insulation provides the principal resistance to air leakage, thermal insulation shall be installed so that at least one face is in full and continuous contact with an element with low air permeance.

(4) Insulation on the interior of *foundation* walls enclosing a crawl space shall be applied so that there is not less than a 50 mm clearance above the crawl space floor if the insulation is of a type that may be damaged by water.

(5) Insulation around concrete slabs-on-ground shall be located so that heat from the *building* is not restricted from reaching the ground beneath the perimeter, where exterior walls are not supported by footings extending below frost level.

(6) Where insulation is exposed to the weather and subject to mechanical damage, it shall be protected with not less than,

- (a) 6 mm asbestos-cement board,
- (b) 6 mm preservative-treated plywood, or
- (c) 12 mm cement parging on wire lath applied to the exposed face and edge.

(7) Except as permitted in Sentence (8), insulation and *vapour barrier* shall be protected from mechanical damage by a covering such as gypsum board, plywood, particleboard, OSB, waferboard or hardboard.

(8) In unfinished *basements*, the protection required in Sentence (7) need not be provided for mineral fibre insulation, provided it is covered with polyethylene *vapour barrier* of at least 0.15 mm in thickness.

(9) Insulation in factory-built *buildings* shall be installed so that it will not become dislodged during transportation.

#### 9.25.2.4. Installation of Loose-Fill Insulation

(1) Except as provided in Sentences (2) to (6), loose-fill insulation shall be used on horizontal surfaces only.

(2) Where loose-fill insulation is installed in an unconfined sloped space, such as an attic space over a sloped ceiling, the supporting slope shall not be more than,

- (a) 4.5 in 12 for mineral fibre or cellulose fibre insulation, and
- (b) 2.5 in 12 for other types of insulation.

(3) Loose-fill insulation may be used in wood frame walls of existing *buildings*.

(4) Where blown-in insulation is installed in above-ground or below-ground wood frame walls of new *buildings*,

- (a) the density of the installed insulation shall be sufficient to preclude settlement,
- (b) the insulation shall be installed behind a membrane that will permit visual inspection prior to installation of the interior finish,
- (c) the insulation shall be installed in a manner that will not interfere with the installation of the interior finish, and
- (d) no water shall be added to the insulation, unless it can be shown that the added water will not adversely affect other materials in the assembly.
- (5) Water repellent loose-fill insulation may be used between the outer and inner wythes of masonry *cavity walls*.
- (6) Where soffit venting is used, measures shall be taken,
  - (a) to prevent loose-fill insulation from blocking the soffit vents and to maintain an open path for circulation of air from the vents into the *attic or roof space*, and
  - (b) to minimize air flow into the loose-fill insulation near the soffit vents to maintain the thermal performance of the material.

#### **9.25.2.5. Installation of Spray-Applied Polyurethane**

(1) Spray-applied polyurethane insulation shall be installed in accordance with CAN/ULC-S705.2, “Thermal Insulation – Spray-Applied Rigid Polyurethane Foam, Medium Density – Application”.

#### **9.25.3. Air Barrier Systems**

##### **9.25.3.1. Required Barrier to Air Leakage**

(1) Wall, ceiling and floor assemblies that separate *conditioned spaces* from unconditioned spaces or from the ground shall be constructed so as to include an *air barrier system* that will provide a continuous barrier to air leakage,

- (a) from the interior of the *building* into wall, floor, *attic or roof spaces* sufficient to prevent excessive moisture condensation in such spaces during the heating season, and
- (b) from the exterior inward sufficient to prevent moisture condensation on the room side during the heating season.

(2) The continuity of the *air barrier system* shall extend throughout the *basement*.

##### **9.25.3.2. Air Barrier System Properties**

(1) Sheet and panel type materials intended to provide the principal resistance to air leakage shall have an air leakage characteristic not greater than 0.02 L/(s·m<sup>2</sup>) measured at an air pressure differential of 75 Pa.

(2) Where polyethylene sheet is used to provide the air-tightness in the *air barrier system*, it shall conform to CAN/CGSB-51.34-M, “Vapour Barrier, Polyethylene Sheet for Use in Building Construction”.

##### **9.25.3.3. Continuity of the Air Barrier System**

(1) Where the *air barrier system* consists of an air-impermeable panel-type material, all joints shall be sealed to minimize air leakage.

(2) Where the *air barrier system* consists of flexible sheet material, all joints shall be,

- (a) sealed with compatible material such as tape or flexible sealant, or
- (b) except as required by Sentence (3), lapped not less than 100 mm and clamped, such as between framing members, furring or blocking and rigid panels.

(3) Where an *air barrier system* consisting of flexible sheet material is installed at locations where it is not supported by an interior finish, such as a behind a bath tub, shower enclosure or fireplace, the continuity of the air barrier shall be maintained by sealing its joints.

(4) Where an interior wall meets an exterior wall, ceiling, floor or roof required to be provided with an air barrier protection, the *air barrier system* shall extend across the intersection and shall be sealed in accordance with Sentences (1) and (2).

(5) Where an interior wall projects through a ceiling or extends to become an exterior wall, spaces in the wall shall be blocked to provide continuity across those spaces with the *air barrier system* in the abutting walls or ceiling by,

- (a) sealing each air barrier to the blocking, or
- (b) wrapping each air barrier around the transition and sealing in accordance with Sentences (1) and (2).

(6) Where an interior floor projects through an exterior wall or extends to become an exterior floor, continuity of the *air barrier system* shall be maintained from the abutting walls across the floor assembly.

(7) Where an interior floor projects through an exterior wall to become an exterior floor,

- (a) the air barrier of the wall under the floor shall be continuous with or sealed to the subfloor or the air barrier on the underside of the floor,
  - (b) the air barrier of the wall above the floor shall be continuous with or sealed to the subfloor or the air barrier on the top of the floor, and
  - (c) the spaces between floor joists shall be blocked and sealed.
- (8) Where a header wrap is used as an air barrier, it shall be sealed or lapped to the wall air barrier above and below in accordance with Sentences (1) and (2).
- (9) Penetrations of the *air barrier system*, such as those created by the installation of electrical wiring, electrical boxes, piping or ductwork, shall be sealed with compatible material such as tape or caulking to maintain the integrity of the *air barrier system* over the entire surface.
- (10) Penetrations of the *air barrier system*, such as those created by the installation of doors, windows and other fenestration shall be sealed to maintain the integrity of the *air barrier system* over the entire surface.
- (11) Where an interior air barrier is penetrated by doors, windows and other fenestration, the air barrier shall be sealed to the door frame or window frame with,
- (a) compatible tape, or
  - (b) spray foam insulation.
- (12) Where an exterior air barrier is penetrated by doors, windows and other fenestration, the air barrier shall be sealed to the door frame or window frame with,
- (a) compatible flexible flashing material,
  - (b) caulking, or
  - (c) spray foam insulation.
- (13) An access hatch installed through an assembly constructed with an *air barrier system* shall be weatherstripped around the perimeter to minimize air leakage.
- (14) Clearances between *chimneys* or *gas vents* and the surrounding construction that would permit air leakage from within the *building* into a wall or *attic* or *roof space* shall be sealed by *noncombustible* material to prevent such leakage and shall be sealed to the air barrier with tape or another compatible material, and to the vent with high temperature caulking in accordance with the manufacturer's installation instructions.
- (15) Where the *foundation* wall and floor slab are used as an air barrier, they shall be caulked at all joints, intersections and penetrations.
- (16) Sump pit covers shall be sealed to maintain continuity of the *air barrier system*.

#### **9.25.3.4. Vapour Barriers Used as Air Barriers**

- (1) A *vapour barrier* used as an air barrier shall comply with the requirements of this Subsection.

#### **9.25.4. Vapour Barriers**

##### **9.25.4.1. Required Barrier to Vapour Diffusion**

- (1) Thermally insulated wall, ceiling and floor assemblies shall be constructed with a *vapour barrier* sufficient to prevent condensation in the wall spaces, floor spaces or *attic* or *roof spaces*.

##### **9.25.4.2. Vapour Barrier Materials**

- (1) *Vapour barriers* shall have a permeance not greater than  $60 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ , measured in accordance with ASTM E96, "Water Vapor Transmission of Materials", using the desiccant method (dry cup).
- (2) Where the intended use of the interior space will result in high moisture generation, the assembly shall be designed according to Part 5.
- (3) Where polyethylene is installed to serve as the *vapour barrier*, it shall conform to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction".
- (4) Membrane-type *vapour barriers* other than polyethylene shall conform to CAN/CGSB-51.33-M, "Vapour Barrier, Sheet, Excluding Polyethylene, for Use in Building Construction".
- (5) Where a coating is applied to gypsum board to function as the *vapour barrier*, the permeance of the coating shall be determined in accordance with CAN/CGSB-1.501-M, "Method for Permeance of Coated Wallboard".
- (6) Where insulation functions as the *vapour barrier*, it shall be sufficiently thick so as to meet the requirement of Sentence (1).

### 9.25.4.3. Installation of Vapour Barriers

- (1) Products installed to function as the *vapour barrier* shall protect the warm side of wall, ceiling and floor assemblies.
- (2) Where different products are used for the *vapour barrier* and the insulation, the *vapour barrier* shall be installed sufficiently close to the warm side of the insulation to prevent condensation at design conditions.
- (3) Where the same product is used for the *vapour barrier* and the insulation, the product shall be installed sufficiently close to the warm side of the assembly to prevent condensation at design conditions.

### 9.25.5. Properties and Position of Materials in Building Envelope

#### 9.25.5.1. General

- (1) Sheet and panel-type materials incorporated into assemblies described in Article 9.25.1.1. shall conform to Article 9.25.5.2. where,
  - (a) the material has,
    - (i) an air leakage characteristic less than 0.1 L/(s·m<sup>2</sup>) at 75 Pa, and
    - (ii) a water vapour permeance less than 60 ng/(Pa·s·m<sup>2</sup>) when measured in accordance with ASTM E96./E96M “Water Vapor Transmission of Materials”, using the desiccant method (dry cup), and
  - (b) the intended use of the interior space where the materials are installed will not result in high moisture generation.
- (2) Where the intended use of the interior space will result in high moisture generation, the assembly shall be designed according to Part 5.
- (3) Wood-based sheathing materials not more than 12.5 mm thick and complying with Article 9.23.16.2. need not comply with Sentence (1).

#### 9.25.5.2. Position of Low Permeance Materials

- (1) Sheet and panel-type materials described in Article 9.25.5.1. shall be installed,
  - (a) on the warm face of the assembly,
  - (b) at a location where the ratio between the total thermal resistance of all materials outboard of its innermost impermeable surface and the total thermal resistance of all materials inboard of that surface is not less than that required by Table 9.25.5.2., or
  - (c) outboard of an air space that is vented to the outdoors.

**Table 9.25.5.2.  
Ratio of Outboard to Inboard Thermal Resistance**

Forming Part of Sentence 9.25.5.2.(1)

Item	Column 1	Column 2
	Heating Degree Days of <i>Building</i> Location <sup>(1)</sup> , Celsius Degree-days	Minimum Ratio, Total Thermal Resistance Outboard of Material’s Inner Surface to Total Thermal Resistance Inboard of Material’s Inner Surface
1.	Up to 4 999	0.20
2.	5 000 to 5 999	0.30
3.	6 000 to 6 999	0.35
4.	7 000 to 7 999	0.40

Notes to Table 9.25.5.2.:

<sup>(1)</sup> See MMAH Supplementary Standard SB-1, “Climatic and Seismic Data”.

- (2) For walls, the air space described in Clause (1)(c) shall be drained and ventilated and shall be not less than 10 mm deep behind the cladding, over the full height and width of the wall.

## Section 9.26. Roofing

### 9.26.1. General

#### 9.26.1.1. Purpose of Roofing

- (1) Roofs shall be protected with roofing, including flashing, installed to shed rain effectively and prevent water from entering the roof as a result of ice damming.
- (2) For the purpose of Sentence (1), roofs shall include platforms that effectively serve as roofs with respect to accumulation or drainage of precipitation.

#### 9.26.1.2. Alternate Installation Methods



(1) Methods described in CAN3-A123.51-M, “Asphalt Shingle Application on Roof Slopes 1:3 and Steeper”, or CAN3-A123.52-M, “Asphalt Shingle Application on Roof Slopes 1:6 to Less than 1:3”, are permitted to be used for asphalt shingle applications not described in this Section.

#### **9.26.1.3. Solar Collector Systems**

(1) A solar collector system is permitted to be installed above roofing materials conforming to Sentence 9.26.2.1.(1).

### **9.26.2. Roofing Materials**

#### **9.26.2.1. Material Standards**

(1) Roofing materials shall conform to,

- (a) CAN/CGSB-37.4-M, “Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing”,
- (b) CAN/CGSB-37.5-M, “Cutback Asphalt Plastic, Cement”,
- (c) CAN/CGSB-37.8-M, “Asphalt, Cutback, Filled, for Roof Coating”,
- (d) CGSB 37-GP-9Ma, “Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing”,
- (e) CGSB 37-GP-21M, “Tar, Cutback, Fibrated, for Roof Coating”,
- (f) CAN/CGSB-37.50-M, “Hot Applied, Rubberized Asphalt for Roofing and Waterproofing”,
- (g) CGSB 37-GP-52M, “Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric”,
- (h) CAN/CGSB-37.54, “Polyvinyl Chloride Roofing and Waterproofing Membrane”,
- (i) CGSB 37-GP-56M, “Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing”,
- (j) CGSB 41-GP-6M, “Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced”,
- (k) CAN/CGSB-51.32-M, “Sheathing, Membrane, Breather Type”,
- (l) CSA A123.1 / A123.5, “Asphalt Shingles Made from Organic Felt and Surfaced with Mineral Granules / Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules”,
- (m) CAN/CSA-A123.2, “Asphalt Coated Roofing Sheets”,
- (n) CSA A123.3, “Asphalt Saturated Organic Roofing Felt”,
- (o) CAN/CSA-A123.4, “Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems”,
- (p) CSA A123.17, “Asphalt Glass Felt Used in Roofing and Waterproofing”,
- (q) CAN/CSA-A220.0-M, “Performance of Concrete Roof Tiles”,
- (r) CSA O118.1, “Western Red Cedar Shakes and Shingles”, or
- (s) CSA O118.2-M, “Eastern White Cedar Shingles”.

#### **9.26.2.2. Nails**

(1) Nails used for roofing shall be corrosion-resistant roofing or shingle nails conforming to CSA B111, “Wire Nails, Spikes and Staples”.

(2) Nails shall have sufficient length to penetrate through or 12 mm into roof sheathing.

(3) Nails used with asphalt roofing shall have a head diameter of not less than 9.5 mm and a shank thickness of not less than 2.95 mm.

(4) Nails used with wood shingles or shakes shall have a head diameter of not less than 4.8 mm and a shank thickness of not less than 2.0 mm and shall be stainless steel, aluminum or hot-dipped galvanized.

#### **9.26.2.3. Staples**

(1) Staples used to apply asphalt or wood shingles shall be corrosion-resistant and shall be driven with the crown parallel to the eaves.

(2) Staples used with asphalt shingles shall be not less than 19 mm long, 1.6 mm diam or thickness, with not less than a 25 mm crown, except that an 11 mm crown may be used as provided in Sentence 9.26.7.4.(2).

(3) Staples used with wood shingles shall be not less than 29 mm long, 1.6 mm diam or thickness, with not less than a 9.5 mm crown and shall be stainless steel or aluminum.

### **9.26.3. Slope of Roof Surfaces**

#### **9.26.3.1. Slope**

(1) Except as provided in Sentences (2) and (3), the slopes on which roof coverings may be applied shall conform to Table 9.26.3.1.

**Table 9.26.3.1.  
Roofing Types and Slope Limits**

Forming Part of Sentence 9.26.3.1.(1)

Item	Column 1	Column 2	Column 3
	Type of Roofing	Minimum Slope	Maximum Slope
1.	Asbestos-Cement Corrugated Sheets	1 in 4	no limit
2.	Asphalt Shingles		
	Low slope application	1 in 6	no limit
	Normal application	1 in 3	no limit
3.	Built-up Roofing		
	Asphalt base (without gravel)	1 in 25	1 in 2
	Asphalt base (gravelled)	1 in 50 <sup>(1)</sup>	1 in 4
	Coal-tar base (gravelled)	1 in 50 <sup>(1)</sup>	1 in 25
	Cold process	1 in 25	1 in 1.33
4.	Cedar Shakes	1 in 3	no limit
5.	Clay Tile	1 in 2	no limit
6.	Glass Fibre Reinforced Polyester Roofing Panels	1 in 4	no limit
7.	Modified Bituminous Membranes	1 in 50	1 in 4
8.	Profiled Metal Roofing	1 in 4 <sup>(2)</sup>	no limit
9.	Roll Roofing		
	480 mm wide selvage asphalt roofing	1 in 6	no limit
	Cold application felt	1 in 50	1 in 1.33
	Smooth and mineral surfaced	1 in 4	no limit
10.	Sheet Metal Shingles	1 in 4 <sup>(2)</sup>	no limit
11.	Slate Shingles	1 in 2	no limit
12.	Wood Shingles	1 in 4	no limit

**Notes to Table 9.26.3.1.:**

<sup>(1)</sup> See Sentence 9.26.3.1.(2).

<sup>(2)</sup> See Sentence 9.26.3.1.(3).

(2) Asphalt and gravel or coal tar and gravel roofs may be constructed with lower slopes than required in Sentence (1) when effective drainage is provided by roof drains located at the lowest points on the roofs.

(3) Profiled metal roof cladding systems specifically designed for low-slope applications are permitted to be installed with lower slopes than required in Sentence (1), provided they are installed in conformance with the manufacturer's written recommendations.

(4) Except where back-slope will not adversely affect adjacent supported or supporting elements due to water ingress, roofs and elements that effectively serve as roofs shall be constructed with sufficient slope away from,

- (a) exterior walls, and
- (b) *guards* that are connected to the roof, or to an element that effectively serves as a roof, by more than pickets or posts.

(5) The slope required in Sentence (4) shall be sufficient to maintain a positive slope,

- (a) after expected shrinkage of the *building* frame, where these surfaces are supported by exterior walls and on exterior columns, and
- (b) once design loading is taken into consideration, where these surfaces are cantilevered from exterior walls.

**9.26.4. Flashing at Intersections**

**9.26.4.1. Required Flashing at Intersections**

(1) Except where the omission will not adversely affect adjacent supported or supporting elements, flashing shall be installed at junctions between roofs and,

- (a) walls that rise above the roof, and
- (b) *guards* that are connected to the roof by other than pickets or posts.

(2) For the purpose of Sentence (1), roofs shall include platforms that effectively serve as roofs with respect to accumulation or drainage of precipitation.

#### **9.26.4.2. Materials**

- (1) Sheet metal flashing shall consist of not less than,
  - (a) 1.73 mm thick sheet lead,
  - (b) 0.33 mm thick galvanized steel,
  - (c) 0.33 mm thick copper,
  - (d) 0.35 mm thick zinc, or
  - (e) 0.48 mm thick aluminum.

#### **9.26.4.3. Valley Flashing**

- (1) Where sloping surfaces of shingled roofs intersect to form a valley, the valley shall be flashed.
- (2) Valley flashing shall be installed over continuous sheathing.
- (3) Closed valleys shall not be used with rigid shingles on slopes of less than 1 in 1.2.
- (4) Closed valley flashing shall consist of sheet metal, self sealing composite membranes consisting of polyethylene and bituminous material or one layer of either Type S smooth surface roll roofing or Type M mineral surface roll roofing (mineral surface down) not less than 600 mm wide, and nails shall not penetrate the flashing within 75 mm of its edge or 124 mm of the bottom of the valley centreline.
- (5) Open valleys shall be flashed with,
  - (a) at least one layer of sheet metal not less than 600 mm wide, or
  - (b) no fewer than two layers of roll roofing.
- (6) The bottom layer of roofing required in Sentence (4) shall consist of not less than Type S smooth roll roofing or Type M mineral surface roll roofing (mineral surface down) not less than 457 mm wide, centred in the valley and fastened with nails spaced not more than 450 mm o.c. located 25 mm away from the edges.
- (7) The top layer of roofing required in Sentence (4) shall consist of not less than Type M mineral surface roll roofing (mineral surface up), 914 mm wide, centred in the valley, applied over a 100 mm wide strip of cement along each edge of the bottom layer, and fastened with a sufficient number of nails to hold it in place until the shingles are applied.

#### **9.26.4.4. Intersection of Shingle Roofs and Masonry**

- (1) The intersection of shingle roofs and masonry walls or *chimneys* shall be protected with flashing.
- (2) Counter flashing required in Sentence (1) shall be embedded not less than 25 mm in the masonry and shall extend not less than 150 mm down the masonry and lap the lower flashing not less than 100 mm.
- (3) Flashing along the slopes of a roof described in Sentence (1) shall be stepped so that there is not less than a 75 mm head lap in both the lower flashing and counter flashing.
- (4) Where the roof described in Sentence (1) slopes upwards from the masonry, the flashing shall extend up the roof slope to a point equal in height to the flashing on the masonry, but not less than 1.5 times the shingle exposure.

#### **9.26.4.5. Intersection of Shingle Roofs and Walls Other Than Masonry**

- (1) The intersection of shingle roofs and walls clad with other than masonry shall be protected with flashing.
- (2) Flashing required in Sentence (1) shall be installed so that it extends up the wall not less than 75 mm behind the sheathing paper, and extends not less than 75 mm horizontally.
- (3) Along the slope of the roof, the flashing required in Sentence (1) shall be stepped with not less than a 75 mm head lap.

#### **9.26.4.6. Intersection of Built-Up Roofs and Masonry**

- (1) The intersection of built-up roofs with masonry walls or *chimneys* shall have a cant strip at the intersection and a roofing membrane shall be mopped over the cant strip and not less than 150 mm up the wall.
- (2) Counter flashing installed over the intersection referred to in Sentence (1) shall be embedded not less than 25 mm in the masonry, and shall be of sufficient length to extend down not less than 150 mm, lapping the membrane on the masonry not less than 100 mm.

#### **9.26.4.7. Intersection of Built-Up Roofs and Walls other than Masonry**

- (1) The intersection of built-up roofs with walls clad with other than masonry shall have a cant strip at the intersection.
- (2) The roofing membrane shall be mopped over the cant strip referred to in Sentence (1).
- (3) Flashing plies shall extend not less than 150 mm up the wall referred to in Sentence (1) behind the sheathing paper.

#### **9.26.4.8. Chimney Saddles**

(1) Except as otherwise permitted in Sentence (5), *chimney* saddles shall be installed where the upper side of a *chimney* on a sloping roof is more than 750 mm wide.

(2) *Chimney* saddles shall be covered with sheet metal or roofing material of weight and quality equivalent to the roofing.

(3) Saddles shall be flashed where they intersect the roof.

(4) The intersection of the saddle and the *chimney* shall be flashed and counterflashed as required in Article 9.26.4.4.

(5) A *chimney* saddle need not be installed if the intersection between the *chimney* and roof is protected by sheet metal flashing that extends up the *chimney* to a height equal to at least one-sixth the width of the *chimney*, but not less than 150 mm, and up the roof slope to a point equal in height to the flashing on the *chimney*, but not less than 1.5 times the shingle exposure.

(6) Flashing described in Sentence (5) at the *chimney* shall be counterflashed as required by Article 9.26.4.4.

#### **9.26.5. Eave Protection for Shingles and Shakes**

##### **9.26.5.1. Required Eave Protection**

(1) Except as provided in Sentence (2), eave protection shall be provided on shingle, shake or tile roofs, extending from the edge of the roof a minimum of 900 mm up the roof slope to a line not less than 300 mm inside the inner face of the exterior wall.

(2) Eave protection is not required,

(a) over unheated garages, carports and porches,

(b) where the roof overhang exceeds 900 mm measured along the roof slope from the edge of the roof to the inner face of the exterior wall,

(c) on roofs of asphalt shingles installed in accordance with Subsection 9.26.8.,

(d) on roofs with slopes of 1 in 1.5 or greater, or

(e) in regions with 3 500 or fewer degree-days.

##### **9.26.5.2. Materials**

(1) Eave protection shall be laid beneath the starter strip and shall consist of,

(a) No. 15 asphalt-saturated felt laid in two plies lapped 480 mm and cemented together with lap cement,

(b) Type M or S roll roofing laid with not less than 100 mm head and end laps cemented together with lap cement,

(c) glass fibre or polyester fibre coated base sheets, or

(d) self-sealing composite membranes consisting of modified bituminous coated material.

#### **9.26.6. Underlay Beneath Shingles**

##### **9.26.6.1. Materials**

(1) Except as required in Sentence (2), when underlay is used beneath shingles, it shall be,

(a) asphalt-saturated sheathing paper weighing not less than 0.195 kg/m<sup>2</sup>, or

(b) No. 15 plain or perforated asphalt-saturated felt.

(2) Underlay used beneath wood shingles shall be breather type.

##### **9.26.6.2. Installation**

(1) When used with shingles, underlay shall be installed parallel to the eaves with head and end lap of not less than 50 mm.

(2) The top edge of each strip referred to in Sentence (1) shall be fastened with sufficient roofing nails to hold it in place until the shingles are applied.

(3) The underlay referred to in Sentence (1) shall overlap the eave protection by not less than 100 mm.

#### **9.26.7. Asphalt Shingles on Slopes of 1 in 3 or Greater**

##### **9.26.7.1. Coverage**

(1) Coverage shall be not less than two thicknesses of shingle over the entire roof, disregarding cutouts.

##### **9.26.7.2. Starter Strip**

(1) A starter strip shall be installed along the lower edge of the roof so that it extends approximately 12 mm beyond the eaves and rake of the roof and fastened along the bottom edge with nails spaced not more than 300 mm o.c.

(2) Starter strips shall be,

(a) at least Type M mineral-surfaced roll roofing not less than 300 mm wide,

(b) shingles of the same weight and quality as those used as a roof covering with tabs facing up the roof slope, or

(c) pre-manufactured starter strips installed with sealant at the eaves.

(3) Starter strips need not be provided where eave protection of not less than Type M mineral-surfaced roll roofing is provided or self-sealing composite membranes consisting of polyethylene and bituminous material is provided.

#### **9.26.7.3. Head Lap**

(1) Shingles shall have a head lap of not less than 50 mm.

#### **9.26.7.4. Fasteners**

(1) Except as provided in Sentence (2), shingles shall be fastened with at least four nails or staples for 1 000 mm wide shingles so that no nails or staples are exposed.

(2) Where staples with an 11 mm crown are used, shingles shall be fastened with at least six staples.

(3) Fasteners may be reduced for narrower shingles in proportion to the width of the shingle or when shingles incorporating interlocking devices are used.

(4) Fasteners referred to in Sentences (1) and (2) shall be located 25 mm to 40 mm from each end of each strip shingle with other fasteners equally spaced between them.

(5) Fasteners referred to in Sentences (1) and (2) shall be located not less than 12 mm above the tops of the cutouts.

#### **9.26.7.5. Securing of Tabs**

(1) Shingle tabs shall be secured by a spot of plastic cement not exceeding 25 mm diam under the centre of each tab or by interlocking devices or self-sealing strips.

#### **9.26.7.6. Hips and Ridges**

(1) Shingles on hips and ridges shall be applied so they extend not less than 100 mm on either side of the hip or ridge, and shall be lapped not less than 150 mm.

(2) Shingles referred to in Sentence (1) shall be fastened with nails or staples on each side located not more than 25 mm from the edge and 25 mm above the butt of the overlying shingle.

#### **9.26.7.7. Eave Protection**

(1) Eave protection shall conform to Subsection 9.26.5.

#### **9.26.7.8. Flashing**

(1) Flashing shall conform to Subsection 9.26.4.

### **9.26.8. Asphalt Shingles on Slopes of Less Than 1 in 3**

#### **9.26.8.1. Coverage**

(1) Except for the first two courses, coverage shall be not less than three thicknesses of shingle over the entire roof, disregarding cutouts.

#### **9.26.8.2. Starter Strip**

(1) A starter strip shall be installed as in Article 9.26.7.2.

(2) Starter strips required in Sentence (1) shall be laid in a continuous band of cement not less than 200 mm wide.

#### **9.26.8.3. Securing of Tabs**

(1) Shingle tabs shall be secured with cold application cement applied at the rate of not less than 0.5 L/m<sup>2</sup> of cemented area, or hot application asphalt applied at the rate of 1 kg/m<sup>2</sup> of cemented area.

#### **9.26.8.4. Securing of Shingle Courses**

(1) The first course of shingles shall be secured by a continuous band of cement along the eaves applied so that the width of the band equals the shingle exposure plus 100 mm.

(2) The succeeding courses of shingles shall be secured by a continuous band of cement applied so that the width of the band equals the shingle exposure plus 50 mm.

(3) The band required in Sentence (2) shall be located not more than 50 mm above the butt of the overlying course of shingles.

**9.26.8.5. Hips and Ridges**

(1) Shingles on hips and ridges shall be not less than 300 mm wide applied to provide triple coverage.

(2) Shingles referred to in Sentence (1) shall be cemented to the roof shingles and to each other with a coat of cement and fastened with nails or staples located 40 mm above the butt of the overlying shingle and 50 mm from each edge.

**9.26.8.6. Flashing**

(1) Flashing shall conform to Subsection 9.26.4.

**9.26.8.7. Fastening**

(1) Shingles shall be fastened in accordance with Article 9.26.7.4.

**9.26.9. Wood Roof Shingles**

**9.26.9.1. Decking**

(1) Decking for wood shingled roofs may be continuous or spaced.

**9.26.9.2. Grade**

(1) Western cedar shingles shall be not less than No. 2 grade.

(2) Eastern white cedar shingles shall be not less than B (clear) grade.

**9.26.9.3. Size**

(1) Wood shingles shall be not less than 400 mm long and not less than 75 mm nor more than 350 mm wide.

**9.26.9.4. Spacing and Joints**

(1) Shingles shall be spaced approximately 6 mm apart and offset at the joints in adjacent courses not less than 40 mm so that joints in alternate courses are staggered.

**9.26.9.5. Fastening**

(1) Shingles shall be fastened with two nails or staples located approximately 20 mm from the sides of the shingle and 40 mm above the exposure line.

**9.26.9.6. Exposure**

(1) The exposure of wood roof shingles shall conform to Table 9.26.9.6.

**Table 9.26.9.6.  
Exposure of Wood Shingles**

Forming Part of Sentence 9.26.9.6.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
	Roof Slope	Maximum Exposure, mm					
		No. 1 or A Grade Length of Shingle, mm			No. 2 or B Grade Length of Shingle, mm		
		400	450	600	400	450	600
1.	<1 in 3	100	115	165	90	100	140
2.	≥1 in 3	125	140	190	100	115	165

**9.26.9.7. Flashing**

(1) Flashing shall conform to Subsection 9.26.4.

**9.26.9.8. Eave Protection**

(1) Eave protection shall conform to Subsection 9.26.5.

**9.26.10. Cedar Roof Shakes**

**9.26.10.1. Size and Thickness**

(1) Shakes shall be not less than 450 mm long and not less than 100 mm nor more than 350 mm wide with a butt thickness of not more than 32 mm and not less than 9 mm.

**9.26.10.2. Underlay**

(1) Where eave protection is not provided, an underlay conforming to the requirements in Article 9.26.6.1. for wood shingles shall be laid as a strip not less than 900 mm wide along the eaves.

(2) A strip of material similar to that described in Sentence (1) not less than 450 mm wide shall be interlayered between each course of shakes with the bottom edge of the strip positioned above the butt line at a distance equal to double the exposure of the shakes.

(3) Interlayered strips in Sentence (2) shall be lapped at least 150 mm at hips and ridges in a manner that will prevent water from reaching the roof sheathing.

**9.26.10.3. Spacing and Joints**

(1) Shakes shall be spaced 6 mm to 9 mm apart and the joints in one course shall be separated not less than 40 mm from joints in adjacent courses.

**9.26.10.4. Fastening**

(1) Shakes shall be fastened with nails located approximately 20 mm from the sides of the shakes and 40 mm above the exposure line.

**9.26.10.5. Exposure**

- (1) The exposure of wood shakes shall not exceed,
  - (a) 190 mm for shakes not less than 450 mm long, and
  - (b) 240 mm for shakes not less than 600 mm long.

**9.26.10.6. Flashing**

(1) Flashing shall conform to Subsection 9.26.4.

**9.26.10.7. Eave Protection**

(1) Eave protection shall conform to Subsection 9.26.5.

**9.26.10.8. Grade**

(1) Shakes shall be not less than No. 1 or Handsplit grade.

**9.26.11. Built-Up Roofs**

**9.26.11.1. Quantity of Materials**

(1) The quantities of bituminous materials used on built-up roofs shall conform to Table 9.26.11.1.

**Table 9.26.11.1.  
Quantities of Bitumen for Built-Up Roofs**

Forming Part of Sentence 9.26.11.1.(1)

Item	Column 1	Column 2	Column 3
	Type of Roof	Amount of Bitumen per Square Metre of Roof Surface	
		Mopping Coats Between Layers	Flood Coat
1.	Asphalt and aggregate	1 kg	3 kg
2.	Coal-tar and aggregate	1.2 kg	3.6 kg
3.	Cold process roofing	0.75 L cold process cement	2 L cold process top coating

**9.26.11.2. Coal-Tar and Asphalt Products**

(1) Coal-tar products and asphalt products shall not be used together in built-up roof construction.

**9.26.11.3. Roof Felts**

(1) Bitumen roofing felts shall be not less than No.15 felt.

**9.26.11.4. Aggregate Surfacing**

(1) Aggregate used for surfacing built-up roofs shall be clean, dry and durable and shall consist of particles of gravel, crushed stone or air-cooled blast furnace slag having a size of from 6 mm to 15 mm.

(2) The minimum amount of aggregate surfacing per square metre of roof surface shall be 15 kg gravel or crushed stone or 10 kg crushed slag.

**9.26.11.5. Flashing**

(1) Flashing shall conform to Subsection 9.26.4.

**9.26.11.6. Number of Layers**

(1) Built-up roofing shall consist of at least three mopped-down layers of roofing felt flood coated with bitumen.

**9.26.11.7. Installation of Layers**

(1) In hot process applications, each layer of bitumen-saturated felt shall be laid while the bitumen is hot, with each layer overlapping the previous one.

(2) The full width under each lap referred to in Sentence (1) shall be coated with bitumen so that in no place does felt touch felt.

(3) Felt shall be laid free of wrinkles and shall be rolled directly into the hot bitumen and broomed forward and outward from the centre to ensure complete adhesion.

#### **9.26.11.8. Roofing over Wood-Based Sheathing**

(1) Except as permitted in Sentence (2), built-up roofing applied over wood, plywood, OSB or waferboard roof sheathing shall be laid over an additional base layer of felt laid dry over the entire roof deck with at least a 50 mm headlap and a 50 mm sidelap between each sheet.

(2) Where plywood, OSB or waferboard roof sheathing is used, the dry layer of felt required in Sentence (1) may be omitted when the joints are taped and the sheathing is primed with asphalt.

#### **9.26.11.9. Attachment to Decking**

(1) Roofing shall be securely attached to the decking or where insulation is applied above the deck, the insulation shall be securely attached to the deck before the first layer of felt is fastened to the insulation.

#### **9.26.11.10. Cant Strips**

(1) Except as permitted in Sentence (4), a cant strip shall be provided at the edges of roofs.

(2) No fewer than two plies of the roofing membrane shall be carried over the top of the cant strip.

(3) Flashing shall extend over the top of the cant strip and be shaped to form a drip.

(4) The cant strip required in Sentence (1) may be omitted where a gravel stop is provided at the edge of roofs.

(5) The roofing membranes shall be carried over the edge of the roof before the gravel stop referred to in Sentence (4) is fastened and two plies of roofing membrane mopped to the top surface of the gravel stop before the flood coat is applied.

(6) The gravel stop referred to in Sentence (4) shall extend over the edge of the roof to form a drip or shall be flashed so that the flashing extends over the edge to form a drip.

#### **9.26.12. Selvage Roofing**

##### **9.26.12.1. Double Coverage**

(1) Wide selvage asphalt roofing shall provide double coverage over the entire roof surface.

##### **9.26.12.2. Joints**

(1) Plies of selvage roofing shall be cemented together to ensure a water-tight joint.

#### **9.26.13. Sheet Metal Roofing**

##### **9.26.13.1. Thickness**

(1) Sheet metal roofing shall be not less than,

(a) 0.33 mm thick galvanized steel,

(b) 0.46 mm thick copper,

(c) 0.46 mm thick zinc, or

(d) 0.48 mm thick aluminum.

##### **9.26.13.2. Support**

(1) Where sheet metal roofing is not supported by roof decking but spans between spaced supports, the panels shall be designed to support the specified *live loads* for roofs.

#### **9.26.14. Glass Reinforced Polyester Roofing**

##### **9.26.14.1. Support**

(1) Where glass reinforced polyester roofing panels are not supported by roof decking but span between spaced supports, the panels shall be designed to support the specified roof loads.

#### **9.26.15. Hot Applied Rubberized Asphalt Roofing**

##### **9.26.15.1. Installation**



(1) Hot applied rubberized asphalt roofing shall be installed in accordance with CAN/CGSB-37.51-M, “Application for Hot Applied Rubberized Asphalt for Roofing and Waterproofing”.

#### **9.26.16. Polyvinyl Chloride Sheet Roofing**

##### **9.26.16.1. Installation**

(1) Polyvinyl chloride sheet applied roofing membrane shall be installed in accordance with CGSB 37-GP-55M, “Application of Sheet Applied Flexible Polyvinyl Chloride Roofing Membrane”.

#### **9.26.17. Concrete Roof Tiles**

##### **9.26.17.1. Installation**

(1) Concrete roof tiles shall be installed according to CAN/CSA-A220.1-M, “Installation of Concrete Roof Tiles”.

#### **9.26.18. Roof Drains and Downspouts**

##### **9.26.18.1. Roof Drains**

(1) When roof drains are provided they shall conform to Part 7.

##### **9.26.18.2. Downspouts**

(1) Where downspouts are provided and are not connected to a sewer, extensions shall be provided to carry rainwater away from the *building* in a manner that will prevent *soil* erosion.

### **Section 9.27. Cladding**

#### **9.27.1. Application**

##### **9.27.1.1. General**

(1) Where lumber, wood shingles, shakes, fibre-cement shingles, planks and sheets, plywood, OSB, waferboard, hardboard, vinyl, aluminum and steel, including trim and soffits, are installed as cladding on wood frame walls exposed to precipitation, the cladding assembly shall comply with,

- (a) Subsections 9.27.2. to 9.27.12., or
- (b) Part 5.

(2) Where stucco is installed as cladding on wood frame or masonry walls exposed to precipitation, the cladding assembly shall comply with,

- (a) Subsections 9.27.2. to 9.27.4., and Section 9.28., or
- (b) Part 5.

(3) Where masonry serves as cladding on wood frame or masonry walls exposed to precipitation, the cladding assembly shall comply with,

- (a) Subsections 9.27.2. to 9.27.4., and Section 9.20., or
- (b) Part 5.

(4) Where asphalt shingles are installed as cladding on wood frame walls exposed to precipitation, the cladding assembly shall comply with,

- (a) Subsections 9.26.7. and 9.27.2. to 9.27.4., or
- (b) Part 5.

(5) Where cladding materials other than those described in Sentences (1) to (4) are installed, or where these are installed on substrates other than those identified in Sentences (1) to (4), the materials and installation shall comply with Part 5.

#### **9.27.2. Required Protection from Precipitation**

##### **9.27.2.1. Minimizing and Preventing Ingress and Damage**

(1) Except where exterior walls are protected from precipitation or where it can be shown that ingress will not adversely affect occupant health or safety, exterior walls shall be designed and constructed to,

- (a) minimize the ingress of precipitation into the assembly, and
- (b) prevent ingress into interior space.

(2) Except where exterior walls are protected from specific mechanisms of deterioration, such as mechanical impact and ultraviolet radiation, exterior walls shall be designed and constructed to minimize the likelihood of their required performance being reduced to an unacceptable level as a result of those mechanisms.

#### **9.27.2.2. Minimum Protection from Precipitation Ingress**

(1) Exterior walls exposed to precipitation shall be protected against ingress of precipitation with an exterior cladding assembly consisting of a first plane of protection and a second plane of protection where the wall encloses spaces of *residential occupancy* or spaces that directly serve spaces of *residential occupancy*.

#### **9.27.2.3. First and Second Planes of Protection**

(1) Where walls required to provide protection from precipitation comprise assemblies with first and second planes of protection,

- (a) the first plane of protection shall,
  - (i) consist of cladding, with appropriate trim, accessory pieces and fasteners, and
  - (ii) be designed and constructed to minimize the passage of rain and snow into the wall by minimizing holes and managing precipitation ingress caused by kinetic energy of raindrops, surface tension, capillarity, gravity, and air pressure differences,
- (b) the second plane of protection shall be designed and constructed to,
  - (i) intercept all precipitation that gets past the first plane of protection, and
  - (ii) effectively dissipate any precipitation to the exterior, and
- (c) the protection provided by the first and second planes of protection shall be maintained at,
  - (i) wall penetrations created by the installation of components and services such as windows, doors, ventilation ducts, piping, wiring and electrical outlets, and
  - (ii) the interface with other wall assemblies.

#### **9.27.2.4. Protection of Cladding from Moisture**

(1) A clearance of not less than 200 mm shall be provided between finished ground and cladding that is adversely affected by moisture, such as untreated wood, plywood, OSB, waferboard and hardboard.

(2) A clearance of not less than 50 mm shall be provided between a roof surface and cladding that is adversely affected by moisture, such as untreated wood, plywood, OSB, waferboard and hardboard.

#### **9.27.3. Second Plane of Protection**

##### **9.27.3.1. Elements of the Second Plane of Protection**

(1) The second plane of protection shall consist of a drainage plane with appropriate inner boundary and flashing to dissipate rainwater to the exterior.

(2) The inner boundary of the drainage plane shall comply with Articles 9.27.3.2. to 9.27.3.6.

(3) The protection provided by the second plane of protection shall be maintained,

- (a) at wall penetrations created by the installation of components and services such as windows, doors, ventilation ducts, piping, wiring and electrical outlets, and
- (b) at the interface with other wall assemblies.

(4) Flashing material and installation shall comply with Articles 9.27.3.7. and 9.27.3.8.

##### **9.27.3.2. Sheathing Membrane Material Standard**

(1) Sheathing membranes shall conform to the performance requirements of CAN/CGSB-51.32-M, “Sheathing, Membrane, Breather Type”.

##### **9.27.3.3. Required Sheathing Membrane and Installation**

(1) Except as provided in Articles 9.27.3.4. to 9.27.3.6., at least one layer of sheathing membrane shall be applied beneath siding, stucco or masonry veneer.

(2) Sheathing membrane required in Sentence (1) shall be applied so that joints are lapped not less than 100 mm.

(3) Where sheathing membrane required in Sentence (1) is applied horizontally, the upper sheets shall overlap the lower sheets.

##### **9.27.3.4. Insulating Sheathing in Lieu of Sheathing Membrane**

(1) Where non-wood-based rigid exterior insulating sheathing, or exterior insulating sheathing with an integral sheathing membrane is installed, a separate sheathing membrane is not required.

(2) Where insulating sheathing is installed as provided in Sentence (1),

- (a) sheathing panels subject to moisture deterioration shall be sealed at all joints, and
- (b) the joints of sheathing panels not subject to moisture deterioration shall be,
  - (i) sealed at all joints, or
  - (ii) lapped or tongue and groove, and detailed to ensure drainage of water to the exterior.

**9.27.3.5. Sheathing Membranes in Lieu of Sheathing**

(1) Except as provided in Article 9.27.3.6., where no sheathing is used, at least two layers of sheathing membrane shall be applied beneath the cladding.

(2) All joints in the sheathing membrane required in Sentence (1) shall occur over framing, and the membrane shall be fastened to the framing with roofing nails or staples spaced not more than 150 mm along the edges of the outer layer of sheathing paper.

(3) Wall sheathing is permitted to be used in lieu of one layer of sheathing membrane required in Sentence (1), and the thickness need not conform to Table 9.23.16.2.A.

**9.27.3.6. Face Sealed Cladding**

(1) Sheathing membrane is permitted to be omitted beneath cladding when the joints in the cladding are formed to effectively prevent the passage of wind and rain in conformance with Sentence (2) or (3), as applicable.

(2) Cladding consisting of sheets of plywood, hardboard, OSB, waferboard or fibre cement is considered to meet the requirements of Sentence (1), provided the cladding is applied so that,

- (a) all edges are directly supported by framing,
- (b) the vertical joints between adjacent sheets are sealed and,
  - (i) covered with battens,
  - (ii) shiplapped, or
  - (iii) otherwise matched to provide weathertight joints, and
- (c) the horizontal joints between adjacent sheets are sealed and,
  - (i) shiplapped, or
  - (ii) otherwise matched to provide weathertight joints.

(3) Metal siding consisting of sheets of metal is considered to meet the requirements of Sentence (1) where the joints between sheets are of the locked-seam type.

**9.27.3.7. Flashing Materials**

- (1) Flashing shall consist of not less than,
- (a) 1.73 mm thick sheet lead,
  - (b) 0.33 mm thick galvanized steel,
  - (c) 0.46 mm thick copper,
  - (d) 0.46 mm thick zinc,
  - (e) 0.48 mm thick aluminum, or
  - (f) 1.02 mm thick vinyl.

**9.27.3.8. Flashing Installation**

(1) Except as provided in Sentence (2), flashing shall be installed at,

- (a) every horizontal junction between claddings elements,
- (b) every horizontal offset in the cladding, and
- (c) every horizontal line where the cladding substrates change and where,
  - (i) the substrates differ sufficiently for stresses to be concentrated along that line, or
  - (ii) the installation of the cladding on the lower substrate may compromise the drainage of moisture from behind the cladding above.

(2) Flashing need not be installed as described in Sentence (1),

- (a) where the upper cladding elements overlap the lower cladding elements by not less than 25 mm,

- (b) where,
  - (i) the cladding above and below the joint is installed outboard of a drained and vented air space, and
  - (ii) the horizontal detail is constructed so as to minimize ingress of precipitation into the air space, or
- (c) at horizontal construction joints in stucco, where,
  - (i) the joint is finished with an expansion-contraction strip, and
  - (ii) the cladding is installed outboard of a drained and vented air space.
- (3) Flashing shall be installed over exterior wall openings where the vertical distance from the bottom of the eave to the top of the trim is more than one-quarter of the horizontal overhang of the eave.
- (4) Flashing described in Sentences (1) and (3) shall,
  - (a) extend not less than 50 mm upward inboard of the sheathing membrane or sheathing installed in lieu of the sheathing membrane,
  - (b) have a slope of not less than 6% toward the exterior after the expected shrinkage of the *building* frame,
  - (c) terminate at each end with an end-dam,
    - (i) with a height in millimetres not less than 25 mm or 1/10 of the value of the 1 in 5 driving rain wind pressure in Pa, and
    - (ii) at the height defined in Subclause (i), extending to the face of the adjacent cladding,
  - (d) lap not less than 10 mm vertically over the *building* element below, and
  - (e) terminate in a drip extending not less than 5 mm outward from the outer face of the *building* element below.
- (5) Where the sills of windows and doors installed in exterior walls are not self-flashing, flashing shall be installed between the underside of the window or door and the wall construction below.

#### **9.27.4. Sealants**

##### **9.27.4.1. Required Sealants**

- (1) Sealant shall be provided where required to prevent the entry of water into the structure.
- (2) Sealant shall be provided between masonry, siding or stucco and the adjacent door and window frames or trim, including sills unless such locations are completely protected from the entry of rain.
- (3) Sealant shall be provided at vertical joints between different cladding materials unless the joint is suitably lapped or flashed to prevent the entry of rain.

##### **9.27.4.2. Materials**

- (1) Sealants shall be,
  - (a) non-hardening types suitable for exterior use,
  - (b) selected for their ability to resist the effects of weathering, and
  - (c) compatible with, and adhere to, the substrate to which they are applied.
- (2) Sealants shall conform to,
  - (a) ASTM C834, “Latex Sealants”,
  - (b) ASTM C920, “Elastomeric Joint Sealants”,
  - (c) ASTM C1184, “Structural Silicone Sealants”, or
  - (d) ASTM C1311, “Solvent Release Sealants”.
- (3) Backer rod shall conform to ASTM C1330, “Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants”.

#### **9.27.5. Attachment of Cladding**

##### **9.27.5.1. Attachment**

- (1) Except as permitted in Sentences (2) to (7), cladding shall be fastened to the framing members or furring members, or to blocking between the framing members.
- (2) Vertical lumber and stucco lath or reinforcing are permitted to be attached to sheathing only where the sheathing consists of not less than,
  - (a) 14.3 mm lumber,

- (b) 12.5 mm plywood, or
- (c) 12.5 mm OSB or waferboard.
- (3) Vertically applied metal siding and wood shingles and shakes are permitted to be attached to the sheathing only where the sheathing consists of not less than,
  - (a) 14.3 mm lumber,
  - (b) 7.5 mm plywood, or
  - (c) 7.5 mm OSB or waferboard.
- (4) Asbestos-cement shingles are permitted to be attached to the sheathing only when the sheathing consists of not less than,
  - (a) 14.3 mm lumber,
  - (b) 9.5 mm plywood, or
  - (c) 9.5 mm OSB or waferboard.
- (5) Where wood shingles or shakes are applied to sheathing that is not suitable for attaching the shingles or shakes, the shingles or shakes may be attached to a wood lath not less than 38 mm by 9.5 mm thick securely nailed to the framing and applied as described in Article 9.27.7.5.
- (6) Where asbestos-cement shingles are applied to sheathing that is not suitable for attaching the shingles, the shingles may be fastened to a wood lath not less than 89 mm by 9.5 mm thick securely nailed to the framing.
- (7) Lath referred to in Sentence (6) shall be applied so that it overlaps the preceding shingle course by not less than 20 mm.

**9.27.5.2. Blocking**

(1) Blocking for the attachment of cladding shall be not less than 38 mm by 38 mm lumber securely nailed to the framing and spaced not more than 610 mm o.c.

**9.27.5.3. Furring**

(1) Except as permitted in Sentences 9.27.5.1(5) and (6), furring for the attachment of cladding shall be not less than 19 mm by 38 mm lumber when applied over sheathing.

(2) When applied without sheathing, furring referred to in Sentence (1) shall be not less than,

- (a) 19 mm by 64 mm lumber on supports spaced not more than 406 mm o.c., or
- (b) 19 mm by 89 mm on supports spaced not more than 610 mm o.c.

(3) Furring referred to in Sentence (1) shall be,

- (a) securely fastened to the framing, and
- (b) spaced not more than 610 mm o.c.

**9.27.5.4. Size and Spacing of Fasteners**

(1) Nail or staple size and spacing for the attachment of cladding and trim shall conform to Table 9.27.5.4.

**Table 9.27.5.4.  
Attachment of Cladding**

Forming Part of Sentence 9.27.5.4.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Type of Cladding	Minimum Nail or Staple Length, mm	Minimum Number of Nails or Staples	Maximum Nail or Staple Spacing, mm (o.c.)
1.	Wood trim	51	—	600
2.	Lumber siding or horizontal siding made from sheet metal	51	—	600
3.	Metal cladding	38	—	600 (nailed to framing) 400 (nailed to sheathing only)
4.	Wood shakes			
	up to 200 mm in width	51	2	—
	over 200 mm in width	51	3	—
5.	Wood shingles			
	200 mm in width	32	2	—
	over 200 mm in width	32	3	—

6.	Asbestos-cement shingles	32	2	—
7.	Panel or sheet type cladding			
	up to 7 mm thick	38	—	150 (along edges)
	more than 7 mm thick	51	—	300 (along intermediate supports)

#### 9.27.5.5. Fastener Materials

(1) Nails or staples for the attachment of cladding and wood trim shall be corrosion-resistant and shall be compatible with the cladding material.

#### 9.27.5.6. Expansion and Contraction

(1) Fasteners for metal or vinyl cladding shall be positioned to permit expansion and contraction of the cladding.

#### 9.27.5.7. Penetration of Fasteners

(1) Fasteners for shakes and shingles shall penetrate through the nail-holding base or not less than 19 mm into the framing.

(2) Fasteners for cladding other than that described in Sentence (1) shall penetrate through the nail-holding base or not less than 25 mm into the framing.

#### 9.27.6. Lumber Siding

##### 9.27.6.1. Materials

(1) Lumber siding shall be sound, free of knot holes, loose knots, through checks or splits.

##### 9.27.6.2. Thickness and Width

(1) Drop, rustic, novelty, lapped board and vertical wood siding shall be not less than 14.3 mm thick and not more than 286 mm wide.

(2) Bevel siding shall be,

(a) not less than 5 mm thick at the top, and

(b) not less than,

(i) 12 mm thick at the butt for sidings 184 mm or less in width, and

(ii) 14.3 mm thick at the butt for sidings wider than 184 mm.

(3) Bevel siding shall be not more than 286 mm wide.

##### 9.27.6.3. Joints

(1) Lumber siding shall prevent water from entering at the joints by the use of lapped or matched joints or by vertical wood battens.

(2) Siding shall overlap not less than 1 mm per 16 mm width of lumber, but not less than,

(a) 9.5 mm for matched siding,

(b) 25 mm for lapped bevel siding, or

(c) 12 mm for vertical battens.

#### 9.27.7. Wood Shingles and Shakes

##### 9.27.7.1. Materials

(1) Shingles and shakes shall conform to,

(a) CSA O118.1, “Western Red Cedar Shakes and Shingles”, or

(b) CSA O118.2-M, “Eastern White Cedar Shingles”.

(2) Western cedar shakes shall be not less than No. 1 grade or Handsplit grade, and western cedar shingles not less than No. 2 grade, except that No. 3 grade may be used for undercoursing.

(3) Eastern white cedar shakes shall be at least B (clear) grade, except that C grade may be used for undercoursing.

##### 9.27.7.2. Width

(1) Shingles and shakes shall be not less than 65 mm or more than 350 mm wide.

##### 9.27.7.3. Fasteners

(1) Shingles or shakes shall be fastened with nails located approximately 20 mm from each edge and not less than 25 mm above the exposure line for single-course applications, or approximately 50 mm above the butt for double-course applications.

#### 9.27.7.4. Offsetting of Joints

(1) In single-course application, joints in succeeding courses shall be offset at least 40 mm so that joints in any two of three consecutive courses are staggered.

(2) In double-course application, joints in the outer course shall be offset from joints in the under-course by not less than 40 mm, and joints in succeeding courses shall be offset not less than 40 mm.

#### 9.27.7.5. Fastening to Lath

(1) When lath is used with double-course application (see Sentence 9.27.5.1.(5)), it shall be spaced according to the exposure and securely fastened to the framing.

(2) The butts of the under-course of the application referred to in Sentence (1) shall rest on the top edge of the lath.

(3) The outer course of the application referred to in Sentence (1) shall be fastened to the lath with nails of sufficient length to penetrate through the lath.

(4) The butts of the shingles or shakes shall be so located that they project not less than 12 mm below the bottom edge of the lath referred to in Sentence (1).

(5) If wood lath is not used, the butts of the under-course shingles or shakes of the application referred to in Sentence (1) shall be located 12 mm above the butts of the outer course.

#### 9.27.7.6. Exposure and Thickness

(1) The exposure and butt thickness of shingles and shakes shall conform to Table 9.27.7.6.

**Table 9.27.7.6.  
Exposure and Thickness of Wood Shingles and Shakes**

Forming Part of Sentence 9.27.7.6.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Shake or Shingle Length, mm	Maximum Exposure, mm		Minimum Butt Thickness, mm
		Single Coursing	Double Coursing	
1.	400	190	305	10
2.	450	216	356	11
3.	600	292	406	13

#### 9.27.8. Plywood

##### 9.27.8.1. Material Standards

(1) Plywood cladding shall be exterior type conforming to,

- (a) CSA O115-M, "Hardwood and Decorative Plywood",
- (b) CSA O121-M, "Douglas Fir Plywood",
- (c) CSA O151, "Canadian Softwood Plywood", or
- (d) CSA O153-M, "Poplar Plywood".

##### 9.27.8.2. Thickness

(1) Plywood cladding shall be not less than 6 mm thick when applied directly to sheathing.

(2) When applied directly to framing or over furring strips, plywood cladding thickness shall conform to Table 9.27.8.2.

**Table 9.27.8.2.  
Minimum Plywood Cladding Thickness**

Forming Part of Sentence 9.27.8.2.(2)

Item	Column 1	Column 2	Column 3
	Spacing of Supports, mm	Minimum Thickness, mm, where Face Grain Parallel to Supports	Minimum Thickness, mm, where Face Grain at Right Angles to Supports
1.	406	8	6
2.	610	11	8

(3) The thickness of grooved or textured plywood shall be measured at the point of least thickness.

##### 9.27.8.3. Edge Treatment

(1) The edges of plywood cladding shall be treated with a suitable paint or sealer.

##### 9.27.8.4. Panel Cladding

- (1) Plywood applied in panels shall have all edges supported.
- (2) Not less than a 2 mm gap shall be provided between panels referred to in Sentence (1).
- (3) Vertical joints in cladding referred to in Sentence (1) shall be protected with batten strips or caulking when the plywood joints are not matched.
- (4) Horizontal joints in cladding referred to in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

#### **9.27.8.5. Lapped Strip Siding**

- (1) Plywood applied in horizontal lapped strips shall have not less than a 2 mm gap provided at the butted ends, which shall be caulked.
- (2) The horizontal joints of siding described in Sentence (1) shall be lapped not less than 25 mm.
- (3) Wedges shall be inserted under all vertical butt joints and at all corners when horizontal lapped plywood is applied without sheathing.

#### **9.27.9. Hardboard**

##### **9.27.9.1. Material Standards**

- (1) Factory-finished hardboard cladding shall conform to CAN/CGSB-11.5M, "Hardboard, Precoated, Factory-Finished, for Exterior Cladding".
- (2) Hardboard cladding that is not factory finished shall conform to Types 1, 2 or 5 in CAN/CGSB-11.3-M, "Hardboard".

##### **9.27.9.2. Thickness**

- (1) Type 1 or 2 hardboard cladding shall be not less than,
  - (a) 6.0 mm thick when applied over sheathing that provides continuous support, and
  - (b) 7.5 mm thick when applied to furring or framing members not more than 406 mm o.c.
- (2) Type 5 hardboard cladding shall be not less than 9.0 mm thick when applied over sheathing that provides continuous support or over furring or framing members spaced not more than 406 mm o.c.
- (3) Where hardboard cladding is grooved, the grooves shall not extend more than 1.5 mm into the minimum required thickness.

##### **9.27.9.3. Panel Cladding**

- (1) Hardboard cladding applied in panels shall have all edges supported with not less than a 5 mm gap provided between sheets.
- (2) Vertical joints in cladding described in Sentence (1) shall be protected with batten strips or caulking when the joints are not matched.
- (3) Horizontal joints in cladding described in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

##### **9.27.9.4. Lapped Strip Siding**

- (1) Hardboard applied in horizontal lapped strips shall have not less than a 5 mm gap provided at the butted ends, which shall be caulked or otherwise protected with suitable mouldings.
- (2) The horizontal joints of siding described in Sentence (1) shall overlap not less than 1 mm per 16 mm width of siding board but not less than 9.5 mm for matched joint siding or 25 mm for lapped siding.

##### **9.27.9.5. Clearance**

- (1) Not less than 3 mm clearance shall be provided between hardboard siding and door or window frames.

#### **9.27.10. OSB and Waferboard**

##### **9.27.10.1. Material Standard**

- (1) OSB and waferboard cladding shall conform to CSA O437.0, "OSB and Waferboard".

##### **9.27.10.2. Thickness**

- (1) OSB conforming to O-2 grade shall be not less than 6.0 mm thick where applied directly to sheathing.
- (2) OSB conforming to O-2 grade applied directly to framing or over furring strips shall conform to the thickness shown for plywood in Table 9.27.8.2.
- (3) OSB conforming to O-1 grade and waferboard conforming to R-1 grade shall be not less than 7.9 mm thick where applied directly to sheathing.



(4) Where applied directly to framing or over furring strips, OSB conforming to O-1 grade and waferboard conforming to R-1 grade shall be not less than,

- (a) 9.5 mm thick on supports spaced not more than 406 mm o.c., and
- (b) 12.7 mm thick on supports spaced not more than 610 mm o.c.

#### **9.27.10.3. Panel Cladding**

- (1) OSB and waferboard applied in panels shall have all edges supported and treated with a primer or sealer.
- (2) Not less than a 3 mm gap shall be provided between sheets in cladding described in Sentence (1).
- (3) Vertical joints in cladding described in Sentence (1) shall be protected with batten strips or caulking when the OSB and waferboard joints are not matched.
- (4) Horizontal joints in cladding described in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

#### **9.27.10.4. Clearance**

- (1) At least a 3 mm clearance shall be provided between OSB and waferboard cladding and door or window frames.

#### **9.27.11. Metal**

##### **9.27.11.1. Material Standards**

- (1) Horizontal and vertical strip steel siding, including flashing and trim accessories, shall conform to CAN/CGSB-93.4, “Galvanized Steel and Aluminum-Zinc Alloy Coated Steel Siding, Soffits and Fascia, Prefinished, Residential”.
- (2) Steel sheet cladding shall have a minimum thickness of 0.3 mm and conform to CAN/CGSB-93.3-M, “Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use”.
- (3) Horizontal and vertical strip aluminum siding, including flashing and trim accessories, shall conform to CAN/CGSB-93.2-M, “Prefinished Aluminum Siding, Soffits and Fascia, for Residential Use”.
- (4) Aluminum sheet cladding shall conform to CAN/CGSB-93.1-M, “Sheet, Aluminum Alloy, Prefinished, Residential” and shall have a thickness of not less than 0.58 mm, except that siding supported by backing or sheathing shall have a thickness of not less than 0.46 mm.

#### **9.27.12. Vinyl Siding**

##### **9.27.12.1. Material Standard**

- (1) Vinyl siding, including flashing and trim accessories, shall conform to CAN/CGSB-41.24, “Rigid Vinyl Siding, Soffits and Fascia”.

##### **9.27.12.2. Attachment**

- (1) The attachment of vinyl siding shall conform to the requirements in Subsection 9.27.5. for metal siding.

#### **Section 9.28. Stucco**

##### **9.28.1. General**

###### **9.28.1.1. Sheathing Beneath Stucco**

- (1) Sheathing shall be provided beneath stucco applied over wood frame walls except as permitted in Article 9.28.4.2.
- (2) Where applied beneath stucco, sheathing shall conform to Subsection 9.23.16.

###### **9.28.1.2. Lath and Reinforcing**

- (1) Stucco lath or reinforcing shall be used to attach stucco to any substrate other than masonry.
- (2) Stucco lath or reinforcing shall be used to attach stucco to masonry where,
  - (a) the masonry is soft-burned tile or brick of less strength than the stucco, or
  - (b) the masonry surface is not sound, clean and sufficiently rough to provide a good key.
- (3) Stucco applied over masonry *chimneys* shall be reinforced.

###### **9.28.1.3. Concrete Masonry Units**

- (1) Stucco finish shall not be applied over concrete masonry units less than one month old unless the units have been cured by the autoclave process.

###### **9.28.1.4. Clearance over Ground Level**

- (1) Stucco shall be not less than 200 mm above finished ground level except when it is applied over concrete or masonry.

### 9.28.1.5. Flashing and Sealants

(1) Flashing and sealants used with stucco shall conform to Subsections 9.27.3. and 9.27.4., except that if aluminum flashing is used, it shall be separated from the stucco by an impervious membrane or coating.

### 9.28.2. Stucco Materials

#### 9.28.2.1. Portland Cement

(1) Portland cement shall conform to CAN/CSA-A3001, “Cementitious Materials for Use in Concrete”.

#### 9.28.2.2. Aggregate

(1) Aggregate shall be clean, well-graded natural sand or sand manufactured from crushed stone, gravel or air-cooled blast furnace slag and shall contain no significant amounts of deleterious material.

(2) Aggregate grading shall conform to Table 9.28.2.2.

**Table 9.28.2.2.  
Aggregate Grading for Stucco**

Forming Part of Sentence 9.28.2.2.(2)

Item	Column 1 Sieve Sizes, mm	Column 2	Column 3
		% Aggregate Passing Sieve	
		Maximum	Minimum
1.	4	—	100
2.	2	—	90
3.	1	90	60
4.	0.5	60	45
5.	0.25	30	10
6.	0.125	5	—

#### 9.28.2.3. Water

(1) Water shall be clean and free of significant amounts of deleterious material.

### 9.28.3. Fasteners

#### 9.28.3.1. Materials

(1) Fasteners for stucco lath or reinforcing shall be corrosion-resistant and of a material other than aluminum.

#### 9.28.3.2. Nails and Staples

(1) Nails for stucco lath or reinforcing shall be not less than 3.2 mm diam with a head diameter of not less than 11.1 mm.

(2) Staples for stucco lath reinforcing shall be not less than 1.98 mm diam or thickness.

(3) Staples and nails for attaching stucco lath or reinforcing to vertical surfaces shall be of sufficient length to penetrate 25 mm into framing members or to the full depth of the sheathing where the sheathing is used for attachment.

(4) On horizontal surfaces nails for stucco lath or reinforcing shall be not less than 38 mm long.

### 9.28.4. Stucco Lath

#### 9.28.4.1. Materials

(1) Rib lath or expanded metal stucco mesh shall be,

(a) copper-alloy steel coated with rust-inhibitive paint after fabrication, or

(b) galvanized.

(2) Woven or welded wire mesh shall be galvanized.

#### 9.28.4.2. No Sheathing Required

(1) Sheathing need not be provided beneath stucco where not less than 1.19 mm diam galvanized wire is applied horizontally to the framing at vertical intervals not exceeding 150 mm, or where paper-backed welded wire metal lath is used.

#### 9.28.4.3. Stucco Lath Specifications

(1) Stucco lath shall conform to Table 9.28.4.3.

**Table 9.28.4.3.  
Stucco Lath**

Forming Part of Sentence 9.28.4.3.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Location	Type of Lath	Minimum Diam. of Wire, mm	Maximum Mesh Opening	Minimum Mass, kg/m <sup>2</sup>
1.	Vertical surfaces	Welded or woven wire	1.15	25 mm	—
			1.30	38 mm	—
			1.50	51 mm	—
		Stucco mesh reinforcing (expanded metal)	—	25.8 cm <sup>2</sup>	0.98
2.	Horizontal surfaces	9.5 mm rib lath	—	—	1.84
		Cedar lath	—	—	—

**9.28.4.4. Self-Furring Devices**

(1) Stucco lath shall be held not less than 6 mm away from the backing by means of suitable self-furring devices.

**9.28.4.5. Application of Stucco Lath**

(1) Stucco lath shall be applied with the long dimension horizontal.

(2) Horizontal and vertical joints in stucco lath shall be lapped not less than 50 mm.

(3) End joints of stucco lath shall be staggered and shall occur over framing members.

(4) External corners of stucco lath shall be reinforced with a vertical strip of lath or reinforcing extending not less than 150 mm on both sides of the corner, or the lath or reinforcing shall extend around corners not less than 150 mm.

**9.28.4.6. Fastening**

(1) Stucco lath shall be fastened in conformance with Subsection 9.27.5.

(2) Fasteners on vertical surfaces shall be spaced not more than,

(a) 150 mm o.c. vertically and 406 mm o.c. horizontally, or

(b) 100 mm o.c. vertically and 610 mm o.c. horizontally.

(3) Nailing patterns other than those required in Sentence (2) are permitted to be used provided there are not fewer than 20 fasteners per square metre of wall surface.

(4) Fasteners on horizontal surfaces shall be spaced not more than,

(a) 150 mm o.c. along the framing members when members are spaced not more than 406 mm o.c., and

(b) 100 mm o.c. along members when members are spaced not more than 610 mm o.c.

**9.28.5. Stucco Mixes**

**9.28.5.1. Mixes**

(1) Stucco mixes shall conform to Table 9.28.5.1.

**Table 9.28.5.1.  
Stucco Mixes**

Forming Part of Sentence 9.28.5.1.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Materials, volume			
	Portland Cement	Masonry Cement	Lime	Aggregate
1.	1	—	0.25 to 1	3.25 to 4 parts per part of cementitious material
2.	1	1	—	

**9.28.5.2. Pigments**

(1) Pigment if used shall consist of pure mineral oxides inert to the action of sun, lime and cement.

(2) Pigment shall not exceed 6% of the portland cement by weight.

**9.28.5.3. Mixing**

(1) Materials shall be thoroughly mixed before and after water is added.

(2) Stucco shall be applied not later than 3 h after the initial mixing.

**9.28.6. Stucco Application**

### 9.28.6.1. Low Temperature Conditions

- (1) The base for stucco shall be maintained above freezing.
- (2) Stucco shall be maintained at a temperature of not less than 10°C during application and for not less than 48 h afterwards.

### 9.28.6.2. Number of Coats and Total Thickness

- (1) Stucco shall be applied with at least two base coats and one finish coat, providing a total thickness of not less than 15 mm, measured from the face of the lath or face of the masonry where no lath is used.

### 9.28.6.3. First Coat

- (1) The first coat shall be not less than 6 mm thick, measured from the face of the lath or masonry, fully embedding the lath.
- (2) The surface of the first coat shall be scored to provide a key with the second coat.

### 9.28.6.4. Second Coat

- (1) The second coat shall be not less than 6 mm thick.
- (2) The surface of the second coat shall be lightly roughened to provide a key with the finish coat if the finish coat is other than stone dash.

### 9.28.6.5. Finish Coat

- (1) When the finish coat is other than stone dash, the base shall be dampened but not saturated before the finish coat is applied.
- (2) The thickness of the finish coat shall be not less than 3 mm.
- (3) When a stone dash finish is used, the stone shall be partially embedded in the second coat before the second coat starts to set or stiffen.

## Section 9.29. Interior Wall and Ceiling Finishes

### 9.29.1. General

#### 9.29.1.1. Fire Protection and Sound Control

- (1) A wall or ceiling finish shall also conform to the appropriate requirements in Sections 9.10. and 9.11. in addition to the requirements in this Section.

### 9.29.2. Waterproof Wall Finish

#### 9.29.2.1. Where Required

- (1) Waterproof finish shall be provided to a height of not less than,
  - (a) 1 800 mm above the floor in shower stalls,
  - (b) 1 200 mm above the rims of bathtubs equipped with showers, and
  - (c) 400 mm above the rims of bathtubs not equipped with showers.

#### 9.29.2.2. Materials

- (1) Waterproof finish shall consist of ceramic, plastic or metal tile, sheet vinyl, tempered hardboard, laminated thermosetting decorative sheets or linoleum.

### 9.29.3. Wood Furring

#### 9.29.3.1. Size and Spacing of Furring

- (1) Wood furring for the attachment of wall and ceiling finishes shall conform to Table 9.29.3.1.

**Table 9.29.3.1.  
Size and Spacing of Furring**

Forming Part of Sentence 9.29.3.1.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Maximum Spacing of Furring, mm	Minimum Size of Furring, mm		
		Maximum Spacing of Furring Supports		
		Continuous Supports	406 mm (o.c.)	610 mm (o.c.)
1.	305	19 × 38	19 × 38	19 × 64
2.	406	19 × 38	19 × 38	19 × 64

3.	610	19 × 38	19 × 64	19 × 89
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**9.29.3.2. Fastening**

(1) Furring shall be fastened to the framing or to wood blocks with not less than 51 mm nails.

**9.29.4. Plastering**

**9.29.4.1. Application**

(1) Application of plaster wall and ceiling finishes, including installation of metal or gypsum lath, shall conform to CSA A82.30-M, “Interior Furring, Lathing and Gypsum Plastering”.

**9.29.5. Gypsum Board Finish (Taped Joints)**

**9.29.5.1. Application**

(1) The requirements for application of gypsum board in this Subsection apply to the single layer application of gypsum board to wood furring or framing using nails or screws.

(2) Gypsum board applications not described in this Subsection shall conform to CSA A82.31-M, “Gypsum Board Application”.

**9.29.5.2. Materials**

(1) Gypsum products shall conform to,

- (a) CAN/CSA-A82.27-M, “Gypsum Board”,
- (b) ASTM C1178 / C1178M, “Coated Glass Mat Water-Resistant Gypsum Backing Panel”, or
- (c) ASTM C1396 / C1396M, “Gypsum Board”.

**9.29.5.3. Maximum Spacing of Supports**

(1) Maximum spacing of supports for gypsum board applied as a single layer shall conform to Table 9.29.5.3.

**Table 9.29.5.3.  
Spacing of Supports for Gypsum Board**

Forming Part of Sentence 9.29.5.3.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Thickness, mm	Orientation of Board to Framing	Maximum Spacing of Supports, mm o.c. Walls	Ceilings Painted Finish	Water-Based Texture Finish
1.	Gypsum board conforming to Sentence 9.29.5.2.(1) (except Sections 9 and 12 of ASTM C1396 / C1396M)				
	9.5	Parallel	—	—	—
		perpendicular	406	406	—
	12.7	Parallel	610	406	—
		perpendicular	610	610	406
	15.9	Parallel	610	406	—
		perpendicular	610	610	610
2.	Gypsum board conforming to Clause 9.29.5.2.(1)(c) (only Section 12 of ASTM C1396 / C1396M)				
	12.7	Parallel	610	406	—
		perpendicular	610	610	610

**9.29.5.4. Support of Insulation**

(1) Gypsum board supporting insulation shall be at least 12.7 mm thick.

**9.29.5.5. Length of Fasteners**

(1) The length of fasteners for gypsum board shall conform to Table 9.29.5.5., except that lesser depths of penetration are permitted for assemblies required to have a *fire-resistance rating* provided it can be shown, on the basis of fire tests, that such depths are adequate for the required rating.

**Table 9.29.5.5.  
Fastener Penetration into Wood Supports**

Forming Part of Sentence 9.29.5.5.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Required <i>Fire-Resistance Rating</i> of Assembly	Minimum Penetration, mm			
		Walls		Ceilings	

		Nails	Screws	Nails	Screws
1.	Not required	20	15	20	15
2.	45 min	20	20	30	30
3.	1 h	20	20	45	45
4.	1.5 h	20	20	60	60

#### 9.29.5.6. Nails

(1) Nails for fastening gypsum board to wood supports shall conform to CSA B111, “Wire Nails, Spikes and Staples”.

#### 9.29.5.7. Screws

(1) Screws for fastening gypsum board to wood supports shall conform to ASTM C1002, “Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs”.

#### 9.29.5.8. Spacing of Nails

(1) For single-layer application on ceilings, nails shall be spaced,

- (a) not more than 180 mm o.c. on ceiling supports, or
- (b) every 300 mm o.c. along ceiling supports, in pairs about 50 mm apart.

(2) Where the ceiling sheets are supported by the wall sheets around the perimeter of the ceiling, this support may be considered as equivalent to nailing at this location.

(3) Except as required by Sentence (4), for single-layer application on walls, nails shall be spaced,

- (a) not more than 200 mm o.c. on vertical wall supports, or
- (b) every 300 mm o.c. along vertical wall supports, in pairs about 50 mm apart.

(4) For single-layer application on walls, where gypsum board is required to provide bracing, lateral support or fire protection, nails shall be spaced not more than 200 mm o.c. on,

- (a) vertical wall supports, and
- (b) top and bottom plates.

(5) The uppermost nails on vertical wall supports shall be not more than 200 mm below the ceiling.

(6) Nails shall be located not less than 10 mm from the side or edge of the board.

(7) Nails shall be driven so that the heads do not puncture the paper.

#### 9.29.5.9. Spacing of Screws

(1) For single-layer application on a ceiling, screws shall be spaced not more than 300 mm o.c. on ceiling supports.

(2) Where the ceiling sheets are supported by the wall sheets around the perimeter of the ceiling, this support may be considered as equivalent to screwing at this location.

(3) Except as required by Sentence (4), for single-layer application on walls, screws shall be spaced,

- (a) not more than 300 mm o.c. on vertical wall supports where the supports are more than 406 mm o.c., or
- (b) not more than 400 mm o.c. on vertical wall supports where the supports are not more than 406 mm o.c.

(4) Except as permitted by Sentence (5), for single-layer application on walls, where gypsum board is required to provide bracing, lateral support or fire protection, screws shall be spaced not more than 300 mm o.c. on,

- (a) vertical wall supports, and
- (b) top and bottom plates.

(5) Where a *fire-resistance rating* is determined based on Table 1 of MMAH Supplementary Standard SB-3, “Fire and Sound Resistance of Building Assemblies”, Sentence (4) need not apply for the purpose of fire protection.

(6) Screws shall be located not less than 10 mm from the side or edge of the board.

(7) Screws shall be driven so that the heads do not puncture the paper.

#### 9.29.5.10. Low Temperature Conditions

(1) In cold weather, heat shall be provided to maintain a temperature of not below 10°C for 48 h prior to taping and finishing and maintained for not less than 48 h after that.

### 9.29.6. Plywood Finish

#### 9.29.6.1. Thickness

(1) Except as provided in Sentences (2) and (3), the minimum thickness of plywood interior finish shall conform to Table 9.29.6.1.

**Table 9.29.6.1.  
Thickness of Plywood Interior Finish**

Forming Part of Articles 9.29.6.1., 9.29.6.2. and 9.29.9.2.

Item	Column 1	Column 2	Column 3
	Maximum Spacing of Supports, mm o.c.	Minimum Thickness, mm <sup>(1)</sup> , on Supports with no Horizontal Blocking	Minimum Thickness, mm <sup>(1)</sup> , on Supports with Blocking at Vertical Intervals not Exceeding 1.2 m
1.	406	4.7	4.0
2.	610	8.0	4.7

**Notes to Table 9.29.6.1.**

<sup>(1)</sup> Thickness limits shall apply to the net effective thickness (NET) of grooved, striated, textured and/or embossed panels and to the actual thickness of flat panels.

(2) A manufacturing tolerance of – 0.4 mm may be applied to the thicknesses listed in Table 9.29.6.1.

(3) No minimum thickness is required where plywood is applied over continuous backing.

**9.29.6.2. Grooved Plywood**

(1) Except as permitted in Sentence (2), where plywood for interior finish is grooved, the grooves shall not extend through the face ply and into the plies below the face ply unless the groove is supported by framing or furring.

(2) If the grain of the face ply is at right angles to the supporting members, the groove is permitted to extend into the plies below the face ply provided the thickness of the plywood exceeds the value shown in Table 9.29.6.1. by an amount equal to not less than the depth of penetration of the grooves into the plies below the face ply.

**9.29.6.3. Nails and Staples**

(1) Nails for attaching plywood finishes shall not be less than 38 mm casing or finishing nails spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports, except that staples providing equivalent lateral resistance may also be used.

**9.29.6.4. Edge Support**

(1) All plywood edges shall be supported by furring, blocking or framing.

**9.29.7. Hardboard Finish**

**9.29.7.1. Material Standard**

(1) Hardboard shall conform to CAN/CGSB-11.3-M, “Hardboard”.

**9.29.7.2. Thickness**

(1) Hardboard shall be not less than,

(a) 3 mm thick where applied over continuous back-up,

(b) 6 mm thick where applied to supports spaced not more than 406 mm o.c., and

(c) 9 mm thick where applied to supports spaced not more than 610 mm o.c.

**9.29.7.3. Nails**

(1) Nails for fastening hardboard shall be casing or finishing nails not less than 38 mm long, spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports.

**9.29.7.4. Edge Support**

(1) All hardboard edges shall be supported by furring, blocking or framing where the back-up is not continuous.

**9.29.8. Insulating Fibreboard Finish**

**9.29.8.1. Material Standard**

(1) Insulating fibreboard shall conform to CAN/ULC-S706, “Wood Fibre Thermal Insulation for Buildings”.

**9.29.8.2. Thickness**

(1) Insulating fibreboard sheets shall be not less than 11.1 mm thick on supports not more than 406 mm o.c.

(2) Insulating fibreboard tile shall be not less than 12.7 mm thick on supports spaced not more than 406 mm o.c.

### **9.29.8.3. Nails**

(1) Nails for fastening fibreboard sheets shall be not less than 2.6 mm shank diameter casing or finishing nails of sufficient length to penetrate not less than 20 mm into the supports.

(2) Nails shall be spaced not more than 100 mm o.c. along edge supports and 200 mm o.c. along intermediate supports.

### **9.29.8.4. Edge Support**

(1) All fibreboard edges shall be supported by blocking, furring or framing.

## **9.29.9. Particleboard, OSB or Waferboard Finish**

### **9.29.9.1. Material Standard**

(1) Particleboard finish shall conform to ANSI A208.1, "Particleboard".

(2) OSB or waferboard finish shall conform to,

(a) CAN/CSA-O.325, "Construction Sheathing", or

(b) CSA O437.0, "OSB and Waferboard".

### **9.29.9.2. Minimum Thickness**

(1) Except as provided in Sentences (2) and (3), the minimum thickness of O-2 grade OSB used as an interior finish shall conform to that shown for plywood in Table 9.29.6.1.

(2) Thickness listed in Table 9.29.6.1. shall permit a manufacturing tolerance of – 0.4 mm.

(3) No minimum thickness is required where O-2 grade OSB is applied over continuous backing.

(4) OSB conforming to O-1 grade, waferboard conforming to R-1 grade and particleboard shall be,

(a) not less than 6.35 mm thick on supports not more than 406 mm o.c.,

(b) not less than 9.5 mm thick on supports not more than 610 mm o.c., and

(c) not less than 6.35 mm thick on supports not more than 610 mm o.c. in walls where blocking is provided at midwall height.

(5) OSB conforming to CAN/CSA-O325.0, "Construction Sheathing", shall meet the minimum panel mark of,

(a) W16, on supports not more than 406 mm o.c.,

(b) W24, on supports not more than 610 mm o.c., and

(c) W16, on supports not more than 610 mm o.c. where blocking is provided at midwall height.

### **9.29.9.3. Nails**

(1) Nails for fastening particleboard, OSB or waferboard shall be not less than 38 mm casing or finishing nails spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports.

### **9.29.9.4. Edge Support**

(1) All particleboard, OSB or waferboard edges shall be supported by furring, blocking or framing.

## **9.29.10. Wall Tile Finish**

### **9.29.10.1. Tile Application**

(1) Ceramic tile shall be set in a mortar base or applied with an adhesive.

(2) Plastic tile shall be applied with an adhesive.

### **9.29.10.2. Mortar Base**

(1) When ceramic tile is applied to a mortar base the cementitious material shall consist of one part Portland cement to not more than one-quarter part lime by volume.

(2) The cementitious material described in Sentence (1) shall be mixed with no fewer than three nor more than five parts of aggregate per part of cementitious material by volume.

(3) Mortar shall be applied over metal lath or masonry.

(4) Ceramic tile applied to a mortar base shall be thoroughly soaked and pressed into place forcing the mortar into the joints while the tile is wet.

### **9.29.10.3. Adhesives**



(1) Adhesives to attach ceramic and plastic tile shall be applied to the finish coat or brown coat of plaster that has been steel-trowelled to an even surface or to gypsum board or to masonry provided the masonry has an even surface.

#### **9.29.10.4. Moisture Resistant Backing**

(1) Ceramic and plastic tile installed on walls around bathtubs or showers shall be applied over moisture resistant backing.

#### **9.29.10.5. Joints between Tiles and Bathtub**

(1) The joints between wall tiles and a bathtub or shower shall be suitably caulked with material conforming to CAN/CGSB-19.22-M, "Mildew Resistant Sealing Compound for Tubs and Tile".

### **Section 9.30. Flooring**

#### **9.30.1. General**

##### **9.30.1.1. Required Finish Flooring**

(1) Finished flooring shall be provided in all *residential occupancies*.

##### **9.30.1.2. Water Resistance**

(1) Finished flooring in bathrooms, kitchens, public entrance halls, laundry and general storage areas shall consist of resilient flooring, felted-synthetic-fibre floor coverings, concrete, terrazzo, ceramic tile, mastic or other types of flooring providing similar degrees of water resistance.

##### **9.30.1.3. Sleepers**

(1) Wood sleepers supporting finished flooring over a concrete base supported on the ground shall be not less than 19 mm by 38 mm and shall be treated with a wood preservative.

##### **9.30.1.4. Finish Quality**

(1) Finished flooring shall have a surface that is smooth, even and free from roughness or open defects.

#### **9.30.2. Panel-Type Underlay**

##### **9.30.2.1. Required Underlay**

(1) A panel-type underlay shall be provided under resilient flooring, parquet flooring, ceramic tile, felted-synthetic-fibre floor coverings or carpeting laid over lumber subflooring.

(2) A panel-type underlay shall be provided under resilient flooring, parquet flooring, felted-synthetic-fibre floor coverings or carpeting on panel-type subflooring whose edges are unsupported.

(3) Panel-type underlay shall be provided under ceramic tile applied with adhesive.

(4) Panel-type underlay shall be provided under resilient flooring on waferboard or strandboard subflooring.

##### **9.30.2.2. Materials and Thickness**

(1) Panel-type underlay shall be not less than 6 mm thick and shall conform to,

- (a) ANSI A208.1, "Particleboard",
- (b) CAN/CGSB-11.3-M, "Hardboard",
- (c) CSA O115-M, "Hardwood and Decorative Plywood",
- (d) CSA O121-M, "Douglas Fir Plywood",
- (e) CSA O151, "Canadian Softwood Plywood",
- (f) CSA O153-M, "Poplar Plywood", or
- (g) CSA O437.0, "OSB and Waferboard".

##### **9.30.2.3. Fastening**

(1) Panel-type underlay shall be fastened to the subfloor with staples, annular grooved flooring nails or spiral nails, spaced not more than 150 mm o.c. along the edges and 200 mm o.c. both ways at other locations.

(2) Nails for panel-type underlay shall be not less than 19 mm long for 6 mm thick underlay and 22 mm long for 7.9 mm thick underlay.

(3) Staples for panel-type underlay shall,

- (a) have not less than a 1.2 mm shank diameter or thickness with a 4.7 mm crown, and
- (b) be not less than,

- (i) 22 mm long for 6 mm underlay, and
- (ii) 28 mm long for 7.9 mm and 9.5 mm underlay.

**9.30.2.4. Joints Offset**

(1) Where panel-type underlay is required to be installed over plywood, or OSB or waferboard, the joints in the underlay shall be offset at least 200 mm from the joints in the underlying subfloor.

**9.30.2.5. Surface Defects**

(1) Underlay beneath resilient or ceramic floors applied with an adhesive shall have all holes or open defects on the surface patched so that the defects will not be transmitted to the finished surface.

**9.30.3. Wood Strip Flooring**

**9.30.3.1. Thickness**

(1) The thickness of wood strip flooring shall conform to Table 9.30.3.1.

**Table 9.30.3.1.**  
**Thickness of Wood Strip Flooring**  
Forming Part of Sentence 9.30.3.1.(1)

Item	Column 1	Column 2	Column 3	Column 4
	Type of Flooring	Maximum Joist Spacing, mm	Minimum Thickness of Flooring, mm	
			With Subfloor	No Subfloor
1.	Matched hardwood (interior use only)	406	7.9	19.0
		610	7.9	33.3
2.	Matched softwood (interior or exterior use)	406	19.0	19.0
		610	19.0	31.7
3.	Square edge softwood (exterior use only)	406	—	25.4
		610	—	38.1

**9.30.3.2. Strip Direction and End Joints**

(1) Wood strip flooring shall not be laid parallel to lumber subflooring unless a separate underlay is provided.

(2) If wood strip flooring is applied without a subfloor, it shall be laid at right angles to the joists so that the end joints are staggered and occur over supports or are end matched.

(3) If the flooring is end matched, it shall be laid so that no two adjoining strips break joints in the same space between supports and each strip bears on no fewer than two supports.

**9.30.3.3. Nailing**

(1) When nails are used, wood strip flooring shall be toe nailed or face nailed with at least one nail per strip at the spacings shown in Table 9.30.3.3., except that face nailed strips of more than 25 mm in width shall have at least two nails per strip.

(2) Face nails shall be countersunk.

**Table 9.30.3.3.**  
**Nailing of Wood Strip Flooring**  
Forming Part of Sentence 9.30.3.3.(1)

Item	Column 1	Column 2	Column 3
	Finish Floor Thickness, Mm	Minimum Length of Flooring Nails, mm	Maximum Spacing of Flooring Nails, mm
1.	7.9	38 <sup>(1)</sup>	200
2.	11.1	51	300
3.	19.0	57	400
4.	25.4	63	400
5.	31.7	70	600
6.	38.1	83	600

Notes to Table 9.30.3.3.:

<sup>(1)</sup> See Article 9.30.3.4.

**9.30.3.4. Staples**

(1) Staples are permitted to be used to fasten wood strip flooring not more than 7.9 mm in thickness and not more than 50 mm in width provided the staples,

- (a) are not less than 29 mm long,

- (b) have a shank diameter of not less than 1.19 mm,
- (c) have a crown of not less than 4.7 mm, and
- (d) are spaced not more than 400 mm o.c.

(2) Staples are permitted to be used to fasten wood strip flooring not more than 19 mm in thickness and not more than 83 mm in width provided the staples,

- (a) are not less than 51 mm long,
- (b) have a shank diameter of not less than 1.82 mm,
- (c) have a crown of not less than 12.7 mm, and
- (d) are spaced not more than 400 mm o.c.

#### **9.30.4. Parquet Flooring**

##### **9.30.4.1. Adhesive**

(1) Adhesive used to attach parquet block flooring shall be suitable for bonding wood to the applicable subfloor material.

#### **9.30.5. Resilient Flooring**

##### **9.30.5.1. Materials**

(1) Resilient flooring used on concrete slabs supported on ground shall consist of asphalt, rubber, vinyl-asbestos, unbacked vinyl or vinyl with an inorganic type backing.

(2) Flooring described in Sentence (1) shall be attached to the base with a suitable waterproof and alkali-resistant adhesive.

#### **9.30.6. Ceramic Tile**

##### **9.30.6.1. Substrate**

(1) Ceramic tile shall be set in a mortar bed or applied to a sound smooth base with a suitable adhesive.

(2) Panel-type subfloor to which ceramic tile is to be applied with adhesive shall have its edges supported according to Article 9.23.14.3.

### **Section 9.31. Plumbing Facilities**

#### **9.31.1. Scope**

##### **9.31.1.1. Application**

(1) Except as provided in Sentence (2), this Section applies to *plumbing* facilities and *plumbing systems* serving *dwelling units*.

(2) *Plumbing* facilities, grab bars, floor drains and floor and wall finishes around urinals shall conform to Subsection 3.7.4. and Article 7.1.5.2. in,

- (a) a *recreational camp*,
- (b) a *camp for housing of workers*, or
- (c) all other *buildings* not described in Sentence (1).

(3) Medical gas piping systems shall conform to Subsection 3.7.5.

#### **9.31.2. General**

##### **9.31.2.1. General**

(1) The *construction of plumbing systems* shall conform to Part 7.

##### **9.31.2.2. Corrosion Protection**

(1) Metal pipes in contact with cinders or other corrosive material shall be protected by a heavy coating of bitumen or other corrosion protection.

##### **9.31.2.3. Grab Bars**

(1) When provided, grab bars shall be capable of resisting a load of not less than 1.3 kN applied vertically or horizontally.

#### **9.31.3. Water Supply and Distribution**

##### **9.31.3.1. Required Water Supply**

(1) Every *dwelling unit* shall be supplied with a *water distribution system* where a *drinking water system* is available.

#### **9.31.3.2. Required Connections**

(1) In a *dwelling unit* with a *water distribution system*, piping for hot and cold water shall be connected to every kitchen sink, lavatory, bathtub, shower, slop sink and laundry area.

(2) Piping for cold water shall be run to every water closet.

#### **9.31.4. Required Facilities**

##### **9.31.4.1. Required Fixtures**

(1) A *dwelling unit* with a *water distribution system* shall contain,

(a) a kitchen sink,

(b) a lavatory,

(c) a bathtub or shower stall, and

(d) a water closet or a drainless composting toilet.

##### **9.31.4.2. Laundry Fixtures**

(1) Laundry facilities or a space for laundry facilities shall be provided in every *dwelling unit* or grouped elsewhere in the *building* in a location conveniently accessible to occupants of every *dwelling unit*.

##### **9.31.4.3. Hot Water Supply**

(1) In a *dwelling unit* with a *water distribution system*, a hot water supply shall be provided.

(2) A *water distribution system* supplying hot water to *plumbing fixtures* shall conform to the requirements in Subsection 7.6.5.

##### **9.31.4.4. Floor Drains**

(1) A floor drain shall be installed in a *basement* forming part of a *dwelling unit*.

#### **9.31.5. Reserved**

#### **9.31.6. Service Water Heating Facilities**

##### **9.31.6.1. Hot Water Temperature**

(1) Where a hot water supply is required by Article 9.31.4.3., equipment shall be installed to provide to every *dwelling unit* an adequate supply of service hot water with a temperature range from 45°C to 60°C.

(2) An electric *storage-type service water heater* shall have a minimum set storage temperature of 60°C.

##### **9.31.6.2. Equipment and Installation**

(1) Every *service water heater* and its installation shall conform to Part 7.

(2) Reserved

(3) Where the *building* is in a location where the spectral response acceleration,  $S_a(0.2)$ , is greater than 0.55, *service water heaters* shall be secured to the structure to resist overturning and displacement.

##### **9.31.6.3. Corrosion-Resistant Coating**

(1) Where storage tanks for *service water heaters* are steel, they shall be coated with zinc, vitreous enamel (glass lined), hydraulic cement or other corrosion-resistant material.

##### **9.31.6.4. Fuel-Burning Heaters**

(1) Fuel-burning *service water heaters* shall be connected to a *chimney flue* conforming to Section 9.21.

##### **9.31.6.5. Heating Coils**

(1) Heating coils of *service water heaters* shall not be installed in a *flue* or in the combustion chamber of a *boiler* or furnace heating a *building*.

### **Section 9.32. Ventilation**

#### **9.32.1. General**

##### **9.32.1.1. Application**

(1) This Section applies to the ventilation of rooms and spaces in *residential occupancies* by natural ventilation and to self-contained mechanical ventilation systems serving only one *dwelling unit*.

- (2) Mechanical ventilation systems, other than self-contained systems serving single *dwelling units*, shall conform to Part 6.
- (3) Ventilation of rooms and spaces in other than *residential occupancies* shall conform to Part 6.
- (4) A *storage garage* for more than five cars shall be ventilated in accordance with Part 6.
- (5) A clothes dryer exhaust duct system shall conform to Part 6.

**9.32.1.2. Mechanical Ventilation for Dwelling Units**

(1) Every *dwelling unit* that is supplied with electrical power shall be provided with a mechanical ventilation system in accordance with Subsection 9.32.3.

**9.32.1.3. Ventilation of Rooms and Spaces**

(1) Except as permitted in Sentence (2), rooms or spaces in a *dwelling unit* shall be ventilated by natural means in accordance with Subsection 9.32.2.

(2) The natural ventilation of rooms or spaces required in Sentence (1) may be provided by mechanical means.

(3) Where a room or space is not provided with natural ventilation as described in Sentence (1), mechanical ventilation shall be provided to exhaust inside air from or to introduce outside air to that room or space at the rate of one-half air change per hour if the room or space is mechanically cooled in summer, and one air change per hour if it is not.

**9.32.2. Natural Ventilation**

**9.32.2.1. Natural Ventilation Area**

(1) The unobstructed openable ventilation area to the outdoors for rooms and spaces in residential *buildings* ventilated by natural means shall conform to Table 9.32.2.1.

**Table 9.32.2.1.  
Natural Ventilation**

Forming Part of Sentence 9.32.2.1.(1)

Item	Column 1	Column 2	Column 3
	Location		Minimum Unobstructed Area
1.	Within a <i>dwelling unit</i>	Bathrooms or water closet rooms	0.09 m <sup>2</sup>
		Unfinished <i>basement</i> space	0.2 per cent of the floor area
		Dining rooms, living rooms, bedrooms, kitchens, combined rooms, dens, recreation rooms and all other finished rooms	0.28 m <sup>2</sup> per room or combination of rooms
2.	Other than within a <i>dwelling unit</i>	Bathrooms or water closet rooms	0.09 m <sup>2</sup> per water closet
		Sleeping areas	0.14 m <sup>2</sup> per occupant
		Laundry rooms, kitchens, recreation rooms	4 per cent of the floor area
		Corridors, storage rooms and other similar public rooms or spaces	2 per cent of the floor area
		Unfinished <i>basement</i> space not used on a shared basis	0.2 per cent of the floor area

(2) Where a vestibule opens directly off a living or dining room within a *dwelling unit*, ventilation to the outdoors for such rooms may be through the vestibule.

**9.32.2.2. Protection from Weather and Insects**

(1) Openings for natural ventilation other than windows shall be constructed to provide protection from the weather and insects.

(2) Screening shall be of rust-proof material.

**9.32.3. Mechanical Ventilation**

**9.32.3.1. General**

(1) For the purposes of this Subsection a non-solid fuel-fired *appliance* shall be classified as,

- (a) direct vented whereby the combustion air is supplied directly from the outdoors to the combustion chamber via a sealed passageway, and the products of combustion are exhausted directly outdoors through an independent sealed vent,
- (b) mechanically vented induced draft whereby combustion air is supplied from within the *building* envelope and the products of combustion are positively conveyed to the outdoors by means of a dedicated sealed vent, or
- (c) natural draft whereby combustion air is supplied from within the *building* envelope and the products of combustion are conveyed to the outdoors through a *chimney* or Type B vent.

(2) For the purposes of this Subsection a *dwelling unit* shall be categorized as,

- (a) Type I when,
  - (i) all fuel-fired combustion *appliances* located in the *dwelling unit* are direct vented or, except for fireplaces, are mechanically vented induced draft, and
  - (ii) the *dwelling unit* does not contain a solid fuel-fired combustion *appliance*,
- (b) Type II when a solid fuel-fired combustion *appliance* is installed in a Type I *dwelling unit*,
- (c) Type III when a mechanically vented induced draft non-solid fuel-fired fireplace or a natural draft *appliance* is present, or
- (d) Type IV when *electric space heating* is present.

**9.32.3.2. Required Mechanical Ventilation**

- (1) The mechanical ventilation system required in Article 9.32.1.2. shall comply with,
  - (a) Part 6, or
  - (b) this Subsection for a mechanical ventilation system in a Type I, Type II or Type IV *dwelling unit*.

**9.32.3.3. Total Ventilation Capacity**

(1) The minimum total ventilation capacity of the ventilation system required in Clause 9.32.3.2.(1)(b) shall be the sum of the individual room capacities given in Table 9.32.3.3.

**Table 9.32.3.3.  
Ventilation Capacity**

Forming Part of Sentence 9.32.3.3.(1)

Item	Column 1	Column 2
	Room	Capacity, L/s
1.	Master bedroom <sup>(1)</sup>	10
2.	Other bedrooms	5
3.	Living room <sup>(2)</sup>	5
4.	Dining room <sup>(2)</sup>	5
5.	Kitchen	5
6.	Family room <sup>(2)</sup>	5
7.	Recreation room	5
8.	Basement <sup>(3)</sup>	10
9.	Other habitable rooms <sup>(4)</sup>	5
10.	Bathroom or water closet room	5
11.	Laundry room	5
12.	Utility room	5

**Notes to Table 9.32.3.3.:**

- (1) At least one bedroom in each *dwelling unit* shall be designated as the master bedroom.
- (2) Ventilation capacities assigned to any combined living/dining or family/dining space shall be determined as if the spaces were individual rooms.
- (3) Where a *basement* incorporates rooms of the types designated in this Table, the assigned ventilation capacities for each room shall be as specified for those types of rooms. *Basement* areas used for other purposes that exceed  $\frac{2}{3}$  of the total *basement* floor area shall be assigned a fan capacity of 10 L/s. Those that are less than  $\frac{2}{3}$  of the total floor area shall be assigned 5 L/s.
- (4) Other habitable rooms shall be assigned a ventilation capacity of 5 L/s. This does not include spaces intended solely for access, egress, storage or service equipment.

**9.32.3.4. Principal Exhaust**

(1) A principal exhaust fan shall be installed and shall be rated to provide not less than the capacity given in Table 9.32.3.4.A.

**Table 9.32.3.4.A.  
Principal Exhaust Fan Capacity**

Forming Part of Sentence 9.32.3.4.(1)

Item	Column 1	Column 2
	Number of Bedrooms in <i>Dwelling Unit</i>	Capacity, L/s

1.	1	15
2.	2	22.5
3.	3	30
4.	4	37.5
5.	5	45
6.	More than 5	System must comply with Sentence 6.2.1.1.(1)

(2) Except as permitted in Sentence (3), the principal exhaust fan shall be controlled by a manual switch.

(3) A principal exhaust fan required under this Article may be controlled by a dehumidistat or other automatic control device where the manual switch required in Sentence (2) is capable of activating the fan regardless of the setting of the automatic control.

(4) The switches required in Sentences (2) and (3) shall be centrally located in the *dwelling unit* and shall be identified with the words **VENTILATION FAN**.

(5) The principal exhaust required in this Article may be provided by means of a heat recovery ventilator installed in accordance with Article 9.32.3.11.

(6) Where the installed capacity of the principal exhaust fan exceeds the minimum capacity required in Sentence (1) by more than 50%, the control required in Sentence (2) shall include provision to allow reduction of the flow to within  $\pm 10\%$  of the minimum capacity specified in Sentence (1).

(7) Where an exhaust air intake for the principal exhaust fan is connected directly to the duct system of a forced air heating system or other central air circulating system, it shall,

- (a) be connected to the return air side of the system, and
- (b) be connected not less than 1 000 mm upstream from any outdoor air supply duct.

(8) Where an exhaust air intake for the principal exhaust fan is located in the kitchen, it shall be located in the ceiling or on the wall within 300 mm of the ceiling.

(9) Single or multiple *exhaust ducts* serving the principal exhaust fan required by Sentence (1) shall be sized according to Part 6 except that they may be sized according to Table 9.32.3.4.B. where,

- (a) the longest total duct length, from intake grille to outdoor hood, does not exceed 12 m, and
- (b) the number of elbows does not exceed 4,

but, in any case, they shall not be smaller than recommended by the manufacturer of the fan.

**Table 9.32.3.4.B.  
Principal Exhaust Duct Size**

Forming Part of Sentences 9.32.3.4.(9) and (10)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Number of Bedrooms in <i>Dwelling Unit</i>	Minimum <i>Exhaust Duct</i> Diameter			
		Ducts Connected to Inlet and Outlet of Principal Exhaust Fan		Ducts Connected to One Side Only of Principal Exhaust Fan	
		Smooth Duct, mm	Flexible Duct, mm	Smooth Duct, mm	Flexible Duct, mm
1.	1	100	125	100	125
2.	2	125	150	125	150
3.	3	125	150	150	175
4.	4	150	175	150	175
5.	5	150	175	150	175
6.	More than 5	Part 6 design	Part 6 design	Part 6 design	Part 6 design

(10) In applying Table 9.32.3.4.B.,

- (a) where there is more than one exhaust air inlet duct connected directly to the fan, the diameter of the inlet ducts may be decreased by 25 mm, and
- (b) where the *exhaust duct* is connected to the duct system of a forced air heating system, the duct diameter shall be increased by 25 mm.

**9.32.3.5. Supplemental Exhaust**

(1) Additional supplemental exhaust capacity shall be installed as necessary so that the total capacity of all kitchen, bathroom, water closet room and other supplemental exhaust air intakes is not less than the total ventilation capacity, as required in Article 9.32.3.3., minus the principal exhaust fan capacity, as required in Article 9.32.3.4.

- (2) An exhaust air intake shall be installed in each kitchen, bathroom and water closet room.
- (3) Where the intake for a supplemental exhaust fan, other than a cooking *appliance* exhaust fan serving a *cooktop*, is installed in a kitchen, it shall be installed in the ceiling or on the wall within 300 mm of the ceiling.
- (4) *Exhaust ducts* serving the required kitchen, bathroom, water closet room and other supplemental exhaust air intakes shall be sized according to Part 6 except that they may be sized according to Table 9.32.3.5. where,
- (a) the total duct length does not exceed 9 m, and
  - (b) the number of elbows does not exceed 4,
- but, in any case, they shall not be smaller than recommended by the manufacturer of the fans.

**Table 9.32.3.5.  
Kitchen, Bathroom and Water Closet Room Exhaust Duct Size**

Forming Part of Sentence 9.32.3.5.(4)

Item	Column 1	Column 2	Column 3
	Fan Capacity, L/s	Minimum <i>Exhaust Duct Diameter</i> <sup>(1)</sup>	
		Ducts Connected to Inlet and Outlet of Exhaust Fan, mm	Ducts Connected to One Side Only of Exhaust Fan, mm
1.	25	125	125
2.	50	150	150

**Notes to Table 9.32.3.5.:**

<sup>(1)</sup> Where flexible duct is used, the duct diameter shall be increased by 25 mm.

(5) A supplemental exhaust fan required by this Article shall be controlled by a manual switch located in the room served by the exhaust fan.

(6) Where the supplemental exhaust is provided by an exhaust fan serving multiple exhaust air intakes required in rooms described in Sentence (2), the exhaust fan shall be controlled by a manual switch located in each room served by that exhaust fan and wired in parallel.

(7) Where the supplemental exhaust is provided by a principal exhaust fan serving multiple exhaust air intakes required in rooms described in Sentence (2), the principal exhaust fan shall be controlled by a manual switch located in each room served by that exhaust fan and wired in parallel with the manual switch required in Sentence 9.32.3.4.(4).

(8) Where a supplemental fan required by this Article is controlled by a dehumidistat or other automatic control device in addition to the manual switch required by Sentences (5) to (7), the manual switch shall be capable of activating the fan regardless of the setting of the automatic control.

(9) Supplemental exhaust required in this Article may be provided by means of a heat recovery ventilator installed in accordance with Article 9.32.3.11.

**9.32.3.6. Ventilation Systems Coupled with Forced Air Heating Systems**

(1) This Article applies to a mechanical ventilation system in a *dwelling unit* that contains a forced air heating system which is used for delivery of ventilation air.

(2) In a Type I *dwelling unit*, a ventilation supply inlet is not required.

(3) In a Type II *dwelling unit*, the mechanical ventilation system shall include a heat recovery ventilator, coupled to the forced air heating system, installed in accordance with Article 9.32.3.11.

(4) The forced air heating system circulation fan shall be controlled by a manual switch located adjacent to the ventilation fan switch required in Sentence 9.32.3.4.(4).

(5) The switch required in Sentence (4) shall be identified by the words **CIRCULATION FAN**.

**9.32.3.7. Ventilation Systems Not Coupled with Forced Air Heating Systems**

(1) This Article applies to a mechanical ventilation system in a *dwelling unit* that,

- (a) does not contain a forced air heating system, or
- (b) contains a forced air heating system which is not used for circulation of the ventilation air.

(2) The mechanical ventilation system shall introduce air to and circulate air throughout the *dwelling unit* in compliance with this Article.

(3) The mechanical system in this Article shall include a heat recovery ventilator installed in accordance with Article 9.32.3.11.



(4) Outdoor air shall be distributed by a ductwork system from the heat recovery ventilator required in Sentence (3) to each bedroom, to any *storey* without a bedroom and, if there is no *storey* without a bedroom, to the principal living area.

(5) A *supply duct* from the outdoors to the heat recovery ventilator required in Sentence (3) and a main distribution trunk duct shall be provided and shall be sized according to Part 6, except that the *supply duct* and the main distribution trunk duct may be sized according to Table 9.32.3.7.A. where,

- (a) the total duct length from the outdoor hood to any supply register does not exceed 21 m, and
- (b) the total number of fittings does not exceed 8.

**Table 9.32.3.7.A.  
Minimum Outdoor Air Supply and Main Trunk Duct Sizes**

Forming Part of Sentence 9.32.3.7.(5)

Item	Column 1	Column 2
	Number of Bedrooms in <i>Dwelling Unit</i>	Minimum Outdoor Air Supply and Main Distribution Trunk Duct Diameter, mm
1.	1	150
2.	2	150
3.	3	175
4.	4	175
5.	5	175
6.	More than 5	System must comply with Sentence 6.2.1.1.(1)

(6) The outside air *supply duct* required by Sentence (5) shall not be considered to provide combustion and/or dilution air to fuel-burning *appliances*.

(7) Branch *supply ducts* leading from the main distribution trunk duct required by Sentence (5) to the rooms to which outdoor air is to be distributed shall be provided and shall be sized according to Part 6, except that the branch *supply ducts* may be sized according to Table 9.32.3.7.B. where,

- (a) the total duct length from the outdoor hood to any supply register does not exceed 21 m, and
- (b) the total number of fittings does not exceed 8.

**Table 9.32.3.7.B.  
Minimum Branch Supply Duct Sizes**

Forming Part of Sentence 9.32.3.7.(7)

Item	Column 1	Column 2	Column 3
		Minimum Branch <i>Supply Duct</i> Diameter, mm	
		1 and 2 Bedroom <i>Dwelling Units</i>	3, 4 and 5 Bedroom <i>Dwelling Units</i>
1.	Master bedroom	100	100
2.	Other bedrooms	75	75
3.	<i>Storey</i> with no bedrooms or living area	75	100

(8) In applying Sentence (7), where the *dwelling unit* has more than 5 bedrooms, ducting shall be sized according to Part 6.

(9) All branch *supply ducts* that are not fitted with diffusers with adjustable balance stops shall be supplied with accessible dampers that can be adjusted and fixed in their adjusted positions and that include devices to indicate the positions of the dampers.

(10) Provision shall be made for the free flow of air to all rooms by leaving gaps beneath doors, using louvred doors or installing grilles in doors.

**9.32.3.8. Protection Against Depressurization**

(1) When determining the need to provide protection against depressurization, consideration must be given to,

- (a) whether the presence of *soil* gas is deemed to be a problem, and
- (b) the presence of solid fuel-fired combustion *appliances*.

(2) Where a solid fuel-fired combustion *appliance* is installed, the ventilation system shall include a heat recovery ventilator that is designed to operate so that the flow of exhaust air does not exceed the flow of intake air in any operating mode, and that complies with the requirements of Article 9.32.3.11.

(3) The provision of make-up air is not required for mechanical exhausting devices operating a subfloor depressurization system installed for the purpose of reducing the risk of radon ingress.

**9.32.3.9. Fan Ratings**

- (1) Except as provided in Sentence (4), capacity ratings for required fans shall be determined in accordance with,
- (a) CAN/CSA-C260-M, “Rating the Performance of Residential Mechanical Ventilating Equipment”, or
  - (b) HVI 916, “Airflow Test Procedure”.
- (2) Sound ratings for required fans shall be determined in accordance with,
- (a) CAN/CSA-C260-M, “Rating the Performance of Residential Mechanical Ventilating Equipment”, or
  - (b) HVI 915, “Procedure for Loudness Rating of Residential Fan Products”.
- (3) Capacity ratings for required fans shall be based on a static pressure differential of 50 Pa, 25 Pa or 7.5 Pa depending on whether the fan is installed with ductwork connected on both sides, one side or neither side, respectively.
- (4) Except for heat recovery ventilators, exhaust fans required to make up any part of the total ventilation capacity required by Article 9.32.3.3. shall have a sound rating not greater than that specified in Table 9.32.3.9.

**Table 9.32.3.9.  
Fan Sound Rating**

Forming Part of Sentence 9.32.3.9.(4)

Item	Column 1	Column 2	Column 3
	Fan Application	Maximum Sound Rating, sones	
		Rated according to CAN/CSA-C260-M	Rated according to HVI 915
1.	Principal exhaust fan	2.0	2.5
2.	Supplemental exhaust fans installed in bathrooms and water closet rooms and their make-up air fans	2.5	3.5
3.	Supplemental exhaust fans installed in kitchens and their make-up air fans	no rating required	no rating required

(5) Required fans shall be installed according to the manufacturer's instructions.

(6) Mechanical ventilation devices shall conform to CSA C22.2 No. 113-M, “Fans and Ventilators”.

**9.32.3.10. Ducts**

(1) Ventilation ducts shall conform to the requirements of Part 6 for *supply ducts*, except that *exhaust ducts* that serve only a bathroom or water closet room may be of *combustible* material provided the duct is reasonably airtight and constructed of a material impervious to water.

(2) *Exhaust ducts* shall not discharge into heated or unheated enclosed spaces.

(3) Where an *exhaust duct* passes through or is adjacent to unheated space, the duct shall be insulated to not less than RSI 0.5.

(4) Where a duct carrying outdoor air that is not tempered or not mixed with indoor air passes through heated space, it shall be insulated to not less than RSI 0.5 except that, where such a duct is exposed in the heated space for more than 3 m of length in the heated space, it shall be insulated to not less than the values listed in Table 9.32.3.10.A.

**Table 9.32.3.10.A.  
Insulation of Ducts Carrying Outdoor Air**

Forming Part of Sentence 9.32.3.10.(4)

Item	Column 1	Column 2
	Outside Winter Design Temperature as per MMAH Supplementary Standard SB-1, “Climatic and Seismic Data” <sup>(1)</sup> , °C	Minimum Thermal Resistance, RSI
1.	-7 to -11	0.5
2.	-12 to -17	0.9
3.	-18 to -24	1.2
4.	-25 to -29	1.4
5.	-30 to -34	1.8
6.	-35 and colder	2.1

**Notes to Table 9.32.3.10.A.:**

<sup>(1)</sup> The outside winter design temperatures shall be those listed for the January 2.5 per cent values.

(5) A kitchen *exhaust duct* not equipped with a filter at the inlet end shall be designed and installed so that the entire duct can be cleaned.

(6) Ductwork for cooking *appliance* exhaust fans shall,

- (a) be of *noncombustible*, corrosion-resistant material, and

- (b) lead directly to the outdoors without connection to other exhaust fans or ducts.
- (7) Ductwork for cooking *appliance* exhaust fans shall be equipped with a grease filter at the intake.
- (8) All ductwork shall be permanently supported or clipped to prevent sagging, excessive movement and vibration.
- (9) All ducting connected to supply and exhaust fans shall be constructed so as to inhibit air leakage at joints.
- (10) Where rectangular duct is used in place of round duct, it shall be selected according to Table 9.32.3.10.B.

**Table 9.32.3.10.B.  
Equivalent Duct Sizes**

Forming Part of Sentence 9.32.3.10.(10)

Item	Column 1	Column 2	Column 3	Column 4	Column 5
	Required Round Duct Size, mm	Permitted Equivalent Rectangular Duct Size, mm			
		Stack Duct	100 mm Depth	125 mm Depth	150 mm Depth
1.	75	82 × 250	57 × 100		
2.	100	82 × 250	89 × 100	75 × 125	75 × 150
3.	125	82 × 250	125 × 100	100 × 125	89 × 150
4.	150	82 × 300	200 × 100	150 × 125	125 × 150
5.	175	82 × 350	275 × 100	200 × 125	175 × 150
6.	More than 175	Part 6 design	Part 6 design	Part 6 design	Part 6 design

**9.32.3.11. Heat Recovery Ventilators**

(1) Where a heat recovery ventilator is installed to provide all or part of the requirements of this Subsection, this Article shall apply.

(2) Heat recovery ventilators shall be designed to provide a minimum 55% sensible heat recovery efficiency when tested to the low temperature thermal and ventilation performance test method set out in CAN/CSA-C439, “Rating the Performance of Heat/Energy-Recovery Ventilators”, at a Station 1 test temperature of -25°C at an air flow not less than 30 L/s.

(3) Where a heat recovery ventilator is connected to a forced air heating system, the supply side of the ventilator shall be directly connected to the return air side of the forced air heating system.

(4) Two or more heat recovery ventilators shall not be connected in parallel air flow to a common air *supply duct* unless specifically recommended by the manufacturer.

(5) Two or more heat recovery ventilators shall not be connected in parallel air flow to a common downstream *exhaust duct*.

(6) Heat recovery ventilators installed in unheated spaces shall be installed so as to avoid condensation of moisture on fans and motors in exhaust air, in accordance with the manufacturer's instructions.

(7) All start-up procedures recommended by the manufacturer including air balancing and air-flow determination shall be followed.

(8) Free flow of condensate shall be provided in accordance with the manufacturer's recommendations or, in their absence, a condensate drain of minimum ½ inch nominal pipe size pitched in the direction of flow and complete with a trap or condensate pump with sufficient capacity shall be installed.

(9) The heat recovery ventilator and all condensate lines shall be installed in a space where the ambient temperature will not adversely affect the operation of the system.

(10) When operating at the rate required in Article 9.32.3.4., the supply and exhaust airflow rates of the heat recovery ventilator shall be balanced so that the value of the lesser flow shall be at least 90% of the value of the greater flow, unless otherwise recommended by the manufacturer.

**9.32.3.12. Outdoor Intake and Exhaust Openings**

(1) Separate air intake and exhaust outlet openings, when located on the same wall or roof, shall be installed so as to avoid contamination of the ventilation air by the exhaust air.

(2) Intake openings shall be located so as to avoid contamination of the ventilation air from other local sources such as automobile exhausts and exhaust from adjacent *buildings*.

(3) The distance from the bottom of an air intake opening to finished ground level or to any nearer and lower permanent horizontal surface shall be not less than 450 mm or the depth of expected snow accumulation, whichever is greater.

(4) The distance separating air intakes from *building* envelope penetrations that are potential sources of contaminants, such as *gas vents* or oil fill pipes, shall be not less than 900 mm.

(5) Air intakes shall be clearly labelled as such for identification from locations outside the *dwelling unit*.

(6) The distance from the bottom of an exhaust outlet to finished ground level or to any nearer and lower permanent horizontal surface shall be not less than 100 mm.

(7) Where air intake and exhaust openings are in exposed locations, provision shall be made to protect them from the entry of precipitation by the use of louvres, weather cowls or other suitable protection.

(8) Air intake openings shall incorporate screens or grilles to protect against the entry of animals and insects.

(9) Except for exhaust outlets serving heat recovery ventilators, exhaust outlets shall incorporate backdraft dampers.

(10) Except for clothes dryers, exhaust outlets shall be fitted with screens of mesh not larger than 15 mm, except where climatic conditions may require larger openings.

(11) Where a screen or grille required by Sentences (8) and (10) has a screen mesh less than 6 mm, the screen or grille shall be removable for cleaning.

(12) The gross area of the screens or grilles installed in intake and exhaust openings shall be three times that of the duct served.

(13) Screens and grilles shall be of corrosion-resistant material.

(14) The net free area of an air intake or exhaust outlet shall be equal to or greater than the cross-sectional area of the duct served.

### **9.32.3.13. Installation**

(1) Installation of fans and heat recovery ventilators shall be in accordance with manufacturer's instructions for minimizing noise and vibration transmission and achieving the required sound rating.

(2) Where flow-regulating dampers are required, they shall be adjustable and accessible without requiring the removal of fans, motors, or insulating materials and without the need for specialized tools.

(3) Ventilation equipment shall be accessible for inspection, maintenance, repair and cleaning.

(4) Ventilation equipment installed in unheated spaces shall be installed so as to avoid condensation of moisture on fans and motors in accordance with the manufacturer's instructions.

## **Section 9.33. Heating and Air-Conditioning**

### **9.33.1. General**

#### **9.33.1.1. Design and Installation Requirements**

(1) The design and installation of central heating systems, including requirements for combustion air, shall conform to Part 6 and this Section.

(2) The design and installation of *air-conditioning* systems shall conform to Part 6.

(3) Repairs or component replacements that change the capacity or extent of safety of an existing heating, ventilating or *air-conditioning* system and that alter the method of operation shall conform to this Code.

#### **9.33.1.2. Solid Fuel-Burning Appliances**

(1) The design, construction and installation, including the provision of combustion air, of solid-fuel burning *appliances* and equipment, including *stoves*, *cooktops* and *space heaters*, shall conform to CAN/CSA-B365, "Installation Code for Solid-Fuel-Burning Appliances and Equipment".

#### **9.33.1.3. Structural Movement**

(1) Where the *building* is in a location where the spectral response acceleration,  $S_a(0.2)$ , is greater than 0.55, heating and *air-conditioning* equipment with fuel or power connections shall be secured to the structure to resist overturning and displacement.

### **9.33.2. Required Heating Systems**

#### **9.33.2.1. Residential Heating Systems**

(1) Residential *buildings* intended for use in the winter months on a continuing basis shall be equipped with heating facilities conforming to this Section.

#### **9.33.2.2. Equipment Sizing**

(1) The heating system capacity shall be based on the heating load calculated in accordance with Sentence 6.2.1.1.(1).

(2) Where a cooling system is installed, the cooling system capacity shall be based on the cooling load calculated in accordance with Sentence 6.2.1.1.(1).

(3) The heating and cooling equipment capacities shall be determined in accordance with the requirements of CAN/CSA-F280-M, “Determining the Required Capacity of Residential Space Heating and Cooling Appliances”.

### **9.33.3. Design Temperatures**

#### **9.33.3.1. Indoor Design Temperatures**

(1) At the outside design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than,

- (a) 22°C in all living spaces,
- (b) 22°C in unfinished *basements*, and
- (c) 15°C in heated crawl spaces.

#### **9.33.3.2. Outdoor Design Temperatures**

(1) The outdoor conditions to be used in designing heating, ventilating and *air-conditioning* systems shall be the appropriate values for the location as set out in MMAH Supplementary Standard SB-1, “Climatic and Seismic Data”, using 2.5 per cent design temperature criteria.

### **9.33.4. Carbon Monoxide Alarms**

#### **9.33.4.1. Application**

(1) This Subsection applies to every *building* that,

- (a) contains a *residential occupancy*, and
- (b) contains a fuel-burning *appliance* or a *storage garage*.

#### **9.33.4.2. Location of Carbon Monoxide Alarms**

(1) Where a fuel-burning *appliance* is installed in a *suite* of *residential occupancy*, a carbon monoxide alarm shall be installed adjacent to each sleeping area in the *suite*.

(2) Where a fuel-burning *appliance* is installed in a *service room* that is not in a *suite* of *residential occupancy*, a carbon monoxide alarm shall be installed,

- (a) adjacent to each sleeping area in every *suite* of *residential occupancy* that is adjacent to the *service room*, and
- (b) in the *service room*.

(3) Where a *storage garage* is located in a *building* containing a *residential occupancy*, a carbon monoxide alarm shall be installed adjacent to each sleeping area in every *suite* of *residential occupancy* that is adjacent to the *storage garage*.

(4) Where a *storage garage* serves only the *dwelling unit* to which it is attached or built in, a carbon monoxide alarm shall be installed adjacent to each sleeping area in the *dwelling unit*.

(5) A carbon monoxide alarm shall be mechanically fixed,

- (a) at the manufacturer’s recommended height, or
- (b) in the absence of specific instructions, on or near the ceiling.

#### **9.33.4.3. Installation and Conformance to Standards**

(1) The carbon monoxide alarm required by Article 9.33.4.2. shall,

- (a) except as permitted in Sentence (2), be permanently connected to an electrical circuit and shall have no disconnect switch between the overcurrent device and the carbon monoxide alarm,
- (b) be wired so that its activation will activate all carbon monoxide alarms within the *suite*, where located within a *suite* of *residential occupancy*,
- (c) be equipped with an alarm that is audible within bedrooms when the intervening doors are closed, where located adjacent to a sleeping area, and
- (d) conform to,
  - (i) CAN/CSA-6.19, “Residential Carbon Monoxide Alarming Devices”, or
  - (ii) UL 2034, “Single and Multiple Station Carbon Monoxide Alarms”.

(2) Where the *building* is not supplied with electrical power, carbon monoxide alarms are permitted to be battery operated.

## **Section 9.34. Electrical Facilities**

### **9.34.1. General**

#### **9.34.1.1. Reserved**

#### **9.34.1.2. Required Facilities**

(1) Where electrical services are available, electrical facilities shall be provided for every *building* in conformance with this Section.

#### **9.34.1.3. Location of Equipment in Public Areas**

(1) Entrance switches, meters, panel boxes, splitter boxes, time clocks and other similar equipment shall not be located in any public area unless adequate precautions are taken to prevent interference with the equipment.

#### **9.34.1.4. Recessed Lighting Fixtures**

(1) Recessed lighting fixtures shall not be located in insulated ceilings unless the fixtures are designed for such installations.

#### **9.34.1.5. Wiring and Cables**

(1) Except for *dwelling units* and except as required in Sentence (2), optical fibre cables and electrical wires and cables installed in *buildings* permitted to be of *combustible construction* shall,

- (a) not convey flame or continue to burn for more than 1 min when tested in conformance with the Vertical Flame Test in Clause 4.11.1. of CSA C22.2 No. 0.3, “Test Methods for Electrical Wires and Cables”, (FT1 rating), or
- (b) be located in,
  - (i) totally enclosed *noncombustible* raceways,
  - (ii) masonry walls,
  - (iii) concrete slabs, or
  - (iv) totally enclosed non metallic raceways conforming to Clause 3.1.5.20.(1)(b).

(2) Where a concealed space in a floor or ceiling assembly is used as a *plenum*, electrical wires and cables within the *plenum* shall conform to Sentence 3.6.4.3.(1).

### **9.34.2. Lighting Outlets**

#### **9.34.2.1. Lighting of Entrances**

(1) An exterior lighting outlet with fixture controlled by a wall switch located within the *building* shall be provided at every entrance to *buildings* of *residential occupancy*.

(2) The exterior lighting outlet with fixture required by Sentence (1) may be controlled by a wall switch or panel accessible to authorized personnel only, where it serves,

- (a) a *building* entrance serving multiple *suites* of *residential occupancy*,
- (b) multiple *dwelling unit* entrances,
- (c) *hotels*, or
- (d) *motels*.

#### **9.34.2.2. Outlets in Dwelling Units**

(1) Except as provided in Sentence (2), a lighting outlet with fixture controlled by a wall switch shall be provided in kitchens, bedrooms, living rooms, utility rooms, laundry rooms, dining rooms, bathrooms, water closet rooms, vestibules and hallways in *dwelling units*.

(2) Where a receptacle controlled by a wall switch is provided in bedrooms or living rooms, such rooms need not conform to the requirements of Sentence (1).

#### **9.34.2.3. Stairways**

(1) Every stairway shall be lighted.

(2) Except as provided in Sentence (3), 3-way wall switches located at the head and foot of every stairway shall be provided to control at least one lighting outlet with fixture for stairways with four or more risers in *dwelling units*.

(3) The stairway lighting for *basements* that do not contain finished space or lead to an outside entrance or built-in garage and that serve not more than one *dwelling unit* is permitted to be controlled by a single switch located at the head of the stairs.

#### **9.34.2.4. Basements**

(1) A lighting outlet with fixture shall be provided for each 30 m<sup>2</sup> of floor area or fraction of it in unfinished *basements*.

(2) The outlet required in Sentence (1) nearest the stairs shall be controlled by a wall switch located at the head of the stairs.

**9.34.2.5. Storage Rooms**

(1) A lighting outlet with fixture shall be provided in storage rooms.

**9.34.2.6. Garages and Carports**

(1) A lighting outlet with fixture shall be provided for an attached, built-in or detached garage or carport.

(2) Except as provided in Sentence (3), lighting outlets required in Sentence (1) shall be controlled by a wall switch near the doorway.

(3) Where the lighting outlet and fixture required in Sentence (1) are ceiling mounted above an area not normally occupied by a parked car, or are wall mounted, a fixture with a built-in switch is permitted to be used.

(4) Where a carport is lighted by a light at the entrance to a *dwelling unit*, additional carport lighting is not required.

**9.34.2.7. Public and Service Areas**

(1) Every public or service area in *buildings*, including a *recreational camp* and a *camp for housing of workers*, shall have lighting outlets with fixtures controlled by a wall switch or panel to illuminate such areas.

(2) When provided by incandescent lighting, illumination required in Sentence (1) shall conform to Table 9.34.2.7.

(3) When other types of lighting are used, illumination equivalent to that shown in Table 9.34.2.7. shall be provided.

**Table 9.34.2.7.  
Lighting for Public Areas**

Forming Part of Sentences 9.34.2.7.(2) and (3)

Item	Column 1	Column 2	Column 3
	Room or Space	Minimum Illumination, lx	Minimum Lighting Power Density, W/m <sup>2</sup> of floor area (incandescent lighting)
1.	Storage rooms	50	5
2.	<i>Service rooms</i> and laundry areas	200	20
3.	Garages	50	5
4.	Public water closet rooms	100	10
5.	Service hallways and stairways	50	5
6.	Recreation rooms	100	10
7.	<i>Recreational camps</i> and <i>camps for housing of workers</i> hallways, corridors, stairways and sleeping areas	100	10
8.	Kitchen	500	50
9.	All other rooms	250	25

**9.34.3. Emergency Lighting**

**9.34.3.1. Emergency Lighting**

(1) Emergency lighting shall conform to Subsection 9.9.12.

**Section 9.35. Garages and Carports**

**9.35.1. Scope**

**9.35.1.1. Application**

(1) This Section applies to garages and carports serving a single *dwelling unit*.

**9.35.1.2. Construction Requirements**

(1) The construction of a garage or carport shall conform to the requirements for other *buildings* in this Part except as provided in this Section.

**9.35.2. General**

**9.35.2.1. Carport Considered to be Garage**

(1) Where a roofed enclosure used for the storage or parking of motor vehicles has more than 60 per cent of the total perimeter enclosed by walls, doors or windows, the enclosure shall be considered a garage.

**9.35.2.2. Garage Floor**

(1) Where an attached or built-in garage is provided, the garage floor shall be sloped to drain liquids to the outdoors.

### **9.35.3. Foundations**

#### **9.35.3.1. Foundation Required**

(1) Except as permitted in this Subsection, *foundations* conforming to Sections 9.12. and 9.15. shall be provided for the support of carport and garage super-structures, including that portion beneath garage doors.

#### **9.35.3.2. Protection from Damage due to Soil Movement**

(1) In clay-type *soils* subject to significant movement with a change in *soil* moisture content, the *foundation* depth of carports or garages connected to a *dwelling unit* directly or by a breezeway shall be approximately the same depth as the main *building foundation*.

(2) Where slab-on-ground construction is used, a construction joint shall be provided between the main *building* slab and the garage or breezeway or carport slab.

(3) Except as provided in Section 9.12., *foundations* for attached unheated garages or carports shall be below frost level.

#### **9.35.3.3. Small Garages**

(1) Detached garages of less than 55 m<sup>2</sup> floor area and not more than 1 *storey* in height may be supported on wood mud sills provided the garage is not of masonry or masonry veneer construction.

#### **9.35.3.4. Column Piers**

(1) Piers for the support of carport columns shall extend not less than 150 mm above ground level.

(2) Piers referred to in Sentence (1) shall project not less than 25 mm beyond the base of the column but in no case be less than 190 mm by 190 mm in size.

### **9.35.4. Walls and Columns**

#### **9.35.4.1. Interior Finish**

(1) Interior finish need not be applied to garage and carport walls.

#### **9.35.4.2. Columns**

(1) Columns for garages and carports shall conform to Section 9.17., except that 89 mm by 89 mm wood columns may be used.

#### **9.35.4.3. Anchorage**

(1) Garage or carport walls and columns shall be anchored to the *foundation* to resist wind uplift in conformance with Subsection 9.23.6., except that where a garage is supported on the surface of the ground, ground anchors shall be provided to resist wind uplift.

## **Section 9.36. Cottages**

### **9.36.1. Scope**

#### **9.36.1.1. Application**

(1) This Section applies to *buildings of residential occupancy* used or intended to be used as seasonal recreational *buildings*.

(2) The *buildings* described in Sentence (1) shall comply with all the requirements of this Part, except where they are specifically exempted in this Section.

### **9.36.2. General**

#### **9.36.2.1. Exclusions**

(1) Except as provided in Subsection 9.10.15. and Articles 9.36.2.4. and 9.36.3.1., *buildings* used or intended to be used as seasonal recreational *buildings* need not comply with Sections 9.5. to 9.7. and 9.9. to 9.11.

(2) Flooring need not comply with Section 9.30., but tight-fitting floors shall be provided to support the *live* and *dead* loads.

(3) Except as provided in Sentence (4), thermal insulation, *vapour barrier*, air barrier construction, interior finishes, plumbing, heating, mechanical ventilation, *air-conditioning* and electrical facilities, need not be provided, but where any of these are provided, they shall comply with the requirements of this Part.

(4) Where heating and *air-conditioning* are provided, Article 9.33.3.1. need not be complied with.

#### **9.36.2.2. Foundations**

(1) Continuous perimeter *foundation* walls are not required, but when they are provided, they shall comply with the requirements of this Part.



- (2) Where unit masonry columns are used, the height of such columns shall not exceed,
- (a) in the case of hollow masonry units, 4 times the least dimension of the units,
  - (b) in the case of solid masonry units or hollow units with voids filled with concrete, 10 times the least dimension of the column, or
  - (c) where the column is reinforced with at least four 13 mm diam bars and filled with concrete, 18 times the least dimension of the column.
- (3) Columns in excess of the height limitations of Clauses (2)(a) to (c) shall be designed in accordance with Part 4.

#### **9.36.2.3. Waterproofing and Dampproofing**

- (1) Where *foundations* below ground level and concrete floors on ground are used, they shall comply with Section 9.13.

#### **9.36.2.4. Smoke Alarms**

(1) Every *dwelling unit* within the scope of this Section shall be provided with a *smoke alarm* in accordance with Subsection 9.10.19.

### **9.36.3. Tourist Accommodation**

#### **9.36.3.1. Buildings for Seasonal Tourist Accommodation or for Rent**

(1) Where *buildings* are used or intended to be used for seasonal tourist accommodation or for rent, they shall comply with Sections 9.5. to 9.8. in addition to the requirements of this Section.

## **Section 9.37. Log Construction**

### **9.37.1. General**

#### **9.37.1.1. Material Requirements**

(1) Logs that are sound and free of fractures may be used for *foundations*, beams, posts and similar members, provided it can be shown by a structural analysis or tests or previous experience that the strength of the member is adequate for its intended purposes.

#### **9.37.1.2. Requirement for Wood Preservative**

(1) The portion of any log coming in contact with masonry or concrete at or below *grade* shall be treated with a wood preservative to prevent decay.

#### **9.37.1.3. Exterior Joints**

(1) All exterior joints between logs shall be rendered water-tight by methods such as machined joints, oakum packing, cement parging, chinking, caulking or a combination of these.

### **9.37.2. Walls**

#### **9.37.2.1. Logs**

- (1) Walls may be built of natural or manufactured logs.

#### **9.37.2.2. Attachment of Logs**

(1) Walls made of logs in a horizontal position shall have interlocking intersections that will prevent the collection of water in the joints, or the horizontal logs shall butt to a vertical corner post to which the horizontal logs shall be firmly attached.

#### **9.37.2.3. Joining Logs**

(1) Each log in a horizontal position shall be scribed as close as possible to its bearer and fastened to the bearer in at least three places throughout its length, by dowels, continuous machined joints, vertical framing members or interlocking intersections or any combination of these, but in no case shall the distance between fastenings exceed 1 800 mm.

#### **9.37.2.4. Vertical Logs**

- (1) Each log in a wall built of vertical logs shall be scribed to fit as closely as possible to the adjacent logs.

#### **9.37.2.5. Plates**

(1) Logs used in a vertical position shall have a plate at the top and a plate at the bottom and the plates shall be at least as wide as the largest end diameter of any of the logs.

### **9.37.3. Lintels**

#### **9.37.3.1. Support Over Openings**

(1) Logs placed in vertical position shall be supported over window and door openings by lintels meeting the requirements of Tables A-12 to A-16.

#### **9.37.3.2. Clearance**

(1) At every opening in a wall made of logs in a horizontal position where shrinkage can occur there shall be a clearance between the rough buck header and the lintel log of not less than 13 mm in width for each 300 mm of height to allow for settlement.

### **Section 9.38. Park Model Trailers**

#### **9.38.1. Scope**

##### **9.38.1.1. Application**

(1) This Section applies to manufactured *buildings* designed and constructed in conformance with CAN/CSA-Z241 Series, “Park Model Trailers”, and used or intended to be used as a seasonal recreational *building* of *residential occupancy*.

#### **9.38.2. General**

##### **9.38.2.1. General**

(1) Except as provided in Subsection 9.38.3., a manufactured *building* used or intended to be used as a seasonal recreational *building* of *residential occupancy* is deemed to comply with this Code if it is designed and constructed in conformance with CAN/CSA-Z241 Series, “Park Model Trailers”.

#### **9.38.3. Requirements**

##### **9.38.3.1. Other Building Components**

(1) The requirements of this Code shall apply to *building* components designed and *constructed* outside the place of manufacture of a *building* described in Article 9.38.1.1.

##### **9.38.3.2. Spatial Separation**

(1) *Buildings* described in Article 9.38.1.1. shall comply with Section 9.10. where the *building* is,

- (a) used or intended to be used for seasonal tourist accommodation, or
- (b) leased or intended to be leased.

##### **9.38.3.3. Foundations and Anchorage**

(1) *Buildings* described in Article 9.38.1.1. shall be supported and anchored in conformance with the manufacturer's installation instructions.

##### **9.38.3.4. Proximity to Above Ground Electrical Conductors**

(1) *Buildings* described in Article 9.38.1.1. shall comply with Article 9.1.1.5.

### **Section 9.39. Reinforced Concrete Slabs**

#### **9.39.1. Scope**

##### **9.39.1.1. Application**

(1) This Section applies to,

- (a) reinforced concrete slabs that are suspended over cold rooms in *basements*, and are supported by *foundation* walls along the perimeter of the slab with no additional interior supports, and
- (b) slabs in which the clear span between supporting walls is not more than 2.5 m along the shortest dimension of the slab.

(2) Slabs for conditions other than described in Sentence (1) shall be designed in accordance with Part 4.

(3) This Section does not apply to reinforced concrete slabs intended to support motor vehicles.

##### **9.39.1.2. Concrete**

(1) Concrete shall conform to Section 9.3.

##### **9.39.1.3. Reinforcing Steel**

(1) Reinforcing steel shall conform to Grade 400 in CAN/CSA-G30.18-M, “Billet-Steel Bars for Concrete Reinforcement”.

##### **9.39.1.4. Slab Construction**

(1) Concrete shall be cast against form work in accordance with CSA A23.1, “Concrete Materials and Methods of Concrete Construction”.

(2) The slab shall be not less than 125 mm thick.

(3) The slab shall be reinforced with 10M bars spaced not more than 200 mm o.c. in each direction, with 30 mm clear cover from the bottom of the slab to the first layer of bars, and the second layer of bars laid directly on top of the lower layer in the opposite direction.

(4) The slab shall bear not less than 75 mm on the supporting *foundation* walls and be anchored to the walls with 600 mm× 600 mm 10M bent dowels spaced at not more than 600 mm o.c.

(5) Exposed slabs shall be sloped to effectively shed water away from the exterior wall.

**Section 9.40. Additional Requirements for Change of Use**

**9.40.1. Scope**

**9.40.1.1. Application**

(1) This Section applies where proposed *construction* in respect of an existing *building* will result in any of the following changes of use of all or part of the *building*:

- (a) a change of the *major occupancy* of all or part of a *building* that is designated with a “Y” in Table 1.3.1.4. of Division C,
- (b) a *suite* of a Group C *major occupancy* is converted into more than one *suite* of a Group C *major occupancy*,
- (c) a *farm building* or part of a *farm building* is changed to a *major occupancy*,
- (d) a *building* or part of a *building* is changed to a *post-disaster building*, or
- (e) the use of a *building* or part of a *building* is changed and the previous *major occupancy* of the *building* or part of the *building* cannot be determined.

(2) For the purposes of this Section and Sentences 11.4.2.1.(1) and 11.4.2.5.(4), the changes of use set out in Clauses (1)(b) to (e) are also deemed to constitute a change in *major occupancy*.

(3) The requirements of this Section are in addition to the requirements of other Parts of the Code as they apply to the proposed *construction*.

**9.40.2. Additional Construction**

**9.40.2.1. Change of Use and Compensating Construction**

(1) Where proposed *construction* will result in a change of use described in Clauses 9.40.1.1.(1)(a) to (d), additional *construction* shall be required in order that the *building* or part of a *building* subject to the change of use conforms to the requirements of Subsections 9.5.1. and 9.5.3. to 9.5.10., Section 9.6., Article 9.7.2.3. Sentences 9.7.5.1.(2) and 9.7.6.2.(1) and (3), Articles 9.8.8.1. and 9.9.10.1., Subsection 9.10.17. and Sections 9.31., 9.32. and 9.34. as they apply to the new *major occupancy* that the *building* or part of a *building* is to support.

(2) For the purposes of this Article, existing *buildings* shall be classified as to their *construction* and *occupancy* as provided for in Sentence 11.2.1.1.(1).

**9.40.2.2. Performance Level Evaluation and Compensating Construction**

(1) The *performance level* of a *building* after *construction* shall not be less than the *performance level* of the *building* prior to *construction*.

(2) For the purposes of Sentence (1), reduction of *performance level* shall be determined in accordance with Articles 11.4.2.1., 11.4.2.3. and 11.4.2.5.

(3) Where the proposed *construction* would reduce the *performance level* of an existing *building*, compensating *construction* shall be required in conformance with Articles 11.4.3.1., 11.4.3.2., 11.4.3.4. and 11.4.3.6.

(4) Section 11.5. applies in respect of the requirements of Sentences 11.4.3.4.(1), (3) and (4).

**Table A-1  
Maximum Spans for Floor Joists – General Cases<sup>(1)</sup>**

Forming Part of Sentence 9.23.4.2.(1)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
With Strapping <sup>(2)</sup>				With Bridging			With Strapping <sup>(2)</sup> and Bridging					
Joist Spacing, mm				Joist Spacing, mm			Joist Spacing, mm					
				305	406	610	305	406	610	305	406	610

1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 × 89	2.13	1.97	1.73	2.19	1.99	1.73	2.19	1.99	1.73
			38 × 140	3.23	3.07	2.73	3.44	3.12	2.73	3.44	3.12	2.73
			38 × 184	3.88	3.69	3.51	4.18	3.92	3.59	4.37	4.07	3.59
			38 × 235	4.57	4.34	4.13	4.86	4.57	4.29	5.05	4.70	4.39
			38 × 286	5.21	4.95	4.71	5.49	5.16	4.85	5.66	5.28	4.92
		No. 1 and No. 2	38 × 89	2.00	1.85	1.66	2.09	1.90	1.66	2.09	1.90	1.66
			38 × 140	3.09	2.91	2.62	3.29	2.99	2.62	3.29	2.99	2.62
			38 × 184	3.71	3.53	3.36	4.00	3.76	3.44	4.19	3.90	3.44
			38 × 235	4.38	4.16	3.96	4.66	4.38	4.11	4.84	4.51	4.20
		No. 3	38 × 89	1.90	1.69	1.38	1.95	1.69	1.38	1.95	1.69	1.38
			38 × 140	2.78	2.41	1.97	2.78	2.41	1.97	2.78	2.41	1.97
			38 × 184	3.38	2.93	2.39	3.38	2.93	2.39	3.38	2.93	2.39
			38 × 235	4.14	3.58	2.93	4.14	3.58	2.93	4.14	3.58	2.93
		Construction Standard	38 × 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61
38 × 89	1.81		1.63	1.33	1.88	1.63	1.33	1.88	1.63	1.33		
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	2.08	1.93	1.71	2.16	1.96	1.71	2.16	1.96	1.71
			38 × 140	3.18	3.03	2.69	3.39	3.08	2.69	3.39	3.08	2.69
			38 × 184	3.82	3.64	3.46	4.12	3.87	3.54	4.31	4.02	3.54
			38 × 235	4.50	4.28	4.08	4.80	4.51	4.23	4.98	4.64	4.33
			38 × 286	5.14	4.89	4.65	5.42	5.09	4.78	5.59	5.21	4.86
		No. 1 and No. 2	38 × 89	2.00	1.85	1.66	2.09	1.90	1.66	2.09	1.90	1.66
			38 × 140	3.09	2.91	2.62	3.29	2.99	2.62	3.29	2.99	2.62
			38 × 184	3.71	3.53	3.36	4.00	3.76	3.44	4.19	3.90	3.44
			38 × 235	4.38	4.16	3.96	4.66	4.38	4.11	4.84	4.51	4.20
		No. 3	38 × 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61
			38 × 140	2.99	2.78	2.43	3.19	2.90	2.43	3.19	2.90	2.43
			38 × 184	3.60	3.42	2.95	3.88	3.61	2.95	4.06	3.61	2.95
			38 × 235	4.24	4.03	3.61	4.51	4.24	3.61	4.68	4.37	3.61
		Construction Standard	38 × 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61
38 × 89	1.81		1.68	1.39	1.96	1.71	1.39	1.96	1.71	1.39		
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 × 89	1.95	1.81	1.64	2.06	1.87	1.64	2.06	1.87	1.64
			38 × 140	3.05	2.85	2.57	3.24	2.95	2.57	3.24	2.95	2.57
			38 × 184	3.66	3.48	3.31	3.94	3.70	3.38	4.12	3.84	3.38
			38 × 235	4.31	4.10	3.90	4.59	4.31	4.05	4.76	4.44	4.14
			38 × 286	4.91	4.67	4.45	5.18	4.87	4.57	5.34	4.98	4.64
		No. 1 and No. 2	38 × 89	1.86	1.72	1.58	1.99	1.81	1.58	1.99	1.81	1.58
			38 × 140	2.92	2.71	2.49	3.14	2.85	2.49	3.14	2.85	2.49
			38 × 184	3.54	3.36	3.20	3.81	3.58	3.27	3.99	3.72	3.27
			38 × 235	4.17	3.96	3.77	4.44	4.17	3.92	4.60	4.29	4.00
		No. 3	38 × 89	1.81	1.68	1.55	1.96	1.78	1.55	1.96	1.78	1.55
			38 × 140	2.84	2.64	2.43	3.08	2.80	2.43	3.08	2.80	2.43
			38 × 184	3.47	3.30	2.95	3.74	3.52	2.95	3.92	3.61	2.95
			38 × 235	4.09	3.89	3.61	4.36	4.09	3.61	4.52	4.22	3.61
		Construction Standard	38 × 89	1.81	1.68	1.55	1.96	1.78	1.55	1.96	1.78	1.55
38 × 89	1.70		1.58	1.44	1.88	1.71	1.44	1.88	1.71	1.44		
4.	Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules)	Select Structural	38 × 89	1.65	1.53	1.42	1.84	1.68	1.46	1.84	1.68	1.46
			38 × 140	2.59	2.41	2.24	2.90	2.63	2.30	2.90	2.63	2.30
			38 × 184	3.27	3.11	2.94	3.52	3.31	3.03	3.69	3.44	3.03
			38 × 235	3.85	3.66	3.48	4.10	3.85	3.62	4.26	3.97	3.70
			38 × 286	4.39	4.18	3.97	4.63	4.35	4.09	4.78	4.45	4.15
		No. 1 and No. 2	38 × 89	1.59	1.48	1.37	1.80	1.64	1.43	1.80	1.64	1.43
			38 × 140	2.51	2.33	2.16	2.83	2.57	2.25	2.83	2.57	2.25
			38 × 184	3.19	3.04	2.84	3.44	3.23	2.96	3.60	3.36	2.96
			38 × 235	3.76	3.58	3.41	4.01	3.77	3.54	4.16	3.88	3.62
		No. 3	38 × 89	1.59	1.48	1.37	1.80	1.64	1.43	1.80	1.64	1.43
			38 × 140	2.51	2.33	2.16	2.83	2.57	2.25	2.83	2.57	2.25
			38 × 184	3.19	3.04	2.84	3.44	3.23	2.96	3.60	3.36	2.96
			38 × 235	3.76	3.58	3.41	4.01	3.77	3.54	4.16	3.88	3.62
		Construction Standard	38 × 89	1.59	1.48	1.37	1.80	1.64	1.43	1.80	1.64	1.43
38 × 89	1.47		1.36	1.25	1.72	1.57	1.36	1.72	1.57	1.36		

	No. 3	38 × 89	1.54	1.43	1.32	1.74	1.57	1.36	1.76	1.60	1.36
		38 × 140	2.42	2.24	1.94	2.74	2.38	1.94	2.75	2.38	1.94
		38 × 184	3.12	2.90	2.37	3.35	2.90	2.37	3.35	2.90	2.37
		38 × 235	3.67	3.49	2.89	3.91	3.54	2.89	4.06	3.54	2.89
		38 × 286	4.19	3.98	3.36	4.42	4.11	3.36	4.55	4.11	3.36
	Construction	38 × 89	1.54	1.43	1.32	1.74	1.57	1.40	1.76	1.60	1.40
	Standard	38 × 89	1.48	1.37	1.15	1.63	1.41	1.15	1.63	1.41	1.15

**Notes to Table A-1:**

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.5.3.

(2) See Sentence 9.23.9.4.(5) for alternatives to strapping.

**Table A-2  
Maximum Spans for Floor Joists – Special Cases<sup>(1)</sup>**

Forming Part of Sentence 9.23.4.2.(1) and 9.23.4.4.(2)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
				Joists with Ceilings Attached to Wood Furring						Joists with Concrete Topping		
				Without Bridging			With Bridging			With or Without Bridging <sup>(2)</sup>		
				Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
				305	406	610	305	406	610	305	406	610
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 × 89	2.19	1.99	1.73	2.19	1.99	1.73	2.19	1.99	1.73
			38 × 140	3.44	3.12	2.73	3.44	3.12	2.73	3.44	3.12	2.73
			38 × 184	4.24	3.99	3.59	4.52	4.11	3.59	4.52	4.11	3.59
			38 × 235	4.98	4.69	4.29	5.47	5.20	4.58	5.77	5.24	4.58
			38 × 286	5.67	5.34	4.88	6.19	5.89	5.54	6.83	6.37	5.58
		No. 1 and No. 2	38 × 89	2.09	1.90	1.66	2.09	1.90	1.66	2.09	1.90	1.66
			38 × 140	3.29	2.99	2.62	3.29	2.99	2.62	3.29	2.99	2.55
			38 × 184	4.06	3.83	3.44	4.33	3.93	3.44	4.33	3.81	3.11
			38 × 235	4.78	4.50	4.11	5.24	4.98	4.31	5.37	4.65	3.80
			38 × 286	5.44	5.12	4.68	5.93	5.64	5.00	6.24	5.40	4.41
		No. 3	38 × 89	1.95	1.69	1.38	1.95	1.69	1.38	1.72	1.49	1.21
			38 × 140	2.78	2.41	1.97	2.78	2.41	1.97	2.45	2.12	1.73
			38 × 184	3.38	2.93	2.39	3.38	2.93	2.39	2.98	2.58	2.11
			38 × 235	4.14	3.58	2.93	4.14	3.58	2.93	3.65	3.16	2.58
38 × 286	4.80		4.16	3.39	4.80	4.16	3.39	4.23	3.66	2.99		
Construction	38 × 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.84	1.61		
Standard	38 × 89	1.88	1.63	1.33	1.88	1.63	1.33	1.66	1.44	1.17		
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	2.16	1.96	1.71	2.16	1.96	1.71	2.16	1.96	1.71
			38 × 140	3.39	3.08	2.69	3.39	3.08	2.69	3.39	3.08	2.69
			38 × 184	4.18	3.94	3.54	4.46	4.05	3.54	4.46	4.05	3.54
			38 × 235	4.92	4.63	4.23	5.39	5.13	4.52	5.69	5.17	4.52
			38 × 286	5.60	5.27	4.82	6.10	5.81	5.47	6.74	6.28	5.50
		No. 1 and No. 2	38 × 89	2.09	1.90	1.66	2.09	1.90	1.66	2.09	1.90	1.66
			38 × 140	3.29	2.99	2.62	3.29	2.99	2.62	3.29	2.99	2.62
			38 × 184	4.06	3.83	3.44	4.33	3.93	3.44	4.33	3.93	3.26
			38 × 235	4.78	4.50	4.11	5.24	4.98	4.39	5.53	4.88	3.99
			38 × 286	5.44	5.12	4.68	5.93	5.64	5.25	6.54	5.66	4.63
		No 3.	38 × 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.83	1.50
			38 × 140	3.19	2.90	2.43	3.19	2.90	2.43	3.02	2.62	2.14
			38 × 184	3.94	3.61	2.95	4.17	3.61	2.95	3.68	3.18	2.60
			38 × 235	4.63	4.36	3.61	5.08	4.42	3.61	4.50	3.89	3.18
38 × 286	5.27		4.96	4.19	5.74	5.13	4.19	5.22	4.52	3.69		
Construction	38 × 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.84	1.61		
Standard	38 × 89	1.96	1.71	1.39	1.96	1.71	1.39	1.74	1.50	1.23		
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine,	Select Structural	38 × 89	2.06	1.87	1.64	2.06	1.87	1.64	2.06	1.87	1.64
			38 × 140	3.24	2.95	2.57	3.24	2.95	2.57	3.24	2.95	2.57
			38 × 184	4.00	3.77	3.38	4.26	3.87	3.38	4.26	3.87	3.38
			38 × 235	4.70	4.43	4.05	5.16	4.91	4.32	5.45	4.95	4.32

	Lodgepole Pine, Balsam Fir and Alpine Fir)		38 × 286	5.35	5.04	4.61	5.84	5.55	5.23	6.45	6.01	5.26
		No. 1 and No. 2	38 × 89	1.99	1.81	1.58	1.99	1.81	1.58	1.99	1.81	1.58
			38 × 140	3.14	2.85	2.49	3.14	2.85	2.49	3.14	2.85	2.49
			38 × 184	3.87	3.64	3.27	4.12	3.75	3.27	4.12	3.75	3.27
			38 × 235	4.55	4.28	3.91	4.99	4.75	4.18	5.27	4.79	4.13
			38 × 286	5.18	4.88	4.46	5.65	5.37	5.06	6.23	5.81	4.79
		No. 3	38 × 89	1.96	1.78	1.55	1.96	1.78	1.55	1.96	1.78	1.50
			38 × 140	3.08	2.80	2.43	3.08	2.80	2.43	3.02	2.62	2.14
			38 × 184	3.80	3.58	2.95	4.05	3.61	2.95	3.68	3.18	2.60
			38 × 235	4.47	4.21	3.61	4.90	4.42	3.61	4.50	3.89	3.18
			38 × 286	5.09	4.79	4.19	5.55	5.13	4.19	5.22	4.52	3.69
		Construction	38 × 89	1.96	1.78	1.55	1.96	1.78	1.55	1.96	1.78	1.55
Standard	38 × 89	1.88	1.71	1.44	1.88	1.71	1.44	1.80	1.56	1.27		
4.	Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules)	Select Structural	38 × 89	1.84	1.68	1.46	1.84	1.68	1.46	1.84	1.68	1.46
			38 × 140	2.90	2.63	2.30	2.90	2.63	2.30	2.90	2.63	2.30
			38 × 184	3.58	3.37	3.03	3.81	3.46	3.03	3.81	3.46	3.03
			38 × 235	4.20	3.96	3.62	4.61	4.39	3.86	4.87	4.42	3.86
			38 × 286	4.79	4.51	4.12	5.22	4.96	4.68	5.76	5.37	4.54
		No. 1 and No. 2	38 × 89	1.80	1.64	1.43	1.80	1.64	1.43	1.80	1.64	1.43
			38 × 140	2.83	2.57	2.25	2.83	2.57	2.25	2.83	2.57	2.23
			38 × 184	3.50	3.29	2.96	3.72	3.38	2.96	3.72	3.32	2.71
			38 × 235	4.11	3.87	3.54	4.51	4.29	3.76	4.69	4.06	3.31
			38 × 286	4.68	4.40	4.03	5.10	4.85	4.36	5.44	4.71	3.84
		No. 3	38 × 89	1.76	1.60	1.36	1.76	1.60	1.36	1.70	1.47	1.20
			38 × 140	2.75	2.38	1.94	2.75	2.38	1.94	2.42	2.10	1.71
			38 × 184	3.35	2.90	2.37	3.35	2.90	2.37	2.95	2.55	2.08
			38 × 235	4.01	3.54	2.89	4.09	3.54	2.89	3.61	3.12	2.55
			38 × 286	4.56	4.11	3.36	4.75	4.11	3.36	4.18	3.62	2.96
		Construction	38 × 89	1.76	1.60	1.40	1.76	1.60	1.40	1.76	1.60	1.37
		Standard	38 × 89	1.63	1.41	1.15	1.63	1.41	1.15	1.44	1.25	1.02

**Notes to Table A-2:**

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.5.3.

(2) No bridging is assumed for spans for floor joists with concrete topping.

**Table A-3  
Maximum Spans for Ceiling Joists – Attic not Accessible by a Stairway**

Forming Part of Sentence 9.23.4.2.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Commercial Designation	Grade	Joist Size, mm	Maximum Span, m		
				Joist Spacing, mm		
				305	406	610
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 × 89	3.4	3.10	2.71
			38 × 140	5.37	4.88	4.26
			38 × 184	7.05	6.41	5.60
			38 × 235	9.01	8.18	7.15
			38 × 286	10.96	9.96	8.70
		No. 1 and No. 2	38 × 89	3.27	2.97	2.59
			38 × 140	5.14	4.67	4.08
			38 × 184	6.76	6.14	5.36
			38 × 235	8.63	7.84	6.85
			38 × 286	10.50	9.54	8.34
		No. 3	38 × 89	3.17	2.88	2.42
			38 × 140	4.89	4.23	3.46
			38 × 184	5.95	5.15	4.20
			38 × 235	7.27	6.30	5.14
38 × 286	8.44		7.31	5.97		
Construction	38 × 89	3.17	2.88	2.51		
Standard	38 × 89	3.06	2.78	2.34		
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	3.36	3.06	2.67
			38 × 140	5.29	4.81	4.20
			38 × 184	6.96	6.32	5.52

			38 × 235	8.88	8.07	7.05
			38 × 286	10.81	9.82	8.58
		No. 1 and No. 2	38 × 89	3.27	2.97	2.59
			38 × 140	5.14	4.67	4.08
			38 × 184	6.76	6.14	5.36
			38 × 235	8.63	7.84	6.85
			38 × 286	10.50	9.54	8.34
		No. 3	38 × 89	3.17	2.88	2.51
			38 × 140	4.98	4.53	3.95
			38 × 184	6.55	5.95	5.19
			38 × 235	8.36	7.60	6.34
			38 × 286	10.18	9.01	7.36
		Construction	38 × 89	3.17	2.88	2.50
		Standard	38 × 89	3.06	2.78	2.43
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 × 89	3.22	2.92	2.55
			38 × 140	5.06	4.60	4.02
			38 × 184	6.65	6.05	5.28
			38 × 235	8.50	7.72	6.74
			38 × 286	10.34	9.40	8.21
		No. 1 and No. 2	38 × 89	3.11	2.83	2.47
			38 × 140	4.90	4.45	3.89
			38 × 184	6.44	5.85	5.11
			38 × 235	8.22	7.47	6.52
			38 × 286	10.00	9.09	7.94
		No. 3	38 × 89	3.06	2.78	2.43
			38 × 140	4.81	4.37	3.82
			38 × 184	6.32	5.74	5.02
			38 × 235	8.07	7.33	6.34
			38 × 286	9.82	8.93	7.36
		Construction	38 × 89	3.06	2.78	2.43
		Standard	38 × 89	2.94	2.67	2.33
4.	Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules)	Select Structural	38 × 89	2.88	2.61	2.28
			38 × 140	4.53	4.11	3.59
			38 × 184	5.95	5.40	4.72
			38 × 235	7.60	6.90	6.03
			38 × 286	9.25	8.40	7.34
		No. 1 and No. 2	38 × 89	2.81	2.55	2.23
			38 × 140	4.42	4.02	3.51
			38 × 184	5.81	5.28	4.61
			38 × 235	7.42	6.74	5.89
			38 × 286	9.03	8.21	7.17
		No. 3	38 × 89	2.74	2.49	2.18
			38 × 140	4.31	3.92	3.42
			38 × 184	5.67	5.09	4.16
			38 × 235	7.19	6.23	5.08
			38 × 286	8.34	7.23	5.90
		Construction	38 × 89	2.74	2.49	2.18
		Standard	38 × 89	2.67	2.43	2.03

**Table A-4  
Maximum Spans for Roof Joists – Specified Roof Snow Loads 1.0 to 2.0 kPa**

Forming Part of Sentence 9.23.4.2.(1)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
Specified Snow Load, kPa												
1.0				1.5			2.0					
Joist Spacing, mm				Joist Spacing, mm			Joist Spacing, mm					
				305	406	610	305	406	610	305	406	610
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 × 89	2.71	2.46	2.15	2.37	2.15	1.88	2.15	1.95	1.71
			38 × 140	4.26	3.87	3.38	3.72	3.38	2.95	3.38	3.07	2.68
			38 × 184	5.60	5.09	4.44	4.89	4.44	3.88	4.44	4.04	3.53
			38 × 235	7.15	6.49	5.67	6.24	5.67	4.96	5.67	5.15	4.50

			38 × 286	8.70	7.90	6.91	7.60	6.91	6.03	6.91	6.27	5.48
		No. 1 and No. 2	38 × 89	2.59	2.36	2.06	2.27	2.06	1.80	2.06	1.87	1.63
			38 × 140	4.08	3.71	3.24	3.57	3.24	2.83	3.24	2.94	2.57
			38 × 184	5.36	4.87	4.26	4.69	4.26	3.72	4.26	3.87	3.38
			38 × 235	6.85	6.22	5.44	5.98	5.44	4.74	5.44	4.94	4.22
			38 × 286	8.34	7.57	6.40	7.28	6.62	5.50	6.62	6.00	4.90
		No. 3	38 × 89	2.49	2.16	1.76	2.14	1.85	1.51	1.91	1.65	1.35
			38 × 140	3.56	3.08	2.51	3.06	2.65	2.16	2.72	2.36	1.92
			38 × 184	4.33	3.75	3.06	3.72	3.22	2.63	3.31	2.87	2.34
			38 × 235	5.29	4.58	3.74	4.55	3.94	3.22	4.05	3.51	2.86
			38 × 286	6.14	5.32	4.34	5.28	4.57	3.73	4.70	4.07	3.32
		Construction	38 × 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58
		Standard	38 × 89	2.41	2.08	1.70	2.07	1.79	1.46	1.84	1.60	1.30
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	2.67	2.43	2.12	2.33	2.12	1.85	2.12	1.93	1.68
			38 × 140	4.20	3.82	3.33	3.67	3.33	2.91	3.33	3.03	2.65
			38 × 184	5.52	5.02	4.38	4.82	4.38	3.83	4.38	3.98	3.48
			38 × 235	7.05	6.41	5.60	6.16	5.60	4.89	5.60	5.09	4.44
			38 × 286	8.58	7.80	6.81	7.50	6.81	5.95	6.81	6.19	5.41
		No. 1 and No. 2	38 × 89	2.59	2.36	2.06	2.27	2.06	1.80	2.06	1.87	1.63
			38 × 140	4.08	3.71	3.24	3.57	3.24	2.83	3.24	2.94	2.57
			38 × 184	5.36	4.87	4.26	4.69	4.26	3.72	4.26	3.87	3.38
			38 × 235	6.85	6.22	5.44	5.98	5.44	4.75	5.44	4.94	4.32
			38 × 286	8.34	7.57	6.62	7.28	6.62	5.77	6.62	6.01	5.25
		No. 3	38 × 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58
			38 × 140	3.95	3.59	3.10	3.45	3.14	2.67	3.14	2.85	2.37
			38 × 184	5.20	4.62	3.77	4.54	3.97	3.24	4.09	3.54	2.89
			38 × 235	6.53	5.65	4.61	5.61	4.86	3.97	5.00	4.33	3.53
			38 × 286	7.57	6.56	5.35	6.51	5.64	4.60	5.80	5.02	4.10
		Construction	38 × 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58
		Standard	38 × 89	2.43	2.18	1.78	2.12	1.88	1.53	1.93	1.67	1.36
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 × 89	2.55	2.32	2.03	2.23	2.03	1.77	2.03	1.84	1.61
			38 × 140	4.02	3.65	3.19	3.51	3.19	2.79	3.19	2.90	2.53
			38 × 184	5.28	4.80	4.19	4.61	4.19	3.66	4.19	3.81	3.33
			38 × 235	6.74	6.13	5.35	5.89	5.35	4.68	5.35	4.86	4.25
			38 × 286	8.21	7.46	6.52	7.17	6.52	5.69	6.52	5.92	5.17
		No. 1 and No. 2	38 × 89	2.47	2.24	1.96	2.16	1.96	1.71	1.96	1.78	1.56
			38 × 140	3.89	3.53	3.08	3.40	3.08	2.69	3.08	2.80	2.45
			38 × 184	5.11	4.64	4.05	4.46	4.05	3.54	4.05	3.68	3.22
			38 × 235	6.52	5.93	5.18	5.70	5.18	4.52	5.18	4.70	4.11
			38 × 286	7.94	7.21	6.30	6.94	6.30	5.50	6.30	5.73	5.00
		No. 3	38 × 89	2.43	2.20	1.93	2.12	1.93	1.68	1.93	1.75	1.53
			38 × 140	3.82	3.47	3.03	3.33	3.03	2.65	3.03	2.75	2.37
			38 × 184	5.02	4.56	3.77	4.38	3.97	3.24	3.98	3.54	2.89
			38 × 235	6.41	5.65	4.61	5.60	4.86	3.97	5.00	4.33	3.53
			38 × 286	7.57	6.56	5.35	6.51	5.64	4.60	5.80	5.02	4.10
		Construction	38 × 89	2.43	2.20	1.93	2.12	1.93	1.68	1.93	1.75	1.53
		Standard	38 × 89	2.33	2.12	1.85	2.04	1.85	1.59	1.85	1.68	1.41
4.	Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules)	Select Structural	38 × 89	2.28	2.07	1.81	1.99	1.81	1.58	1.81	1.65	1.44
			38 × 140	3.59	3.26	2.85	3.14	2.85	2.49	2.85	2.59	2.26
			38 × 184	4.72	4.29	3.75	4.12	3.75	3.27	3.75	3.40	2.97
			38 × 235	6.03	5.48	4.79	5.27	4.79	4.18	4.79	4.35	3.80
			38 × 286	7.34	6.67	5.82	6.41	5.82	5.09	5.82	5.29	4.62
		No. 1 and No. 2	38 × 89	2.23	2.03	1.77	1.95	1.77	1.55	1.77	1.61	1.41
			38 × 140	3.51	3.19	2.79	3.07	2.79	2.43	2.79	2.53	2.21
			38 × 184	4.61	4.19	3.66	4.03	3.66	3.20	3.66	3.33	2.91
			38 × 235	5.89	5.35	4.68	5.15	4.68	4.09	4.68	4.25	3.68
			38 × 286	7.17	6.52	5.58	6.26	5.69	4.80	5.69	5.17	4.27
		No. 3	38 × 89	2.18	1.98	1.73	1.90	1.73	1.50	1.73	1.57	1.33
			38 × 140	3.42	3.05	2.49	2.99	2.62	2.14	2.69	2.33	1.90
			38 × 184	4.28	3.71	3.03	3.68	3.19	2.60	3.28	2.84	2.32
			38 × 235	5.23	4.53	3.70	4.50	3.90	3.18	4.01	3.47	2.83
			38 × 286	6.07	5.26	4.29	5.22	4.52	3.69	4.65	4.03	3.29
		Construction	38 × 89	2.18	1.98	1.73	1.90	1.73	1.51	1.73	1.57	1.37
		Standard	38 × 89	2.09	1.81	1.48	1.80	1.56	1.27	1.60	1.38	1.13



**Table A-5  
Maximum Spans for Roof Joists – Specified Roof Snow Loads 2.5 and 3.0 kPa**

Forming Part of Sentence 9.23.4.2.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
	Commercial Designation	Grade	Joist Size, mm	Maximum Span, m					
Specified Snow Load, kPa									
2.5				3.0					
Joist Spacing, mm									
				305	406	610	305	406	610
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 × 89	1.99	1.81	1.58	1.88	1.71	1.49
			38 × 140	3.14	2.85	2.49	2.95	2.68	2.34
			38 × 184	4.12	3.75	3.27	3.88	3.53	3.08
			38 × 235	5.27	4.79	4.18	4.96	4.50	3.93
			38 × 286	6.41	5.82	5.09	6.03	5.48	4.79
		No. 1 and No. 2	38 × 89	1.91	1.74	1.52	1.80	1.63	1.43
			38 × 140	3.01	2.73	2.39	2.83	2.57	2.25
			38 × 184	3.95	3.59	3.14	3.72	3.38	2.90
			38 × 235	5.05	4.59	3.84	4.75	4.32	3.55
			38 × 286	6.14	5.46	4.46	5.78	5.05	4.12
		No. 3	38 × 89	1.74	1.50	1.23	1.60	1.39	1.13
			38 × 140	2.48	2.15	1.75	2.29	1.98	1.62
			38 × 184	3.01	2.61	2.13	2.79	2.41	1.97
			38 × 235	3.69	3.19	2.61	3.41	2.95	2.41
38 × 286	4.28		3.70	3.03	3.95	3.42	2.79		
Construction	38 × 89	1.85	1.68	1.47	1.74	1.58	1.38		
	Standard	38 × 89	1.68	1.45	1.19	1.55	1.34	1.10	
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	1.97	1.79	1.56	1.85	1.68	1.47
			38 × 140	3.10	2.81	2.46	2.91	2.65	2.31
			38 × 184	4.07	3.70	3.23	3.83	3.48	3.04
			38 × 235	5.20	4.72	4.12	4.89	4.44	3.88
			38 × 286	6.32	5.75	5.02	5.95	5.41	4.72
		No. 1 and No. 2	38 × 89	1.91	1.74	1.52	1.80	1.63	1.43
			38 × 140	3.01	2.73	2.39	2.83	2.57	2.25
			38 × 184	3.95	3.59	3.14	3.72	3.38	2.95
			38 × 235	5.05	4.59	4.01	4.75	4.32	3.72
			38 × 286	6.14	5.58	4.68	5.78	5.25	4.32
		No. 3	38 × 89	1.85	1.68	1.47	1.74	1.58	1.38
			38 × 140	2.91	2.65	2.16	2.74	2.45	2.00
			38 × 184	3.72	3.22	2.63	3.44	2.98	2.43
			38 × 235	4.55	3.94	3.22	4.20	3.64	2.97
38 × 286	5.28		4.57	3.73	4.88	4.22	3.45		
Construction	38 × 89	1.85	1.68	1.47	1.74	1.58	1.38		
	Standard	38 × 89	1.76	1.52	1.24	1.62	1.40	1.15	
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 × 89	1.88	1.71	1.49	1.77	1.61	1.41
			38 × 140	2.96	2.69	2.35	2.79	2.53	2.21
			38 × 184	3.89	3.54	3.09	3.66	3.33	2.91
			38 × 235	4.97	4.52	3.94	4.68	4.25	3.71
			38 × 286	6.05	5.50	4.80	5.69	5.17	4.52
		No. 1 and No. 2	38 × 89	1.82	1.65	1.44	1.71	1.56	1.36
			38 × 140	2.86	2.60	2.27	2.69	2.45	2.14
			38 × 184	3.76	3.42	2.99	3.54	3.22	2.81
			38 × 235	4.81	4.37	3.82	4.52	4.11	3.59
			38 × 286	5.85	5.31	4.64	5.50	5.00	4.37
		No. 3	38 × 89	1.79	1.62	1.42	1.68	1.53	1.34
			38 × 140	2.81	2.56	2.16	2.65	2.40	2.005
			38 × 184	3.70	3.22	2.63	3.44	2.98	2.43
			38 × 235	4.55	3.94	3.22	4.20	3.64	2.97
38 × 286	5.28		4.57	3.73	4.88	4.22	3.45		
Construction	38 × 89	1.79	1.62	1.42	1.68	1.53	1.34		
	Standard	38 × 89	1.72	1.56	1.29	1.62	1.46	1.19	
4.	Northern Species (includes any Canadian Species covered by the	Select Structural	38 × 89	1.68	1.53	1.34	1.58	1.44	1.26
			38 × 140	2.65	2.40	2.10	2.49	2.26	1.98
			38 × 184	3.48	3.16	2.76	3.27	2.97	2.60

NLGA Standard Grading Rules)		38 × 235	4.44	4.04	3.53	4.18	3.80	3.32
		38 × 286	5.41	4.91	4.29	5.09	4.62	4.04
	No. 1 and No. 2	38 × 89	1.64	1.49	1.31	1.55	1.41	1.23
		38 × 140	2.59	2.35	2.05	2.43	2.21	1.93
		38 × 184	3.40	3.09	2.70	3.20	2.91	2.53
		38 × 235	4.34	3.94	3.35	4.09	3.71	3.10
	No. 3	38 × 286	5.28	4.76	3.89	4.97	4.40	3.59
		38 × 89	1.60	1.46	1.21	1.51	1.37	1.12
		38 × 140	2.45	2.12	1.73	2.26	1.96	1.60
		38 × 184	2.98	2.58	2.11	2.76	2.39	1.95
	Construction Standard	38 × 235	3.65	3.16	2.58	3.37	2.92	2.38
		38 × 286	4.23	3.66	2.99	3.91	3.39	2.76
		38 × 89	1.60	1.46	1.27	1.51	1.37	1.20
	38 × 89	1.46	1.26	1.03	1.34	1.16	0.95	

**Table A-6  
Maximum Spans for Roof Rafters – Specified Roof Snow Loads 1.0 to 2.0 kPa**

Forming Part of Sentence 9.23.4.2.(1)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m								
				Specified Snow Load, kPa								
				1.0			1.5			2.0		
				Rafter Spacing, mm			Rafter Spacing, mm			Rafter Spacing, mm		
				305	406	610	305	406	610	305	406	610
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 × 89	3.41	3.10	2.71	2.98	2.71	2.37	2.71	2.46	2.15
			38 × 140	5.37	4.88	4.26	4.69	4.26	3.72	4.26	3.87	3.38
			38 × 184	7.05	6.41	5.60	6.16	5.60	4.89	5.60	5.09	4.44
			38 × 235	9.01	8.18	7.15	7.87	7.15	6.24	7.15	6.49	5.62
		No. 1 and No. 2	38 × 286	10.96	9.96	8.70	9.58	8.70	7.40	8.70	7.90	6.52
			38 × 89	3.27	2.97	2.59	2.86	2.59	2.27	2.59	2.36	2.06
			38 × 140	5.14	4.67	3.95	4.49	4.08	3.34	4.08	3.60	2.94
			38 × 184	6.76	5.88	4.80	5.74	4.97	4.06	5.06	4.38	3.58
		No. 3	38 × 235	8.30	7.19	5.87	7.02	6.08	4.96	6.19	5.36	4.38
			38 × 286	9.63	8.34	6.81	8.14	7.05	5.76	7.18	6.22	5.08
			38 × 89	2.65	2.30	1.87	2.24	1.94	1.58	1.98	1.71	1.40
			38 × 140	3.78	3.28	2.68	3.20	2.77	2.26	2.82	2.44	1.99
		Construction Standard	38 × 184	4.61	3.99	3.26	3.89	3.37	2.75	3.43	2.97	2.43
38 × 235	5.63		4.88	3.98	4.76	4.12	3.37	4.20	3.64	2.97		
38 × 286	6.53		5.66	4.62	5.52	4.78	3.91	4.87	4.22	3.44		
38 × 89	3.17		2.88	2.42	2.77	2.50	2.04	2.51	2.21	1.80		
	38 × 89	2.56	2.22	1.81	2.17	1.88	1.53	1.91	1.65	1.35		
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	3.36	3.06	2.67	2.94	2.67	2.33	2.67	2.43	2.12
			38 × 140	5.29	4.81	4.20	4.62	4.20	3.67	4.20	3.82	3.33
			38 × 184	6.96	6.32	5.52	6.08	5.52	4.82	5.52	5.02	4.38
			38 × 235	8.88	8.07	7.05	7.76	7.05	6.16	7.05	6.41	5.54
		No. 1 and No. 2	38 × 286	10.81	9.82	8.58	9.45	8.58	7.28	8.58	7.80	6.42
			38 × 89	3.27	2.97	2.59	2.86	2.59	2.27	2.59	2.36	2.06
			38 × 140	5.14	4.67	4.08	4.49	4.08	3.50	4.08	3.71	3.08
			38 × 184	6.76	6.14	5.04	5.90	5.21	4.26	5.31	4.60	3.75
		No. 3	38 × 235	8.63	7.54	6.16	7.36	6.37	5.20	6.49	5.62	4.59
			38 × 286	10.11	8.75	7.15	8.54	7.40	6.04	7.53	6.52	5.33
			38 × 89	3.17	2.83	2.31	2.76	2.39	1.95	2.44	2.11	1.72
			38 × 140	4.67	4.04	3.30	3.95	3.42	2.79	3.48	3.01	2.46
		Construction Standard	38 × 184	5.68	4.92	4.02	4.80	4.16	3.40	4.23	3.67	2.99
38 × 235	6.95		6.02	4.91	5.87	5.08	4.15	5.18	4.48	3.66		
38 × 286	8.06		6.98	5.70	6.81	5.90	4.82	6.01	5.20	4.25		
38 × 89	3.17		2.88	2.51	2.77	2.51	2.14	2.51	2.28	1.89		
	38 × 89	2.68	2.32	1.90	2.27	1.96	1.60	2.00	1.73	1.41		
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack	Select Structural	38 × 89	3.22	2.92	2.55	2.81	2.55	2.23	2.55	2.32	2.03
			38 × 140	5.06	4.60	4.02	4.42	4.02	3.51	4.02	3.65	3.19
			38 × 184	6.65	6.05	5.28	5.81	5.28	4.61	5.28	4.80	4.19
			38 × 235	8.50	7.72	6.74	7.42	6.74	5.89	6.74	6.13	5.35

	Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)		38 × 286	10.34	9.40	8.21	9.03	8.21	7.17	8.21	7.46	6.52
		No. 1 and	38 × 89	3.11	2.83	2.47	2.72	2.47	2.16	2.47	2.24	1.96
		No. 2	38 × 140	4.90	4.45	3.89	4.28	3.89	3.40	3.89	3.53	3.08
			38 × 184	6.44	5.85	5.11	5.62	5.11	4.41	5.11	4.64	3.89
			38 × 235	8.22	7.47	6.38	7.18	6.52	5.39	6.52	5.82	4.75
			38 × 286	10.00	9.06	7.40	8.74	7.66	6.25	7.80	6.76	5.52
		No. 3	38 × 89	3.06	2.78	2.31	2.67	2.39	1.95	2.43	2.11	1.72
			38 × 140	4.67	4.04	3.30	3.95	3.42	2.79	3.48	3.01	2.46
			38 × 184	5.68	4.92	4.02	4.80	4.16	3.40	4.23	3.67	2.99
			38 × 235	6.95	6.02	4.91	5.87	5.08	4.15	5.18	4.48	3.66
		Construction	38 × 89	8.06	6.98	5.70	6.81	5.90	4.82	6.01	5.20	4.25
			Standard	38 × 89	3.06	2.78	2.43	2.67	2.43	2.12	2.43	2.20
4.	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 × 89	2.88	2.61	2.28	2.51	2.28	1.99	2.28	2.07	1.81
			38 × 140	4.53	4.11	3.59	3.95	3.59	3.14	3.59	3.26	2.85
			38 × 184	5.95	5.40	4.72	5.20	4.72	4.12	4.72	4.29	3.68
			38 × 235	7.60	6.90	6.03	6.64	6.03	5.11	6.03	5.48	4.51
		No. 1 and No. 2	38 × 286	9.25	8.40	7.01	8.08	7.26	5.93	7.34	6.40	5.23
			38 × 89	2.81	2.55	2.23	2.46	2.23	1.95	2.23	2.03	1.77
			38 × 140	4.42	4.02	3.44	3.86	3.51	2.91	3.51	3.14	2.56
			38 × 184	5.81	5.13	4.19	5.00	4.33	3.54	4.41	3.82	3.12
		No. 3	38 × 235	7.24	6.27	5.12	6.12	5.30	4.33	5.40	4.67	3.82
			38 × 286	8.40	7.27	5.94	7.10	6.15	5.02	6.26	5.42	4.43
			38 × 89	2.62	2.27	1.85	2.22	1.92	1.57	1.95	1.69	1.38
			38 × 140	3.74	3.24	2.65	3.16	2.74	2.24	2.79	2.42	1.97
Construction	38 × 184	4.56	3.94	3.22	3.85	3.33	2.72	3.40	2.94	2.40		
	38 × 235	5.57	4.82	3.94	4.71	4.08	3.33	4.15	3.60	2.94		
	38 × 286	6.46	5.60	4.57	5.46	4.73	3.86	4.82	4.17	3.41		
	Standard	38 × 89	2.74	2.49	2.11	2.40	2.18	1.90	2.18	1.93	1.57	
Standard	38 × 89	2.22	1.93	1.57	1.88	1.63	1.33	1.66	1.44	1.17		

**Table A-7  
Maximum Spans for Roof Rafters – Specified Roof Snow Loads 2.5 and 3.0 kPa**

Forming Part of Sentence 9.23.4.2.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9		
	Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m							
				Specified Snow Load, kPa							
				2.5			3.0				
				Rafter Spacing, mm				Rafter Spacing, mm			
				305	406	610	305	406	610		
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	38 × 89	2.51	2.28	1.99	2.37	2.15	1.88		
			38 × 140	3.95	3.59	3.14	3.72	3.38	2.95		
			38 × 184	5.20	4.72	4.12	4.89	4.44	3.83		
			38 × 235	6.64	6.03	5.08	6.24	5.67	4.68		
		No. 1 and No. 2	38 × 286	8.08	7.23	5.90	7.60	6.65	5.43		
			38 × 89	2.41	2.19	1.86	2.27	2.06	1.71		
			38 × 140	3.76	3.26	2.66	3.46	3.00	2.45		
			38 × 184	4.58	3.96	3.24	4.21	3.65	2.98		
		No. 3	38 × 235	5.60	4.85	3.96	5.15	4.46	3.64		
			38 × 286	6.50	5.63	4.59	5.98	5.17	4.23		
			38 × 89	1.79	1.55	1.26	1.64	1.42	1.16		
			38 × 140	2.55	2.21	1.80	2.35	2.03	1.66		
Construction	38 × 184	3.10	2.69	2.20	2.86	2.47	2.02				
	38 × 235	3.80	3.29	2.68	3.49	3.02	2.47				
	38 × 286	4.41	3.82	3.12	4.05	3.51	2.87				
	Standard	38 × 89	2.30	2.00	1.63	2.12	1.84	1.50			
Standard	38 × 89	1.73	1.50	1.22	1.59	1.38	1.12				
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	2.48	2.25	1.97	2.33	2.12	1.85		
			38 × 140	3.90	3.54	3.10	3.67	3.33	2.91		
			38 × 184	5.13	4.66	4.07	4.82	4.38	3.77		
			38 × 235	6.55	5.95	5.01	6.16	5.60	4.61		
		No. 1 and	38 × 286	7.97	7.12	5.81	7.50	6.55	5.34		
			38 × 89	2.41	2.19	1.91	2.27	2.06	1.80		

		No. 2	38 × 140 38 × 184 38 × 235 38 × 286	3.79 4.80 5.87 6.81	3.42 4.16 5.08 5.90	2.79 3.40 4.15 4.82	3.57 4.42 5.40 6.27	3.14 3.83 4.68 5.43	2.57 3.12 3.82 4.43
		No. 3	38 × 89 38 × 140 38 × 184 38 × 235 38 × 286	2.21 3.15 3.83 4.68 5.53	1.91 2.73 3.32 4.06 4.71	1.56 2.23 2.71 3.31 3.84	2.03 2.90 3.52 4.31 5.00	1.76 2.51 3.05 3.73 4.33	1.43 2.05 2.49 3.05 3.54
		Commercial	38 × 89	2.33	2.09	1.71	2.20	1.93	1.57
		Standard	38 × 89	1.81	1.57	1.28	1.66	1.44	1.18
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 × 89	2.37	2.15	1.88	2.23	2.03	1.77
			38 × 140	3.73	3.39	2.96	3.51	3.19	2.79
			38 × 184	4.90	4.45	3.89	4.61	4.19	3.66
			38 × 235	6.26	5.69	4.97	5.89	5.35	4.68
			38 × 286	7.62	6.92	5.90	7.17	6.52	5.43
		No. 1 and No. 2	38 × 89	2.29	2.08	1.82	2.16	1.96	1.71
			38 × 140	3.61	3.28	2.86	3.40	3.08	2.66
			38 × 184	4.74	4.31	3.52	4.46	3.96	3.23
			38 × 235	6.06	5.27	4.30	5.59	4.84	3.96
		No. 3	38 × 89	2.21	1.91	1.56	2.03	1.76	1.43
			38 × 140	3.15	2.73	2.23	2.90	2.51	2.05
			38 × 184	3.83	3.32	2.71	3.52	3.05	2.49
38 × 235	4.68		4.06	3.31	4.31	3.73	3.05		
Construction	38 × 89	2.25	2.05	1.77	2.12	1.93	1.63		
	Standard	38 × 89	1.87	1.62	1.33	1.72	1.49	1.22	
4.	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 × 89	2.12	1.93	1.68	1.99	1.81	1.58
			38 × 140	3.33	3.03	2.65	3.14	2.85	2.49
			38 × 184	4.38	3.98	3.33	4.12	3.75	3.07
			38 × 235	5.60	4.99	4.08	5.27	4.59	3.75
			38 × 286	6.69	5.79	4.73	6.15	5.33	4.35
		No. 1 and No. 2	38 × 89	2.07	1.88	1.62	1.95	1.77	1.49
			38 × 140	3.26	2.84	2.32	3.02	2.61	2.13
			38 × 184	3.99	3.46	2.82	3.67	3.18	2.60
			38 × 235	4.88	4.23	3.45	4.49	3.89	3.17
		No. 3	38 × 89	1.77	1.53	1.25	1.63	1.41	1.15
			38 × 140	2.52	2.19	1.78	2.32	2.01	1.64
			38 × 184	3.07	2.66	2.17	2.82	2.45	2.00
			38 × 235	3.76	3.25	2.66	3.45	2.99	2.44
		Construction	38 × 89	2.01	1.74	1.42	1.85	1.60	1.31
			Standard	38 × 89	1.50	1.30	1.06	1.38	1.19

**Table A-8**  
**Maximum Spans for Built-up Floor Beams Supporting not more than One Floor<sup>(1)(2)</sup>**

Forming Part of Sentence 9.23.4.2.(3)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Commercial Designation	Grade	Supported Length, mm <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
Size of Built-up Beam, mm												
3 – 38 × 184				4 – 38 × 184	5 – 38 × 184	3 – 38 × 235	4 – 38 × 235	5 – 38 × 235	3 – 38 × 286	4 – 38 × 286	5 – 38 × 286	
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	2.4	3.36	3.70	3.99	4.30	4.73	5.09	5.23	5.66	5.99
			3.0	3.12	3.44	3.70	3.99	4.39	4.73	4.84	5.34	5.66
			3.6	2.94	3.23	3.48	3.75	4.13	4.45	4.41	5.03	5.41
			4.2	2.79	3.07	3.31	3.52	3.92	4.23	4.09	4.72	5.14
			4.8	2.67	2.94	3.17	3.29	3.75	4.04	3.82	4.41	4.92
			5.4	2.54	2.83	3.04	3.11	3.59	3.89	3.60	4.16	4.65
		6.0	2.41	2.73	2.94	2.95	3.40	3.75	3.42	3.95	4.41	
		No. 1 and No. 2	2.4	2.97	3.42	3.82	3.63	4.19	4.68	4.21	4.86	5.43
			3.0	2.65	3.06	3.42	3.24	3.75	4.19	3.76	4.35	4.86
			3.6	2.42	2.80	3.13	2.96	3.42	3.82	3.44	3.97	4.44

			4.2	2.24	2.59	2.89	2.74	3.17	3.54	3.18	3.67	4.11
			4.8	2.10	2.42	2.71	2.56	2.96	3.31	2.98	3.44	3.84
			5.4	1.98	2.28	2.55	2.42	2.79	3.12	2.81	3.24	3.62
			6.0	1.88	2.17	2.42	2.29	2.65	2.96	2.66	3.07	3.44
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	3.32	3.65	3.93	4.24	4.66	5.03	5.16	5.61	5.93
			3.0	3.08	3.39	3.65	3.93	4.33	4.66	4.76	5.27	5.61
			3.6	2.90	3.19	3.44	3.70	4.08	4.39	4.35	4.96	5.34
			4.2	2.75	3.03	3.27	3.47	3.87	4.17	4.02	4.65	5.07
			4.8	2.63	2.90	3.12	3.24	3.70	3.99	3.66	4.35	4.85
			5.4	2.49	2.79	3.00	2.95	3.53	3.83	3.32	4.10	4.58
			6.0	2.28	2.69	2.90	2.70	3.35	3.70	3.04	3.87	4.35
		No. 1 and No. 2	2.4	3.11	3.55	3.82	3.80	4.39	4.88	4.41	5.10	5.70
			3.0	2.78	3.21	3.55	3.40	3.93	4.39	3.95	4.56	5.10
			3.6	2.54	2.93	3.28	3.11	3.59	4.01	3.60	4.16	4.65
			4.2	2.35	2.72	3.04	2.88	3.32	3.71	3.34	3.85	4.31
			4.8	2.20	2.54	2.84	2.69	3.11	3.47	3.12	3.60	4.03
			5.4	2.07	2.39	2.68	2.54	2.93	3.27	2.94	3.40	3.80
			6.0	1.97	2.27	2.54	2.41	2.78	3.11	2.79	3.22	3.60
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	3.17	3.49	3.76	4.05	4.46	4.81	4.93	5.42	5.73
			3.0	2.95	3.24	3.49	3.76	4.14	4.46	4.58	5.04	5.42
			3.6	2.77	3.05	3.29	3.54	3.90	4.20	4.31	4.74	5.11
			4.2	2.63	2.90	3.12	3.36	3.70	3.99	4.09	4.51	4.85
			4.8	2.52	2.77	2.99	3.22	3.54	3.81	3.82	4.31	4.64
			5.4	2.42	2.67	2.87	3.09	3.41	3.67	3.60	4.14	4.46
			6.0	2.34	2.57	2.77	2.95	3.29	3.54	3.32	3.95	4.31
		No. 1 and No. 2	2.4	3.07	3.38	3.64	3.92	4.32	4.65	4.57	5.25	5.59
			3.0	2.85	3.14	3.38	3.52	4.01	4.32	4.09	4.72	5.25
			3.6	2.63	2.95	3.18	3.22	3.71	4.06	3.73	4.31	4.82
			4.2	2.44	2.80	3.02	2.98	3.44	3.84	3.46	3.99	4.46
			4.8	2.28	2.63	2.89	2.79	3.22	3.60	3.23	3.73	4.17
			5.4	2.15	2.48	2.77	2.63	3.03	3.39	3.05	3.52	3.93
			6.0	2.04	2.35	2.63	2.49	2.88	3.22	2.89	3.34	3.73
4.	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	2.84	3.12	3.36	3.62	3.99	4.30	4.33	4.85	5.23
			3.0	2.63	2.90	3.12	3.34	3.70	3.99	3.88	4.47	4.85
			3.6	2.48	2.73	2.94	3.05	3.48	3.75	3.54	4.08	4.57
			4.2	2.31	2.59	2.79	2.82	3.26	3.57	3.28	3.78	4.23
			4.8	2.16	2.48	2.67	2.64	3.05	3.41	3.06	3.54	3.96
			5.4	2.04	2.35	2.57	2.49	2.87	3.21	2.89	3.34	3.73
			6.0	1.93	2.23	2.48	2.36	2.73	3.05	2.74	3.16	3.54
		No. 1 and No. 2	2.4	2.59	2.99	3.29	3.16	3.65	4.08	3.67	4.24	4.74
			3.0	2.31	2.67	2.99	2.83	3.27	3.65	3.28	3.79	4.24
			3.6	2.11	2.44	2.73	2.58	2.98	3.33	3.00	3.46	3.87
			4.2	1.95	2.26	2.52	2.39	2.76	3.09	2.77	3.20	3.58
			4.8	1.83	2.11	2.36	2.24	2.58	2.89	2.59	3.00	3.35
			5.4	1.72	1.99	2.23	2.11	2.43	2.72	2.45	2.82	3.16
			6.0	1.64	1.89	2.11	2.00	2.31	2.58	2.32	2.68	3.00

**Notes to Table A-8:**

- (1) Beam spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) When the floors have a concrete topping of not more than 51 mm, the spans must be multiplied by 0.8.
- (3) Supported length means half the sum of the joists spans on both sides of the beam.
- (4) Straight interpolation may be used for other supported lengths.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) 3-ply beams with supported lengths greater than 4.2 m require minimum bearing length of 114 mm. All other beams require minimum bearing length of 76 mm.

**Table A-9**  
**Maximum Spans for Built-up Floor Beams Supporting not more than Two Floors<sup>(1)(2)</sup>**

Forming Part of Sentence 9.23.4.2.(3)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Commercial Designation	Grade	Supported Length, mm <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
				Size of Built-up Beam, mm								
				3 – 38 × 184	4 – 38 × 184	5 – 38 × 184	3 – 38 × 235	4 – 38 × 235	5 – 38 × 235	3 – 38 × 286	4 – 38 × 286	5 – 38 × 286
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	2.4	2.80	3.08	3.32	3.49	3.93	4.24	4.05	4.67	5.16
			3.0	2.55	2.86	3.08	3.12	3.60	3.93	3.62	4.18	4.67
			3.6	2.33	2.69	2.90	2.85	3.29	3.68	3.30	3.82	4.27
			4.2	2.16	2.49	2.75	2.64	3.04	3.40	2.99	3.53	3.95
			4.8	2.00	2.33	2.60	2.38	2.85	3.18	2.69	3.30	3.69
			5.4	1.82	2.20	2.45	2.17	2.68	3.00	2.45	3.08	3.48
			6.0	1.67	2.08	2.33	2.00	2.51	2.85	2.26	2.83	3.30
		No. 1 and No. 2	2.4	2.22	2.56	2.87	2.72	3.14	3.51	3.15	3.64	4.07
			3.0	1.99	2.29	2.56	2.43	2.80	3.14	2.82	3.25	3.64
			3.6	1.81	2.09	2.34	2.22	2.56	2.86	2.57	2.97	3.32
			4.2	1.68	1.94	2.17	2.05	2.37	2.65	2.38	2.75	3.07
			4.8	1.57	1.81	2.03	1.92	2.22	2.48	2.23	2.57	2.88
			5.4	1.48	1.71	1.91	1.81	2.09	2.34	2.10	2.43	2.71
			6.0	1.40	1.62	1.81	1.72	1.98	2.22	1.99	2.30	2.57
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	2.76	3.04	3.27	3.43	3.88	4.18	3.99	4.60	5.09
			3.0	2.51	2.82	3.04	2.97	3.55	3.88	3.34	4.12	4.60
			3.6	2.15	2.65	2.86	2.56	3.24	3.62	2.88	3.65	4.20
			4.2	1.90	2.40	2.72	2.26	2.85	3.35	2.55	3.21	3.87
			4.8	1.70	2.15	2.56	2.03	2.56	3.08	2.30	2.88	3.46
			5.4	1.56	1.95	2.35	1.86	2.32	2.79	2.11	2.62	3.14
			6.0	1.44	1.79	2.15	1.72	2.14	2.56	1.96	2.42	2.88
		No. 1 and No. 2	2.4	2.33	2.69	3.01	2.85	3.29	3.68	3.30	3.82	4.27
			3.0	2.08	2.41	2.69	2.55	2.94	3.29	2.96	3.41	3.82
			3.6	1.90	2.20	2.45	2.33	2.68	3.00	2.70	3.12	3.48
			4.2	1.76	2.03	2.27	2.15	2.49	2.78	2.50	2.88	3.22
			4.8	1.65	1.90	2.13	2.01	2.33	2.60	2.30	2.70	3.02
			5.4	1.55	1.79	2.00	1.86	2.19	2.45	2.11	2.54	2.84
			6.0	1.44	1.70	1.90	1.72	2.08	2.33	1.96	2.41	2.70
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	2.64	2.91	3.13	3.37	3.71	4.00	4.05	4.52	4.87
			3.0	2.45	2.70	2.91	3.12	3.45	4.71	3.62	4.18	4.52
			3.6	2.31	2.54	2.73	2.79	3.24	3.49	3.14	3.82	4.25
			4.2	2.07	2.41	2.60	2.46	3.04	3.32	2.77	3.50	3.95
			4.8	1.85	2.31	2.48	2.21	2.79	3.17	2.50	3.14	3.69
			5.4	1.69	2.13	2.39	2.02	2.53	3.00	2.28	2.85	3.42
			6.0	1.56	1.95	2.31	1.86	2.32	2.79	2.11	2.62	3.14
		No. 1 and No. 2	2.4	2.41	2.79	3.03	2.95	3.41	3.81	3.42	3.95	4.42
			3.0	2.16	2.49	2.79	2.64	3.05	3.41	3.06	3.53	3.95
			3.6	1.97	2.27	2.54	2.41	2.78	3.11	2.79	3.23	3.61
			4.2	1.82	2.11	2.35	2.23	2.57	2.88	2.59	2.99	3.34
			4.8	1.71	1.97	2.20	2.09	2.41	2.69	2.42	2.79	3.12
			5.4	1.61	1.86	2.08	1.97	2.27	2.54	2.28	2.63	2.95
			6.0	1.53	1.76	1.97	1.86	2.15	2.41	2.11	2.50	2.79
4.	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	2.29	2.60	2.80	2.80	3.23	3.57	3.24	3.75	4.19
			3.0	2.04	2.36	2.60	2.50	2.89	3.23	2.90	3.35	3.75
			3.6	1.87	2.16	2.41	2.28	2.64	2.95	2.65	3.06	3.42
			4.2	1.73	2.00	2.23	2.11	2.44	2.73	2.45	2.83	3.17
			4.8	1.62	1.87	2.09	1.98	2.28	2.55	2.29	2.65	2.96
			5.4	1.52	1.76	1.97	1.86	2.15	2.41	2.11	2.50	2.79
			6.0	1.44	1.67	1.87	1.72	2.04	2.28	1.96	2.37	2.65
		No. 1 and No. 2	2.4	1.94	2.24	2.50	2.37	2.73	3.06	2.75	3.17	3.55
			3.0	1.73	2.00	2.24	2.12	2.44	2.73	2.46	2.84	3.17
			3.6	1.58	1.83	2.04	1.93	2.23	2.50	2.24	2.59	2.90
			4.2	1.46	1.69	1.89	1.79	2.07	2.31	2.08	2.40	2.68
			4.8	1.37	1.58	1.77	1.67	1.93	2.16	1.94	2.24	2.51
			5.4	1.29	1.49	1.67	1.58	1.82	2.04	1.83	2.11	2.36

			6.0	1.22	1.41	1.58	1.50	1.73	1.93	1.74	2.01	2.24
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**Notes to Table A-9:**

- (1) Beam spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) When the floors have a concrete topping of not more than 51 mm, the spans must be multiplied by 0.8.
- (3) Supported length means half the sum of the joists spans on both sides of the beam.
- (4) Straight interpolation may be used for other supported lengths.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) 3-ply beams require minimum bearing length of 114 mm. 4-ply and 5-ply beams with supported lengths greater than 3 m require minimum bearing length of 114 mm. All other beams require minimum bearing length of 76 mm.

**Table A-10**  
**Maximum Spans for Built-up Floor Beams Supporting not more than Three Floors<sup>(1)(2)</sup>**

Forming Part of Sentence 9.23.4.2.(3)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
	Commercial Designation	Grade	Supported Length, mm <sup>(3)(4)</sup>	Maximum Span, m <sup>(5)(6)</sup>								
Size of Built-up Beam, mm												
3 – 38 × 184				4 – 38 × 184	5 – 38 × 184	3 – 38 × 235	4 – 38 × 235	5 – 38 × 235	3 – 38 × 286	4 – 38 × 286	5 – 38 × 286	
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	2.4	2.38	2.74	2.95	2.91	3.36	3.75	3.37	3.89	4.35
			3.0	2.13	2.46	2.74	2.60	3.00	3.36	2.92	3.48	3.89
			3.6	1.88	2.24	2.51	2.24	2.74	3.06	2.53	3.18	3.56
			4.2	1.66	2.08	2.32	1.99	2.49	2.84	2.25	2.81	3.29
			4.8	1.50	1.88	2.17	1.80	2.24	2.65	2.04	2.53	3.02
			5.4	1.38	1.71	2.05	1.65	2.04	2.44	1.88	2.31	2.75
			6.0	1.28	1.58	1.88	1.53	1.89	2.24	1.75	2.14	2.53
		No. 1 and No. 2	2.4	1.85	2.14	2.39	2.26	2.61	2.92	2.63	3.03	3.39
			3.0	1.66	1.91	2.14	2.02	2.34	2.61	2.35	2.71	3.03
			3.6	1.51	1.74	1.95	1.85	2.13	2.39	2.14	2.48	2.77
			4.2	1.40	1.62	1.81	1.71	1.98	2.21	1.99	2.29	2.56
			4.8	1.31	1.51	1.69	1.60	1.85	2.07	1.86	2.14	2.40
			5.4	1.23	1.42	1.59	1.51	1.74	1.95	1.75	2.02	2.26
			6.0	1.17	1.35	1.51	1.43	1.65	1.85	1.66	1.92	2.14
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	2.22	2.70	2.91	2.64	3.31	3.70	2.98	3.78	4.29
			3.0	1.85	2.35	2.70	2.21	2.79	3.31	2.50	3.14	3.78
			3.6	1.61	2.02	2.43	1.92	2.40	2.89	2.18	2.71	3.24
			4.2	1.43	1.78	2.14	1.71	2.13	2.54	1.95	2.40	2.86
			4.8	1.30	1.61	1.92	1.56	1.92	2.28	1.77	2.18	2.58
			5.4	1.19	1.47	1.74	1.44	1.76	2.08	1.64	2.00	2.35
			6.0	1.11	1.36	1.61	1.34	1.63	1.92	1.53	1.85	2.18
		No. 1 and No. 2	2.4	1.94	2.24	2.51	2.37	2.74	3.06	2.75	3.18	3.56
			3.0	1.74	2.00	2.24	2.12	2.45	2.74	2.46	2.84	3.18
			3.6	1.58	1.83	2.05	1.92	2.24	2.50	2.18	2.60	2.90
			4.2	1.43	1.69	1.89	1.71	2.07	2.32	1.95	2.40	2.69
			4.8	1.30	1.58	1.77	1.56	1.92	2.17	1.77	2.18	2.51
			5.4	1.19	1.47	1.67	1.44	1.76	2.04	1.64	2.00	2.35
			6.0	1.11	1.36	1.58	1.34	1.63	1.92	1.53	1.85	2.18
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	2.35	2.58	2.78	2.89	3.30	3.55	3.24	3.89	4.33
			3.0	2.02	2.40	2.58	2.40	3.00	3.30	2.71	3.42	3.89
			3.6	1.74	2.20	2.43	2.08	2.62	3.06	2.35	2.95	3.54
			4.2	1.55	1.94	2.31	1.85	2.31	2.77	2.10	2.61	3.12
			4.8	1.40	1.74	2.09	1.68	2.08	2.48	1.91	2.35	2.80
			5.4	1.28	1.59	1.90	1.54	1.90	2.26	1.76	2.16	2.55
			6.0	1.19	1.47	1.74	1.44	1.76	2.08	1.64	2.00	2.35
		No. 1 and No. 2	2.4	2.01	2.32	2.60	2.46	2.84	3.17	2.85	3.29	3.68
			3.0	1.80	2.08	2.32	2.20	2.54	2.84	2.55	2.95	3.29
			3.6	1.64	1.90	2.12	2.01	2.32	2.59	2.33	2.69	3.01
			4.2	1.52	1.75	2.96	1.85	2.15	2.40	2.10	2.49	2.78
			4.8	1.40	1.64	1.84	1.68	2.01	2.24	1.91	2.33	2.60

			5.4	1.28	1.55	1.73	1.54	1.89	2.12	1.76	2.16	2.46
			6.0	1.19	1.47	1.64	1.44	1.76	2.01	1.64	2.00	2.33
4.	Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	1.91	2.20	2.46	2.33	2.69	3.01	2.70	3.12	3.49
			3.0	1.70	1.97	2.20	2.08	2.41	2.69	2.42	2.79	3.12
			3.6	1.56	1.80	2.01	1.90	2.20	2.46	2.18	2.55	2.85
			4.2	1.43	1.66	1.86	1.71	2.03	2.27	1.95	2.36	2.64
			4.8	1.30	1.56	1.74	1.56	1.90	2.13	1.77	2.18	2.47
			5.4	1.19	1.47	1.64	1.44	1.76	2.01	1.64	2.00	2.33
			6.0	1.11	1.36	1.56	1.34	1.63	1.90	1.53	1.85	2.18
		No. 1 and No. 2	2.4	1.61	1.86	2.08	1.97	2.28	2.55	2.29	2.64	2.96
			3.0	1.44	1.67	1.86	1.76	2.04	2.28	2.05	2.36	2.64
			3.6	1.32	1.52	1.70	1.61	1.86	2.08	1.87	2.16	2.41
			4.2	1.22	1.41	1.57	1.49	1.72	1.93	1.73	2.00	2.23
			4.8	1.14	1.32	1.47	1.40	1.61	1.80	1.62	1.87	2.09
			5.4	1.08	1.24	1.39	1.32	1.52	1.70	1.53	1.76	1.97
			6.0	1.02	1.18	1.32	1.25	1.44	1.61	1.45	1.67	1.87

**Notes to Table A-10:**

- (1) Beam spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) When the floors have a concrete topping of not more than 51 mm, the spans must be multiplied by 0.8.
- (3) Supported length means half the sum of the joists spans on both sides of the beam.
- (4) Straight interpolation may be used for other supported lengths.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) 3-ply beams with supported lengths greater than 4.2 m require minimum bearing length of 152 mm. All other beams require minimum bearing length of 114 mm.

**Table A-11  
Maximum Spans for Glue-Laminated Floor Beams – 20f-E Grade<sup>(1)</sup>**

Forming Part of Sentence 9.23.4.2.(3)

Item	Column 1	Column 2	Column 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	
	Number of <i>Storeys</i> Supported	Beam Width, mm	Supported Length, m <sup>(2)(3)</sup>	Maximum Span, m <sup>(4)(5)(6)(7)</sup>							
				Beam Depth, mm							
				228	266	304	342	380	418	456	
1.	1	80	2.4	4.32	5.04	5.76	6.48	7.20	7.92	8.64	
			3.0	3.87	4.51	5.15	5.80	6.44	7.09	7.73	
			3.6	3.53	4.12	4.70	5.29	5.88	6.47	7.06	
			4.2	3.27	3.81	4.36	4.90	5.44	5.99	6.53	
			4.8	3.06	3.57	4.07	4.58	5.09	5.60	6.11	
			5.4	2.88	3.36	3.84	4.32	4.80	5.28	5.76	
			6.0	2.73	3.19	3.64	4.10	4.56	5.01	5.47	
		130	2.4	5.51	6.43	7.35	8.26	9.18	10.10	11.02	
			3.0	4.93	5.75	6.57	7.39	8.21	9.03	9.86	
			3.6	4.50	5.25	6.00	6.75	7.50	8.25	9.00	
			4.2	4.16	4.86	5.55	6.25	6.94	7.64	8.33	
			4.8	3.90	4.54	5.19	5.84	6.49	7.14	7.79	
			5.4	3.67	4.28	4.90	5.51	6.12	6.73	7.35	
			6.0	3.48	4.07	4.65	5.23	5.81	6.39	6.97	
2.	2	80	2.4	3.28	3.83	4.37	4.92	5.47	6.01	6.56	
			3.0	2.93	3.42	3.91	4.40	4.89	5.38	5.87	
			3.6	2.68	3.12	3.57	4.02	4.46	4.91	5.36	
			4.2	2.48	2.89	3.31	3.72	4.13	4.54	4.96	
			4.8	2.32	2.71	3.09	3.48	3.86	4.25	4.64	
			5.4	2.19	2.55	2.91	3.28	3.64	4.01	4.37	
			6.0	2.07	2.42	2.77	3.11	3.46	3.80	4.15	
		130	2.4	4.18	4.88	5.57	6.27	6.97	7.66	8.36	
			3.0	3.74	4.36	4.99	5.61	6.23	6.85	7.48	
			3.6	3.41	3.98	4.55	5.12	5.69	6.26	6.83	
			4.2	3.16	3.69	4.21	4.74	5.27	5.79	6.32	
			4.8	2.96	3.45	3.94	4.43	4.93	5.42	5.91	



			5.4	2.79	3.25	3.72	4.18	4.64	5.11	5.57
			6.0	2.64	3.08	3.53	3.97	4.41	4.85	5.29
3.	3	80	2.4	2.75	3.21	3.66	4.12	4.58	5.04	5.50
			3.0	2.46	2.87	3.28	3.69	4.10	4.51	4.92
			3.6	2.24	2.62	2.99	3.37	3.74	4.11	4.49
			4.2	2.08	2.42	2.77	3.12	3.46	3.81	4.15
			4.8	1.94	2.27	2.59	2.91	3.24	3.56	3.89
			5.4	1.83	2.14	2.44	2.75	3.05	3.36	3.66
			6.0	1.74	2.03	2.32	2.61	2.90	3.19	3.48
			6.0	1.74	2.03	2.32	2.61	2.90	3.19	3.48
		130	2.4	3.50	4.09	4.67	5.25	5.84	6.42	7.01
			3.0	3.13	3.66	4.18	4.70	5.22	5.74	6.27
			3.6	2.86	3.34	3.81	4.29	4.77	5.24	5.72
			4.2	2.65	3.09	3.53	3.97	4.41	4.85	5.30
			4.8	2.48	2.89	3.30	3.72	4.13	4.54	4.95
			5.4	2.34	2.72	3.11	3.50	3.89	4.28	4.67
			6.0	2.22	2.58	2.95	3.32	3.69	4.06	4.43
			6.0	2.22	2.58	2.95	3.32	3.69	4.06	4.43

**Notes to Table A-11:**

- (1) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) Supported length means half the sum of the joist spans on both sides of the beam.
- (3) Straight interpolation may be used for other supported lengths.
- (4) Spans are valid for glued-laminated timber conforming to CAN/CSA-O122-M and CSA O177.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) Provide a minimum bearing length of 89 mm. (Alternatively, the bearing length may be designed in accordance with Part 4.)
- (7) Top edge of beam assumed to be fully laterally supported by joists.

**Table A-12**

**Maximum Spans for Built-up Ridge Beams and Lintels Supporting the Roof and Ceiling Only – No. 1 or No. 2 Grade**

Forming Part of Sentences 9.23.4.2.(4), 9.23.12.3.(1) and (3), 9.23.13.8.(2) and 9.37.3.1.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
			Maximum Span, m <sup>(1)(2)(3)</sup>				
			Specified Snow Load, kPa				
			1.0	1.5	2.0	2.5	3.0
1.	Douglas Fir – Larch (includes Douglas Fir and Western Larch)	3 – 38 × 184	2.65	2.28	2.03	1.85	1.71
		4 – 38 × 184	3.06	2.64	2.35	2.14	1.97
		5 – 38 × 184	3.43	2.95	2.62	2.39	2.21
		3 – 38 × 235	3.25	2.79	2.49	2.26	2.09
		4 – 38 × 235	3.75	3.22	2.87	2.61	2.41
		5 – 38 × 235	4.19	3.60	3.21	2.92	2.70
		3 – 38 × 286	3.77	3.24	2.88	2.62	2.43
		4 – 38 × 286	4.35	3.74	3.33	3.03	2.80
		5 – 38 × 286	4.86	4.18	3.72	3.39	3.13
2.	Hem – Fir (includes Western Hemlock and Amabilis Fir)	3 – 38 × 184	2.78	2.39	2.13	1.94	1.79
		4 – 38 × 184	3.21	2.76	2.46	2.24	2.07
		5 – 38 × 184	3.59	3.09	2.75	2.50	2.31
		3 – 38 × 235	3.40	2.93	2.61	2.37	2.19
		4 – 38 × 235	3.93	3.38	3.01	2.74	2.53
		5 – 38 × 235	4.39	3.78	3.36	3.06	2.83
		3 – 38 × 286	3.95	3.40	3.02	2.75	2.54
		4 – 38 × 286	4.56	3.92	3.49	3.18	2.94
		5 – 38 × 286	5.10	4.38	3.90	3.55	3.28
3.	Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	3 – 38 × 184	2.88	2.48	2.21	2.01	1.86
		4 – 38 × 184	3.30	2.86	2.55	2.32	2.14
		5 – 38 × 184	3.55	3.10	2.82	2.59	2.40
		3 – 38 × 235	3.53	3.03	2.70	2.46	2.27
		4 – 38 × 235	4.07	3.50	3.12	2.84	2.62
		5 – 38 × 235	4.54	3.91	3.49	3.17	2.93
		3 – 38 × 286	4.09	3.52	3.13	2.85	2.63

	4 – 38 × 286	4.72	4.06	3.62	3.29	3.04
	5 – 38 × 286	5.28	4.54	4.04	3.68	3.40

**Notes to Table A-12:**

- (1) Beam and lintel spans are calculated based on a maximum supported length of 4.9 m. Spans may be increased by 5% for supported lengths of not more than 4.3 m, by 10% for supported lengths of not more than 3.7 m, and by 25% for supported lengths of not more than 2.4 m.
- (2) For ridge beams, supported length means half the sum of the rafter, joist or truss spans on both sides of the beam. For lintels, supported length means half the sum of truss, roof joist or rafter spans supported by the lintel plus the length of the overhang beyond the lintel.
- (3) Provide a minimum bearing length of 76 mm.

**Table A-13**  
**Maximum Spans for Douglas Fir – Larch Lintels – No. 1 or No. 2 Grade – Non-Structural Sheathing<sup>(1)</sup>**

Forming Part of Sentences 9.23.12.3.(1) and (3) and 9.37.3.1.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
	Lintel Supporting	Lintel Size, mm <sup>(2)</sup>	Maximum Span, m <sup>(3)(4)</sup>					Interior Walls
			Exterior Walls					
			Specified Snow Load, kPa					
			1.0	1.5	2.0	2.5	3.0	
1.	Limited attic storage and ceiling	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	This Area Intentionally Left Blank					1.25 1.78 2.17 2.65 3.08
2.	Roof and ceiling only (tributary width of 0.6 m maximum) <sup>(5)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	2.68 4.21 5.50 6.61 7.66	2.34 3.68 4.84 5.97 6.92	2.13 3.34 4.39 5.56 6.44	1.97 3.10 4.08 5.21 6.09	1.86 2.92 3.84 4.88 5.66	1.97 3.10 4.08 5.21 6.09
3.	Roof and ceiling only (tributary width of 4.9 m maximum) <sup>(6)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	1.25 1.78 2.17 2.65 3.08	1.07 1.53 1.86 2.28 2.64	0.96 1.36 1.66 2.03 2.35	0.87 1.24 1.51 1.85 2.14	0.80 1.15 1.40 1.71 1.98	0.87 1.24 1.51 1.85 2.14
4.	Roof, ceiling and 1 storey <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	0.96 1.37 1.67 2.04 2.37	0.88 1.26 1.53 1.88 2.18	0.82 1.17 1.42 1.74 2.02	0.77 1.10 1.34 1.63 1.90	0.73 1.04 1.26 1.54 1.79	0.68 0.97 1.18 1.44 1.67
5.	Roof, ceiling and 2 storeys <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	0.86 1.23 1.50 1.84 2.13	0.81 1.16 1.41 1.72 2.00	0.77 1.09 1.33 1.63 1.89	0.73 1.04 1.27 1.55 1.80	0.70 0.99 1.21 1.48 1.72	0.61 0.87 1.06 1.30 1.51
6.	Roof, ceiling and 3 storeys <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	0.81 1.15 1.40 1.71 1.99	0.77 1.10 1.33 1.63 1.89	0.73 1.05 1.28 1.56 1.81	0.71 1.01 1.22 1.50 1.74	0.68 0.97 1.18 1.44 1.67	0.57 0.82 1.00 1.22 1.41

**Notes to Table A-13:**

- (1) Where structural sheathing is used, lintel spans may be increased by 15%. Structural sheathing consists of a minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151, CAN/CSA-O325.0 or CSA O437.0 fastened with at least two rows of fasteners to the exterior face of the lintel, and a single row to the top plates and studs. Fasteners shall conform to Table 9.23.3.5.
- (2) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.
- (3) If floor joists span the full width of the *building* without support, lintel spans shall be reduced by 15% for “Roof, ceiling and 1 storey”, by 20% for “Roof, ceiling and 2 storeys”, and by 25% for “Roof, ceiling and 3 storeys”.

(4) For ends of lintels fully supported by walls, provide minimum bearing length of 38 mm for lintel spans up to 3 m, or minimum bearing length of 76 mm for lintel spans greater than 3 m.

(5) Spans for 0.6 m tributary width are calculated for lintels in end walls that support only a 0.6 m width of roof and ceiling, but do not support roof joists, roof rafters or roof trusses.

(6) Lintel spans are calculated based on a maximum floor joist, roof joist or rafter span of 4.9 m and a maximum roof truss span of 9.8 m. Lintel spans may be increased by 5% if rafter and joist spans are not more than 4.3 m and roof truss spans are not more than 8.6 m. Spans may be increased by 10% if rafter and joist spans are not more than 3.7 m and roof trusses are not more than 7.4 m.

(7) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* does not exceed that specified for residential areas as described in Table 4.1.5.3.

**Table A-14**  
**Maximum Spans for Hem – Fir Lintels – No. 1 or No. 2 Grade – Non-Structural Sheathing<sup>(1)</sup>**

Forming Part of Sentences 9.23.12.3.(1) and (3) and 9.37.3.1.(1)

Item	Column 1	Column 2	Maximum Span, m <sup>(3)(4)</sup>					Interior Walls
			Exterior Walls					
			Specified Snow Load, kPa					
			1.0	1.5	2.0	2.5	3.0	
1.	Limited attic storage and ceiling	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	This Area Intentionally Left Blank					1.31 1.87 2.27 2.78 3.23
2.	Roof and ceiling only (tributary width of 0.6 m maximum) <sup>(5)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	2.68 4.21 5.50 6.61 7.66	2.34 3.68 4.84 5.97 6.92	2.13 3.34 4.39 5.56 6.44	1.97 3.10 4.08 5.21 6.09	1.86 2.92 3.84 4.90 5.82	1.97 3.10 4.08 5.21 6.09
3.	Roof and ceiling only (tributary width of 4.9 m maximum) <sup>(6)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	1.31 1.87 2.27 2.78 3.23	1.13 1.61 1.95 2.39 2.77	1.00 1.43 1.74 2.13 2.47	0.91 1.30 1.58 1.92 2.17	0.84 1.20 1.42 1.71 1.94	0.91 1.30 1.58 1.92 2.17
4.	Roof, ceiling and 1 storey <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	1.01 1.44 1.75 2.14 2.49	0.93 1.32 1.61 1.96 2.22	0.86 1.23 1.47 1.76 2.00	0.81 1.14 1.34 1.60 1.82	0.76 1.05 1.23 1.48 1.69	0.69 0.95 1.12 1.35 1.55
5.	Roof, ceiling and 2 storeys <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	0.91 1.29 1.57 1.90 2.15	0.85 1.21 1.44 1.73 1.97	0.80 1.13 1.33 1.60 1.82	0.76 1.05 1.24 1.49 1.70	0.72 0.98 1.16 1.40 1.60	0.60 0.82 0.98 1.19 1.37
6.	Roof, ceiling and 3 storeys <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	0.85 1.21 1.43 1.72 1.95	0.81 1.14 1.33 1.60 1.82	0.77 1.06 1.25 1.50 1.72	0.74 1.00 1.18 1.42 1.63	0.69 0.95 1.12 1.35 1.55	0.55 0.76 0.91 1.10 1.27

**Notes to Table A-14:**

(1) Where structural sheathing is used, lintel spans may be increased by 15%. Structural sheathing consists of a minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151, CAN/CSA-O325.0 or CSA O437.0 fastened with at least two rows of fasteners to the exterior face of the lintel, and a single row to the top plates and studs. Fasteners shall conform to Table 9.23.3.5.

(2) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(3) If floor joists span the full width of the *building* without support, lintel spans shall be reduced by 15% for “Roof, ceiling and 1 storey”, by 20% for “Roof, ceiling and 2 storeys”, and by 25% for “Roof, ceiling and 3 storeys”.

(4) For ends of lintels fully supported by walls, provide minimum bearing length of 38 mm for lintel spans up to 3 m, or minimum bearing length of 76 mm for lintel spans greater than 3 m.

(5) Spans for 0.6 m tributary width are calculated for lintels in end walls that support only a 0.6 m width of roof and ceiling, but do not support roof joists, roof rafters or roof trusses.

(6) Lintel spans are calculated based on a maximum floor joist, roof joist or rafter span of 4.9 m and a maximum roof truss span of 9.8 m. Lintel spans may be increased by 5% if rafter and joist spans are not more than 4.3 m and roof truss spans are not more than 8.6 m. Spans may be increased by 10% if rafter and joist spans are not more than 3.7 m and roof trusses are not more than 7.4 m.

(7) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* does not exceed that specified for residential areas as described in Table 4.1.5.3.

**Table A-15**  
**Maximum Spans for Spruce – Pine – Fir Lintels – No. 1 or No. 2 Grade – Non-Structural Sheathing<sup>(1)</sup>**

Forming Part of Sentences 9.23.12.3.(1) and (3) and 9.37.3.1.(1)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	
	Lintel Supporting	Lintel Size, mm <sup>(2)</sup>	Maximum Span, m <sup>(3)(4)</sup>					Interior Walls	
			Exterior Walls						
			Specified Snow Load, kPa						
			1.0	1.5	2.0	2.5	3.0		
1.	Limited attic storage and ceiling	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	This Area Intentionally Left Blank					1.27 1.93 2.35 2.88 3.34	
2.	Roof and ceiling only (tributary width of 0.6 m maximum) <sup>(5)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	2.55 4.01 5.27 6.37 7.38	2.23 3.50 4.61 5.76 6.67	2.02 3.18 4.18 5.34 6.21	1.88 2.96 3.88 4.96 5.87	1.77 2.78 3.66 4.67 5.61	1.88 2.96 3.88 4.96 5.87	
3.	Roof and ceiling only (tributary width of 4.9 m maximum) <sup>(6)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	1.27 1.93 2.35 2.88 3.34	1.11 1.66 2.02 2.47 2.87	1.01 1.48 1.80 2.20 2.56	0.93 1.35 1.64 2.01 2.33	0.87 1.25 1.52 1.84 2.09	0.93 1.35 1.64 2.01 2.33	
4.	Roof, ceiling and 1 storey <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	1.05 1.49 1.82 2.22 2.58	0.96 1.37 1.67 2.04 2.36	0.89 1.27 1.55 1.89 2.15	0.84 1.19 1.44 1.73 1.96	0.79 1.13 1.33 1.59 1.81	0.74 1.02 1.20 1.45 1.66	
5.	Roof, ceiling and 2 storeys <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	0.94 1.34 1.63 1.99 2.31	0.88 1.26 1.53 1.87 2.12	0.83 1.19 1.44 1.72 1.96	0.79 1.13 1.33 1.60 1.82	0.76 1.06 1.25 1.50 1.71	0.64 0.88 1.05 1.27 1.45	
6.	Roof, ceiling and 3 storeys <sup>(3)(6)(7)</sup>	2 – 38 × 89 2 – 38 × 140 2 – 38 × 184 2 – 38 × 235 2 – 38 × 286	0.88 1.25 1.52 1.86 2.11	0.83 1.19 1.44 1.73 1.96	0.80 1.14 1.35 1.62 1.84	0.77 1.08 1.27 1.53 1.74	0.74 1.02 1.21 1.45 1.66	0.59 0.81 0.97 1.17 1.35	

**Notes to Table A-15:**

(1) Where structural sheathing is used, lintel spans may be increased by 15%. Structural sheathing consists of a minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151, CAN/CSA-O325.0 or CSA O437.0 fastened with at least two rows of fasteners to the exterior face of the lintel, and a single row to the top plates and studs. Fasteners shall conform to Table 9.23.3.5.

(2) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(3) If floor joists span the full width of the *building* without support, lintel spans shall be reduced by 15% for “Roof, ceiling and 1 storey”, by 20% for “Roof, ceiling and 2 storeys”, and by 25% for “Roof, ceiling and 3 storeys”.

(4) For ends of lintels fully supported by walls, provide minimum bearing length of 38 mm for lintel spans up to 3 m, or minimum bearing length of 76 mm for lintel spans greater than 3 m.

(5) Spans for 0.6 m tributary width are calculated for lintels in end walls that support only a 0.6 m width of roof and ceiling, but do not support roof joists, roof rafters or roof trusses.

(6) Lintel spans are calculated based on a maximum floor joist, roof joist or rafter span of 4.9 m and a maximum roof truss span of 9.8 m. Lintel spans may be increased by 5% if rafter and joist spans are not more than 4.3 m and roof truss spans are not more than 8.6 m. Spans may be increased by 10% if rafter and joist spans are not more than 3.7 m and roof trusses are not more than 7.4 m.

(7) Spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* does not exceed that specified for residential areas as described in Table 4.1.5.3.

**Table A-16**  
**Maximum Spans for Glued-Laminated Timber Lintels – 20f-E Stress Grade – Exterior Walls – Roof and Ceiling Load Only**

Forming Part of Sentences 9.23.12.3.(1) and (3) and 9.37.3.1.(1)

Item	Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Lintel Size, mm	Maximum Span, m <sup>(1)(2)(3)</sup>														
		Specified Snow Load, kPa														
		1.0			1.5			2.0			2.5			3.0		
		Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>			Supported length, m <sup>(4)(5)</sup>		
		2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8
1.	130 × 304	6.23	5.63	5.24	5.63	5.09	4.73	5.24	4.73	4.40	4.95	4.48	4.17	4.73	4.28	3.87
2.	80 × 380	6.52	5.89	5.48	5.89	5.32	4.96	5.48	4.96	4.52	5.19	4.69	4.11	4.96	4.39	3.80
3.	130 × 342	6.80	6.15	5.72	6.15	5.56	5.17	5.72	5.17	4.81	5.41	4.89	4.55	5.17	4.67	4.35
4.	80 × 418	7.00	6.33	5.89	6.33	5.72	5.32	5.89	5.32	4.96	5.57	5.03	4.52	5.32	4.81	4.18
5.	130 × 380	7.36	6.65	6.19	6.65	6.01	5.59	6.19	5.59	5.21	5.86	5.29	4.92	5.59	5.06	4.70
6.	80 × 456	7.48	6.76	6.29	6.76	6.10	5.68	6.29	5.68	5.29	5.95	5.37	4.93	5.68	5.13	4.56
7.	130 × 418	7.91	7.15	6.65	7.15	6.46	6.01	6.65	6.01	5.59	6.29	5.68	5.29	6.01	5.43	5.05
8.	80 × 494	7.94	7.17	6.68	7.17	6.48	6.03	6.68	6.03	5.61	6.31	5.71	5.31	6.03	5.45	4.94
9.	80 × 532	8.39	7.58	7.06	7.58	6.85	6.38	7.06	6.38	5.93	6.67	6.03	5.61	6.38	5.76	5.32
10.	130 × 456	8.44	7.63	7.10	7.63	6.89	6.41	7.10	6.41	5.97	6.71	6.07	5.65	6.41	5.80	5.39

Notes to Table A-16:

(1) Spans are valid for glued-laminated timber conforming to CAN/CSA-O122-M and CSA O177.

(2) Provide a minimum bearing length of 89 mm. (Alternatively, the bearing length may be calculated in accordance with Part 4.)

(3) Top edge of lintel assumed to be fully laterally supported.

(4) Supported length means half the length of trusses or rafters, plus the length of overhang beyond the wall.

(5) For intermediate supported lengths, straight interpolation may be used.

**Table A-17**  
**Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls<sup>(1)(2)(3)</sup> (1-10M Bottom Bar)**

Forming Part of Sentence 9.20.17.4.(3)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
			Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
			Maximum Ground Snow Load, kN/m <sup>2</sup>			
			1.50	3.33	1.50	3.33
1.	140	200	1.41	1.18	1.03	0.93
		300	1.78	1.50	1.30	1.18
		400	2.08	1.75	1.53	1.38
		500	2.33	1.97	1.72	1.56
		600	2.55	2.16	1.89	1.71
2.	150	200	1.41	1.18	1.02	0.92
		300	1.78	1.50	1.29	1.17

		400	2.08	1.75	1.51	1.37
		500	2.33	1.97	1.70	1.54
		600	2.54	2.15	1.87	1.70
3.	160	200	1.41	1.18	1.01	0.91
		300	1.78	1.50	1.28	1.16
		400	2.07	1.75	1.50	1.36
		500	2.32	1.96	1.68	1.53
		600	2.53	2.15	1.85	1.68
4.	190	200	1.41	1.19	0.98	0.89
		300	1.78	1.50	1.24	1.13
		400	2.06	1.74	1.45	1.32
		500	2.30	1.95	1.63	1.49
		600	2.51	2.13	1.78	1.63
5.	200	200	1.41	1.19	0.97	0.89
		300	1.77	1.49	1.23	1.12
		400	2.06	1.74	1.43	1.31
		500	2.30	1.95	1.61	1.48
		600	2.50	2.13	1.77	1.62
6.	240	200	1.41	1.19	0.94	0.86
		300	1.76	1.49	1.18	1.09
		400	2.04	1.73	1.38	1.27
		500	2.27	1.93	1.55	1.43
		600	2.47	2.11	1.70	1.56

**Notes to Table A-17:**

- (1) Deflection criteria is  $L/240$ , where “L” is the clear span of the lintel.
- (2) Linear interpolation is permitted between ground snow loads and between lintel depths.
- (3) 10M stirrups are required at a maximum  $d/2$  spacing for spans greater than 1 200 mm, where “d” is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

**Table A-18**  
**Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls<sup>(1)(2)(3)</sup> (1-15M Bottom Bar)**

Forming Part of Sentence 9.20.17.4.(3)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
			Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
			Maximum Ground Snow Load, kN/m <sup>2</sup>			
			1.50	3.33	1.50	3.33
1.	140	200	1.63	1.46	1.31	1.23
		300	2.43	2.08	1.81	1.64
		400	2.90	2.44	2.13	1.93
		500	3.26	2.75	2.41	2.18
		600	3.58	3.03	2.65	2.40
2.	150	200	1.67	1.49	1.33	1.25
		300	2.48	2.08	1.79	1.62
		400	2.90	2.44	2.11	1.91
		500	3.26	2.75	2.38	2.16
		600	3.57	3.02	2.62	2.38
3.	160	200	1.70	1.53	1.35	1.26
		300	2.48	2.08	1.78	1.61
		400	2.90	2.44	2.09	1.90
		500	3.25	2.75	2.36	2.14
		600	3.56	3.02	2.59	2.36
4.	190	200	1.80	1.61	1.36	1.24
		300	2.48	2.09	1.73	1.58
		400	2.89	2.44	2.03	1.85
		500	3.23	2.74	2.29	2.09
		600	3.53	3.00	2.51	2.30
5.	200	200	1.83	1.64	1.35	1.23
		300	2.48	2.09	1.71	1.57
		400	2.88	2.44	2.01	1.84

		500	3.22	2.74	2.26	2.07
		600	3.52	2.99	2.48	2.28
6.	240	200	1.93	1.65	1.30	1.20
		300	2.47	2.08	1.66	1.52
		400	2.86	2.43	2.94	1.78
		500	3.19	2.72	2.18	2.01
		600	3.47	2.97	2.39	2.20

**Notes to Table A-18:**

- (1) Deflection criteria is  $L/240$ , where “L” is the clear span of the lintel.  
(2) Linear interpolation is permitted between ground snow loads and between lintel depths.  
(3) 10M stirrups are required at a maximum  $d/2$  spacing for spans greater than 1 200 mm, where “d” is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

**Table A-19**  
**Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls<sup>(1)(2)(3)</sup> (2-15M Bottom Bar)**

Forming Part of Sentence 9.20.17.4.(3)

Item	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
	Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
			Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
			Maximum Ground Snow Load, kN/m <sup>2</sup>			
			1.50	3.33	1.50	3.33
1.	140	200	1.63	1.46	1.31	1.23
		300	2.43	2.18	1.96	1.84
		400	3.22	2.90	2.60	2.42
		500	4.00	3.60	3.25	2.70
		600	4.71	4.20	3.61	2.97
2.	150	200	1.67	1.49	1.33	1.25
		300	2.48	2.23	1.99	1.87
		400	3.29	2.96	2.64	2.45
		500	4.80	3.68	3.29	2.74
		600	4.87	4.20	3.64	3.02
3.	160	200	1.70	1.53	1.35	1.27
		300	2.53	2.28	2.02	1.90
		400	3.36	3.02	2.68	2.48
		500	4.16	3.76	3.27	2.78
		600	4.95	4.20	3.61	3.08
4.	190	200	1.80	1.61	1.39	1.32
		300	2.67	2.40	2.09	1.97
		400	3.53	3.19	2.77	2.56
		500	4.38	3.81	3.18	2.90
		600	4.92	4.19	3.50	3.21
5.	200	200	1.83	1.64	1.41	1.33
		300	2.87	2.44	2.11	2.00
		400	3.78	3.24	2.79	2.55
		500	4.46	3.81	3.15	2.89
		600	4.86	4.18	3.47	3.18
6.	240	200	2.07	1.74	1.46	1.38
		300	3.07	2.59	2.18	2.07
		400	3.95	3.38	2.70	2.48
		500	4.40	3.80	3.04	2.80
		600	4.78	4.16	3.34	3.08

**Notes to Table A-19:**

- (1) Deflection criteria is  $L/240$ , where “L” is the clear span of the lintel.  
(2) Linear interpolation is permitted between ground snow loads and between lintel depths.  
(3) 10M stirrups are required at a maximum  $d/2$  spacing for spans greater than 1 200 mm, where “d” is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

**Table A-20**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Exterior Stud Walls with Brick Veneer – 1.0 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof <i>Live Load</i> , kPa	1.0								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	2.96	2.79	2.86	2.71	2.78	2.65	2.71	2.59
	W 150 × 30	3.32	3.14	3.22	3.05	3.13	2.98	3.04	2.91
	W 150 × 37	3.62	3.41	3.50	3.32	3.40	3.24	3.32	3.17
	W 200 × 27	3.80	3.59	3.68	3.49	3.58	3.41	3.49	3.33
	W 200 × 31	4.06	3.83	3.93	3.73	3.82	3.64	3.72	3.56
	W 200 × 36	4.17	3.94	4.04	3.83	3.93	3.74	3.82	3.65
	W 200 × 42	4.42	4.18	4.29	4.06	4.16	3.96	4.05	3.87
	W 250 × 33	4.71	4.44	4.56	4.32	4.43	4.22	4.31	4.12
	W 250 × 39	5.04	4.76	4.88	4.63	4.75	4.52	4.62	4.41
	W 250 × 49	5.32	5.02	5.15	4.89	5.01	4.77	4.87	4.66
	W 310 × 39	5.66	5.34	5.49	5.20	5.33	5.07	5.19	4.96
	W 310 × 45	5.96	5.62	5.77	5.47	5.61	5.34	5.46	5.22
	W 310 × 52	6.33	5.98	6.13	5.82	5.96	5.67	5.8	5.54
	W 310 × 60	6.50	6.14	6.30	5.98	6.12	5.83	5.96	5.69
	W 360 × 33	5.61	5.29	5.43	5.15	5.28	5.03	5.14	4.91
W 360 × 39	6.01	5.68	5.83	5.53	5.66	5.39	5.51	5.27	
W 360 × 45	6.38	6.03	6.19	5.87	6.01	5.72	5.85	5.59	
W 360 × 51	6.70	6.32	6.49	6.16	6.31	6.00	6.14	5.87	
W 360 × 57	7.00	6.61	6.78	6.43	6.59	6.28	6.42	6.13	

Notes to Table A-20:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-21**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Interior Stud Walls or Exterior Stud Walls with Siding – 1.0 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof <i>Live Load</i> , kPa	1.0								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	4.20	3.82	3.98	3.67	3.81	3.51	3.66	3.35
	W 150 × 30	4.72	4.30	4.48	4.13	4.28	3.98	4.11	3.85
	W 150 × 37	5.14	4.68	4.88	4.49	4.66	4.33	4.48	4.19
	W 200 × 27	5.41	4.92	5.13	4.72	4.90	4.56	4.71	4.41
	W 200 × 31	5.77	5.25	5.48	5.04	5.23	4.86	5.02	4.71
	W 200 × 36	5.93	5.40	5.63	5.18	5.38	5.00	5.16	4.84
	W 200 × 42	6.29	5.72	5.97	5.50	5.70	5.30	5.47	5.13
	W 250 × 33	6.69	6.09	6.35	5.85	6.06	5.64	5.82	5.45
	W 250 × 39	7.17	6.52	6.80	6.26	6.49	6.04	6.24	5.85
	W 250 × 49	7.56	6.88	7.17	6.61	6.85	6.37	6.58	6.17
	W 310 × 39	8.05	7.32	7.63	7.03	7.29	6.78	7.01	6.56
W 310 × 45	8.47	7.71	8.03	7.40	7.68	7.14	7.37	6.91	

Notes to Table A-21:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.



**Table A-22**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Exterior Stud Walls with Brick Veneer – 1.5 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof <i>Live Load</i> , kPa	1.5								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	2.86	2.71	2.74	2.62	2.64	2.53	2.55	2.46
	W 150 × 30	3.22	3.05	3.08	2.94	2.97	2.85	2.87	2.76
	W 150 × 37	3.50	3.32	3.36	3.20	3.23	3.10	3.13	3.01
	W 200 × 27	3.68	3.49	3.53	3.37	3.40	3.26	3.29	3.16
	W 200 × 31	3.93	3.73	3.77	3.60	3.63	3.48	3.51	3.38
	W 200 × 36	4.04	3.83	3.88	3.70	3.73	3.58	3.61	3.47
	W 200 × 42	4.29	4.06	4.11	3.92	3.96	3.79	3.82	3.68
	W 250 × 33	4.56	4.32	4.37	4.17	4.21	4.03	4.07	3.91
	W 250 × 39	4.88	4.63	4.68	4.47	4.51	4.32	4.36	4.19
	W 250 × 49	5.15	4.89	4.94	4.71	4.76	4.56	4.60	4.42
	W 310 × 39	5.49	5.20	5.26	5.01	5.06	4.85	4.89	4.71
	W 310 × 45	5.77	5.47	5.53	5.28	5.33	5.11	5.15	4.95
	W 310 × 52	6.13	5.82	5.88	5.61	5.66	5.43	5.47	5.26
	W 310 × 60	6.30	5.98	6.04	5.76	5.81	5.57	5.62	5.41
	W 360 × 33	5.43	5.15	5.21	4.97	5.01	4.81	4.85	4.66
W 360 × 39	5.83	5.53	5.58	5.33	5.38	5.15	5.20	5.00	
W 360 × 45	6.19	5.87	5.93	5.65	5.71	5.47	5.52	5.31	
W 360 × 51	6.49	6.16	6.22	5.93	5.99	5.74	5.79	5.57	
W 360 × 57	6.78	6.43	6.50	6.20	6.26	6.00	6.05	5.82	

Notes to Table A-22:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-23**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Interior Stud Walls or Exterior Stud Walls with Siding – 1.5 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof <i>Live Load</i> , kPa	1.5								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	3.98	3.67	3.73	3.48	3.53	3.30	3.36	3.12
	W 150 × 30	4.48	4.13	4.19	3.91	3.97	3.74	3.78	3.59
	W 150 × 37	4.88	4.49	4.56	4.26	4.32	4.07	4.12	3.91
	W 200 × 27	5.13	4.72	4.80	4.48	4.54	4.28	4.33	4.11
	W 200 × 31	5.48	5.04	5.12	4.78	4.85	4.57	4.62	4.39
	W 200 × 36	5.63	5.18	5.27	4.92	4.98	4.70	4.75	4.51
	W 200 × 42	5.97	5.50	5.58	5.21	5.28	4.98	5.04	4.78
	W 250 × 33	6.35	5.85	5.94	5.54	5.62	5.30	5.36	5.09
	W 250 × 39	6.80	6.26	6.36	5.94	6.02	5.67	5.74	5.45
	W 250 × 49	7.17	6.61	6.71	6.27	6.35	5.99	6.06	5.75
	W 310 × 39	7.63	7.03	7.14	6.67	6.76	6.37	6.45	6.12
W 310 × 45	8.03	7.40	7.52	7.02	7.11	6.71	6.78	6.44	

Notes to Table A-23:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-24**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Exterior Stud Walls with Brick Veneer – 2.0 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof Live Load, kPa	2								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	2.78	2.65	2.64	2.53	2.53	2.43	2.43	2.35
	W 150 × 30	3.13	2.98	2.97	2.85	2.84	2.74	2.73	2.64
	W 150 × 37	3.40	3.24	3.23	3.10	3.09	2.98	2.97	2.88
	W 200 × 27	3.58	3.41	3.40	3.26	3.25	3.13	3.13	3.02
	W 200 × 31	3.82	3.64	3.63	3.48	3.47	3.34	3.34	3.23
	W 200 × 36	3.93	3.74	3.73	3.58	3.57	3.44	3.43	3.32
	W 200 × 42	4.16	3.96	3.96	3.79	3.78	3.64	3.64	3.52
	W 250 × 33	4.43	4.22	4.21	4.03	4.02	3.88	3.87	3.74
	W 250 × 39	4.75	4.52	4.51	4.32	4.31	4.15	4.15	4.01
	W 250 × 49	5.01	4.77	4.76	4.56	4.55	4.38	4.37	4.23
	W 310 × 39	5.33	5.07	5.06	4.85	4.84	4.66	4.65	4.50
	W 310 × 45	5.61	5.34	5.33	5.11	5.10	4.91	4.90	4.74
	W 310 × 52	5.96	5.67	5.66	5.43	5.41	5.21	5.21	5.03
	W 310 × 60	6.12	5.83	5.81	5.57	5.56	5.36	5.35	5.17
	W 360 × 33	5.28	5.03	5.01	4.81	4.80	4.62	4.61	4.46
W 360 × 39	5.66	5.39	5.38	5.15	5.14	4.95	4.94	4.78	
W 360 × 45	6.01	5.72	5.71	5.47	5.46	5.26	5.25	5.08	
W 360 × 51	6.31	6.00	5.99	5.74	5.73	5.52	5.51	5.33	
W 360 × 57	6.59	6.28	6.26	6.00	5.99	5.77	5.76	5.57	

Notes to Table A-24:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-25**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Interior Stud Walls or Exterior Stud Walls with Siding – 2.0 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof Live Load, kPa	2.0								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	3.81	3.54	3.53	3.33	3.32	3.13	3.15	2.94
	W 150 × 30	4.28	3.98	3.97	3.74	3.73	3.55	3.54	3.39
	W 150 × 37	4.66	4.33	4.32	4.70	4.06	3.86	3.85	3.69
	W 200 × 27	4.90	4.56	4.54	4.28	4.27	4.06	4.05	3.88
	W 200 × 31	5.23	4.86	4.85	4.57	4.56	4.34	4.32	4.14
	W 200 × 36	5.38	5.00	4.98	4.07	4.68	4.46	4.45	4.26
	W 200 × 42	5.70	5.30	5.28	4.98	4.96	4.72	4.71	4.51
	W 250 × 33	6.06	5.64	5.62	5.30	5.28	5.03	5.01	4.80
	W 250 × 39	6.49	6.04	6.02	5.67	5.66	5.38	5.37	5.14
	W 250 × 49	6.85	6.37	6.35	5.99	5.97	5.68	5.67	5.43
	W 310 × 39	7.29	6.78	6.76	6.37	6.35	6.04	6.03	5.77
W 310 × 45	7.68	7.14	7.11	6.71	6.69	6.36	6.35	6.08	

Notes to Table A-25:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-26**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Exterior Stud Walls with Brick Veneer – 2.5 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof Live Load, kPa	2.5								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	2.71	2.59	2.55	2.46	2.43	2.35	2.33	2.26
	W 150 × 30	3.04	2.91	2.87	2.76	2.73	2.64	2.62	2.54
	W 150 × 37	3.32	3.17	3.13	3.01	2.97	2.88	2.85	2.77
	W 200 × 27	3.49	3.33	3.29	3.16	3.13	3.02	2.99	2.91
	W 200 × 31	3.72	3.56	3.51	3.38	3.34	3.23	3.20	3.10
	W 200 × 36	3.82	3.65	3.61	3.47	3.43	3.32	3.29	3.19
	W 200 × 42	4.05	3.87	3.82	3.68	3.64	3.52	3.48	3.38
	W 250 × 33	4.31	4.12	4.07	3.91	3.87	3.74	3.71	3.60
	W 250 × 39	4.62	4.41	4.36	4.19	4.15	4.01	3.97	3.85
	W 250 × 49	4.87	4.66	4.60	4.42	4.37	4.23	4.19	4.07
	W 310 × 39	5.19	4.96	4.89	4.71	4.65	4.50	4.46	4.33
	W 310 × 45	5.46	5.22	5.15	4.95	4.90	4.74	4.69	4.55
	W 310 × 52	5.80	5.54	5.47	5.26	5.21	5.03	4.98	4.84
	W 310 × 60	5.96	5.69	5.62	5.41	5.35	5.17	5.12	4.97
	W 360 × 33	5.14	4.91	4.85	4.66	4.61	4.46	4.42	4.29
W 360 × 39	5.51	5.27	5.20	5.00	4.94	4.78	4.73	4.60	
W 360 × 45	5.85	5.59	5.52	5.31	5.25	5.08	5.03	4.88	
W 360 × 51	6.14	5.87	5.79	5.57	5.51	5.33	5.27	5.12	
W 360 × 57	6.42	6.13	6.05	5.82	5.76	5.57	5.51	5.35	

Notes to Table A-26:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-27**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Interior Stud Walls or Exterior Stud Walls with Siding – 2.5 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof Live Load, kPa	2.5								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	3.66	3.43	3.36	3.19	3.15	2.98	2.98	2.79
	W 150 × 30	4.11	3.85	3.78	3.59	3.54	3.39	3.35	3.23
	W 150 × 37	4.48	4.19	4.12	3.91	3.85	3.69	3.64	3.51
	W 200 × 27	4.71	4.41	4.33	4.11	4.05	3.88	3.83	3.69
	W 200 × 31	5.02	4.71	4.62	4.39	4.32	4.14	4.09	3.94
	W 200 × 36	5.16	4.84	4.75	4.51	4.45	4.26	4.21	4.05
	W 200 × 42	5.47	5.13	5.04	4.78	4.71	4.51	4.46	4.30
	W 250 × 33	5.82	5.46	5.36	5.09	5.01	4.80	4.74	4.54
	W 250 × 39	6.24	5.85	5.74	5.45	5.37	5.14	5.08	4.90
	W 250 × 49	6.58	6.17	6.06	5.75	5.67	5.43	5.36	5.17
	W 310 × 39	7.01	6.56	6.45	6.12	6.03	5.78	5.70	5.47
W 310 × 45	7.37	6.91	6.78	6.44	6.35	6.08	6.00	5.79	

Notes to Table A-27:

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-28**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Exterior Stud Walls with Brick Veneer – 3.0 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof <i>Live Load</i> , kPa	3.0								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	2.64	2.53	2.48	2.39	2.35	2.28	2.24	2.18
	W 150 × 30	2.97	2.85	2.78	2.69	2.64	2.56	2.52	2.45
	W 150 × 37	3.23	3.10	3.03	2.93	2.87	2.79	2.74	2.67
	W 200 × 27	3.40	3.26	3.19	3.08	3.02	2.93	2.88	2.81
	W 200 × 31	3.63	3.48	3.40	3.28	3.22	3.13	3.08	3.00
	W 200 × 36	3.73	3.58	3.50	3.38	3.31	3.21	3.16	3.08
	W 200 × 42	3.96	3.79	3.71	3.58	3.51	3.41	3.35	3.26
	W 250 × 33	4.21	4.03	3.94	3.81	3.74	3.62	3.57	3.47
	W 250 × 39	4.51	4.32	4.23	4.08	4.00	3.88	3.82	3.72
	W 250 × 49	4.76	4.56	4.46	4.30	4.22	4.10	4.03	3.93
	W 310 × 39	5.06	4.85	4.74	4.58	4.49	4.36	4.29	4.18
	W 310 × 45	5.33	5.11	4.99	4.82	4.73	4.59	4.51	4.40
	W 310 × 52	5.66	5.43	5.31	5.12	5.03	4.88	4.80	4.67
	W 310 × 60	5.81	5.57	5.45	5.26	5.16	5.01	4.93	4.80
	W 360 × 33	5.01	4.81	4.70	4.54	4.45	4.32	4.25	4.14
W 360 × 39	5.38	5.15	5.04	4.86	4.77	4.63	4.56	4.44	
W 360 × 45	5.71	5.47	5.35	5.16	5.07	4.92	4.84	4.71	
W 360 × 51	5.99	5.74	5.61	5.42	5.32	5.16	5.08	4.94	
W 360 × 57	6.26	6.00	5.87	5.66	5.56	5.39	5.31	5.17	

**Notes to Table A-28:**

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-29**  
**Maximum Spans for Steel Beams Supporting a Roof and one Floor in Dwelling Units Where Beams Support Interior Stud Walls or Exterior Stud Walls with Siding – 3.0 kPa Specified Roof Design Snow Load**

Forming Part of Sentence 9.23.4.3.(1)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	
Maximum Span, m									
Roof <i>Live Load</i> , kPa	3.0								
Supported Roof Length, m <sup>(1)</sup>	2.4		3.6		4.8		6.0		
Supported Floor Length, m <sup>(2)</sup>	2.4	3.6	2.4	3.6	2.4	3.6	2.4	3.6	
Steel Beam Section	W 150 × 22	3.53	3.33	3.23	3.08	3.01	2.85	2.83	2.66
	W 150 × 30	3.97	3.74	3.63	3.47	3.38	3.26	3.19	3.09
	W 150 × 37	4.32	4.07	3.95	3.77	3.68	3.55	3.48	3.37
	W 200 × 27	4.54	4.28	4.15	3.97	3.87	3.73	3.65	3.52
	W 200 × 31	4.85	4.57	4.43	4.23	4.13	3.98	3.90	3.78
	W 200 × 36	4.98	4.70	4.56	4.35	4.25	4.09	4.01	3.88
	W 200 × 42	5.28	4.98	4.83	4.61	4.50	4.34	4.25	4.12
	W 250 × 33	5.62	5.30	5.14	4.91	4.79	4.61	4.52	4.33
	W 250 × 39	6.02	5.67	5.51	5.26	5.13	4.94	4.84	4.69
	W 250 × 49	6.35	5.99	5.81	5.55	5.42	5.21	5.11	4.95
	W 310 × 39	6.76	6.37	6.18	5.90	5.76	5.55	5.44	5.21
W 310 × 45	7.11	6.71	6.51	6.21	6.07	5.84	5.72	5.54	

**Notes to Table A-29:**

- (1) Supported roof length means half the sum of the roof framing spans on both sides of the beam.
- (2) Supported floor length means half the sum of the floor framing spans on both sides of the beam.

**Table A-30**  
**Sizes for Spruce-Pine-Fir No. 2 Grade Exterior Wall Studs with Brick Veneer<sup>(1)(2)</sup>**

Forming Part of Sentence 9.23.10.1.(2)

Item	Column 1	2	3	4	5	6	7	8	9	10
	Stud Size and Spacing									
	Hourly Wind Pressure (1/50), kPa		0.40		0.45		0.50		0.60	
	Specified Roof Snow Load, kPa	Stud Length, m	Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m	
			3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0
1.	1.0	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	B	B	B	B
		4.6	B	B	B	B	C	C	C	C
		5.0	C	C	C	C	C	C	D	D
		5.3	C	C	C	C	D	D	D	D
		5.6	C	C	D	D	D	D		
2.	1.5	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	B	B	B	B
		4.6	B	B	B	B	C	C	C	C
		5.0	C	C	C	C	C	C	D	D
		5.3	C	C	C	C	D	D	D	D
		5.6	C	C	D	D	D	D		
3.	2.0	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	B	B	B	B
		4.6	B	B	B	B	C	C	C	C
		5.0	C	C	C	C	C	C	D	D
		5.3	C	C	C	C	D	D	D	D
		5.6	C	C	D	D	D	D		
4.	2.5	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	B	B	B	B
		4.6	B	B	B	B	C	C	C	C
		5.0	C	C	C	C	C	C	D	D
		5.3	C	C	C	C	D	D	D	D
		5.6	C	C	D	D	D	D		
5.	3.0	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	B	B	B	B
		4.6	B	B	B	B	C	C	C	C
		5.0	C	C	C	C	C	C	D	D
		5.3	C	C	C	C	D	D	D	D
		5.6	C	C	D	D	D	D		

**Legend - Stud Size and Spacing**

**A = 38 × 140 mm at 406 mm on centre**

**B = 38 × 140 mm at 305 mm on centre**

**C = two 38 × 140 mm studs at 406 mm on centre**

**D = two 38 × 140 mm studs at 305 mm on centre**

**Notes to Table A-30:**

<sup>(1)</sup> A roof dead load of 0.5 kPa has been assumed. The Table does not apply where the stud supports additional loads from heavy roofing materials such as concrete tiles or clay roofing tiles.

<sup>(2)</sup> Wall construction shall conform to the requirements of Sentence 9.23.10.1.(2).

**Table A-31**  
**Sizes for Spruce-Pine-Fir No. 2 Grade Exterior Wall Studs with Siding<sup>(1)(2)</sup>**

Forming Part of Sentence 9.23.10.1.(2)

Item	Column 1	2	3	4	5	6	7	8	9	10
	Stud Size and Spacing									
	Hourly Wind Pressure (1/50), kPa		0.40		0.45		0.50		0.60	

	Specified Roof Snow Load, kPa	Stud Length, m	Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m	
			3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0
1.	1.0	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	A	A
		5.0	A	A	A	A	A	A	B	B
		5.3	A	A	A	A	B	B	B	B
		5.6	A	A	B	B	B	B	C	C
2.	1.5	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	A	A
		5.0	A	A	A	A	A	A	B	B
		5.3	A	A	A	A	B	B	B	B
		5.6	A	A	B	B	B	B	C	C
3.	2.0	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	A	A
		5.0	A	A	A	A	A	A	B	B
		5.3	A	A	A	A	B	B	B	B
		5.6	A	A	B	B	B	B	C	C
4.	2.5	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	A	A
		5.0	A	A	A	A	A	A	B	B
		5.3	A	A	A	A	B	B	B	B
		5.6	A	B	B	B	B	B	C	C
5.	3.0	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	A	A
		5.0	A	A	A	A	A	A	B	B
		5.3	A	B	A	B	B	B	B	B
		5.6	A	B	B	B	B	B	C	C

**Legend - Stud Size and Spacing**

**A = 38 × 140 mm at 406 mm on centre**

**B = 38 × 140 mm at 305 mm on centre**

**C = two 38 × 140 mm studs at 406 mm on centre**

**D = two 38 × 140 mm studs at 305 mm on centre**

**Notes to Table A-31:**

(1) A roof dead load of 0.5 kPa has been assumed. The Table does not apply where the stud supports additional loads from heavy roofing materials such as concrete tiles or clay roofing tiles.

(2) Wall construction shall conform to the requirements of Sentence 9.23.10.1.(2).

**Table A-32**  
**Sizes for Northern Species No. 2 Grade Exterior Wall Studs with Brick Veneer<sup>(1)(2)</sup>**

Forming Part of Sentence 9.23.10.1.(2)

Item	Column 1	2	3	4	5	6	7	8	9	10
	Stud Size and Spacing									
	Hourly Wind Pressure (1/50), kPa		0.40		0.45		0.50		0.60	
	Specified Roof Snow Load, kPa	Stud Length, m	Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m	
			3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0
1.	1.0	3.8	A	A	A	A	B	B	B	B
		4.2	B	B	B	B	C	C	C	C
		4.6	C	C	C	C	C	C	D	D
		5.0	C	C	D	D	D	D		
		5.3	D	D	D	D				

2.	1.5	5.6								
		3.8	A	A	A	A	B	B	B	B
		4.2	B	B	B	B	C	C	C	C
		4.6	C	C	C	C	C	C	D	D
		5.0	C	C	D	D	D	D		
		5.3	D	D	D	D				
3.	2.0	5.6								
		3.8	A	A	A	A	B	B	B	B
		4.2	B	B	B	B	C	C	C	C
		4.6	C	C	C	C	C	C	D	D
		5.0	C	C	D	D	D	D		
		5.3	D	D	D	D				
4.	2.5	5.6								
		3.8	A	A	A	A	B	B	B	B
		4.2	B	B	B	B	C	C	C	C
		4.6	C	C	C	C	C	C	D	D
		5.0	C	C	D	D	D	D		
		5.3	D	D	D	D				
5.	3.0	5.6								
		3.8	A	A	A	A	B	B	B	B
		4.2	B	B	B	B	C	C	C	C
		4.6	C	C	C	C	C	C	D	D
		5.0	C	C	D	D	D	D		
		5.3	D	D	D	D				

**Legend - Stud Size and Spacing**

**A = 38 × 140 mm at 406 mm on centre**

**B = 38 × 140 mm at 305 mm on centre**

**C = two 38 × 140 mm studs at 406 mm on centre**

**D = two 38 × 140 mm studs at 305 mm on centre**

**Notes to Table A-32:**

<sup>(1)</sup> A roof dead load of 0.5 kPa has been assumed. The Table does not apply where the stud supports additional loads from heavy roofing materials such as concrete tiles or clay roofing tiles.

<sup>(2)</sup> Wall construction shall conform to the requirements of Sentence 9.23.10.1.(2).

**Table A-33**  
**Sizes for Northern Species No. 2 Grade Exterior Wall Studs with Siding<sup>(1)(2)</sup>**

Forming Part of Sentence 9.23.10.1.(2)

Item	Column 1	2	3	4	5	6	7	8	9	10
	Stud Size and Spacing									
	Hourly Wind Pressure (1/50), kPa		0.40		0.45		0.50		0.60	
	Specified Roof Snow Load, kPa	Stud Length, m	Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m		Supported Roof Length, m	
			3.0	6.0	3.0	6.0	3.0	6.0	3.0	6.0
1.	1.0	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	B	B
		5.0	A	A	B	B	B	B	C	C
		5.3	B	B	B	B	C	C	C	C
		5.6	C	C	C	C	C	C	D	D
2.	1.5	3.8	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	B	B
		5.0	A	A	B	B	B	B	C	C
		5.3	B	B	B	B	C	C	C	C
		5.6	C	C	C	C	C	C	D	D
3.	2.0	3.8	A	A	A	A	A	A	A	

		4.2	A	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	B	B	B
		5.0	A	A	B	B	B	B	C	C	C
		5.3	B	B	B	B	C	C	C	C	C
		5.6	C	C	C	C	C	C	D	D	D
4.	2.5	3.8	A	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A	A
		4.6	A	A	A	A	A	A	B	B	B
		5.0	A	B	B	B	B	B	C	C	C
		5.3	B	B	B	B	C	C	C	C	C
		5.6	C	C	C	C	C	C	D	D	D
5.	3.0	3.8	A	A	A	A	A	A	A	A	A
		4.2	A	A	A	A	A	A	A	A	A
		4.6	A	B	A	B	A	B	B	B	B
		5.0	A	B	B	B	B	B	C	C	C
		5.3	B	C	B	C	C	C	C	C	C
		5.6	C	C	C	C	C	C	D	D	D

**Legend - Stud Size and Spacing**

**A** = 38 × 140 mm at 406 mm on centre

**B** = 38 × 140 mm at 305 mm on centre

**C** = two 38 × 140 mm studs at 406 mm on centre

**D** = two 38 × 140 mm studs at 305 mm on centre

**Notes to Table A-33:**

(1) A roof dead load of 0.5 kPa has been assumed. The Table does not apply where the stud supports additional loads from heavy roofing materials such as concrete tiles or clay roofing tiles.

(2) Wall construction shall conform to the requirements of Sentence 9.23.10.1.(2).

**Table A-34**

**Minimum Number of 38 × 89 mm Spruce-Pine-Fir Stud Posts in Exterior Stud Walls Supporting Girder Trusses and Roof Beams<sup>(1)(2)(3)</sup>**

Forming Part of Sentence 9.23.10.7.(2)

Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Minimum Number of Studs																					
Stud Height, m	Span of Beam or Girder, m	Specified Roof Design Snow Load, kPa																			
		1.0				1.5				2.0				2.5				3.0			
		Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m			
		2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0
2.4	2.4	1	1	2	2	1	2	2	2	1	2	2	3	2	2	3	3	2	2	3	3
	3.6	1	2	2	2	2	2	3	3	2	2	3	4	2	3	4	4	2	3	4	5
	4.8	2	2	3	3	2	3	3	4	2	3	4	5	3	4	5		3	4	5	
	6.0	2	2	3	4	2	3	4	5	3	4	5		3	4	5		3	5		
	7.2	2	3	4	4	3	4	5		3	4			4	5			4			
	8.4	2	3	4	5	3	4	5		3	5			4				5			
	9.6	3	4	5		3	5			4				5				5			
	10.8	3	4	5		4	5			4				5							
12.0	3	4			4				5												
3.0	2.4	1	2	2	2	2	2	3	3	2	2	3	4	2	3	4	4	2	3	4	5
	3.6	2	2	3	3	2	3	4	4	2	3	4	5	3	4	5		3	4		
	4.8	2	3	4	4	3	4	5		3	4			4	5			4			
	6.0	2	3	4	5	3	4			4	5			4				5			
	7.2	3	4	5		4	5			4				5							
	8.4	3	4			4				5											
	9.6	4	5			5															
	10.8	4				5															
12.0	4																				

**Notes to Table A-34:**

(1) A roof dead load of 0.62 kPa has been assumed.



(2) Roof beams require a minimum bearing length of 89 mm.

(3) Girder trusses require a minimum bearing length of 89 mm unless otherwise specified by the truss manufacturer.

**Table A-35**  
**Minimum Number of 38 × 140 mm Spruce-Pine-Fir Stud Posts in Exterior Stud Walls Supporting Girder Trusses and Roof Beams<sup>(1)(2)(3)</sup>**

Forming Part of Sentence 9.23.10.7.(2)

Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Minimum Number of Studs																					
Stud Height, m	Span of Beam or Girder, m	Specified Roof Design Snow Load, kPa																			
		1.0				1.5				2.0				2.5				3.0			
		Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m			
		2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0
3.0	2.4	1	1	1	1	1	1	1	1	1	1	1	2	1	1	2	2	1	1	2	2
	3.6	1	1	1	1	1	1	2	2	1	1	2	2	1	2	2	2	1	2	2	3
	4.8	1	1	2	2	1	2	2	2	1	2	2	3	2	2	3	3	2	2	3	4
	6.0	1	1	2	2	1	2	2	3	2	2	3	3	2	2	3	4	2	3	4	4
	7.2	1	2	2	2	2	2	3	3	2	2	3	4	2	3	4	4	2	3	4	5
	8.4	1	2	2	3	2	2	3	4	2	3	4	4	2	3	4	5	3	4	5	
	9.6	2	2	3	3	2	3	3	4	2	3	4	5	3	4	5		3	4	5	
	10.8	2	2	3	3	2	3	4	4	2	3	4	5	3	4	5		3	5		
12.0	2	2	3	4	2	3	4	5	3	4	5		3	4			4	5			
3.6	2.4	1	1	1	1	1	1	1	2	1	1	2	2	1	1	2	2	1	2	2	2
	3.6	1	1	1	2	1	1	2	2	1	2	2	3	1	2	2	3	2	2	3	3
	4.8	1	1	2	2	1	2	2	3	2	2	3	3	2	2	3	4	2	3	4	4
	6.0	1	2	2	3	2	2	3	3	2	3	3	4	2	3	4	5	2	3	4	5
	7.2	1	2	2	3	2	2	3	4	2	3	4	5	2	3	4	5	3	4	5	
	8.4	2	2	3	3	2	3	4	4	2	3	4	5	3	4	5		3	4	5	
	9.6	2	2	3	4	2	3	4	5	3	4	5		3	4			4	5		
	10.8	2	3	3	4	2	3	4	5	3	4	5		3	5			4			
12.0	2	3	4	5	3	4	5		3	5			4	5			4				

Notes to Table A-35:

(1) A roof dead load of 0.62 kPa has been assumed.

(2) Roof beams require a minimum bearing length of 140 mm.

(3) Girder trusses require a minimum bearing length of 140 mm unless otherwise specified by the truss manufacturer.

**Table A-36**  
**Minimum Number of 38 × 89 mm Northern Species Stud Posts in Exterior Stud Walls Supporting Girder Trusses and Roof Beams<sup>(1)(2)(3)</sup>**

Forming Part of Sentence 9.23.10.7.(2)

Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Minimum Number of Studs																					
Stud Height, m	Span of Beam or Girder, m	Specified Roof Design Snow Load, kPa																			
		1.0				1.5				2.0				2.5				3.0			
		Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m			
		2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0
2.4	2.4	1	2	2	2	2	2	3	3	2	2	3	4	2	3	4	4	2	3	4	5
	3.6	2	2	3	3	2	3	4	4	2	3	4	5	3	4	5		3	4		
	4.8	2	3	4	4	3	4	5		3	4			4	5			4			
	6.0	2	3	4	5	3	4			4	5			4				5			
	7.2	3	4	5		4	5			4				5							
	8.4	3	4			4				5											
	9.6	4	5			5															
	10.8	4				5															
12.0	4																				
3.0	2.4	2	2	3	3	2	3	3	4	2	3	4	5	3	4	5		3	4		
	3.6	2	3	4	5	3	4	5		3	5			4	5			4			
	4.8	3	4	5		3	5			4				5							
	6.0	3	5			4				5											

7.2	4	5			5															
8.4	4																			
9.6	5																			
10.8	5																			
12.0																				

**Notes to Table A-36:**

- (1) A roof dead load of 0.62 kPa has been assumed.
- (2) Roof beams require a minimum bearing length of 89 mm.
- (3) Girder trusses require a minimum bearing length of 89 mm unless otherwise specified by the truss manufacturer.

**Table A-37**  
**Minimum Number of 38 × 140 mm Northern Species Stud Posts in Exterior Stud Walls Supporting Girder Trusses and Roof Beams<sup>(1)(2)(3)</sup>**

Forming Part of Sentence 9.23.10.7.(2)

Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Minimum Number of Studs																					
Stud Height, m	Span of Beam or Girder, m	Specified Roof Design Snow Load, kPa																			
		1.0				1.5				2.0				2.5				3.0			
		Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m				Supported Length, m			
		2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0	2.4	3.6	4.8	6.0
3.0	2.4	1	1	1	1	1	1	2	2	1	1	2	2	1	2	2	2	1	2	2	3
	3.6	1	1	2	2	1	2	2	2	1	2	2	3	2	2	3	3	2	3	3	4
	4.8	1	2	2	2	2	2	3	3	2	2	3	4	2	3	4	4	2	3	4	5
	6.0	1	2	2	3	2	2	3	4	2	3	4	5	2	3	4	5	3	4	5	
	7.2	2	2	3	3	2	3	4	4	2	3	4	5	3	4	5		3	5		
	8.4	2	3	3	4	2	3	4	5	3	4	5		3	5			4	5		
	9.6	2	3	4	4	3	4	5		3	4			4	5			4			
	10.8	2	3	4	5	3	4	5		3	5			4				5			
12.0	2	3	4	5	3	4			4	5			4				5				
3.6	2.4	1	1	1	2	1	1	2	2	1	2	2	3	1	2	2	3	2	2	3	3
	3.6	1	2	2	2	1	2	2	3	2	2	3	4	2	3	3	4	2	3	4	5
	4.8	1	2	2	3	2	2	3	4	2	3	4	5	2	3	4	5	3	4	5	
	6.0	2	2	3	4	2	3	4	5	3	4	5		3	4	5		3	5		
	7.2	2	3	3	4	2	3	4	5	3	4	5		3	5			4			
	8.4	2	3	4	5	3	4	5		3	5			4				4			
	9.6	2	3	4	5	3	4			4	5			4				5			
	10.8	3	4	5		3	5			4				5							
12.0	3	4	5		4	5			5				5								

**Notes to Table A-37:**

- (1) A roof dead load of 0.62 kPa has been assumed.
- (2) Roof beams require a minimum bearing length of 140 mm.
- (3) Girder trusses require a minimum bearing length of 140 mm unless otherwise specified by the truss manufacturer.

O. Reg. 332/12, Division B, Part 9.

**PART 10**  
**CHANGE OF USE**

<b>Section</b>	<b>10.1.</b>	<b>General</b>
	<b>10.1.1.</b>	<b>Scope</b>
<b>Section</b>	<b>10.2.</b>	<b>Classification of Existing Buildings</b>
	<b>10.2.1.</b>	<b>Classification</b>
<b>Section</b>	<b>10.3.</b>	<b>Requirements</b>
	<b>10.3.1.</b>	<b>General</b>
	<b>10.3.2.</b>	<b>Performance Level</b>
<b>Section</b>	<b>10.4.</b>	<b>Compliance Alternatives</b>
	<b>10.4.1.</b>	<b>Compliance Alternatives</b>

	NUMBER	PART 4 REQUIREMENTS	PART 11 COMPLIANCE ALTERNATIVE
78.	B78	4.1.8.	The requirements under this Subsection do not apply.
	NUMBER	PART 6 REQUIREMENTS	PART 11 COMPLIANCE ALTERNATIVE
79.	B79	6.2.2.1.(2)	Required outdoor air rates may be provided by mechanical, natural or combination of natural and mechanical means.
	NUMBER	PART 8 REQUIREMENTS	PART 11 COMPLIANCE ALTERNATIVE
80.	B80	8.2.1.4.	Existing clearances acceptable where a <i>sewage system</i> is replaced with another <i>sewage system</i> within the same class and the capacity of the replacement <i>sewage system</i> does not exceed the capacity of the existing <i>sewage system</i> .
81.	B81	8.2.1.4.	Existing clearances are acceptable where a replacement <i>sewage system</i> requires lesser clearances than those required in Part 8 for the existing <i>sewage system</i> .

**Table 11.5.1.1.C.**  
**Compliance Alternatives for Residential Occupancies**

Forming Part of Article 11.5.1.1.

Item	Col. 1	Column 2	Column 3
	NUMBER	PART 3 REQUIREMENTS	PART 11 COMPLIANCE ALTERNATIVE
1.	C1	3.1.4.7.	Existing <i>heavy timber construction</i> acceptable where <i>construction</i> is within 90% of member sizes listed in Part 3.
2.	C2	3.1.5.2. to 3.1.5.4.; 3.1.5.6.	Existing acceptable.
3.	C3	3.1.5.7. to 3.1.5.10.	Except for exposed foamed plastics, existing acceptable. To match existing, materials may be added from on or off site.
4.	C4	3.1.5.14. to 3.1.5.17.; 3.1.5.21.; 3.1.5.23.	Existing acceptable.
5.	C5	3.1.7.1.	<i>Fire-resistance ratings</i> may also be used where they are based on: 1. HUD Rehabilitation Guidelines, "Guideline on Fire Ratings of Archaic Materials and Assemblies". 2. DBR Technical Paper No. 194, "Fire Endurance of Protected Steel Columns and Beams". 3. DBR Technical Paper No. 207, "Fire Endurance of Unit Masonry Walls". 4. DBR Technical Paper No. 222, "Fire Endurance of Light-Framed and Miscellaneous Assemblies".
6.	C6	3.1.7.5.(3)	Existing assemblies required to be of <i>noncombustible construction</i> may be supported by <i>combustible construction</i> having at least the same <i>fire-resistance rating</i> as that supported.
7.	C7	3.1.8.1.(2); 3.1.8.6.(1) and (2)	Existing functional <i>closures</i> are acceptable and may be relocated within the same existing <i>fire separation</i> .
8.	C8	3.1.8.5.(2)	(a) Existing functional and sound doors in existing <i>buildings</i> that are either hollow metal or kalamein and containing wired glass at least 6 mm thick and conforming to Sentence 3.1.8.14.(2) are permitted in lieu of doors not required to exceed 45 min, (b) all existing functional and sound hollow metal or kalamein doors which carry existing 1.5 h labels are acceptable in lieu of current 1.5 h labels and may contain wired glass panels not exceeding 0.0645 m <sup>2</sup> , at least 6 mm thick and conforming to Sentence 3.1.8.14.(2), and (c) every fire door, window assembly or glass block used as a <i>closure</i> in a required <i>fire separation</i> shall be installed in conformance with good engineering practice.
9.	C9	3.1.8.7. to 3.1.8.9.	Except for <i>hotels</i> , <i>fire dampers</i> or <i>fire stop flaps</i> are not required to be installed in existing ducts at penetrations of existing <i>fire separations</i> .
10.	C10	3.1.8.10.(1)	For existing unlabeled doors in existing <i>buildings</i> , at least 45 mm solid core wood or metal clad are acceptable. Except for <i>residential occupancies</i> , existing closure rating of 20 min will not be required where the entire <i>floor area</i> is <i>sprinklered</i> .
11.	C11	3.1.8.13.	Existing functionally operable latching devices, excluding draw bolts, are acceptable.
12.	C12	3.1.8.14.	Existing transoms or sidelights located in <i>fire separations</i> not required to be greater than 1 h may be retained if wired glass, at least 6 mm thick, is securely fixed to a wood frame of at least 50 mm thickness with steel stops. Operable transoms shall be fixed closed.
13.	C13	3.1.8.15. to 3.1.8.17.	Existing acceptable.

14.	C14	3.1.11.	Where the concealed space is being materially altered, provide smoke or heat detection in that space in lieu of <i>fire blocks</i> and tie into fire alarm system.
15.	C15	3.2.2.17.(1)(b) and (c)	Existing sprinkler systems in 1 <i>storey buildings</i> need not comply.
16.	C16	3.2.3.	Existing windows. (a) Existing windows in walls may be relocated to another part of the wall, provided the existing opening is blocked up to provide the same fire rating for the wall, and the projection of the new opening, at a right angle to the property line onto another <i>building</i> , lies not closer than 300 mm from a window in such other <i>building</i> , where the “opposite” window is less than 2 400 mm from the opposite new opening, and (b) except relocation of units, shall be restricted to the same <i>fire compartment</i> and shall conform to the requirements of Article 3.2.3.14. or 9.10.12.3. where applicable, or (c) where a <i>building</i> does not satisfy the requirements of Subsection 3.2.3. for the amount of openings facing a yard or space that does not have sufficient <i>limiting distance</i> , such existing openings are allowed to be relocated provided: (i) such openings are not increased in size and they are protected with wired glass in steel frames conforming to Sentence 3.1.8.14.(2), or (ii) the <i>building</i> is <i>sprinklered</i> .
17.	C17	3.2.3.6.(3)	Existing roof soffit projections acceptable.
18.	C18	3.2.4.	(a) Existing fire alarm system may remain except that Article 3.2.4.5. does not apply where the fire safety plan (as described in the Fire Code made under the <i>Fire Protection and Prevention Act, 1997</i> ) for the <i>building</i> addresses the intent of Subsection 3.2.4. (i.e. “stage” system, electrical supervision, detection as required, Fire Department connection, and emergency power supply), and (b) extension of an existing system must ensure continuity and compatibility, and integrity of the system.
19.	C19	3.2.4.9.(2)(e)	Does not apply to existing installations in <i>buildings</i> .
20.	C20	3.2.4.10.(5)(c)	Does not apply to existing installations in <i>buildings</i> .
21.	C21	3.2.4.22.	Such <i>smoke alarms</i> may be battery operated.
22.	C22	3.2.5.1.; 3.2.5.2.	Existing acceptable.
23.	C23	3.2.5.3.(1)	Existing access acceptable.
24.	C24	3.2.5.3.(2)	Existing acceptable.
25.	C25	3.2.5.4. to 3.2.5.6.	(a) For <i>buildings</i> 6 <i>storeys</i> and less, existing access to existing <i>occupancy</i> is acceptable, and (b) where existing <i>building</i> is changed to a “C” <i>occupancy</i> , an access route shall be provided, or the existing access is acceptable provided the <i>building</i> is <i>sprinklered</i> .
26.	C26	3.2.5.7.	Existing water supply and hydrants are acceptable in <i>buildings</i> up to 6 <i>storeys</i> in <i>building height</i> .
27.	C27	3.2.5.13.	Existing sprinkler systems in existing <i>buildings</i> that do not conform to NFPA 13 may be altered, added to, or extended from the existing system without complying with NFPA 13, provided the system is operational and adequate with respect to coverage, water supply and controls, and provided the system is evaluated by a qualified designer.
28.	C28	3.2.9.	Does not apply to <i>buildings</i> 4 <i>storeys</i> and less. For existing <i>buildings</i> over 4 <i>storeys</i> in <i>building height</i> , existing standpipe and hose systems water supply is acceptable provided it can deliver a minimum flow rate of 265 L/min for 30 min at 345 kPa (gauge) at the two highest and most remote hose valves, with not less than 132 L/min from each of the two simultaneously.
29.	C29	3.3.1.4.(1); 3.3.4.2.(1)	30 min is acceptable to separate corridors or <i>exits</i> in <i>buildings</i> not exceeding 6 <i>storeys</i> in <i>building height</i> , except that 45 min is required for <i>exits</i> in <i>buildings</i> exceeding 3 <i>storeys</i> in <i>building height</i> . For <i>buildings</i> exceeding 6 <i>storeys</i> in <i>building height</i> , 30 min is acceptable where <i>smoke detectors</i> are installed in corridors, except 1 h is required in <i>exits</i> . 30 min is acceptable to separate <i>public corridors</i> , <i>exits</i> or <i>suites</i> in <i>hotels</i> , provided <i>fire detectors</i> are installed in every room in a <i>suite</i> and in every room not located in a <i>suite</i> , other than corridors, washrooms, closets in <i>suites</i> , saunas, refrigerated areas and swimming pools.
30.	C30	3.3.1.5.(1)(c); Tables 3.3.1.5.A. and 3.3.1.5.B.	In Column 2, maximum area of room or <i>suite</i> to be unlimited.
31.	C31	3.3.1.9.	Existing width of <i>public corridors</i> of not less than 914 mm is acceptable.

32.	C32	3.3.1.10.; 3.3.1.11.	Existing door swings may remain in <i>heritage buildings</i> , existing or being restored, with no change in <i>major occupancy</i> and with <i>occupant load</i> no greater than 100.
33.	C33	3.3.1.12.	Existing doors acceptable, provided not less than 600 mm wide.
34.	C34	3.3.1.15.	Existing curved or spiral stairs acceptable.
35.	C35	3.3.1.16.	Existing non-conforming capacities of <i>access to exits</i> are acceptable, provided that the excessive capacity is no greater than 15% and, (a) <i>corridor fire separations</i> are rated to Code plus early warning system provided, or (b) there are sprinklers, plus <i>smoke alarms in suites</i> .
36.	C36	3.3.1.17.	Does not apply to <i>heritage buildings</i> .
37.	C37	3.3.1.18.	Existing stained, etched, bevelled, leaded or figured glass acceptable.
38.	C38	3.3.4.2.(3)(b)(i) 3.3.4.2.(3)(b)(ii), (iii) 3.3.4.2.(3)(b)(iv)	30 min <i>fire separation</i> acceptable. 45 min <i>fire separation</i> acceptable. 1.5 h <i>fire separation</i> acceptable.
39.	C39	3.3.4.4.(4) and (5)	For <i>buildings 6 storeys</i> and less, doorway from <i>dwelling unit</i> will be permitted to open directly into <i>exit</i> stairway or interior corridor served by a single <i>exit</i> if a fire alarm system complying with Subsection 3.2.4. is installed and the <i>dwelling unit</i> has a second and separate <i>means of egress</i> .
40.	C40	3.3.5.4.(1) and 3.3.5.7.(3)	Need not comply where a gasketed door and self closer are provided in the existing <i>fire separation</i> .
41.	C41	3.4.1.4.	Except for <i>hotels</i> , the following types of <i>exits</i> may also be used for <i>buildings</i> not over 6 <i>storeys</i> in <i>building height</i> : (a) connected balconies, which connect across <i>firewalls</i> , or connect to another <i>exit</i> , or with access to ground level, (b) areas of refuge where fire service rescue is possible and that comply with Measure L of Sentences (4) to (10), (18) and Clauses (20)(a), (b) and (d) in MMAH Supplementary Standard SB-4, “Measures for Fire Safety in High Buildings”.
42.	C42	3.4.1.8.	Existing stained, etched, bevelled, leaded or figured glass acceptable.
43.	C43	3.4.2.5.(1)	Existing travel distance acceptable where <i>floor area</i> is <i>sprinklered</i> and provided <i>fire separations</i> comply with Part 3.
44.	C44	3.4.3.2.(7)	Existing width of <i>exits</i> acceptable provided the <i>occupant load</i> is not more than 15% above the <i>exit</i> capacity.
45.	C45	3.4.3.4.	Except for <i>heritage buildings</i> , existing acceptable, provided not less than 800 mm.
46.	C46	3.4.3.5.	Existing headroom clearance of not less than 1 980 mm is acceptable.
47.	C47	3.4.4.1.(1)	Except for <i>exits</i> , no rating required where <i>floor areas</i> are <i>sprinklered</i> .
48.	C48	3.4.4.1.	<i>Fire separations of exits</i> permitted in <i>buildings</i> : - 30 min, up to 3 <i>storeys</i> in <i>building height</i> ; - 45 min, in <i>hotels</i> up to 3 <i>storeys</i> in <i>building height</i> ; - 45 min, up to 6 <i>storeys</i> in <i>building height</i> ; - 1 h, over 6 <i>storeys</i> in <i>building height</i> .
49.	C49	3.4.4.4.(8)	Existing washrooms opening directly into an <i>exit</i> stairwell shall be separated from the <i>exit</i> stairwell by a 45 min <i>closure</i> .
50.	C50	3.4.5.1.(2) and (9)	Existing illuminated legible <i>exit signs</i> are acceptable.
51.	C51	3.4.6.1.	Existing acceptable.
52.	C52	3.4.6.2.	Existing acceptable, if visually apparent.
53.	C53	3.4.6.3.(1)	Existing acceptable with rise no greater than 3.7 m.
54.	C54	3.4.6.4.(1)	Existing acceptable.
55.	C55	3.4.6.4.(2) and (3)	Existing acceptable.
56.	C56	3.4.6.5.(2) and (11)	Existing acceptable.
57.	C57	3.4.6.6.(2) and (4)	Existing acceptable.
58.	C58	3.4.6.7.(1)	Existing acceptable.
59.	C59	3.4.6.8.	Existing acceptable.
60.	C60	3.4.6.9.	Existing acceptable.
61.	C61	3.4.6.10.(2) to (6)	Existing acceptable.
62.	C62	3.4.6.11.(1) and (2)	Existing acceptable.
63.	C63	3.4.6.12.	Existing acceptable in <i>heritage buildings</i> provided the <i>occupant load</i> is not more than 60.
64.	C64	3.4.6.16.(1) to (3)	Existing functionally operable panic hardware acceptable.
65.	C65	3.4.7.2.	<i>Combustible</i> fire escapes which are protected from fire in accordance with Sentence 3.2.3.13.(2) are permitted or may be reconstructed or recreated (as in the case of a <i>heritage building</i> ).

66.	C66	3.5.1.	Existing acceptable except where <i>building</i> is classified under Subsection 3.2.6.
67.	C67	3.6.2.1.(7)	45 min <i>fire separation</i> acceptable.
68.	C68	3.6.2.2.	Existing acceptable where explosion-resistant <i>construction</i> or venting is provided.
69.	C69	3.6.2.6.	Existing acceptable.
70.	C70	3.6.2.7.(1)	2 h <i>fire separation</i> acceptable.
71.	C71	3.6.3.1.(1) to (5)	45 min <i>fire separation</i> acceptable up to 6 <i>storeys</i> .
72.	C72	3.6.3.3.(2)	Where 2 h <i>fire separation</i> is required, 1 h is acceptable. Except for linen discharge rooms where 1 h <i>fire separation</i> is required, 45 min is acceptable.
73.	C73	3.6.3.3.(4) and (5)	Existing sizes acceptable.
74.	C74	3.6.3.3.(9)	Where 2 h <i>fire separation</i> is required, 1 h is acceptable.
75.	C75	3.6.4.2.	Ceiling <i>fire separation</i> need not be fire-resistance rated where sprinklering, subject to <i>C.A. C27</i> , of <i>fire compartments</i> on both sides of vertical <i>fire separation</i> is provided and where such <i>fire separation</i> is not required to exceed 1 h.
76.	C76	3.6.4.3.(1)	Existing to meet <i>flame-spread rating</i> of 25 or to be <i>sprinklered</i> .
77.	C77	3.6.4.4. to 3.6.4.6.	Existing access acceptable.
78.	C78	3.7.1.1.(2)	Minimum room height shall be not less than 1 950 mm over the required floor area and any location that would normally be used as a <i>means of egress</i> .
79.	C79	3.7.2.1.	(a) Where windows are not used as <i>means of egress</i> and where they do not conflict with ventilation requirements, the minimum glass areas as shown in Table 9.7.2.3. may be reduced by 50%, or (b) an existing room converted to an interior room, created by an addition, shall not require a window, provided there is an opening in a dividing wall occupying not less than 30% of the separating plane to an adjoining room, where the adjoining room has a minimum of 5% window area of the combined floor areas, and provided the required ventilation for the combined room is maintained.
80.	C80	3.7.4.	Where the <i>occupant load</i> is increased by more than 15% above the capacity of the existing facilities, facilities to be added to accommodate the increase.
81.	C81	3.8.1.2.	Existing accessible entrance acceptable. (see <i>C.A. C85</i> ) Existing curb ramp conforming to Sentence 3.8.3.2.(3) is acceptable.
82.	C82	3.8.1.3.(1)	Existing unobstructed width of 920 mm minimum is acceptable.
83.	C83	3.8.1.3.(4)	Existing unobstructed space not less than 1 500 mm in width and 1 500 mm in length located not more than 30 m apart is acceptable.
84.	C84	3.8.3.3.(1)	Existing doorway acceptable, provided not less than 810 mm wide.
85.	C85	3.8.3.4.(1)(a)	Existing ramp acceptable, provided not less than 870 mm between handrails.
86.	C86	3.8.3.8.(1)(d)(i)	Existing grab bar is acceptable.
87.	C87	3.8.3.13.(1)(f)	Existing grab bar is acceptable.
	<b>NUMBER</b>	<b>PART 4 REQUIREMENTS</b>	<b>PART 11 COMPLIANCE ALTERNATIVE</b>
88.	C88	4.1.8.	The requirements under this Subsection do not apply.
	<b>NUMBER</b>	<b>PART 6 REQUIREMENTS</b>	<b>PART 11 COMPLIANCE ALTERNATIVE</b>
89.	C89	6.2.2.1.(2)	Required outdoor air rates may be provided by mechanical, natural or combination of natural and mechanical means.
90.	C90	6.2.3.2.; 6.2.3.8.; 6.2.3.18; 6.2.3.19.	Existing acceptable.
91.	C91	6.2.3.9.(1)	In a <i>building</i> containing not more than four <i>dwelling units</i> or residential <i>suites</i> , the existing heating or <i>air-conditioning</i> system may be altered to serve more than one <i>dwelling unit</i> or <i>suite</i> , provided <i>smoke alarms</i> are installed in each <i>dwelling unit</i> or <i>suite</i> and provided a <i>smoke detector</i> is installed in the supply or return air duct system serving the entire <i>building</i> which would turn off the fuel supply and electrical power to the heating system upon activation of such detector.
92.	C92	6.2.3.12.	Existing openings, grilles and diffusers acceptable.
93.	C93	6.2.4.2.(1); 6.2.4.3.(1) to (3), (5), (11) and (12)	Existing acceptable.
94.	C94	6.2.4.3.(10)	Where the duct system is being altered, lesser amounts and extent of insulation will be permitted.

95.	C95	6.2.4.7.(10)	In a <i>building</i> containing not more than four <i>dwelling units</i> or residential <i>suites</i> , the existing heating or <i>air-conditioning</i> system may be altered to serve more than one <i>dwelling unit</i> or <i>suite</i> , provided <i>smoke alarms</i> are installed in each <i>dwelling unit</i> or <i>suite</i> and provided a <i>smoke detector</i> is installed in the supply or return air duct system serving the entire <i>building</i> which would turn off the fuel supply and electrical power to the heating system upon activation of such detector.
96.	C96	6.2.9.2.	Existing acceptable.
97.	C97	6.2.12.3.(1)	Carbon monoxide alarms may be battery operated or plugged into an electrical outlet.
98.	C98	6.3.1.	Existing acceptable, provided products of combustion are safely vented.
	<b>NUMBER</b>	<b>PART 8 REQUIREMENTS</b>	<b>PART 11 COMPLIANCE ALTERNATIVE</b>
99.	C99	8.2.1.4.	Existing clearances acceptable where a <i>sewage system</i> is replaced with another <i>sewage system</i> within the same class and the capacity of the replacement <i>sewage system</i> does not exceed the capacity of the existing <i>sewage system</i> .
100.	C100	8.2.1.4.	Existing clearances are acceptable where a replacement <i>sewage system</i> requires lesser clearances than those required in Part 8 for the existing <i>sewage system</i> .
	<b>NUMBER</b>	<b>PART 9 REQUIREMENTS</b>	<b>PART 11 COMPLIANCE ALTERNATIVE</b>
101.	C101	9.3.2.1.	Sound used lumber may be acceptable for reuse without a grade stamp provided that: (a) visual examination shows no excessive weakening by holes, notches, nail splits or other damage, (b) where the grade or species is unknown, the minimum grade shall apply for span table use, and (c) lumber has not been subjected to termite infestation.
102.	C102	9.5.3.1.	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , (a) minimum room height shall not be less than 1 950 mm over the required floor area and in any location that would normally be used as a <i>means of egress</i> , or (b) minimum room height shall not be less than 2 030 mm over at least 50% of the required floor area, provided that any part of the floor having a clear height of less than 1 400 mm shall not be considered in computing the required floor area.
103.	C103	9.5.11.1.	Doors may be lesser heights to suit ceiling heights.
104.	C104	9.5.11.2.	Existing acceptable, provided not less than 600 mm.
105.	C105	9.6.1.2.(2) and (3); 9.6.1.4.(1) and (2)	Existing doors and sidelights being reused or relocated need not conform if identified or protected.
106.	C106	9.6.1.4.(3)	Existing acceptable, if marked to indicate their existence and position.
107.	C107	9.7.2.3.	(a) Where windows are not used as a <i>means of egress</i> and where they do not conflict with ventilation requirements, the minimum glass areas as shown in Table 9.7.2.3. may be reduced by 50%, and (b) an existing room converted to an interior room, created by an addition, shall not require a window, provided there is an opening in a dividing wall occupying not less than 30% of the separating plane to an adjoining room, where the adjoining room has a minimum of 5% window area of the combined floor areas, and provided the required ventilation for the combined room is maintained.
108.	C108	9.7	Existing acceptable.
109.	C109	9.8.1. to 9.8.4.	Replacement or extension of existing stair systems shall be exempt from the provisions of these Subsections, except that they shall have: (a) a minimum width between wall faces of 700 mm, and (b) a minimum clear height over tread nosing or landing of 1 800 mm.
110.	C110	9.8.4.3.	Existing curved or spiral stairs are acceptable.
111.	C111	9.8.4.5.	Where a stair complies with Subsection 9.8.4., an extension to a stair may contain two sets of winders provided that they are separated by at least three treads or a landing.
112.	C112	9.8.5.1.(2)	Existing ramps acceptable, where practical.
113.	C113	9.8.7.	Existing handrails acceptable, unless considered unsafe by <i>chief building official</i> .
114.	C114	9.8.8.	Existing <i>guards</i> acceptable, unless considered unsafe by <i>chief building official</i> .
115.	C115	9.8.9.6.(4)	Existing acceptable.
116.	C116	9.9.2.1.(1) to (3)	Except for <i>hotels</i> , the following types of <i>exits</i> may also be used:

			<ul style="list-style-type: none"> <li>(a) connected balconies, which connect across <i>firewalls</i>, or connect to another <i>exit</i>, or with access to grade,</li> <li>(b) areas of refuge approved by the <i>chief building official</i>, where fire service rescue is possible, or</li> <li>(c) <i>combustible</i> or <i>noncombustible</i> exterior stairways or fire escapes which are protected in accordance with Sentence 3.2.3.13.(2). These may be reconstructed or recreated (as in the case of a <i>heritage building</i>).</li> </ul>
117.	C117	9.9.2.1.(4)	Except for <i>hotels</i> , existing acceptable.
118.	C118	9.9.3.2.	<ul style="list-style-type: none"> <li>(a) In a <i>building</i> containing not more than four <i>dwelling units</i>, the width of every <i>exit</i> facility may be as the existing, but not less than 800 mm, or</li> <li>(b) in a <i>building</i> containing more than four <i>dwelling units</i>, the width of every <i>exit</i> facility may be as the existing, but not less than 900 mm.</li> </ul>
119.	C119	9.9.3.3.	<ul style="list-style-type: none"> <li>(a) In a <i>building</i> containing not more than four <i>dwelling units</i>, the minimum width of a <i>public corridor</i> may be 800 mm, or</li> <li>(b) in a <i>building</i> containing more than four <i>dwelling units</i>, the minimum width of a <i>public corridor</i> may be 900 mm.</li> </ul>
120.	C120	9.9.3.4.	Existing clear height of not less than 1 950 mm is acceptable.
121.	C121	9.9.4.2.	Except as permitted in <i>C.A. C136</i> , in a <i>building</i> containing not more than four <i>dwelling units</i> or <i>suites</i> , one <i>exit</i> need not be separated from the remainder of the <i>building</i> at the <i>first storey</i> where there are one or more other <i>exits</i> complying with <i>C.A. C122</i> .
122.	C122	9.9.4.2.(1) and (2)	30 min <i>fire separation</i> acceptable.
123.	C123	9.9.5.4.	Existing acceptable.
124.	C124	9.9.5.8.	Existing acceptable provided minimum 45 min <i>fire separation</i> and where explosion-resistant <i>construction</i> or venting is provided.
125.	C125	9.9.5.9.	Existing acceptable, provided that the enclosure has a 45 min <i>fire-resistance rating</i> .
126.	C126	9.9.6.1.	Except for <i>hotels</i> , existing acceptable.
127.	C127	9.9.6.2.	Existing clear opening height of not less than 1 950 mm is acceptable.
128.	C128	9.9.6.3.	Existing door widths are acceptable, provided <i>exit</i> widths conform to <i>C.A. C118</i> .
129.	C129	9.9.6.5.	Existing door swings acceptable. Existing acceptable in <i>public heritage buildings</i> , where approved by <i>chief building official</i> .
130.	C130	9.9.6.6.(1)	Where <i>exit</i> doors open onto a landing, they shall not extend beyond the face of the first riser.
131.	C131	9.9.6.8.	Existing functionally operable passage or panic hardware acceptable.
132.	C132	9.9.7.4.(1)(a)	Maximum area of existing room or <i>suite</i> does not apply.
133.	C133	9.9.7.5.	Except as provided in <i>C.A. C136</i> , in detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , the Code requirement applies.
134.	C134	9.9.8.2.(1)	Existing travel distance acceptable where <i>floor area</i> is <i>sprinklered</i> and provided <i>fire separations</i> comply with Part 9.
135.	C135	9.9.8.5.	In a <i>building</i> containing not more than four <i>dwelling units</i> or <i>suites</i> , existing glazed solid wood doors to lobby may remain in lieu of new 20 minute doors, provided the <i>fire separations</i> for the floor above or below are provided as per <i>C.A. C147</i> , and a second <i>means of egress</i> from the <i>dwelling units</i> complies with the Code requirements.
136.	C136	9.9.9.	<p>In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i>, <i>exit</i> requirements are acceptable if at least one of the following conditions exists:</p> <ul style="list-style-type: none"> <li>(a) a door, including a sliding door, that opens directly to the exterior from a <i>dwelling unit</i>, serves only that <i>dwelling unit</i> and has reasonable access to ground level, and the <i>dwelling units</i> are equipped with <i>smoke alarms</i> installed in conformance with Subsection 9.10.19.,</li> <li>(b) an <i>exit</i> that is accessible to more than one <i>dwelling unit</i> and provides the only <i>means of egress</i> from each <i>dwelling unit</i>, provided that the <i>means of egress</i> is separated from the remainder of the <i>building</i> and common areas by a <i>fire separation</i> having a 30 min <i>fire-resistance rating</i> and provided further that the required <i>access to exit</i> from any <i>dwelling unit</i> cannot be through another <i>dwelling unit</i>, <i>service room</i> or other <i>occupancy</i>, and both <i>dwelling units</i> and common areas are provided with <i>smoke alarms</i> that are installed in conformance with Subsection 9.10.19. and are interconnected, or</li> <li>(c) access to an <i>exit</i> from one <i>dwelling unit</i> which leads through another <i>dwelling unit</i> where,</li> </ul>



			<ul style="list-style-type: none"> <li>(i) an additional means of escape is provided through a window that conforms to the following: <ul style="list-style-type: none"> <li>(A) the sill height is not more than 1 000 mm above or below adjacent ground level,</li> <li>(B) the window can be opened from the inside without the use of tools,</li> <li>(C) the window has an individual unobstructed open portion having a minimum area of 0.38 m<sup>2</sup> with no dimension less than 460 mm,</li> <li>(D) the sill height does not exceed 900 mm above the floor or fixed steps,</li> <li>(E) where the window opens into a window well, a clearance of not less than 1 000 mm shall be provided in front of the window, and</li> <li>(F) <i>smoke alarms</i> are installed in every <i>dwelling unit</i> and in common areas in conformance with Subsection 9.10.19. and are interconnected,</li> </ul> </li> <li>(ii) an additional means of escape is provided through a window that conforms to the following: <ul style="list-style-type: none"> <li>(A) a casement window not less than 1 060 mm high, 560 mm wide, with a sill height not more than 900 mm above the inside floor,</li> <li>(B) the sill height of the window is not more than 5 m above adjacent ground level, and</li> <li>(C) <i>smoke alarms</i> are installed in every <i>dwelling unit</i> and in common areas in conformance with Subsection 9.10.19. and are interconnected, or</li> </ul> </li> <li>(iii) the <i>building</i> is <i>sprinklered</i> and the <i>dwelling units</i> are equipped with <i>smoke alarms</i> installed in conformance with Subsection 9.10.19.</li> </ul>
137.	C137	9.9.10.1.	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , existing acceptable, where there is direct access to the exterior.
138.	C138	9.9.11.	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , the requirements under this Subsection do not apply.
139.	C139	9.9.11.3.	Existing illuminated legible signs are acceptable for <i>exit</i> signs, if approved by <i>chief building official</i> .
140.	C140	9.9.12.	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , the requirements under this Subsection apply only where the condition described in (b) of <i>C.A.</i> C136 exists.
141.	C141	9.10.1.1.	Assemblies required to be of <i>noncombustible construction</i> may be supported by <i>combustible construction</i> having at least the same <i>fire-resistance rating</i> as that supported.
142.	C142	9.10.1.3.(8) to (10)	Existing installations acceptable subject to <i>C.A.</i> 's C26, C27 and C28.
143.	C143	9.10.3.	<i>Fire-resistance ratings</i> may also be used where they are based on: <ol style="list-style-type: none"> <li>1. HUD Rehabilitation Guidelines, "Guideline on Fire Ratings of Archaic Materials and Assemblies".</li> <li>2. DBR Technical Paper No. 194, "Fire Endurance of Protected Steel Columns and Beams".</li> <li>3. DBR Technical Paper No. 207, "Fire Endurance of Unit Masonry Walls".</li> <li>4. DBR Technical Paper No. 222, "Fire Endurance of Light-Framed and Miscellaneous Assemblies".</li> </ol>
144.	C144	9.10.5.1.	<ul style="list-style-type: none"> <li>(a) Existing openings in existing wall or ceiling membranes to remain.</li> <li>(b) Existing openings may be moved to another location in the same wall or ceiling, provided the aggregate area of openings does not increase and are not cumulative, and the existing opening is blocked up to provide the same rating as the existing wall or ceiling assembly.</li> </ul>
145.	C145	9.10.6.2.	Existing <i>heavy timber construction</i> acceptable where <i>construction</i> is within 90% of member sizes listed in Part 3.
146.	C146	9.10.7.	Existing acceptable for <i>heritage buildings</i> , subject to approval of <i>chief building official</i> .
147.	C147	9.10.8.1.; 9.10.8.3.; 9.10.8.8.	<ul style="list-style-type: none"> <li>(a) Except as provided in (b) and (c), 30 min rating is acceptable.</li> <li>(b) In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i>, 15 min horizontal <i>fire separation</i> is acceptable where, <ul style="list-style-type: none"> <li>(i) <i>smoke alarms</i> are installed in every <i>dwelling unit</i> and in common areas in conformance with Subsection 9.10.19., and</li> </ul> </li> </ul>

			(ii) <i>smoke alarms</i> are interconnected. (c) In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , the <i>fire-resistance rating</i> of the <i>fire separation</i> is waived where the <i>building</i> is <i>sprinklered</i> .
148.	C148	9.10.9.7.; 9.10.9.9.	Existing acceptable in existing <i>fire separations</i> .
149.	C149	9.10.9.10.(1)	Ceiling <i>fire separation</i> need not be fire-resistance rated where sprinklering, subject to <i>C.A. C27</i> , of <i>fire compartments</i> on both sides of vertical <i>fire separation</i> is provided and where such <i>fire separation</i> is not required to exceed 1 h.
150.	C150	9.10.9.11.(1)	Except for <i>hotels</i> , 30 min <i>fire separation</i> acceptable.
151.	C151	9.10.9.11.(2)	In lieu of the 2 h <i>fire separation</i> , sprinklers may be used in the <i>mercantile occupancy</i> or <i>medium hazard industrial occupancy</i> , with a 1 h <i>fire separation</i> .
152.	C152	9.10.9.14.(1) and (3); 9.10.9.15.(1)	(a) Except as provided in (b) and (c), 30 min <i>fire separation</i> is acceptable.  (b) In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , 15 min horizontal <i>fire separation</i> is acceptable where, (i) <i>smoke alarms</i> are installed in every <i>dwelling unit</i> and in common areas in conformance with Subsection 9.10.19., and (ii) <i>smoke alarms</i> are interconnected. (c) In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , the <i>fire-resistance rating</i> of the <i>fire separation</i> is waived where the <i>building</i> is <i>sprinklered</i> .
153.	C153	9.10.10.3.	(a) Except as provided in (b) and (c) and in Articles 9.10.10.5. and 9.10.10.6., 30 min <i>fire separation</i> is acceptable. (b) In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , the <i>fire-resistance rating</i> of the vertical <i>fire separation</i> is waived where, (i) <i>smoke alarms</i> are installed in every <i>dwelling unit</i> and in common areas in conformance with Subsection 9.10.19., and (ii) <i>smoke alarms</i> are interconnected. (c) In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , the <i>fire-resistance rating</i> of the vertical <i>fire separation</i> is waived where <i>service rooms</i> are <i>sprinklered</i> .
154.	C154	9.10.11.2.(1)	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , a <i>party wall</i> with 1 h <i>fire-resistance rating</i> is acceptable.
155.	C155	9.10.13.1	Existing functional <i>closures</i> are acceptable subject to <i>C.A.</i> 's C8 and C156.
156.	C156	9.10.13.2.(1)	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , existing unlabelled doors at least 45 mm solid core wood or metal clad are acceptable. For existing <i>closures</i> , ratings of 20 min will not be required where the entire <i>floor area</i> is <i>sprinklered</i> .
157.	C157	9.10.13.2.(1)	In a <i>building</i> containing not more than four <i>dwelling units</i> or <i>suites</i> , existing glazed solid wood doors to corridors may remain in lieu of new 20 min doors, provided they are not located in a dead end corridor.
158.	C158	9.10.13.3.	Existing acceptable provided that wood door frames are secured with hinge screws going through frame into the stud.
159.	C159	9.10.13.5.	Existing wired glass acceptable. Existing transoms or sidelights located in required <i>fire separations</i> may be retained if wired glass, at least 6 mm thick, is securely fixed to a wood frame of at least 50 mm thickness with steel stops. Operable transoms shall be fixed closed.
160.	C160	9.10.13.6.	Existing steel door frames acceptable.
161.	C161	9.10.13.7.	Existing glass block acceptable.
162.	C162	9.10.13.8.	Existing sizes acceptable.
163.	C163	9.10.13.9.	Existing operable latches acceptable.
164.	C164	9.10.13.10.(1)	Existing functionally operable self-closing devices acceptable.
165.	C165	9.10.13.11.	Existing operable self-releasing electromagnetic hold-open device acceptable, and except for <i>hotels</i> , fusible link hold-open devices acceptable.
166.	C166	9.10.13.12.	Existing swings acceptable.

167.	C167	9.10.13.13.(1)	Except as permitted in <i>C.A. C168</i> , in a <i>building</i> containing not more than four <i>dwelling units</i> , the existing heating or <i>air-conditioning</i> system may be altered to serve more than one <i>dwelling unit</i> , provided <i>smoke alarms</i> are installed in each <i>dwelling unit</i> and provided a <i>smoke detector</i> is installed in the supply or return air duct system serving the entire <i>building</i> which would turn off the fuel supply and electrical power to the heating system upon activation of such detector.
168.	C168	9.10.13.13.(1)	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , existing acceptable.
169.	C169	9.10.13.14.; 9.10.5.1.	Except as permitted in <i>C.A. C170</i> , in a <i>building</i> containing not more than four <i>dwelling units</i> , the existing heating or <i>air-conditioning</i> system may be altered to serve more than one <i>dwelling unit</i> , provided <i>smoke alarms</i> are installed in each <i>dwelling unit</i> and provided a <i>smoke detector</i> is installed in the supply or return air duct system serving the entire <i>building</i> which would turn off the fuel supply and electrical power to the heating system upon activation of such detector.
170.	C170	9.10.13.14.; 9.10.5.1.	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , existing acceptable.
171.	C171	9.10.14.2.(2) and (3); 9.10.14.4.(2); 9.10.15.2.(2) and (3); 9.10.15.4.(4)	Where an addition to an existing residential <i>building</i> has its <i>exposing building face</i> further distant from the line than the existing <i>exposing building face</i> and the <i>limiting distance</i> is at least 1 200 mm, the total area of allowable <i>unprotected openings</i> may be determined under Sentence 9.10.14.2.(2) or 9.10.15.2.(2) for the combined new and existing <i>exposing building faces</i> and, (a) where the existing <i>exposing building face</i> has no <i>unprotected openings</i> , or the existing <i>unprotected openings</i> are to be filled in, the total allowable area of <i>unprotected openings</i> may be installed in the new <i>exposing building face</i> , or (b) where the existing <i>unprotected openings</i> are to remain, (i) their area shall be deducted from the total allowable area of <i>unprotected openings</i> , and the balance may be installed in the new <i>exposing building face</i> , and (ii) Sentences 9.10.14.2.(3) and 9.10.14.4.(2) or Sentences 9.10.15.2.(3) and 9.10.15.4.(4) apply only to the new <i>exposing building face</i> .
172.	C172	9.10.14.4.; 9.10.15.4.	Existing windows. (a) Existing windows in walls may be relocated to another part of the wall, provided the existing opening is blocked up to provide the same fire rating for the wall, and the projection of the new opening, at a right angle to the property line onto another <i>building</i> , lies no closer than 300 mm from a window in such other <i>building</i> , where the “opposite” window is less than 2 400 mm from the opposite new opening, and (b) except relocation of units, to be restricted to the same <i>fire compartment</i> and shall conform to the requirements of Article 3.2.3.14. or 9.10.12.3. where applicable, or (c) where a <i>building</i> does not satisfy the requirements of Subsection 3.2.3. for the amount of openings facing a yard or space that does not have sufficient <i>limiting distance</i> , such existing openings are allowed to be relocated provided: (i) such openings are not increased in size and they are protected with wired glass in steel frames conforming to Sentence 3.1.8.14.(2), or (ii) the <i>building</i> is <i>sprinklered</i> .
173.	C173	9.10.16.2.(1)	Where balloon framing is exposed during renovation, <i>fire blocks</i> shall be provided.
174.	C174	9.10.18.	(a) Subject to approval by the <i>chief building official</i> , existing fire alarm system may remain where the fire safety plan (as described in the Fire Code made under the <i>Fire Protection and Prevention Act, 1997</i> ) for the <i>building</i> addresses the intent of Subsection 3.2.4. (i.e. “stage” system, electrical supervision, detection as required, Fire Department connection, and emergency power supply), and (b) extension of an existing system must ensure continuity and compatibility, and integrity of the system.
175.	C175	9.10.19.4.	<i>Smoke alarms</i> may be battery operated.
176.	C176	9.10.20.	Existing access acceptable.
177.	C177	9.14.2.1.(2)	Existing acceptable.
178.	C178	9.18.2.	Existing access acceptable.
179.	C179	9.18.3.	Existing vents and ventilation acceptable.
180.	C180	9.19.	Existing acceptable.

181.	C181	9.20.2.2.	Used masonry may be reused for patching and filling openings to match adjacent work. Used interior brick may not be used for exterior applications.
182.	C182	9.20.3.	Archaic mortars may be used to match existing jointing.
183.	C183	9.20.4.1.	Sound jointing techniques may be employed to match existing archaic joints.
184.	C184	9.20.12.1.	Corbelling may be constructed to match existing or original details, provided that it is structurally adequate for the proposed use.
185.	C185	9.21.	Existing acceptable, provided the products of combustion are safely vented and provided no fire hazard is created.
186.	C186	9.22.1. to 9.22.7.	Sound period materials, designs and techniques may be employed in recreated fireplaces, provided no fire hazard is created. Existing need not comply with Article 9.22.1.4.
187.	C187	9.23.	Existing acceptable.
188.	C188	9.24.	Existing acceptable.
189.	C189	9.25.	A <i>vapour barrier</i> may consist of paint or other coating with specified perm rating such as two coats of leafing aluminum pigmented paint.
190.	C190	9.26.	Existing acceptable, except when removing and replacing shingles, comply with the eave protection requirements of Subsection 9.26.5.
191.	C191	9.27.	Existing acceptable.
192.	C192	9.28.	All replacement or recreation of existing stucco may be compatible with the existing materials and application.
193.	C193	9.29.4.	Existing acceptable. All replacement or recreation of existing plaster may be compatible with the existing materials and application.
194.	C194	9.32.	In detached houses, semi-detached houses, townhouses and row houses containing not more than two <i>dwelling units</i> , rooms or spaces in <i>dwelling units</i> to be ventilated by natural means in accordance with Subsection 9.32.2. or by providing adequate mechanical ventilation.
195.	C195	9.33.1.1.	In a <i>building</i> containing not more than four <i>dwelling units</i> , the existing heating or <i>air-conditioning</i> system may be altered to serve more than one <i>dwelling unit</i> , provided <i>smoke alarms</i> are installed in each <i>dwelling unit</i> and provided a <i>smoke detector</i> is installed in the supply or return air duct system serving the entire <i>building</i> which would turn off the fuel supply and electrical power to the heating system upon activation of such detector.
196.	C196	9.33.1.2.	Sound, used or antique <i>appliances</i> are acceptable, provided that: (a) visual examination shows no excessive weakening by corrosion or other damage, (b) no structural parts are missing, (c) no cracks are present in the components intended to support the <i>appliance</i> or enclose the fire, and (d) loading and ash removal door latches and hinges hold the door closed.
197.	C197	9.33.4.3.(1)	Carbon monoxide alarms may be battery operated or plugged into an electrical outlet
198.	C198	9.37.	Sound used materials shall be acceptable for reuse, subject to the following limitations: (a) visual examination shows no excessive weakening by holes, notches, nail splits or other damage, and (b) logs have not been subjected to termite infestation.
	<b>NUMBER</b>	<b>PART 12 REQUIREMENTS</b>	<b>PART 11 COMPLIANCE ALTERNATIVE</b>
199.	C199	12.2.1.1.(3)	(a) Where the framing systems are being altered to match the existing framing, lesser amounts and extent of insulation and <i>vapour barrier</i> is acceptable. (b) Existing acceptable for Article 2.1.1.9. of MMAH Supplementary Standard SB-12, "Energy Efficiency for Housing". (c) Existing previously occupied log houses that are dismantled and reconstructed are exempt from Article 2.1.1.5. of MMAH Supplementary Standard SB-12, "Energy Efficiency for Housing".

**Table 11.5.1.1.D/E.  
Compliance Alternatives for Business/Mercantile Occupancies**

Forming Part of Article 11.5.1.1.

Item	Col. 1	Column 2	Column 3
	<b>NUMBER</b>	<b>PART 3 REQUIREMENTS</b>	<b>PART 11 COMPLIANCE ALTERNATIVE</b>
1.	DE1	3.1.4.7.	Existing <i>heavy timber construction</i> acceptable where <i>construction</i> is within 90% of member sizes listed in Part 3.
2.	DE2	3.1.5.2. to 3.1.5.4.; 3.1.5.6.	Existing acceptable.