Part 9
Housing and Small Buildings

Part 9
Housing and Small Buildings

Section 9.1. General

9.1.1. Scope

9.1.1.1. Scope

(1) The scope of this Part shall be as described in Section 2.1. (See Section 9.36. regarding application to seasonally and intermittently occupied *buildings*.)

9.1.1.2. Signs

(1) Signs shall conform to the requirements in Section 3.14.

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 3.13.1.

(2) *Air-supported structures* shall conform to the requirements in Subsection 3.13.2.

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 3.1.18. shall apply.

■ 9.1.1.6. Food Premises

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

Section 9.2. Definitions

9.2.1. General

9.2.1.1. Defined Words

(1) Words in italics are defined in Part 1.

Section 9.3. Materials, Systems and Equipment

9.3.1. Concrete

9.3.1.1. Concrete

(1) Concrete shall be designed, mixed, placed, cured and tested in accordance with CAN3-A438-M, "Concrete Construction for Housing and Small Buildings".

9.3.1.2. Cement

(1) Cement shall meet the requirements of CAN/CSA-A5, "Portland Cements".

9.3.1.3. Concrete in Contact with Sulfate Soil

(1) Concrete in contact with sulfate *soil* deleterious to normal cement shall conform to the requirements in Clause 15.5 of CAN/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 CAN/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

(See also Articles 9.12.4.1., 9.15.4.1. and 9.18.6.1.)

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

(a) 32 MPa (4650 psi) for garage and carport floors and all exterior flatwork, and

(b) 15 MPa (2200 psi) 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. Site Mixed Concrete

(1) The concrete mixes described in Table 9.3.1.7. shall be considered acceptable if, when measured according to the slump test described in Appendix A of CAN3-A438-M, "Concrete Construction for Housing and Small Buildings", the slump does not exceed

(a) 150 mm (5⅞ in) for footings for walls, columns, fireplaces and *chimneys*, *foundation* walls, grade beams and piers, or

(b) 100 mm (4 in) for garage and carport floors and all exterior flatwork.

Table 9.3.1.7.
Site Mixed Concrete Proportions[1]
Forming Part of Sentence 9.3.1.7.(1)

Maximum Size of Course Aggregate mm (in)	Materials, volume					
	Cement		Fine Aggregate (damp average course sand)		Course Aggregate (gravel or crushed stone)	
	Parts	L[2]	Parts	L	Parts	L
14 (½)	1	28	1.75	49	2	56
20 (¾)	1	28	1.75	49	2.5	70
28 (1⅛)	1	28	2	56	3	84
40 (1½)	1	28	2	56	3.5	98
Column 1	2	3	4	5	6	7

Notes to Table 9.3.1.7.:
(1) The concrete strength obtained from these proportions will be in excess of the minimum strengths required in Sentence 9.3.1.6.(1).
(2) A 40 kg (88 lb) bag of cement contains 28 L.

(2) Aggregate for unreinforced concrete mixes referred to in Sentence (1) shall not exceed in size

(a) 1/5 the distance between the sides of vertical forms, or

(b) 1/3 the thickness of flatwork.

9.3.1.8. Admixtures

(1) Admixtures shall conform to CAN3-A266.1-M, "Air Entraining Admixtures for Concrete" or CAN3-A266.2-M, "Chemical Admixtures for Concrete," as applicable.

9.3.1.9. Reinforced Concrete

(1) Reinforced concrete shall be designed to conform to the requirements of Part 4.

9.3.1.10. Cold Weather Requirements

(1) When the air temperature is below 5°C (41°F), concrete shall be

(a) kept at a temperature of not less than 10°C (50°F) or more than 25°C (77°F) while being placed, and

(b) maintained at a temperature of not less than 10°C (50°F) 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". (See Appendix A.)

9.3.2.2. Lumber Grades

(1) Except for joists, rafters, trusses and beams, visually graded lumber shall conform to the grades in Table 9.3.2.1. (See Article 9.23.4.2. for joists, rafters beams and Article 9.23.13.11. for trusses.)

9.3.2.3. Machine Stress Rated Lumber

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

Table 9.3.2.1.
Minimum Lumber Grades for Specific End Uses
Forming Part of Sentence 9.3.2.1.(1)

Use	Boards[1]			Framing
	Paragraph in the NLGA grading rules under which boards are graded			
	All Species		Eastern White Pine & Red Pine	All Species
	Para 113	Para 114	Para 118	
Stud wall framing (*loadbearing* members)	—	—	—	Stud, Standard No. 2
Stud wall framing (non-*loadbearing* members)	—	—	—	Stud, Utility No. 3
Plank frame construction (*loadbearing* members)	No. 3 Common	—	No. 3 Common	No. 2
Plank frame construction (non-*loadbearing* members)	No. 5 Common	—	No. 5 Common	Economy, No 3
Post and beams less than 114 mm (4½ in) in thickness	—	—	—	Standard, No.2
Post and beams not less than 114 mm (4½ in) in thickness	—	—	—	Standard
Roof sheathing	No. 3 Common	Standard	No. 4 Common	—
Subflooring	No. 3 common	Standard	No. 3 Common	—
Wall sheathing when required as a nailing base	No. 4 Common	Utility	No. 4 Common	—
Wall sheathing not required as a nailing base	No. 5 Common	Common	No. 5 Common	—
Column 1	2	3	4	5

Note to Table 9.3.2.1.:

[1] See Appendix A.

9.3.2.4. OSB, Waferboard and Plywood Marking

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

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

9.3.2.5. Moisture Content

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

9.3.2.6. Lumber Dimensions

(1) Lumber dimensions referred to in this Part are actual dimensions determined in conformance with CAN/CSA-O141, "Softwood Lumber".

9.3.2.7. Panel Thickness Tolerances

(1) The 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 herein.

9.3.2.8. Undersized Lumber

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

9.3.2.9. Termite and Decay Protection

(1) In localities where termites are known to occur, the clearance between structural wood elements and the ground shall be not less than 450 mm (17¾ in), unless the structural wood elements are pressure treated with a chemical that is toxic to termites.

(2) Structural wood elements shall be pressure treated with a preservative to resist decay where

(a) the structural wood elements are in contact with the ground, or

(b) the vertical clearance between structural wood elements and the ground is less than 150 mm (5⅞ in). (See also Articles 9.23.2.2. and 9.23.2.3.)

(3) Where wood is required by this Article to be treated to resist termites or decay, such treatment shall be in accordance with the requirements of

(a) CAN/CSA-O80.1-M, "Preservative Treatment of All Timber Products by Pressure Process",
(b) CAN/CSA-O80.2-M, "Preservative Treatment of Lumber, Timber, Bridge Ties and Mine Ties by Pressure Process",
(c) CAN/CSA-O80.9-M, "Preservative Treatment of Plywood by Pressure Process", or
(d) CAN/CSA-O80.15-M, "Preservative Treatment of Wood for Building Foundation Systems, Basements and Crawl Spaces by Pressure Process".

9.3.3. Metal

9.3.3.1. Sheet Metal Thickness

(1) Minimum thickness for sheet material given in this Part refer to the actual minimum thickness measured at any point of the material, and in the case of galvanized steel, include the thickness of the coating unless otherwise indicated.

9.3.3.2. Galvanized Sheet Steel

(1) Where galvanized sheet steel is intended for use in locations exposed to weather or as a flashing material, it shall have a zinc coating not less than the G90 coating designation in

(a) ASTM A 653, "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process", or
(b) ASTM A 924, "Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process".

Section 9.4. Structural Requirements (See Appendix A.)

9.4.1. General

9.4.1.1. Structural Design

(1) Except as provided in Sentence (2), Sentence 9.23.4.2.(2) and Subsections 9.4.2. to 9.4.4. and Subsection 9.40.3., structural members and their connections shall be designed in conformance with Part 4.

(2) Where structural members and their connections conform to the requirements listed elsewhere in this Part, it shall be deemed that the structural design requirements have been met.

9.4.1.2. Post, Beam and Plank Construction

(1) Except for columns described in Section 9.17. and beams described in Subsection 9.23.4., post, beam and plank construction with the *loadbearing* framing members spaced more than 600 mm (24 in) apart shall be designed in conformance with Subsection 4.3.1.

9.4.2. Specified Loads

9.4.2.1. Application

(1) This Subsection applies to wood frame assemblies with clear spans not exceeding 12.20 m (40 ft) and members spaced not more than 600 mm (24 in) apart.

9.4.2.2. Design Snow Loads

(1) Except as provided in Sentences (2) and (3), specified snow loads shall be not less than the composite snow load listed in Column 12 of Table 2.5.1.1.

(2) Where the entire width of a roof does not exceed 4.3 m (14 ft 1 in), the specified snow load shall be not less than the composite snow load listed in Column 13 of Table 2.5.1.1.

(3) In no case shall the specified snow load be less than 1 kPa (20 psf).

(4) Bow string, arch or semi-circular roof trusses having an unsupported span greater than 6 m (19 ft 8 in) shall be designed in conformance with the snow load requirements in Subsection 4.1.7.

9.4.2.3. Balconies

(1) Residential balconies not used as passageways shall be designed to carry the specified roof snow load or 1.9 kPa (40 psf), whichever is greater.

9.4.2.4. Attics

(1) Residential attics having limited accessibility to preclude storage of equipment or material are permitted to be designed for a total specified load of 0.5 kPa (10 psf), where the total specified load is the sum of the specified *dead load* plus the specified live ceiling load.

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).

9.4.4. Foundation Conditions

9.4.4.1. Allowable Bearing Pressures

(1) Where footing sizes for *shallow foundations* are not determined in conformance with Section 9.15., footings are permitted to be designed using maximum *allowable bearing pressures* in Table 9.4.4.1.

Table 9.4.3.1.
Maximum Deflections
Forming Part of Sentence 9.4.3.1.(1)

Structural Members	Type of Ceiling Supported	Max. Allowable Deflection as an Expressed Ratio of the Clear Span
Roof rafters, roof joists, roof beams and roof decking of plank and beam construction	No ceiling	1/180
	Other than plaster or gypsum board	1/240
	Plaster or gypsum board	1/360
Ceiling joists	Other than plaster or gypsum board	1/240
	Plaster or gypsum board	1/360
Floor beams, floor joists and floor decking	All cases	1/360
Column 1	2	3

Table 9.4.4.1.
Allowable bearing Pressure for Soil or Rock
Forming Part of Sentence 9.4.4.1.(1)

Type and Condition of *Soil* or *Rock*	Maximum Allowable Bearing Pressure, kPa (psf)
Dense or compact sand or gravel	150 (3130)
Loose sand or gravel	50 (1040)
Dense or compact silt	100 (2090)
Stiff clay	150 (3130)
Firm clay	75 (1570)
Soft clay	40 (835)
Till	200 (4180)
Clay shale	300 (6270)
Sound rock	500 (10400)
Column 1	2

Notes to Table 9.4.4.1.:
(1) See Appendix A.

(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 in which *soil* movement caused by changes in *soil* moisture content is known to occur to the extent that it will cause significant damage to a *building*, measures shall be taken to minimize the effect of such movement on the *building*.

9.4.4.5. Walls Supporting Drained Earth

(1) Walls supporting drained earth are permitted to be designed for pressure equivalent to that exerted by a fluid with a density of not less than 480 kg/m^3 (30 lb/ft^3) and having a depth equal to that of the retained earth.

(2) Any surcharge shall be in addition to the equivalent fluid pressure specified in Sentence (1).

Section 9.5. Design of Areas and Spaces

9.5.1. General

9.5.1.1. Application

(1) Unless otherwise specifically indicated, 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) Unless otherwise indicated herein, 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 are considered as a combination room if the dividing wall occupies less than 60 per cent of the separating plane.

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 8 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. Reserved.

9.5.3. Ceiling Heights

9.5.3.1. Heights of Rooms or Spaces

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

Table 9.5.3.1.
Room Heights
Forming Part of Sentence 9.5.3.1.(1)

Room or Space	Minimum Heights
Living room or space, dining room or space, kitchen or kitchen space	2 300 mm (7 ft 7 in) over at least 75 per cent of the required floor area with a clear height of 2 100 mm (6 ft 11 in) at any point over the required area
Bedroom or bedroom space	2 300 mm (7 ft 7 in) over at least 50 per cent of the required area or 2 100 mm (6 ft 11 in) over all of the required floor area. Any part of the floor having a clear height of less than 1 400 mm (4 ft 7 in) shall not be considered in computing the required floor area.
Basement space	2 100 mm (6 ft 11 in) over at least 75 per cent of the *basement* area except that under beams and ducts the clearance is permitted to be reduced to 1 950 mm (6 ft 5 in)
Bathroom, water-closet room or laundry area above *grade*	2 100 mm (6 ft 11 in) in any area where a person would normally be in a standing position
Passage, hall or main entrance vestibule and finished rooms not specifically mentioned above	2 100 mm (6 ft 11 in)
Column 1	2

9.5.3.2. Mezzanines

(1) The clear height above and below a *mezzanine* floor assembly in all *occupancies* shall be not less than 2 100 mm (6 ft 11 in).

9.5.3.3. Storage Garages

(1) The clear height in a *storage garage* shall be not less than 2 000 mm (6 ft 7 in).

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^2 (145 ft^2).

(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 2 persons shall be not less than 11 m^2 (118 ft^2).

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^2 (35 ft^2).

(2) Dining rooms not combined with other space shall have a minimum area of 7 m^2 (75 ft^2).

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^2 (45 ft^2) including the area occupied by the base cabinets, except that in *dwelling units* containing sleeping accommodation for not more than 2 persons, the minimum area shall be 3.7 m^2 (40 ft^2).

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 m² (75 ft²) where built-in cabinets are not provided and not less than 6 m² (65 ft²) where built-in cabinets are provided.

9.5.7.2. Areas of Master Bedrooms

(1) Except as provided in Article 9.5.7.3., not less than one bedroom in every *dwelling unit* shall have an area of not less than 9.8 m² (105 ft²) where built-in cabinets are not provided and not less than 8.8 m² (95 ft²) 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 m² (45 ft²).

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 m² (75 ft²) per person for single *occupancy* and 4.6 m² (50 ft²) 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 m² (40 ft²) per camper or, if double or triple tier bunk units are used, 2.79 m² (30 ft²) 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 m² (40 ft²) per employee in every room used for sleeping purposes.

9.5.7A. Combined Spaces ▲

9.5.7A.1. Combined Living, Dining, Bedroom and Kitchen Spaces

(1) Despite Subsections 9.5.4, 9.5.5, 9.5.6 and 9.5.7, where living, dining, bedroom and kitchen spaces are combined in a *dwelling unit* that contains sleeping accommodation for not more than 2 persons, the area of the combined spaces shall be not less than 13.5 m² (145 ft²).

9.5.8. Bathrooms and Water-Closet Rooms

9.5.8.1. 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. Hallways

9.5.9.1. Width of Hallway Within Dwelling Unit

(1) The unobstructed width of a hallway within a *dwelling unit* shall be at least 860 mm (2 ft 10 in), except that the hallway width is permitted to be 710 mm (2 ft 4 in) 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.

Section 9.6. Doors

9.6.1. General

9.6.1.1. Application

(1) This Section applies to doors, to glazed areas in doors and to sidelights for doors. (See also Sections 3.8., 9.9. and 9.10.)

9.6.2. Required Doors

9.6.2.1. Doors for Dwelling Units

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

9.6.3. Doorway Sizes

9.6.3.1. Doorway Opening Sizes

(1) Except as provided in Articles 9.6.3.3. and 9.9.6.4., doorway openings within dwelling units shall be designed to accommodate at least the door sizes in Table 9.6.3.1. for swing-type doors or folding doors.

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Table 9.6.3.1.
Minimum Size of Door
Forming Part of Sentence 9.6.3.1.(1)

At Entrance to:	Minimum Width, mm (in)	Minimum Height, mm (in)
Dwelling unit (required entrance) Vestibule or entrance hall	810 (32)	1 980 (78)
Stairs to a floor level that contains a finished space All doors in not less than one line of passage from the exterior to the *basement* Utility rooms	810 (32)	1 980 (78)
Walk-in closet	610 (24)	1 980 (78)
Bathroom, water-closet room, shower room[1]	610 (24)	1 980 (78)
Rooms located off hallways that are permitted to be 710 mm (2 ft 4 in) wide	610 (24)	1 980 (78)
Rooms not mentioned above, exterior balconies	760 (30)	1 980 (78)
Column 1	2	3

Note to Table 9.6.3.1.:
(1) See Article 9.6.3.3.

9.6.3.2. Doors to Public Water-Closet Rooms

(1) Doors to public water-closet rooms shall be not less than 810 mm (32 in) wide and 2 030 mm (6 ft 8 in) high.

9.6.3.3. 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 (2 ft 6 in) where the door is served by a corridor or space not less than 1 060 mm (3 ft 6 in) wide, and
(b) 810 mm (2 ft 8 in) where the door is served by a corridor or space less than 1 060 mm (3 ft 6 in) wide.

9.6.4. Door Sill Height

9.6.4.1. Height of Door Sills Above Floors or Ground

(1) Doors in *buildings* of *residential occupancy* shall conform to Sentence (2) where

(a) the top surface of the sill of a door, including sliding doors, is located less than 200 mm (7⅞ in) above the finished floor on one side of the door, and
(b) the finished floor referred to in Clause (a) is more than 600 mm (23⅝ in) above the floor, landing, stair tread or ground level on the other side of the door.

(2) Doors described in Sentence (1) shall be

(a) permanently adjusted to prevent an opening greater than
  (i) 200 mm (7⅞ in) where the height described in Clause (1)(b) is not more than 1 800 mm (5 ft 11 in), and
  (ii) 100 mm (4 in) where the height described in Clause (1)(b) is greater than 1 800 mm (5 ft 11 in), or
(b) be protected by a guard in accordance with Section 9.8.

9.6.5. Exterior Doors

9.6.5.1. Exterior Wood Doors

(1) Exterior wood doors shall conform to CAN/CSA-O132.2-M, "Wood Flush Doors".

(2) Each door described in Sentence (1) shall indicate legibly

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

9.6.5.2. Sliding Doors

(1) Sliding doors shall conform to CAN/CGSB 82.1-M, "Sliding Doors".

9.6.5.3. Insulated Steel Doors

(1) Insulated steel doors shall conform to CAN/CGSB-82.5-M, "Insulated Steel Doors".

9.6.5.4. Air Infiltration for Exterior Swing Type Doors

(1) Except where a door is weather-stripped on all edges, and protected with a storm door, or by an enclosed unheated space, an exterior swing type door assemblies shall have a rate of air infiltration not exceeding 11.6 x 10^{-4} m^3/s for each metre (0.0125 ft^3/s for each foot) of crack length when tested at a pressure differential of 75 Pa (0.011 psi) in conformance with ASTM E283, "Standard Method of Test for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors".

9.6.5.5. Air Infiltration for Patio Type Sliding Doors

(1) A patio type sliding glass door shall have a rate of air infiltration not exceeding 38 x 10^{-4} m^3/s for each square metre (0.0125 ft^3/s for each square foot) of door area when tested in conformance with ASTM E283.

9.6.5.6. Weather Stripping

(1) In buildings of *residential occupancy* weather stripping shall be provided around all exterior doors except garage doors.

9.6.6. Glass

9.6.6.1. Maximum Area of Glass

(1) The maximum area of individual panes of glass for doors shall conform to Table 9.6.6.1.

9.6.6.2. Glass in Doors and Sidelights

(1) Glass in doors and sidelights for doors shall conform to Sentence 9.7.3.1.(1).

(2) Glass in sidelights greater than 500 mm (19¾ in) 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".

Table 9.6.6.1.
Maximum Glass Area for Doors
Forming Part of Sentence 9.6.6.1.(1)

Glass Thickness, mm (in)	Maximum Glass Area, m^2 (ft^2)[1]					
	Type of Glass					
	Annealed	Annealed Multiple-Glazed Factory-Sealed Units	Laminated	Wired	Heat Strengthened	Fully Tempered
3 (1/8)	0.50 (5.4)	0.70 (7.5)	[2]	[2]	1.00 (10.8)	1.00 (10.8)
4 (5/32)	1.00 (10.8)	1.50 (16.1)	[2]	[2]	1.50 (16.1)	4.00 (43.1)
5 (3/16)	1.50 (16.1)	1.50 (16.1)	[2]	[2]	1.50 (16.1)	No limit
6 (1/4)	1.50 (16.1)	1.50 (16.1)	1.20 (13.0)	1.00 (10.8)	1.50 (16.1)	No limit
Column 1	2	3	4	5	6	7

Notes to Table 9.6.6.1.:
[1] See Appendix A.
[2] Not generally available.

(3) Except as provided in Article 9.7.5.2., glass in entrance doors to dwelling units and in public areas other than the entrance door described in Sentence (2), shall be safety glass or wired glass of the type described in Sentence (2) where the glass area exceeds 0.5 m^2 (5.4 ft^2) and extends to less than 900 mm (2 ft 11 in) from the bottom of the door.

9.6.6.3. Mirrored Glass Doors

(1) 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". (See Appendix A.)

(2) Mirrored glass doors reinforced with a film backing shall meet the impact resistance requirements specified in CAN2-12.5-M, "Mirrors, Silvered".

9.6.6.4. Visibility of Glass or Transparent Doors

(1) Except as provided in Article 9.7.5.3., every glass or transparent door accessible to the public shall be equipped with hardware, bars or other permanent fixtures designed so that the existence and position of such door will be readily apparent.

9.6.6.5. Glass for Shower or Bathtub Enclosures

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

9.6.7. Thermal Breaks

9.6.7.1. Application

(1) This Subsection applies to doors and sidelights separating heated space from unheated space or the exterior.

9.6.7.2. Required Thermal Breaks

(1) Except as provided in Sentence (2), metal frames for doors, for glazing in doors, and for sidelights for doors shall incorporate a thermal break.

(2) Thermal breaks need not be installed in accordance with Sentence (1) where the doors are

(a) garage doors,
(b) storm doors, or
(c) doors that are required to have a *fire-resistance rating*.

9.6.8. Resistance to Forced Entry

9.6.8.1. Application (See Appendix A.)

(1) Except as permitted in Sentence (2), this Subsection applies to

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

(2) Sentence (1) does not apply to exterior doors to garages and to other ancillary spaces.

9.6.8.2. Wood Doors

(1) Except as permitted in Article 9.6.8.10., wood doors as described in Sentence 9.6.8.1.(1) shall

(a) be solid core or stile and rail type,
(b) be not less than 45 mm (1¾ in) thick, and
(c) if of the stile and rail panel type, have a panel thickness of not less than 19 mm (¾ in), with a total panel area not more than half of the door area.

9.6.8.3. Deadbolt Lock

(1) Except as permitted in Article 9.6.8.10., doors described in Sentence 9.6.8.1.(1) shall be provided with a deadbolt lock with a cylinder having no fewer than 5 pins and a bolt throw not less than 25 mm (1 in), protected with a solid or hardened free-turning ring or bevelled cylinder housing. (See Article 9.9.6.8.)

9.6.8.4. Double Doors

(1) Except as permitted in Article 9.6.8.10., an inactive leaf in double doors used in locations specified in Sentence 9.6.8.1.(1) shall be provided with heavy duty bolts top and bottom having an engagement of not less than 15 mm (⅝ in).

9.6.8.5. Fastening of Hinges

(1) Except as permitted in Article 9.6.8.10., hinges for doors in Sentence 9.6.8.1.(1) shall be fastened to wood doors with wood screws not less than 25 mm (1 in) long and to wood frames with wood screws such that at least two screws per hinge penetrate not less than 30 mm (13/16 in) into solid wood. (See Appendix A.)

(2) Except as permitted in Article 9.6.8.10., hinges for doors in Sentence 9.6.8.1.(1) shall be fastened to metal doors

and metal frames with machine screws not smaller than No. 8 and not less than 10 mm (3/8 in) long.

9.6.8.6. Fastening of Strikeplates

(1) Except as permitted in Article 9.6.8.10., strikeplates for deadbolts described in Sentence 9.6.8.3.(1) shall be fastened to wood frames with wood screws that penetrate not less than 30 mm (13/16 in) into solid wood. (See A-9.6.8.5.(1) in Appendix A.)

(2) Except as permitted in Article 9.6.8.10., strikeplates for deadbolts in Sentence 9.6.8.3.(1) shall be fastened to metal frames with machine screws not smaller than No. 8 and not less than 10 mm (3/8 in) long.

9.6.8.7. Outward Swinging Doors

(1) Except for storm doors or screen doors, doors described in Sentence 9.6.8.1.(1) which swing outward shall be provided with hinges or pins so that the doors cannot be removed when they are in the closed position. (See Appendix A.)

9.6.8.8. Door Viewer

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

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

9.6.8.9. Solid Blocking

(1) Solid blocking shall be provided on both sides at the lock height between the jambs for doors described in Sentence 9.6.8.1.(1) and the structural framing so that the jambs will resist spreading by force.

9.6.8.10. Alternate Test Procedure

(1) Doors, frames and hardware which conform to a security level of at least Grade 10 as described in the Annex to ASTM F476, "Standard Test Methods for Security of Swinging Door Assemblies", are not required to conform to Articles 9.6.8.2. to 9.6.8.6. (See Appendix A.)

Section 9.7. Windows and Skylights

9.7.1. General

9.7.1.1. Application

(1) Windows shall conform to the requirements of this Section. (See also Sections 9.10. and 9.32. for fire protection and ventilation.)

9.7.1.2. Minimum Window Areas

(1) Except as required in Article 9.7.1.3. and Sentence (3), the minimum window glass area for rooms in *buildings* of *residential occupancy* or which are used for sleeping shall conform to Table 9.7.1.2.

Table 9.7.1.2.
Glass Areas for Rooms of Residential Occupancy
Forming Part of Sentence 9.7.1.2.(1)

Location	Minimum Unobstructed Glass Area	
	With No Electric Lighting	With Electric Lighting
Laundry, *basement* recreation room, unfinished *basement*	4% of area served	Windows not required
Water-closet room	0.37 m² (4 ft²)	Windows not required
Kitchen, kitchen space, kitchen alcove	10% of area served	Windows not required
Living rooms and dining rooms	10% of area served	10% of area served
Bedrooms and other finished rooms not mentioned above	5% of area served[1]	5% of area served[1]
Column 1	2	3

Note to Table 9.7.1.2.:
[1] See Article 9.7.1.3.

(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).

9.7.1.3. Bedroom Windows

(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

(a) at least 1 outside window that can be opened from the inside without the use of tools, and
(b) each such window shall provide an individual, unobstructed open portion having a minimum area of

0.35 m² (3.8 ft²) with no dimension less than 380 mm (15 in). (See Appendix A.)

(2) Except for *basement* areas, the window described in Sentence (1) shall have a maximum sill height of 1 000 mm (3 ft 3 in) 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 (3 ft 6 in) 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 m² (215 ft²) whichever is less and an unobstructed direct path of travel is provided from the *mezzanine* to this window.

9.7.1.4. Window Opening into a Window-Well

(1) Where a window required in Article 9.7.1.3. opens into a window-well, a clearance of not less than 550 mm (21⅝ in) shall be provided in front of the window.

(2) Where the sash of a window referred to in Sentence (1) swings towards the window-well, the operation of the sash shall not reduce the clearance in a manner that would restrict escape in an emergency.

9.7.1.5. Termites

(1) 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 (5⅞ in) below the nearest wood unless the wood is pressure treated with a chemical toxic to termites in accordance with Article 9.3.2.9.

9.7.1.6. Height of Window Sills above Floors or Ground

(See Appendix A.)

(1) Except as provided in Sentence (2), openable windows in *buildings* of *residential occupancy* shall be protected by

(a) a guard in accordance with Section 9.8., or
(b) a mechanism capable of controlling the free swinging or sliding of the openable part of the window so as to limit any clear unobstructed opening to not more than 100 mm (4 in) measured either vertically or horizontally where the other dimension is greater than 380 mm (15 in).

(2) Windows need not be protected in accordance with Sentence (1) where

(a) the window serves a *dwelling unit* that is not located above another *suite*,
(b) the only opening greater than 100 mm by 380 mm (4 in by 15 in) is a horizontal opening at the top of the window,
(c) the top surface of the window sill is located more than 480 mm (1 ft 7 in) 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 (5 ft 11 in) above the floor or ground on the other side of the window.

9.7.1.7. Air Infiltration of Exterior Windows

(1) Air infiltration of exterior windows shall not exceed .775 dm³/s for each metre (0.5 cfm for each foot) of sash crack when tested at a pressure differential of 75 Pa (0.011 psi) in conformance with ASTM E283, "Standard Method of Test Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors".

9.7.2. Window Standards

9.7.2.1. Window Standard

(1) Windows shall conform with CAN/CSA-A440-M, "Windows", but need not meet air tightness, water tightness and wind load resistance requirements more stringent than those for classifications A1, B1 and C1 in CAN/CSA-A440-M. (See Appendix A and Article 9.7.6.1.)

9.7.3. Glass

9.7.3.1. Glass Standards

(1) Glass shall conform to

(a) CAN/CGSB-12.1-M, "Tempered or Laminated Safety Glass",
(b) CAN/CGSB-12.2-M, "Flat, Clear Sheet Glass",
(c) CAN/CGSB-12.3-M, "Flat, Clear Float Glass",
(d) CAN/CGSB-12.4-M, "Heat-Absorbing Glass",
(e) CAN/CGSB-12.8-M, "Insulating Glass Units",
(f) CAN/CGSB-12.10, "Glass, Light and Heat/Reflecting", or

(g) CAN/CGSB-12.11-M, "Wired Safety Glass".

9.7.3.2. Structural Design of Glass

(1) Glass in windows, sloped glazing and skylights shall be designed in conformance with CAN/CGSB-12.20-M, "Structural Design of Glass for Buildings". (See Appendix A.)

9.7.4. Caulking and Glazing

9.7.4.1. Sealing Compound

(1) The sealing compound used to seal the glass component of a factory-sealed double-glazed unit to the sash component shall be compatible with the material used to edge seal the glass component.

9.7.4.2. Caulking Compound

(1) Caulking shall be provided between window frames or trim and the exterior siding or masonry in conformance with Subsection 9.27.4.

9.7.5. Protection of Windows in Public Areas

9.7.5.1. Transparent Panels

(1) Except as provided in Article 9.7.5.2., transparent panels that could be mistaken as a *means of egress* shall be protected by barriers or railings.

9.7.5.2. Sliding Glass Partitions

(1) Sliding glass *partitions* which separate a *public corridor* from an adjacent *occupancy* and which are open during working hours need not conform to Article 9.7.5.1. and Sentence 9.6.6.2.(3), except that such *partitions* shall be suitably marked to indicate their existence and position.

9.7.5.3. Windows in Exit Stairways

(1) Windows in *exit* stairways that extend to less than 1 070 mm (3 ft 6 in) above the landing shall be

(a) protected by *guards*, in accordance with Section 9.8., or

(b) non-operable and designed to withstand the specified loads for balcony *guards* as provided in Part 4.

9.7.5.4. Windows above the Second Storey

(1) Windows in public areas that extend to less than 1 000 mm (3 ft 3 in) from the floor and are located above the second *storey* in *buildings* of *residential occupancy* shall be

(a) protected by *guards* in accordance with Section 9.8., or

(b) non-openable and designed to withstand the lateral design loads for balcony *guards* in Part 4.

9.7.6. Resistance to Forced Entry

9.7.6.1. Forced Entry Through Windows

(1) In *dwelling units*, windows, any part of which is located within 2 000 mm (6 ft 7 in) of adjacent ground level, shall conform to the requirements for resistance to forced entry as described in Clause 10.13 of CAN/CSA-A440-M, "Windows". (See Appendix A.)

9.7.7. Skylights

9.7.7.1. Plastic Skylights

(1) Plastic skylights shall conform to CAN/CGSB-63.14-M, "Plastic Skylights".

9.7.7.2. Glass Skylights

(1) Factory-built glass skylights shall meet the performance requirements of CAN/CGSB-63.14-M, "Plastic Skylights".

Section 9.8. Stairs, Ramps, Handrails and Guards

9.8.1. Scope

9.8.1.1. Application

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

9.8.1.2. Exit Stairs

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

9.8.1.3. Escalators and Moving Walkways

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

9.8.2. General

9.8.2.1. Uniform Treads and Risers

(1) Treads and risers shall have uniform rise and run in any one flight.

(2) A stairway that is not an *exit* is permitted to contain both a curved and straight portions of stairs in a single flight provided each curved portion conforms to Article 9.8.5.2. and the riser height is uniform throughout the flight.

9.8.2.2. Minimum Number of Risers

(1) Except for interior stairs within a *dwelling unit*, at least 3 risers shall be provided for interior stairs.

9.8.2.3. Interior Stairs Extending Through the Roof

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

9.8.3. Stair Dimensions

9.8.3.1. Rise, Run and Tread Depth of Stairs

(1) Except as provided in Subsection 9.8.5., the rise, run and tread depth of stairs shall conform to Table 9.8.3.1

Table 9.8.3.1.
Rise, Run and Tread Depth of Stairs
Forming Part of Sentence 9.8.3.1.(1)

Stair Type	Rise, mm (in)		Run, mm (in)		Tread Depth, mm (in)	
	max.	min.	max.	min.	max.	min.
Service and *mezzanines* in *live/work units*[1]	no limit	125 (4⅞)	355 (14)	no limit	355 (14)	no limit
Private[2]	200 (7⅞)	125 (4⅞)	355 (14)	210 (8¼)	355 (14)	235 (9¼)
Public[3]	200 (7⅞)	125 (4⅞)	355 (14)	230 (9)	355 (14)	250 (9⅞)
Column 1	2	3	4	5	6	7

Notes to Table 9.8.3.1.:

(1) Service stairs serve areas used only as *service rooms* or *service spaces* and stairs that serve *mezzanines* not exceeding 20 m^2 (215 ft^2) within *live/work units.*

(2) Private stairs are interior stairs within *dwelling units* and exterior stairs serving a single *dwelling unit.*

(3) public stairs are all stairs not described as service stair or private stairs.

9.8.3.2. Nosings

(1) Curved or bevelled leading edges of treads
(a) shall not reduce the required tread depth by more than 15 mm (⅝ in), and
(b) shall not, in any case, exceed 25 mm (1 in) horizontally. (See Appendix A.)

9.8.3.3. Stair Width

(1) *Exit* stairs and stairs used by the public shall have a width, measured between wall faces or *guards*, of not less than 900 mm (2 ft 11 in).

(2) At least 1 stairway between each floor level in a *dwelling unit* shall have a width between wall faces of not less than 860 mm (2 ft 10 in).

9.8.3.4. Headroom

(1) The headroom measured vertically from a line drawn through the outer edges of the nosings shall be at leas: 1 950 mm (6 ft 5 in) for stairs located in *dwelling units* and 2 050 mm (6 ft 9 in) for all other stairs.

9.8.4. Landings

9.8.4.1. Dimensions of Landings

(1) Landings shall be at least as wide and as long as the

width of stairs in which they occur, except that

(a) the length of landing for exterior stairs serving not more than 1 *dwelling unit* need not exceed 900 mm (2 ft 11 in), and

(b) the length of landing for all other stairs in a straight run need not exceed 1 100 mm (3 ft 7 in).

(See also Articles 9.9.6.2. and 9.9.6.6. for landings in *exits*.)

9.8.4.2. Required Landings

(1) Where a door swings towards a stair, the full arc of its swing shall be over a landing.

(2) Except as provided in Sentence (3), a landing shall be provided at the top and bottom of each flight of interior stairs and where a doorway occurs in a stairway.

(3) 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 stairs.

(4) A landing shall be provided at the top of all exterior stairs, except that a landing is permitted to be omitted at a secondary entrance to a *building* containing a single *dwelling* unit provided the stair does not contain more than 3 risers.

9.8.4.3. Height between Landings

(1) The vertical height between any landings shall not exceed 3.7 m (12 ft 2 in).

9.8.4.4. Height over Landings

(1) The clear height over landings shall be not less than 1 950 mm (6 ft 5 in) in *dwelling units* and 2 050 mm (6 ft 9 in) for other landings.

9.8.5. Curved Stairs and Winders

9.8.5.1. Curved Stairs in Exits

(1) Curved stairs used in *exits* shall conform to the requirements of Article 3.4.6.8.

9.8.5.2. Curved Stairs not in Exits

(1) Except as permitted in Article 9.8.5.3., a curved stair not required as an *exit* shall have an average run of not less than 200 mm (7⅞ in) and a minimum run of 150 mm (5⅞ in) and shall have risers conforming to Article 9.8.3.1.

9.8.5.3. 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.

(See Appendix A.)

(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 (3 ft 11 in).

9.8.6. Pedestrian Ramps

9.8.6.1. Ramps in a Barrier-Free Path of Travel

(1) Ramps in a *barrier-free* path of travel shall conform to the requirements in Section 3.8.

9.8.6.2. Maximum Slope

(1) Except as provided in Article 9.8.6.1., the slope of interior pedestrian ramps shall be not more than

(a) 1 in 10 for *residential occupancies*,

(b) 1 in 6 for *mercantile* or *industrial occupancies*, and

(c) 1 in 8 for all other *occupancies*.

(2) Except as provided in Article 9.8.6.1., the slope of every exterior ramp shall be not more than 1 in 10.

9.8.6.3. Level Areas on Ramps

(1) Except as provided in Article 9.8.6.1., where a doorway or stairway opens onto the side of a ramp, there shall be a level area extending across the full width of the ramp and for a distance of not less than 300 mm (11¾ in) on either side of the wall opening.

(2) Except as provided in Article 9.8.6.1., where a doorway or stairway opens onto the end of a ramp, there shall be a level area extending across the full width of the ramp and along it for not less than 900 mm (2 ft 11 in).

9.8.7. Handrails

9.8.7.1. Required Handrails

(1) Except as permitted in Sentences (2) and (3), a handrail shall be provided on

(a) at least one side of stairs less than 1 100 mm (3 ft 7 in) in width,

(b) two sides of stairs 1 100 mm (3 ft 7 in) in width or greater, and

(c) two sides of a curved stair used as an *exit*.

(2) Handrails are not required for stairs within *dwelling units* having not more than 2 risers, or for exterior stairs having not more than 3 risers and serving not more than one *dwelling unit*.

(3) Only one handrail is required on exterior stairs having more than 3 risers provided such stairs serve not more than one *dwelling unit*.

9.8.7.2. Continuous Handrail

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

(a) doorways, or

(b) newel posts at changes in direction.

(See A-3.4.6.4.(5) in Appendix A.)

(2) For stairs serving only 1 *dwelling unit*, at least one handrail shall be continuous throughout the length of the stairway except where interrupted

(a) by doorways,

(b) by newel posts

(c) at landings, or

(d) at changes in direction.

9.8.7.3. Termination of Handrails

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

(2) Except for stairways serving only 1 *dwelling unit*, at least one handrail at the sides of a stairway or ramp shall extend horizontally not less than 300 mm (11¾ in) beyond the top and bottom of the stairway or ramp. (See A-3.4.6.4.(5) in Appendix A.)

9.8.7.4. Height of Handrails

(1) Height of handrails on stairs and ramps shall be measured vertically from a line drawn

(a) through the outside edges of the stair nosing, or

(b) from the surface of the ramp, floor or landing below 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 800 mm (2 ft 7 in), and

(b) not more than 965 mm (3 ft 2 in).

(3) Where *guards* are required, handrails on landings are permitted to be not more than 1 070 mm (3 ft 6 in) in height.

(4) Handrails not meeting the requirements of Sentences (2) and (3) are permitted provided they are installed in addition to the required handrails.

9.8.7.5. Ergonomic Design

(1) A clearance of not less than 40 mm (19/16 in) shall be provided between each handrail and the wall to which it is fastened.

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

9.8.7.6. Projections into Stairway

(1) Handrails and constructions below handrails, including handrail supports and stair stringers shall not project more than 100 mm (4 in) into the required width of a stairway.

9.8.7.7. Handrails for Ramps

(1) Where ramps are used in lieu of stairs, the handrail requirements for stairs in Articles 9.8.7.1. to 9.8.7.8. shall apply where the gradient exceeds 1 in 10.

9.8.7.8. Attachment of Handrails

(See Appendix A.)

(1) Handrails shall be attached to wood studs, wood blocking, steel studs or masonry at points spaced not more than 1 200 mm (3 ft 11 in) apart.

(2) Attachment to wood studs and wood blocking required in Sentence (1) shall consist of not less than 2 wood screws at each point, penetrating not less than 32 mm (1¼ in) into solid wood.

9.8.8. Guards

(See Appendix A regarding loads on guards.)

9.8.8.1. Required Guards

(See Appendix A.)

(1) Except for the edges of floor pits in *repair garages* and loading docks, every surface to which access is provided for other than maintenance purposes, including but not limited to exterior landings, porches, decks, balconies, *mezzanines*, galleries, raised *walkways* and roofs, shall be protected by a *guard* on each side which is not protected by a wall and where there is a difference in elevation to adjacent surfaces of more than 600 mm (23⅝ in).

(2) Every exterior stair with more than 6 risers and every ramp shall be protected with *guards* on all open sides where the difference in elevation between the adjacent ground level and the stair or ramp exceeds 600 mm (23⅝ in).

(3) When an interior stair has more than 2 risers, the sides of the stair and the landing or floor level around the stair well shall be enclosed by walls, or be protected by *guards*, except that a stair to an unfinished *basement* in a *dwelling unit* is permitted to have 1 unprotected side.

9.8.8.2. Height of Guards

(See Appendix A.)

(1) Except as provided in Sentences (2) to (4), all *guards*, including those for balconies, shall be at least 1 070 mm (3 ft 6 in) high.

(2) *Guards* for porches, decks, landings and balconies are permitted to be a minimum of 900 mm (2 ft 11 in) high where

(a) the walking surface of the porch, deck, landing or balcony served by the *guard* is not more than 1 800 mm (5 ft 11 in) above the finished ground level, and

(b) the porch, deck, landing or balcony serves not more than one *dwelling unit*.

(3) Except as provided in Sentence (4), *guards* for stairs shall be not less than 900 mm (2 ft 11 in) high measured vertically from a line drawn through the outside edges of the stair nosings, and 1 070 mm (3 ft 6 in) high at landings.

(4) *Guards* for stairs within *dwelling units* and stairs serving not more than one *dwelling unit* shall be not less than 800 mm (2 ft 7 in) measured vertically above a line drawn through the outside edges of stair nosings, and not less than 900 mm (2 ft 11 in) above landings.

(5) All required *guards* within *dwelling units* other than those described in Sentence (4) shall be not less than 900 mm (2 ft 11 in) high.

9.8.8.3. Guards for Floors and Ramps in Garages

(1) Except for floors of garages referred to in Section 9.35., a continuous curb not less than 150 mm (5⅞ in) in height and a *guard* not less than 1 070 mm (3 ft 6 in) above the floor level shall be provided at every opening through a garage floor and around the perimeter of such floor and ramps where the exterior walls are omitted and where the top of the floor is 600 mm (23⅝ in) or more above an adjacent ground or floor level.

9.8.8.4. Openings in Guards

(1) Except as provided in Sentence (2), openings through any *guard* which is required by Article 9.8.8.1. shall be of a size which will prevent the passage of a spherical object having a diameter of more than 100 mm (4 in) unless it can be shown that the location and size of openings which exceed this limit do not represent a hazard. (See A-9.8.8.4.(1) and (2) in Appendix A.)

(2) Openings through any *guard* which is required by Article 9.8.8.1. and which is installed in a *building* of *industrial occupancy* shall be of a size which will prevent the passage of a spherical object having a diameter of more than 200 mm (7⅞ in) unless it can be shown that the location and size of such openings which exceed this limit do not represent a hazard. (See A-9.8.8.4.(1) and (2) in Appendix A.)

(3) Openings through any *guard* which is not required by Article 9.8.8.1. and which serves a *building* of other than *industrial occupancy*, shall be of a size which

(a) will prevent the passage of a spherical object having a diameter of more than 100 mm (4 in), or

(b) will permit the passage of a spherical object having a diameter of more than 200 mm (7⅞ in) unless it can be shown that the location and size of openings which exceed these limits do not represent a hazard.

(See Appendix A.)

9.8.8.5. Design to Prevent Climbing

(See Appendix A.)

(1) *Guards* required by Article 9.8.8.1. and serving *buildings* of *residential occupancy* shall be designed so that no member, attachment or opening located between 100 mm (4 in) and 900 mm (2 ft 11 in) above the floor or walking surface protected by the *guard* will facilitate climbing.

9.8.8.6. Guards for Ramps

(1) *Guards* for ramps including vehicular ramps shall conform to the requirements for *guards* for stairs in Articles 9.8.8.2. and 9.8.8.4.

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".

9.8.8.8. Construction of Guards

(1) Except as permitted in Sentence (2), *guards* shall conform to the loading criteria in Article 4.1.10.1

(2) Guards constructed in accordance with the requirements in the Supplementary Guidelines shall be deemed to satisfy the requirements of Sentence 9.8.8.8.(1).

9.8.9. Construction

9.8.9.1. Exterior Concrete Stairs

(1) Exterior concrete stairs with more than 2 risers and 2 treads shall be
(a) supported on unit masonry or concrete walls or piers not less than 150 mm (5⅞ in) 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.

9.8.9.2. Exterior Wood Steps

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

9.8.9.3. Wooden Stair Stringers

(1) Wooden stair stringers shall
(a) have a minimum effective depth of 90 mm (3½ in) and an over-all depth of not less than 235 mm (9¼ in),
(b) be supported and secured top and bottom,
(c) be not less than 25 mm (1 in) actual thickness if supported along their length and 38 mm (1½ in) actual thickness if unsupported along their length, and
(d) except as permitted in Sentence (2), be spaced not more than 900 mm (2 ft 11 in) o.c. for stairs serving not more than one dwelling unit, and 600 mm (23⅝ in) 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 (3 ft 11 in).

9.8.9.4. Treads

(1) Stair treads of lumber, plywood or O-2 grade OSB within *dwelling units* shall be not less than 25 mm (1 in) actual thickness, except that if open risers are used and the distance between stringers exceeds 750 mm (2 ft 6 in), the treads shall be not less than 38 mm (1½ in) actual thickness.

(2) Stair treads of plywood or O-2 grade OSB shall have their face grain or direction of face orientation at right angles to the stringers.

9.8.9.5. Finish for Treads and Landings

(1) The finish for treads and landings of interior stairs in *dwelling units*, other than stairs to unfinished *basements*, shall consist of hardwood, vertical grain softwood, resilient flooring or other material providing equivalent performance.

(2) Treads and landings of interior and exterior stairs and ramps, other than those within *dwelling units*, shall have a slip-resistant finish or be provided with slip-resistant strips which extend not more than 1 mm (0.039 in) 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 in Article 9.8.10.1. shall be anchored to concrete *foundation* walls at least 200 mm (7⅞ in) 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. Scope

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) *Flame-spread ratings*, *fire-resistance ratings* and *fire-protection ratings* 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) 2 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 3.1.16.1..

9.9.2. General

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

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

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

(3) Where a podium, terrace, platform or contained open space is provided, egress requirements shall conform to the appropriate requirements for rooms or *suites* in Article 9.9.7.3.

9.9.2.2. Types of Exits

(1) 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.

9.9.2.3. Fire Escapes

(1) Fire escapes are permitted to be used as *exits* on existing *buildings* provided they are designed and installed in conformance with Part 3.

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

9.9.2.4. Elevators, Slide Escapes and Windows

(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 (3 ft 6 in) high, 560 mm (22 in) wide, with a sill height not more than 900 mm (2 ft 11 in) 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.

9.9.2.5. 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*.

9.9.2.6. Ancillary Rooms

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

9.9.2.7. Horizontal Exits

(1) Where a *horizontal exit* is used, it shall conform to Part 3.

9.9.2.8. 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.

9.9.2.9. 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 1 *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 (2 ft 11 in). (See Article 9.9.6.4. for doors and Subsection 9.8.3. for stairs.)

9.9.3.3. Width of Corridors

(1) The width of every *public corridor*, corridor used by the public, and *exit* corridor shall be not less than 1 100 mm (3 ft 7 in). (See also Subsection 9.9.5. for obstructions in corridors.)

9.9.3.4. Headroom Clearance

(1) Except for stairways, doorways and *storage garages*, the minimum headroom clearance in *exits* and *access to exits* shall be 2 100 mm (6 ft 11 in). (See Articles 9.8.3.4. and 9.8.4.4. for stairways and Subsection 9.9.6. for doorways.)

(2) The clear height of every *storey* in a *storage garage* shall be not less than 2 000 mm (6 ft 7 in).

9.9.4. Fire Protection of Exits

9.9.4.1. Application

(1) Except as provided in Article 9.9.4.4., this Subsection applies to the fire protection of all *exits* except *exits* serving not more than one *dwelling unit*.

9.9.4.2. Fire 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*. (See Article 9.10.9.10.)

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

(3) A *fire separation* common to 2 *exits* shall be smoke-tight and not be pierced by doorways, duct work, piping or any other opening that may affect the continuity of the separation.

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

(5) The requirements in Sentence (1) do not apply to an exterior *exit* passageway provided the passageway has 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

(See A-3.1.8.17.(1) in Appendix A.)

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

(2) Except as provided in Sentence (3), the combined area of glazing in doors and sidelights shall not exceed 0.8 m^2 (8.6 ft^2).

(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 (9 ft 10 in) horizontally and less than 10 m (32 ft 10 in) below or less than 5 m (16 ft 5 in) 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 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 (9 ft 10 in) horizontally and less than 2 000 mm (6 ft 7 in) above the openings in the exterior walls of the *exit*.

(See Appendix A.)

9.9.4.6. Openings Near Exit Doors

(1) Where an exterior *exit* door in one *fire compartment* is within 3 m (9.ft 10 in) horizontally of openings in another *fire compartment*, and the exterior walls of these *fire compartments* intersect at an exterior angle of less than 135°, the openings shall be protected with wired glass in fixed steel frames or glass block conforming to Articles 9.10.13.5. and 9.10.13.7.

9.9.4.7. Stairways in 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 3 *storeys* in *building height*,

(b) the *suite* is separated from other *occupancies* by at least a 45 min *fire separation*,

(c) the area occupied by the *suite* is not greater than 100 m^2 (1070 ft^2) 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 (82 ft),

(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 9.10.18.

(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 not more than 1 *dwelling unit*.

9.9.5.2. Occupancies in Public Corridors

(1) Where a *public corridor* or a corridor used by the public contains an *occupancy*, such *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 (6 ft 6 in) of the floor shall not project horizontally more than 100 mm (4 in) into *exit* passageways, corridors used by the public or *public corridors* in a manner that would create a hazard for visually impaired persons travelling adjacent to walls.

(2) The horizontal projection of an obstruction in Sentence (1) is permitted to exceed 100 mm (4 in) where the obstruction extends to less than 680 mm (2 ft 3 in) above the floor. (See A-3.3.1.9.(4) in Appendix A.)

9.9.5.4. Obstructions in Exits

(1) Except as permitted in Subsection 9.9.6. and Article 9.8.7.8., 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 (2 ft 6 in) 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, which 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, which 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 unobstructed *means of egress* is not generally accessible to the public.

9.9.5.6. Mirrors or Draperies

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

9.9.5.7. Fuel-Fired Appliances

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

9.9.5.8. Service Rooms

(1) *Service rooms* containing equipment subject to possible explosion, such as *boilers* designed to operate at a pressure in excess of 100 kPa (14.5 psi), 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. Application

(1) This Subsection applies to all doors in a *means of egress* except doors within *dwelling units* and exterior doors serving not more than 1 *dwelling unit* unless otherwise stated herein.

9.9.6.2. Obstruction by Doors

(1) *Exit* doors shall not decrease the required *exit* width by more than 100 mm (4 in) in *exit* corridors, and not more than 50 mm (2 in) for other *exit* facilities.

(2) Doors in their swing 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 (2 ft 6 in) on *exit* stairs and landings.

9.9.6.3. Headroom Obstructions

(1) No door closer or other device shall be installed in an *exit* in such a manner as to reduce the headroom clearance to less than 1 980 mm (6 ft 6 in).

9.9.6.4. Door Sizes

(1) Every *exit* door or door that opens into or is located within a *public corridor* or other facility that provides *access to exit* from a *suite* shall

(a) be not less than 2 030 mm (6 ft 8 in) high,
(b) be not less than 810 mm (2 ft 8 in) wide where there is only one door leaf, and
(c) shall have no single leaf less than 610 mm (2 ft) wide in any multiple leaf door.

9.9.6.5. Direction of Door Swing

(1) Except as provided in Sentence 3.3.1.11.(1), every door that opens 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, and every door that is located within a corridor that is required to be separated from the remainder of the *floor area* by a *fire separation* shall swing on a vertical axis in the direction of *exit* travel and shall not open onto a step.

(2) Except as permitted in Sentences (4) and (5) and in Sentences 3.4.6.11.(3) and 3.4.6.13.(1), every required *exit* door shall open in the direction of *exit* travel and shall swing on its vertical axis.

(3) Except as provided in Sentences (4) and (5), every required *exit* door shall open in the direction of *exit* travel.

(4) An *exit* door serving not more than one *dwelling unit* is permitted to swing inward.

(5) *Exit* doors serving a *storage garage* serving not more than one *dwelling unit*, or doors serving other accessory *buildings* where there is no danger to life safety, need not conform to Sentence (2) or (3).

9.9.6.6. Nearness of Doors to Stairs

(1) Except as provided in Sentence (2), the distance between a stair riser and the leading edge of a door during its swing shall be not less than 300 mm (11¾ in).

(2) Where there is a danger of blockage from ice or snow, an *exit* door is permitted to open onto not more than 1 step provided the riser of such step does not exceed 150 mm (5⅞ in).

9.9.6.7. Revolving Doors

(1) Revolving doors used as *exits* shall conform to Article 3.4.6.14.

9.9.6.8. Door Opening Mechanism

(1) Except as provided in Sentence 3.4.16.15.(4) for electromagnetic locking systems, *exit* doors and doors to *suites*, including exterior doors to *dwelling units*, shall be openable from the inside without requiring keys, special devices or specialized knowledge of the door opening mechanism.

9.9.6.9. Automatic Locking Prohibited

(1) Except for *hotels* and motels, a door opening onto a *public corridor* which provides *access to exit* from *suites* shall be designed not to lock automatically when such doors are equipped with automatic self-closing devices. (See A-3.3.4.5. in Appendix A.)

9.9.6.10. Effort Required to Open

(1) Every *exit* door 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 (20 lb) applied at the knob or other latch releasing device. (See Sentence 3.8.3.3.(7) for door opening forces in a *barrier-free* path of travel.)

9.9.6.11. Arabic Numerals

(1) Where an *exit* stair serves a *hotel*, arabic numerals indicating the assigned floor number shall be

(a) mounted permanently on each side of the *exit* door to the *exit* stair shaft,
(b) not less than 60 mm (2⅜ in) high, raised approximately 0.7 mm (0.028 in) above the door surface,
(c) located 1 500 mm (4 ft 11 in) from the finished floor, and
(d) contrasting in colour with the door surface on which they are applied.

9.9.7. Access to Exits

9.9.7.1. Means of Egress from Suites

(1) Except as permitted in Sentences 9.9.8.2.(2) and 9.9.9.3.(1), each *suite* in a *floor area* occupied by more than one *suite* shall have

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

(2) Except as provided in Sentence 9.9.7.2.(1), from the point where a doorway described in Clause (1)(b) enters the *public corridor* or exterior passageway, it shall be possible to go in opposite directions to each of 2 separate *exits*.

9.9.7.2. Dead End Corridors

(1) A dead-end *public corridor* is permitted in an *occupancy* shown in Table 9.9.7.2. where

(a) a 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 9.9.7.2.
Dead End Public Corridors
Forming Part of Sentence 9.9.7.2.(1)

Occupancy	Maximum Length of Dead-End *Public Corridor*, m (ft-in)	Maximum *Occupant Load* or *Suites* Served by Dead-End *Public Corridor*
Group C	6 (19'-8")	4 *suites*
Group D	6 (19'-8")	30
Group E	9 (29'-6")	30
Group F	9 (29'-6")	30
Column 1	2	3

(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 2 such doors have to be passed to reach the nearest *exit*. The area of wired glass in such doors shall not exceed 645 cm² (100 in²).

9.9.7.3. Number and Spacing of Egress Doors

(1) Except for *dwelling units*, at least 2 egress doors shall be provided where

(a) the area of a room or *suite* exceeds 200 m² (2150 ft²) in a Group D, E, F2 and F3 *occupancy*, or 150 m² (1610 ft²) 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 (82 ft).

(2) Doors 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.

9.9.7.4. Independent Access to Exit

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

9.9.7.5. Travel Distance within Rooms and Suites

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

9.9.8. Exits From Floor Areas

9.9.8.1. Measurement of Travel Distance

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

(2) Where a room or *suite* is separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* of at least 45 min, or in a *sprinklered building*, by a *fire separation* which is not required to have a *fire-resistance rating*, the travel distance 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 (29 ft 6 in) 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., not less than 2 *exits* shall be provided from every *floor area*, spaced so that the travel distance to the nearest *exit* is not more than

(a) 40 m (131 ft 3 in) in the case of *business and personal services occupancies*,
(b) 45 m (147 ft 3 in) for all *occupancies* where the *floor area* is *sprinklered*, and

(c) 30 m (98 ft 5 in) 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 9.9.7.3. 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 8 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 1 *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 1 *exit* is required from a *floor area*, not less than 2 *exits* shall be independent of each other and be placed remote from each other along the path of travel between them. (See Appendix A.)

9.9.8.5. Exiting through a Lobby

(1) Not more than one *exit* from a *floor area* 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 (14 ft 9 in) above *grade*, and the path of travel through the lobby to the outdoors shall not exceed 15 m (49 ft 3 in).

(3) The lobby referred to in Sentence (1) shall conform in all respects with 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 required in Sentence (5), 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) An *exit* which 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*.

(6) Where the lobby referred to in Sentence (1) and adjacent *occupancies* that are permitted to open into the lobby are *sprinklered*, the *fire separation* between such *occupancies* and the lobby need not have a *fire-resistance rating*. (See A-3.4.4.2.(2)(e) in Appendix A.)

9.9.8.6. Exits for Mezzanines

(1) A *mezzanine* shall be provided with *exits* on the same basis as required for a *floor area* where a *mezzanine* is considered to be a *storey* in Subsection 9.10.4. or is of a size required to have more than one *exit*.

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 (4 ft 11 in) 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 (3 ft 3 in) in height and 550 mm (21⅝ in) in width, and
(b) located so that the sill is not more than
  (i) 1 000 mm (3 ft 3 in) above the floor, and
  (ii) 7 m (23 ft) 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 9.9.7.2.(1), where an egress door from a *dwelling unit* opens onto a *public corridor* or exterior passageway it shall be possible from the location where the egress door opens onto the corridor or exterior passageway to go in opposite directions to 2 separate

exits unless the *dwelling unit* has a second and separate *means of egress*.

9.9.9.3. Shared Egress Facilities

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

(a) an *exit* stairway serving more than 1 *suite*,
(b) a *public corridor* serving more than one *suite* served by a single *exit* stairway,
(c) an exterior passageway more than 1 500 mm (4 ft 11 in) above adjacent ground level, serving more than one *suite* and served by a single *exit* stairway, or
(d) a balcony more than 1 500 mm (4 ft 11 in) above adjacent ground level, serving more than one *suite* and served by a single *exit* stairway.

9.9.10. Signage

9.9.10.1. Application

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

9.9.10.2. Visibility of Exits

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

9.9.10.3. Required Exit Signs

(1) Except as required in Sentence (2), every *exit* door other than a main entrance to a room or *building* shall have an *exit* sign over or adjacent to it when the *exit* serves

(a) a three *storey building*,
(b) a *building* with an *occupant load* greater than 150, or
(c) a room or *floor area* that has a fire escape as part of a required *means of egress*.

(2) Except for *suite* doors opening directly to the exterior, every *exit* serving a *hotel* shall have an *exit* sign placed over or adjacent to it.

9.9.10.4. Exit Direction Signs

(1) *Exit* direction signs shall be placed in corridors and passageways where necessary to indicate the direction of *exit* travel.

9.9.10.5. Visibility of Exit Signs

(1) *Exit* signs shall be installed so as to be visible from the *exit* approach.

9.9.10.6. Lettering

(1) *Exit* signs shall have the word **EXIT** or the words **EXIT/SORTIE** in red letters on a contrasting background or a red background with contrasting letters when the sign is internally lighted, and white letters on a red background or red letters on a white background when the sign is externally lighted.

(2) Lettering referred to in Sentence (1) shall be made with not less than 19 mm (¾ in) wide strokes and be not less than 150 mm (5⅞ in) high when the sign is externally lighted, and at least 114 mm (4½ in) high when the sign is internally lighted.

(3) Where an *exit* sign having the word **EXIT** is installed in conformance with Sentence (1), an additional sign having the word **SORTIE** is permitted to be installed.

9.9.10.7. Illumination

(1) Illumination of *exit* signs required in Article 9.9.10.3. shall conform to Sentences 9.9.11.3.(2) and (3).

(2) Where illumination of *exit* signs required in Article 9.9.10.3. is provided by an electrical circuit, that circuit shall serve no equipment other than emergency equipment.

9.9.10.8. Exits Continuing to a Basement

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

9.9.10.9. Floor Numbering

(1) Arabic numerals indicating the assigned floor number shall be

(a) mounted permanently on the stair side of the wall at the latch side of doors to *exit* stair shafts,
(b) not less than 60 mm (2⅜ in) high, raised approximately 0.7 mm (0.028 in) above the surface,
(c) located 1 500 mm (4 ft 11 in) from the finished floor and not more than 300 mm (11¾ in) from the door,

and

(d) contrasting in colour with the surface on which they are applied.
(See A-3.4.6.18.(1)(d) in Appendix A.)

9.9.11. Lighting

9.9.11.1. Application

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

9.9.11.2. Required Lighting in Egress Facilities

(1) Every *exit*, *public corridor* or corridor providing *access to exit* for the public shall be equipped to provide illumination to an average level of not less than 50 lx (4.6 ft-candle) at floor or tread level and at all points such as angles and intersections at changes of level where there are stairs or ramps.

9.9.11.3. Emergency Lighting

(1) 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 (0.9 ft-candle) at floor or tread level.

(5) Where incandescent lighting is provided, lighting equal to 1 W/m² (0.093 W/ft²) of *floor area* shall be considered to meet the requirement in Sentence (4).

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

Section 9.10. Fire Protection

9.10.1. General

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 which 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 m² (6460 ft²) in area shall conform to Part 3.

(4) Where rooms or spaces are intended for the storage, manufacture or use of hazardous or explosive material, such rooms or spaces shall conform to Part 3. (See A-3.3.1.2.(1) in Appendix A.)

(5) Reserved.

(6) Openings through floors that are not protected by shafts or *closures* shall be protected in conformance with Subsection 3.2.8. (See also Sentence 9.9.4.7.(1).)

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

(8) Where sprinkler, standpipe and hose systems are installed, they shall be installed in conformance with Part 3.

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. (See Appendix A.)

(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) Except as provided in Article 9.10.2.2., every *building* or part thereof shall be classified according to its *major occupancy* as belonging to one of the groups or divisions described in Table 9.10.2.1.

Table 9.10.2.1.
Occupancy Classifications
Forming Part of Sentence 9.10.2.1.(1)

Group	Division	Description of *Major Occupancies*
C	—	*Residential occupancy*
D	—	*Business and personal services occupancies*
E	—	*Mercantile occupancies*
F	2	*Medium hazard industrial occupancies*
F	3	*Low hazard industrial occupancies* (Does not include *storage garages* serving individual *dwelling units*)
Column 1	2	3

Note to Table 9.10.2.1.:
(1) See A-3.1.2.1. in Appendix A.

9.10.2.2. Custodial and Convalescent Homes

(1) Children's custodial homes and convalescent homes for ambulatory occupants living as a single housekeeping unit in a *dwelling unit* with sleeping accommodation for not more than 10 persons is permitted to be classified as *residential occupancies* (Group C).

9.10.2.3. Major Occupancies above Other Major Occupancies

(1) Except as permitted in Article 9.10.2.4., in any *building* containing more than 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 9.10.8.1. and 9.10.2.3. provided they are not classified as Group F, Division 2 *occupancies*.

9.10.2.4. Restaurants

(1) A restaurant is permitted to be classified as a Group E *major occupancy* provided such restaurant is designed to accommodate not more than 30 persons consuming food or drink.

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 the Supplementary Guidelines. (See Appendix A.)

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 the Supplementary Guidelines.

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

9.10.3.3. Fire Exposure

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

(2) Exterior walls shall be rated for exposure to fire from inside the *building*, except that such walls need not comply with the temperature rise limitations required by the standard tests referred to in Article 9.10.3.1. if such walls have a *limiting distance* of not less than 1 200 mm (3 ft 11 in), 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 which contribute to the required *fire-resistance rating*, hold down clips or other means shall be provided to prevent the lifting of such panels or tiles in the event of a fire.

9.10.4. Building Size Determination

9.10.4.1. Mezzanines not Considered as Storeys

(See A-3.2.1.1.(3) in Appendix A.)

(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% cent 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 (3 ft 6 in) 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 Garage

(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 A-9.10.3.1.B. in the Supplementary Guidelines, 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 the Supplementary Guidelines.

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 45 min *fire-resistance rating* when it is constructed in accordance with the requirements for *heavy timber construction* in Article 3.1.4.6.

9.10.7. Steel Members

9.10.7.1. Protection of Structural Steel Members

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

9.10.8. Fire Resistance in Relation to Occupancy and Height

9.10.8.1. Fire Resistance Ratings for Floors and Roofs

(1) Except as otherwise provided in this Subsection, the *fire-resistance ratings* of floors and roofs shall conform to Table 9.10.8.1. (See Subsection 9.10.2. for mixed *occupancies* and Subsection 9.10.20. for construction camps.)

Table 9.10.8.1.
Fire Resistance Ratings for Structural Members and Assemblies
Forming Part of Sentence 9.10.8.1.(1)

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

9.10.8.2. Fire-Resistance Ratings in Sprinklered Buildings

(1) The requirements in Table 9.10.8.1. for roof assemblies to have a *fire-resistance rating* are permitted to be waived in *sprinklered buildings* where

(a) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.9.(2), and

(b) the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4).

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. Service Rooms

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

9.10.8.5. 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.

9.10.8.6. 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.

9.10.8.7. 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*.

9.10.8.8. Crawl Spaces

(1) Where a crawl space exceeds 1 800 mm (5 ft 11 in) 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.

9.10.8.9. Application to Houses

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

9.10.8.10. 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. (See A-3.1.8.1.(1)(a) in Appendix A.)

9.10.9.3. Openings to be Protected With Closures

(1) Except as permitted in Articles 9.10.9.5., 9.10.9.6. and 9.10.9.7., openings in required *fire separations* shall be protected with *closures* conforming to Subsection 9.10.13.

9.10.9.4. Floor Assemblies

(1) Except as permitted in Sentences (2) to (4), all floor assemblies shall be constructed as *fire separations*.

(2) Floor assemblies contained within *dwelling units* need not be constructed as *fire separations*.

(3) Floor assemblies for which no *fire-resistance rating* is required by Subsection 9.10.8. and floors of *mezzanines* not required to be counted as *storeys* in Articles 9.10.4.1. and 9.10.4.2. need not be constructed as *fire separations*.

(4) Where a crawl space is not required by Article 9.10.8.8. 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. Service Equipment Penetrating a Fire Separation

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

(2) Except as provided in Sentences (3) to (9) and Article 9.10.9.7., pipes, ducts, electrical 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.

(3) 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 (2).

(4) Electrical wires or cables, single or grouped, with *combustible* insulation or jacketing that is not totally enclosed in raceways of *noncombustible* material, are permitted to partly or wholly penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2) provided the overall diameter of the wiring is not more than 25 mm (1 in).

(5) *Combustible* totally enclosed raceways which are embedded in a concrete floor slab are permitted in an

assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2), where the concrete provides at least 50 mm (2 in) of cover between the raceway and the bottom of slab.

(6) *Combustible* outlet boxes are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2) provided the opening through the membrane into the box does not exceed 160 cm² (25 in²).

(7) *Combustible* water distribution piping that has an outside diameter not more than 30 mm (13/16 in) is permitted to partly or wholly penetrate a vertical *fire separation* that is required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required in Sentence (2) provided the piping is sealed in conformance with Article 3.1.9.1.

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

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

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 CAN4-S115, "Standard Method of Fire Tests for Firestop Systems" with a pressure differential of 50 Pa (0.007 psi) 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) Beams and joists framed into a masonry or concrete *fire separation* shall not reduce the thickness of the *fire separation* to less than
(a) 100 mm (4 in) of solid masonry or solid concrete, or
(b) the equivalent thickness of the masonry or concrete determined in accordance with the Supplementary Guidelines.

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 9.10.20.2., *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. (See A-3.3.4.4.(1) in Appendix A.)

9.10.9.15. Separation of Public Corridors

(1) Except as provided in Sentences (2) and (3), *public corridors* shall be separated from the remainder of the *building* by a *fire separation* having not less than a 45 min *fire-resistance rating*.

(2) In other than *residential occupancies*, no *fire-resistance rating* is required for *fire separations* between a *public corridor* and the remainder of the *building* if

(a) the floor area is *sprinklered*,
(b) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.9.(2), and
(c) the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(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 3.2.4.9.(2),
(c) the operation of the sprinkler system will cause a

signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4), and

(d) the corridor exceeds 5 m (16 ft 5 in) in width.

9.10.9.16. Separation of Storage Garages

(1) Except as provided in Sentences (2) and (3), a *storage garage* shall be separated from other *occupancies* by a *fire separation* having not less than a 1.5 h *fire-resistance rating*.

(2) Except as permitted in Sentence (3), *storage garages* containing 5 motor vehicles or fewer shall be separated from other *occupancies* by a *fire separation* of not less than 1 h.

(3) Where a *storage garage* serves only the *dwelling unit* to which it is attached or built in, 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* where

(a) the construction between the garage and the *dwelling unit* provides an effective barrier to gas and exhaust fumes, and

(b) every door between the garage and *dwelling unit* conforms to Article 9.10.13.15.

(See Appendix A.)

9.10.9.17. Separation of Repair Garages

(1) Except as provided in Sentence (2), 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).

9.10.9.18. Exhaust Ducts Serving More Than One Fire Compartment

(1) Where a *vertical service space* contains an *exhaust* duct that serves more than one *fire compartment*, the duct shall have a fan located at or near the exhaust outlet to ensure that the duct is under negative pressure.

(2) Individual *fire compartments* referred to in Sentence (1) shall not have fans that exhaust directly into the duct in the *vertical service space*.

9.10.9.19. Central Vacuum Systems

(1) A central vacuum system shall serve not more than one *suite*.

9.10.10. 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 required in Sentence (2) and Articles 9.10.10.5. and 9.10.10.6., *service rooms* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h when the *floor area* containing the *service room* is not *sprinklered*.

(2) Where a room contains a limited quantity of service equipment and the service equipment does not constitute a fire hazard, the requirements in Sentence (1) shall not apply.

9.10.10.4. Appliances and Equipment to be Located in a Service Room

(1) Except as provided in Sentence (2) and Article 9.10.10.5., fuel-fired *appliances* other than fireplaces shall be located in a *service room* separated from the remainder of the *building* by a *fire separation* having not less than a 1 h *fire-resistance rating*.

(2) Except as required in the *appliance* installation standards referenced in Sentences 6.2.1.5.(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^2 (4310 ft^2) and a *building height* of not more than 2 *storeys*.

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*.

9.10.11. 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. Separation of Exterior Openings

(1) In *buildings* of *mercantile* or *medium hazard industrial occupancy*, exterior openings in one *storey* shall be separated from openings in an adjacent *storey* by

(a) a wall not less than 1 000 mm (3 ft 3 in) in vertical dimension, or

(b) a canopy or balcony not less than 1 000 mm (3 ft 3 in) in width.

(2) The wall, canopy or balcony described in Sentence (1) shall have a *fire-resistance rating* not less than that required for the floor assembly separating the *storeys*, except that the rating need not exceed 1 h.

9.10.12.2. 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.

9.10.12.3. 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 (16 ft 5 in) of the windows in the exposed wall.

9.10.12.4. 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 1 200 mm (3 ft 11 in) where the openings are in different *fire compartments*.

(2) The exterior wall of each *fire compartment* referred to in Sentence (1) within the 1 200 mm (3 ft 11 in) 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*.

9.10.12.5. Protection of Soffits

(1) Except as provided in Sentences (2) and (3), where a common *attic or roof space* spans more than 2 *suites* of *residential occupancy*, and projects beyond the exterior wall of the *building*, the portion of any soffit or other surface enclosing the projection which is less than 2 500 mm (8 ft 2 in) vertically above a window or door and less than 1 200 mm (3 ft 11 in) from either side of the window or door, shall have no *unprotected openings* and shall be protected by

(a) *noncombustible* material having a minimum thickness of 0.38 mm (0.015 in) and a melting point not below 650°C (1202°F),
(b) not less than 12.7 mm (½ in) thick gypsum soffit board or gypsum wallboard installed according to CSA A82.31-M, "Gypsum Board Application",
(c) not less than 11 mm (7/16 in) thick plywood,
(d) not less than 12.5 mm (½ in) thick OSB or waferboard, or
(e) not less than 11 mm (7/16 in) thick lumber.

(See Appendix A.)

(2) Where the soffit or other surface described in Sentence (1) is completely separated from the remainder of the *attic or roof space* by firestopping, the requirements in Sentence (1) do not apply.

(3) Where all *suites* spanned by a common *attic or roof space* are *sprinklered*, the requirements in Sentence (1) 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 Chapters 2 to 14 of NFPA 80, "Fire Doors and Windows" unless otherwise specified herein. (See also Article 9.10.3.1.)

Table 9.10.13.1.
Fire-Protection Ratings for Closures
Forming Part of Sentence 9.10.13.1.(1)

Required *Fire-Resistance Rating* of *Fire Separation*	Required *Fire-Protection Rating* of *Closure*
30 or 45 min	20 min[1]
1 h	45 min[1]
1.5 h	1 h
2 h	1.5 h
3 h	2 h
4 h	3 h
Column 1	2

Note to Table 9.10.13.1.:
[1] See Article 9.10.13.2.

9.10.13.2. Solid Core Wood Door as a Closure

(1) A 45 mm (1¾ in) 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 CAN4-S113, "Standard Specification for Wood Core Doors Meeting the Performance Required by CAN4-S104 for Twenty Minute Fire-Rated Closure Assemblies". (See Appendix A.)

(2) Doors described in Sentence (1) shall have not more than a 6 mm (¼ in) clearance beneath and not more than 3 mm (⅛ in) at the sides and top.

(3) Where a 45 mm (1¾ in) thick solid core wood door is permitted in a required *fire separation*, the requirement for a *noncombustible* sill in NFPA 80, "Fire Doors and Windows" shall not apply.

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 (1¾ in) solid core wood shall be mounted in a wood frame of at least 38 mm (1½ in) thickness where the frame has not been tested and rated.

9.10.13.4. Doors as a Means of Egress

(1) Doors forming part of an *exit* or a public *means of egress* shall conform to Subsection 9.9.6. in addition to this Subsection.

9.10.13.5. Wired Glass as a Closure

(1) Wired glass conforming to Article 9.7.3.1. which has not been tested in accordance with Article 9.10.3.1. is permitted as a *closure* in a vertical *fire separation* required to have a *fire-resistance rating* of not more than 1 h provided such glass is not less than 6 mm (¼ in) 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 (0.053 in) and a glazing stop of not less than 20 mm (13/16 in) on each side of the glass.

(3) Individual panes of glass described in Sentence (1) shall not exceed 0.8 m² (9 ft²) in area or 1 400 mm (4 ft 7 in) in height or width, and the area of glass not structurally supported by mullions shall not exceed 7.5 m² (80.7 ft²).

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, "Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104".

9.10.13.7. Glass Block as a Closure

(1) Glass block that has not been tested in accordance with Article 9.10.3.1. is permitted as a *closure* in a *fire separation* required to have a *fire-resistance rating* of not more than 1 h. (See Article 9.20.9.6.)

9.10.13.8. Maximum Size of Opening

(1) The size of an opening in an interior *fire separation*, even where protected with a *closure*, shall not exceed 11 m² (118 ft²), with no dimension greater than 3.7 m (12 ft 2 in), 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 m² (237 ft²), with no dimension greater than 6 m (19 ft 8 in), 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 which 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 9.10.5.1.(4) ducts that connect 2 *fire compartments* or penetrate an assembly required to be a *fire separation* with a *fire-resistance rating* shall be equipped with a *fire damper* in conformance with Article 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 (1400°F),
(b) has a cross-sectional area less than 0.013 m² (20 in²), and

(c) supplies only air-conditioning units or combined *air-conditioning* and heating units discharging air at not more than 1 200 mm (3 ft 11 in) 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 (1400°F),
(b) the branch duct is carried up inside the riser at least 500 mm (19¾ in), 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 (1400°F), and
(b) each individual duct exhausts directly to the outside at the top of the *vertical service space*.

(5) A duct serving commercial cooking equipment and piercing a required *fire separation* need not be equipped with a *fire damper* at the *fire separation*. (See also Article 6.2.2.6.)

9.10.13.14. Fire Stop Flaps

(1) *Fire stop flaps* in ceiling membranes required in Sentence 9.10.5.1.(4) shall be constructed in conformance with the Supplementary Guidelines.

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 Separations between Buildings

9.10.14.1. Maximum Percentage Area of Unprotected Openings

(1) Except as provided in Sentence (2) and Articles 9.10.14.3. to 9.10.14.11., the maximum percentage of *unprotected openings* in an *exposing building face* shall conform to Table 9.10.14.1. or to Subsection 3.2.3., whichever is the least restrictive for the *occupancy* being considered.

(2) An opening in an *exposing building face* not more than 0.013 m² (20 in²) shall not be considered an *unprotected opening*.

9.10.14.2. Area of Exposing Building Face

(1) The area of an *exposing building face* shall be calculated as the total area of exterior wall facing in 1 direction on any side of a *building* measured from the finished ground level to the uppermost ceiling, except that where a *building* is divided by *fire separations* into *fire compartments*, the area of *exposing building face* is permitted to be calculated for each *fire compartment* provided such separations have not less than a 45 min *fire-resistance rating*.

9.10.14.3. Inadequate Fire Fighting 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 Article 9.10.14.1. or required in Articles 9.10.14.12., 9.10.14.14., and 9.10.14.16., shall be doubled for a *building* that is not sprinklered.

Table 9.10.14.1.
Maximum Percentage of Unprotected Openings or Glazed Areas, % of *Exposing Building Face* Area
Forming Part of Sentence 9.10.14.1.(1)

Occupancy Classification of *Building*	Maximum Area of *Exposing Building Face*, m² (ft²)	*Limiting Distance*, m (ft-in)													
		Less than 1.2 (3'-11")	1.2 (3'-11")	1.5 (4'-11")	2.0 (6'-7")	2.5 (8'-4")	3.0 (9'-10")	4.0 (13'-1")	6.0 (19'-8")	8.0 (26'-3")	10.0 (32'-10")	12.0 (39'-4")	16.0 (54'-6")	20.0 (65'-7")	25.0 (82'-0")
Residential, business and personal services and *low hazard industrial*	10 (107)	0	8	12	21	33	55	96	100	—	—	—	—	—	—
	15 (160)	0	8	10	17	25	37	67	100	—	—	—	—	—	—
	20 (215)	0	8	10	15	21	30	53	100	—	—	—	—	—	—
	25 (267)	0	8	9	13	19	26	45	100	—	—	—	—	—	—
	30 (323)	0	7	9	12	17	23	39	88	100	—	—	—	—	—
	40 (431)	0	7	8	11	15	20	32	69	100	—	—	—	—	—
	50 (538)	0	7	8	10	14	18	28	57	100	—	—	—	—	—
	100 (1080)	0	7	8	9	11	13	18	34	56	84	100	—	—	—
	Over 100 (1080)	0	7	7	8	9	10	12	19	28	40	55	92	100	—
Mercantile and medium hazard industrial	10 (107)	0	4	6	10	17	25	48	100	—	—	—	—	—	—
	15 (160)	0	4	5	8	13	18	34	82	100	—	—	—	—	—
	20 (215)	0	4	5	7	11	15	27	63	100	—	—	—	—	—
	25 (267)	0	4	5	7	9	13	22	51	94	100	—	—	—	—
	30 (323)	0	4	4	6	9	12	20	44	80	100	—	—	—	—
	40 (431)	0	4	4	6	8	10	16	34	61	97	100	—	—	—
	50 (538)	0	4	4	5	7	9	14	29	50	79	100	—	—	—
	100 (1080)	0	4	4	4	5	6	9	17	28	42	60	100	—	—
	Over 100 (1080)	0	4	4	4	4	5	6	10	14	20	27	46	70	100
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

9.10.14.4. Alternate Method of Determining Limiting Distance

(1) The *limiting distance* shown in Table 9.10.14.1. is permitted to be reduced provided it is not less than the square root of

(a) the aggregate area of *unprotected openings* in an *exposing building face* in *residential occupancies*, *business and personal services occupancies* and *low hazard industrial occupancies*, and

(b) twice the aggregate area of *unprotected openings* in *mercantile occupancies* and *medium hazard industrial occupancies*.

9.10.14.5. Openings in Walls Having a Limiting Distance Less Than 1.2 m

(1) Openings in a wall having a *limiting distance* of less than 1.2 m (3 ft 11 in) shall be protected by *closures*, of other than wired glass or glass block, whose *fire protection* rating is in conformance with the *fire-resistance rating* required for the wall. (See Table 9.10.13.1.)

9.10.14.6. Allowance for Sprinklers and Wired Glass or Glass Block

(See A-3.2.3.11. in Appendix A.)

(1) The maximum area of *unprotected openings* is permitted to be doubled where the *building* is *sprinklered* 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.

(2) The maximum area of *unprotected openings* is permitted to be doubled where the *unprotected openings* are glazed with wired glass in steel frames or glass blocks as described in Articles 9.10.13.5. and 9.10.13.7.

9.10.14.7. Exterior Wall Construction for Irregular-Shaped or Skewed Walls

(1) For the purpose of using Table 9.10.14.11. to determine the required type of construction, cladding and *fire-resistance rating* for an 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).

(2) *Unprotected openings* in the *exposing building face* referred to in Sentence (1) shall not be permitted if the *limiting distance* is less than 1.2 m (3 ft 11 in) and shall be limited in conformance with the requirements for *unprotected openings* in Table 9.10.14.1. where the *limiting distance* is 1.2 m (3 ft 11 in) or greater.

9.10.14.8. Percentage of Unprotected Openings for Irregular-Shaped or Skewed Walls

(1) For the purpose of using Table 9.10.14.1. to determine the actual percentage of *unprotected openings* permitted in an irregularly-shaped or skewed exterior wall, the location of the *exposing building face* is permitted to be taken at a vertical plane located so that there are no *unprotected openings* between the vertical plane and the line to which *limiting distance* is measured. (See A-3.2.3.1.(4) in Appendix A.)

9.10.14.9. Storeys at Street Level

(1) The *exposing building face* of a *storey* that faces a *street* and is at approximately the same level as the *street* is permitted to have unlimited *unprotected openings* if the *limiting distance* is not less than 9 m (29 ft 6 in).

9.10.14.10. Open-Air Storage Garages

(1) When a *storage garage* has all *storeys* constructed as *open-air storeys*, the *exposing building face* of such garage is permitted to have unlimited *unprotected openings* provided it has a *limiting distance* of not less than 3 m (9 ft 10 in).

9.10.14.11. Construction of Exposing Building Face

(1) Except as permitted in Sentence (2) and Articles 9.10.14.12. to 9.10.14.16., 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 9.10.14.11. and Subsection 9.10.8.

(2) Cladding installed on *exposing building faces* and exterior walls located above *exposing building faces* that enclose an *attic or roof space* need not conform to "Type of Cladding Required" in Table 9.10.14.11. provided

(a) the *limiting distance* is not less than 600 mm (23⅝ in),

(b) the exposing face is constructed with no *unprotected openings*, and

(c) the cladding conforms to Clauses 9.10.14.12.(3)(a) to (d).

9.10.14.12. Exposing Building Face of Houses

(1) For the purposes of application of this Article

(a) the *exposing building face* is permitted to be divided into any number of portions and the *fire-resistance rating*, type of cladding and glazed area 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 percentage of glazed areas permitted in an exterior wall, the glazed area shall be projected onto the vertical plane established in Clause (b).

(See Appendix A.)

Table 9.10.14.11.
Minimum Construction Requirements for Exposing Building Faces
Forming Part of Article 9.10.14.11.

Occupancy Classification of *Building*	Maximum Area of *Unprotected Openings* Permitted, % of *Exposing Building Face* Area	Minimum Required *Fire-Resistance Rating*	Type of Construction Required	Type of Cladding Required
Residential, business and personal services, and low hazard industrial	0 – 10	1 h	*Noncombustible*	*Noncombustible*
	11 – 25	1 h	*Combustible* or *noncombustible*	*Noncombustible*
	26 - < 100	45 min	*Combustible* or *noncombustible*	*Combustible* or *noncombustible*
Mercantile and *medium hazard industrial*	0 – 10	2 h	*Noncombustible*	*Noncombustible*
	11 – 25	2 h	*Combustible* or *noncombustible*	*Noncombustible*
	26 - < 100	1 h	*Combustible* or *noncombustible*	*Combustible* or *noncombustible*
Column 1	2	3	4	5

(2) Except as required in Article 9.10.14.3. and as provided in Sentence (4), in *buildings* containing only *dwelling units* in which there is no *dwelling unit* above another *dwelling unit*, the requirements of Article 9.10.14.11. do not apply provided that the exposing building face

(a) has a *fire-resistance rating* of not less than 45 min where the *limiting distance* is less than 1.2 m (3 ft 11 in), and

(b) is clad with *non-combustible* material where the *limiting distance* is less than 600 mm (23⅝ in).

(3) Cladding on the *exposing building face* described in Sentence (2) is permitted to be vinyl when the *limiting distance* is less than 600 mm provided the cladding

(a) conforms to Subsection 9.27.13.,

(b) is installed over sheathing paper and 12.7 mm (½ in) gypsum sheathing,

(c) has a flame spread rating not greater than 25 when tested in accordance with Sentence 3.1.12.1.(2), and

(d) material thickness is not more than 2 mm (3/32 in) exclusive of fasteners, joints and local reinforcements.

(4) Glazed areas in the *exposing building face* referred to in Sentence (1)

(a) shall not be permitted if the *limiting distance* is less than 1.2 m (3 ft 11 in), and

(b) shall be limited in conformance with the requirements for glazed areas in Table 9.10.14.1. where the *limiting distance* is 1.2 m (3 ft 11 in) or greater.

(5) 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.

(6) Where an agreement referred to in Sentence (5) 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.

9.10.14.13. Combustible Projections

(1) 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 (3 ft 3 in) 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) 1 200 mm (3 ft 11 in) of a property line or the centreline of a *public way*, or

(b) 2 400 mm (7 ft 10 in) of a *combustible* projection on another *building* on the same property.

9.10.14.14. Detached Garage or Accessory Building Serving One Dwelling Unit

(1) Except as required in Article 9.10.14.3., the *exposing building face* of a garage or accessory *building* that serves one *dwelling unit* only and is detached from any *building* shall have a *fire-resistance rating* of at least 45 min, except that no *fire-resistance rating* is required where the *limiting distance* is 600 mm (23⅝ in) or greater.

(2) The exterior *cladding* of detached garages or accessory *buildings* described in Sentence (1) is not required to be *noncombustible* regardless of the *limiting distance*.

(3) The percentage of glazed areas permitted in the *exposing building face* of detached garages or accessory *buildings* described in Sentence (1) shall conform to the requirements for glazed areas in Table 9.10.14.1.

(4) The requirements for *limiting distance* shall not apply between a detached garage or accessory *building* and a *dwelling unit* 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.

9.10.14.15. Heavy Timber and Steel Columns

(1) Heavy timber and steel columns need not conform to the requirements of Article 9.10.14.11. provided the *limiting distance* is not less than 3 m (9 ft 10 in).

9.10.14.16. Low Fire Load Occupancies

(1) Except as required in Article 9.10.14.3., in *buildings* of 1 *storey* in *building height* of *noncombustible construction* classified as *low hazard industrial occupancy* which are used only for low *fire load occupancies* such as power generating plants or plants for the manufacture or storage of *noncombustible* materials, non-*loadbearing* wall components need not have a minimum *fire-resistance rating* provided the *limiting distance* is 3 m (9 ft 10 in) or more.

9.10.15. Fire Stops

9.10.15.1. Required Fire Stops in Concealed Spaces

(1) Concealed spaces in interior walls, ceilings and crawl spaces shall be separated by fire stops from concealed spaces in exterior walls and *attic or roof spaces*.

(2) Fire stops shall be provided at all interconnections between concealed vertical and horizontal spaces in interior coved ceilings, drop ceilings and soffits where the exposed construction materials within the concealed spaces have a surface *flame-spread rating* greater than 25.

(3) Fire stops shall be provided at the top and bottom of each run of stairs where they pass through a floor containing concealed space in which the exposed construction materials within the space have a surface *flame-spread rating* greater than 25.

(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 stops into compartments of not more than not more than 300 m² (3230 ft²) in area where such space contains exposed construction materials having a surface *flame-spread rating* greater than 25.

(5) No dimension of such space shall exceed 20 m (65 ft 7 in).

(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 stops at intervals of not more than 20 m (65 ft 7 in) and at points where such concealed spaces

extend across the ends of required vertical *fire separations*.

9.10.15.2. Required Fire Stops in Wall Assemblies

(1) Except as permitted in Sentences (2) and (3), fire stops shall be provided to block off concealed spaces within wall assemblies, including spaces created by furring,

(a) at each floor level,
(b) at each ceiling level where the ceiling contributes to part of the required *fire-resistance rating*, and
(c) at other locations within the wall, so that the distance between fire stops does not exceed 20 m (65 ft 7 in) horizontally and 3 m (9 ft 10 in) vertically.

(2) Fire stops required in Sentence (1) are not required provided

(a) the width of the concealed wall space does not exceed 25 mm (1 in),
(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.

(3) Fire stops required in Sentence (1) are not required provided the wall space is filled with insulation.

9.10.15.3. Fire Stop Materials

(1) Fire stops shall be constructed of not less than

(a) 0.38 mm (0.015 in) sheet steel,
(b) 6 mm (¼ in) asbestos board,
(c) 12.7 mm (½ in) gypsum wallboard,
(d) 12 mm (½ in) plywood, OSB or waferboard, with joints having continuous support,
(e) 2 layers of 19 mm (¾ in) lumber with joints staggered,
(f) 38 mm (1½ in) lumber, or
(g) materials conforming to Sentence 3.1.11.7.(1).

9.10.15.4. Penetration of Fire Stops

(1) Where fire stops are pierced by pipes, ducts or other elements, the effectiveness of the fire stops shall be maintained around such elements.

9.10.16. Flame Spread Limits

9.10.16.1. 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).

9.10.16.2. Ceilings in Exits or Public Corridors

(1) At least 90% of the exposed surface of every ceiling in an *exit* or unsprinklered ceiling in a *public corridor* shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.16.6.)

9.10.16.3. Walls in Exits

(1) Except as provided in Sentence (2), at least 90% of the exposed surfaces of every wall in an *exit* shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.16.6.)

(2) At least 75% of the wall surface of a lobby used as an *exit* in Article 9.9.8.5. shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.16.6.)

9.10.16.4. 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.

9.10.16.5. Walls in Public Corridors

(1) At least 90% of the total wall surface in any unsprinklered *public corridor* shall have a surface *flame-spread rating* of not more than 75, or at least 90% of the upper half of such walls shall have a surface *flame-spread rating* of not more than 25. (See Article 9.10.16.6.)

9.10.16.6. 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.

9.10.16.7. 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*.

9.10.16.8. 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).

9.10.16.9. 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^2 (10.8 ft^2) in area and shall be spaced not less than 1 200 mm (3 ft 11 in) apart.

9.10.16.10. Protection of Foamed Plastics

(1) Except as provided in Sentence (2), foamed plastics which 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 (0.015 in) and a melting point not below 650°C (1202°F) provided the building does not contain a Group C *major occupancy*, or
(c) any thermal barrier that meets the requirements of Clause 3.1.5.11.(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.

9.10.16.11. 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.

9.10.16.12. 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.

9.10.17. Alarm and Detection Systems

9.10.17.1. 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*.

9.10.17.2. 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 9.10.17.2. 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 9.10.17.2.
Maximum Occupant Load for Buildings without Fire Alarm Systems
Forming Part of Sentence 9.10.17.2.(1)

Major Occupancy Classification	*Occupant Load* above which Fire Alarm System is required
Residential	10 (sleeping accommodation)
Business and personal services, mercantile	150 above or below the *first storey*
Low or medium hazard industrial	75 above or below the *first storey*
Column 1	2

9.10.17.3. Rooms and Spaces Requiring Heat Detectors or Smoke Detectors

(1) Where a fire alarm system is required, every *public corridor* in *buildings* of *residential occupancy* and every *exit* stair shaft shall be provided with *smoke detectors*.

(2) Except as provided in Sentence (3), *buildings* required to have a fire alarm system shall be equipped with *heat detectors* or *smoke detectors* in storage rooms, *service rooms*, elevator shafts, chutes, janitors closets and any other rooms where hazardous substances are intended to be used or stored.

(3) 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.

9.10.17.4. Smoke Detectors in Recirculating Air Handling Systems

(1) Except for a recirculating air system serving not more than 1 *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*.

9.10.17.5. Portions of Buildings Considered as Separate Buildings

(1) Except as provided in Sentence (2), where a vertical *fire separation* having a *fire-resistance rating* of 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.

9.10.17.6. Design and Installation Requirements

(1) Fire alarm, fire detection and smoke detection devices and systems, and their installation, shall conform to Subsection 3.2.4.

9.10.17.7. Reserved.

9.10.17.8. Open-Air Storage Garages

(1) Except as required in Article 9.10.17.1., a fire alarm system is not required in a *storage garage* conforming to Article 3.2.2.60. provided there are no other *occupancies* in the *building*.

9.10.17.9. 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. Smoke Alarms

9.10.18.1. Required Smoke Alarms

(1) *Smoke alarms* conforming to CAN/ULC-S531, "Standard for Smoke Alarms" shall be installed in each *dwelling unit* and in each sleeping room not within a *dwelling unit*.

9.10.18.2. Location of Smoke Alarms

(1) Within *dwelling units*, sufficient *smoke alarms* shall be installed so that

(a) there is at least one *smoke alarm* on each floor level, including *basements*, that is 900 mm (2 ft 11 in) or more above or below an adjacent floor level,

(b) each bedroom is protected by a *smoke alarm* either inside the bedroom or, if outside, within 5 m (16 ft 5 in), measured following corridors and doorways, of the bedroom door, and

(c) the distance, measured following corridors and doorways, from any point on a floor level to a *smoke alarm* on the same level does not exceed 15 m (49 ft 3 in).

(See Appendix A.)

(2) *Smoke alarms* required in Article 9.10.18.1. and Sentence (1) shall be installed on or near the ceiling.

(3) *Smoke alarms* required in Sentences (1) and (2) shall be audible within the bedrooms when the intervening doors are closed.

(4) Smoke alarms required in Sentences (1) and (2) shall be installed in conformance with the manufacturers instructions.

9.10.18.3. Power Supply

(1) Except as permitted in Sentence (2), *smoke alarms* shall be installed by permanent connections to an electrical circuit and shall have no disconnect switch between the overcurrent circuit device and the *smoke alarm*.

(2) Where the *building* is not supplied with electrical power, *smoke alarms* are permitted to be battery operated.

9.10.18.4. 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.

9.10.18.5. Instructions for Maintenance and Repair

(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.

9.10.18.6. Silencing of Alarm Noise

(1) A manually operated device is permitted to be incorporated within the circuitry of a *smoke alarm* installed in a *dwelling unit* so that it will silence the signal emitted by the *smoke alarm* for a period of not more than 10 min, after which the *smoke alarm* will reset and again sound the alarm if the level of smoke in the vicinity is sufficient to reactuate the *smoke alarm*.

9.10.19. Fire Fighting

9.10.19.1. 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 (3 ft 7 in) high and 550 mm (21⅝ in) wide and having a sill height of not more than 900 mm (2 ft 11 in) 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*.

9.10.19.2. Access to Basements

(1) Except in *basements* serving not more than one *dwelling unit*, each unsprinklered *basement* exceeding 25 m (82 ft) in length or width shall be provided with direct access to the outdoors to not less than 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 (3 ft 7 in) high and 550 mm (21⅝ in) wide, the sill height of which shall not be more than 900 mm (2 ft 11 in) above the floor.

(3) Access required in Sentence (1) is also permitted to be provided by an interior stair accessible from the outdoors.

9.10.19.3. Fire Department Access to Buildings

(1) Access for fire department equipment shall be provided to each *building* by means of a *street*, private roadway or yard. (See A-3.2.5.6.(1) and A-9.10.19.3.(1) in Appendix A.)

(2) Where access to a *building* as required in Sentence (1) is provided by means of a roadway or yard, the design and location of such roadway or yard shall take into account connection with public thoroughfares, weight of fire fighting equipment, width of roadway, radius of curves, overhead clearance, location of fire hydrants, location of fire department connections and vehicular parking.

9.10.19.4. Portable Extinguishers

(1) Portable extinguishers shall be installed in all *buildings*, except within *dwelling units*, in conformance with the provisions of the *Ontario Fire Code* made under the *Fire Protection and Prevention Act, 1997.*

9.10.19.5. 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.

9.10.20. Fire Protection for Construction Camps

9.10.20.1. Requirements for Construction Camps

(1) Except as provided in Articles 9.10.20.2. to 9.10.20.9., *camps for housing of workers* shall conform to Subsections 9.10.1. to 9.10.19.

9.10.20.2. 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*.

9.10.20.3. 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*.

9.10.20.4. 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*.

9.10.20.5. 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 (32 ft 10 in) unless otherwise permitted in Subsection 9.10.14.

9.10.20.6. 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 having a *fire-resistance rating* of not less than 45 min shall have a *flame-spread rating* conforming to the appropriate requirements in Subsection 9.10.16.

9.10.20.7. 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.

9.10.20.8. 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 *Ontario Fire Code* made under the

Fire Protection and Prevention Act, 1997.

9.10.20.9. 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 (¾ in) 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 (990 gal) with a pumping system capable of supplying a flow of at least 5 L/s (1.1 gal/s) at a gauge pressure of 300 kPa (43.5 psi).

9.10.21. Fire Protection for Gas and Electric Ranges

9.10.21.1. Installation of Gas Ranges

(1) Reserved.

(2) Clearances for gas *ranges* shall be not less than those provided in Articles 9.10.21.2. and 9.10.21.3.

9.10.21.2. Vertical Clearances

(1) Except as provided in Sentence (2), framing, finishes and cabinetry installed directly above the location of the *range* shall be not less than 750 mm (2 ft 6 in) above the level of the electric or gas *range* burners or elements.

(2) The vertical clearance described in Sentence (1) for framing, finishes and cabinets located directly above the location of the *range* is permitted to be reduced to 600 mm (23⅝ in) 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 (¼ in) thick, covered with sheet metal not less than 0.33 mm (0.013 in) thick, or

(ii) a metal hood with a 125 mm (4⅞ in) projection beyond the framing, finishes and cabinets.

9.10.21.3. Horizontal Clearances

(1) Except as provided in Sentences (2) to (3), *combustible* wall framing, finishes or cabinets within 450 mm (17¾ in) of the area where the *range* is to be located shall be protected above the level of the heating elements by material providing fire resistance not less than that of a 9.5 mm (⅜ in) thickness of gypsum board.

(2) Counter-top splash boards or back plates which extend above the level of the heating elements need not be protected as described in Sentence (1).

(3) Except for cabinetry described in Article 9.10.21.2., cabinetry located not less than 450 mm (17¾ in) above the level of the heating elements 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 Rating

(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 E 90, "Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements", or

(b) ASTM E 336, "Measurement of Airborne Sound Insulation in Buildings".

(See Appendix A.)

9.11.2. Required Sound Control Locations (Airborne Sound)

9.11.2.1. Minimum Sound Transmission Class Rating

(1) Except as provided in Sentence (2), every *dwelling unit* and every *suite* in *hotels* and motels, 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 8.1 and 8.2 in the Supplementary Guidelines.

• (2) Where a *dwelling unit* is adjacent to an elevator shaft or a refuse chute, the separating construction shall have a sound transmission class rating of at least 55, measured in accordance with Subsection 9.11.1. or listed in Tables 8.1 and 8.2 in the Supplementary Guidelines.

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 (11¾ in) 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.

(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. (See Appendix A.)

(3) The minimum depth of *foundations* for exterior concrete steps with more than 2 risers shall conform to Sentences (1) to (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 *buildings* of other than masonry or masonry veneer construction

(a) whose superstructure conforms with the requirements of the deformation resistance test in CAN/CSA-Z240.2.1., "Structural Requirements for Mobile Homes", or

(b) used as accessory *buildings* of not more than 1 *storey* in *building height* and not more than 50 m² (538 ft²) in *building area*.

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Table 9.12.2.2.
Minimum Depths of Foundation
Forming Part of Sentence 9.12.2.2.(1)

Type of *Soil*	*Foundation* containing heated *Basement* or Crawl Space[1]		*Foundation* Containing no Heated Space[2]	
	Good *Soil* Drainage[3]	Poor *Soil* Drainage	Good *Soil* Drainage[3]	Poor *Soil* Drainage
Rock	No limit	No limit	No limit	No limit
Coarse grained *soils*	No limit	No limit	No limit	Below the depth of frost penetration
Silt	No limit	No limit	Below the depth of frost penetration	Below the depth of frost penetration
Clay or *soils* not clearly defined[4]	1.2 m (3 ft 11 in)	1.2 m (3 ft 11 in)	1.2 m (3 ft 11 in) but not less than the depth of frost penetration	1.2 m (3 ft 11 in) but not less than the depth of frost penetration
Column 1	2	3	4	5

Notes to Table 9.12.2.2.:

(1) Foundation not insulated to reduce heat loss through the footings.

(2) Including foundations containing heated space insulated to reduce heat loss through the footings.

(3) To not less than the depth of frost penetration.

(4) See Appendix A.

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 (23⅝ in) of the *foundation* shall be free of deleterious debris and boulders larger than 250 mm (9⅞ in) diam.

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 (1500 psi) to support the footing.

Section 9.13. Dampproofing, Waterproofing and Soil Gas Control

9.13.1. General

9.13.1.1. Required Dampproofing

(1) Except as provided in Article 9.13.1.2., 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

9.13.1.2., 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.

9.13.1.2. Required Waterproofing

(1) Where hydrostatic pressure occurs, floors-on-ground and exterior surfaces of walls below ground level shall be waterproofed.

(2) Roofs of underground structures shall be waterproofed to prevent the entry of water into the structure.

9.13.1.3. Required Soil Gas Control

(See Appendix A.)

(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 sub-floor depressurization in accordance with the Supplementary Guidelines.

9.13.1.4. Standards for Application

(1) The method of application of all bituminous waterproofing and 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. Material

9.13.2.1. Material Standards

(1) Except as otherwise specified in this Section, materials used for exterior dampproofing or waterproofing 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-56M, "Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing",
(f) CGSB 37-GP-18Ma, "Tar, Cutback, Unfilled, for Dampproofing",
(g) CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet, for Use in Building Construction", or
(h) CSA A123.4, "Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems".

(2) Materials used to provide a barrier to *soil* gas ingress shall conform to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet, for Use in Building Construction".

9.13.3. Dampproofing of Walls

9.13.3.1. 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 (¼ in) 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.

9.13.3.2. Application of Dampproofing Material

(1) Dampproofing material shall be applied over the parging or concrete below ground level.

9.13.3.3. Interior Dampproofing of Walls

(1) Where a separate interior finish is applied to a concrete or unit masonry wall which is in contact with the *soil*, or where wood members are applied to such walls for the installation of insulation or finish, the interior surface of the *foundation* wall below ground level shall be dampproofed.

(2) The dampproofing required in Sentence (1) shall extend from the *basement* floor and shall terminate at ground level.

(3) No membrane or coating with a permeance less than 170 ng/(Pa.s.m^2) (3 PERM INS.) shall be applied to the interior surface of the *foundation* wall above ground level between the insulation and the *foundation* wall.

9.13.3.4. Dampproofing of Preserved Wood Foundation Walls

(1) Preserved wood *foundation* walls shall be dampproofed as described in CAN3-S406, "Construction of Preserved Wood Foundations".

9.13.4. Dampproofing of Floors-on-Ground

9.13.4.1. Location of Dampproofing

(1) When 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.

9.13.4.2. Dampproofing below the Floor

(See Appendix A.)

(1) When installed below the floor, dampproofing membranes shall consist of polyethylene not less than 0.15 mm (0.006 in) thick, or type S roll roofing.

(2) Joints in dampproofing membranes shall be lapped not less than 300 mm (11¾ in).

9.13.4.3. Dampproofing above the Slab

(1) When installed above the slab, dampproofing shall consist of not less than

(a) 2 mopped-on coats of bitumen,
(b) 0.05 mm (0.002 in) polyethylene, or
(c) other material providing equivalent performance.

9.13.5. Waterproofing of Walls

9.13.5.1. Preparation of Surface

(1) Except where it can be shown to be unnecessary, unit masonry walls to be waterproofed shall be parged on exterior surfaces below ground level with not less than 6 mm (¼ in) of mortar conforming to Section 9.20.

(2) Concrete walls to be waterproofed shall have all holes and recesses resulting from removal of form ties sealed with mortar or waterproofing material.

9.13.5.2. Application of Waterproofing Membranes

(1) Concrete or unit masonry walls to be waterproofed shall be covered with not less than 2 layers of bitumen-saturated membrane, with each layer cemented in place with bitumen and coated over-all with a heavy coating of bitumen.

9.13.6. Waterproofing of Floors-on-Ground

9.13.6.1. 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 (3 in) thick, with the floor membrane mopped to the wall membrane to form a complete seal.

9.13.7. Soil Gas

9.13.7.1. 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 the Supplementary Guidelines.

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 permitted in Sentences (4), (5) and (6), where the insulation on a *foundation* wall extends to more than 900 mm (2 ft 11 in) 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 (¾ in) mineral fibre insulation with a density of not less than 57 kg/m^3 (3.6 lb/ft^3), or
  (ii) not less than 100 mm (4 in) of free draining granular material, or
(b) a system shall be installed which can be shown to provide equivalent performance to that provided by the materials described in Clause (a).

(3) Where mineral fibre insulation, crushed *rock* or other drainage layer medium is provided adjacent to the exterior surface of a *foundation* wall, it shall extend to the footing level and facilitate drainage of ground water to the *foundation* drainage system. (See Appendix A.)

(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) The drainage layer in Sentence (1) is only required where the *foundation* wall is constructed after the day this Regulation comes into force.

(7) 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 C 4, "Clay Drain Tile",
(b) ASTM C 412M, "Concrete Drain Tile (Metric)",
(c) ASTM C 444M, "Perforated Concrete Pipe (Metric)",
(d) ASTM C 700, "Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated",
(e) CAN/CGSB-34.22-M, "Pipe, Asbestos-Cement, Drain",
(f) CAN/CSA-B182.1-M, "Plastic Drain and Sewer Pipe and Pipe Fittings",
(g) CAN3-G401, "Corrugated Steel Pipe Products", or
(h) BNQ 3624-115, "Thermo-Plastic Pipe - Flexible Corrugated Tubing and Fittings for Soil Drainage".

9.14.3.2. Minimum Size

(1) Drain tile or pipe used for *foundation* drainage shall be not less than 100 mm (4 in) 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 crawl space.

(2) Drain tile or pipe with butt joints shall be laid with 6 mm (¼ in) to 10 mm (⅜ in) open joints.

(3) The top half of joints referred to in Sentence (2) shall be covered with sheathing paper, 0.10 mm (0.004 in) 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 (5⅞ in) of crushed stone or other coarse clean granular material containing not more than 10% of material that will pass a 4 mm (5/32 in) 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 not more than 10% of material that will pass a 4 mm (5/32 in) sieve.

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 (4⅞ in) beneath the *building* and extend not less than 300 mm (11¾ in) 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 (4⅞ in) 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 designed to resist removal by children.

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 (16 ft 5 in) 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 Septic Disposal Beds

(1) Surface drainage shall be directed away from the location of a water supply well or septic tank disposal bed.

9.14.6.3. Window Wells

(1) Every window well shall be drained to the footing level or other suitable location.

9.14.6.4. Catch Basin

(1) Where runoff water from a driveway is likely to accumulate or enter a garage, a catch basin shall be installed to provide adequate drainage.

9.14.6.5. Downspouts

(1) Downspouts shall conform to Article 9.26.18.2.

Section 9.15. Footings and Foundations

9.15.1. Scope

9.15.1.1. Application

(1) Except as provided in Articles 9.15.1.2., 9.15.1.3. and 9.15.1.4., this Section applies to poured-in-place concrete or unit masonry *foundation* walls and poured-in-place concrete footings on *soils* with an allowable bearing pressure of 75 kPa (10.9 psi) or greater for *buildings* of wood frame or masonry construction.

(2) Except as provided in Sentences (3) and (4), *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 (0.08 mil), 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. Wood-Frame Foundations

(1) *Foundations* of wood frame construction are permitted to be used provided they conform to Sentence (2) or (3).

(2) Except as provided in Sentence (3), wood-frame *foundations* shall be designed in conformance with Part 4.

(3) Wood-frame *foundations* conforming to CAN3-S406, "Construction of Preserved Wood Foundations" need not comply with Sentence (2) provided

(a) they are supported on *soil* having an allowable bearing pressure of not less than 75 kPa (10.9 psi), and
(b) their configuration conforms with the design assumptions stated in the standard.

(See Appendix A.)

9.15.1.4. Foundations for Deformation Resistant Buildings

(1) Where the superstructure of a detached *building* conforms to the requirements of the deformation resistance test in CAN/CSA-Z240.2.1., "Structural Requirements for Mobile Homes", the *foundation* is permitted to be constructed in conformance with CSA Z240.10.1., "Site Preparation, Foundation and Anchorage of Mobile Homes".

9.15.2. General

9.15.2.1. Concrete

(1) Concrete shall conform to Section 9.3.

9.15.2.2. Concrete Block

(1) Concrete block shall conform to CAN/CSA-A165.1, "Concrete Masonry Units" and shall have a compressive strength over the net area of the block of not less than 15 MPa (2200 psi).

9.15.2.3. Unit Masonry Construction

(1) Mortar, mortar joints, corbelling and protection for unit masonry shall conform to Section 9.20.

9.15.2.4. 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 (11 ft 6 in) 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 when the width of the *building* is 4.3 m (14 ft 1 in) or less, placed with their longest dimension at right angles to the longest dimension of the *building*.

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*.

9.15.3.3. Footing Sizes

(1) Except as provided in Sentences (2) to (8) and in Articles 9.15.3.4. and 9.15.3.5., the minimum footing size shall be as shown in Table 9.15.3.3. provided the length of supported joists does not exceed 4.9 m (16 ft 1 in) and the design *live load* on any floor supported by the footing does

not exceed 2.4 kPa (50 psf). (See Table 4.1.6.3.)

(2) Where the specified *live load* exceeds 2.4 kPa (50 psf) footings shall be designed in accordance with Section 4.2.

(3) Except as provided in Sentence (4), where the span of the supported joists exceeds 4.9 m (16 ft 1 in), footings shall be designed in accordance with Section 4.2.

(4) Where the supported joist span exceeds 4.9 m (16 ft 1 in), footing sizes are permitted to be determined according to the calculation provided in the Supplementary Guidelines.

(5) The strip footing sizes for exterior walls shown in Table 9.15.3.3. shall be increased by 65 mm (2⅝ in) for each *storey* of masonry veneer over wood frame construction supported by the *foundation* wall.

(6) The strip footing sizes for exterior walls shown in Table 9.15.3.3. shall be increased by 130 mm (5⅛ in) for each *storey* of masonry construction supported by the *foundation* wall.

(7) The minimum strip footing sizes for interior walls shown in Table 9.15.3.3. shall be increased by 100 mm (4 in) for each *storey* of masonry construction supported by the footing.

(8) The footing area for column spacings other than shown in Table 9.15.3.3. shall be adjusted in proportion to the distance between columns.

Table 9.15.3.3.
Minimum Footing Sizes
Forming Part of Article 9.15.3.3.

Floors Supported	Minimum Width of Strip Footings, mm (in)		Minimum Footing Area for Columns Spaced 3 m (9 ft 10 in) o.c.[1], m^2 (ft^2)
	Supporting Exterior Walls	Supporting Interior Walls	
1	250 (9⅞)[2]	200 (7⅞)[3]	0.4 (4.3)
2	350 (13¾)[2]	350 (13¾)[3]	0.75 (8.1)
3	450 (17¾)[2]	500 (19¾)[3]	1.0 (10.9)
Column 1	2	3	4

Notes to Table 9.15.3.3.:
[1] See Sentence 9.15.3.3.(8)
[2] See Sentences 9.15.3.3.(5) and (6)
[3] See Sentence 9.15.3.3.(7)

9.15.3.4. High Water Table

(1) 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*, the footing width shall be not less than twice the width required by Article 9.15.3.3.

9.15.3.5. Non-Loadbearing Walls

(1) Footings for interior non-*loadbearing* masonry walls shall be not less than 200 mm (7⅞ in) wide for walls up to 5.5 m (18 ft) high and shall be increased by 100 mm (4 in) for each additional 2 700 mm (8 ft 10 in) of height.

9.15.3.6. Thickness

(1) Footings shall be not less than 100 mm (4 in) in thickness except when greater thicknesses are required because of the projection of the footing beyond the supported element.

9.15.3.7. Footing Projection

(1) The projection of an unreinforced footing beyond the supported element shall be not greater than the thickness of the footing.

9.15.3.8. Step Footings

(1) When step footings are used
(a) the vertical rise between horizontal portions shall not exceed 600 mm (23⅝ in), for firm *soils* and 400 mm (15¾ in) for sand or gravel, and
(b) the horizontal distance between risers shall be not less than 600 mm (23⅝ in).

9.15.4. Foundation Walls

9.15.4.1. Foundation Wall Thickness

(1) Where average stable *soils* are encountered, the thickness of *foundation* walls subject to lateral earth pressure shall conform to Table 9.15.4.1. for walls not exceeding 2 500 mm (8 ft 2 in) in unsupported height.

Table 9.15.4.1.
Thickness of Foundation Walls
Forming Part of Sentence 9.15.4.1.(1)

Type of *Foundation* wall	Minimum Wall Thickness, mm (in)	Maximum Height of Finish Ground Above *Basement* Floor or Crawl space Ground cover, m (ft-in)	
		Foundation Wall Laterally Unsupported at the Top[1]	*Foundation* Wall Laterally Supported at the Top[1]
Solid concrete 15 MPa (2200 psi) min. strength	150 (5⅞) 200 (7⅞) 250 (9⅞) 300 (11¾)	0.80 (2'-7") 1.20 (3'-11") 1.40 (4'-7") 1.50 (4'-11")	1.50 (4'-11") 2.15 (6'-11") 2.30 (7'-7") 2.30 (7'-7")
Solid concrete 20 Mpa (2900 psi) min. strength	150 (5⅞) 200 (7⅞) 250 (9⅞) 300 (11¾)	0.80 (2'-7") 1.20 (3'-11") 1.40 (4'-7") 1.50 (4'-11")	1.80 (5'-11") 2.30 (7'-7") 2.30 (7'-7") 2.30 (7'-7")
Unit masonry	140 (5½) 190 (7½) 240 (9½) 290 (11⅜)	0.60 (2'-0") 0.90 (2'-11") 1.20 (3'-11") 1.40 (4'-7")	0.80 (2'-7") 1.20 (3'-11") 1.80 (5'-11") 2.20 (7'-3")
Column 1	2	3	4

Note to Table 9.15.4.1.:
[1] See Article 9.15.4.2.

9.15.4.2. Lateral Support

(1) For the purposes of Article 9.15.4.1., *foundation* walls shall be considered laterally supported at the top if such walls support solid masonry superstructure or if the floor joists are embedded in the top of the *foundation* walls.

(2) *Foundation* walls shall also be considered to be supported at the top if the floor system is anchored to the top of the *foundation* walls with anchor bolts, in which case the joists are permitted to run either parallel or perpendicular to the *foundation* wall.

(3) When a *foundation* wall contains an opening more than 1 200 mm (3 ft 11 in) in length or contains openings in more than 25% of its length, that portion of the wall beneath such openings shall be considered laterally unsupported, unless the wall around the opening is reinforced to withstand the earth pressure.

(4) When the length of solid wall between windows is less than the average length of the windows, the combined length of such windows shall be considered as a single opening for the purposes of Sentence (3).

9.15.4.3. Extension above Ground Level

(1) Exterior *foundation* walls shall extend not less than 150 mm (5⅞ in) above finished ground level.

9.15.4.4. 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 (13¾ in) high and not less than 90 mm (3½ in) 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 (3½ in) 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 (7⅞ in) o.c. vertically, and
  (ii) 900 mm (2 ft 11 in) o.c. horizontally.

(3) The space between wall and facing described in Sentence (2) shall be filled with mortar.

9.15.4.5. Corbelling

(1) Corbelling of masonry *foundation* walls supporting cavity walls shall conform to Article 9.20.12.2.

9.15.4.6. Crack Control Joints

(1) Crack control joints shall be provided in *foundation* walls more than 25 m (82 ft) long at intervals of not more than 15 m (49 ft 3 in).

(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.

9.15.4.7. Interior Masonry Walls

(1) Interior masonry *foundation* walls not subject to lateral earth pressure shall conform to Section 9.20.

9.15.5. Joist and Beam Support

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 (2 in) 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 (2 in by 4 in), and
(c) when the siding overlaps the *foundation* wall not less than 12 mm (½ in).

9.15.5.2. Support of Beams

(1) Not less than a 190 mm (7½ in) 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 (5½ in) or less in thickness.

(2) Pilasters required in Sentence (1) shall be not less than 90 mm by 290 mm (3½ in by 11⅜ in) and shall be bonded or tied into the wall.

(3) The top 200 mm (7⅞ in) of pilasters required in Sentence (1) shall be solid.

9.15.6. Parging and Finishing

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. Slabs-on-Ground

9.16.1. Scope

9.16.1.1. Application

(1) This Section applies to floors supported on ground or granular *fill* which 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. Granular Material beneath Floors

9.16.2.1. Required Installation of Granular Fill

(1) Except as provided in Sentence (2), not less than 100 mm (4 in) of coarse clean granular material containing not more than 10% of material that will pass a 4 mm (5/32 in) sieve shall be placed beneath floors-on-ground. (See Clause 9.13.1.3.(2)(c), Article 9.13.8.2., and A-9.13.1.3. and A-9.13.8.2. in Appendix A.)

(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 therein permits or requires the use of large openings in the *building* envelope even during the winter.

(3) Any *fill* beneath the top portion of coarse clean granular material referred to in Sentence (1) shall be compacted.

(4) Any *fill* placed beneath slabs in garages other than coarse clean granular material as described in Sentence (1) shall be compacted to provide uniform support for the slab.

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. (See Section 9.31.)

9.16.4. Concrete

9.16.4.1. Floor 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. 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 (3600 psi) after 28 days.

(2) Where dampproofing is provided as described in Subsection 9.13.6., the concrete used for floors-on-ground shall have a compressive strength of not less than 15 MPa (2200 psi) after 28 days.

9.16.4.3. 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 (13/16 in) thick.

9.16.4.4. Thickness

(1) Concrete slabs shall be not less than 75 mm (3 in) thick exclusive of concrete topping.

9.16.4.5. Bond Break

(1) A bond-breaking material shall be placed between the slab and footings or *rock*.

9.16.5. Wood

9.16.5.1. Wood Frame Floors

(1) Floors-on-ground constructed of wood shall conform to CAN/CSA-S406, "Construction of Preserved Wood Foundations".

Section 9.17. Columns

9.17.1. Scope

9.17.1.1. Application

(1) This Section applies to columns used to support carport roofs (see Section 9.35.), and beams carrying loads from not more than 2 wood-frame floors where the length of joists carried by such beams does not exceed 5 m (16 ft 5 in) and the *live load* on any floor does not exceed 2.4 kPa (50 psf).

(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. Fastening

(1) Columns shall be securely fastened to the supported member to prevent lateral movement.

9.17.3. Steel Columns

9.17.3.1. Size and Thickness

(1) Except as permitted in Sentence (2), steel pipe columns shall have an outside diameter of not less than 73 mm (2⅞ in) and a wall thickness of not less than 4.76 mm (3/16 in).

(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 (4 in by 4 in) by 6.35 mm (¼ in) 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) Steel columns shall be treated on the outside surface with not less than 1 coat of rust-inhibitive paint.

9.17.3.4. Adjustable Steel Columns

(1) Adjustable steel columns shall conform to CAN/CGSB-7.2-M, "Adjustable Steel Columns".

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 (7¼ in) for round columns and 140 mm by 140 mm (5½ in by 5½ in) 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 (1½ in) thick full-length members

(a) bolted together with not less than 9.52 mm (⅜ in) diam bolts spaced not more than 450 mm (17¾ in) o.c., or

(b) nailed together with not less than 76 mm (3 in) nails spaced not more than 300 mm (11¾ in) 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 (0.002 in) 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 (5⅞ in) above grade and located not less than 50 mm (2 in) 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 Masonry Units", and

(b) have a compressive strength over the net area of the block of not less than 15 MPa (2200 psi).

9.17.5.2. Sizes

(1) Unit masonry columns shall be not less than 290 mm by 290 mm (11⅜ in by 11⅜ in) or 240 mm by 380 mm (9½ in by 15 in) 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 (7⅞ in by 7⅞ in) for rectangular columns and 230 mm (9 in) 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 (5 ft 11 in) in height.

9.18.1.2. Foundations

(1) *Foundations* enclosing crawl spaces shall conform to Section 9.15.

9.18.1.3. Heated and Unheated Crawl Spaces

(1) Crawl spaces shall be considered to be heated where the space

(a) is used as a hot 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 (19¾ in) by 700 mm (2 ft 4 in) shall be provided to each crawl space where the crawl space serves a single *dwelling unit*, and not less than 550 mm (21⅝ in) by 900 mm (2 ft 11 in) 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 m² (1.1 ft²) of unobstructed vent area for every 50 m² (538 ft²) 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 (23⅝ in) shall be provided from the access door to the equipment and for a distance of 900 mm (2 ft 11 in) on the side or sides of the equipment to be serviced. (See also

Article 9.3.2.9.)

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 Article 9.16.3.1.

(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 (2 in) of asphalt paving material,
(b) 100 mm (4 in) of 15 MPa (2200 psi) Portland cement concrete,
(c) Type S roll roofing, or
(d) 0.10 mm (0.004 in) polyethylene.

(2) Joints in sheet-type ground cover required in Sentence (1) shall be lapped not less than 100 mm (4 in) 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 (0.006 in) polyethylene sheet conforming to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet, for Use in Building Construction" shall be provided.

(2) Joints in the ground cover required in Sentence (1) shall be lapped not less than 300 mm (11¾ in) and

(a) sealed and weighted down, or
(b) covered with a concrete skim coat not less than 50 mm (2 in) thick.

(3) The perimeter of the ground cover required in Sentence (1) shall be sealed to the *foundation* wall. (See A-9.13.1.3., A-9.13.7. and 9.13.8., and A-9.13.8.1.(2) and (3) in Appendix A.)

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. (See Appendix A.)

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. (See Appendix A.)

9.19.1.2. Vent Requirements

(1) Except as provided in Sentence (2), the unobstructed vent area shall be not less than 1/300 of the insulated ceiling area.

(2) Where the roof slope is less than 1 in 6 or in roofs that are constructed with roof joists, the unobstructed vent area shall be not less than 1/150 of the insulated ceiling area.

(3) Required vents are permitted to be roof type, eave type, gable-end type or any combination thereof, and shall be distributed

(a) uniformly on opposite sides of the *building*,
(b) with not less than 25% of the required openings located at the top of the space, and
(c) with not less than 25% of the required openings located at the bottom of the space.

(4) Except where each 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 (2 in by 2 in) on the top of the roof joists.

(5) Vents shall be designed to prevent the entry of rain, snow and insects.

(6) The unobstructed vent area required in Sentences (1) and (2) shall be determined in conformance with CAN3-A93, "Natural Airflow Ventilators for Buildings".

9.19.1.3. Clearances

(1) Where venting is provided to a roof joist space, not less than 63 mm (2½ in) of space shall be provided between the top of the insulation and the underside of the roof sheathing.

(2) Ceiling insulation shall be installed in a manner which 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* measures:

(a) not less than 10 m² (108 ft²), in area,
(b) not less than 1 000 mm (3 ft 3 in) in length or width, and
(c) not less than 600 mm (23⅝ in) in height over at least the area described in Clauses (a) and (b).

(2) The hatch required in Sentence (1) shall be not less than 550 mm (21⅝ in) by 900 mm (2 ft 11 in) except that, where the hatch serves not more than one *dwelling unit*, the hatch is permitted to be reduced to 500 mm (19¾ in) by 700 mm (2 ft 4 in).

(3) Hatchways to *attic or roof spaces* shall be fitted with doors or covers.

Section 9.20. Above-Grade Masonry

9.20.1. Scope

9.20.1.1. Application

(1) Except as provided in Article 9.20.1.2., this Section applies to unreinforced masonry and masonry veneer in which the wall height above the *foundation* wall does not exceed 11 m (36 ft 1 in), and in which the roof or floor system above the *first storey* is not of concrete construction.

(2) For *buildings* other than described in Sentence (1), or where the masonry is designed on the basis of design loads and allowable stresses, Subsection 4.3.2. shall apply.

9.20.1.2. Earthquake Reinforcement

(See Appendix A.)

(1) In velocity- or acceleration-related seismic zones, of 4 or greater, *loadbearing* elements of masonry *buildings* more than 1 *storey* in *building height* shall be reinforced with at least the minimum amount of reinforcement as required in Subsection 9.20.15.

(2) In velocity- or acceleration-related seismic zones, of 2 and 3, *loadbearing* elements of masonry *buildings* 3 *storeys* in *building height* shall be reinforced with at least 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 C 126, "Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units",
(b) ASTM C 212, "Structural Clay Facing Tile",
(c) CAN/CSA-A82.1, "Burned Clay Brick (Solid Masonry Units Made from Clay or Shale)",
(d) CSA A82.3-M, "Calcium Silicate (Sand-Lime) Building Brick",
(e) CSA A82.4-M, "Structural Clay Load-Bearing Wall Tile",
(f) CSA A82.5-M, "Structural Clay Non-Load-Bearing Tile",
(g) CAN3 A82.8-M, "Hollow Clay Brick",

(h) CAN/CSA-A165.1, "Concrete 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 units exposed to the weather shall have weight and water absorption characteristics conforming to Classes A, B or C, described in CAN/CSA-A165.1, "Concrete Masonry Units".

(2) Where cellular concrete blocks are used in situations described in Sentence (1), allowance shall be made in the design for the shrinkage characteristics of the units to be used.

9.20.2.7. Compressive Strength

(1) The compressive strength of masonry units shall conform to Table 9.20.2.7.

Table 9.20.2.7.
Compressive Strength of Concrete Masonry Units
Forming Part of Sentence 9.20.2.7.(1)

Type of Unit	Minimum Compressive Strength Over Net Area, Mpa (psi)	
	Exposed to Weather	Not Exposed to Weather
Solid or hollow concrete units	15 (2200)	10 (1500)
Solid *loadbearing* cellular units	Not permitted	5 (730)
Solid non-*loadbearing* cellular units	Not permitted	2 (290)
Column 1	2	3

9.20.3. Mortar

9.20.3.1. Mortar Materials

(1) Cementitious materials and aggregates for mortar shall comply with
(a) ASTM C 5, "Quicklime for Structural Purposes",
(b) ASTM C 207, "Hydrated Lime for Masonry Purposes",
(c) CAN/CSA-A5, "Portland Cement",
(d) CAN/CSA-A8, "Masonry Cement", or
(e) CSA A82.56-M, "Aggregate for Masonry Mortar".

(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 Mixes

(1) Except as provided in Sentences (3) and (4), mortar mixes shall conform to Table 9.20.3.2.

(2) Mortar containing portland cement shall not be used later than 2.5 h after mixing.

(3) Mortar for sand-lime brick and concrete brick is permitted to consist of 1 part masonry cement to not less than 3 or not more than 3.5 parts of aggregate by volume in addition to those mixes permitted in Table 9.20.3.2.

(4) Mortar for glass block shall consist of 1 part portland cement and 1 part hydrated lime to not more than 4 parts aggregate by volume.

Table 9.20.3.2.
Mortar Mix Proportions (By Volume)
Forming Part of Sentence 9.20.3.2.(1)

Permissible Use of Mortar	Portland Cement	Masonry Cement	Lime	Aggregate
All locations but not for use with sand-lime or concrete brick	0.5 to 1 1	1 —	— 0.25 to 0.5	Not less than 2.25 and not more than 3 times the sum of the volumes of the cement and the lime
All locations except *foundation* walls and piers, but not for use with sand-lime or concrete brick	— 1	1 —	— 0.5 to 1.25	
All locations except *loadbearing* walls of hollow units, parapet walls and *chimneys*	1	—	1.25 to 2.5	
All non-*loadbearing* interior walls and all *loadbearing* walls of solid units, except *foundation* walls, parapet walls and *chimneys*	1 —	— —	2.25 to 4 1	
Column 1	2	3	4	5

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 (⅜ in).

(2) Permitted tolerances in head and bed joints shall be -5 mm (-3/16 in) to +10 mm (+⅜ in).

9.20.4.2. Solid Masonry Units

(1) 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.

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 9.15.1.3.(3).

(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 permitted in Sentence (3), 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 have even and level bearing and shall have not less than 150 mm (5⅞ in) length of bearing at end supports.

(5) Steel angle lintels supporting masonry shall be prime painted or otherwise protected from corrosion.

Table 9.20.5.2.A.
Loose Steel Lintels for Masonry - No. & Size of Angles Required[7]
Forming Part of Sentence 9.20.5.2.(2)

Clear Span[1][3]	Exterior Angles		Wall Thickness, mm (in)	Interior Angles						
	for Brick	for Stone		Maximum Floor Loads per Metre of Span in Newtons (pounds)[2][4][5]						
	100 mm (4 in)	100 mm (4 in) + 50 mm (2 in) stone facing		None	3 650 (250)	7 300 (500)	10 950 (750)	14 600 (1000)	18 250 (1250)	21 900 (1500)
	No Floor Load									
1 200 mm (3'-11") or less	L-90 x 90x 6 (L-3½"x3½"x¼")	L-125 x 90x 8 (L-5"x3½"x5/16")	203 (8)	L-90 x 90 x6	L-90 x 90 x6	L-90 x 90 x8	L-100 x 90 x8	L-125 x 90 x8	L-125 x 90 x10	L-125 x 90 x13
			305 (12)	2Ls-90 x 90 x 8	2Ls-90 x 90 x 8	2Ls-90 x 90 x 8	2Ls-90 x 90 x 8	2Ls-90 x 90 x 8	2Ls-100 x 90 x 8	2Ls-100 x 90 x 8
1 500 mm (4'-11")	L-90 x 90x 8 (L-3½"x3½"x5/16")	L-125 x 90x 8 (L-5"x3½"x5/16")	203 (8)	L-90 x 90 x8	L-90 x 90 x8	L-125 x 90 x8	L-125 x 90 x10	L-125 x 90 x13	L-150 x 90 x10	— — —
			305 (12)	2Ls-90 x 90 x 8	2Ls-90 x 90 x 8	2Ls-90 x 90 x 8	2Ls-125 x 90 x 8	2Ls-125 x 90 x 8	2Ls-125 x 90 x 8	2Ls-125 x 90 x 10
1 800 mm (5'-11")	L-100 x 90x 8 (L-4"x3½"x5/16")	L-125 x 125x 8 (L-5"x5"x5/16")	203 (8)	L-100 x 90 x 8	L-125 x 90 x 8	L-125 x 90 x 8	L-150 x 100 x 10			
			305 (12)	2Ls-100 x 90 x 8	2Ls-100 x 90 x 8	2Ls-125 x 90 x 8	2Ls-125 x 90 x 8	2Ls-125 x 90 x 10	2Ls-150 x 100 x 10	2Ls-150 x 100 x 10
2 100 mm (6'-11")	L-100 x 90x 8 (L-4"x3½"x5/16")	L-125 x 125x 8 (L-5"x5"x5/16")	203 (8)	L-100 x 90 x 8	L-125 x 90 x 10	L-150 x 100 x 10				
			305 (12)	2Ls-100 x 90 x 8	2Ls-125 x 90 x 10	2Ls-125 x 90 x 10	2Ls-150 x 100 x 10	2Ls-150 x 100 x 10		
2 400 mm (7'-10")	L-125 x 90x 8 (L-5"x3½"x5/16")	L-125 x 125x 8 (L-5"x5"x5/16")	203 (8)	L-125 x 90 x 8	L-150 x 100 x 10					
			305 (12)	2Ls-125 x 90 x 8	2Ls-125 x 90 x 13	2Ls-150 x 100 x 10				
2 700 mm (8'-10")	L-125 x 90x 10 (L-5"x3½"x⅜")	L-125 x 125x 10 (L-5"x5"x⅜")	203 (8)	L-125 x 90 x 10						
			305 (12)	2Ls-125 x 150 x 10	2Ls-150 x 100 x 10					
3 000 mm (9'-10")	L-150 x100 x 10 (L-6"x4"x⅜")	L-125 x 125x 13 (L-5"x5"x½")	203 (8)	L-150 x 100 x 10						
			305 (12)	2Ls-150 x 100 x 10						
Column 1	2	3	4	5	6	7	8	9	10	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 (7⅞ in) walls and interior angles in 300 mm (11¾ in) walls are bolted together when clear span is over 1 800 mm (5 ft 11 in).

(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) fs = 138 Mpa (20,000 psi)., Deflection maximum = 1/700 span.

(7) The figures in the Table indicating wall thickness and angle cross-section are in mm (in).

Table 9.20.5.2.B.
Maximum Allowable Spans for Steel Lintels Supporting Masonry Veneer, m (ft-in)
Forming Part of Sentence 9.20.5.2.(3)

Minimum Angle Size, mm (in)			70 mm (2¾ in)	90 mm (3½ in)	100 mm (4 in)
Vertical Leg	Horizontal Leg	Thickness	Brick	Brick	Stone
90 (3½)	75 (3)	6 (¼)	2.55 (8'-4")	—	—
90 (3½)	90 (3½)	6 (¼)	2.59 (8'-6")	2.47 (8'-1")	2.30 (7'-7")
100 (4)	90 (3½)	6 (¼)	2.79 (9'-2")	2.66 (8'-9")	2.48 (8'-2")
125 (4⅞)	90 (3½)	8 (5/16)	3.47 (11'-5")	3.31 (10'-10")	3.08 (10'-1")
125 (4⅞)	90 (3½)	10 (⅜)	3.64 (11'-11")	3.48 (11'-5")	3.24 (10'-8")
Column 1	2	3	4	5	6

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 (5½ in) thick provided the walls are not more than 2 800 mm (9 ft 2 in) high at the eaves and 4.6 m (15 ft 1 in) 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 (7½ in) thick.

(3) In exterior walls composed of more than one wythe, each wythe shall be not less than 90 mm (3½ in) thick.

9.20.6.2. Cavity Walls

(1) Cavity walls shall be made with not less than 90 mm (3½ in) wide units if the joints are raked and not less than 75 mm (3 in) 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 (2 in) nor greater than 150 mm (5⅞ in).

(3) The minimum thickness of cavity walls above the supporting base shall be 230 mm (9 in) for the top 7.6 m (24 ft 11 in) and 330 mm (13 in) for the remaining portion, except that where 75 mm (3 in) wide units are used, the wall height above the top of the *foundation* wall shall not exceed 6 m (19 ft 8 in).

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 (2⅝ in).

9.20.6.4. Masonry Veneer Walls

(1) Except for masonry veneer individually supported by the back-up material, masonry veneer shall be of solid units not less than 70 mm (2¾ in) thick.

(2) Veneer described in Sentence (1) over wood-frame walls shall have not less than a 25 mm (1 in) air space behind the veneer.

(3) Masonry veneer less than 90 mm (3½ in) thick shall have unraked joints.

(4) Masonry veneer individually supported by the back-up material shall conform to Subsection 4.3.2.

9.20.6.5. Parapet Walls

(1) The height of parapet walls above the adjacent roof surface shall be not more than 3 times the parapet wall thickness.

(2) Parapet walls shall be solid from the top of the parapet to not less than 300 mm (11¾ in) below the adjacent roof level.

9.20.6.6. Stone or Concrete Facings

(1) Limestone slab facings and precast concrete panel facings shall conform to Subsection 4.3.2.

9.20.7. Chases and Recesses

9.20.7.1. Maximum Dimensions

(1) Except as permitted in Sentence 9.20.7.2.(2) and Article 9.20.7.4., the depth of any chase or recess shall not exceed one third the thickness of the wall, and the width of the chase or recess shall not exceed 500 mm (19¾ in).

9.20.7.2. Minimum Wall Thickness

(1) Except as permitted in Sentence (2) and Article 9.20.7.4., no chase or recess shall be constructed in any wall 190 mm (7½ in) or less in thickness.

(2) Recesses may be constructed in 190 mm (7½ in) walls provided they do not exceed 100 mm (4 in) in depth, 750 mm (2 ft 6 in) in height and 500 mm (19¾ in) in width.

9.20.7.3. Separation of Chases and Recesses

(1) Chases and recesses shall be not less than
(a) 4 times the wall thickness apart measured from centre to centre, and
(b) not less than 600 mm (23⅝ in) 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 (2 in) 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 (2 in by 4 in).

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 (2¼ in) 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 (2¼ in) of solid masonry, bridging the full thickness of the wall, or
(b) a wood plate not less than 38 mm (1½ in) thick, bearing not less than 50 mm (2 in) 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 (3½ in).

(3) The length of end bearing of floor, roof or ceiling joists supported on masonry shall be not less than 40 mm (19/16 in).

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 (7½ in).

(2) Not less than 190 mm (7½ in) 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 (2 in by 11¾ in).

(5) Unit masonry pilasters required in Sentence (1) shall be not less than 100 mm by 290 mm (4 in by 11⅜ in).

9.20.8.5. Distance to Edge of Supporting Members

(See Appendix A.)

(1) Masonry veneer of hollow units resting on bearing support shall not project more than

(a) 30 mm (13/16 in) beyond the supporting base where the veneer is not less than 90 mm (3½ in) thick, and

(b) 12 mm (½ in) beyond the supporting base where the veneer is less than 90 mm (3½ in) thick.

(2) Masonry veneer of solid units resting on bearing support shall not project more than one third of the width of the veneer.

(3) Where the masonry veneer described in Sentence (2) is rough stone masonry,

(a) the projection shall be measured as the average projection of the units, and

(b) the width of the veneer shall be measured as the average width of the veneer.

9.20.9. Bonding and Tying

9.20.9.1. Joints to be Offset or Reinforced

(1) Vertical joints in adjacent masonry courses shall be offset unless each wythe of masonry is reinforced with the equivalent of not less than 2 corrosion-resistant steel bars of 3.76 mm (5/32 in) diam placed in the horizontal joints at vertical intervals not exceeding 460 mm (18⅛ in).

(2) Where joints in the reinforcing referred to in Sentence (1) occur, the bars shall be lapped not less than 150 mm (5⅞ in).

9.20.9.2. Bonding or Tying of Other than Masonry Veneer

(1) Masonry walls, other than masonry veneer walls, that consist of 2 or more wythes shall have the wythes bonded or tied together with masonry bonding units as described in Article 9.20.9.3. or with metal ties as described in 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 (23⅝ in) vertically and horizontally in the case of brick masonry and 900 mm (2 ft 11 in) o.c. in the case of block or tile.

(3) Units described in Sentence (1) shall extend not less than 90 mm (3½ in) into adjacent wythes.

9.20.9.4. Tying

(1) Where 2 or more wythes are tied together with metal ties of the individual rod type, the ties shall conform to the requirements in Sentences (3) to (6).

(2) Other ties may be used where it can be shown that such ties provide walls that are at least as strong and as durable as those made with the individual rod type.

(3) Metal ties of the individual rod type shall

(a) be corrosion-resistant,

(b) have a minimum cross-sectional area of not less than 17.8 mm^2 (0.028 in^2), and

(c) have not less than a 50 mm (2 in) portion bent at right angles at each end.

(4) Metal ties of the individual rod type shall

(a) extend from within 25 mm (1 in) of the outer face of the wall to within 25 mm (1 in) of the inner face of the wall,

(b) be completely embedded in mortar except for the portion exposed in cavity walls, and

(c) be staggered from course to course.

(5) Where 2 or more wythes in walls other than cavity walls and masonry veneer/masonry 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 (11¾ in) of openings and spaced not more than 900 mm (2 ft 11 in) apart around openings, and

(b) spaced not more than 900 mm (2 ft 11 in) apart horizontally and 460 mm (18⅛ in) 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 (2 ft 11 in) apart horizontally and 400 mm (15¾ in) apart vertically.

(8) Within 100 mm (4 in) 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 (23⅝ in) apart horizontally.

(9) Within 300 mm (11¾ in) of any openings, the ties described in Sentence (7) shall be spaced not more than 900 mm (2 ft 11 in) apart.

9.20.9.5. Ties for Masonry Veneer

(1) Masonry veneer 70 mm (2¾ in) 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 (0.030 in) thick,
(c) not less than 22 mm (⅞ in) wide,
(d) shaped to provide a key with the mortar, and
(e) spaced in accordance with Table 9.20.9.5.

Table 9.20.9.5.
Veneer Tie Spacing
Forming Part of Sentence 9.20.9.5.(1)

Maximum Vertical Spacing, mm (in)	Maximum Horizontal Spacing, mm (in)
400 (15¾)	800 (31½)
500 (19¾)	600 (23⅝)
600 (23⅝)	400 (15¾)
Column 1	2

(2) The straps described in Sentence (1) which are fastened to the wood framing members shall be

(a) bent at a right angle within 6 mm (¼ in) from the fastener, and
(b) fastened with corrosion resistant 3.18 mm (0.125 in) diam. screws, or spiral nails having a wood penetration of not less than 30 mm (1^3/16 in).

(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 2 corrosion-resistant bars of not less than 3.76 mm (5/32 in) or expanded metal strips not less than 75 mm (3 in) wide

(a) spaced at vertical intervals of not more than 600 mm (23⅝ in) for units 190 mm (7½ in) or less in height, and
(b) installed in every horizontal joint for units higher than 190 mm (7½ in).

(2) Reinforcement required in Sentence (1) shall be lapped not less than 150 mm (5⅞ in).

9.20.10. Lateral Support

9.20.10.1. Lateral Support Required

(1) Masonry walls shall be laterally supported by floor or roof construction or by intersecting masonry walls or buttresses.

(2) The spacing of supports required in Sentence (1) shall be not more than •

(a) 20 times the wall thickness for all *loadbearing* walls and exterior non-*loadbearing* walls, and
(b) 36 times the wall thickness for interior non-*loadbearing* walls.

(3) In applying Sentence (2), the thickness of *cavity walls* shall be taken as the greater of

(a) two-thirds of the sum of the thicknesses of the wythes, or
(b) the thickness of the thicker wythe.

(4) Floor and roof constructions providing lateral support for walls as required in Sentence (1) shall be constructed to transfer lateral loads to walls or buttresses approximately at right angles to the laterally supported walls

9.20.11. Anchorage of Roofs, Floors and Intersecting Walls

9.20.11.1. Anchorage 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 2 000 mm (6 ft 7 in), except that anchorage of floor joists not more than 1 000 mm (3 ft 3 in) 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 ($1^{9}/16$ in) by 4.76 mm (3/16 in) 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 tie.

(4) When joists are parallel to the wall, anchors required in Sentence (1) shall extend across not less than 3 joists.

9.20.11.2. Bonding and Tying 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 imbedded 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 (3/16 in) by 40 mm ($1^{9}/16$ in) steel strapping,
(c) spaced not more than 800 mm (2 ft 7 in) 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 (3/16 in) diam corrosion-resistant steel rods spaced not more than 900 mm (2 ft 11 in) 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 walls by not less than 12.7 mm (½ in) diam anchor bolts

(a) spaced not more than 2 400 mm (7 ft 10 in) apart,
(b) embedded not less that 90 mm (3½ in) into the masonry, and
(c) fastened to a rafter plate of not less than 38 mm (1½ in) 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 which project beyond the wall face shall have not less than 65% of their mass, but not less than 90 mm (3½ in), 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 9.15.2.4.(4) and shall be capped with concrete or reinforced masonry not less than 200 mm (7⅞ in) 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 (1 in) 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 (1 in) over the outer face of the *foundation* wall disregarding parging.

(2) Where the *foundation* wall referred to in Sentence (1) is unit masonry, it is permitted to be corbelled to meet flush with the inner face of a cavity wall provided

(a) the projection of each course does not exceed half

the height or one-third the width of the corbelled unit, and

(b) the total corbel does not exceed one-third of the *foundation* wall thickness.

(See Appendix A.)

9.20.12.3. Corbelling for Masonry Veneer

(1) Masonry veneer resting on a bearing support shall not project more than 25 mm (1 in) beyond the supporting base where the veneer is at least 90 mm (3½ in) thick, and 12 mm (½ in) beyond the supporting base where the veneer is less than 90 mm (3½ in) 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) Material 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 Material
Forming Part of Sentence 9.20.13.1.(1)

Material	Minimum Thickness, mm (in)	
	Exposed Flashing	Concealed Flashing
Aluminum	0.48 (0.019)	—
Copper	0.46 (0.018)	0.46 (0.018)
Copper or aluminum laminated to felt or kraft paper	—	0.05 (0.002)
Hot dipped or galvanized steel	0.33 (0.013)	0.33 (0.013)
Lead sheet	1.73 (1/16)	1.73 (1/16)
Polyethylene	—	0.5 (0.02)
Roll roofing, Type S	—	standard
Zinc	0.46 (0.018)	0.46 (0.018)
Column 1	2	3

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, beneath weep holes, and

(d) 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 which accumulates in the air space will be directed to the exterior of the *building*.

9.20.13.4. Extension of Flashing

(1) A flashing may be deleted 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 which conforms to Article 9.20.13.12.

(2) 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.

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 (1 in) in the inside wythe,

(b) extend to not less than 5 mm (3/16 in) 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 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 (3/16 in) beyond the outer face of the *building* element below the flashing to a point 150 mm (5⅞ in) 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 (2 ft 7 in) 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 9.20.13.4.

(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 which 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,

(b) covered with No. 15 breather-type asphalt-saturated paper conforming to CAN2-51.32,"Sheathing, Membrane, Breather Type", and

(c) the paper referred to in Clause (b) shall be lapped not less than 100 mm (4 in) 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. (See Appendix A.)

9.20.13.10. Mortar Droppings

(1) Cavity walls shall be constructed so that mortar droppings are prevented from forming a bridge to allow the passage of rain water across the cavity.

9.20.13.11. Caulking at Door and Window Frames

(1) The junction of door and window frames with masonry shall be caulked in conformance with Subsection 9.27.4.

9.20.13.12. Drips Beneath Window Sills

(1) Except for wall openings located less than 150 mm (5⅞ in) 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 (1 in) 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 (41°F) 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 CAN3-A371, "Masonry Construction for Buildings".

9.20.16. Corrosion Resistance

9.20.16.1. Corrosion Resistance of Connectors

(1) Carbon steel connectors required to be corrosion-resistant shall be galvanized to at least the minimum standards in Table 9.20.16.1.

Table 9.20.16.1.
Minimum Requirements for Galvanizing
Forming Part of Sentence 9.20.16.1.(1)

Connector Material	ASTM Standard	Coating Class
Wire ties and continuous reinforcing (hot-dipped galvanizing)	A153	Class B2 or 458 g/m² (0.094 lb/ft²)
Hardware and bolts	A153	See A153
Strip, plate, bars, and rolled sections (not less than 3.18 mm (0.125 in) thick)	A123	610 g/m² (0.124 lb/ft²)
Sheet (less than 3.18 mm (0.125 in) thick)	A123	305 g/m² (0.062 lb/ft²) on material 0.76 mm (0.030 in) thick[1]
Column 1	2	3

Notes to Table 9.20.16.1.:
(1) ASTM A123 does not apply to metal less than 3.18 mm (0.125 in) thick.

Galvanizing coatings may be interpolated for thicknesses between 3.18 mm (0.125 in) and 0.76 mm (0.030 in).

Section 9.21. Chimneys and Flues

9.21.1. General

9.21.1.1. Application

(1) Except when otherwise specifically stated herein, this Section applies to

(a) rectangular *chimneys* of brick masonry or concrete not more than 12 m (39 ft 4 in) in height serving fireplaces or *appliances* having a combined total rated heat output of 120 kW (410,000 Btu/h) or less, and

(b) *flue pipes* serving *appliances* regulated by Article 9.33.1.2.

(2) *Chimneys* and *flue pipes* other than those described in Sentence (1) 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, "650°C Factory-Built Chimneys". (See Appendix A.)

9.21.1.3. Chimneys, Gas Vents or Flue Pipes

(1) Except as provided in Sentence (2), *chimneys* (other than those described in Sentences 9.21.1.1.(1) and 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. (Note: vents for gas- or oil-burning *appliances* are regulated by Standards administered by other agencies.)

(2) *Flue pipes* serving solid fuel-burning *stoves*, *ranges* and *space heaters* shall conform to CAN/CSA-B365-M, "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 Limitation

(1) A *chimney flue* serving a fireplace or incinerator shall not serve any other *appliance*.

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 2 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 below connections for *appliances* burning other fuels.

(4) Solid fuel-burning *appliances* shall not be connected to a *chimney flue* serving a gas-burning *appliance*.

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 standards 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)

Fireplace Opening, m²	*Chimney* Height, m							
	3.0 to 4.5		>4.5 to 5.9		>5.9 to 8.9		>8.9 to 12	
	Flue diameter, mm							
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Up to 0.150	110	170	100	160	90	150	90	150
0.151 to 0.250	150	210	130	190	130	190	120	180
0.251 to 0.350	180	240	160	220	150	210	140	200
0.351 to 0.500	220	280	200	260	190	250	170	230
0.501 to 0.650	260	320	230	290	220	280	200	260
0.651 to 0.800	290	350	260	320	240	300	220	280
0.801 to 1.00	330	390	290	350	270	330	250	310
1.01 to 1.20	360	420	320	380	300	360	270	330
1.21 to 1.40	390	450	350	410	330	390	300	360
1.41 to 1.60	420	480	380	440	350	410	320	380
1.61 to 1.80	—	—	400	460	370	430	340	400
1.81 to 2.00	—	—	—	—	400	460	360	420
2.01 to 2.20	—	—	—	—	—	—	380	440
Column 1	2	3	4	5	6	7	8	9

Table 9.21.2.5.B
Rectangular Flue Sizes for Fireplace Chimneys
Forming Part of Sentence 9.21.2.5.(1)

Fireplace Opening, m²	*Chimney* Height, m							
	3.0 to 4.5		›4.5 to 5.9		›5.9 to 8.9		›8.9 to 12	
	Flue Size, mm							
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Up to 0.150	200 x 200	200 x 200	100 x 200	100 x 200	100 x 200	100 x 200	100 x 200	100 x 200
0.151 to 0.250	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200	200 x 200
0.251 to 0.350	200 x 300	200 x 300	200 x 200	200 x 300	200 x 200	200 x 200	200 x 200	200 x 200
0.351 to 0.500	300 x 300	300 x 300	200 x 300	200 x 300	200 x 300	200 x 300	200 x 200	200 x 300
0.501 to 0.650	300 x 300	300 x 400	300 x 300	300 x 300	300 x 300	300 x 300	200 x 300	200 x 300
0.651 to 0.800	300 x 400	300 x 400	300 x 300	300 x 400	300 x 300	300 x 300	300 x 300	300 x 300
0.801 to 1.00	400 x 400	400 x 400	300 x 400	300 x 400	300 x 400	300 x 400	300 x 300	300 x 300
1.01 to 1.20	400 x 400	400 x 400	400 x 400	400 x 400	300 x 400	300 x 400	300 x 400	300 x 400
1.21 to 1.40	—	—	400 x 400	400 x 400	400 x 400	400 x 400	300 x 400	300 x 400
1.41 to 1.60	—	—	—	—	400 x 400	400 x 400	400 x 400	400 x 400
1.61 to 1.80	—	—	—	—	—	—	400 x 400	400 x 400
1.81 to 2.00	—	—	—	—	—	—	400 x 400	400 x 400
Column 1	2	3	4	5	6	7	8	9

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 Linings".

(2) Liners referred to in Sentence (1) shall be not less than 15.9 mm (⅝ in) thick and shall be capable of resisting, without softening or cracking, a temperature of 1100°C (2012°F).

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, "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 (0.012 in) thick stainless steel.

(2) Except as permitted 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*. (See Appendix A.)

9.21.3.7. Installation of Chimney Liners

(1) *Chimney liners* shall be installed when the surrounding masonry or concrete is placed.

9.21.3.8. Spaces between Liners and Surrounding Masonry

(1) A space not less than 10 mm wide shall be left between a *chimney liner* and 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 1 part portland cement to 3 parts sand by volume.

(2) *Chimney liners* used in *chimneys* for oil- or gas-burning *appliances* shall be laid in a full bed of mortar consisting of 1 part portland cement to 3 parts sand by volume.

9.21.3.10. Extension of Chimney Liners

(1) *Chimney liners* shall extend from a point not less than 200 mm (7⅞ in) below the lowest *flue pipe* connection to a point not less than 50 mm (2 in) or more than 100 mm (4 in) 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 (2 ft 11 in) above the highest point at which the *chimney* comes in contact with the roof, and

(b) not less than 600 mm (23⅝ in) above the highest roof surface or structure within 3 m (9 ft 10 in) of the *chimney*.

(See Appendix A.)

9.21.4.5. Lateral Stability

(1) Except as provided in Sentence (2), *chimneys* shall be braced to provide lateral stability for wind loads in accordance with CAN3-S304-M, "Masonry Design for Buildings".

(2) A *chimney* need not be laterally braced provided

(a) no horizontal outside dimension is less than 400 mm (15¾ in), and

(b) the *chimney* extends not more than 3.6 m (11 ft 10 in) above a roof or the masonry wall of which it forms a part.

(See Appendix A.)

9.21.4.6. Chimney Caps

(1) The top of a *chimney* shall have a waterproof cap of reinforced concrete, masonry or metal.

(2) The cap required in Sentence (1) shall slope from the lining and be provided with a drip not less than 25 mm (1 in) 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 (2¾ in) 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 (2¾ in) of masonry or concrete exclusive of liners where clay liners are used, or 90 mm (3½ in) 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 (2 in) for interior *chimneys*, and

(b) 12 mm (½ in) for exterior *chimneys*.

(See Appendix A.)

(2) A clearance of not less than 150 mm (5⅞ in) 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 (½ in) 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 which enclose *chimney flues* provided the *combustible* members are separated from the *flue* by a minimum of 290 mm (11⅜ in) of solid masonry.

Section 9.22. Fireplaces

9.22.1. General

9.22.1.1. Application

(1) Except as otherwise specifically stated herein, this Section applies to masonry fireplaces constructed on site.

9.22.1.2. Masonry and Concrete

(1) Except as otherwise stated in this Section, unit masonry shall conform to Section 9.20. and concrete to Section 9.3.

(2) Masonry above openings shall be supported by steel lintels conforming to Sentence 9.20.5.2.(2), reinforced concrete or a masonry arch.

9.22.1.3. Footings

(1) Footings for masonry and concrete fireplaces shall conform to Section 9.15.

9.22.1.4. Combustion Air

(1) 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 (4 in) 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 (2 in) thick for the sides and back, and
(b) 25 mm (1 in) 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, "Standard for 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 consist of not less than 190 mm (7½ in) thick where a metal liner or a firebrick liner less than 50 mm (2 in) 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 (3½ in) thick, or
(b) hollow masonry units not less than 190 mm (7½ in) 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 (11¾ in).

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 (15¾ in) in front of the fireplace opening measured from the facing, and not less than 200 mm (7⅞ in) beyond each side of the fireplace opening.

(2) Where the fire chamber floor is elevated more than 150 mm (5⅞ in) 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 (2 in) for an elevation above 150 mm (5⅞ in) and not more than 300 mm (11¾ in), and
(b) an additional 25 mm (1 in) for every 50 mm in elevation above 300 mm (11¾ in).

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 (4 in) thick at its supports and, if cantilevered, not less than 50 mm (2 in) thick at its unsupported edge.

(2) A hearth for a fireplace with an opening raised not less than 200 mm (7⅞ in) 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 (7½ in) at the sides, front and back, except that the portions of the back exposed to the outside may be 140 mm (5½ in) 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 (5⅞ in) of the fireplace opening, except that where the *combustible* material projects more than 38 mm (1½ in) out from the face of the fireplace above the opening, such material shall be at least 300 mm (11¾ in) 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 (2 in) 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 (4 in) clearance shall be provided between the back and sides of a solid fuel burning fireplace and *combustible* framing, except that a 50 mm (2 in) clearance is permitted where the fireplace is located in an exterior wall.

(2) Not less than a 50 mm (2 in) 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 (1 in) 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 (11¾ in) where the *combustible* material projects more than 38 mm (1½ in) from the face, and

(b) 150 mm (5⅞ in) where the projection is less than 38 mm (1½ in).

9.22.10. Fireplace Inserts

9.22.10.1. Installation Standard

(1) Fireplace inserts and hearth mounted *stoves* vented through the throat of a fireplace shall conform to ULC S628 "Standard for 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-M, "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 (7½ in) 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*,

(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), or

(c) a direct sealed connection to the smoke chamber and a cleanout provided to any inaccessible part of the smoke chamber.

Section 9.23. Wood-Frame Construction

9.23.1. Scope

9.23.1.1. Application

(1) This Section applies to conventional wood-frame construction in which the framing members are spaced not more than 600 mm (23⅝ in) o.c.

(2) The requirements in this Section with regard to floor framing, subflooring and their fastenings apply to floors for which the design *live load* does not exceed 2.4 kPa (50 psf).

(3) The requirements in this Section with regard to wall framing and its fastenings apply to walls which support floors for which the design *live load* does not exceed 2.4 kPa (50 psf) on any floor.

(4) Where the conditions in Sentences (2) or (3) are exceeded, the design of the framing and fastening shall conform to Subsection 4.3.1.

9.23.1.2. Post, Beam and Plank Construction

(1) Post, beam and plank construction and plank frame wall construction shall conform to Article 9.4.1.2.

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 (½ in) 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 which are supported on concrete in contact with the ground or *fill* shall be separated from the concrete by not less than 0.05 mm (0.002 in) 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 (5⅞ in) 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 (5⅞ in) above *grade*.

(2) Wood lattice or skirting around porches shall be separated from piers and *soil* by at least 50 mm (2 in).

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 B18.6.1., "Slotted and Recessed Wood Screws (Inch Series)". (See Appendix A.)

9.23.3.2. Length of Nails

(1) All nails shall be long enough so that not less than half their required length penetrates into the second member.

9.23.3.3. Prevention of Splitting

(1) Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by

keeping nails well in from the edges. (See Appendix A.)

9.23.3.4. Nailing of Framing

(1) Except as provided in Sentence (2), nailing of framing shall conform to Table 9.23.3.4.

Table 9.23.3.4.
Nailing for Framing
Forming Part of Sentence 9.23.3.4.(1)

Construction Detail	Minimum Length of Nails, mm (in)	Minimum Number or Maximum Spacing of Nails
Floor joist to plate - toe nail	82 (3¼)	2
Wood or metal strapping to underside of floor joists	57 (2¼)	2
Cross bridging to joists	57 (2¼)	2 at each end
Double header or trimmer joists	76 (3)	300 mm (11¾ in) (o.c.)
Floor joist to stud (balloon construction)	76 (3)	2
Ledger strip to wood beam	82 (3¼)	2 per joist
Joist to joist splice (See also Table 9.23.13.8.)	76 (3)	2 at each end
Tail joist to adjacent header joist	82 (3¼)	5
(end nailed) around openings	101 (4)	3
Each header joist to adjacent trimmer joist	82 (3¼)	5
(end nailed) around openings	101 (4)	3
Stud to wall plate (each end) toe nail	63 (2½)	4
or end nail	82 (3¼)	2
Doubled studs at openings, or studs at walls or wall intersections and corners	76 (3)	750 mm (30 in) (o.c.)
Doubled top wall plates	76 (3)	600 mm (23⅝ in) (o.c.)
Bottom wall plate or sole plate to joists or blocking (exterior walls)(1)	82 (3¼)	400 mm (15¾ in) (o.c.)
Interior walls to framing or subflooring	82 (3¼)	600 mm (23⅝ in) (o.c.)
Horizontal member over openings in non-*loadbearing* walls - each end	82 (3¼)	2
Lintels to studs	82 (3¼)	2 at each end
Ceiling joist to plate - toe nail each end	82 (3¼)	2
Roof rafter, roof truss or roof joist to plate - toe nail	82 (3¼)	3
Rafter plate to each ceiling joist	101 (4)	2
Rafter to joist (with ridge supported)	76 (3)	3
Rafter to joist (with ridge unsupported)	76 (3)	See Table 9.23.13.8.
Gusset plate to each rafter at peak	57 (2¼)	4
Rafter to ridge board - toe nail - end nail	82 (3¼)	3
Collar tie to rafter - each end	76 (3)	3
Collar tie lateral support to each collar tie	57 (2¼)	2
Jack rafter to hip or valley rafter	82 (3¼)	2
Roof strut to rafter	76 (3)	3
Roof strut to *loadbearing* wall - toe nail	82 (3¼)	2
38 mm x 140 mm (2 in by 6 in) or less plank decking to support	82 (3¼)	2
Plank decking wider than 38 mm x 140 mm (2 in by 6 in) to support	82 (3¼)	3
38 mm (2 in) edge laid plank decking to support (toe nail)	76 (3)	1
38 mm (2 in) edge laid plank to each other	76 (3)	450 mm (17¾ in) (o.c.)
Column 1	2	3

Note to Table 9.23.3.4.:

(1) 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 (2 in) wide galvanized-metal strips

(i) not less than 0.41 mm (0.016 in) in thickness,
(ii) spaced not more than 1 200 mm (3 ft 11 in) apart, and
(iii) fastened at each end with at least two 63 mm (2½ in) nails.

9.23.3.5. Fastening for Sheathing or Subflooring

(1) Fastening of sheathing and subflooring shall conform to Table 9.23.3.5.

Table 9.23.3.5.
Fasteners for Sheathing and Subflooring
Forming Part of Sentence 9.23.3.5.(1)

Element	Minimum Length of Fasteners, mm (in)				Minimum Number or Maximum Spacing of Fastener
	Common or Spiral Nails	Ring Thread Nails or Screws	Roofing Nails	Staples	
Board lumber 184 mm (8 in) or less wide	51 (2)	45 (1¾)	N/A	51 (2)	2 per support
Board Lumber more than 184 mm (8 in) wide	51 (2)	45 (1¾)	N/A	51 (2)	3 per support
Fibreboard sheathing up to 13 mm (½ in) thick	N/A	N/A	44 (1¾)	28 (1⅛)	
Gypsum sheathing up to 13 mm (½ in) thick	N/A	N/A	44 (1¾)	N/A	
Plywood, OSB or waferboard up to 10 mm (⅜ in) thick	51 (2)	45 (1¾)	N/A	38 (1½)	
Plywood, OSB or waferboard from 10 mm (⅜ in) to 20 mm (13/16 in) thick	51 (2)	45 (1¾)	N/A	51 (2)	
Plywood, OSB or waferboard over 20 mm (13/16 in) Thick	57 (2¼)	51 (2)	N/A	N/A	150 mm (o.c.) along edges and 300 mm (o.c.) along intermediate supports
Column 1	2	3	4	5	6

(2) Staples shall not be less than 1.6 mm (1/16 in) in diameter or thickness, with not less than a 9.5 mm (⅜ in) 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 (⅛ in) in diameter with a minimum head diameter of 11.1 mm (7/16 in).

(4) Flooring screws shall not be less than 3.2 mm (⅛ in) in diameter.

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 4.1.6.3., or

(b) the uniformly distributed *live load* on the floors do not exceed that specified for residential areas as described in Table 4.1.6.3.

(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

(See Appendix A.)

(1) Except as required in Sentence (2), the spans for wood joists, rafters and beams shall conform to the spans shown in Tables A-1 to A-7 for the uniform *live loads* shown

in the tables. (See Article 9.4.2.2.)

(2) Spans for floor joists which are not selected from Tables A-1 and A-2 and which are required to be designed for the same loading conditions, shall not exceed the design requirements for uniform loading and vibration criteria. (See Appendix A.)

(3) Spans for built-up wood and glued-laminated timber floor beams shall conform to the spans in Tables A-8 to A-11. (See Article 9.4.2.2.)

(4) Spans for roof ridge beams shall conform to the spans in Table A-12 for the uniform snow load shown. (See Articles 9.4.2.2. and 9.23.13.8.)

9.23.4.3. Steel Beams

(1) The spans for steel floor beams with laterally supported top flanges shall conform to Table 9.23.4.3. (See Appendix A.)

Table 9.23.4.3.
Maximum Spans for Steel Beams Supporting Floors in Dwelling Units
Forming Part of Sentence 9.23.4.3.(1)

Section	Supported Joist Length, m (Half the sum of joist spans on both sides of the beam)						
	2.4	3.0	3.6	4.2	4.8	5.4	6.0
	One *Storey* Supported						
W150 x 22	5.5	5.2	4.9	4.8	4.5	4.3	4.1
W200 x 21	6.5	6.2	5.7	5.3	5.0	4.7	4.5
W200 x 27	7.3	6.9	6.6	6.3	6.1	5.8	5.5
W200 x 31	7.8	7.4	7.1	6.8	6.6	6.4	6.1
W250 x 24	8.1	7.5	6.9	6.4	6.0	5.7	5.4
W250 x 33	9.2	8.7	8.3	8.0	7.6	7.2	6.9
W250 x 39	10.0	9.4	9.0	8.6	8.3	8.9	7.6
W310 x 31	10.4	9.6	8.8	8.2	7.7	7.3	7.0
W310 x 39	11.3	10.7	10.2	9.8	9.2	8.7	8.3
	Two *Storeys* Supported						
W150 x 22	4.7	4.2	3.9	3.6	3.4	3.2	3.0
W200 x 21	5.2	4.7	4.3	4.0	3.7	3.5	3.4
W200 x 27	6.3	5.7	5.2	4.8	4.5	4.3	4.1
W200 x 31	6.9	6.2	5.7	5.3	5.0	4.7	4.5
W250 x 24	6.2	5.6	5.1	4.8	4.5	4.2	4.0
W250 x 33	7.9	7.1	6.5	6.0	5.7	5.4	5.1
W250 x 39	8.7	7.8	7.2	6.7	6.3	5.9	5.6
W310 x 31	8.0.	7.2	6.6	6.1	5.8	5.4	5.2
W310 x 39	9.5	8.6	7.9	7.3	6.9	6.5	6.2
Column 1	2	3	4	5	6	7	8

(2) Beams described in Sentence (1) shall at least meet the requirements for Grade 300 W steel in CAN/CSA-G40.21-M, "Structural Quality Steels".

(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 (24 in) 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 (1 in by 2 in) 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

(See Appendix A.)

(1) Except as permitted in Sentence (2), where a floor is required to support a concrete topping, the joist spans shown in Table A-1 or the spacing of the members shall be reduced to allow for the loads due to the topping.

(2) Where a floor is required to support a concrete topping, joist spans are permitted to be selected from Table

A-2 provided the concrete

(a) is 38 to 51 mm (1½ to 2 in) thick,
(b) is normal weight,
(c) is placed directly on the subflooring, and
(d) has not less than 20 MPa (2900 psi) compressive strength after 28 days.

(3) Where a floor is required to support a concrete topping, the beam spans shown in Tables A-8 to A-11 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-20. (See A-9.23.4.2. in Appendix A.)

9.23.5. Notching and Drilling

9.23.5.1. Holes Drilled in Framing Members

(1) Holes drilled in roof, floor or ceiling framing members shall be not larger than one-quarter the depth of the member and shall be located not less than 50 mm (2 in) 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 (19/16 in) 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 (2 in) 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 (½ in) diam anchor bolts spaced not more than 2 400 mm (7 ft 10 in) 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 (4 in) 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) Exterior columns and posts shall be anchored to resist uplift and lateral movement.

9.23.6.3. Anchorage of Smaller Buildings

(1) *Buildings* not more than 4.3 m (14 ft 1 in) 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".

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 (2 in by 2 in) lumber bolted to the web with not less than 6.3 mm (¼ in) diam bolts spaced not more than 600 mm (23⅝ in) apart.

(4) Joists referred to in Sentence (3) shall be spliced above the beam with not less than 38 mm by 38 mm (2 in by 2 in) lumber at least 600 mm (23⅝ in) long to support the flooring.

(5) Not less than a 12 mm (½ in) 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.(5), 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) Where a panel-type ceiling finish is attached to wood furring, the provisions of Article 9.23.9.5. shall apply.

(2) Except as permitted in Sentence (5), where strapping is specified, it shall be

(a) not less than 19 mm by 64 mm (1 in by 3 in), nailed to the underside of floor joists
(b) located not more than 2 100 mm (6 ft 11 in) from each support or other rows of strapping, and
(c) fastened at each end to a sill or header.

(3) Where bridging is specified in Table A-1, it shall consist of not less than 19 mm by 64 mm (1 in by 3 in) or 38 mm by 38 mm (2 in by 2 in) cross-bridging located not more than 2 100 mm (6 ft 11 in) from each support or other rows of bridging.

(4) Where bridging and strapping are specified in Tables A-1 and A-2, they shall consist of

(a) bridging as described in Sentence (3), together with, wood strapping as described in Sentence (2), or
(b) 38 mm (1½ in) solid blocking located not more than 2 100 mm (6 ft 11 in) from each support or other rows of bridging and securely fastened between the joists, together with wood strapping as defined in Sentence (2).

(5) Strapping is not required if furring strips or a panel-type ceiling finish is attached directly to the joists. (See A-9.23.4.2.(2) in Appendix A.)

9.23.9.5. Ceiling in Table A2

(1) Where a ceiling is specified in Table A-2, it shall consist of gypsum board, plywood or OSB not less than 12.7 mm (½ in) thick attached to

(a) 19 mm by 89 mm (1 in by 4 in) wood furring spaced at not more than 600 mm (23⅝ in) o.c., or
(b) 19 mm by 64 mm (1 in by 3 in) wood furring spaced at not more than 400 mm (15¾ in) o.c.

9.23.9.6. Header Joists

(1) Header joists around floor openings shall be doubled when they exceed 1 200 mm (3 ft 11 in) in length.

(2) The size of header joists exceeding 3.2 m (10 ft 6 in) in length shall be determined by calculations.

9.23.9.7. Trimmer Joists

(1) Trimmer joists around floor openings shall be doubled when the length of the header joist exceeds 800 mm (2 ft 7 in).

(2) When the header joist exceeds 2 000 mm (6 ft 7 in) in length the size of the trimmer joists shall be determined by calculations.

9.23.9.8. 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.

9.23.9.9. 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 (2 in by 4 in) lumber, spaced not more than 1 200 mm (3 ft 11 in) apart.

(3) Non-*loadbearing* interior walls at right angles to the floor joists are not restricted as to location.

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 (2 in by 4 in) material.

9.23.7.2. Levelling of Sill Plates

(1) Sill plates shall be levelled by setting them on a full bed of mortar, except that where the top of the *foundation* is level, they may be laid directly on the *foundation* provided the junction between the *foundation* and the sill plate is caulked or the sill plate is placed on a layer of mineral wool not less than 25 mm (1 in) thick before being compressed. (See also Article 9.23.2.3.)

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 (3½ in) length of bearing at end supports.

9.23.8.2. Priming of Steel Beams

(1) Steel beams shall be shop primed.

9.23.8.3. Built-up Wood Beams

(See Appendix A.)

(1) Where a beam is made up of individual pieces of lumber that are nailed together, the individual members shall be 38 mm (1½ in) 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 1 span, individual members are permitted to be butted together to form a joint at or within 150 mm (5⅞ in) 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 1 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 (1½ in) 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 (3½ in) in length, spaced not more than 450 mm (17¾ in) apart in each row with the end nails located 100 mm (4 in) to 150 mm (5⅞ in) from the end of each piece.

(8) Where 38 mm (1½ in) 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 (½ in) diam bolts equipped with washers and spaced not more than 1 200 mm (3 ft 11 in) o.c., with the end bolts located not more than 600 mm (23⅝ in) 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 (1½ in) length of end bearing.

(2) Ribbon boards referred to in Sentence (1) shall be not less than 19 mm by 89 mm (1 in by 4 in) 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 (2 in by 3 in) ledger strips nailed to the side of the beam, except that 38 mm by 38 mm (2 in by 2 in) ledger strips may be used provided each joist is nailed to the beam by at least four 89 mm (3½ in) 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

(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 (2 ft 11 in) from the joist support when the wall does not support a floor, and not more than 600 mm (23⅝ in) from the joist support when the wall supports one or more floors, unless the joist size is designed to support such loads.

9.23.9.10. Cantilevered Floor Joists

(1) Floor joists supporting roof loads shall not be cantilevered more than 400 mm (15¾ in) beyond their supports where 38 mm by 184 mm (2 in by 8 in) joists are used and not more than 600 mm (23⅝ in) beyond their supports where 38 mm by 235 mm (2 in by 10 in) 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 6 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) The size and spacing of studs shall conform to Table 9.23.10.1.

9.23.10.2. Bracing and Lateral Support

(See Appendix A.)

(1) Except as provided in Sentence (2), each exterior wall in each *storey* shall be braced with at least one diagonal brace conforming to Sentence (3).

(2) Bracing is not required where 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 (1 in by 4 in) 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 (2½ in) 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 not less than 1 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 2 100 mm (6 ft 11 in) 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. (See Appendix A.)

Table 9.23.10.1.
Size and Spacing of Studs
Forming Part of Sentence 9.23.10.1.(1)

Type of Wall	Supported Loads (including *dead loads*)	Minimum Stud Size, mm (in)	Maximum Stud Spacing, mm (in)	Maximum Unsupported Height, m (ft-in)
Interior	No load	38 x 38 (2" x 2") 38 x 89 (2" x 4") flat[1]	400 (16) 400 (16)	2.4 (7'-10") 3.6 (11'-10")
	Attic not accessible by a stairway	38 x 64 (2" x 3") 38 x 64 (2" x 3") flat[1] 38 x 89 (2" x 4") 38 x 89 (2" x 4") flat[1]	600 (24) 400 (16) 600 (24) 400 (16)	3.0 (9'-10") 2.4 (7'-10") 3.6 (11'-10") 2.4 (7'-10")
	Attic accessible by a stairway plus one floor Roof load plus one floor Attic not accessible by stairway plus 2 floors	38 x 89 (2" x 4")	400 (16)	3.6 (11'-10")
	Roof load, Attic accessible by a stairway Attic not accessible by a stairway plus one floor	 38 x 64 (2" x 3") 38 x 89 (2" x 4")	 400 (16) 600 (24)	 2.4 (7'-10") 3.6 (11'-10")
	Attic accessible by a stairway plus 2 floors Roof load plus 2 floors	38 x 89 (2" x 4") 64 x 89 (3" x 4") 38 x 140 (2" x 6")	300 (12) 400 (16) 400 (16)	3.6 (11'-10") 3.6 (11'-10") 4.2 (13'-9")
	Attic accessible by a stairway plus 3 floors Roof load plus 3 floors	38 x 140 (2" x 6")	300 (12)	4.2 (13'-9")
Exterior	Roof with or without attic storage	38 x 64 (2" x 3") 38 x 89 (2" x 4")	400 (16) 600 (24)	2.4 (7'-10") 3.0 (9'-10")
	Roof with or without attic storage plus one floor	38 x 89 (2" x 4") 38 x 140 (2" x 6")	400 (16) 600 (24)	3.0 (9'-10") 3.0 (9'-10")
	Roof with or without attic storage plus 2 floors	38 x 89 (2" x 4") 64 x 89 (3" x 4") 38 x 140 (2" x 6")	300 (12) 400 (16) 400 (16)	3.0 (9'-10") 3.0 (9'-10") 3.6 (11'-10")
	Roof with or without attic storage plus 3 floors	38 x 140 (2" x 6")	300 (12)	1.8 (5'-11")
Column 1	2	3	4	5

Notes to Table 9.23.10.1.:
[1] See Article 9.23.10.3.

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 2 studs.

(2) Where the vertical edges of interior finishes at wall intersections are supported at vertical intervals by blocking or furring, the vertical distance between such supports shall not exceed the maximum distance between supports specified in Section 9.29.

9.23.10.6. Studs at Sides of Openings

(1) 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 2 such openings of full stud space width are located in adjacent stud spaces.

(See Appendix A.)

9.23.11. Wall Plates

9.23.11.1. Size of Wall Plates

(1) Except as provided in Sentence (2), wall plates shall be

(a) not less than 38 mm (1½ in) 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 (¾ in) 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 2 top plates shall be provided in *loadbearing* walls.

(2) A single top plate is permitted to be used in a section of a *loadbearing* wall containing a lintel provided the top plate forms a tie across the lintel.

(3) A single top plate is permitted to be used in *loadbearing* walls where the concentrated loads from ceilings, floors and roofs are not more than 50 mm (2 in) 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 (3 in) by 150 mm (5⅞ in) by 0.91 mm (0.036 in) thick galvanized steel, or

(b) 19 mm (1 in) by 89 mm (4 in) by 300 mm (11¾ in) wood splice nailed to each wall section with at least three 63 mm (2½ in) 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 (3 in) by 150 mm (5⅞ in) by 0.91 mm (0.036 in) thick galvanized steel nailed to each wall with at least three 63 mm (2½ in) 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 (1½ in) 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 (1½ in) thick members that are the same width as the wall plates.

9.23.12.2. Openings in Loadbearing Walls

(1) Openings in *loadbearing* walls greater than the required stud spacing shall be framed with lintels designed to carry the superimposed loads to adjacent studs. (See A-9.23.10.6.(2) in Appendix A.)

(2) Except as provided in Sentence 9.23.12.3.(3), where 2 or more members are used in lintels, they shall be fastened together with not less than 82 mm (3¼ in) nails in a double row, with nails not more than 450 mm (17¾ in) 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-13 to A-20

(a) for *buildings* of *residential occupancy*,

(b) where the wall studs exceed 38 mm by 64 mm (2 in

by 3 in) in size,
(c) where the spans of supported joists do not exceed 4.9 m (16 ft 1 in), and
(d) where the spans of trusses do not exceed 9.8 m (32 ft 2 in).

(2) In *loadbearing* exterior and interior walls of 38 by 64 mm (2 in by 3 in) framing members, lintels shall consist of
(a) solid 64 mm (2½ in) thick members on edge, or
(b) 38 mm (1½ in) thick and 19 mm (¾ in) thick members fastened together with a double row of nails not less than 63 mm (2½ in) long and spaced not more than 450 mm (17¾ in) apart.

(3) Lintels referred to in Sentence (2)
(a) shall be not less than 50 mm (2 in) greater in depth than those shown in Tables A-13 to A-20 for the maximum spans shown, and
(b) shall not exceed 2 240 mm (7 ft 4 in) in length.

9.23.13. Roof and Ceiling Framing

9.23.13.1. Continuity of Rafters and Joists

(1) Roof rafters and joists and ceiling joists shall be continuous or shall be spliced over vertical supports that extend to suitable bearing.

9.23.13.2. Framing around Openings

(1) Roof and ceiling framing members shall be doubled on each side of openings greater than 2 rafter or joist spacings wide.

9.23.13.3. End Bearing Length

(1) The length of end bearing of joists and rafters shall be not less than 38 mm (1½ in).

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 (11/16 in) 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 (7⅞ in) by 75 mm (3 in) by 0.41 mm (0.016 in) thick spaced not more than 1 200 mm (3 ft 11 in) apart and nailed at each end to the framing by at least two 63 mm (2½ in) 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 (2 in) greater in depth than the common rafters and not less than 38 mm (1½ in) 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 (2 in by 4 in) 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 2 400 mm (7 ft 10 in) long shall be laterally supported near their centres by not less than 19 mm by 89 mm (1 in by 4 in) 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 (2 in by 4 in) material extending from each rafter to a *loadbearing* wall at an angle of not less than 45° to the horizontal.

(5) When dwarf walls are used for rafter support, they shall be framed in the same manner as *loadbearing* walls and securely fastened top and bottom to the roof and ceiling framing to prevent over-all movement.

(6) Solid blocking shall be installed between floor joists beneath dwarf walls referred to in Sentence (5) that enclose finished rooms.

9.23.13.8. Ridge Support

(1) Except as provided in Sentence (4), roof rafters and joists shall be supported at the ridge of the roof by

(a) a *loadbearing* wall extending from the ridge to suitable bearing, or

(b) a ridge beam supported by not less than 89 mm (3½ in) 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 (16 ft 1 in), 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 (1½ in by 5½ in) material, and

(b) the beam is supported at intervals not exceeding 1 200 mm (3 ft 11 in) by not less than 38 mm by 89 mm (2 in by 4 in) 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 consis 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 the Table 9.23.13.8.

(7) Members referred to in Sentence (6) are permitted tc 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)

Roof Slope	Rafter Spacing, mm (in)	Minimum Number of Nails not less than 75 mm (3 in) Long											
		Rafter Tied to every Joist						Rafter tied to Joist every 1.2 m (3 ft 11 in)					
		Building Width up to 8 m (26 ft 3 in)			*Building* width up to 9.8 m (32 ft 2 in)			*Building* Width up to 8 m (26 ft 3 in)			*Building* Width up to 9.8 m (32 ft 2 in)		
		Roof Snow Load, kPa (psf)			Roof Snow Load, kPa (psf)			Roof Snow Load, kPa (psf)			Roof Snow Load, kPa (psf)		
		1.0 (20) or less	1.5 (30)	2.0 (40) or more	1.0 (20) or less	1.5 (30)	2.0 (40) or more	1.0 (20) or less	1.5 (30)	2.0 (40) or more	1.0 (20) or less	1.5 (30)	2.0 (40) or more
1 in 3	400 (16)	4	5	6	5	7	8	11	—	—	—	—	—
	600 (24)	6	8	9	8	—	—	11	—	—	—	—	—
1 in 2.4	400 (16)	4	4	5	5	6	7	7	10	—	9	—	—
	600 (24)	5	7	8	7	9	11	7	10	—	—	—	—
1 in 2	400 (16)	4	4	4	4	4	5	6	8	9	8	—	—
	600 (24)	4	5	6	5	7	8	6	8	9	8	—	—
1 in 1.71	400 (16)	4	4	4	4	4	4	5	7	8	7	9	11
	600 (24)	4	4	5	5	6	7	5	7	8	7	9	11
1 in 1.33	400 (16)	4	4	4	4	4	4	4	5	6	5	6	7
	600 (24)	4	4	4	4	4	5	4	5	6	5	6	7
1 in 1	400 (16)	4	4	4	4	4	4	4	4	4	4	4	5
	600 (24)	4	4	4	4	4	4	4	4	4	4	4	5
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14

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 Loads Supporting Roof Loads

(1) Except as permitted in Sentence (2), ceiling joists supporting part of the roof load from the rafters shall be not less than 25 mm (1 in) 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 which are not designed in accordance with Part 4 shall

(a) be capable of supporting a total ceiling load (*dead load* plus *live load*) of 0.5 kPa (10 psf) 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)

Truss Span	Type of Ceiling	Maximum Deflection
4.3 m (14 ft 1 in) or less	Plaster or gypsum board	1/360 of the span
	Other than plaster or gypsum board	1/180 of the span
Over 4.3 m (14 ft 1 in)	Plaster or gypsum board	1/360 of the span
	Other than plaster or gypsum board	1/240 of the span
Column 1	2	3

(2) The joint connections used in trusses described in Sentence (1) shall be designed in conformance with the requirements in Subsection 4.3.1. (See Appendix A.)

(3) Where the length of compression web members in roof trusses described in Sentence (1) exceeds 1 830 mm (6 ft), 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 (1 in by 4 in) lumber nailed at right angles to the web members near their centres with at least two 63 mm (2½ in) 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 "Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses", published by the Truss Plate Institute of Canada.

9.23.14. Subflooring

9.23.14.1. Subflooring Required

(1) Subflooring shall be provided beneath finish flooring where the finish flooring does not have adequate strength to support the design loads. (See Subsection 9.30.3.)

9.23.14.2. Material Standards

(1) Wood-based panels for subfloors shall conform to

(a) CSA O121, "Douglas Fir Plywood",

(b) CSA O151, "Canadian Softwood Plywood",

(c) CSA O153, "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 N-1 or N-2 in CAN3-O188.1, "Interior Mat-Formed Wood 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 and other areas subject to periodic wetting. (See Appendix A.)

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 (2 in by 2 in) 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 O-1 and O-2 grades in CSA-O437.0 and waferboard subflooring conforming to R-1 grade in CSA O437.0 shall be installed with the direction of face orientation at right angles to the joists and with the joints parallel to floor joists staggered. (See Appendix A.)

9.23.14.5. Subfloor Thickness or Rating

(1) Except as provided in Sentences (2) and (3), subfloors shall conform to Table 9.23.14.5.A. or Table 9.23.14.5.B.

Table 9.23.14.5.A.
Thickness of Subflooring
Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.6.(1)

Maximum Spacing of Supports, mm (in)	Minimum Thickness, mm (in)			
	Plywood and OSB, O-2 Grade	OSB, O-1 Grade, and Waferboard, R-1 Grade	Particleboard	Lumber
400 (16)	15.5 (5/8)	15.9 (5/8)	15.9 (5/8)	17.0 (11/16)
500 (20)	15.5 (5/8)	15.9 (5/8)	19.0 (3/4)	19.0 (3/4)
600 (24)	18.5 (3/4)	19.0 (3/4)	25.4 (1)	19.0 (3/4)
Column 1	2	3	4	5

(2) Where the finished flooring consists of not less than 19 mm (¾ in) matched wood strip flooring laid at right angles to joists, spaced not more than 600 mm (24 in) o.c., subflooring shall be permitted to consist of not less than

(a) 12.5 mm (½ in) thick plywood,
(b) 12.5 mm (½ in) thick OSB conforming to O-2 grade,
(c) 12.7 mm (½ in) thick OSB conforming to O-1 grade, or
(d) 12.7 mm (½ in) thick waferboard conforming to R-1 grade.

Table 9.23.14.5.B.
Rating for Subfloor when Applying CSA 0325.0
Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.6.(1)

Maximum Spacing of Supports, mm (in)	Panel Mark	
	Subfloor	Used with Panel-Type Underlay
400 (16)	1F16	2F16
500 (20)	1F20	2F20
600 (24)	1F24	2F24
Column 1	2	3

(3) Except where the flooring consists of ceramic tiles applied with adhesive, where a separate panel-type underlay or concrete topping is applied to a subfloor on joists spaced not more than 400 mm (16 in) o.c., the subfloor may consist of not less than

(a) 12.5 mm (½ in) thick plywood,
(b) 12.5 mm (½ in) thick OSB conforming to O-2 grade,
(c) 12.7 mm (½ in) thick OSB conforming to O-1 grade, or
(d) 12.7 mm (½ in) thick waferboard conforming to R-1 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 45^0 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 (7¼ in) wide.

9.23.15. Roof Sheathing

9.23.15.1. Material Standards

(1) Wood-based panels used for roof sheathing shall conform to the requirements of

(a) CSA O121, "Douglas Fir Plywood",
(b) CSA O151, "Canadian Softwood Plywood",

(c) CSA O153, "Poplar Plywood",
(d) CAN/CSA-O325.0, "Construction Sheathing", or
(e) CAN3-O437.0, "OSB and Waferboard".

9.23.15.2. 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 O-1 and O-2 grades as specified in CSA-O437.0, "OSB and Waferboard", shall be installed with the direction of face orientation at right angles to the roof framing members. (See A-9.23.14.4.(2) in Appendix A.)

9.23.15.3. 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 (3/32 in) shall be left between sheets of plywood, OSB or waferboard.

9.23.15.4. Lumber Roof Sheathing

(1) Lumber roof sheathing shall not be more than 286 mm (11¼ in) wide and shall be applied so that all ends are supported with end joints staggered.

9.23.15.5. 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 (2 in by 2 in) 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.

9.23.15.6. 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.

Table 9.23.15.6.A.
Thickness of Roof Sheathing
Forming Part of Sentence 9.23.15.6.(2)

Maximum Spacing of Supports, mm (in)	Minimum Thickness, mm (in)				
	Plywood and OSB, O-2 Grade		OSB, O-1 Grade and Waferboard, R-1 Grade		Lumber
	Edges Supported	Edges Unsupported	Edges Supported	Edges Unsupported	
300 (12)	7.5 (5/16)	7.5 (5/16)	9.5 (⅜)	9.5 (⅜)	17.0 (11/16)
400 (16)	7.5 (5/16)	9.5 (⅜)	9.5 (⅜)	11.1 (7/16)	17.0 (11/16)
600 (24)	9.5 (⅜)	12.5 (½)	11.1 (7/16)	12.7 (½)	19.0 (¾)
Column 1	2	3	4	5	6

Table 9.23.15.6.B.
Rating for Roof Sheathing When Applying CSA O325.0
Forming Part of Sentence 9.23.15.6.(2)

Maximum Spacing of Supports, mm (in)	Panel Mark	
	Edges Supported	Edges Unsupported
400 (16)	2R16	1R16
500 (20)	2R20	1R20
600 (24)	2R24	1R24
Column 1	2	3

(2) The thickness or rating of roof sheathing on a roof not used as a walking deck shall conform to either Table 9.23.15.6.A. or Table 9.23.15.6.B.

(3) Asphalt-coated or asphalt-impregnated fibreboard not less than 11.1 mm (7/16 in) thick conforming to CSA A247-M, "Insulating Fibreboard" is permitted to be used as a roof sheathing over supports spaced not more than 400 mm (16 in) o.c. provided the roofing consists of
(a) a continuous sheet of galvanized steel not less than 0.33 mm (0.013 in) in thickness, or

(b) a continuous sheet of aluminum not less than 0.61 mm (0.024 in) 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, 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 Article 9.23.16.2.(1)

Type of Sheathing	Minimum Thickness, mm (in) [1]		Material Standards
	With Supports 400 mm (16 in) o.c.	With Supports 600 mm (24 in) o.c.	
Fibreboard (insulating)	9.5 (3/8)	11.1 (7/16)	CAN/CSA-A247
Gypsum sheathing	9.5 (3/8)	12.7 (1/2)	CSA/CSA-A82.27-M ASTM C 97
Lumber	17.0 (11/16)	17.0 (11/16)	See Table 9.3.2.1.
Mineral Fibre, Rigid Board, Type 2	25 (1)	25 (1)	CSA A101-M
OSB. O-2 Grade	6.0 (1/4)	7.5 (5/16)	CSA O437
OSB, O-1 Grade, and waferboard, R-1 Grade	6.35 (1/4)	7.9 (5/16)	CSA O437
Phenolic, faced	25 (1)	25 (1)	CAN/CGSB-51.25-M
Plywood (exterior type)	6.0 (1/4)	7.5 (5/16)	CSA O121-M CSA O151-M CSA O153-M
Polystyrene expanded Types 1 and 2	38 (1 1/2)	38 (1 1/2)	CAN/CGSB-51.20-M
Polystyrene expanded Types 3 and 4	25 (1)	25 (1)	CAN/CGSB-51.20-M
Urethane and Isocycanurate Types 1, 2 and 4	38 (1 1/2)	38 (1 1/2)	CGSB 51-GP-21M
Urethane and Isocycanurate, Type 3	25 (1)	25 (1)	CGSB 51-GP-21M
Urethane and Isocycanurate Types 1 and 2 faced	25 (1)	25 (1)	CAN/CGSB-51.26-M
Column 1	2	3	4

Notes to Table 9.23.16.2.A.:
[1] See also Sentences 9.27.5.1.(2) to (4).

Table 9.23.16.2.B.
Rating For Wall Sheathing When Applying CSA O325.0
Forming Part of Article 9.23.16.2.

Maximum Spacing of Supports, mm (in)	Panel Mark
400 (16)	W16
500 (20)	W20
600 (24)	W24
Column 1	2

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 (1/8 in) diam with a minimum head diameter of 11 mm (7/16 in).

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 (3/32 in) 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 Subsection 9.23.17.

9.23.17. Wall Sheathing Membrane

9.23.17.1. Material Standard

(1) Sheathing paper shall conform to the performance requirements of CAN2-51.32-M, "Sheathing, Membrane, Breather Type".

9.23.17.2. Sheathing Paper Beneath Stucco

(1) Tar-saturated felts or papers shall not be used as a sheathing paper beneath stucco.

9.23.17.3. Sheathing Membrane and Installation

(1) Except as provided in Articles 9.23.17.4., 9.23.17.5. and 9.23.17.6., 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 (4 in).

(3) Where sheathing membrane required in Sentence (1) is applied horizontally, the upper sheets shall overlap the lower sheets.

9.23.17.4. Insulating Sheathing in Lieu of Sheathing Membrane

(1) Where non-wood based rigid exterior insulating sheathing, or exterior insulating sheathing with an integral sheathing membrane is installed, a separate sheathing membrane is not required.

(2) Where insulating sheathing is installed as provided in Sentence (1),

(a) sheathing panels subject to moisture deterioration shall be sealed at all joints, and
(b) the joints of sheathing panels not subject to moisture deterioration shall be
  (i) sealed at all joints, or
  (ii) lapped or tongue and groove, and detailed to ensure drainage of water to the exterior.

(See Appendix A.)

9.23.17.5. Sheathing Membranes in Lieu of Sheathing

(1) Except as provided in Article 9.23.17.6., where no sheathing is used, at least 2 layers of sheathing membrane shall be applied beneath the cladding. (See Article 9.23.16.1. and Appendix A.)

(2) All joints in the sheathing membrane required in Sentence (1) shall occur over framing, and the membrane shall be fastened to the framing with roofing nails or staples spaced not more than 150 mm (5⅞ in) along the edges of the outer layer of sheathing paper.

(3) Wall sheathing is permitted to be used in lieu of 1 layer of sheathing membrane required in Sentence (1), and the thickness need not conform to Table 9.23.16.2.A.

9.23.17.6. Face Sealed Cladding

(See Appendix A.)

(1) Sheathing membrane is permitted to be omitted beneath cladding when the joints in the cladding are formed to effectively prevent the passage of wind and rain in conformance with Sentence (2) or (4) as applicable.

(2) Cladding consisting of sheets of plywood, hardboard, OSB, waferboard or asbestos 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, and
(b) the vertical joints between adjacent sheets are
  (i) covered with battens,

(ii) shiplapped, or
(iii) otherwise matched to provide weathertight joints.

(3) Joints between sheets described in Sentence (2) shall be caulked.

(4) 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.

Section 9.24. Sheet Steel Stud Wall Framing

9.24.1. General

9.24.1.1. Application

(1) This Section applies to sheet steel studs for use in non-*loadbearing* exterior and interior walls.

(2) Where *loadbearing* steel studs are used, they shall be designed in conformance with Part 4.

9.24.1.2. Material Standards

(1) Steel studs and runners shall conform to CAN/CGSB-7.1-M, "Cold Formed Steel Framing Components".

9.24.1.3. Metal Thickness

(1) Metal thickness specified in this Section shall be the minimum base steel thickness exclusive of coatings.

9.24.1.4. Screws

(1) Screws for the application of cladding, sheathing or interior finish materials to steel studs, runners and furring channels shall conform to ASTM C1002, "Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases".

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 (3/8 in) through the metal.

9.24.2. Size of Framing

9.24.2.1. Size and Spacing of Studs in Interior Walls

(1) Except as required in Articles 9.24.2.3. and 9.24.2.4., the size and spacing of steel studs for non-*loadbearing* interior walls shall conform to Table 9.24.2.1.

Table 9.24.2.1.
Steel Studs for Non-Loadbearing Interior Walls
Forming Part of Sentence 9.24.2.1.(1)

Minimum Stud Size, mm (in)	Maximum Stud Spacing, mm (in)	Maximum Wall Height, m (ft-in)
30 x 40 (13/16 x 19/16)	400 (16) 600 (24)	3.0 (9'-10") 2.7 (8'-10")
30 x 63 (13/16 x 2 1/2)	400 (16) 600 (24)	4.0 (13'-1") 3.6 (11'-10")
30 x 91 (13/16 x 3 5/8)	400 (16) 600 (24)	5.2 (17'-1") 4.9 (16'-1")
Column 1	2	3

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 (0.018 in).

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 (13/16 in) 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 1 200 mm (3 ft 11 in) in width,

(a) the width of steel studs shall be not less than 63 mm (2½ in), and
(b) the steel thickness shall be not less than 0.46 mm (0.018 in).

(2) Where openings described in Sentence (1) exceed 1 200 mm (3 ft 11 in) in width,

(a) the width of steel studs shall be not less than 91 mm (3⅝ in), and

(b) the metal thickness shall be not less than 0.85 mm (0.033 in).

(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 (16 in).

(4) Where the distance between the framing over the opening referred to in Sentence (1) and the top runner exceeds 400 mm (16 in) in such walls, intermediate support shall be installed at intervals of not more than 400 mm (16 in) above the opening.

9.24.2.5. Size and Spacing of Studs in Exterior Walls

(1) The size and spacing of non-*loadbearing* steel studs for exterior walls shall conform to Table 9.24.2.5.

Table 9.24.2.5.
Size and Spacing of Steel Studs for Non-Loadbearing Exterior Walls
Forming Part of Sentence 9.24.2.5.(1)

Minimum Stud Size, mm (in)	Minimum Metal Thickness, mm (in)	Maximum Stud Length, m (ft-in)		
		Spacing of Studs		
		300 mm (12 in), (o.c.)	400 mm (16 in), (o.c.)	600 mm (24 in), (o.c.)
30 x 91 (1 3/16x3⅝)	0.53 (0.021)	3.0 (9'-10")	2.4 (7'-10")	—
30 x 91 (1 3/16x3⅝)	0.69 (0.027)	3.3 (10'-10")	2.7 (8'-10")	2.4 (7'-10")
30 x 91 (1 3/16x3⅝)	0.85 (0.033)	3.6 (11'-10")	3.0 (9'-10")	2.7 (8'-10")
30 x 91 (1 3/16x3⅝)	1.0 (0.039)	4.0 (13'-1")	3.3 (10'-10")	3.0 (9'-10")
Column 1	2	3	4	5

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 (2 in) from the ends, and at intervals of not more than 600 mm (24 in) o.c. for interior walls and 300 mm (11¾ in) o.c. for exterior walls.

(3) Fasteners used for attachment described in Sentence (2) shall consist of the equivalent of 63 mm (2½ in) nails or 25 mm (1 in) screws.

(4) Studs at openings and which are not full wall height shall be supported by a runner at the ends of the studs, securely fastened to the full length studs at the sides of the opening.

9.24.3.2. Fire-Rated Walls

(1) Steel studs used in walls required to have a *fire-resistance rating* shall be installed so that there is not less than a 12 mm (½ in) clearance between the top of the stud and the top of the runner to allow for expansion in the event of fire.

(2) Except as provided in Article 9.24.3.6., studs in walls referred to in Sentence (1) shall not be attached to the runners in a manner that will prevent such expansion.

(3) Framing above doors with steel door frames in non-*loadbearing fire separations* required to have a *fire-resistance rating* shall consist of 2 runners on the flat fastened back to back. (See Appendix A.)

(4) The 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 (5⅞ in) 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 1 stud space, and shall be tripled where the openings in exterior walls exceed 2 400 mm (7 ft 10 in) 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 (11¾ in) 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 (½ in) fastened to stud and runner webs.

Section 9.25. Heat Transfer, Air Leakage and Condensation Control

9.25.1. Scope

9.25.1.1. Application

(1) This Section applies to the application of thermal insulation and measures to control condensation, heat transfer and air leakage for *buildings* of *residential occupancy* intended for use on a continuing basis during the winter months.

(2) Insulation and sealing of heating and ventilating ducts shall conform to Sections 9.32. and 9.33.

9.25.1.2. General

(See Appendix A.)

(1) Except as provided in Sentence (2), any sheet or panel type material with an air leakage characteristic less than 0.1 l/(s.m^2) at 75 Pa (0.011 psi) and water vapour permeance less than 60 ng/(Pa•s•m^2) (1 PERM INS.) and incorporated in a *building* assembly required by Article 9.25.2.1. to be insulated 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 required in Table 9.25.1.2., or

(c) outboard of an air space that is vented to the outdoors and, for walls, drained.

Table 9.25.1.2.
Ratio of Outboard to Inboard Thermal Resistance
Forming Part of Sentence 9.25.1.2.(1)

Heating Degree Days of *Building Location*[1], Celsius degree-days	Minimum Ratio, Total Thermal Resistance Outboard of material's Inner Surface to Total Thermal Resistance Inboard of Material's Inner Surface
up to 4999	0.20
5000 to 5999	0.30
6000 to 6999	0.35
7000 to 7999	0.40
8000 to 8999	0.50
9000 to 9999	0.55
10000 to 10999	0.60
11000 to 11999	0.65
12000 or higher	0.75
Column 1	2

Notes to Table 9.25.1.2.:
(1) See Sentence 2.5.1.1.(1)

(2) Sheathing materials installed so that, in each framing space, at least one of the gaps required by Article 9.23.15.3. and Sentence 9.23.16.5.(1) does not occur over framing need not comply with Sentence (1).

9.25.1.3. Thermal Design

(1) The requirements for thermal insulation in this Section need not be met where thermal design is provided in accordance with Section 9.38.

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 sufficient thermal insulation to prevent moisture condensation on their room side during the winter and to ensure comfortable conditions for the occupants. (See A-9.1.1.1. in Appendix A.)

(2) Insulation shall be provided between heated and unheated spaces and between heated spaces and the exterior, and around the perimeter of concrete slabs-on-ground.

(3) Reflective surfaces of insulating materials shall not be considered in calculating the thermal resistance of *building* assemblies.

(4) Except as permitted in Sentences (5), (6), (7), (8), (13) and (14) the minimum thermal resistance of insulation shall conform to Table 9.25.2.1.

(5) Except for doors on enclosed unheated vestibules and cold cellars, and except for glazed portions of doors, all doors separating heated space from unheated space shall have a thermal resistance of not less than RSI 0.7 (R4) where a storm door is not provided.

(6) All sliding glass doors separating heated space from unheated space shall have a thermal resistance of not less than 0.30 $m^2°C/W$ (1.70 $ft^2.h.°F/Btu$).

Table 9.25.2.1.
Minimum Thermal Resistance of Insulation to be Installed based on Degree Day Zones[1]
Forming Part of Sentence 9.25.2.1.(4)

Building Element Exposed to the Exterior or to Unheated Space	RSI (R) Value Required		
	Zone 1 Less than 5000	Zone 2 5000 or more	*Electric Space Heating* Zone 1 & 2
Ceiling below *attic or roof space*	5.40 (R31)	6.70 (R38)	7.00 (R40)
Roof assembly without *attic or roof space*	3.52 (R20)	3.52 (R20)	3.87 (R22)
Wall other than *foundation* wall	3.00 (R17)	3.87 (R22)	4.70 (R27)
Foundation walls enclosing heated space	1.41 (R8)	2.11 (R12)	3.25 (R19)
Floor, other than slab-on-ground	4.40 (R25)	4.40 (R25)	4.40 (R25)
Slab-on ground containing pipes or heating ducts	1.76 (R10)	1.76 (R10)	1.76 (R10)
Slab-on-ground not containing pipes or heating ducts	1.41 (R8)	1.41 (R8)	1.41 (R8)
Column 1	2	3	4

Notes to Table 9.25.2.1.:
(1) Number of degree days for individual locations are contained in Table 2.5.1.1.

(7) All glazing that separates heated space from unheated space shall have a thermal resistance of not less than 0.30 $m^2°C/W$ (1.70 $ft^2.h.°F/Btu$).

(8) The thermal resistance values in Table 9.25.2.1. for exposed roofs or ceilings may be reduced near eaves to the extent made necessary by the roof slope and required ventilation clearances, except that the thermal resistance of insulation at the location directly above the inner surface of the exterior wall shall be at least RSI 2.1 (R12).

(9) Where an enclosed unheated space is separated from a heated space by glazing, the unheated enclosure may be considered to provide a thermal resistance of 0.16 $m^2°C/W$ (0.91 $ft^2.h.°F/Btu$).

(10) When *electric space heating* is used in a category TIL3 *dwelling unit*, all sliding glass doors separating heated space from unheated space or the outdoors shall have an energy rating of not less than -13 ER.

(11) When *electric space heating* is used in a category TIL3 *dwelling unit*, all glazing that separates heated space from unheated space or the outdoors shall have an energy rating of not less than -13 ER for openable windows and 0 ER for fixed glazing.

(12) The energy rating required in Sentences (10) and (11) shall be determined in conformance with CAN/CSA-A440.2-M, "Energy Performance Evaluation of Windows and Sliding Glass Doors".

• (13) Except as provided in Sentences (14) and (15), log wall construction and post, beam and plank construction shall have a minimum thermal resistance of RSI 2.1 (R12) for the total assembly.

• (14) The thermal resistance value in Sentence (13) for the total wall assembly may be reduced to not less than RSI 1.61 (R9) if

(a) the thermal resistance of insulation for the exposed roof or ceiling required in Table 9.25.2.1. is increased by an amount equivalent to the reduction permitted in this Sentence, and
(b) for log walls, the logs have tongue-and-groove or splined joints.

(15) Where milled log walls are installed, the thermal resistance value in Sentence (13) for the total wall assembly does not apply if

(a) the mean thickness of each log is not less than 150 mm (6 in),
(b) the thermal resistance of insulation for the exposed roof or ceiling required in Table 9.25.2.1. is increased by RSI 0.53 (R3), and
(c) the logs have tongue-and-groove or splined joints.

9.25.2.2. Reserved.

9.25.2.3. Insulation Materials

(1) Except as required in Sentence (2), thermal insulation shall conform to the requirements of

(a) CAN/CGSB-51.20-M, "Thermal Insulation, Polystyrene, Boards and Pipe Covering",
(b) CGSB 51-GP-21M, "Thermal Insulation, Urethane and Isocyanurate, Unfaced",
(c) CAN/CGSB-51.23,"Spray Applied Rigid Polyurethane Cellular Plastic Thermal Insulation",
(d) CAN/CGSB-51.25-M, "Thermal Insulation, Phenolic, Faced",
(e) CAN/CGSB-51.26-M, "Thermal Insulation, Urethane and Isocyanurate, Board, Faced",
(f) CAN/CGSB-51-GP-27M, "Thermal Insulation, Polystyrene, Loose Fill",
(g) CGSB 51-GP-60M, "Cellulose Fibre Loose Fill Thermal Insulation",
(h) CSA A101, "Thermal Insulation, Mineral Fibre, for Buildings", or
(i) CAN/CSA-A247-M, "Insulating Fibreboard".

(2) The *flame-spread ratings* requirements contained in the standards listed in Sentence (1) shall not apply. (See Appendix A.)

(3) Insulation in contact with the ground shall be inert to the action of *soil* and water and be such that its insulative properties are not significantly reduced by moisture. (See Appendix A.)

(4) Type 1 expanded polystyrene insulation as described in CAN/CGSB-51.20-M, "Thermal Insulation, Polystyrene, Boards and Pipe Covering" shall not be used in contact with the ground or as roof insulation applied above the roofing membrane.

9.25.2.4. 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 1 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 (2 in) 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 (¼ in) asbestos-cement board,
(b) 6 mm (¼ in) preservative-treated plywood, or
(c) 12 mm (½ in) 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 of gypsum board, plywood, particleboard, 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 (0.006 in) in thickness.

(9) Insulation in factory-built *buildings* shall be installed so that it will not become dislodged during transportation.

(10) Insulation applied to the interior of *foundation* walls enclosing heated space shall extend from the underside of the subfloor to not less than 600 mm (23⅝ in) below the adjacent exterior ground level.

(11) The insulation required by Sentence (10) may be provided by a system installed

(a) on the interior of the *foundation* wall,
(b) on the exterior face of the *foundation* wall, or
(c) partially on the interior and partially on the exterior, provided the thermal performance of the system is equivalent to that permitted in Clauses (a) or (b).

(13) If a *foundation* wall is constructed of hollow masonry units, one or more of the following shall be used to control convection currents in the core spaces,

(a) filling the core spaces,
(b) at least one row of semi-solid blocks at or below *grade*, or
(c) other similar methods.

(14) Masonry walls of hollow units which penetrate the ceiling shall be sealed at or near the ceiling adjacent to the roof space to prevent air within the voids from entering the *attic or roof space* by

(a) capping with masonry units without voids, or
(b) installation of flashing material extending across the full width of the masonry.

9.25.2.5. 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) Loose-fill insulation is permitted to be installed in attic spaces over ceilings sloped not more than 2.5 in 12.

(3) Loose-fill insulation may be used in wood-frame walls of existing *buildings*. (See Appendix A.)

(4) Water repellent loose-fill insulation may be used between the outer and inner wythes of masonry cavity walls. (See Appendix A.)

(5) 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. (See Article 9.19.1.3.)

9.25.2.6. Installation of Spray-applied Polyurethane

(1) Spray-applied polyurethane insulation shall be installed in accordance with CAN/CGSB-51.39, "Sprayed Application of Rigid Polyurethane Cellular Plastic Thermal Insulation for Building Construction".

9.25.3. Air Barrier Systems

9.25.3.1. Required Barrier to Air Leakage

(1) Thermally insulated wall, ceiling and floor assemblies shall be constructed so as to include an *air barrier system* which 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 winter, and
(b) from the exterior inward sufficient to prevent moisture condensation on the room side during winter.

(See Appendix A.)

9.25.3.2. Air Barrier System Properties

(See Appendix A.)

(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^2) (0.004 cfm/ft^2) measured at an air pressure differential of 75 Pa (0.011 psi).

(2) Where polyethylene sheet used to provide the air-tightness in the *air barrier system* shall conform to CAN/CGSB-51.34-M, "Vapour Barrier, Polyethylene Sheet for Use in Building Construction".

9.25.3.3. Continuity of the Air Barrier System

(1) Where the *air barrier system* consists of an air-impermeable panel-type material, all joints shall be sealed to prevent air leakage.

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(2) Where the *air barrier system* consists of flexible sheet material, all joints shall be

(a) sealed, or

(b) lapped not less than 100 mm (4 in) and clamped, such as between framing members, furring or blocking and rigid panels.

(3) Where an interior wall meets an exterior wall, ceiling, floor or roof required to be provided with an air barrier protection, the *air barrier system* shall extend across the intersection.

(4) Where an interior wall projects through a ceiling or extends to become an exterior wall, spaces in the wall shall be blocked to provide continuity across those spaces with the *air barrier system* in the abutting walls or ceiling.

(5) Where an interior floor projects through an exterior wall or extends to become an exterior floor, continuity of the *air barrier system* shall be maintained from the abutting walls across the floor assembly.

(6) Penetrations of the *air barrier system*, such as those created by the installation of doors, windows, electrical wiring, electrical boxes, piping or ductwork, shall be sealed to maintain the integrity of the *air barrier system* over the entire surface.

(7) Access hatches installed through assemblies constructed with an *air barrier system* shall be weatherstripped around their perimeters to prevent air leakage.

(8) Clearances between *chimneys* or *gas vents* and the surrounding construction which would permit air leakage from within the *building* into a wall or *attic or roof space* shall be sealed by *noncombustible* material to prevent such leakage.

9.25.4. Vapour Barriers

9.25.4.1. Required Barrier to Vapour Diffusion

(1) Thermally insulated wall, ceiling and floor assemblies shall be constructed with a vapour barrier sufficient to prevent condensation in the wall spaces, floor spaces or *attic or roof spaces*.

9.25.4.2. Vapour Barrier Materials

(1) Except as required in Sentence (2), *vapour barriers* shall have an initial permeance not greater than 45 ng/(Pa•s•m^2) (0.78 PERM INS.).

(2) When used where a high resistance to vapour movement is required, such as in wall constructions that incorporate exterior cladding or sheathing having a low water vapour permeance, *vapour barriers* shall have a permeance not greater than 15 ng/(Pa•s•m^2) (0.26 PERM INS.). (See Appendix A.)

(3) Where polyethylene is installed as the *vapour barrier* required in Sentence (2), 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/CSA-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".

9.25.4.3. Installation of Vapour Barriers

(1) *Vapour barriers* shall be installed to protect the entire surfaces of thermally insulated wall, ceiling and floor assemblies.

(2) *Vapour barriers* shall be installed sufficiently close to the warm side of insulation to prevent condensation at design conditions. (See Appendix A.)

Section 9.26. Roofing

9.26.1. General

9.26.1.1. Purpose of Roofing

(1) Roofs shall be protected with roofing, including flashing, installed to shed rain effectively and prevent water due to ice damming from entering the roof.

9.26.1.2. Alternate Installation Methods

(1) Methods described in CAN3-A123.51, "Asphalt Shingle Application on Roof Slopes 1:3 and Steeper", or CAN3-A123.52, "Asphalt Shingle Application on Roof Slopes 1:6 to Less than 1:3" are permitted to be used for asphalt shingle applications not described in this Section.

9.26.2. Roofing Materials

9.26.2.1. Material Standards

(1) Roofing materials shall conform to
(a) CAN/CGSB-37.4-M, "Fibrated, Cutback Asphalt, Lap Cement for Asphalt Roofing",
(b) CAN/CGSB-37.5-M, "Cutback Asphalt Plastic, Cement",
(c) CSA/CGSB 37.8M, "Asphalt, Cutback, Filled, for Roof Coating",
(d) CGSB 37-GP-9Ma, "Primer, Asphalt for Asphalt Roofing, Dampproofing and Waterproofing",
(e) CGSB 37-GP-21M, "Tar, Cutback, Fibrated, for Roof Coating",
(f) CAN/CGSB 37.50-M, "Asphalt, Rubberized, Hot Applied for Roofing and Waterproofing",
(g) CGSB 37-GP-52M, "Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric",
(h) CGSB 37-GP-54M, "Roofing and Waterproofing Membrane, Sheet Applied, Flexible, Polyvinyl Chloride",
(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) CAN2-51.32-M, "Sheathing, Membrane, Breather Type",
(l) CSA A123.1-M, "Asphalt Shingles Surfaced with Mineral Granules",
(m) CSA A123.2-M, "Asphalt Coated Roofing Sheets",
(n) CSA A123.3-M, "Asphalt or Tar Saturated Roofing Felt",
(o) CSA A123.4-M, "Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems",
(p) CAN/CSA A123.5-M, "Asphalt Shingles Made from Glass Felt and Saturated with Mineral Granules",
(q) CAN/CSA A123.17, "Asphalt-Saturated Felted Glass-Fibre Mat for Use in Construction of Built-Up Roofs",
(r) CAN/CSA-A220.0, "Performance of Concrete Roof Tiles",
(s) CSA O118.1-M, "Western Red Cedar Shingles and Shakes", or
(t) 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 (½ in) into roof sheathing.

(3) Nails used with asphalt roofing shall have a head diameter of not less than 9.5 mm (⅜ in) and a shank thickness of not less than 2.95 mm (⅛ in).

(4) Nails used with wood shingles or shakes shall have a head diameter of not less than 4.8 mm (3/16 in) and a shank thickness of not less than 2.0 mm (3/32 in) and shall be stainless steel, aluminum or hot-dipped galvanized. (See Appendix A.)

9.26.2.3. Staples

(1) Staples used to apply asphalt or wood shingles shall be corrosion-resistant and shall be driven with the crown parallel to the eaves.

(2) Staples used with asphalt shingles shall be not less than 19 mm (¾ in) long, 1.6 mm (1/16 in) diam or thickness, with not less than a 25 mm (1 in) crown, except that an 11 mm (7/16 in) 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 (13/16 in) long, 1.6 mm (1/16 in) diam or thickness, with not less than a 9.5 mm (⅜ in) crown and shall be stainless steel or aluminum. (See A-9.26.2.2.(4) in Appendix A.)

9.26.3. Roof Slope

9.26.3.1. Slope

(1) Except as provided in Sentences (2) and (3), the roof slopes on which roof coverings may be applied shall conform to Table 9.26.3.1.

(2) Asphalt and gravel or coal tar and gravel roofs may be constructed with lower slopes than required in Sentence (1) when effective drainage is provided by roof drains located at the lowest points on the roofs.

(3) Sheet metal roof cladding systems specifically designed for low-slope applications are permitted to be installed with lower slopes than required in Sentence (1).

Table 9.26.3.1.
Roofing Types and Slope Limits
Forming Part of Sentence 9.26.3.1.(1)

Type of Roofing	Minimum Slope	Maximum Slope
Built-up Roofing		
Asphalt base (gravelled)	1 in 50[1]	1 in 4
Asphalt base (without gravel)	1 in 25	1 in 2
Coal-tar base (gravelled)	1 in 50[1]	1 in 25
Cold process	1 in 25	1 in 1.33
Asphalt Shingles		
Normal application	1 in 3	no limit
Low slope application	1 in 6	no limit
Roll Roofing		
Smooth and mineral surfaced	1 in 4	no limit
480 mm (18⅞ in) wide selvage asphalt roofing	1 in 6	no limit
Cold application felt	1 in 50	1 in 1.33
Wood Shingles	1 in 4	no limit
Handsplit Shakes	1 in 3	no limit
Asbestos-Cement Corrugated sheets	1 in 4	no limit
Corrugated Metal roofing	1 in 4	no limit
Sheet Metal shingles	1 in 4	no limit
Slate shingles	1 in 2	no limit
Clay Tile	1 in 2	no limit
Glass Fibre Reinforced polyester Roofing Panels	1 in 4	no limit
Column 1	2	3

Note to Table 9.26.3.1.:
[1] See Sentences 9.26.3.1.(2) and (3)

9.26.4. Flashing at Intersections

9.26.4.1. Materials

(1) Sheet metal flashing shall consist of not less than
(a) 1.73 mm (0.068 in) thick sheet lead,
(b) 0.33 mm (0.013 in) thick galvanized steel,
(c) 0.46 mm (0.018 in) thick copper,
(d) 0.46 mm (0.018 in) thick zinc, or
(e) 0.48 mm (0.019 in) thick aluminum.

9.26.4.2. Valley Flashing

(1) Where sloping surfaces of shingled roofs intersect to form a valley, the valley shall be flashed.

(2) Closed valleys shall not be used with rigid shingles on slopes of less than 1 in 1.2.

(3) 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 (23⅝ in) wide, and nails shall not penetrate the flashing within 75 mm (3 in) of its edge or 124 mm (4⅞ in) of the bottom of the valley centreline.

(4) Open valleys shall be flashed with not less than
(a) one layer of sheet metal not less than 600 mm (23⅝ in) wide, or
(b) 2 layers of roll roofing.

(5) 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 (18 in) wide, centred in the valley and fastened with nails spaced not more than 450 mm (17¾ in) o.c. located 25 mm (1 in) away from the edges.

(6) 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 (3 ft) wide, centred in the valley, applied over a 100 mm (4 in) 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.

9.26.4.3. 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 (1 in) in the masonry and shall extend not less than 150 mm (5⅞ in) down the masonry and lap the lower flashing not less than 100 mm (4 in).

(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 (3 in) 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.

9.26.4.4. 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 (3 in) behind the sheathing paper, and extends not less than 75 mm (3 in) horizontally.

(3) Along the slope of the roof, the flashing required in Sentence (1) shall be stepped with not less than a 75 mm (3 in) head lap.

9.26.4.5. 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 (5⅞ in) up the wall.

(2) Counter flashing installed over the intersection referred to in Sentence (1) shall be embedded not less than 25 mm (1 in) in the masonry, and shall be of sufficient length to extend down not less than 150 mm (5⅞ in), lapping the membrane on the masonry not less than 100 mm (4 in).

9.26.4.6. 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 (5⅞ in) up the wall referred to in Sentence (1) behind the sheathing paper.

9.26.4.7. 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 (2 ft 6 in) wide.

(2) *Chimney* saddles shall be covered with sheet metal or roofing material of equivalent 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 in Article 9.26.4.3.

(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 (5⅞ in), 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 9.26.4.3.

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 (2 ft 11 in) up the roof slope to a line not less than 300 mm (11¾ in) 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 (2 ft 11 in) 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 (18⅞ in) and cemented together with lap cement,
(b) Type M or S roll roofing laid with not less than 100 mm (4 in) 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/m² (0.04 lb/ft²), 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 in).

(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 (4 in). (See Article 9.26.10.2. for underlay beneath wood shakes.)

9.26.7. Asphalt Shingles on Slopes of 1 in 3 or Greater

9.26.7.1. Coverage

(1) Coverage shall be not less than 2 thicknesses of shingle over the entire roof, disregarding cutouts.

9.26.7.2. Starter Strip

(1) A starter strip shall be installed along the lower edge of the roof so that it extends approximately 12 mm (½ in) beyond the eaves and rake of the roof and fastened along the bottom edge with nails spaced not more than 300 mm (11¾ in) o.c.

(2) Starter strips shall be at least Type M mineral-surfaced roll roofing not less than 300 mm (11¾ in) wide, or shingles of the same weight and quality as those used as a roof covering with tabs facing up the roof slope.

(3) Starter strips need not be provided where eave protection of not less than Type M mineral-surfaced roll roofing is provided 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 (2 in).

9.26.7.4. Fasteners

(1) Except as provided in Sentence (2), shingles shall be fastened with at least 4 nails or staples for 1 000 mm (3 ft 3 in) wide shingles so that no nails or staples are exposed.

(2) Where staples with an 11 mm (7/16 in) crown are used, shingles shall be fastened with at least 6 staples.

(3) Fasteners may be reduced for narrower shingles in proportion to the width of the shingle or when shingles incorporating interlocking devices are used.

(4) Fasteners referred to in Sentences (1) and (2) shall be located 25 mm (1 in) to 40 mm (19/16 in) 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 (½ in) 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 (1 in) 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 (4 in) on either side of the hip or ridge, and shall be lapped not less than 150 mm (5⅞ in).

(2) Shingles referred to in Sentence (1) shall be fastened with nails or staples on each side located not more than 25 mm (1 in) from the edge and 25 mm (1 in) above the butt of the overlying shingle.

9.26.7.7. Eave Protection

(1) Eave protection shall conform to Subsection 9.26.5.

9.26.7.8. Flashing

(1) Flashing shall conform to Subsection 9.26.4.

9.26.8. Asphalt Shingles on Slopes of Less Than 1 in 3

9.26.8.1. Coverage

(1) Except for the first 2 courses, coverage shall be not less than 3 thicknesses of shingle over the entire roof, disregarding cutouts.

9.26.8.2. Starter Strip

(1) A starter strip shall be installed as in Article 9.26.7.2.

(2) Starter strips required in Sentence (1) shall be laid in a continuous band of cement not less than 200 mm (7⅞ in) 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/m² (1 gal/100 ft²) of cemented area, or hot application asphalt applied at the rate of 1 kg/m² (0.2 lb/ft²) 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 (4 in) and the band is located not less than 50 mm (2 in) above the lower edge of the starter strip.

(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 (2 in).

(3) The band required in Sentence (2) shall be located not less than 25 mm (1 in) nor more than 50 mm (2 in) 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 (11¾ in) 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 25 mm (1 in) from the edges of the shingles and fastened with nails or staples located 40 mm (19/16 in) above the butt of the overlying shingle and 50 mm (2 in) 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 red 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 (15¾ in) long and not less than 75 mm (3 in) nor more than 350 mm (13¾ in) wide.

9.26.9.4. Spacing and Joints

(1) Shingles shall be spaced approximately 6 mm (¼ in) apart and offset at the joints in adjacent courses not less than 40 mm (19/16 in) so that joints in alternate courses are staggered.

9.26.9.5. Fastening

(1) Shingles shall be fastened with 2 nails or staples located approximately 20 mm (13/16 in) from the sides of the shingle and 40 mm (19/16 in) 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)

Roof Slope	Maximum Exposure, mm (in)					
	No. 1 or A Grade Length of Shingle, mm (in)			No 2 or B Grade Length of Shingle, mm (in)		
	400 (15¾)	450 (17¾)	600 (23⅝)	400 (15¾)	450 (17¾)	600 (23⅝)
< 1 in 3	100 (4)	115 (4½)	165 (6½)	90 (3½)	100 (4)	140 (5½)
≥ 1 in 3	125 (5)	140 (5½)	190 (7½)	100 (4)	115 (4½)	165 (6½)
Column 1	2	3	4	5	6	7

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. Handsplit Roof Shakes

9.26.10.1. Size and Thickness

(1) Shakes shall be not less than 450 mm (17¾ in) long and not less than 100 mm (4 in) nor more than 350 mm (13¾ in) wide with a butt thickness of not more than 32 mm (1¼ in) and not less than 9 mm (⅜ in).

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 (2 ft 11 in) wide along the eaves.

(2) A strip of material similar to that described in Sentence (1) not less than 450 mm (17¾ in) wide shall be interlayed 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) Interlayed strips in Sentence (2) shall be lapped at least 150 mm (5⅞ in) 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 (¼ in) to 9 mm (⅜ in) apart and the joints in one course shall be separated not less than 40 mm (19/16 in) from joints in adjacent courses.

9.26.10.4. Fastening

(1) Shakes shall be fastened with nails located approximately 20 mm (¾ in) from the sides of the shakes and 40 mm (19/16 in) above the exposure line.

9.26.10.5. Exposure

(1) The exposure of wood shakes shall not exceed
(a) 190 mm (7½ in) for shakes not less than 450 mm (17¾ in) long, and
(b) 240 mm (9½ in) for shakes not less than 600 mm (23⅝ in) 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.

9.26.11. Built-Up Roofs

9.26.11.1. Quantity of Materials

(1) The quantities of bituminous materials used on built-up roofs shall conform to Table 9.26.11.1.

Table 9.26.11.1.
Quantities of Bitumen for Built-Up Roofs
Forming Part of Sentence 9.26.11.1.(1)

Type of Roof	Amount of Bitumen per Square Metre of Roof Surfac	
	Mopping Coats Between Layers	Flood Coat
Asphalt and aggregate Coal-tar and aggregate	1 kg (2.2 lb) 1.2 kg (2.6 lb)	3 kg (6.6 lb) 3.6 (7.9 lb)
Cold process roofing	0.75 L (0.16 Gal) cold process cement	2 L (0.44 Gal) cold process top coating
Column 1	2	3

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 (¼ in) to 15 mm (⅝ in).

(2) The minimum amount of aggregate surfacing per square metre of roof surface shall be 15 kg (33.1 lb) gravel or crushed stone or 10 kg (22 lb) 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 3 mopped-down layers of roofing felt flood coated with bitumen.

9.26.11.7. Installation of Layers

(1) In hot process applications each layer of bitumen-saturated felt shall be laid while the bitumen is hot, with each layer overlapping the previous one.

(2) The full width under each lap referred to in Sentence (1) shall be coated with bitumen so that in no place does felt touch felt.

(3) Felt shall be laid free of wrinkles and shall be rolled directly into the hot bitumen and broomed forward and outward from the centre to ensure complete adhesion.

9.26.11.8. Roofing over Wood-Based Sheathing

(1) Except as permitted in Sentence (2), built-up roofing applied over wood, plywood, OSB or waferboard roof sheathing shall be laid over an additional base layer of felt laid dry over the entire roof deck with at least a 50 mm (2 in) headlap and a 50 mm (2 in) 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 2 plies of the roofing membrane shall be carried over the top of the cant strip.

(3) Flashing shall extend over the top of the cant strip and be shaped to form a drip.

(4) The cant strip required in Sentence (1) 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 is fastened and 2 plies of roofing membrane mopped to the top surface of the gravel stop referred to in Sentence (4) 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 (0.013 in) thick galvanized steel,
(b) 0.46 mm (0.018 in) thick copper,
(c) 0.46 mm (0.018 in) thick zinc, or
(d) 0.48 mm (0.019 in) thick aluminum.

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 CGSB 37-GP-51M, "Application or Rubberized Asphalt, Hot Applied, 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. Coverage

(1) Concrete roof tiles shall be installed according to CAN/CSA-A220.1, "Installation of Concrete Roof Tiles". (See Appendix A.)

9.26.18. Downspouts and Roof Drains

9.26.18.1. Roof Drains

(1) When roof drains are provided they shall conform to Part 7.

9.26.18.2. Downspouts

(1) Where downspouts are provided and are not connected to a sewer, extensions shall be provided to carry rainwater away from the *building* in a manner which will prevent *soil* erosion.

Section 9.27. Cladding

9.27.1. Scope

9.27.1.1. Application

(1) This Section applies to exterior wall coverings of lumber, wood shingles, shakes, asbestos-cement shingles and sheets, plywood, OSB, waferboard, hardboard, asphalt shingles, vinyl, aluminum and steel including trim, soffits and flashing.

9.27.1.2. Stucco and Masonry Veneer

(1) Requirements for stucco shall conform to Section 9.28. and requirements for masonry veneer shall conform to Section 9.20.

9.27.1.3. Asphalt Shingles

(1) Where asphalt shingles are used as siding, they shall conform to the requirements in Section 9.26. for asphalt roof shingles.

9.27.2. General

9.27.2.1. Required Cladding

(1) Exterior walls shall be protected with cladding, including flashing, trim and other special purpose accessory pieces required for the cladding system being used, to restrict the entry of rain and snow into the wall assembly.

9.27.2.2. Clearance from Ground

(1) Not less than a 200 mm (7⅞ in) clearance shall be provided between the finished ground level and siding that is adversely affected by moisture such as wood, plywood, OSB, waferboard and hardboard.

9.27.2.3. Clearance from Roof Surface

(1) Not less than a 50 mm (2 in) clearance shall be provided between a roof surface and cladding that is adversely affected by moisture such as wood, plywood, OSB, waferboard and hardboard.

9.27.2.4. Insulating Asphalt Siding

(1) Insulating asphalt cladding shall be ventilated by not less than a 10 mm (⅜ in) air space behind the cladding. (See Sentence 9.25.1.2.(1))

9.27.3. Flashing

9.27.3.1. Materials

(1) Flashing shall consist of not less than
(a) 1.73 mm (0.068 in) thick sheet lead,
(b) 0.33 mm (0.013 in) thick galvanized steel,
(c) 0.46 mm (0.018 in) thick copper,
(d) 0.46 mm (0.018 in) thick zinc,
(e) 0.48 mm (0.019 in) thick aluminum, or
(f) 1.02 mm (0.040 in) thick vinyl.

9.27.3.2. Installation

(1) Flashing shall be installed at every horizontal junction between 2 different exterior finishes, except where the upper finish overlaps the lower finish.

(2) Except as provided in Sentence (4), flashing shall be applied 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.

(3) Flashing shall be installed so that it extends upwards not less than 50 mm (2 in) behind the sheathing paper and forms a drip on the outside edge.

(4) Where a window or exterior door is designed to be installed without head flashing, the exterior flange of the window or door frame shall be bedded into a non-hardening type caulking material and the exterior flange screwed down over the caulking material to the wall framing to form a waterproof joint.

9.27.4. Caulking

9.27.4.1. Required Caulking

(1) Caulking shall be provided where required to prevent the entry of water into the structure.

(2) Caulking shall be provided between masonry, siding or stucco and the adjacent door and window frames or trim, including sills unless such locations are completely protected from the entry of rain.

(3) Caulking shall be provided at vertical joints between different cladding materials unless the joint is suitably lapped or flashed to prevent the entry of rain. (See Articles 9.7.4.2., 9.20.13.12. and 9.28.1.5.)

9.27.4.2. Materials

(1) Caulking shall be
(a) a non-hardening type suitable for exterior use,
(b) selected for its ability to resist the effects of weathering, and
(c) compatible with and adhere to the substrate to which it is applied.

(2) Caulking shall conform to
(a) CGSB 19-GP-5M, "Sealing Compound, One Component, Acrylic Base, Solvent Curing",
(b) CAN/CGSB-19.13-M, "Sealing Compound, One Component, Elastomeric, Chemical Curing",
(c) CGSB 19-GP-14M, "Sealing Compound, One Component, Butyl- Polyisobutylene Polymer Base, Solvent Curing", or
(d) CAN/CGSB-19.24-M, "Multi-Component, Chemical Curing Sealing Compound".

9.27.5. Attachment of Cladding

9.27.5.1. Attachment

(1) Except as permitted in Sentences (2) to (7), cladding shall be nailed to the framing members, 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 (⅝ in) lumber,
(b) 12.5 mm (½ in) plywood, or
(c) 12.5 mm (½ in) 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 (⅝ in) lumber,
(b) 7.5 mm (5/16 in) plywood, or

(c) 7.5 mm (5/16 in) 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 (⅝ in) lumber,
(b) 9.5 mm (⅜ in) plywood, or
(c) 9.5 mm (⅜ in) OSB or waferboard.

(5) Where wood shingles or shakes are applied to sheathing which is not suitable for attaching the shingles or shakes, the shingles or shakes may be attached to a wood lath not less than 38 mm (1½ in) by 9.5 mm (⅜ in) 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 (3½ in) by 9.5 mm (⅜ in) 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 (13/16 in).

9.27.5.2. Blocking

(1) Blocking for the attachment of cladding shall be not less than 38 mm (2 in) by 38 mm (2 in) lumber securely nailed to the framing and spaced not more than 600 mm (24 in) 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 (1 in by 2 in) 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 (1 in by 3 in) lumber on supports spaced not more than 400 mm (16 in) o.c., or
(b) 19 mm by 89 mm (1 in by 4 in) on supports spaced not more than 600 mm (24 in) o.c.

(3) Furring referred to in Sentence (1) shall be
(a) securely fastened to the framing, and
(b) spaced not more than 600 mm (24 in) 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.

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 siding.

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 (¾ in) 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 (1 in) 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 (9/16 in) thick and not more than 286 mm (11¼ in) wide.

(2) Bevel siding shall be
(a) not less than 5 mm (3/16 in) thick at the top, and
(b) not less than
  (i) 12 mm (½ in) thick at the butt for sidings 184 mm () or less in width, and
  (ii) 14.3 mm (9/16 in) thick at the butt for sidings wider than 184 mm (7¼ in).

(3) Bevel siding shall be not more than 286 mm (11¼ in) wide.

Table 9.27.5.4.
Attachment of Cladding
Forming Part of Sentence 9.27.5.4.(1)

Type of Cladding	Minimum Nail or Staple Length, mm (in)	Minimum Number of Nails or Staples	Maximum Nail or Staple Spacing
Wood trim	51 (2)	—	600 mm (o.c.)
Lumber siding or horizontal siding made from sheet metal	51 (2)	—	600 mm (o.c.)
Metal siding	38 (1½)	—	600 mm (o.c.) (nailed to framing)
Handsplit wood shakes			
up to 200 mm (7⅞ in) in width	51 (2)	2	—
over 200 mm (7⅞ in) in width	51 (2)	3	—
Wood shingles and machine grooved shakes			
200 mm (7⅞ in) in width	32 (1¼)	2	—
over 200 mm (7⅞ in) in width	32 (1¼)	3	—
Asbestos-cement shingles	32 (1¼)	2	—
Panel or sheet type cladding			150 mm (5⅞ in) along edges
up to 7 mm (5/16 in) thick	38 (1½))	—	300 mm (11¾ in along intermediate
more than 7 mm thick (5/16 in)	51 (2)	—	supports
Column 1	2	3	4

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 (0.039 in) per 16 mm (⅝ in) width of lumber, but not less than
(a) 9.5 mm (⅜ in) for matched siding,
(b) 25 mm (1 in) for lapped bevel siding, or
(c) 12 mm (½ in) for vertical battens.

9.27.7. Wood Shingles and Machine Grooved Shakes

9.27.7.1. Materials

(1) Shingles and shakes shall conform to
(a) CSA O118.1-M, "Western Red Cedar Shingles and Shakes", or
(b) CSA 0118.2-M, "Eastern White Cedar Shingles".

(2) Western red cedar shakes shall be at least No. 1 grade and shingles at least No. 2 grade, except that No. 3 grade may be used for the lower course of double course applications.

(3) Eastern white cedar shakes shall be at least B (clear) grade, except that C grade may be used for the lower course of double course applications.

9.27.7.2. Width

(1) Shingles and shakes shall be not less than 65 mm (2⅝ in) nor more than 350 mm (13¾ in) wide.

9.27.7.3. Fasteners

(1) Shingles or shakes shall be fastened with nails located approximately 20 mm (13/16 in) from each edge and not less than 25 mm (1 in) above the exposure line for single-course applications, or approximately 50 mm (2 in) 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 (19/16 in) so that joints in any 2 of 3 consecutive courses are staggered.

(2) In double-course application, joints in the outer course shall be offset from joints in the under-course by not less than 40 mm (19/16 in), and joints in succeeding courses shall be offset not less than 40 mm (19/16 in).

9.27.7.5. Fastening to Lath

(1) When lath is used with double-course application, 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 (½ in) 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 (½ in) above the butts of the outer course.

9.27.7.6. Exposure and Thickness

(1) The exposure and butt thickness of shingles shall conform to Table 9.27.7.6.

Table 9.27.7.6.
Exposure and Thickness of Wood Shingles and Machine Grooved Shakes
Forming Part of Sentence 9.27.7.6.(1)

Shake or Shingle Length, mm (in)	Maximum Exposure, mm (in)		Minimum Butt Thickness, mm (in)
	Single Coursing	Double Coursing	
400 (15¾) 450 (17¾) 600 (23⅝)	190 (7½) 216 (8½) 292 (11½)	305 (12) 356 (14) 406 (16)	10 (⅜) 11 (7/16) 13 (½)
Column 1	2	3	4

9.27.8. Asbestos-Cement Shingles and Sheets

9.27.8.1. Material Standards

(1) Asbestos-cement shingles and sheets shall conform to

(a) CAN/CGSB-34.4-M, "Siding, Asbestos Cement, Shingles and Clapboards",

(b) CAN/CGSB-34.5-M, "Sheets, Asbestos Cement, Corrugated",

(c) CAN/CGSB-34.14-M, "Sheets, Asbestos Cement, Decorative",

(d) CAN/CGSB-34.16, "Sheets, Asbestos Cement, Flat, Fully Compressed",

(e) CAN/CGSB-34.17-M, "Sheets, Asbestos Cement, Flat, Semi-compressed", or

(f) CAN/CGSB-34.21-M, "Panels, Sandwich Asbestos, Cement and Insulating Cores".

9.27.8.2. Weight and Thickness

(1) Asbestos-cement shingles shall weigh not less than 8.06 kg/m² (1.65 lb/ft²).

(2) Asbestos-cement sheet shall be not less than

(a) 4.75 mm (3/16 in) thick where applied to studs spaced not more than 400 mm (16 in) o.c., and,

(b) 6 mm (¼ in) thick where applied to studs spaced not more than 600 mm (24 in) o.c.

(3) Where applied over sheathing, the thickness of asbestos-cement sheet shall be not less than 3.15 mm (⅛ in).

9.27.8.3. Fastening of Shingles

(1) Asbestos-cement shingles shall be fastened with nails located not less than 25 mm (1 in) above the exposure line.

9.27.8.4. Joints of Shingles

(1) Asbestos-cement shingles shall be installed so that vertical joints in succeeding courses are staggered.

(2) Asphalt-coated backer strips shall be installed behind each vertical joint.

(3) Shingles referred to in Sentence (1)shall have not less than a 25 mm (1 in) head lap.

9.27.8.5. Joints in Panels

(1) Vertical joints of asbestos-cement panels shall be protected with batten strips, caulking or other suitable method.

(2) Horizontal joints of asbestos-cement panels shall be lapped, flashed, caulked or otherwise suitably protected.

9.27.9. Plywood

9.27.9.1. Material Standards

(1) Plywood cladding shall be exterior type conforming to

(a) CSA O115-M, "Hardwood and Decorative Plywood",
(b) CSA O121-M, "Douglas Fir Plywood",
(c) CSA O151-M, "Canadian Softwood Plywood", or
(d) CSA O153-M, "Poplar Plywood".

9.27.9.2. Thickness

(1) Plywood cladding shall be not less than 6 mm (¼ in) thick when applied directly to sheathing.

(2) When applied directly to framing or over furring strips, plywood cladding thickness shall conform to Table 9.27.9.2.

Table 9.27.9.2.
Minimum Plywood Cladding Thickness
Forming Part of Sentence 9.27.9.2.(2)

Spacing of Supports, mm (in)	Minimum Thickness, mm (in)	
	Face Grain Parallel to Supports	Face Grain Right Angles to Supports
400 (12)	8 (5/16)	6 (¼)
600 (24)	11 (7/16)	8 (5/16)
Column 1	2	3

(3) The thickness of grooved or textured plywood shall be measured at the point of least thickness.

9.27.9.3. Edge Treatment

(1) The edges of plywood cladding shall be treated with a suitable paint or sealer.

9.27.9.4. Panel Siding

(1) Plywood applied in panels shall have all edges supported.

(2) Not less than a 2 mm (3/32 in) 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 (1 in) or shall be suitably flashed.

9.27.9.5. Lapped Strip Siding

(1) Plywood applied in horizontal lapped strips shall have not less than a 2 mm (3/32 in) 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 (1 in).

(3) Wedges shall be inserted under all vertical butt joints and at all corners when horizontal lapped plywood is applied without sheathing.

9.27.10. Hardboard

9.27.10.1. Material Standards

(1) Factory-finished hardboard cladding shall conform to CAN/CGSB-11.5M, "Hardboard, Precoated, Factory-Finished, for Exterior Cladding".

(2) Hardboard cladding which is not factory finished shall conform to Types 1, 2 or 5 in CAN/CGSB-11.3-M, "Hardboard".

9.27.10.2. Thickness

(1) Type 1 or 2 hardboard cladding shall be not less than
(a) 6.0 mm (¼ in) thick when applied over sheathing that provides continuous support, and
(b) 7.5 mm (5/16 in) thick when applied to furring or framing members not more than 400 mm (16 in) o.c.

(2) Type 5 hardboard cladding shall be not less than 9.0 mm (⅜ in) thick when applied over sheathing that provides continuous support or over furring or framing members spaced not more than 400 mm (16 in) o.c.

(3) Where hardboard cladding is grooved, the grooves shall not extend more than 1.5 mm (1/16 in) into the required thickness. (See Appendix A.)

9.27.10.3. Panel Siding

(1) Hardboard cladding applied in panels shall have all edges supported with not less than a 5 mm (3/16 in) 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 (1 in) or shall be suitably flashed.

9.27.10.4. Lapped Strip Siding

(1) Hardboard applied in horizontal lapped strips shall have not less than a 5 mm (3/16 in) 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 (0.039 in) per 16 mm (⅝ in) width of siding board but not less than 9.5 mm (⅜ in) for matched joint siding or 25 mm (1 in) for lapped siding.

9.27.10.5. Clearance

(1) Not less than 3 mm (⅛ in) clearance shall be provided between hardboard siding and door or window frames.

9.27.11. OSB and Waferboard

9.27.11.1. Material Standard

(1) OSB and waferboard cladding shall conform to CAN3-O437.0, "OSB and Waferboard".

9.27.11.2. Thickness

(1) OSB conforming to O-2 grade shall be not less than 6.0 mm (¼ in) thick where applied directly to sheathing.

(2) OSB conforming to O-2 grade applied directly to framing or over furring strips, shall conform to the thickness shown for plywood in Table 9.27.9.2. (See Appendix A.)

(3) OSB conforming to O-1 grade and waferboard conforming to R-1 grade shall be not less than 7.9 mm (5/16 in) 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 (⅜ in) thick on supports spaced not more than 400 mm (16 in) o.c., and

(b) 12.7 mm (½ in) thick on supports spaced not more than 600 mm (24 in) o.c.

9.27.11.3. Panel Cladding

(1) OSB and waferboard applied in panels shall have all edges supported and treated with a primer or sealer.

(2) Not less than a 3 mm (⅛ in) 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 (1 in) or shall be suitably flashed.

9.27.11.4. Clearance

(1) At least a 3 mm (⅛ in) clearance shall be provided between OSB and waferboard cladding and door or window frames.

9.27.12. Metal Siding

9.27.12.1. Material Standards

(1) Horizontal and vertical strip steel siding, including flashing and trim accessories, shall conform to CAN/CGSB-93.4-M, "Galvanized Steel and Aluminum-Zinc Coated Steel Siding, Soffits and Fascia, Prefinished, Residential".

(2) Steel sheet cladding shall have a minimum thickness of 0.3 mm (0.012 in) and conform to CAN/CGSB-93.3-M, "Prefinished Galvanized and Aluminum-Zinc Alloy 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 (0.023 in), except that siding supported by backing or sheathing shall have a thickness of not less than 0.46 mm (0.018 in).

9.27.13. Vinyl Siding

9.27.13.1. Material Standard

(1) Vinyl siding, including flashing and trim accessories, shall conform to CGSB 41-GP-24Ma, "Siding, Soffits and Fascia, Rigid Vinyl".

9.27.13.2. Attachment

(1) The attachment of vinyl siding shall conform to the requirements in Subsection 9.27.5. for metal siding.

Section 9.28. Stucco

9.28.1. General

9.28.1.1. Sheathing Beneath Stucco

(1) Sheathing shall be provided beneath stucco applied over wood-frame walls except as permitted in Article 9.28.4.2.

(2) Where applied beneath stucco, sheathing shall conform to Subsection 9.23.16.

9.28.1.2. Lath and Reinforcing

(1) Stucco lath or reinforcing shall be used to attach stucco to any substrate other than masonry.

(2) Stucco lath or reinforcing shall be used to attach stucco to masonry where

(a) the masonry is soft-burned tile or brick of less strength than the stucco, or

(b) the masonry surface is not sound, clean and sufficiently rough to provide a good key.

(3) Stucco applied over *masonry chimneys* shall be reinforced.

9.28.1.3. Concrete Masonry Units

(1) Stucco finish shall not be applied over concrete masonry units less than one month old unless the units have been cured by the autoclave process.

9.28.1.4. Clearance over Ground Level

(1) Stucco shall be not less than 200 mm (7⅞ in) above finished ground level except when it is applied over concrete or masonry.

9.28.1.5. Flashing and Caulking

(1) Flashing and caulking used with stucco shall conform to Subsections 9.27.3. and 9.27.4., except that if aluminum flashing is used, it shall be separated from the stucco by an impervious membrane or coating. (See Article 9.7.4.2. for caulking around window frames.)

9.28.2. Stucco Materials

9.28.2.1. Portland Cement

(1) Portland cement shall conform to CAN/CSA-A5, "Portland Cement".

9.28.2.2. Aggregate

(1) Aggregate shall be clean, well-graded natural sand or sand manufactured from crushed stone, gravel or air-cooled blast furnace slag and shall contain no significant amounts of deleterious material.

(2) Aggregate grading shall conform to Table 9.28.2.2.

Table 9.28.2.2.
Aggregate Grading for Stucco
Forming Part of Sentence 9.28.2.2.(2)

Sieve Sizes, mm (in)	% Passing	
	Maximum	Minimum
4 (0.157)	—	100
2 (0.079)	—	90
1 (0.039)	90	60
0.5 (0.020)	60	45
0.25 (0.010)	30	10
0.125 (0.005)	5	—
Column 1	2	3

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 (⅛ in) diam with a head diameter of not less than 11.1 mm (7/16 in).

(2) Staples for stucco lath reinforcing shall be not less than 1.98 mm (0.078 in) 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 (1 in) 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 (1½ in) 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 (0.047 in) diam galvanized wire is applied horizontally to the framing at vertical intervals not exceeding 150 mm (5⅞ in), 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. (See Appendix A.)

9.28.4.4. Self-Furring Devices

(1) Stucco lath shall be held not less than 6 mm (¼ in) 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 shall be lapped not less than 50 mm (2 in).

Table 9.28.4.3.
Stucco Lath
Forming Part of Sentence 9.28.4.3.(1)

Location	Type of Lath	Minimum Diam. of Wire, mm (in)	Maximum Mesh Opening	Minimum Mass, kg/m² (lb/ft²)
Vertical surfaces	Welded or woven wire	1.19 (0.047) 1.35 (0.053) 1.60 (0.063)	25 mm (1 in) 38 mm (1½ in) 51 mm (2 in)	— — —
	Stucco mesh reinforcing (expanded metal)	—	25.8 cm² (4 in²)	0.98 (0.20)
Horizontal surfaces[1]	9.5 mm (⅜ in) rib lath	—	—	1.84 (0.38)
	Cedar lath	—	—	—
Column 1	2	3	4	5

Note to Table 9.28.4.3.:
[1] See Appendix A.

(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 (5⅞ in) on both sides of the corner, or the lath or reinforcing shall extend around corners not less than 150 mm (5⅞ in).

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 (5⅞ in) o.c. vertically and 400 mm (16 in) o.c. horizontally, or

(b) 100 mm (4 in) o.c. vertically and 600 mm (24 in) 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 (5⅞ in) o.c. along the framing members when members are spaced not more than 400 mm (16 in) o.c., and

(b) 100 mm (4 in) o.c. along members when members are spaced not more than 600 mm (24 in) o.c.

9.28.5. Stucco Mixes

9.28.5.1. Mixes

(1) Stucco mixes shall conform to Table 9.28.5.1.

Table 9.28.5.1.
Stucco Mixes
Forming Part of Sentence 9.28.5.1.(1)

Materials, volume			
Portland Cement	Masonry Cement	Lime	Aggregate
1	—	0.25 to 1	3.25 to 4 parts per part of cementitious material
1	1	—	
Column 1	2	3	4

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 (50°F) during application and for not less than 48 h afterwards.

9.28.6.2. Number of Coats and Total Thickness

(1) Stucco shall be applied with at least 2 base coats and one finish coat, providing a total thickness of not less than 15 mm (⅝ in), 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 (¼ in) 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 (¼ in) thick.

(2) The surface of the second 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 (⅛ in).

(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 (5 ft 11 in) above the floor in shower stalls,
(b) 1 200 mm (3 ft 11 in) above the rims of bathtubs equipped with showers, and
(c) 400 mm (15¾ in) 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.

9.29.3.2. Fastening

(1) Furring shall be fastened to the framing or to wood blocks with not less than 51 mm (2 in) 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".

Table 9.29.3.1.
Size and Spacing of Furring
Forming Part of Sentence 9.29.3.1.(1)

Maximum Spacing of Furring, mm (in)	Minimum Size of Furring, mm (in)		
	Maximum Spacing of Furring Supports		
	Continuous Supports	400 mm (16 in) (o.c.)	600 mm (24 in) (o.c.)
300 (12)	19 x 38 (1"x2")	19 x 38 (1"x2")	19 x 64 (1"x3")
400 (16)	19 x 38 (1"x2")	19 x 38 (1"x2")	19 x 64 (1"x3")
600 (24)	19 x 38 (1"x2")	19 x 64 (1"x3")	19 x 89 (1"x4")
Column 1	2	3	4

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, "Gypsum Board",
(b) ASTM C 36, "Gypsum Wallboard",
(c) ASTM C 37, "Gypsum Lath",
(d) ASTM C 442, "Gypsum Backing Board and Coreboard",
(e) ASTM C 558, "Gypsum Base for Veneer Plaster",
(f) ASTM C 630, "Water Resistant Gypsum Board Backing",
(g) ASTM C 931, "Exterior Gypsum Soffit Board", or
(h) ASTM C 960, "Predecorated Gypsum Board".

9.29.5.3. Maximum Spacing of Supports

(1) Maximum spacing of supports for gypsum board applied as a single layer shall conform to Table 9.29.5.3.

Table 9.29.5.3.
Spacing of Supports for Gypsum Board
Forming Part of Sentence 9.29.5.3.(1)

Thickness mm (in)	Orientation of Board to Framing	Maximum Spacing of Supports, mm (in) o.c.		
		Walls	Ceilings	
			Painted Finish	Water-Based Texture Finish
9.5 (3/8)	parallel perpendicular	— 400 (16)	— 400 (16)	— —
12.7 (1/2)	parallel perpendicular	600 (24) 600 (24)	400 (16) 600 (24)	— 400 (16)
15.9 (5/8)	parallel perpendicular	600 (24) 600 (24)	400 (16) 600 (24)	— 600 (24)
Column 1	2	3	4	5

9.29.5.4. Support of Insulation

(1) Gypsum board supporting insulation shall be at least 12.7 mm (½ in) thick.

9.29.5.5. Length of Fasteners

(1) The length of fasteners for gypsum board shall conform to Table 9.29.5.5., except that lesser depths of penetration are permitted for assemblies required to have a *fire-resistance rating* provided it can be shown, on the basis of fire tests, that such depths are adequate for the required rating.

Table 9.29.5.5.
Fastener Penetration into Wood Supports
Forming Part of Sentence 9.29.5.5.(1)

Required *Fire-Resistance Rating* of Assembly	Minimum Penetration, mm (in)			
	Walls		Ceilings	
	Nails	Screws	Nails	Screws
Not required	20 (13/16)	15 (5/8)	20 (13/16)	15 (5/8)
45 min	20 (13/16)	20 (13/16)	30 (13/16)	30 (13/16)
1 h	20 (13/16)	20 (13/16)	45 (1¾)	45 (1¾)
1.5 h	20 (13/16)	20 (13/16)	60 (2⅜)	60 (2⅜)
Column 1	2	3	4	5

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 Drill Screws for the Application of Gypsum Board or Metal Plaster Bases".

9.29.5.8. Spacing of Nails

(1) For single-layer application nails shall be spaced not more than 180 mm (7⅛ in) on ceiling supports, and not more than 200 mm (7⅞ in) apart along vertical wall supports, except that nails may be spaced in pairs about 50 mm (2 in) apart every 300 mm (11¾ in) along such wall or 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 nailing at this location.

(3) The uppermost wall nails shall be not more than 200 mm (7⅞ in) below the ceiling.

(4) Nails shall be located not less than 10 mm (⅜ in) from the side or edge of the board.

(5) Nails shall be driven so that the heads are below the plane of the board surface but do not puncture the paper.

9.29.5.9. Spacing of Screws

(1) Where gypsum board is applied with drywall screws, the screws shall be spaced not more than 300 mm (11¾ in) o.c. along supports, except that on vertical surfaces the screws may be spaced 400 mm (15¾ in) o.c. where the supports are not more than 400 mm (16 in) o.c.

9.29.5.10. Low Temperature Conditions

(1) In cold weather, heat shall be provided to maintain a temperature of not below 10°C (50°F) for 48 h prior to taping and finishing and maintained for not less than 48 h thereafter.

9.29.6. Plywood Finish

9.29.6.1. Thickness

(1) Except as provided in Sentences (2) and (3), the minimum thickness of plywood interior finish shall conform to Table 9.29.6.1.

Table 9.29.6.1.
Thickness of Plywood Interior Finish
Forming Part of Articles 9.29.6.1. and 9.29.6.2.

Maximum Spacing of Supports, mm (in)	Minimum Thickness, mm (in) [1]	
	On supports with no Horizontal Blocking	On Supports with Blocking at Vertical Intervals not Exceeding 1.2 m (3 ft 11 in)
400 (16)	4.7 (3/16)	4.0 (5/32)
600 (24)	8.0 (5/16)	4.7 (3/16)
Column 1	2	3

Notes to Table 9.29.6.1.

[1] 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 (0.016) 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 (1½ in) casing or finishing nails spaced not more than 150 mm (5⅞ in) o.c. along edge supports and 300 mm (11¾ in) 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 (⅛ in) thick where applied over continuous back-up,
(b) 6 mm (¼ in) thick where applied to supports spaced not more than 400 mm (16 in) o.c., and
(c) 9 mm (⅜ in) thick where applied to supports spaced not more than 600 mm (24 in) o.c.

9.29.7.3. Nails

(1) Nails for fastening hardboard shall be casing or finishing nails not less than 38 mm (1½ in) long, spaced not more than 150 mm (5⅞ in) o.c. along edge supports and 300 mm (11¾ in) 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/CSA-A247-M, "Insulating Fibreboard".

9.29.8.2. Thickness

(1) Insulating fibreboard sheets shall be not less than 11.1 mm (7/16 in) thick on supports not more than 400 mm (16 in) o.c.

(2) Insulating fibreboard tile shall be not less than 12.7 mm (½ in) thick on supports spaced not more than 400 mm (16 in) o.c.

9.29.8.3. Nails

(1) Nails for fastening fibreboard sheets shall be not less than 2.6 mm (3/32 in) shank diameter casing or finishing nails of sufficient length to penetrate not less than 20 mm (13/16 in) into the supports.

(2) Nails shall be spaced not more than 100 mm (4 in) o.c. along edge supports and 200 mm (7⅞ in) 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 CAN3-O188.1, "Interior Mat-Formed Wood Particleboard".

(2) OSB or waferboard and strandboard finish shall conform to 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 (0.016 in).

(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 (¼ in) thick on supports not more than 400 mm (16 in) o.c.,
(b) not less than 9.5 mm (⅜ in) thick on supports not more than 600 mm (24 in) o.c., and
(c) not less than 6.35 mm (¼ in) thick on supports not more than 600 mm (24 in) o.c. in walls 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 (1½ in) casing or finishing nails spaced not more than 150 mm (5⅞ in) o.c. along edge supports and 300 mm (11¾ in) 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 1 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 not less than 3 nor more than 5 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. (See Appendix A.)

9.30.1.3. Sleepers

(1) Wood sleepers supporting finished flooring over a concrete base supported on the ground shall be not less than 19 mm by 38 mm (1 in by 2 in) and shall be treated with a wood preservative.

9.30.1.4. Finish Quality

(1) Finished flooring shall have a surface that is smooth, even and free from roughness or open defects.

9.30.2. Panel-Type Underlay

9.30.2.1. Required Underlay

(1) A panel-type underlay shall be provided under resilient flooring, parquet flooring, ceramic tile, felted-synthetic-fibre floor coverings or carpeting laid over lumber subflooring. (See Sentence 9.30.3.2.(1).)

(2) 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. (See Article 9.23.14.3.)

(3) Panel-type underlay shall be provided under resilient flooring on waferboard or strandboard subflooring.

(4) Panel-type underlay shall be provided under ceramic tile applied with adhesive.

9.30.2.2. Materials and Thickness

(1) Panel-type underlay shall be not less than 6 mm (¼ in) thick and shall conform to

(a) CAN/CGSB-11.3-M, "Hardboard",
(b) CSA O115-M, "Hardwood and Decorative Plywood",
(c) CSA O121-M, "Douglas Fir Plywood",
(d) CSA O151-M, "Canadian Softwood Plywood",
(e) CSA O153-M, "Poplar Plywood",
(f) CAN3-O188.1-M, "Interior Mat-Formed Wood Particleboard", or
(g) CSA O437.0, "OSB and Waferboard".

(2) Reserved.

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 (5⅞ in) o.c. along the edges and 200 mm (7⅞ in) o.c. both ways at other locations.

(2) Nails for panel-type underlay shall be not less than 19 mm (¾ in) long for 6 mm (¼ in) thick underlay and 22 mm (⅞ in) long for 7.9 mm (5/16 in) thick underlay.

(3) Staples for panel-type underlay shall

(a) have not less than a 1.2 mm (0.047 in) shank diameter or thickness with a 4.7 mm (3/16 in) crown, and
(b) be not less than
  (i) 22 mm (⅞ in) long for 6 mm (¼ in) underlay, and
  (ii) 28 mm (1⅛ in) long for 7.9 mm (5/16 in) and 9.5 mm (⅜ in) 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 (7⅞ in) from the joints in the underlying subfloor.

9.30.2.5. Surface Defects

(1) Underlay beneath resilient or ceramic floors applied with an adhesive shall have all holes or open defects on the surface patched so that the defects will not be transmitted to the finished surface.

9.30.3. Wood Strip Flooring

9.30.3.1. Thickness

(1) The thickness of wood strip flooring shall conform to Table 9.30.3.1.

Table 9.30.3.1.
Thickness of Wood Strip Flooring
Forming Part of Sentence 9.30.3.1.(1)

Type of Flooring	Max. Joist Spacing, mm (in)	Minimum Thickness of Flooring, mm (in)	
		With Subfloor	No Subfloor
Matched hardwood (interior use only)	400 (16)	7.9 (5/16)	19.0 (¾)
	600 (24)	7.9 (5/16)	33.3 (15/16)
Matched softwood (interior or exterior use)	400 (16)	19.0 (¾)	19.0 (¾)
	600 (24)	19.0 (¾)	31.7 (1¼)
Square edge softwood (exterior use only)	400 (16)	—	25.4 (1)
	600 (24)	—	38.1 (1½)
Column 1	2	3	4

9.30.3.2. Strip Direction and End Joints

(1) Wood strip flooring shall not be laid parallel to lumber subflooring unless a separate underlay is provided.

(2) If wood strip flooring is applied without a subfloor, it shall be laid at right angles to the joists so that the end joints are staggered and occur over supports or are end matched.

(3) If the flooring is end matched, it shall be laid so that no 2 adjoining strips break joints in the same space between supports and each strip bears on no fewer than 2 supports.

9.30.3.3. Nailing

(1) When nails are used, wood strip flooring shall be toe nailed or face nailed with not less than 1 nail per strip at the spacings shown in Table 9.30.3.3., except that face nailed strips of more than 25 mm (1 in) in width shall have at least 2 nails per strip.

(2) Face nails shall be countersunk and the holes filled with suitable filler.

Table 9.30.3.3.
Nailing of Wood Strip Flooring
Forming Part of Sentence 9.30.3.3.(1)

Finish Floor Thickness, mm (in)	Minimum Length of Flooring Nails, mm (in)	Maximum Spacing of Flooring Nails, mm (in)
7.9 (5/16)	38 (1½)[1]	200 (7⅞)
11.1 (7/16)	51 (2)	300 (11¾)
19.0 (¾)	57 (2¼)	400 (15¾)
25.4 (1)	63 (2½)	400 (15¾)
31.7 (1¼)	70 (2¾)	600 (23⅝)
38.1 (1½)	83 (3¼)	600 (23⅝)
Column 1	2	3

Note to Table 9.30.3.3.:
(1) 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 (5/16 in) in thickness and not more than 50 mm (2 in) in width provided the staples
(a) are not less than 29 mm (13/16 in) long,
(b) have a shank diameter of not less than 1.19 mm (0.047 in),
(c) have a crown of not less than 4.7 mm (3/16 in), and
(d) are spaced not more than 400 mm (16 in) o.c.

(2) Staples are permitted to be used to fasten wood strip flooring not more than 19 mm (¾ in) in thickness and not more than 83 mm (3¼ in) in width provided the staples
(a) are not less than 51 mm (2 in) long,
(b) have a shank diameter of not less than 1.82 mm (0.072 in),
(c) have a crown of not less than 12.7 mm (½ in), and
(d) are spaced not more than 400 mm (16 in) 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. Application

(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.

9.30.6.2. Ceramic Tile Set in Mortar Bed

(1) When ceramic tile is set in mortar bed, the bed shall be not less than 32 mm thick. A 50 mm by 50 mm (2 in by 2 in) galvanized wire mesh shall be placed in the mortar bed, and asphalt sheathing paper, felt or polyethylene film shall be applied under the mortar bed when the mortar is applied over wood subfloors.

(2) The mortar bed described in Sentence (1) shall consist of by volume

(a) 1 part portland cement,
(b) 4 parts sand, and
(c) 1 part water.

(3) The tile joints for the ceramic tile in Sentence (1) shall be grouted with cement grout which shall be compressed into joints between the tiles and then wiped smooth.

9.30.6.3. Reinforcement for Panel-Type Wood Sheathing

(1) Except as permitted in Article 9.30.6.4., when ceramic floor tiles are set on panel-type wood sheathing, one of the following assemblies for reinforcing the floor assembly shall be used

(a) 20 mm (13/16 in) thick plywood or waferboard with all edges supported by at least 38 mm by 38 mm (2 in by 2 in) blocking with floor joists spaced not more than 400 mm (16 in) o.c., with 6 mm (¼ in) underlay,
(b) sheathing with a thickness which conforms to Table 9.23.14.5.A. or a rating which complies to Table 9.23.14.5.B. and has an underlay consisting of 15.9 mm (⅝ in) plywood or waferboard with offsetting joints, with a 4 mm (5/32 in) gap between the sheets, or
(c) sub-floor sheathing reinforced with close spaced 38 mm by 38 mm (2 in by 2 in) blocking at spacings at least half that of the floor joist spacing.

9.30.6.4. Ceramic Tile Applied to Mortar Bed with Adhesive

(1) When ceramic tile is applied to a mortar bed with adhesive, the bed shall be not less than 12.5 mm (½ in) thick.

(2) The mortar bed described in Sentence (1) shall consist of by volume

(a) 1 part portland cement,
(b) 3 parts sand, and
(c) 1 part water.

(3) Not less than one layer of galvanized diamond mesh wire lath shall be imbedded in the mortar bed.

(4) Joints in the wire lath required by Sentence (3) shall be overlapped not less than 12 mm (½ in).

(5) The wire lath required in Sentence (1) shall be fastened to the subfloor with

(a) lath nails not less than 38 mm (1½ in) in length spaced not more than 150 mm (5⅞ in) o.c., or
(b) staples not less than 38 mm (1½ in) in length spaced not more than 150 mm (5⅞ in) o.c.

(6) Asphalt sheathing paper, felt or polyethylene film shall be applied between the mortar bed and the wood subfloor.

(7) Floor joists supporting the mortar bed described in Sentence (1) shall

(a) be spaced not more than 400 mm (16 in) o.c., and
(b) have not less than two rows of 38 mm x 38 mm (2 in by 2 in) cross bridging.

(8) The tile joints for the ceramic tile in Sentence (1) shall be grouted with cement grout which shall be compressed into joints between the tiles and then wiped smooth.

Section 9.31. Plumbing Facilities

9.31.1. Scope

9.31.1.1. Application

(1) This Section applies to *plumbing* facilities and *plumbing systems* within *dwelling units* that are not within a *recreational camp* or a *camp for housing of workers*.

(2) *Plumbing* facilities other than those required in *dwelling units* shall conform to Subsection 3.7.4. (See also Section 3.8. regarding *barrier-free plumbing* facilities.)

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 (300 lb) applied vertically or horizontally.

9.31.3. Water Supply and Distribution

9.31.3.1. Required Water Supply

(1) Reserved.

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 and hose bib.

9.31.4. Required Facilities

9.31.4.1. Required Fixtures

(1) In a *dwelling unit* with a *water distribution system*, a kitchen sink, lavatory, bathtub or shower stall and water closet shall be provided.

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*.

(2) Where gravity drainage to a *sanitary drainage system* is possible, the floor drain in Sentence (1) shall be connected to the *sanitary drainage system*.

(3) Where gravity drainage to a *sanitary drainage system* is not possible, the floor drain in Sentence (1) is permitted to be connected to a *storm drainage system*, dry well or drainage ditch.

(4) A floor drain shall be provided in a public laundry room, garbage room, incinerator room, *boiler* or heating room, serving more than one *dwelling unit*.

9.31.4.5. Required Facilities at Recreational Camps and a Camp for Housing of Workers

(1) A minimum of one water closet or privy shall be provided

(a) for every ten campers of each sex in a recreational camp, and

(b) for every ten employees of each sex in a *camp for housing of workers*.

(2) In *recreational camps* and a *camp for housing of workers*, at least two lavatories or provision for a pail or other portable container of sound construction shall be provided for each of the water closets or privies required in Sentence (1).

(3) A *camp for housing of workers* shall

(a) have at least one shower or other area of bathing, and

(b) provide for at least one washing machine or laundry tub for every fifteen beds.

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 (113°F) to 60°C (140°F).

9.31.6.2. Supply Source

(1) Service hot water is permitted to be distributed from a centrally located heater to supply the entire *building* or may be supplied by an individual *service water heater* for each *dwelling unit*.

9.31.6.3. Equipment and Installation

(1) Every *service water heater* and its installation shall conform to Part 7.

(2) Reserved.

(3) Where a *building* is located in seismic zone 4, 5, or 6, *service water heaters* shall be anchored to the structure to prevent overturning or breaking of gas, oil or electrical lines.

9.31.6.4. 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.

9.31.6.5. Fuel-Burning Heaters

(1) Fuel-burning *service water heaters* shall be connected to a *chimney flue* conforming to Section 9.21.

9.31.6.6. Heating Coils

(1) Heating coils of *service water heaters* shall not be installed in a *flue* or in the combustion chamber of a *boiler* or furnace heating a *building*.

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 5 cars shall be ventilated in accordance with 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.
(See A-9.32.3. in Appendix A.)

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)

Location		Minimum Unobstructed Area
Within *dwelling unit*	Bathrooms or water closet rooms	0.09 m² (0.97 ft²)
	Unfinished *basement* 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 m² (3 ft²) per room or combination of rooms
Other than within *dwelling unit*	Bathrooms or water closet rooms	0.09 m² (0.97 ft²) per water closet
	Sleeping areas	0.14 m² (1.5 ft²) 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 *basement* space not used on a shared basis	0.2 per cent of the floor area
Column 1	2	3

(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

(See Appendix A.)

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 Clauses 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)

Room	Capacity, L/s (cfm)
Master bedroom[1]	10 (21.2)
Other bedrooms	5 (10.6)
Living room[2]	5 (10.6)
Dining room[2]	5 (10.6)
Kitchen	5 (10.6)
Family Room[2]	5 (10.6)
Recreation room	5 (10.6)
Basement[3]	10 (21.2)
Other habitable rooms[4]	5 (10.6)
Bathroom or water closet room	5 (10.6)
Laundry room	5 (10.6)
Utility room	5 (10.6)
Column 1	2

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 ⅔ of the total *basement* floor area shall be assigned a fan capacity of 10 L/s (21.2 cfm). Those that are less than ⅔ of the total floor area shall be assigned 5 L/s (10.6 cfm).

(4) Other habitable rooms shall be assigned a ventilation capacity of 5 L/s (10.6 cfm). 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)

Number of Bedrooms in *Dwelling Unit*	Capacity, L/s (cfm)
1	15 (31.8)
2	22.5 (47.7)
3	30 (63.6)
4	37.5 (79.5)
More than 4	Part 6 design
Column 1	2

(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 ±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 (3 ft 3 in) 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 (11¾ in) of the ceiling. (See A-9.32.3. in Appendix A.)

(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 (39 ft 4 in), 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 Sentence 9.32.3.4.(9)

Number of Bedrooms in *Dwelling Unit*	Minimum *Exhaust Duct* Diameter			
	Ducts Connected to Inlet and Outlet of Principal Exhaust Fan		Ducts Connected to One Side Only of Principal Exhaust Fan	
	Smooth Duct, mm (in)	Flexible Duct, mm (in)	Smooth Duct, mm (in)	Flexible Duct, mm (in)
1	100 (4)	125 (5)	100 (4)	125 (5)
2	125 (5)	150 (6)	125 (5)	150 (6)
3	125 (5)	150 (6)	150 (6)	175 (7)
4	150 (6)	175 (7)	150 (6)	175 (7)
More than 4	Part 6 Design	Part 6 Design	Part 6 Design	Part 6 Design
Column 1	2	3	4	5

(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 (1 in), 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 (1 in).

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 inlets 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 range hood or range-top fan is installed in a kitchen, it shall be installed in the ceiling or on the wall within 300 mm (11¾ in) of the ceiling.

(4) *Exhaust ducts* serving the required kitchen, bathroom, water closet room and other supplemental exhaust air inlets 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 (29 ft 6 in), and

(b) the number of elbows does not exceed 4,

but, in any case, they shall not be smaller than recommended by the manufacturers 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)

Fan Capacity, L/s (cfm)	Minimum *Exhaust Duct* Diameter[1]	
	Ducts Connected to Inlet & Outlet of Exhaust Fan, mm (in)	Ducts Connected to One Side Only of Exhaust Fan, mm (in)
25 (53)	125 (5)	125 (5)
50 (106)	150 (6)	150 (6)
Column 1	2	3

Note to Table 9.32.3.5.:

[1] Where flexible duct is used, the duct diameter shall be increased by 25 mm (1 in).

(5) A supplemental exhaust fan required by this Article shall be provided with a manual switch located in the same room as the exhaust air inlet.

(6) Where a supplemental fan required by this Article is controlled by a dehumidistat or other automatic control in addition to the manual switch required by Sentence (5), the manual switch shall be capable of activating the fan regardless of the setting of the automatic control.

(7) 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 and the forced air heating system 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 contains a forced air heating system, or
(b) contains a forced air heating system and the forced air heating system 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 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 (68 ft 11 in), and
(b) the total number of fittings does not exceed 8.

(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*.

Table 9.32.3.7.A
Minimum Outdoor Air Supply and Main Trunk Duct Sizes
Forming Part of Sentence 9.32.3.7.(5)

Number of Bedrooms in *Dwelling Unit*	Minimum Outdoor Air Supply and Main Distribution Trunk Duct Diameter, mm (In)
1	150 (6)
2	150 (6)
3	175 (7)
4	175 (7)
More than 4	Part 6 design
Column 1	2

(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 outdoor hood to supply register does not exceed 21 m (68 ft 11 in), 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)

Room, Space or *Storey* Served	Minimum Branch *Supply Duct* Diameter	
	1 and 2 Bedroom *Dwelling Units*, mm (in)	3 and 4 Bedroom *Dwelling Units*, mm (in)
Master bedroom	100 (4)	100 (4)
Other bedrooms	75 (3)	75 (3)
Storey with no bedrooms or living area	75 (3)	100 (4)
Column 1	2	3

(8) In applying Sentence (7), where the *dwelling unit* has more than 4 bedrooms, ducting shall be sized according to Part 6.

(9) All branch *supply ducts* which are not fitted with diffusers with adjustable balance stops shall be supplied with accessible dampers which can be adjusted and fixed in their adjusted positions and which 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) Revoked

○ (3) Revoked

○ (4) Revoked

○ (5) Revoked

(6) Where a solid fuel-fired combustion *appliance* is installed, the ventilation system shall include a heat recovery ventilator which is designed to operate so that the flow of exhaust air does not exceed the flow of intake air in any operating mode, and which complies with the requirements of Article 9.32.3.11.

9.32.3.9. Fan Ratings

(1) Except as provided in Sentence (3), capacity and sound ratings for required fans shall be determined in accordance with CAN/CSA-C260, "Rating the Performance of Residential Mechanical Ventilating Equipment".

(2) Capacity ratings for required fans shall be based on a static pressure differential of 50 Pa (0.007 psi), 25 Pa (0.0036 psi) or 7.5 Pa (0.001 psi) depending on whether the fan is installed with ductwork connected on both sides, one side or neither side, respectively.

(3) 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. (See A-9.32.3. in Appendix A.)

Table 9.32.3.9.
Fan Sound Rating
Forming Part of Sentence 9.32.3.9.(3)

Type of Fan	Maximum Sound Ratings	
	Sone	dBA
Principal exhaust	2.5	55
Kitchen	3.5	60
Bathroom or water closet room	2.5	55
Supply	2.5	55
Column 1	2	3

(4) Required fans shall be installed according to the manufacturer's instructions.

(5) Mechanical ventilation devices shall conform to CSA-C22.2 No. 113, "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 (R3).

(4) Where a *supply 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 (R3) except that, where such a duct is exposed in the heated space for more than 3 m (9 ft 10 in) of length in the heated space, it shall be insulated to not less than the values listed in Table 9.32.3.10.A.

(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.

Table 9.32.3.10.A
Insulation of Fresh Air Supply Ducts
Forming Part of Sentence 9.32.3.10.(4)

Outside Winter Design Temperature as per Article 2.5.1.1.(1), °C (°F)	Minimum Thermal Resistance, RSI (R)
-7 to -11 (19 to 12)	0.5 (R3)
-12 to -17 (10 to 1)	0.9 (R5)
-18 to -24 (0 to -11)	1.2 (R7)
-25 to -29 (-13 to -20)	1.4 (R8)
-30 to -34 (-22 to -29)	1.8 (R10)
-35 (-31) and colder	2.1 (R12)
Column 1	2

Note to Table 9.32.3.10.A:
(1) The outside winter design temperatures shall be those listed for the January 2.5 percent values.

(6) Ductwork for range hoods and range-top fans shall be of *noncombustible*, corrosion-resistant material and shall lead directly to the outdoors without connection to other exhaust fans or ducts.

(7) Ductwork for range hoods and range-top 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.

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-439-M, "Standard Methods of Test for Rating the Performance of Heat Recovery Ventilators", at a Station 1 test temperature of -25°C (-13°F) at an air flow not less than 30 L/s (64 cfm).

(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.

Table 9.32.3.10.B
Equivalent Duct Sizes
Forming Part of Sentence 9.32.3.10.(10)

Required Round Duct Size, mm (in)	Permitted Equivalent Rectangular Duct Size, mm (in)			
	Stack Duct	100 mm (4") Depth	125 mm (5") Depth	150 mm (6") Depth
75 (3)	82 X 250 (3¼ x 10)	57 X 100 (2¼ x 4)		
100 (4)	82 X 250 (3¼ x 10)	89 X 100 (3½ x 4)	75 X 125 (3 x 5)	75 X 150 (3 x 6)
125 (5)	82 X 250 (3¼ x 10)	125 X 100 (5 x 4)	100 X 125 (4 x 5)	89 X 150 (3½ x 6)
150 (6)	82 X 300 (3¼ x 12)	200 X 100 (8 x 4)	150 X 125 (6 x 5)	125 X 150 (5 x 6)
175 (7)	82 X 350 (3¼ x 14)	275 X 100 (11 x 4)	200 X 125 (8 x 5)	175 X 150 (7 x 6)
More Than 175 (7)	Part 6 Design	Part 6 Design	Part 6 Design	Part 6 Design
Column 1	2	3	4	5

(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 (17¾ in) 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 (2 ft 11 in).

(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 (4 in).

(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) Where a backdraft damper required by Sentence (9) is not located at the *building* envelope, the exhaust outlet shall incorporate a screen, located at the *building* envelope, to protect against the entry of animals.

(11) Where a screen or grille required by Sentences (8) and (10) has a mesh size of less than 6 mm (¼ in), 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 (See Appendix A.)

(1) The design and installation of central heating systems including requirements for combustion air, shall conform to the requirements in Part 6 and to this Section.

(2) The design and installation of *air-conditioning* systems shall conform to Part 6.

(3) Repairs, adjustments 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 and installation of solid-fuel burning *stoves, ranges* and *space heaters*, including the requirements for combustion air, shall conform to CAN/CSA-B365-M, "Installation Code for Solid-Fuel Burning Appliances and Equipment".

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.

9.33.3. 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 (72°F) in all living spaces,
(b) 22°C (72°F) in unfinished *basements*, and
(c) 15°C (59°F) 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 Municipality as set out in Section 2.5. Climatic Data, using 2.5 per cent design temperature criteria. (See Table 2.5.1.1.)

○ 9.33.4. Carbon Monoxide Detectors

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 Detectors

(1) Where a fuel-burning *appliance* is installed in a *suite* of *residential occupancy*, a carbon monoxide detector 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 detector 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*.

(2) Where a *storage garage* is located in a *building* containing a *residential occupancy*, a carbon monoxide detector shall be installed adjacent to each sleeping area in every *suite* of *residential occupancy* that is adjacent to the *storage garage*.

(3) Where a *storage garage* serves only the *dwelling unit* to which it is attached or built in, a carbon monoxide detector shall be installed adjacent to each sleeping area in the *dwelling unit*.

9.33.4.3. Installation and Conformance to Standards

(1) The carbon monoxide detector required by Article 9.33.4.2. shall

(a) be permanently connected to an electrical circuit and shall have no disconnect switch between the overcurrent device and the carbon monoxide detector,
(b) be wired so that its activation will activate all carbon monoxide detectors 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/CGA-6.19, "Residential Carbon Monoxide Detectors",
    (ii) CSA 6.19, "Residential Carbon Monoxide Alarming Devices", or
    (iii) UL 2034, "Single and Multiple Station Carbon Monoxide Detectors".

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), electrical wiring and cables installed in *buildings* permitted to be of *combustible construction* shall conform to Sentence 3.1.4.3.(1).

(2) Where a concealed space in a floor or ceiling assembly is used as a *plenum*, electrical wiring 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*.

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

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switches located at the head and foot of every stairway shall be provided to control not less than one lighting outlet with fixture for stairways with 4 or more risers in *dwelling units*.

(3) The stairway lighting for *basements* that do not contain finished space or lead to an outside entrance or built-in garage and which serve not more than one *dwelling unit* is permitted to be controlled by a single switch located at the head of the stairs.

9.34.2.4. Basements

(1) A lighting outlet with fixture shall be provided for each 30 m^2 (323 ft^2) or fraction thereof of floor area in unfinished *basements*.

(2) The outlet required in Sentence (1) nearest the stairs shall be controlled by a wall switch located at the head of the stairs.

9.34.2.5. Storage Rooms

(1) A lighting outlet with fixture shall be provided in storage rooms.

9.34.2.6. Garages and Carports

(1) A lighting outlet with fixture shall be provided for an attached, built-in or detached garage or carport.

(2) Except as provided in Sentence (3), 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.

(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. (See Article 9.9.11.2. for lighting in *means of egress*.)

Table 9.34.2.7.
Lighting for Public Areas
Forming Part of Sentences 9.34.2.7.(2) and (3)

Room or Space	Minimum Illumination, lx (ft-candle)	Minimum Lighting Power Density, W/M^2 (W/ft^2) of *floor area* (incandescent lighting)
Storage rooms	50 (4.6)	5 (0.46)
Service rooms and laundry areas	200 (18.6)	20 (1.86)
Garages	50 (4.6)	5 (0.46)
Public water-closet rooms	100 (9.3)	10 (0.93)
Service hallways and stairways	50 (4.6)	5 (0.46)
Recreation rooms	100 (9.3)	10 (0.93)
Recreational camps and *camps for housing of workers* hallways, corridors, stairways and sleeping areas Kitchen All other rooms	100 (9.3) 500 (46.5) 250 (23.2)	10 (0.93) 50 (4.65) 25 (2.32)
Column 1	2	3

9.34.3. Emergency Lighting

9.34.3.1. Emergency Lighting

(1) Emergency lighting shall conform to Subsection 9.9.11.

9.34.4. Service Entrance Requirements

9.34.4.1. Meter Mounting Device

(1) Except in the case of externally mounted read-outs, each new residential consumer service of 200 amperes or less shall have a meter mounting device located outdoors in an accessible location.

(2) For the purposes of this Subsection, the front of the *building* is the side nearest the utility distribution line.

9.34.4.2. Location of Meter Mounting Device

(1) Meter mounting devices shall be installed on the wall

of the *building* or where that is not possible, on a separate support, so that the midpoint of the meter after installation will be 1 750 mm (5 ft 9 in) ± 100 mm (4 in) from finished *grade*.

(2) Meter mounting devices shall be located not more than 3 m (9 ft 10 in) back from the front of the single family and semi-detached homes.

9.34.4.3. Location of Consumer Service Standpipe

(1) For an underground supply, the bottom of the consumer service standpipe shall be located not more than 3 m (9 ft 10 in) from the corner of the *building*.

(2) For an overhead supply, the top of the consumer service standpipe shall be located not more than 3 m (9 ft 10 in) from the corner of the *building* except that where this location does not permit a 4.5 m (14 ft 9 in) clearance at the point of attachment of the service conductors to the *building*, the top of the standpipe may be extended to a point not more than half way along the *building*.

9.34.4.4. Meter Mounting Device

(1) The meter mounting device shall be
(a) one hundred ampere capacity except when the service equipment is to be greater,
(b) standardized for each service size, and
(c) capable of accepting 2 in. IPS conduit of steel, aluminum, copper or PVC if intended for underground service entrance.

9.34.4.5. Underground Service

(1) For consumer services supplied underground
(a) a 2 in. IPS steel, aluminum, copper or PVC conduit shall be attached to the bottom of the meter-mounting device and shall terminate in the earth at a point at least 900 mm (2 ft 11 in) below *grade* and a conduit bushing shall be attached to the conduit in the earth, and
(b) the conductors on the line side of the meter and those on the load side of the meter shall not be installed in the same conduit.

Section 9.35. Garages and Carports

9.35.1. Scope

9.35.1.1. Application

(1) This Section applies to garages and carports serving not more than 1 *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 50 m² (538 ft²) 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 (5⅞ in) above ground level.

(2) Piers referred to in Sentence (1) shall project not less than 25 mm (1 in) beyond the base of the column but in no case be less than 190 mm by 190 mm (7½ in by 7½ in) 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 (4 in by 4 in) 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 Articles 9.36.3.1. and 9.36.2.4. and Subsection 9.10.15., *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 Sentences (4) and (5), 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.

(5) Where thermal insulation is provided, the minimum thermal resistance of insulation in Table 9.25.2.1. need not be provided.

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 (½ in) diameter bars and filled with concrete, 18 times the least dimension of the column.

(3) Columns in excess of the height limitations of Clause (2)(a), (2)(b), or (2)(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 *grade* are used, they shall comply with Section 9.13., "Waterproofing and Dampproofing".

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 9.10.18.

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 which are sound and free of fractures may be used for *foundations*, beams, posts and similar members providing 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 which 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 (5 ft 11 in).

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, which are 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 A13 to A20.

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 (½ in) in width for each 300 mm (11¾ in) of height to allow for settlement.

Section 9.38. Thermal Design

9.38.1. Scope

9.38.1.1. Application

(1) This Section applies to the thermal design of a *building* of *residential occupancy* where such design is an alternative to the thermal insulation requirements of Section 9.25. (See Sentence 2.3.1.1.(6).)

9.38.2. General

9.38.2.1. Materials and Installation

(1) The materials for, and the installation of, thermal insulation and vapour barrier protection shall conform to Section 9.25.

9.38.2.2. Protection of Foamed Plastic

(1) Foamed plastic thermal insulation shall be protected as described in Article 9.10.16.10.

9.38.2.3. Crawl Spaces

(1) Crawl spaces shall comply to Section 9.18.

9.38.2.4. Roof Spaces

(1) Roof spaces shall comply to Section 9.19.

9.38.2.5. Ventilation

(1) Ventilation requirements shall comply to Section 9.32. except as provided in Subsection 9.38.7.

9.38.2.6. Heating and Air-Conditioning

(1) Heating and *air-conditioning* requirements shall comply to Section 9.33.

9.38.3. Thermal Resistance of Assemblies

9.38.3.1. Thermal Resistance

(1) Except as provided in Articles 9.38.3.2. to 9.38.3.6., and except for doors, windows, skylights and other *closures*, the thermal resistance of each *building* assembly through any portion that does not include framing or furring shall conform to Table 9.38.3.1.

Table 9.38.3.1.
Minimum Thermal Resistance, RSI (R) Value
Forming Part of Sentence 9.38.3.1.(1)

Building Assembly	Maximum Number of Celsius Degree Days		*Electric Space Heating*
	Up to 5000	Above 5000	
Ceiling below *attic or roof space*	5.6 (R32)	6.9 (R39)	7.20 (R41)
Roof assembly without *attic or roof space*	3.8 (R22)	3.8 (R22)	4.15 (R24)
Wall other than *foundation* wall	3.45 (R19)	4.3 (R24)	5.15 (R29)
Foundation walls enclosing heated space	1.7 (R10)	2.4 (R14)	3.54 (R20)
Floor, other than slab-on-ground	4.7 (R27)	4.7 (R27)	4.7 (R27)
Slab-on-ground[1]			
— containing pipes or heating ducts	2.11 (R12)	2.11 (R12)	2.11 (R12)
— not containing pipes or heating ducts	1.76 (R10)	1.76 (R10)	1.76 (R10)
Column 1	2	3	4

Notes to Table 9.38.3.1.:
(1) "RSI value" shown for slab-on-ground is for rigid insulation.

9.38.3.2. Metal Framing Elements Acting as Thermal Bridge

(1) Except as provided in Article 9.38.3.3., the thermal resistance of the insulated portion of a *building* assembly in Sentence 9.38.1.1.(1) that incorporates metal framing elements, such as steel studs and steel joists, that act as thermal bridges to facilitate heat flow through the assembly, shall be 20 per cent greater than the values shown in Table 9.38.3.1., unless it can be shown that the heat flow is not greater than the heat flow through a wood frame assembly of the same thickness.

9.38.3.3. Insulated Thermal Bridges

(1) Article 9.38.3.2. does not apply for *building* assemblies incorporating thermal bridges where the thermal bridges are insulated to restrict heat flow through the thermal bridges by a material providing a thermal resistance at least equal to 25 per cent of the thermal resistance required for the insulated portion of the assembly in Article 9.38.3.1.

9.38.3.4. Reduction of Thermal Resistance

(1) The thermal resistance of a *building* assembly may be reduced by not more than 20 per cent from that required in Articles 9.38.3.1. and 9.38.3.2., and the amount of glazing may be increased to more than permitted in Article 9.38.4.3., where it can be shown that the total calculated heat loss from the *building* enclosure does not exceed the heat loss that would result if the enclosure were constructed in conformance with the minimum thermal resistance requirements in Articles 9.38.3.1. and 9.38.3.2. and with the maximum amount of glazing permitted in Article 9.38.4.3., provided no allowance is made for solar heat gains or for the orientation of the glazing as described in Article 9.38.4.5.

9.38.3.5. Thermal Resistance Values for Roof and Ceiling Assemblies

(1) The thermal resistance values in Article 9.38.3.1. and 9.38.3.2. for roof or ceiling assemblies separating heated space from unheated space or the exterior may be reduced near the eaves to the extent made necessary by the roof slope and required ventilation clearances, except that the thermal resistance at the location directly above the inner surface of the exterior wall shall be at least 2.1 $m^2°C/W$ (11.92 $ft^2.h.°F/Btu$).

9.38.3.6. Reduction in Thermal Resistance Values due to Thermal Inertia

(1) The thermal resistance values required in Article 9.38.3.1. may be reduced to take into account the effect of thermal inertia resulting from the mass of the *building* in conformance with Building Research Note No. 126, published by the Division of Building Research, National Research Council of Canada, January 1978.

9.38.3.7. Insulation on Exterior of Foundation Wall

(1) Insulation applied to the exterior of a *foundation* wall or slab-on-ground floor shall extend down at least 600 mm (23⅝ in) below the adjacent exterior ground level or shall extend down and outward from the floor or wall for a total distance of at least 600 mm (23⅝ in) measured from the adjacent finished ground level.

9.38.3.8. Insulation on Interior of Foundation Wall

(1) Insulation applied to the interior of a *foundation* walls enclosing heated space shall extend from the underside of the subfloor to not less than 600 mm (23⅝ in) below the adjacent exterior ground level.

9.38.4. Glazing

9.38.4.1. Thermal Resistance of Glazing

(1) Except as provided in Articles 9.38.4.2. and 9.38.4.4., all glazing that separates heated space from unheated space or the exterior shall have a thermal resistance of at least 0.30 $m^2°C/W$ (1.79 $ft^2.h.°F/Btu$).

9.38.4.2. Enclosed Unheated Space

(1) Where an enclosed unheated space, such as a sun porch, enclosed verandah or vestibule, is separated from a heated space by glazing, the unheated enclosure may be considered to provide thermal resistance of 0.16 $m^2°C/W$ (0.91 $ft^2.h.°F/Btu$), or the equivalent of one layer of glazing.

9.38.4.3. Maximum Area of Glazing

(1) Except as provided in Articles 9.38.4.4. and 9.38.4.5., the total area of glazing, including glazing for doors and skylights, that separates heated space from unheated space or the exterior shall not exceed 20 per cent of the *floor area* of the *storey* served by the glazed areas and shall not exceed 40 per cent of the total area of the walls of that *storey* separating heated space from unheated space or the exterior. (In the case of a sloping wall, the area of the opaque portion of the wall is calculated as its projected area on a vertical plane.)

9.38.4.4. Different Thermal Resistance of Glazing

(1) Where the thermal resistance of glazing is different from that required in Articles 9.38.4.1. and 9.38.4.2., the area of such glazing for the purpose of applying Article 9.38.4.3. may be assumed as being equal to the actual area multiplied by the ratio of the required thermal resistance divided by the actual thermal resistance of the glazing.

9.38.4.5. Clear Glass or Shading Coefficient

(1) Except as provided in Article 9.38.4.6., the area of glazing that contains clear glass or that has a shading coefficient of more than 0.70 that is unshaded in the winter and faces a direction within 45° of due South may be assumed to be 50 per cent of its unshaded area in calculating the maximum area of glazing in Articles 9.38.4.3. and 9.38.4.4. provided the *building* is designed with a system that is capable of distributing the solar heat gain from such glazed areas throughout the *building*. For the purpose of determining whether or not the glazing is shaded in the winter, the shading shall be calculated using the noon sun angles of December 21.

9.38.4.6. Building Designed to be Cooled

(1) Article 9.38.4.5. shall not apply where the *building* is designed to be cooled unless the glazing described in 9.38.4.5. is shaded in the summer with exterior devices. For the purpose of determining whether or not the glazing is shaded in the summer, the shading shall be calculated using the noon sun angles of June 21.

9.38.5. Doors and Windows

9.38.5.1. Air Curtains

(1) Air curtains shall not be used in place of exterior doors.

9.38.5.2. Infiltration around Doors

(1) Except for doors used primarily to facilitate the movement of vehicles or handling of material, infiltration around doors shall conform to the appropriate requirements in Subsection 9.38.6.

9.38.5.3. Minimum Thermal Resistance of Doors

(1) Except for doors on enclosed unheated vestibules, all doors separating heated space from the outside shall conform to the appropriate requirements of Article 9.25.2.1.

9.38.5.4. Minimum Thermal Resistance of Windows

(1) Windows shall conform to the appropriate requirements of Article 9.25.2.1.

(2) When *electric space heating* is used, all sliding glass doors separating heated space from unheated space or the outdoors shall have an energy rating of not less than -13 ER.

(3) When *electric space heating* is used, all glazing that separates heated space from unheated space or the outdoors shall have an energy rating of not less than -13 ER for openable windows and 0 ER for fixed glazing.

(4) The energy rating required in Sentences (2) and (3) shall be determined in conformance with CAN/CSA-A440.2-M, "Energy Performance Evaluation of Windows and Sliding Glass Doors".

9.38.6. Infiltration

9.38.6.1. Air Infiltration of Exterior Windows

(1) Windows separating heated space from unheated space or the exterior shall be designed to limit the rate of air infiltration to not more than 0.775 dm^3/s for each metre (0.50 cfm for each square foot) of sash crack when tested at pressure differential of 75 Pa (0.011 psi) in conformance with ASTM E283, "Standard Method of Test for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors".

9.38.6.2. Air Infiltration of Exterior Sliding Glass Doors

(1) Manually operated exterior sliding glass door assemblies that separate heated space from unheated space or the exterior shall be designed to limit air infiltration to not more than 2.5 dm^3/s for each square metre (0.50 cfm for each square foot) of door area when tested in conformance with Article 9.38.6.1.

9.38.6.3. Air Infiltration of Exterior Swing Type Doors

(1) Except where the door is weather-stripped on all edges and protected with a storm door or by an enclosed unheated space, exterior swing type door assemblies for *dwelling units*, individually rented hotel and motel rooms and *suites* shall be designed to limit the rate of air infiltration to not more than 6.35 dm^3/s for each square metre (1.25 cfm for each square foot) of door area when tested in conformance with Article 9.38.6.1.

9.38.6.4. Air Infiltration of Other Doors

(1) Door assemblies other than those described in Articles 9.38.6.2. and 9.38.6.3. that separate heated space from unheated space or the exterior shall be designed to limit the rate of air infiltration to not more than 17.0 dm^3/s for each metre (11 cfm for each square foot) of door crack when tested in conformance with Article 9.38.6.1.

9.38.6.5. Caulking Materials

(1) Caulking material to reduce air infiltration shall conform to the requirements in Subsection 9.27.4.

9.38.6.6. Sealing of Joints to Prevent Air Leakage

(1) The junction between the sill plate and the *foundation*, joints between exterior wall panels and any other location where there is a possibility of air leakage into heated spaces in a *building* through the exterior walls, such as at utility service entrances, shall be caulked, gasketed or sealed to restrict such air leakage.

9.38.6.7. Air Leakage

(1) Air leakage between heated space and adjacent roof or attic space caused by the penetration of services shall be restricted in conformance with the requirements of Subsection 9.25.3.

9.38.7. Ventilation

9.38.7.1. Minimum Ventilation Rate

(1) Fresh air for the ventilation of rooms and spaces in *buildings* of *residential occupancy* shall be provided at a rate of at least 0.3 air change per hour by a combination of natural and mechanical ventilation.

Section 9.39. Park Model Trailers

9.39.1. Scope

9.39.1.1. Application

(1) This Section applies to manufactured *buildings* designed and constructed in conformance with CAN/CSA-Z241 Series-M, "Park Model Trailers" and used or intended to be used as a seasonal recreational *building* of *residential occupancy*.

9.39.2. General

9.39.2.1. General

(1) Except as provided in Subsection 9.39.3., 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-M, "Park Model Trailers".

9.39.3. Requirements

9.39.3.1. 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 9.39.1.1.

9.39.3.2. Spatial Separation

(1) *Buildings* described in Article 9.39.1.1. 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.

9.39.3.3. Foundations and Anchorage

(1) *Buildings* described in Article 9.39.1.1. shall be supported and anchored in conformance with the manufacturer's installation instructions.

9.39.3.4. Proximity to Above Ground Electrical Conductors

(1) *Buildings* described in Article 9.39.1.1. shall comply with Article 9.1.1.5.

Section 9.40. Construction of Farm Buildings

9.40.1. Scope

9.40.1.1. Application

(1) This Section applies to *farm buildings* of *low human occupancy*.

9.40.1.2. Construction Requirements

(1) The construction of *farm buildings* of *low human occupancy* shall, subject to Article 2.1.1.5., conform to the requirements of this Part except as provided in this Section.

9.40.2. Lumber

9.40.2.1. Lumber Requirements

(1) Except as permitted by Article 9.40.2.2., lumber shall conform to appropriate requirements in Subsection 9.3.2.

9.40.2.2. Ungraded Lumber

(1) *Ungraded lumber* may be used for wood posts, joists, rafters, lintels, beams and wall studs in a *farm building* of *low human occupancy* of not more than one *storey* in *building height*.

9.40.3. Structural Requirements

9.40.3.1. Structural Design

(1) Except as provided in Articles 9.40.3.2. to 9.40.3.4., wood posts, joists, rafters, lintels, beams and wall studs shall be designed in conformance with Section 9.4.

9.40.3.2. Posts

(1) In a *farm building* of *low human occupancy*, the size of wood posts shall conform to Tables 9.40.3.2.A. to 9.40.3.2.J. for the loads shown in the Tables.

9.40.3.3. Spans

(1) In a *farm building* of *low human occupancy*, the spans of wood joists, rafters, lintels and beams shall conform to the spans shown in Tables 9.40.3.3.K. to 9.40.3.3.T. for the loads shown in the Tables.

9.40.3.4. Stud Size and Spacing

(1) In a *farm building* of *low human occupancy*, the size and spacing of wood studs shall conform to Tables 9.40.3.4.U. to 9.40.3.4.W. for the loads shown in the Tables.

Table 9.40.3.2.A.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades) For Wind Loading q10 ≤ 0.30 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	A	A	A	A	A	B	B	B
	3.6	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	4.2	B	B	B	B	B	B	B	B	C	C	B	C	C	C	C
	4.8	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
	6.0	C	C	C	C	C	C	C	C	D	D	C	D	D	—	—
12.1	≤3.0	A	A	A	A	A	A	A	A	B	B	A	B	B	B	C
	3.6	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	4.2	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C
	4.8	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	6.0	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
15.2	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	4.2	B	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.8	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—
	6.0	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
18.2	≤3.0	A	A	A	B	B	A	B	B	B	C	B	B	C	C	C
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes

A = 89 mm x 140 mm C = 140 mm x 184 mm
B = 140 mm x 140 mm D = 184 mm x 184 mm

Notes to Table 9.40.3.2.A.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.
(2) Posts shall be oriented with the long dimension parallel to the *building* width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.B.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades) For Wind Loading q10 ≤ 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	A	A	B	A	B	B	B	B
	3.6	A	A	A	A	A	A	B	B	B	B	B	B	C	C	C
	4.2	B	B	B	B	B	B	B	C	C	C	C	C	C	C	C
	4.8	B	B	B	C	C	C	C	C	C	C	C	C	C	D	D
	6.0	C	C	C	C	C	C	D	D	D	D	D	—	—	—	—
12.1	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C
	4.2	B	B	B	B	C	C	C	C	C	C	C	C	C	C	D
	4.8	B	C	C	C	C	C	C	C	C	C	C	D	D	D	—
	6.0	C	C	C	C	D	D	D	D	—	—	—	—	—	—	—
15.2	≤3.0	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
18.2	≤3.0	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.2	B	B	C	C	C	C	C	C	C	D	C	D	D	D	—
	4.8	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes

A = 89 mm x 140 mm C = 140 mm x 184 mm
B = 140 mm x 140 mm D = 184 mm x 184 mm

Notes to Table 9.40.3.2.B.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.
(2) Posts shall be oriented with the long dimension parallel to the *building* width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.C.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades) For Wind Loading q10 ≤ 0.30 kPa															
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m					
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa					
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	
9.14	≤3.0	A	A	A	A	A	A	A	A	B	B	A	B	B	B	C	
	3.6	A	A	A	A	B	A	B	B	B	C	B	C	C	C	C	
	4.2	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C	
	4.8	C	C	C	C	C	C	C	C	C	C	C	C	C	D	D	
	6.0	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—	
12.1	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C	
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	C	
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	C	D	D	
	4.8	C	C	C	C	C	C	C	C	D	D	C	D	D	—	—	
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—	
15.2	≤3.0	A	A	A	B	B	A	B	B	C	C	B	C	C	C	C	
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	C	C	D	
	4.2	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—	
	4.8	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—	
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—	
18.2	≤3.0	A	A	B	B	B	B	B	C	C	C	B	C	C	C	D	
	3.6	B	B	B	C	C	C	C	C	C	C	C	C	C	D	D	
	4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—	
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—	
	6.0	C	D	D	—	—	—	—	—	—	—	—	—	—	—	—	
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	

Legend - Post Sizes

A = 89 mm x 140 mm C = 140 mm x 184 mm
B = 140 mm x 140 mm D = 184 mm x 184 mm

Notes to Table 9.40.3.2.C.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.
(2) Posts shall be oriented with the long dimension parallel to the *building* width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.D.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades) For Wind Loading q10 ≤ 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	B	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C
	4.2	B	B	B	B	C	C	C	C	C	C	C	C	C	C	D
	4.8	C	C	C	C	C	C	C	C	C	D	C	D	D	D	—
	6.0	C	C	C	C	D	D	D	—	—	—	—	—	—	—	—
12.1	≤3.0	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	3.6	B	B	B	B	B	B	C	C	C	C	C	C	C	C	C
	4.2	B	B	C	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	D	D	D	D	—	—	—	—	—	—	—	—	—
15.2	≤3.0	A	A	B	B	B	B	B	B	C	C	B	C	C	C	C
	3.6	A	B	B	C	C	C	C	C	C	C	C	C	C	D	D
	4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.8	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—
	6.0	C	D	D	—	—	—	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	3.6	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—
	4.2	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	4.8	C	C	C	D	D	C	D	—	—	—	D	—	—	—	—
	6.0	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes

A = 89 mm x 140 mm C = 140 mm x 184 mm
B = 140 mm x 140 mm D = 184 mm x 184 mm

Notes to Table 9.40.3.2.D.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.
(2) Posts shall be oriented with the long dimension parallel to the *building* width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.E.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned For Wind Loading q10 ≤ 0.30 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	A	B	B	A	B	B	C	C
	3.6	A	A	A	A	B	A	B	B	B	C	B	C	C	C	C
	4.2	B	B	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.8	B	B	B	B	C	C	C	C	C	C	C	C	C	D	D
	6.0	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
12.1	≤3.0	A	A	A	A	B	A	B	B	B	C	B	B	C	C	C
	3.6	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	4.2	B	B	B	B	C	B	C	C	C	C	C	C	D	D	D
	4.8	B	B	C	C	C	C	C	C	C	D	C	D	D	D	—
	6.0	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
15.2	≤3.0	A	A	A	B	B	B	B	C	C	C	B	C	C	D	D
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	D	D	D
	4.2	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.8	B	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
18.2	≤3.0	A	A	B	B	C	B	B	C	C	D	C	C	D	D	—
	3.6	A	B	B	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	B	C	C	C	C	C	C	D	D	D	C	D	—	—	—
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes

A = 101.6 mm x 152.4 mm C = 152.4 mm x 203.2 mm

B = 152.4 mm x 152.4 mm D = 203.2 mm x 203.2 mm

Notes to Table 9.40.3.2.E:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.

(2) Posts shall be oriented with the long dimension parallel to the *building* width.

(3) Bracing systems shall be specified by a competent designer.

(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.

(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.

(6) Post designs are based on partial fixity condition due to embedment in soil.

(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.F.
Post Sizes for Diaphragm-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned For Wind Loading q10 ≤ 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	C	C	C	C	C
	4.2	B	B	B	B	C	C	C	C	C	C	C	C	C	D	D
	4.8	B	B	C	C	C	C	C	C	C	D	C	D	D	D	—
	6.0	C	C	C	C	C	D	D	D	—	—	—	—	—	—	—
12.1	≤3.0	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	3.6	A	A	B	B	B	B	C	C	C	C	C	C	C	D	D
	4.2	B	B	B	C	C	C	C	C	C	D	C	D	D	D	—
	4.8	B	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
15.2	≤3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	D	D
	3.6	A	B	B	C	C	C	C	C	C	D	C	C	D	D	—
	4.2	B	C	C	C	C	C	C	C	D	D	D	D	D	—	—
	4.8	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—
	6.0	C	C	D	D	—	D	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	B	B	B	C	B	C	C	C	D	C	C	D	D	—
	3.6	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	B	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.8	C	C	C	C	D	D	D	D	—	—	—	—	—	—	—
	6.0	C	D	D	—	—	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes

A = 101.6 mm x 152.4 mm C = 152.4 mm x 203.2 mm
B = 152.4 mm x 152.4 mm D = 203.2 mm x 203.2 mm

Notes to Table 9.40.3.2.F:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.
(2) Posts shall be oriented with the long dimension parallel to the *building* width.
(3) Bracing systems shall be specified by a competent designer.
(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.
(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.
(6) Post designs are based on partial fixity condition due to embedment in soil.
(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.G.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned														
		For Wind Loading q10 ≤ 0.30 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	A	A	A	B	B	B	B	B	C	C	C
	3.6	A	A	A	B	B	B	B	B	C	C	B	C	C	C	C
	4.2	B	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.8	C	C	C	C	C	C	C	C	C	D	C	C	D	D	—
	6.0	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
12.1	≤3.0	A	A	A	B	B	A	B	B	C	C	B	C	C	C	D
	3.6	A	B	B	B	C	B	C	C	C	C	C	C	C	D	D
	4.2	B	B	C	C	C	C	C	C	C	D	C	C	D	D	—
	4.8	C	C	C	C	C	C	C	D	D	D	D	D	—	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
15.2	≤3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	D	D
	3.6	A	B	B	C	C	C	C	C	C	D	C	C	D	D	—
	4.2	B	C	C	C	C	C	C	D	D	D	C	D	—	—	—
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
	6.0	C	D	D	D	—	D	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	B	B	C	C	B	C	C	C	D	C	C	D	D	—
	3.6	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	C	C	C	C	D	C	C	D	—	—	D	D	—	—	—
	4.8	C	C	C	D	D	C	D	—	—	—	D	—	—	—	—
	6.0	C	D	—	—	—	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes

A = 101.6 mm x 152.4 mm C = 152.4 mm x 203.2 mm

B = 152.4 mm x 152.4 mm D = 203.2 mm x 203.2 mm

Notes to Table 9.40.3.2.G.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.

(2) Posts shall be oriented with the long dimension parallel to the *building* width.

(3) Bracing systems shall be specified by a competent designer.

(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.

(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.

(6) Post designs are based on partial fixity condition due to embedment in soil.

(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.H.
Post Sizes for Knee-Braced Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.2.

Building Width, m	Wall Height, m	Ungraded Lumber, Full-Dimensioned For Wind Loading q10 ≤ 0.45 kPa														
		Post Spacing, 2.4 m					Post Spacing, 3.6 m					Post Spacing, 4.8 m				
		Roof Load, kPa					Roof Load, kPa					Roof Load, kPa				
		1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
9.14	≤3.0	A	A	A	A	B	A	B	B	B	C	B	C	C	C	C
	3.6	A	A	B	B	B	B	C	C	C	C	C	C	C	C	D
	4.2	B	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.8	C	C	C	C	C	C	C	C	D	D	D	D	D	—	—
	6.0	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
12.1	≤3.0	A	A	B	B	B	B	B	C	C	C	C	C	C	C	D
	3.6	A	B	B	C	C	C	C	C	C	C	C	C	D	D	D
	4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.8	C	C	C	C	C	C	D	D	D	—	D	—	—	—	—
	6.0	C	D	D	D	—	—	—	—	—	—	—	—	—	—	—
15.2	≤3.0	A	B	B	B	C	B	C	C	C	C	C	C	D	D	D
	3.6	B	B	C	C	C	C	C	C	D	D	C	D	D	—	—
	4.2	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.8	C	C	C	D	D	D	D	—	—	—	—	—	—	—	—
	6.0	D	D	D	—	—	—	—	—	—	—	—	—	—	—	—
18.2	≤3.0	A	B	B	C	C	C	C	C	D	D	C	D	D	—	—
	3.6	B	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.2	C	C	C	C	C	C	C	D	D	—	D	D	—	—	—
	4.8	C	C	C	C	D	C	D	D	—	—	D	—	—	—	—
	6.0	C	C	D	D	D	D	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Legend - Post Sizes

A = 101.6 mm x 152.4 mm C = 152.4 mm x 203.2 mm

B = 152.4 mm x 152.4 mm D = 203.2 mm x 203.2 mm

Notes to Table 9.40.3.2.H.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.

(2) Posts shall be oriented with the long dimension parallel to the *building* width.

(3) Bracing systems shall be specified by a competent designer.

(4) Posts shall be situated on footings and shall be anchored to prevent wind uplift.

(5) Posts shall be constrained against lateral movement at ground level and at the footing. Concrete floor, splash-rail and uplift anchor help to meet this condition.

(6) Post designs are based on partial fixity condition due to embedment in soil.

(7) Footing excavations should be backfilled with parent material unless otherwise specified by a competent designer.

Table 9.40.3.2.I.
Post Sizes for Farm Buildings of Low Human Occupancy
(With Second Storey Loading)

Forming Part of Article 9.40.3.2.

Side wall Height, m	Total Roof Load, kPa	Spruce-Pine-Fir, No. 1, Dressed (Post and Timber Grades)																Second *Storey* Plate, kN/m
		Wind load: q10 ≤ 0.30 kPa								Wind load: q10 ≤ 0.45 kPa								
		2.4 m o.c.				3.600 m o.c.				2.400 m o.c.				3.600 m o.c.				
		Building Width, m				*Building* Width, m				*Building* Width, m				*Building* Width, m				
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	
3.0	1.9	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B	14.6
	2.4	A	A	A	A	A	B	B	B	A	A	A	B	A	B	B	B	
	2.8	A	A	A	B	A	B	B	C	A	A	B	B	B	B	B	C	
	3.3	A	A	B	B	B	B	B	C	A	A	B	B	B	B	C	C	
3.6	1.9	A	A	A	B	A	B	B	C	A	A	B	B	B	B	C	C	14.6
	2.4	A	A	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	2.8	A	B	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	3.3	A	B	B	C	B	C	C	C	B	B	B	C	C	C	C	C	
3.0	1.9	A	A	A	A	A	A	B	B	A	A	A	A	A	A	B	B	7.3
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B	
	2.8	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	C	
	3.3	A	A	B	B	B	B	B	C	A	A	B	B	B	B	C	C	
3.6	1.9	A	A	A	B	A	B	B	B	A	A	B	B	B	B	C	C	7.3
	2.4	A	A	B	B	B	B	C	C	A	B	B	B	B	B	C	C	
	2.8	A	A	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	3.3	A	B	B	B	B	C	C	C	B	B	B	C	C	C	C	C	
3.0	1.9	A	A	A	A	A	A	A	B	A	A	A	A	A	A	B	B	3.6
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B	
	2.8	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	C	
	3.3	A	A	A	B	A	B	B	C	A	A	B	B	B	B	C	C	
3.6	1.9	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	C	3.6
	2.4	A	A	B	B	B	B	B	C	A	A	B	B	B	B	C	C	
	2.8	A	A	B	B	B	B	C	C	A	B	B	B	B	C	C	C	
	3.3	A	B	B	B	B	C	C	C	A	B	B	C	B	C	C	C	
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Post Sizes

A = 89 mm x 140 mm

B = 140 mm x 140 mm

C = 140 mm x 184 mm

Notes to Table 9.40.3.2.I.:

(1) Designs are based on load combinations of total roof load, wind load and stored product acting at the same time on a closed *building*.

(2) All notes following Table 9.40.3.2.A. apply, with the following conditions/exceptions:

— 14.6 kN/m loading: Full 4.8 m sidewall hay/straw storage space above. It is supported by beams spaced at 3.6 m o.c. The outside plate carries a 1.8 m floor width. If the loading is greater, refer to a qualified person for design.

— 7.3 kN/m loading: Full 2.4 m sidewall hay/straw storage space above or a gambrel roof structure > 9.14 m in total width. Floor support beams as above.

— 3.6 kN/m loading: Small gambrel roof structure or storage space for light storage. Floor support beams as above.

Table 9.40.3 2.J.
Round Posts
Forming Part of Article 9.40.3.2.

Ungraded Lumber Full-dimension Size, mm	Equivalent Diameter Full Size, mm
50.8 x 101.6	101.6
50.8 x 152.4	127.0
50.8 x 203.2	152.4
50.8 x 254.0	177.8
50.8 x 304.8	203.2
76.2 x 304.8	228.6
76.2 x 355.6	254.0
101.6 x 152.4	158.8
101.6 x 304.8	203.2
101.6 x 355.6	279.4
127.0 x 203.2	209.6
127.0 x 254.0	241.3
152.4 x 152.4	190.5
152.4 x 203.2	222.3
152.4 x 254.0	260.4
203.2 x 203.2	247.7
203.2 x 254.0	285.8
203.2 x 304.8	317.5
254.0 x 304.8	342.9
254.0 x 355.6	381.0
Column 1	2

Notes to Table 9.40.3.2.J.:

(1) When selecting round, *ungraded lumber*, ensure that the material is of good quality.

(2) Any timber that is in contact with ground shall be chemically treated to resist growth of fungus and decay.

(3) Equivalent diameter indicated in this Table refers to the smallest diameter of a tapering pole.

(4) Used hydro or telephone poles may be used if they are of good quality and are chemically treated to prevent decay.

(5) Indicated equivalent diameter will provide bending, shear and deflection resisting capabilities equal to or better than the rectangular section that it replaces.

Table 9.40.3.3.K.
Common Rafter Sizes for Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.3.

Rafter Span, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)														
	Rafter Spacing														
	300 mm					400 mm					600 mm				
	Live Load, kPa					*Live Load*, kPa					*Live Load*, kPa				
	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
2.4	A	A	B	B	B	A	B	B	B	B	B	B	B	B	B
3.0	B	B	B	B	B	B	B	B	B	C	B	B	C	C	D
3.6	B	B	C	C	C	B	C	C	C	C	C	C	D	D	D
4.2	B	C	C	C	C	C	C	C	D	D	C	D	D	E	E
4.8	C	C	D	D	D	C	D	D	E	E	D	E	E	—	—
5.4	C	D	D	D	E	D	D	E	E	—	E	E	—	—	—
6.0	D	D	D	E	—	D	E	E	—	—	E	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Legend - Rafter Sizes

A = 38 mm x 89 mm
B = 38 mm x 140 mm
C = 38 mm x 184 mm
D = 38 mm x 235 mm
E = 38 mm x 286 mm

Notes to Table 9.40.3.3.K.:

(1) The rafter span is the unsupported length of the rafter from plate to plate or from plate to ridge. A *dead load* of 0.24 kPa is incorporated to allow for weight of the roof sheathing and rafter.

Table 9.40.3.3.L.
Common Rafter Sizes for Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.3.

Rafter Span, m	*Ungraded Lumber*, Full-Dimension														
	Rafter Spacing														
	300 mm					400 mm					600 mm				
	Live Load, kPa					*Live Load*, kPa					*Live Load*, kPa				
	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3	1.4	1.9	2.4	2.8	3.3
2.4	A	A	B	B	B	B	B	B	B	C	B	B	C	C	D
3.0	B	B	B	C	C	B	C	C	C	D	C	C	D	D	E
3.6	B	C	C	D	D	C	C	D	D	E	D	D	E	F	F
4.2	C	C	D	D	E	D	D	E	E	F	E	F	F	F	G
4.8	C	D	E	E	F	D	E	F	F	F	F	F	F	G	I
5.4	D	E	F	F	F	E	F	F	F	G	F	G	H	I	—
6.0	E	F	F	F	G	F	F	G	G	I	F	H	I	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Legend - Rafter Sizes

A = 50.8 mm x 101.6 mm
B = 50.8 mm x 152.4 mm
C = 50.8 mm x 203.2 mm
D = 50.8 mm x 254.0 mm
E = 50.8 mm x 304.8 mm
F = 76.2 mm x 304.8 mm
G = 76.2 mm x 355.6 mm
H = 101.6 mm x 304.8 mm
I = 101.6 mm x 355.6 mm

Notes to Table 9.40.3.3.L.:

(1) The rafter span is the unsupported length of the rafter from plate to plate or from plate to ridge. A *dead load* of 0.24 kPa is incorporated to allow for weight of the roof sheathing and rafter.

Table 9.40.3.3.M.
Floor Joists for Farm Buildings of Low Human Occupancy -Intermittent Loads[1]
Forming Part of Article 9.40.3.3.

Joist Span, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)																	
	Joist Spacing																	
	300 mm						400 mm						600 mm					
	Live Load, kPa						*Live Load*, kPa						*Live Load*, kPa					
	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6
2.4	A	B	B	B	B	C	B	B	B	B	C	C	B	B	B	C	D	D
3.0	B	B	B	C	C	D	B	B	C	C	D	D	B	C	C	D	E	—
3.6	B	C	C	C	D	D	C	C	C	D	E	E	C	D	D	E	—	—
4.2	C	C	D	D	E	E	C	D	D	E	—	—	D	d	E	—	—	—
4.8	C	D	D	E	—	—	D	D	E	E	—	—	D	E	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Joist Sizes

A = 38 mm x 89 mm
B = 38 mm x 140 mm
C = 38 mm x 184 mm
D = 38 mm x 235 mm
E = 38 mm x 286 mm

Notes to Table 9.40.3.3.M.:

(1) Loads are applied to the floor intermittently. (When loads are applied for extended periods of time, use Table 9.40.3.3.N.).

(2) A *dead load* of 0.48 kPa is incorporated to allow for the dead weight of the floor system.

Table 9.40.3.3.N.
Floor Joists for Farm Buildings of Low Human Occupancy-Continuous Loads[1]
Forming Part of Article 9.40.3.3.

Joist Span, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)																	
	Joist Spacing																	
	300 mm						400 mm						600 mm					
	Live Load, kPa						*Live Load*, kPa						*Live Load*, kPa					
	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6	1.9	2.8	3.8	4.8	6.7	8.6
2.4	A	B	B	B	C	C	B	B	B	C	D	E	B	C	C	D	—	—
3.0	B	B	C	C	D	E	B	C	C	D	E	—	C	D	D	E	—	—
3.6	B	C	D	D	E	—	C	D	D	E	—	—	D	E	—	—	—	—
4.2	C	D	D	E	—	—	D	E	E	—	—	—	E	—	—	—	—	—
4.8	D	D	E	—	—	—	D	E	—	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Joist Sizes

A = 38 mm x 89 mm
B = 38 mm x 140 mm
C = 38 mm x 184 mm
D = 38 mm x 235 mm
E = 38 mm x 286 mm

Notes to Table 9.40.3.3.N.:

(1) For use of floors that support hay, straw, grain or other continuous loads.

(2) A *dead load* of 0.48 kPa is incorporated to allow for the dead weight of the floor system.

Table 9.40.3.3.O.
Built-up Wood Beam Sizes for Farm Buildings of Low Human Occupancy -Intermittent Loads[1]
Forming Part of Article 9.40.3.3.

Beam Span, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber) Total Load on Beam, kN/m										
	5.84	8.76	11.67	14.59	17.51	20.43	23.35	26.27	29.19	32.11	35.03
1.8	A	A	A	B	B	D	D	G	G	J	L
2.4	A	A	B	D	E	H	J	L	—	—	—
3.0	A	C	E	H	J	K	—	—	—	—	—
3.6	C	H	J	L	—	—	—	—	—	—	—
4.2	E	J	L	—	—	—	—	—	—	—	—
4.8	I	L	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10	11	12

Legend - Beam Sizes

A = 3 - 38 mm x 184 mm B = 4 - 38 mm x 184 mm C = 3 - 38 mm x 235 mm D = 5 - 38 mm x 184 mm E = 3 - 38 mm x 286 mm
F = 4 - 38 mm x 235 mm G = 6 - 38 mm x 184 mm H = 5 - 38 mm x 235 mm I = 4 - 38 mm x 286 mm J = 6 - 38 mm x 235 mm
K = 5 - 38 mm x 286 mm L = 6 - 38 mm x 286 mm

Notes to Table 9.40.3.3.O.:

(1) Loads are applied to the beam intermittently.
(2) A *dead load* of 0.584 kN/m is assumed for all beams.
(3) Floors systems supporting heavy loads over larger spans will require the use of steel beams or other specialized materials.

Table 9.40.3.3.P.
Built-up Wood Beam Sizes for Farm Buildings of Low Human Occupancy -Continuous Loads[1]
Forming Part of Article 9.40.3.3.

Beam Span, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber) Total Load on Beam, kN/m						
	5.84	8.76	11.67	14.59	17.51	20.43	23.35
1.8	A	A	B	D	G	J	L
2.4	A	C	E	J	L	—	—
3.0	D	H	J	L	—	—	—
3.6	H	K	—	—	—	—	—
4.2	K	—	—	—	—	—	—
4.8	L	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8

Legend - Beam Sizes

A = 3 - 38 mm x 184 mm B = 4 - 38 mm x 184 mm C = 3 - 38 mm x 235 mm D = 5 - 38 mm x 184 mm
E = 3 - 38 mm x 286 mm F = 4 - 38 mm x 235 mm G = 6 - 38 mm x 184 mm H = 5 - 38 mm x 235 mm
I = 4 - 38 mm x 286 mm J = 6 - 38 mm x 235 mm K = 5 - 38 mm x 286 mm L = 6 - 38 mm x 286 mm

Notes to Table 9.40.3.3.P.:

(1) For use of floors that support hay, straw, grain or other continuous loads.
(2) A *dead load* of 0.48 kPa is assumed for all beams.
(3) Floor systems supporting heavy loads over larger spans will require use of steel beams or other specialized materials.

Table 9.40.3.3.Q.
Ungraded Lumber, Full-Dimension Roof Beam Sizes for Farm Buildings of Low Human Occupancy [1]
Forming Part of Article 9.40.3.3.

Beam Span, m	Total Load on Built-up Wood Beam, kN/m							
	5.84	8.76	11.67	14.59	17.51	20.43	23.35	26.27
1.8	A	A	B	C	D	F	G	H
2.4	B	D	E	H	I	J	—	—
3.0	D	G	I	—	—	—	—	—
3.6	G	J	—	—	—	—	—	—
4.2	J	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9

Legend - Built-up Wood Beam Sizes

A = 3 - 50.8 mm x 203.2 mm F = 4 - 50.8 mm x 254.0 mm
B = 4 - 50.8 mm x 203.2 mm G = 5 - 50.8 mm x 254.0 mm
C = 3 - 50.8 mm x 254.0 mm H = 4 - 50.8 mm x 304.8 mm
D = 5 - 50.8 mm x 203.2 mm I = 5 - 50.8 mm x 304.8 mm
E = 6 - 50.8 mm x 203.2 mm J = 6 - 50.8 mm x 304.8 mm

Notes to Table 9.40.3.3.Q.:

(1) *Ungraded lumber*, full-dimension, built-up wood beam.
(2) A *dead load* of 0.584 kN/m is assumed.
(3) Beams are sized for roof load only.

Table 9.40.3.3.R.
Ungraded Lumber, Full-Dimension Roof Beam Sizes for Farm Buildings of Low Human Occupancy [1]
Forming Part of Article 9.40.3.3.

Beam Span, m	Total Load on Built-up Sawn Beam, kN/m							
	5.84	8.76	11.67	14.59	17.51	20.43	23.35	26.27
1.8	A	A	B	C	D	E	F	G
2.4	A	B	D	D	F	G	—	—
3.0	C	D	E	F	—	—	—	—
3.6	D	F	G	—	—	—	—	—
4.2	E	G	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9

Legend - Sawn Beam Sizes

A = 127.0 mm x 203.2 mm E = 203.2 mm x 304.8 mm
B = 127.0 mm x 254.0 mm F = 254.0 mm x 304.8 mm
C = 152.4 mm x 254.0 mm G = 254.0 mm x 355.6 mm
D = 203.2 mm x 254.0 mm

Notes to Table 9.40.3.3.R.:

(1) *Ungraded lumber*, full-dimension, sawn wood beam.
(2) A *dead load* of 0.584 kN/m is assumed.
(3) Beams are sized for roof load only.

Table 9.40.3.3.S.
Roof Plate-Beams and Lintels for Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.3.

Building Width, m	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber) Total Roof Load, kPa, with Post Spacing at 2.4 m								
	A	B	C	D	E	F	G	H	I
7.3	1.67	2.77	3.68	2.49	4.11	5.50	3.35	5.55	7.42
8.5	1.43	2.34	3.16	2.15	3.54	4.74	2.87	4.74	6.36
9.7	1.24	2.05	2.77	1.86	3.11	4.11	2.53	4.16	5.55
10.9	—	1.81	2.44	1.67	2.72	3.68	2.25	3.68	4.93
12.1	—	1.62	2.20	1.48	2.49	3.30	2.01	3.30	4.45
13.4	—	1.48	2.01	1.34	2.25	3.01	1.81	3.01	4.02
14.6	—	1.38	1.81	1.24	2.05	2.72	1.67	2.77	3.68
15.8	—	1.24	1.67	—	1.91	2.53	1.53	2.53	3.40
17.0	—	—	1.58	—	1.77	2.34	1.43	2.39	3.16
18.2	—	—	1.48	—	1.62	2.20	1.34	2.20	2.96
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.0 m								
	A	B	C	D	E	F	G	H	I
7.3	—	1.72	2.29	1.53	2.58	3.44	2.10	3.44	4.64
8.5	—	1.48	1.96	1.34	2.20	2.96	1.77	2.96	3.97
9.7	—	1.29	1.72	—	1.91	2.58	1.58	2.58	3.44
10.9	—	—	1.53	—	1.72	2.29	1.38	2.29	3.06
12.1	—	—	1.38	—	1.53	2.05	1.24	2.05	2.77
13.4	—	—	1.24	—	1.38	1.86	—	1.86	2.53
14.6	—	—	—	—	1.29	1.72	—	1.72	2.29
15.8	—	—	—	—	—	1.58	—	1.58	2.10
17.0	—	—	—	—	—	1.48	—	1.48	1.96
18.2	—	—	—	—	—	1.38	—	1.38	1.81
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.6 m								
	A	B	C	D	E	F	G	H	I
7.3	—	1.38	1.81	1.24	2.05	2.72	1.67	2.77	3.68
8.5	—	—	1.58	—	1.77	2.34	1.43	2.39	3.16
9.7	—	—	1.38	—	1.53	2.05	1.24	2.05	2.77
10.9	—	—	1.19	—	1.38	1.81	—	1.81	2.44
12.1	—	—	—	—	1.24	1.62	—	1.67	2.20
13.4	—	—	—	—	—	1.48	—	1.48	2.01
14.6	—	—	—	—	—	1.38	—	1.38	1.81
15.8	—	—	—	—	—	1.24	—	1.29	1.67
17.0	—	—	—	—	—	—	—	—	1.58
18.2	—	—	—	—	—	—	—	—	1.48
Column 1	2	3	4	5	6	7	8	9	10

Legend - Roof Plate-Beam and Lintel Sizes

A = 2 - 38 mm x 184 mm
B = 3 - 38 mm x 184 mm
C = 4 - 38 mm x 184 mm
D = 2 - 38 mm x 235 mm
E = 3 - 38 mm x 235 mm
F = 4 - 38 mm x 235 mm
G = 2 - 38 mm x 286 mm
H = 3 - 38 mm x 286 mm
I = 4 - 38 mm x 286 mm

Notes to Table 9.40.3.3.S.:

(1) Trusses are at 1.2 m on centres.

(2) Plate-beam/lintel loading can be very significant.

(3) Specifications for anchorage at supporting posts must be specified by a competent designer.

Table 9.40.3.3.T.
Roof Plate-Beams and Lintels for Farm Buildings of Low Human Occupancy
Forming Part of Article 9.40.3.3.

Building Width, m	*Ungraded Lumber*-Full Dimension								
	Total Roof Load, kPa, with Post Spacing at 2.4 m								
	A	B	C	D	E	F	G	H	I
7.3	—	1.72	2.29	1.48	2.44	3.25	1.91	3.20	4.26
8.5	—	1.43	1.96	1.24	2.10	2.77	1.67	2.72	3.68
9.7	—	1.29	1.72	—	1.81	2.44	1.43	2.39	3.20
10.9	—	—	1.53	—	1.62	2.15	1.29	2.15	2.87
12.1	—	—	1.34	—	1.48	1.96	—	1.91	2.58
13.4	—	—	1.24	—	1.34	1.77	—	1.72	2.34
14.6	—	—	—	—	1.19	1.62	—	1.58	2.15
15.8	—	—	—	—	—	1.48	—	1.48	1.96
17.0	—	—	—	—	—	1.38	—	1.38	1.81
18.2	—	—	—	—	—	1.29	—	1.29	1.72
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.0 m								
	A	B	C	D	E	F	G	H	I
7.3	—	—	1.43	—	1.53	2.05	1.19	2.01	2.68
8.5	—	—	1.19	—	1.29	1.72	—	1.72	2.29
9.7	—	—	—	—	—	1.53	—	1.48	2.01
10.9	—	—	—	—	—	1.34	—	1.34	1.77
12.1	—	—	—	—	—	1.19	—	—	1.58
13.4	—	—	—	—	—	—	—	—	1.43
14.6	—	—	—	—	—	—	—	—	1.34
15.8	—	—	—	—	—	—	—	—	1.24
17.0	—	—	—	—	—	—	—	—	—
18.2	—	—	—	—	—	—	—	—	—
Building Width, m	Total Roof Load, kPa, with Post Spacing at 3.6 m								
	A	B	C	D	E	F	G	H	I
7.3	—	—	—	—	1.19	1.62	—	1.58	2.15
8.5	—	—	—	—	—	1.38	—	1.38	1.81
9.7	—	—	—	—	—	1.19	—	—	1.58
10.9	—	—	—	—	—	—	—	—	1.43
12.1	—	—	—	—	—	—	—	—	1.29
13.4	—	—	—	—	—	—	—	—	—
14.6	—	—	—	—	—	—	—	—	—
15.8	—	—	—	—	—	—	—	—	—
17.0	—	—	—	—	—	—	—	—	—
18.2	—	—	—	—	—	—	—	—	—
Column 1	2	3	4	5	6	7	8	9	10

Legend - Roof Plate-Beam and Lintel Sizes:

A = 2 - 50.8 mm x 203.2 mm
B = 3 - 50.8 mm x 203.2 mm
C = 4 - 50.8 mm x 203.2 mm
D = 2 - 50.8 mm x 254.0 mm
E = 3 - 50.8 mm x 254.0 mm
F = 4 - 50.8 mm x 254.0 mm
G = 2 - 50.8 mm x 304.8 mm
H = 3 - 50.8 mm x 304.8 mm
I = 4 - 50.8 mm x 304.8 mm

Notes to Table 9.40.3.3.T.:

(1) Trusses are at 1.2 m on centres.

(2) Plate-beam/lintel loading can be very significant.

(3) Specifications for anchorage at supporting posts must be specified by a competent designer.

Table 9.40.3.4.U.
Stud Sizes for Farm Buildings of Low Human Occupancy (Single *Storey*)
Forming Part of Article 9.40.3.4.

Sidewall Height, m	Total Roof Load, kPa	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)															
		Wind Load: q10 ≤ 0.30 kPa								Wind Load: q10 ≤ 0.45 kPa							
		400 mm o.c.				600 mm o.c.				400 mm o.c.				600 mm o.c.			
		Building Width, m				*Building* Width, m				*Building* Width, m				*Building* Width, m			
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3
3.0	1.9	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	B
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	A	B	B
	2.8	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B
	3.3	A	A	A	B	A	B	B	B	A	A	A	B	A	B	B	B
3.6	1.9	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	B
	2.4	A	A	B	B	B	B	B	B	A	A	B	B	B	B	B	B
	2.8	A	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
	3.3	A	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
4.2	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
4.8	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C
	2.8	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C
	3.3	B	B	B	B	B	B	C	C	B	B	B	B	B	B	C	C
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Legend - Stud Sizes

A = 38 mm x 89 mm

B = 38 mm x 140 mm

C = 38 mm x 184 mm or double 38 mm x 140 mm under the trusses, with an intermediate 38 mm x 140 mm stud at 600 mm.

Notes to Table 9.40.3.4.U.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.

(2) It is assumed that the double top plate is rigid enough to cause load sharing amongst all studs regardless of the spacing 400 mm or 600 mm.

(3) Solid bridging shall be used on all walls as follows:

- ≤3.0 m : 1 row at mid-height.
- 3.6 m - 4.2 m : 2 rows at third-points.
- 4.8 m : 3 rows at quarter-points.

(4) Wind bracing shall not impose additional bending forces onto the stud.

Table 9.40.3.4.V.
Stud Sizes for Farm Buildings of Low Human Occupancy
(With Second *Storey* Loading)

Forming Part of Article 9.40.3.4.

Sidewall Height, m	Total Roof Load, kPa	Spruce-Pine-Fir, No. 1 and No. 2 (Dressed Lumber)																Second Storey Plate, kN/m
		Wind Load: q10 ≤ 0.30 kPa								Wind Load: q10 ≤ 0.45 kPa								
		400 mm o.c.				600 mm o.c.				400 mm o.c.				600 mm o.c.				
		Building Width, m				*Building* Width, m				*Building* Width, m				*Building* Width, m				
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	
3.0	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	14.6
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
3.6	1.9	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C	14.6
	2.4	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C	
	2.8	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C	
	3.3	B	B	B	B	B	C	C	C	B	B	B	B	C	C	C	C	
3.0	1.9	A	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	7.3
	2.4	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
3.6	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	7.3
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	
3.0	1.9	A	A	A	A	A	B	B	B	A	A	A	A	B	B	B	B	3.6
	2.4	A	A	A	B	B	B	B	B	A	A	A	A	B	B	B	B	
	2.8	A	A	B	B	B	B	B	B	A	A	B	B	B	B	B	B	
	3.3	A	A	B	B	B	B	B	B	A	B	B	B	B	B	B	B	
3.6	1.9	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	3.6
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	2.8	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	3.3	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Legend - Stud Sizes

A = 38 mm x 89 mm

B = 38 mm x 140 mm

C = 38 mm x 184 mm or double 38 mm x 140 mm

Notes to Table 9.40.3.4.V.:

(1) Design is based on load combinations of total roof load, wind load and stored product acting at the same time on a closed *building*.

(2) All notes following Table 9.40.3.4.U. apply, with the following conditions/exceptions:

14.6 kN/m loading: Full 4.8 m sidewall hay/straw storage space above. It is supported by beams spaced at 3.6 m o.c. The outside plate carries a 1.8 m floor width. If the loading is greater, refer to a qualified person for design.

7.3 kN/m loading: Full 2.4 m sidewall hay/straw storage space above or a gambrel roof structure >9.14 m in total width. Floor support beams as above.

3.6 kN/m loading: Small gambrel roof structure or storage space for light storage. Floor support beams as above.

Table 9.40.3.4.W.
Stud Sizes for Farm Buildings of Low Human Occupancy (Single *Storey*)
Forming Part of Article 9.40.3.4.

Sidewall Height, m	Total Roof Load, kPa	Ungraded Lumber, Full-Dimensioned															
		Wind Load: q10 ≤ 0.30 kPa								Wind Load: q10 ≤ 0.45 kPa							
		400 mm o.c.				600 mm o.c.				400 mm o.c.				600 mm o.c.			
		Building Width, m				*Building* Width, m				*Building* Width, m				*Building* Width, m			
		9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3	9.14	12.2	15.2	18.3
3.0	1.9	A	A	A	A	A	A	A	B	A	A	A	A	A	A	B	B
	2.4	A	A	A	A	A	A	B	B	A	A	A	A	A	B	B	B
	2.8	A	A	A	A	A	B	B	B	A	A	A	B	B	B	B	B
	3.3	A	A	A	B	A	B	B	B	A	A	A	B	A	B	B	B
3.6	1.9	A	A	A	B	A	B	B	B	A	A	A	B	B	B	B	B
	2.4	A	A	B	B	B	B	B	B	A	A	B	B	B	B	B	B
	2.8	A	B	B	B	B	B	B	B	A	B	B	B	B	B	B	B
	3.3	A	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C
4.2	1.9	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2.4	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C
	2.8	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C
	3.3	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C
4.8	1.9	B	B	B	B	B	B	B	C	B	B	B	B	B	B	C	C
	2.4	B	B	B	B	B	B	C	C	B	B	B	B	B	C	C	C
	2.8	B	B	B	B	B	B	C	C	B	B	B	C	C	C	C	C
	3.3	B	B	B	B	B	C	C	C	B	B	B	C	C	C	C	C
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Legend - Stud Sizes

A = 50.8 mm x 101.6 mm

B = 50.8 mm x 152.4 mm

C = 50.8 mm x 203.2 mm or double 50.8 mm x 152.4 mm under the trusses, with an intermediate 50.8 mm x 152.4 mm stud at 600 mm

Notes to Table 9.40.3.4.W.:

(1) Designs are based on load combinations of total roof load and wind load acting at the same time on a closed *building*.

(2) It is assumed that the double top plate is rigid enough to cause load sharing amongst all studs regardless of the spacing 400 mm or 600 mm.

(3) Solid bridging shall be used on all walls as follows:

- ≤ 3.0 m : 1 row at mid-height.
- 3.6 m to 4.2 m : 2 rows at third-points.
- 4.8 m : 3 rows at quarter-points.

(4) Wind bracing shall not impose additional bending forces onto the stud.

Section 9.41. Additional Requirements for Change of Use

9.41.1. Scope

9.41.1.1. Application

(1) This Section applies where proposed *construction* in respect of an existing *building* will result in 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 2.4.1.1.,

(b) a *suite* of a Group C *major occupancy* is converted into more than one *suite* of Group C *major occupancy*,

(c) a *farm building* or part of a *farm building* is changed to a *major occupancy*, or

(d) 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 (d) shall also be 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*.

9.41.2. Additional Construction

9.41.2.1. Change of Use and Compensating Construction

(1) Where proposed *construction* will result in a change of use described in Clauses 9.41.1.1.(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 Sections 9.5. and 9.7., Subsection 9.10.16., Sections 9.31. and 9.32., and Subsections 9.34.1., 9.34.2. and 9.34.3. 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).

9.41.2.2. 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[1]
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
			With Strapping			With Bridging			With Strapping and Bridging		
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600	300	400	600
Douglas Fir - Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.13	1.97	1.73	2.19	1.99	1.73	2.19	1.99	1.73
		38 x 140	3.23	3.07	2.73	3.44	3.12	2.73	3.44	3.12	2.73
		38 x 184	3.88	3.69	3.51	4.18	3.92	3.59	4.37	4.07	3.59
		38 x 235	4.57	4.34	4.13	4.86	4.57	4.29	5.05	4.70	4.39
		38 x 286	5.21	4.95	4.71	5.49	5.16	4.85	5.66	5.28	4.92
	No. 1 and No. 2	38 x 89	2.00	1.85	1.66	2.09	1.90	1.66	2.09	1.90	1.66
		38 x 140	3.09	2.91	2.62	3.29	2.99	2.62	3.29	2.99	2.62
		38 x 184	3.71	3.53	3.36	4.00	3.76	3.44	4.19	3.90	3.44
		38 x 235	4.38	4.16	3.96	4.66	4.38	4.11	4.84	4.51	4.20
		38 x 286	4.99	4.75	4.52	5.26	4.94	4.65	5.43	5.06	4.72
	No. 3	38 x 89	1.90	1.69	1.38	1.95	1.69	1.38	1.95	1.69	1.38
		38 x 140	2.78	2.41	1.97	2.78	2.41	1.97	2.78	2.41	1.97
		38 x 184	3.38	2.93	2.39	3.38	2.93	2.39	3.38	2.93	2.39
		38 x 235	4.14	3.58	3.93	4.14	3.58	2.93	4.14	3.58	2.93
		38 x 286	4.80	4.16	3.39	4.80	4.16	3.39	4.80	4.16	3.39
	Construction	38 x 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61
	Standard	38 x 89	1.81	1.63	1.33	1.88	1.63	1.33	1.88	1.63	1.33
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.08	1.93	1.71	2.16	1.96	1.71	2.16	1.96	1.71
		38 x 140	3.18	3.03	2.69	3.39	3.08	2.69	3.39	3.08	2.69
		38 x 184	3.82	3.64	3.46	4.12	3.87	3.54	4.31	4.02	3.54
		38 x 235	4.50	4.28	4.08	4.80	4.51	4.23	4.98	4.64	4.33
		38 x 286	5.14	4.89	4.65	5.42	5.09	4.78	5.59	5.21	4.86
	No. 1 and No. 2	38 x 89	2.00	1.85	1.66	2.09	1.90	1.66	2.09	1.90	1.66
		38 x 140	3.09	2.91	2.62	3.29	2.99	2.62	3.29	2.99	2.62
		38 x 184	3.71	3.53	3.36	4.00	3.76	3.44	4.19	3.90	3.44
		38 x 235	4.38	4.16	3.96	4.66	4.38	4.11	4.84	4.51	4.20
		38 x 286	4.99	4.75	4.52	5.26	4.94	4.65	5.43	5.06	4.72
	No. 3	38 x 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61
		38 x 140	2.99	2.78	2.43	3.19	2.90	2.43	3.19	2.90	2.43
		38 x 184	3.60	3.42	2.95	3.88	3.61	2.95	4.06	3.61	2.95
		38 x 235	4.24	4.03	3.61	4.51	4.24	3.61	4.68	4.37	3.61
		38 x 286	4.84	4.60	4.19	5.10	4.79	4.19	5.26	4.90	4.19
	Construction	38 x 89	1.90	1.77	1.61	2.03	1.84	1.61	2.03	1.84	1.61
	Standard	38 x 89	1.81	1.68	1.39	1.96	1.71	1.39	1.96	1.71	1.39
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-1 (Cont'd)
Maximum Spans for Floor Joists - General Cases[1]
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
			With Strapping			With Bridging			With Strapping and Bridging		
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600	300	400	600
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	1.95	1.81	1.64	2.06	1.87	1.64	2.06	1.87	1.64
		38 x 140	3.05	2.85	2.57	3.24	2.95	2.57	3.24	2.95	2.57
		38 x 184	3.66	3.48	3.31	3.94	3.70	3.38	4.12	3.84	3.38
		38 x 235	4.31	4.10	3.90	4.59	4.31	4.05	4.76	4.44	4.14
		38 x 286	4.91	4.67	4.45	5.18	4.87	4.57	5.34	4.98	4.64
	No. 1 and No. 2	38 x 89	1.86	1.72	1.58	1.99	1.81	1.58	1.99	1.81	1.58
		38 x 140	2.92	2.71	2.49	3.14	2.85	2.49	3.14	2.85	2.49
		38 x 184	3.54	3.36	3.20	3.81	3.58	3.27	3.99	3.72	3.27
		38 x 235	4.17	3.96	3.77	4.44	4.17	3.92	4.60	4.29	4.00
		38 x 286	4.75	4.52	4.30	5.01	4.71	4.42	5.17	4.82	4.49
	No. 3	38 x 89	1.81	1.68	1.55	1.96	1.78	1.55	1.96	1.78	1.55
		38 x 140	2.84	2.64	2.43	3.08	2.80	2.43	3.08	2.80	2.43
		38 x 184	3.47	3.30	2.95	3.74	3.52	2.95	3.92	3.61	2.95
		38 x 235	4.09	3.89	3.61	4.36	4.09	3.61	4.52	4.22	3.61
		38 x 286	4.67	4.44	4.19	4.92	4.62	4.19	5.08	4.73	4.19
	Construction	38 x 89	1.81	1.68	1.55	1.96	1.78	1.55	1.96	1.78	1.55
	Standard	38 x 89	1.70	1.58	1.44	1.88	1.71	1.44	1.88	1.71	1.44
Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules	Select Structural	38 x 89	1.65	1.53	1.42	1.84	1.68	1.46	1.84	1.68	1.46
		38 x 140	2.59	2.41	2.24	2.90	2.63	2.30	2.90	2.63	2.30
		38 x 184	3.27	3.11	2.94	3.52	3.31	3.03	3.69	3.44	3.03
		38 x 235	3.85	3.66	3.48	4.10	3.85	3.62	4.26	3.97	3.70
		38 x 286	4.39	4.18	3.97	4.63	4.35	4.09	4.78	4.45	4.15
	No. 1 and No. 2	38 x 89	1.59	1.48	1.37	1.80	1.64	1.43	1.80	1.64	1.43
		38 x 140	2.51	2.33	2.16	2.83	2.57	2.25	2.83	2.57	2.25
		38 x 184	3.19	3.04	2.84	3.44	3.23	2.96	3.60	3.36	2.96
		38 x 235	3.76	3.58	3.41	4.01	3.77	3.54	4.16	3.88	3.62
		38 x 286	4.29	4.08	3.88	4.53	4.25	4.00	4.67	4.35	4.06
	No. 3	38 x 89	1.54	1.43	1.32	1.74	1.57	1.36	1.76	1.60	1.36
		38 x 140	2.42	2.24	1.94	2.74	2.38	1.94	2.75	2.38	1.94
		38 x 184	3.12	2.90	2.37	3.35	2.90	2.37	3.35	2.90	2.37
		38 x 235	3.67	3.49	2.89	3.91	3.54	2.89	4.06	3.54	2.89
		38 x 286	4.19	3.98	3.36	4.42	4.11	3.36	4.55	4.11	3.36
	Construction	38 x 89	1.54	1.43	1.32	1.74	1.57	1.40	1.76	1.60	1.40
	Standard	38 x 89	1.48	1.37	1.15	1.63	1.41	1.15	1.63	1.41	1.15
Column 1	2	3	4	5	6	7	8	9	10	11	12

Notes to Table A-1:

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

Table A-2
Maximum Spans for Floor Joists - Special Cases[1]
Forming Part of Sentence 9.23.4.2.(1) and 9.23.4.4.(2)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
			Joists with Ceilings Attached to Wood Furring						Joists with Concrete Topping		
			Without Bridging			With Bridging			With or Without Bridging[2]		
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600	300	400	600
Douglas Fir - Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.19	1.99	1.73	2.19	1.99	1.73	2.19	1.99	1.73
		38 x 140	3.44	3.12	2.73	3.44	3.12	2.73	3.44	3.12	2.73
		38 x 184	4.24	3.99	3.59	4.52	4.11	3.59	4.52	4.11	3.59
		38 x 235	4.98	4.69	4.29	5.47	5.20	4.58	5.77	5.24	4.58
		38 x 286	5.67	5.34	4.88	6.19	5.89	5.54	6.83	6.37	5.58
	No. 1 and No, 2	38 x 89	2.09	1.90	1.66	2.09	1.90	1.66	2.09	1.90	1.66
		38 x 140	3.29	2.99	2.62	3.29	2.99	2.62	3.29	2.99	2.55
		38 x 184	4.06	3.83	3.44	4.33	3.93	3.44	4.33	3.81	3.11
		38 x 235	4.78	4.50	4.11	5.24	4.98	4.31	5.37	4.65	3.80
		38 x 286	5.44	5.12	4.68	5.93	5.64	5.00	6.24	5.40	4.41
	No. 3	38 x 89	1.95	1.69	1.38	1.95	1.69	1.38	1.72	1.49	1.21
		38 x 140	2.78	2.41	1.97	2.78	2.41	1.97	2.45	2.12	1.73
		38 x 184	3.38	2.93	2.39	3.38	2.93	2.39	2.98	2.58	2.11
		38 x 235	4.14	3.58	2.93	4.14	3.58	2.93	3.65	3.16	2.58
		38 x 286	4.80	4.16	3.39	4.80	4.16	3.39	4.23	3.66	2.99
	Construction	38 x 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.84	1.61
	Standard	38 x 89	1.88	1.63	1.33	1.88	1.63	1.33	1.66	1.44	1.17
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.16	1.96	1.71	2.16	1.96	1.71	2.16	1.96	1.71
		38 x 140	3.39	3.08	2.69	3.39	3.08	2.69	3.39	3.08	2.69
		38 x 184	4.18	3.94	3.54	4.46	4.05	3.54	4.46	4.05	3.54
		38 x 235	4.92	4.63	4.23	5.39	5.13	4.52	5.69	5.17	4.52
		38 x 286	5.60	5.27	4.82	6.10	5.81	5.47	6.74	6.28	5.50
	No .1 and No. 2	38 x 89	2.09	1.90	1.66	2.09	1.90	1.66	2.09	1.90	1.66
		38 x 140	3.29	2.99	2.62	3.29	2.99	2.62	3.29	2.99	2.62
		38 x 184	4.06	3.83	3.44	4.33	3.93	3.44	4.33	3.93	3.26
		38 x 235	4.78	4.50	4.11	5.24	4.98	4.39	5.53	4.88	3.99
		38 x 286	5.44	5.12	4.68	5.93	5.64	5.25	6.54	5.66	4.63
	No 3	38 x 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.83	1.50
		38 x 140	3.19	2.90	2.43	3.19	2.90	2.43	3.02	2.62	2.14
		38 x 184	3.94	3.61	2.95	4.17	3.61	2.95	3.68	3.18	2.60
		38 x 235	4.63	4.36	3.61	5.08	4.42	3.61	4.50	3.89	3.18
		38 x 286	5.27	4.96	4.19	5.74	5.13	4.19	5.22	4.52	3.69
	Construction	38 x 89	2.03	1.84	1.61	2.03	1.84	1.61	2.03	1.84	1.61
	Standard	38 x 89	1.96	1.71	1.39	1.96	1.71	1.39	1.74	1.50	1.23
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-2 (Cont'd)
Maximum Spans for Floor Joists - Special Cases[1]
Forming Part of Sentence 9.23.4.2.(1) and 9.23.4.4.(2)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
			Joists with Ceilings Attached to Wood Furring						Joists with Concrete Topping		
			Without Bridging			With Bridging			With or Without Bridging[2]		
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600	300	400	600
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	2.06	1.87	1.64	2.06	1.87	1.64	2.06	1.87	1.64
		38 x 140	3.24	2.95	2.57	3.24	2.95	2.57	3.24	2.95	2.57
		38 x 184	4.00	3.77	3.38	4.26	3.87	3.38	4.26	3.87	3.38
		38 x 235	4 70	4.43	4.05	5.16	4.91	4.32	5.45	4.95	4.32
		38 x 286	5.35	5.04	4.61	5.84	5.55	5.23	6.45	6.01	5.26
	No. 1 and No. 2	38 x 89	1.99	1.81	1.58	1.99	1.81	1.58	1.99	1.81	1.58
		38 x 140	3.14	2.85	2.49	3.14	2.85	2.49	3.14	2.85	2.49
		38 x 184	3.87	3.64	3.27	4.12	3.75	3.27	4.12	3.75	3.27
		38 x 235	4.55	4.28	3.91	4.99	4.75	4.18	5.27	4.79	4.13
		38 x 286	5.18	4.88	4.46	5.65	5.37	5.06	6.23	5.81	4.79
	No. 3	38 x 89	1.96	1.78	1.55	1.96	1.78	1.55	1.96	1.78	1.50
		38 x 140	3.08	2.80	2.43	3.08	2.80	2.43	3.02	2.62	2.14
		38 x 184	3.80	3.58	2.95	4.05	3.61	2.95	3.68	3.18	2.60
		38 x 235	4.47	4.21	3.61	4.90	4.42	3.61	4.50	3.89	3.18
		38 x 286	5.09	4.79	4.19	5.55	5.13	4.19	5.22	4.52	3.69
	Construction	38 x 89	1.96	1.78	1.55	1.96	1.78	1.55	1.96	1.78	1.55
	Standard	38 x 89	1.88	1.71	1.44	1.88	1.71	1.44	1.80	1.56	1.27
Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules	Select Structural	38 x 89	1.84	1.68	1.46	1.84	1.68	1.46	1.84	1.68	1.46
		38 x 140	2.90	2.63	2.30	2.90	2.63	2.30	2.90	2.63	2.30
		38 x 184	3.58	3.37	3.03	3.81	3.46	3.03	3.81	3.46	3.03
		38 x 235	4.20	3.96	3.62	4.61	4.39	3.86	4.87	4.42	3.86
		38 x 286	4.79	4.51	4.12	5.22	4.96	4.68	5.76	5.37	4.54
	No. 1 and No. 2	38 x 89	1.80	1.64	1.43	1.80	1.64	1.43	1.80	1.64	1.43
		38 x 140	2.83	2.57	2.25	2.83	2.57	2.25	2.83	2.57	2.23
		38 x 184	3.50	3.29	2.96	3.72	3.38	2.96	3.72	3.32	2.71
		38 x 235	4.11	3.87	3.54	4.51	4.29	3.76	4.69	4.06	3.31
		38 x 286	4.68	4.40	4.03	5.10	4.85	4.36	5.44	4.71	3.84
	No. 3	38 x 89	1.76	1.60	1.36	1.76	1.60	1.36	1.70	1.47	1.20
		38 x 140	2.75	2.38	1.94	2.75	2.38	1.94	2.42	2.10	1.71
		38 x 184	3.35	2.90	2.37	3.35	2.90	2.37	2.95	2.55	2.08
		38 x 235	4.01	3.54	2.89	4.09	3.54	2.89	3.61	3.12	2.55
		38 x 286	4.56	4.11	3.36	4.75	4.11	3.36	4.18	3.62	2.96
	Construction	38 x 89	1.76	1.60	1.40	1.76	1.60	1.40	1.76	1.60	1.37
	Standard	38 x 89	1.63	1.41	1.15	1.63	1.41	1.15	1.44	1.25	1.02
Column 1	2	3	4	5	6	7	8	9	10	11	12

Notes to Table A-2:

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

(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)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m Joist Spacing, mm		
			300	400	600
Douglas Fir - Larch (Includes Douglas Fir and Western Larch)	Select Structural	38 x 89	3.41	3.10	2.71
		38 x 140	5.37	4.88	4.26
		38 x 184	7.05	6.40	5.59
		38 x 235	9.01	8.18	7.15
		38 x 286	10.96	9.96	8.70
	No. 1 and No. 2	38 x 89	3.27	2.97	2.59
		38 x 140	5.14	4.67	4.08
		38 x 184	6.76	6.14	5.36
		38 x 235	8.63	7.84	6.85
		38 x 286	10.50	9.54	8.34
	No. 3	38 x 89	3.17	2.88	2.42
		38 x 140	4.89	4.23	3.46
		38 x 184	5.95	5.15	4.20
		38 x 235	7.27	6.30	5.14
		38 x 286	8.44	7.31	5.97
	Construction	38 x 89	3.17	2.88	2.51
	Standard	38 x 89	3.06	2.78	2.34
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	3.36	3.06	2.67
		38 x 140	5.29	4.81	4.20
		38 x 184	6.96	6.32	5.52
		38 x 235	8.88	8.07	7.05
		38 x 286	10.81	9.82	8.58
	No. 1 and No. 2	38 x 89	3.27	2.97	2.59
		38 x 140	5.14	4.67	4.08
		38 x 184	6.76	6.14	5.36
		38 x 235	8.63	7.84	6.85
		38 x 286	10.50	9.54	8.34
	No. 3	38 x 89	3.17	2.88	2.51
		38 x 140	4.98	4.53	3.95
		38 x 184	6.55	5.95	5.19
		38 x 235	8.36	7.60	6.34
		38 x 286	10.18	9.01	7.36
	Construction	38 x 89	3.17	2.88	2.50
	Standard	38 x 89	3.06	2.78	2.43
Column 1	2	3	4	5	6

Table A-3 (Cont'd)
Maximum Spans for Ceiling Joists - Attic not Accessible by a Stairway
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m Joist Spacing, mm		
			300	400	600
Spruce -Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	3.22	2.92	2.55
		38 x 140	5.06	4.60	4.02
		38 x 184	6.65	6.05	5.28
		38 x 235	8.50	7.72	6.74
		38 x 286	10.34	9.40	8.21
	No. 1 and No. 2	38 x 89	3.11	2.83	2.47
		38 x 140	4.90	4.45	3.89
		38 x 184	6.44	5.85	5.11
		38 x 235	8.22	7.47	6.52
		38 x 286	10.00	9.09	7.94
	No. 3	38 x 89	3.06	2.78	2.43
		38 x 140	4.81	4.37	3.82
		38 x 184	6.32	5.74	5.02
		38 x 235	8.07	7.33	6.34
		38 x 286	9.82	8.93	7.36
	Construction	38 x 89	3.06	2.78	2.43
	Standard	38 x 89	2.94	2.67	2.33
Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules	Select Structural	38 x 89	2.88	2.61	2.28
		38 x 140	4.53	4.11	3.59
		38 x 184	5.95	5.40	4.72
		38 x 235	7.60	6.90	6.03
		38 x 286	9.25	8.40	7.34
	No. 1 and No. 2	38 x 89	2.81	2.55	2.23
		38 x 140	4.42	4.02	3.51
		38 x 184	5.81	5.28	4.61
		38 x 235	7.42	6.74	5.89
		38 x 286	9.03	8.21	7.17
	No. 3	38 x 89	2.74	2.49	2.18
		38 x 140	4.31	3.92	3.42
		38 x 184	5.67	5.09	4.16
		38 x 235	7.19	6.23	5.08
		38 x 286	8.34	7.23	5.90
	Construction	38 x 89	2.74	2.49	2.18
	Standard	38 x 89	2.67	2.43	2.03
Column 1	2	3	4	5	6

Table A-4
Maximum Spans for Roof Joists - Specified Roof Snow Loads 1.0 to 2.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
			Specified Snow Load, kPa								
			1.0			1.5			2.0		
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600	300	400	600
Douglas Fir - Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.71	2.46	2.15	2.37	2.15	1.88	2.15	1.95	1.71
		38 x 140	4.26	3.87	3.38	3.72	3.38	2.95	3.38	3.07	2.68
		38 x 184	5.60	5.09	4.44	4.89	4.44	3.88	4.44	4.04	3.53
		38 x 235	7.15	6.49	5.67	6.24	5.67	4.96	5.67	5.15	4.50
		38 x 286	8.70	7.90	6.91	7.60	6.91	6.03	6.91	6.27	5.48
	No. 1 and No. 2	38 x 89	2.59	2.36	2.06	2.27	2.06	1.80	2.06	1.87	1.63
		38 x 140	4.08	3.71	3.24	3.57	3.24	2.83	3.24	2.94	2.57
		38 x 184	5.36	4.87	4.26	4.69	4.26	3.72	4.26	3.87	3.38
		38 x 235	6.85	6.22	5.44	5.98	5.44	4.74	5.44	4.94	4.22
		38 x 286	8.34	7.57	6.40	7.28	6.62	5.50	6.62	6.00	4.90
	No. 3	38 x 89	2.49	2.16	1.76	2.14	1.85	1.51	1.91	1.65	1.35
		38 x 140	3.56	3.08	2.51	3.06	2.65	2.16	2.72	2.36	1.92
		38 x 184	4.33	3.75	3.06	3.72	3.22	2.63	3.31	2.87	2.34
		38 x 235	5.29	4.58	3.74	4.55	3.94	3.22	4.05	3.51	2.86
		38 x 286	6.14	5.32	4.34	5.28	4.57	3.73	4.70	4.07	3.32
	Construction	38 x 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58
	Standard	38 x 89	2.41	2.08	1.70	2.07	1.79	1.46	1.84	1.60	1.30
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.67	2.43	2.12	2.33	2.12	1.85	2.12	1.93	1.68
		38 x 140	4.20	3.82	3.33	3.67	3.33	2.91	3.33	3.03	2.65
		38 x 184	5.52	5.02	4.38	4.82	4.38	3.83	4.38	3.98	3.48
		38 x 235	7.05	6.41	5.60	6.16	5.60	4.89	5.60	5.09	4.44
		38 x 286	8.58	7.80	6.81	7.50	6.81	5.95	6.81	6.19	5.41
	No. 1 and No. 2	38 x 89	2.59	2.36	2.06	2.27	2.06	1.80	2.06	1.87	1.63
		38 x 140	4.08	3.71	3.24	3.57	3.24	2.83	3.24	2.94	2.57
		38 x 184	5.36	4.87	4.26	4.69	4.26	3.72	4.26	3.87	3.38
		38 x 235	6.85	6.22	5.44	5.98	5.44	4.75	5.44	4.94	4.32
		38 x 286	8.34	7.57	6.62	7.28	6.62	5.77	6.62	6.01	5.25
	No. 3	38 x 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58
		38 x 140	3.95	3.59	3.10	3.45	3.14	2.67	3.14	2.85	2.37
		38 x 184	5.20	4.62	3.77	4.54	3.97	3.24	4.09	3.54	2.89
		38 x 235	6.53	5.65	4.61	5.61	4.86	3.97	5.00	4.33	3.53
		38 x 286	7.57	6.56	5.35	6.51	5.64	4.60	5.80	5.02	4.10
	Construction	38 x 89	2.51	2.28	1.99	2.20	1.99	1.74	1.99	1.81	1.58
	Standard	38 x 89	2.43	2.18	1.78	2.12	1.88	1.53	1.93	1.67	1.36
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-4 (Cont'd)
Maximum Spans for Roof Joists - Specified Roof Snow Loads 1.0 to 2.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m								
			Specified Snow Load, kPa								
			1.0			1.5			2.0		
			Joist Spacing, mm			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600	300	400	600
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	2.55	2.32	2.03	2.23	2.03	1.77	2.03	1.84	1.61
		38 x 140	4.02	3.65	3.19	3.51	3.19	2.79	3.19	2.90	2.53
		38 x 184	5.28	4.80	4.19	4.61	4.19	3.66	4.19	3.81	3.33
		38 x 235	6.74	6.13	5.35	5.89	5.35	4.68	5.35	4.86	4.25
		38 x 286	8.21	7.46	6.52	7.17	6.52	5.69	6.52	5.92	5.17
	No. 1 and No. 2	38 x 89	2.47	2.24	1.96	2.16	1.96	1.71	1.96	1.78	1.56
		38 x 140	3.89	3.53	3.08	3.40	3.08	2.69	3.08	2.80	2.45
		38 x 184	5.11	4.64	4.05	4.46	4.05	3.54	4.05	3.68	3.22
		38 x 235	6.52	5.93	5.18	5.70	5.18	4.52	5.18	4.70	4.11
		38 x 286	7.94	7.21	6.30	6.94	6.30	5.50	6.30	5.73	5.00
	No. 3	38 x 89	2.43	2.20	1.93	2.12	1.93	1.68	1.93	1.75	1.53
		38 x 140	3.82	3.47	3.03	3.33	3.03	2.65	3.03	2.75	2.37
		38 x 184	5.02	4.56	3.77	4.38	3.97	3.24	3.98	3.54	2.89
		38 x 235	6.41	5.65	4.61	5.60	4.86	3.97	5.00	4.33	3.53
		38 x 286	7.57	6.56	5.35	6.51	5.64	4.60	5.80	5.02	4.10
	Construction	38 x 89	2.43	2.20	1.93	2.12	1.93	1.68	1.93	1.75	1.53
	Standard	38 x 89	2.33	2.12	1.85	2.04	1.85	1.59	1.85	1.68	1.41
Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules	Select Structural	38 x 89	2.28	2.07	1.81	1.99	1.81	1.58	1.81	1.65	1.44
		38 x 140	3.59	3.26	2.85	3.14	2.85	2.49	2.85	2.59	2.26
		38 x 184	4.72	4.29	3.75	4.12	3.75	3.27	3.75	3.40	2.97
		38 x 235	6.03	5.48	4.79	5.27	4.79	4.18	4.79	4.35	3.80
		38 x 286	7.34	6.67	5.82	6.41	5.82	5.09	5.82	5.29	4.62
	No. 1 and No. 2	38 x 89	2.23	2.03	1.77	1.95	1.77	1.55	1.77	1.61	1.41
		38 x 140	3.51	3.19	2.79	3.07	2.79	2.43	2.79	2.53	2.21
		38 x 184	4.61	4.19	3.66	4.03	3.66	3.20	3.66	3.33	2.91
		38 x 235	5.89	5.35	4.68	5.15	4.68	4.09	4.68	4.25	3.68
		38 x 286	7.17	6.52	5.58	6.26	5.69	4.80	5.69	5.17	4.27
	No. 3	38 x 89	2.18	1.98	1.73	1.90	1.73	1.50	1.73	1.57	1.33
		38 x 140	3.42	3.05	2.49	2.99	2.62	2.14	2.69	2.33	1.90
		38 x 184	4.28	3.71	3.03	3.68	3.19	2.60	3.28	2.84	2.32
		38 x 235	5.23	4.53	3.70	4.50	3.90	3.18	4.01	3.47	2.83
		38 x 286	6.07	5.26	4.29	5.22	4.52	3.69	4.65	4.03	3.29
	Construction	38 x 89	2.18	1.98	1.73	1.90	1.73	1.51	1.73	1.57	1.37
	Standard	38 x 89	2.09	1.81	1.48	1.80	1.56	1.27	1.60	1.38	1.13
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-5
Maximum Spans for Roof Joists - Specified Roof Snow Loads 2.5 and 3.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m					
			Specified Snow Load, kPa					
			2.5			3.0		
			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600
Douglas Fir - Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	1.99	1.81	1.58	1.88	1.71	1.49
		38 x 140	3.14	2.85	2.49	2.95	2.68	2.34
		38 x 184	4.12	3.75	3.27	3.88	3.53	3.08
		38 x 235	5.27	4.79	4.18	4.96	4.50	3.93
		38 x 286	6.41	5.82	5.09	6.03	5.48	4.79
	No. 1 and No. 2	38 x 89	1.91	1.74	1.52	1.80	1.63	1.43
		38 x 140	3.01	2.73	2.39	2.83	2.57	2.25
		38 x 184	3.95	3.59	3.14	3.72	3.38	2.90
		38 x 235	5.05	4.59	3.84	4.75	4.32	3.55
		38 x 286	6.14	5.46	4.46	5.78	5.05	4.12
	No. 3	38 x 89	1.74	1.50	1.23	1.60	1.39	1.13
		38 x 140	2.48	2.15	1.75	2.29	1.98	1.62
		38 x 184	3.01	2.61	2.13	2.79	2.41	1.97
		38 x 235	3.69	3.19	2.61	3.41	2.95	2.41
		38 x 286	4.28	3.70	3.03	3.95	3.42	2.79
	Construction	38 x 89	1.85	1.68	1.47	1.74	1.58	1.38
	Standard	38 x 89	1.68	1.45	1.19	1.55	1.34	1.10
Hem - Fir (includes Western Hemlock and Amabills Fir)	Select Structural	38 x 89	1.97	1.79	1.56	1.85	1.68	1.47
		38 x 140	3.10	2.81	2.46	2.91	2.65	2.31
		38 x 184	4.07	3.70	3.23	3.83	3.46	3.04
		38 x 235	5.20	4.72	4.12	4.89	4.44	3.88
		38 x 286	6.32	5.75	5.02	5.95	5.41	4.72
	No. 1 and No. 2	38 x 89	1.91	1.74	1.52	1.80	1.63	1.43
		38 x 140	3.01	2.73	2.39	2.83	2.57	2.25
		38 x 184	3.95	3.59	3.14	3.72	3.38	2.95
		38 x 235	5.05	4.59	4.01	4.75	4.32	3.72
		38 x 286	6.14	5.58	4.68	5.78	5.25	4.32
	No. 3	38 x 89	1.85	1.68	1.47	1.74	1.58	1.38
		38 x 140	2.91	2.65	2.16	2.74	2.45	2.00
		38 x 184	3.72	3.22	2.63	3.44	2.98	2.43
		38 x 235	4.55	3.94	3.22	4.20	3.64	2.97
		38 x 286	5.28	4.57	3.73	4.88	4.22	3.45
	Construction	38 x 89	1.85	1.68	1.47	1.74	1.58	1.38
	Standard	38 x 89	1.76	1.52	1.24	1.62	1.40	1.15
Column 1	2	3	4	5	6	7	8	9

Table A-5 (Cont'd)
Maximum Spans for Roof Joists - Specified Roof Snow Loads 2.5 and 3.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Joist Size, mm	Maximum Span, m					
			Specified Snow Load, kPa					
			2.5			3.0		
			Joist Spacing, mm			Joist Spacing, mm		
			300	400	600	300	400	600
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	1.88	1.71	1.49	1.77	1.61	1.41
		38 x 140	2.96	2.69	2.35	2.79	2.53	2.21
		38 x 184	3.89	3.54	3.09	3.66	3.33	2.91
		38 x 235	4.97	4.52	3.94	4.68	4.25	3.71
		38 x 286	6.05	5.50	4.80	5.69	5.17	4.52
	No. 1 and No. 2	38 x 89	1.82	1.65	1.44	1.71	1.56	1.36
		38 x 140	2.86	2.60	2.27	2.69	2.45	2.14
		38 x 184	3.76	3.42	2.99	3.54	3.22	2.81
		38 x 235	4.81	4.37	3.82	4.52	4.11	3.59
		38 x 286	5.85	5.31	4.64	5.50	5.00	4.37
	No. 3	38 x 89	1.79	1.62	1.42	1.68	1.53	1.34
		38 x 140	2.81	2.56	2.16	2.65	2.40	2.00
		38 x 184	3.70	3.22	2.63	3.44	2.98	2.43
		38 x 235	4.55	3.94	3.22	4.20	3.64	2.97
		38 x 286	5.28	4.57	3.73	4.88	4.22	3.45
	Construction	38 x 89	1.79	1.62	1.42	1.68	1.53	1.34
	Standard	38 x 89	1.72	1.56	1.29	1.62	1.46	1.19
Northern Species (includes any Canadian Species covered by the NLGA Standard Grading Rules	Select Structural	38 x 89	1.68	1.53	1.34	1.58	1.44	1.26
		38 x 140	2.65	2.40	2.10	2.49	2.26	1.98
		38 x 184	3.48	3.16	2.76	3.27	2.97	2.60
		38 x 235	4.44	4.04	3.53	4.18	3.80	3.32
		38 x 286	5.41	4.91	4.29	5.09	4.62	4.04
	No. 1 and No. 2	38 x 89	1.64	1.49	1.31	1.55	1.41	1.23
		38 x 140	2.59	2.35	2.05	2.43	2.21	1.93
		38 x 184	3.40	3.09	2.70	3.20	2.91	2.53
		38 x 235	4.34	3.94	3.35	4.09	3.71	3.10
		38 x 286	5.28	4.76	3.89	4.97	4.40	3.59
	No. 3	38 x 89	1.60	1.46	1.21	1.51	1.37	1.12
		38 x 140	2.45	2.12	1.73	2.26	1.96	1.60
		38 x 184	2.98	2.58	2.11	2.76	2.39	1.95
		38 x 235	3.65	3.16	2.58	3.37	2.92	2.38
		38 x 286	4.23	3.66	2.99	3.91	3.39	2.76
	Construction	38 x 89	1.60	1.46	1.27	1.51	1.37	1.20
	Standard	38 x 89	1.46	1.26	1.03	1.34	1.16	0.95
Column 1	2	3	4	5	6	7	8	9

Table A-6
Maximum Spans for Roof Rafters Specified Roof Snow Loads 1.0 to 2.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m								
			Specified Snow Load, kPa								
			1.0			1.5			2.0		
			Rafter Spacing, mm			Rafter Spacing, mm			Rafter Spacing, mm		
			300	400	600	300	400	600	300	400	600
Douglas Fir - Larch (includes Douglas Fir and Western larch)	Select Structural	38 x 89	3.41	3.10	2.71	2.98	2.71	2.37	2.71	2.46	2.15
		38 x 140	5.37	4.88	4.26	4.69	4.26	3.72	4.26	3.87	3.38
		38 x 184	7.05	6.41	5.60	6.16	5.60	4.89	5.60	5.09	4.44
		38 x 235	9.01	8.18	7.15	7.87	7.15	6.24	7.15	6.49	5.62
		38 x 285	10.96	9.96	8.70	9.58	8.70	7.40	8.70	7.90	6.52
	No. 1 and No. 2	38 x 89	3.27	2.97	2.59	2.86	2.59	2.27	2.59	2.36	2.06
		38 x 140	5.14	4.67	3.95	4.49	4.08	3.34	4.08	3.60	2.94
		38 x 184	6.76	5.88	4.80	5.74	4.97	4.06	5.06	4.38	3.58
		38 x 235	8.30	7.19	5.87	7.02	6.08	4.96	6.19	5.36	4.38
		38 x 285	9.63	8.34	6.81	8.14	7.05	5.76	7.18	6.22	5.08
	No. 3	38 x 89	2.65	2.30	1.87	2.24	1.94	1.58	1.98	1.71	1.40
		38 x 140	3.78	3.28	2.68	3.20	2.77	2.26	2.82	2.44	1.99
		38 x 184	4.61	3.99	3.26	3.89	3.37	2.75	3.43	2.97	2.43
		38 x 235	5.63	4.88	3.98	4.76	4.12	3.37	4.20	3.64	2.97
		38 x 285	6.53	5.66	4.62	5.52	4.78	3.91	4.87	4.22	3.44
	Construction	38 x 89	3.17	2.88	2.42	2.77	2.50	2.04	2.51	2.21	1.80
	Standard	38 x 89	2.56	2.22	1.81	2.17	1.88	1.53	1.91	1.65	1.35
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	3.36	3.06	2.67	2.94	2.67	2.33	2.67	2.43	2.12
		38 x 140	5.29	4.81	4.20	4.62	4.20	3.67	4.20	3.82	3.33
		38 x 184	6.96	6.32	5.52	6.08	5.52	4.82	5.52	5.02	4.38
		38 x 235	8.88	8.07	7.05	7.76	7.05	6.16	7.05	6.41	5.54
		38 x 285	10.81	9.82	8.58	9.45	8.58	7.28	8.58	7.80	6.42
	No. 1 and No. 2	38 x 89	3.27	2.97	2.59	2.86	2.59	2.27	2.59	2.36	2.06
		38 x 140	5.14	4.67	4.08	4.49	4.08	3.50	4.08	3.71	3.08
		38 x 184	6.76	6.14	5.04	5.90	5.21	4.26	5.31	4.60	3.75
		38 x 235	8.63	7.54	6.16	7.36	6.37	5.20	6.49	5.62	4.59
		38 x 285	10.11	8.75	7.15	8.54	7.40	6.04	7.53	6.52	5.33
	No. 3	38 x 89	3.17	2.83	2.31	2.76	2.39	1.95	2.44	2.11	1.72
		38 x 140	4.67	4.04	3.30	3.95	3.42	2.79	3.48	3.01	2.46
		38 x 184	5.68	4.92	4.02	4.80	4.16	3.40	4.23	3.67	2.99
		38 x 235	6.95	6.02	4.91	5.87	5.08	4.15	5.18	4.48	3.66
		38 x 285	8.06	6.98	5.70	6.81	5.90	4.82	6.01	5.20	4.25
	Construction	38 x 89	3.17	2.88	2.51	2.77	2.51	2.14	2.51	2.28	1.89
	Standard	38 x 89	2.68	2.32	1.90	2.27	1.96	1.60	2.00	1.73	1.41
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-6 (Cont'd)
Maximum Spans for Roof Rafters Specified Roof Snow Loads 1.0 to 2.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m								
			Specified Snow Load, kPa								
			1.0			1.5			2.0		
			Rafter Spacing, mm			Rafter Spacing, mm			Rafter Spacing, mm		
			300	400	500	300	400	500	300	400	600
Spruce - Pine - Fir (Includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	3.22	2.92	2.55	2.81	2.55	2.23	2.55	2.32	2.03
		38 x 140	5.06	4.60	4.02	4.42	4.02	3.51	4.02	3.65	3.19
		38 x 184	6.65	6.05	5.28	5.81	5.28	4.61	5.28	4.80	4.19
		38 x 235	8.50	7.72	6.74	7.42	6.74	5.89	6.74	6.13	5.35
		38 x 285	10.34	9.40	8.21	9.03	8.21	7.17	8.21	7.46	6.52
	No. 1 and No. 2	38 x 89	3.11	2.83	2.47	2.72	2.47	2.16	2.47	2.24	1.96
		38 x 140	4.90	4.45	3.89	4.28	3.89	3.40	3.89	3.53	3.08
		38 x 184	6.44	5.85	5.11	5.62	5.11	4.41	5.11	4.64	3.89
		38 x 235	8.22	7.47	6.38	7.18	6.52	5.39	6.52	5.82	4.75
		38 x 285	10.00	9.06	7.40	8.74	7.66	6.25	7.80	6.76	5.52
	No. 3	38 x 89	3.06	2.78	2.31	2.67	2.39	1.95	2.43	2.11	1.72
		38 x 140	4.67	4.04	3.30	3.95	3.42	2.79	3.48	3.01	2.46
		38 x 184	5.68	4.92	4.02	4.80	4.16	3.40	4.23	3.67	2.99
		38 x 235	6.95	6.02	4.91	5.87	5.08	4.15	5.18	4.48	3.66
		38 x 285	8.06	6.98	5.70	6.81	5.90	4.82	6.01	5.20	4.25
	Construction	38 x 89	3.06	2.78	2.43	2.67	2.43	2.12	2.43	2.20	1.93
	Standard	38 x 89	2.78	2.41	1.97	2.35	2.04	1.66	2.07	1.79	1.47
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	2.88	2.61	2.28	2.51	2.28	1.99	2.28	2.07	1.81
		38 x 140	4.53	4.11	3.59	3.95	3.59	3.14	3.59	3.26	2.85
		38 x 184	5.95	5.40	4.72	5.20	4.72	4.12	4.72	4.29	3.68
		38 x 235	7.60	6.90	6.03	6.64	6.03	5.11	6.03	5.48	4.51
		38 x 285	9.25	8.40	7.01	8.08	7.26	5.93	7.34	6.40	5.23
	No. 1 and No. 2	38 x 89	2.81	2.55	2.23	2.46	2.23	1.95	2.23	2.03	1.77
		38 x 140	4.42	4.02	3.44	3.86	3.51	2.91	3.51	3.14	2.56
		38 x 184	5.81	5.13	4.19	5.00	4.33	3.54	4.41	3.82	3.12
		38 x 235	7.24	6.27	5.12	6.12	5.30	4.33	5.40	4.67	3.82
		38 x 285	8.40	7.27	5.94	7.10	6.15	5.02	6.26	5.42	4.43
	No. 3	38 x 89	2.62	2.27	1.85	2.22	1.92	1.57	1.95	1.69	1.38 1.97
		38 x 140	3.74	3.24	2.65	3.16	2.74	2.24	2.79	2.42	2.40
		38 x 184	4.56	3.94	3.22	3.85	3.33	2.72	3.40	2.94	2.94
		38 x 235	5.57	4.82	3.94	4.71	4.08	3.33	4.15	3.60	3.41
		38 x 285	6.46	5.60	4.57	5.46	4.73	3.86	4.82	4.17	
	Construction	38 x 89	2.74	2.49	2.11	2.40	2.18	1.90	2.18	1.93	1.57
	Standard	38 x 89	2.22	1.93	1.57	1.88	1.63	1.33	1.66	1.44	1.17
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-7
Maximum Spans for Roof Rafters – Specified Roof Snow Loads 2.5 and 3.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m					
			Specified Snow Load, kPa					
			2.5			3.0		
			Rafter Spacing, mm			Rafter Spacing, mm		
			300	400	600	300	400	600
Douglas Fir - Larch (includes Douglas Fir and Western Larch)	Select Structural	38 x 89	2.51	2.28	1.99	2.37	2.15	1.88
		38 x 140	3.95	3.59	3.14	3.72	3.38	2.95
		38 x 184	5.20	4.72	4.12	4.89	4.44	3.83
		38 x 235	6.64	6.03	5.08	6.24	5.67	4.68
		38 x 286	8.08	7.23	5.90	7.60	6.65	5.43
	No. 1 and No. 2	38 x 89	2.41	2.19	1.86	2.27	2.06	1.71
		38 x 140	3.76	3.26	2.66	3.46	3.00	2.45
		38 x 184	4.58	3.96	3.24	4.21	3.65	2.98
		38 x 235	5.60	4.85	3.96	5.15	4.46	3.64
		38 x 286	6.50	5.63	4.59	5.98	5.17	4.23
	No. 3	38 x 89	1.79	1.55	1.26	1.64	1.42	1.16
		38 x 140	2.55	2.21	1.80	2.35	2.03	1.66
		38 x 184	3.10	2.69	2.20	2.86	2.47	2.02
		38 x 235	3.80	3.29	2.68	3.49	3.02	2.47
		38 x 286	4.41	3.82	3.12	4.05	3.51	2.87
	Construction	38 x 89	2.30	2.00	1.63	2.12	1.84	1.50
	Standard	38 x 89	1.73	1.50	1.22	1.59	1.38	1.12
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 x 89	2.48	2.25	1.97	2.33	2.12	1.85
		38 x 140	3.90	3.54	3.10	3.67	3.33	2.91
		38 x 184	5.13	4.66	4.07	4.82	4.38	3.77
		38 x 235	6.55	5.95	5.01	6.16	5.60	4.61
		38 x 286	7.97	7.12	5.81	7.50	6.55	5.34
	No. 1 and No. 2	38 x 89	2.41	2.19	1.91	2.27	2.06	1.80
		38 x 140	3.79	3.42	2.79	3.57	3.14	2.57
		38 x 184	4.80	4.16	3.40	4.42	3.83	3.12
		38 x 235	5.87	5.08	4.15	5.40	4.68	3.82
		38 x 286	6.81	5.90	4.82	6.27	5.43	4.43
	No. 3	38 x 89	2.21	1.91	1.56	2.03	1.76	1.43
		38 x 140	3.15	2.73	2.23	2.90	2.51	2.05
		38 x 184	3.83	3.32	2.71	3.52	3.05	2.49
		38 x 235	4.68	4.06	3.31	4.31	3.73	3.05
		38 x 286	5.53	4.71	3.84	5.00	4.33	3.54
	Commercial	38 x 89	2.33	2.09	1.71	2.20	1.93	1.57
	Standard	38 x 89	1.81	1.57	1.28	1.66	1.44	1.18
Column 1	2	3	4	5	6	7	8	9

Table A-7 (Cont'd)
Maximum Spans for Roof Rafters – Specified Roof Snow Loads 2.5 and 3.0 kPa
Forming Part of Sentence 9.23.4.2.(1)

Commercial Designation	Grade	Rafter Size, mm	Maximum Span, m					
			Specified Snow Load, kPa					
			2.5			3.0		
			Rafter Spacing, mm			Rafter Spacing, mm		
			300	400	600	300	400	600
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	38 x 89	2.37	2.15	1.88	2.23	2.03	1.77
		38 x 140	3.73	3.39	2.96	3.51	3.19	2.79
		38 x 184	4.90	4.45	3.89	4.61	4.19	3.66
		38 x 235	6.26	5.69	4.97	5.89	5.35	4.68
		38 x 286	7.62	6.92	5.90	7.17	6.52	5.43
	No. 1 and No. 2	38 x 89	2.29	2.08	1.82	2.16	1.96	1.71
		38 x 140	3.61	3.28	2.86	3.40	3.08	2.66
		38 x 184	4.74	4.31	3.52	4.46	3.96	3.23
		38 x 235	6.06	5.27	4.30	5.59	4.84	3.96
		38 x 286	7.06	6.11	4.99	6.49	5.62	4.59
	No. 3	38 x 89	2.21	1.91	1.56	2.03	1.76	1.43
		38 x 140	3.15	2.73	2.23	2.90	2.51	2.05
		38 x 184	3.83	3.32	2.71	3.52	3.05	2.49
		38 x 235	4.68	4.06	3.31	4.31	3.73	3.05
		38 x 286	5.43	4.71	3.84	5.00	4.33	3.54
	Construction	38 x 89	2.25	2.05	1.77	2.12	1.93	1.63
	Standard	38 x 89	1.87	1.62	1.33	1.72	1.49	1.22
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	38 x 89	2.12	1.93	1.68	1.99	1.81	1.58
		38 x 140	3.33	3.03	2.65	3.14	2.85	2.49
		38 x 184	4.38	3.98	3.33	4.12	3.75	3.07
		38 x 235	5.60	4.99	4.08	5.27	4.59	3.75
		38 x 286	6.69	5.79	4.73	6.15	5.33	4.35
	No. 1 and No. 2	38 x 89	2.07	1.88	1.62	1.95	1.77	1.49
		38 x 140	3.26	2.84	2.32	3.02	2.61	2.13
		38 x 184	3.99	3.46	2.82	3.67	3.18	2.60
		38 x 235	4.88	4.23	3.45	4.49	3.89	3.17
		38 x 286	5.66	4.90	4.00	5.21	4.51	3.68
	No. 3	38 x 89	1.77	1.53	1.25	1.63	1.41	1.15
		38 x 140	2.52	2.19	1.78	2.32	2.01	1.64
		38 x 184	3.07	2.66	2.17	2.82	2.45	2.00
		38 x 235	3.76	3.25	2.66	3.45	2.99	2.44
		38 x 286	4.36	3.77	3.08	4.01	3.47	2.83
	Construction	38 x 89	2.01	1.74	1.42	1.85	1.60	1.31
	Standard	38 x 89	1.50	1.30	1.06	1.38	1.19	0.98
Column 1	2	3	4	5	6	7	8	9

Table A-8
Maximum Spans for Built-up Floor Beams Supporting not more than One Floor[1]
Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, mm[4][5]	Maximum Span, m[2][3]								
			Size of Built-up Beam, mm								
			3 – 38 x 184	4 – 38 x 184	5 – 38 x 184	3 – 38 x 235	4 – 38 x 235	5 – 38 x 235	3 – 38 x 286	4 – 38 x 286	5 – 38 x 286
Douglas Fir - Larch (includes Douglas Fir and Western larch)	Select Structural	2.4	3.84	4.43	4.96	4.70	5.42	6.06	5.45	6.29	7.03
		3.0	3.43	3.97	4.43	4.20	4.85	5.42	4.87	5.63	6.29
		3.6	3.14	3.62	4.05	3.83	4.43	4.95	4.45	5.14	5.74
		4.2	2.90	3.35	3.75	3.55	4.10	4.58	4.12	4.76	5.32
		4.8	2.72	3.14	3.51	3.32	3.83	4.29	3.85	4.45	4.97
		5.4	2.56	2.96	3.31	3.13	3.61	4.04	3.63	4.19	4.69
		6.0	2.43	2.80	3.14	2.97	3.43	3.83	3.34	3.98	4.45
	No. 1 and No. 2	2.4	2.99	3.45	3.86	3.66	4.22	4.72	4.24	4.90	5.48
		3.0	2.67	3.09	3.45	3.27	3.78	4.22	3.79	4.38	4.90
		3.6	2.44	2.82	3.15	2.98	3.45	3.85	3.46	4.00	4.47
		4.2	2.26	2.61	2.92	2.76	3.19	3.57	3.21	3.70	4.14
		4.8	2.11	2.44	2.73	2.59	2.98	3.34	3.00	3.46	3.87
		5.4	1.99	2.30	2.57	2.44	2.81	3.15	2.83	3.27	3.65
		6.0	1.89	2.18	2.44	2.31	2.67	2.98	2.68	3.10	3.46
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	3.78	4.37	4.88	4.62	5.34	5.97	5.37	6.20	6.93
		3.0	3.38	3.91	4.37	4.14	4.78	5.34	4.80	5.54	6.20
		3.6	3.09	3.57	3.99	3.78	4.36	4.87	4.35	5.06	5.66
		4.2	2.86	3.30	3.69	3.39	4.04	4.51	3.81	4.68	5.24
		4.8	2.55	3.09	3.45	3.03	3.78	4.22	3.40	4.35	4.90
		5.4	2.31	2.91	3.25	2.74	3.50	3.98	3.09	3.93	4.62
		6.0	2.12	2.70	3.09	2.52	3.20	3.78	2.84	3.59	4.35
	No. 1 and No. 2	2.4	3.14	3.62	4.05	3.83	4.43	4.95	4.45	5.14	5.74
		3.0	2.80	3.24	3.62	3.43	3.96	4.43	3.98	4.60	5.14
		3.6	2.56	2.96	3.31	3.13	3.61	4.04	3.63	4.19	4.69
		4.2	2.37	2.74	3.06	2.90	3.35	3.74	3.36	3.88	4.34
		4.8	2.22	2.56	2.86	2.71	3.13	3.50	3.15	3.63	4.06
		5.4	2.09	2.41	2.70	2.56	2.95	3.30	2.97	3.42	3.83
		6.0	1.98	2.29	2.56	2.42	2.80	3.13	2.81	3.25	3.63
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	3.84	4.43	4.96	4.70	5.42	6.06	5.45	6.29	7.03
		3.0	3.43	3.97	4.43	4.20	4.85	5.42	4.87	5.63	6.29
		3.6	3.14	3.62	4.05	3.83	4.43	4.95	4.45	5.14	5.74
		4.2	2.90	3.35	3.75	3.55	4.10	4.58	4.12	4.76	5.32
		4.8	2.72	3.14	3.51	3.31	3.83	4.29	3.72	4.45	4.97
		5.4	2.53	2.96	3.31	3.00	3.61	4.04	3.37	4.19	4.69
		6.0	2.31	2.80	3.14	2.74	3.43	3.83	3.09	3.93	4.45
	No. 1 and No. 2	2.4	3.25	3.75	4.19	3.97	4.59	5.13	4.61	5.32	5.95
		3.0	2.90	3.35	3.75	3.55	4.10	4.59	4.12	4.76	5.32
		3.6	2.65	3.06	3.42	3.24	3.74	4.19	3.76	4.34	4.86
		4.2	2.45	2.83	3.17	3.00	3.47	3.88	3.48	4.02	4.50
		4.8	2.30	2.65	2.96	2.81	3.24	3.63	3.26	3.76	4.21
		5.4	2.17	2.50	2.80	2.65	3.06	3.42	3.07	3.55	3.97
		6.0	2.05	2.37	2.65	2.51	2.90	3.24	2.91	3.37	3.76
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-8 (Cont'd)
Maximum Spans for Built-up Floor Beams Supporting not more than One Floor[1]
Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, mm[4][5]	Maximum Span, m[2][3]								
			Size of Built-up Beam, mm								
			3 – 38 x 184	4 – 38 x 184	5 – 38 x 184	3 – 38 x 235	4 – 38 x 235	5 – 38 x 235	3 – 38 x 286	4 – 38 x 286	5 – 38 x 286
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	3.08	3.55	3.97	3.76	4.35	4.86	4.37	5.04	5.64
		3.0	2.75	3.18	3.55	3.37	3.89	4.35	3.91	4.51	5.04
		3.6	2.51	2.90	3.24	3.07	3.55	3.97	3.57	4.12	4.60
		4.2	2.33	2.69	3.00	2.85	3.29	3.67	3.30	3.81	4.26
		4.8	2.18	2.51	2.81	2.66	3.07	3.44	3.09	3.57	3.99
		5.4	2.05	2.37	2.65	2.51	2.90	3.24	2.91	3.36	3.76
		6.0	1.95	2.25	2.51	2.38	2.75	3.07	2.76	3.19	3.57
	No. 1 and No. 2	2.4	2.61	3.01	3.36	3.19	3.68	4.11	3.70	4.27	4.77
		3.0	2.33	2.69	3.01	2.85	3.29	3.68	3.31	3.82	4.27
		3.6	2.13	2.46	2.75	2.60	3.00	3.36	3.02	3.49	3.90
		4.2	1.97	2.27	2.54	2.41	2.78	3.11	2.80	3.23	3.61
		4.8	1.84	2.13	2.38	2.25	2.60	2.91	2.61	3.02	3.38
		5.4	1.74	2.01	2.24	2.12	2.45	2.74	2.47	2.85	3.18
		6.0	1.65	1.90	2.13	2.02	2.33	2.60	2.34	2.70	3.02
Column 1	2	3	4	5	6	7	8	9	10	11	12

Notes to Table A-8:

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.6.3.

(2) Spans are clear spans between supports. For total span, add two bearing lengths.

(3) Provide minimum 89 mm of bearing.

(4) Supported length means half the sum of the joists spans on both sides of the beam.

(5) Straight line interpolation may be used for other supported lengths.

Table A-9
Maximum Spans for Built-up Floor Beams Supporting not more than Two Floors[1]
Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, mm[4][5]	Maximum Span, m[2][3]								
			Size of Built-up Beam, mm								
			3 – 38 x 184	4 – 38 x 184	5 – 38 x 184	3 – 38 x 235	4 – 38 x 235	5 – 38 x 235	3 – 38 x 286	4 – 38 x 286	5 – 38 x 286
Douglas Fir - Larch (includes Douglas Fir and Western larch)	Select Structural	2.4	2.91	3.36	3.76	3.56	4.11	4.60	4.13	4.77	5.34
		3.0	2.61	3.01	3.36	3.19	3.68	4.11	3.70	4.27	4.77
		3.6	2.38	2.75	3.07	2.87	3.36	3.76	3.23	3.90	4.36
		4.2	2.13	2.54	2.84	2.53	3.11	3.48	2.85	3.61	4.04
		4.8	1.91	2.38	2.66	2.27	2.87	3.25	2.56	3.23	3.77
		5.4	1.74	2.19	2.51	2.07	2.60	3.07	2.34	2.93	3.52
		6.0	1.60	2.01	2.38	1.91	2.39	2.87	2.17	2.70	3.23
	No. 1 and No.2	2.4	2.27	2.62	2.93	2.77	3.20	3.58	3.22	3.72	4.16
		3.0	2.03	2.34	2.62	2.48	2.86	3.20	2.88	3.32	3.72
		3.6	1.85	2.14	2.39	2.26	2.62	2.92	2.63	3.03	3.39
		4.2	1.71	1.98	2.21	2.10	2.42	2.71	2.43	2.81	3.14
		4.8	1.60	1.85	2.07	1.96	2.26	2.53	2.28	2.63	2.94
		5.4	1.51	1.75	1.95	1.85	2.14	2.39	2.15	2.48	2.77
		6.0	1.43	1.66	1.85	1.75	2.03	2.26	2.04	2.35	2.63
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	2.87	3.31	3.70	3.42	4.05	4.53	3.83	4.70	5.26
		3.0	2.38	2.96	3.31	2.83	3.61	4.05	3.18	4.05	4.70
		3.6	2.05	2.61	3.02	2.43	3.09	3.70	2.75	3.47	4.19
		4.2	1.81	2.29	2.77	2.15	2.72	3.28	2.44	3.06	3.68
		4.8	1.63	2.05	2.47	1.94	2.43	2.93	2.20	2.75	3.29
		5.4	1.49	1.86	2.23	1.78	2.22	2.65	2.02	2.50	2.99
		6.0	1.37	1.71	2.05	1.65	2.04	2.43	1.88	2.31	2.75
	No. 1 and No.2	2.4	2.38	2.75	3.07	2.91	3.36	3.76	3.38	3.90	4.36
		3.0	2.13	2.46	2.75	2.60	3.00	3.36	3.02	3.49	3.90
		3.6	1.94	2.24	2.51	2.38	2.74	3.07	2.75	3.18	3.56
		4.2	1.80	2.08	2.32	2.15	2.54	2.84	2.44	2.95	3.29
		4.8	1.63	1.94	2.17	1.94	2.38	2.66	2.20	2.75	3.08
		5.4	1.49	1.83	2.05	1.78	2.22	2.50	2.02	2.50	2.91
		6.0	1.37	1.71	1.94	1.65	2.04	2.38	1.88	2.31	2.75
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	2.91	3.36	3.76	3.56	4.11	4.60	4.13	4.77	5.34
		3.0	2.61	3.01	3.36	3.09	3.68	4.11	3.47	4.27	4.77
		3.6	2.23	2.75	3.07	2.65	3.36	3.76	2.99	3.79	4.36
		4.2	1.97	2.50	2.84	2.34	2.96	3.48	2.64	3.33	4.02
		4.8	1.77	2.23	2.66	2.11	2.65	3.20	2.38	2.99	3.59
		5.4	1.61	2.03	2.44	1.93	2.41	2.90	2.18	2.72	3.26
		6.0	1.49	1.86	2.23	1.78	2.22	2.65	2.02	2.50	2.99
	No. 1 and No.2	2.4	2.46	2.85	3.18	3.01	3.48	3.89	3.50	4.04	4.51
		3.0	2.20	2.55	2.85	2.70	3.11	3.48	3.13	3.61	4.04
		3.6	2.01	2.32	2.60	2.46	2.84	3.18	2.85	3.30	3.69
		4.2	1.86	2.15	2.40	2.28	2.63	2.94	2.64	3.05	3.41
		4.8	1.74	2.01	2.25	2.11	2.46	2.75	2.38	2.85	3.19
		5.4	1.61	1.90	2.12	1.93	2.32	2.59	2.18	2.69	3.01
		6.0	1.49	1.80	2.01	1.78	2.20	2.46	2.02	2.50	2.85
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-9 (Cont'd)
Maximum Spans for Built-up Floor Beams Supporting not more than Two Floors[1]
Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length,[4][5] mm	Maximum Span, m[2][3] Size of Built-up Beam, mm								
			3 – 38 x 184	4 – 38 x 184	5 – 38 x 184	3 – 38 x 235	4 – 38 x 235	5 – 38 x 235	3 – 38 x 286	4 – 38 x 286	5 – 38 x 286
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	2.34	2.70	3.02	2.86	3.30	3.69	3.31	3.83	4.28
		3.0	2.09	2.41	2.70	2.55	2.95	3.30	2.96	3.42	3.83
		3.6	1.91	2.20	2.46	2.33	2.69	3.01	2.71	3.12	3.49
		4.2	1.77	2.04	2.28	2.15	2.49	2.79	2.44	2.89	3.23
		4.8	1.63	1.91	2.13	1.94	2.33	2.61	2.20	2.71	3.03
		5.4	1.49	1.80	2.01	1.78	2.20	2.46	2.02	2.50	2.85
		6.0	1.37	1.71	1.91	1.65	2.04	2.33	1.88	2.31	2.71
	No. 1 and No.2	2.4	1.98	2.28	2.55	2.42	2.79	3.12	2.81	3.24	3.62
		3.0	1.77	2.04	2.28	2.16	2.50	2.79	2.51	2.90	3.24
		3.6	1.61	1.86	2.08	1.97	2.28	2.55	2.29	2.65	2.96
		4.2	1.49	1.73	1.93	1.83	2.11	2.36	2.12	2.45	2.74
		4.8	1.40	1.61	1.81	1.71	1.97	2.21	1.98	2.29	2.56
		5.4	1.32	1.52	1.70	1.61	1.86	2.08	1.87	2.16	2.42
		6.0	1.25	1.44	1.61	1.53	1.77	1.97	1.77	2.05	2.29
Column 1	2	3	4	5	6	7	8	9	10	11	12

Notes to Table A-9:

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.6.A., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.6.A.

(2) Spans are clear spans between supports. For total span, add two bearing lengths.

(3) Provide minimum 89 mm of bearing.

(4) Supported length means half the sum of the joists spans on both sides of the beam.

(5) Straight line interpolation may be used for other supported lengths.

Table A-10
Maximum Spans for Built-up Floor Beams Supporting not more than Three Floors[1]
Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, mm[4][5]	Maximum Span, m[2][3]								
			Size of Built-up Beam, mm								
			3– 38 x 184	4– 38 x 184	5– 38 x 184	3– 38 x 235	4– 38 x 235	5– 38 x 235	3– 38 x 286	4– 38 x 286	5– 38 x 286
Douglas Fir - Larch (includes Douglas Fir and Western larch)	Select Structural	2.4	2.44	2.82	3.15	2.99	3.45	3.85	3.37	4.00	4.47
		3.0	2.10	2.52	2.82	2.49	3.08	3.45	2.81	3.56	4.00
		3.6	1.81	2.29	2.57	2.16	2.72	3.15	2.44	3.06	3.65
		4.2	1.60	2.01	2.38	1.92	2.40	2.88	2.17	2.70	3.24
		4.8	1.45	1.81	2.17	1.73	2.16	2.58	1.97	2.44	2.90
		5.4	1.33	1.65	1.97	1.59	1.97	2.34	1.82	2.23	2.64
		6.0	1.23	1.52	1.81	1.48	1.82	2.16	1.69	2.06	2.44
	No. 1 and No.2	2.4	1.90	2.19	2.45	2.32	2.68	3.00	2.70	3.11	3.48
		3.0	1.70	1.96	2.19	2.08	2.40	2.68	2.41	2.79	3.11
		3.6	1.55	1.79	2.00	1.90	2.19	2.45	2.20	2.54	2.84
		4.2	1.44	1.66	1.86	1.76	2.03	2.27	2.04	2.35	2.63
		4.8	1.34	1.55	1.74	1.64	1.90	2.12	1.91	2.20	2.46
		5.4	1.27	1.46	1.64	1.55	1.79	2.00	1.80	2.08	2.32
		6.0	1.20	1.39	1.55	1.47	1.70	1.90	1.69	1.97	2.20
Hem - Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	2.14	2.72	3.10	2.54	3.23	3.80	2.86	3.62	4.39
		3.0	1.78	2.25	2.72	2.13	2.68	3.23	2.40	3.01	3.62
		3.6	1.55	1.94	2.33	1.85	2.31	2.77	2.10	2.61	3.12
		4.2	1.38	1.71	2.05	1.65	2.05	2.44	1.88	2.32	2.75
		4.8	1.25	1.55	1.84	1.50	1.85	2.19	1.72	2.10	2.48
		5.4	1.15	1.42	1.68	1.39	1.70	2.00	1.59	1.93	2.27
		6.0	1.07	1.31	1.55	1.30	1.57	1.85	1.49	1.79	2.10
	No. 1 and No.2	2.4	1.99	2.30	2.57	2.44	2.81	3.15	2.83	3.27	3.65
		3.0	1.78	2.06	2.30	2.13	2.52	2.81	2.40	2.92	3.27
		3.6	1.55	1.88	2.10	1.85	2.30	2.57	2.10	2.61	2.98
		4.2	1.38	1.71	1.95	1.65	2.05	2.38	1.88	2.32	2.75
		4.8	1.25	1.55	1.82	1.50	1.85	2.19	1.72	2.10	2.48
		5.4	1.15	1.42	1.68	1.39	1.70	2.00	1.59	1.93	2.27
		6.0	1.07	1.31	1.55	1.30	1.57	1.85	1.49	1.79	2.10
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	2.33	2.82	3.15	2.77	3.45	3.85	3.12	3.96	4.47
		3.0	1.94	2.46	2.82	2.31	2.92	3.45	2.61	3.29	3.96
		3.6	1.68	2.11	2.55	2.00	2.51	3.02	2.27	2.83	3.40
		4.2	1.49	1.86	2.24	1.78	2.22	2.66	2.03	2.51	2.99
		4.8	1.35	1.68	2.00	1.62	2.00	2.39	1.84	2.27	2.69
		5.4	1.24	1.53	1.82	1.49	1.83	2.17	1.70	2.08	2.46
		6.0	1.15	1.42	1.68	1.39	1.70	2.00	1.59	1.93	2.27
	No. 1 and No.2	2.4	2.06	2.38	2.67	2.52	2.92	3.26	2.93	3.38	3.78
		3.0	1.85	2.13	2.38	2.26	2.61	2.92	2.61	3.03	3.38
		3.6	1.68	1.95	2.18	2.00	2.38	2.66	2.27	2.76	3.09
		4.2	1.49	1.80	2.02	1.78	2.20	2.46	2.03	2.51	2.86
		4.8	1.35	1.68	1.88	1.62	2.00	2.30	1.84	2.27	2.67
		5.4	1.24	1.53	1.78	1.49	1.83	2.17	1.70	2.08	2.46
		6.0	1.15	1.42	1.68	1.39	1.70	2.00	1.59	1.93	2.27
Column 1	2	3	4	5	6	7	8	9	10	11	12

Table A-10 (Cont'd)

Maximum Spans for Built-up Floor Beams Supporting not more than Three Floors[1]

Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, mm[4][5]	Maximum Span, m[2][3]								
			Size of Built-up Beam, mm								
			3 – 38 x 184	4 – 38x 184	5 – 38 x 184	3 – 38 x 235	4 – 38 x 235	5 – 38 x 235	3 – 38 x 286	4 – 38 x 286	5 – 38 x 286
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	1.96	2.26	2.53	2.39	2.76	3.09	2.78	3.21	3.58
		3.0	1.75	2.02	2.26	3.13	2.47	2.76	2.40	2.87	3.21
		3.6	1.55	1.85	2.06	1.85	2.26	2.52	2.10	2.61	2.93
		4.2	1.38	1.71	1.91	1.65	2.05	2.34	1.88	2.32	2.71
		4.8	1.25	1.55	1.79	1.50	1.85	2.18	1.72	2.10	2.48
		5.4	1.15	1.42	1.68	1.39	1.70	2.00	1.59	1.93	2.27
		6.0	1.07	1.31	1.55	1.30	1.57	1.85	1.49	1.79	2.10
	No. 1 and No.2	2.4	1.66	1.91	2.14	2.03	2.34	2.62	2.35	2.72	3.04
		3.0	1.48	1.71	1.91	1.81	2.09	2.34	2.10	2.43	2.72
		3.6	1.35	1.56	1.75	1.65	1.91	2.14	1.92	2.22	2.48
		4.2	1.25	1.45	1.62	1.53	1.77	1.98	1.78	2.05	2.29
		4.8	1.17	1.35	1.51	1.43	1.65	1.85	1.66	1.92	2.15
		5.4	1.10	1.28	1.43	1.35	1.56	1.74	1.57	1.81	2.02
		6.0	1.05	1.21	1.35	1.28	1.48	1.65	1.49	1.72	1.92
Column 1	2	3	4	5	6	7	8	9	10	11	12

Notes to Table A-10:

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.6.3.

(2) Spans are clear spans between supports. For total span, add two bearing lengths.

(3) Provide minimum 89 mm of bearing.

(4) Supported length means half the sum of the joists spans on both sides of the beam.

(5) Straight line interpolation may be used for other supported lengths.

Table A-11
Maximum Spans for Glue-Laminated Floor Beams - 20f-E Grade[1]
Forming Part of Sentence 9.23.4.2.(3)

Number of *Storeys* Supported	Beam Width, mm	Supported Length, m[6][7]	Maximum Span, m[2][3][4][5] Beam Depth, mm						
			228	266	304	342	380	418	456
1	80	2.4	4.32	5.04	5.76	6.48	7.20	7.92	8.64
		3.0	3.87	4.51	5.15	5.80	6.44	7.09	7.73
		3.6	3.53	4.12	4.70	5.29	5.88	6.47	7.06
		4.2	3.27	3.81	4.36	4.90	5.44	5.99	6.53
		4.8	3.06	3.57	4.07	4.58	5.09	5.60	6.11
		5.4	2.88	3.36	3.84	4.32	4.80	5.28	5.76
		6.0	2.73	3.19	3.64	4.10	4.56	5.01	5.47
	130	2.4	5.51	6.43	7.35	8.26	9.18	10.10	11.02
		3.0	4.93	5.75	6.57	7.39	8.21	9.03	9.86
		3.6	4.50	5.25	6.00	6.75	7.50	8.25	9.00
		4.2	4.16	4.86	5.55	6.25	6.94	7.64	8.33
		4.8	3.90	4.54	5.19	5.84	6.49	7.14	7.79
		5.4	3.67	4.28	4.90	5.51	6.12	6.73	7.35
		6.0	3.48	4.07	4.65	5.23	5.81	6.39	6.97
2	80	2.4	3.28	3.83	4.37	4.92	5.47	6.01	6.56
		3.0	2.93	3.42	3.91	4.40	4.89	5.38	5.87
		3.6	2.68	3.12	3.57	4.02	4.46	4.91	5.36
		4.2	2.48	2.89	3.31	3.72	4.13	4.54	4.96
		4.8	2.32	2.71	3.09	3.48	3.86	4.25	4.64
		5.4	2.19	2.55	2.91	3.28	3.64	4.01	4.37
		6.0	2.07	2.42	2.77	3.11	3.46	3.80	4.15
	130	2.4	4.18	4.88	5.57	6.27	6.97	7.66	8.36
		3.0	3.74	4.36	4.99	5.61	6.23	6.85	7.48
		3.6	3.41	3.98	4.55	5.12	5.69	6.26	6.83
		4.2	3.16	3.69	4.21	4.74	5.27	5.79	6.32
		4.8	2.96	3.45	3.94	4.43	4.93	5.42	5.91
		5.4	2.79	3.25	3.72	4.18	4.64	5.11	5.57
		6.0	2.64	3.08	3.53	3.97	4.41	4.85	5.29
3	80	2.4	2.75	3.21	3.66	4.12	4.58	5.04	5.50
		3.0	2.46	2.87	3.28	3.69	4.10	4.51	4.92
		3.6	2.24	2.62	2.99	3.37	3.74	4.11	4.49
		4.2	2.08	2.42	2.77	3.12	3.46	3.81	4.15
		4.8	1.94	2.27	2.59	2.91	3.24	3.56	3.89
		5.4	1.83	2.14	2.44	2.75	3.05	3.36	3.66
		6.0	1.74	2.03	2.32	2.61	2.90	3.19	3.48
	130	2.4	3.50	4.09	4.67	5.25	5.84	6.42	7.01
		3.0	3.13	3.66	4.18	4.70	5.22	5.74	6.27
		3.6	2.86	3.34	3.81	4.29	4.77	5.24	5.72
		4.2	2.65	3.09	3.53	3.97	4.41	4.85	5.30
		4.8	2.48	2.89	3.30	3.72	4.13	4.54	4.95
		5.4	2.34	2.72	3.11	3.50	3.89	4.28	4.67
		6.0	2.22	2.58	2.95	3.32	3.69	4.06	4.43
Column 1	2	3	4	5	6	7	8	9	10

Notes to Table A-11:

(1) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

(2) Spans are valid for glued-laminated timber conforming to CAN/CSA-O122-M and CAN/CSA-O177-M.

(3) Spans are clear spans between supports. For total span, add two bearing lengths.

(4) Provide a minimum bearing length of 89 mm. (Alternatively, the bearing length may be designed in accordance with Part 4.)

(5) Top edge of beam assumed to be fully laterally supported by joists.

(6) Supported length means half the sum of the joist spans on both sides of the beam.

(7) Straight line interpolation may be used for other supported lengths.

Table A-12
Maximum Spans for Built-up Roof Ridge Beams - No. 1 or No. 2 Grade
Forming Part of Sentence 9.23.4.2.(4)

Commercial Designation	Beam Size, mm	Maximum Span, m[1][2] Specified Snow Load, kPa				
		1.0	1.5	2.0	2.5	3.0
Douglas Fir - Larch (includes Douglas Fir and Western Larch)	3 - 38 x 184	2.42	2.08	1.86	1.69	1.56
	4 - 38 x 184	2.80	2.41	2.14	1.95	1.80
	5 - 38 x 184	3.13	2.69	2.40	2.18	2.01
	3 - 38 x 235	2.96	2.55	2.27	2.06	1.91
	4 - 38 x 235	3.42	2.94	2.62	2.38	2.20
	5 - 38 x 235	3.83	3.29	2.93	2.67	2.46
	3 - 38 x 286	3.44	2.96	2.63	2.40	2.21
	4 - 38 x 286	3.97	3.41	3.04	2.77	2.56
	5 - 38 x 286	4.44	3.82	3.40	3.09	2.86
Hem - Fir (includes Western Hemlock and Amabilis Fir)	3 - 38 x 184	2.54	2.18	1.95	1.77	1.64
	4 - 38 x 184	2.93	2.52	2.25	2.05	1.89
	5 - 38 x 184	3.28	2.82	2.51	2.29	2.11
	3 - 38 x 235	3.11	2.67	2.38	2.17	2.00
	4 - 38 x 235	3.59	3.08	2.75	2.50	2.31
	5 - 38 x 235	4.01	3.45	3.07	2.80	2.58
	3 - 38 x 286	3.61	3.10	2.76	2.51	2.32
	4 - 38 x 286	4.16	3.58	3.19	2.90	2.68
	5 - 38 x 286	4.66	4.00	3.56	3.24	3.00
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	3 - 38 x 184	2.63	2.26	2.02	1.83	1.69
	4 - 38 x 184	3.04	2.61	2.33	2.12	1.96
	5 - 38 x 184	3.40	2.92	2.60	2.37	2.19
	3 - 38 x 235	3.22	2.77	2.46	2.24	2.07
	4 - 38 x 235	3.72	3.20	2.85	2.59	2.39
	5 - 38 x 235	4.16	3.57	3.18	2.90	2.68
	3 - 38 x 286	3.73	3.21	2.86	2.60	2.40
	4 - 38 x 286	4.31	3.71	3.30	3.01	2.78
	5 - 38 x 286	4.82	4.15	3.69	3.36	3.10
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	3 - 38 x 184	2.11	1.82	1.62	1.47	1.36
	4 - 38 x 184	2.44	2.10	1.87	1.70	1.57
	5 - 38 x 184	2.73	2.34	2.09	1.90	1.76
	3 - 38 x 235	2.58	2.22	1.98	1.80	1.66
	4 - 38 x 235	2.98	2.56	2.28	2.08	1.92
	5 - 38 x 235	3.33	2.87	2.55	2.32	2.15
	3 - 38 x 286	3.00	2.58	2.29	2.09	1.93
	4 - 38 x 286	3.46	2.98	2.65	2.41	2.23
	5 - 38 x 286	3.87	3.33	2.96	2.70	2.49
Column 1	2	3	4	5	6	7

Notes to Table A-12:

(1) The spans are calculated based on a maximum supported length of 4.9 m where supported length means half the sum of the rafter, joist or truss spans on both sides of the beam. Spans may be increased by 5% for supported lengths not more than 4.3 m, or by 10% for supported lengths not more than 3.7 m.

(2) Provide minimum 89 mm bearing.

Table A-13
Maximum Spans for Douglas Fir - Larch Lintels - No. 1 or No. 2 Grade - Non-Structural Sheathing
Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, mm[4]	Maximum Span, m[1][2][3]					
		Exterior Walls					Interior Walls
		Specified Snow Load, kPa					
		1.0	1.5	2.0	2.5	3.0	
Limited attic storage and ceiling	2 - 38 x 89	This Area Intentionally Left Blank					1.25
	2 - 38 x 140						1.78
	2 - 38 x 184						2.17
	2 - 38 x 235						2.65
	2 - 38 x 286						3.08
Roof and ceiling only	2 - 38 x 89	1.25	1.07	0.96	0.87	0.80	0.87
	2 - 38 x 140	1.78	1.53	1.36	1.24	1.15	1.24
	2 - 38 x 184	2.17	1.86	1.66	1.51	1.40	1.51
	2 - 38 x 235	2.65	2.28	2.03	1.85	1.71	1.85
	2 - 38 x 286	3.08	2.64	2.35	2.14	1.98	2.14
Roof, ceiling and 1 storey[5]	2 - 38 x 89	0.96	0.88	0.82	0.77	0.73	0.68
	2 - 38 x 140	1.37	1.26	1.17	1.10	1.04	0.97
	2 - 38 x 184	1.67	1.53	1.42	1.34	1.26	1.18
	2 - 38 x 235	2.04	1.88	1.74	1.63	1.54	1.44
	2 - 38 x 286	2.37	2.18	2.02	1.90	1,79	1.67
Roof, ceiling and 2 storeys[5]	2 - 38 x 89	0.86	0.81	0.77	0.73	0.70	0.61
	2 - 38 x 140	1.23	1.16	1.09	1.04	0.99	0.87
	2 - 38 x 184	1.50	1.41	1.33	1.27	1.21	1.06
	2 - 38 x 235	1.84	1.72	1.63	1.55	1.48	1.30
	2 - 38 x 286	2.13	2.00	1.89	1.80	1.72	1.51
Roof, ceiling and 3 storeys[5]	2 - 38 x 89	0.81	0.77	0.73	0.71	0.68	0.57
	2 - 38 x 140	1.15	1.10	1.05	1.01	0.97	0.82
	2 - 38 x 184	1.40	1.33	1.28	1.22	1.18	1.00
	2 - 38 x 235	1.71	1.63	1.56	1.50	1.44	1.22
	2 - 38 x 286	1.99	1.89	1.81	1.74	1.67	1.41
Column 1	2	3	4	5	6	7	8

Notes to Table A-13:

(1) Spans are calculated based on a maximum supported joist or rafter length of 4.9 m and a maximum supported truss length of 9.8 m. Spans may be increased by 5% for supported lengths not more than 4.3 m, or by 10% for supported lengths not more than 3.7 m. Supported length means half the span of the longest supported member.

(2) If floor joists span the full width of the *building* without support, lintel spans shall be reduced by 15% for Roof, ceiling and one *storey*, by 20% for Roof, ceiling and two *storeys*, and by 25% for Roof, ceiling and three *storeys*.

(3) For ends of lintels fully supported by the wall, provide minimum 38 mm of bearing for lintel spans up to 3 m, or minimum 76 mm or bearing for lintel spans greater than 3 m.

(4) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(5) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

Table A-14
Maximum Spans for Douglas Fir - Larch Lintels - No. 1 or No. 2 Grade - Structural Sheathing[1]
Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, mm[5]	Maximum Span, m[2][3][4]				
		Exterior Walls				
		Specified Snow Load, kPa				
		1.0	1.5	2.0	2.5	3.0
Roof and ceiling only	2 - 38 x 89	1.46	1.25	1.12	1.02	0.94
	2 - 38 x 140	2.08	1.79	1.59	1.45	1.34
	2 - 38 x 184	2.53	2.18	1.94	1.76	1.63
	2 - 38 x 235	3.09	2.66	2.37	2.16	1.99
	2 - 38 x 286	3.59	3.09	2.75	2.50	2.31
Roof, ceiling and 1 storey[6]	2 - 38 x 89	1.12	1.03	0.96	0.90	0.85
	2 - 38 x 140	1.60	1.47	1.37	1.28	1.21
	2 - 38 x 184	1.95	1.79	1.66	1.56	1.47
	2 - 38 x 235	2.39	2.19	2.03	1.91	1.80
	2 - 38 x 286	2.77	2.54	2.36	2.21	2.09
Roof, ceiling and 2 storeys[6]	2 - 38 x 89	1.01	0.95	0.90	0.85	0.81
	2 - 38 x 140	1.44	1.35	1.28	1.21	1.16
	2 - 38 x 184	1.75	1.64	1.55	1.48	1.41
	2 - 38 x 235	2.14	2.01	1.90	1.81	1.73
	2 - 38 x 286	2.49	2.33	2.21	2.10	2.00
Roof, ceiling and 3 storeys[6]	2 - 38 x 89	0.94	0.90	0.86	0.82	0.79
	2 - 38 x 140	1.35	1.28	1.22	1.18	1.13
	2 - 38 x 184	1.64	1.56	1.49	1.43	1.38
	2 - 38 x 235	2.00	1.91	1.82	1.75	1.68
	2 - 38 x 286	2.32	2.21	2.11	2.03	1.95
Column 1	2	3	4	5	6	7

Notes to Table A-14:

(1) A minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151-M, CAN/CSA-O325.0 or CAN/CSA-O437.0 shall be fastened with at least 2 rows of fasteners conforming to Table 9.23.3.5 to the exterior face of the lintel, and a single row to the top plates and studs.

(2) Spans are calculated based on a maximum supported joist or rafter length of 4.9 m and a maximum supported truss length of 9.8 m. Spans may be increased by 5% for supported lengths not more than 4.3 m, or by 10% for supported lengths not more than 3.7 m. Supported length means half the span of the longest supported members.

(3) If floor joists span the full width of the *building* without support, lintels 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 three *storeys*.

(4) For ends of lintels fully supported by walls, provide minimum 38 mm of bearing for lintel spans up to 3 m, or minimum 76 mm of bearing for lintel spans greater than 3 m.

(5) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(6) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

Table A-15
Maximum Spans for Hem - Fir Lintels - No. 1 or No. 2 Grade - Non-Structural Sheathing
Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, mm [4]	Maximum Span, m [1][2][3]					
		Exterior Walls					Interior Walls
		Specified Snow Load, kPa					
		1.0	1.5	2.0	2.5	3.0	
Limited attic storage and ceiling	2 - 38 x 89	This Area Intentionally Left Blank					1.31
	2 - 38 x 140						1.87
	2 - 38 x 184						2.27
	2 - 38 x 235						2.78
	2 - 38 x 286						3.23
Roof and ceiling only	2 - 38 x 89	1.31	1.13	1.00	0.91	0.84	0.91
	2 - 38 x 140	1.87	1.61	1.43	1.30	1.20	1.30
	2 - 38 x 184	2.27	1.95	1.74	1.58	1.42	1.58
	2 - 38 x 235	2.78	2.39	2.13	1.92	1.71	1.92
	2 - 38 x 286	3.23	2.77	2.47	2.17	1.94	2.17
Roof, ceiling and 1 *storey*[5]	2 - 38 x 89	1.01	0.93	0.86	0.81	0.76	0.69
	2 - 38 x 140	1.44	1.32	1.23	1.14	1.05	0.95
	2 - 38 x 184	1.75	1.61	1.47	1.34	1.23	1.12
	2 - 38 x 235	2.14	1.96	1.76	1.60	1.48	1.35
	2 - 38 x 286	2.49	2.22	2.00	1.82	1.69	1.55
Roof, ceiling and 2 *storeys*[5]	2 - 38 x 89	0.91	0.85	0.80	0.76	0.72	0.60
	2 - 38 x 140	1.29	1.21	1.13	1.05	0.98	0.82
	2 - 38 x 184	1.57	1.44	1.33	1.24	1.16	0.98
	2 - 38 x 235	1.90	1.73	1.60	1.49	1.40	1.19
	2 - 38 x 286	2.15	1.97	1.82	1.70	1.60	1.37
Roof, ceiling and 3 *storeys*[5]	2 - 38 x 89	0.85	0.81	0.77	0.74	0.69	0.55
	2 - 38 x 140	1.21	1.14	1.06	1.00	0.95	0.76
	2 - 38 x 184	1.43	1.33	1.25	1.18	1.12	0.91
	2 - 38 x 235	1.72	1.60	1.50	1.42	1.35	1.10
	2 - 38 x 286	1.95	1.82	1.72	1.63	1.55	1.27
Column 1	2	3	4	5	6	7	8

Notes to Table A-15:

(1) Spans are calculated based on a maximum supported joist or rafter length of 4.9 m and a maximum supported truss length of 9.8 m. Spans may be increased by 5% for supported lengths not more than 4.3 m, or by 10% for supported lengths not more than 3.7 m. Supported length means half the span of the longest supported member.

(2) If floor joists span the full width of the *building* without support, lintels 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*.

(3) For ends of lintels fully supported by walls, provide minimum 38 mm of bearing for lintel spans up to 3 m, or minimum 76 mm of bearing for lintel spans greater than 3 m.

(4) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(5) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

Table A-16
Maximum Spans for Hem - Fir Lintels - No. 1 or No. 2 Grade - Structural Sheathing[1]
Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size mm,[5]	Maximum Span, m[2][3][4]				
		Exterior Walls				
		Specified Snow Load, kPa				
		1.0	1.5	2.0	2.5	3.0
Roof and ceiling only	2 - 38 x 89	1.47	1.29	1.17	1.07	0.98
	2 - 38 x 140	2.18	1.88	1.67	1.52	1.40
	2 - 38 x 184	2.65	2.28	2.03	1.85	1.71
	2 - 38 x 235	3.25	2.79	2.49	2.26	2.08
	2 - 38 x 286	3.77	3.24	2.88	2.62	2.35
Roof, ceiling and 1 *storey*[6]	2 - 38 x 89	1.18	1.08	1.00	0.94	0.89
	2 - 38 x 140	1.68	1.54	1.43	1.34	1.27
	2 - 38 x 184	2.05	1.88	1.74	1.63	1.49
	2 - 38 x 235	2.50	2.30	2.13	1.94	1.78
	2 - 38 x 286	2.91	2.66	2.42	2.20	2.03
Roof, ceiling and 2 *storeys*[6]	2 - 38 x 89	1.06	0.99	0.94	0.89	0.85
	2 - 38 x 140	1.51	1.42	1.34	1.27	1.19
	2 - 38 x 184	1.84	1.73	1.62	1.50	1.40
	2 - 38 x 235	2.25	2.11	1.93	1.79	1.68
	2 - 38 x 286	2.61	2.38	2.19	2.03	1.91
Roof, ceiling and 3 *storeys*[6]	2 - 38 x 89	0.99	0.94	0.90	0.86	0.83
	2 - 38 x 140	1.41	1.34	1.28	1.22	1.15
	2 - 38 x 184	1.72	1.62	1.52	1.43	1.35
	2 - 38 x 235	2.09	1.94	1.81	1.71	1.62
	2 - 38 x 286	2.37	2.20	2.06	1.94	1.84
Column 1	2	3	4	5	6	7

Notes to Table A-16:

(1) A minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151-M, CAN/CSA-O325.0 or CAN/CSA-O437.0 shall be fastened with at least 2 rows of fasteners conforming to Table 9.23.3.5 to the exterior face of the lintel, and a single row to the top plates and studs.

(2) Spans are calculated based on a maximum supported joist or rafter length of 4.9 m and a maximum supported truss length of 9.8 m. Spans may be increased by 5% for supported lengths not more than 4.3 m, or by 10% for supported lengths not more than 3.7 m. Supported length means half the span of the longest supported member.

(3) If floor joists span the full width of the *building* without support, lintels spans shall be reduced by 15% for Roof, ceiling and 1 *storey*, by 20% for Roof, ceiling and 2 *storeys*, and by 25% for Roof, ceiling and 3 *storeys*.

(4) For ends of lintels fully supported by walls, provide minimum 38 mm of bearing for lintel spans up to 3 m, or minimum 76 mm of bearing for lintel spans greater than 3 m.

(5) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(6) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed live load on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

Table A-17
Maximum Spans for Spruce - Pine - Fir Lintels - No. 1 or No. 2 Grade - Non-Structural Sheathing
Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, mm [4]	Maximum Span, m [1][2][3]					
		Exterior Walls					Interior Walls
		Specified Snow Load, kPa					
		1.0	1.5	2.0	2.5	3.0	
Limited attic storage and ceiling	2 - 38 x 89	This Area Intentionally Left Blank					1.27
	2 - 38 x 140						1.99
	2 - 38 x 184						2.51
	2 - 38 x 235						3.07
	2 - 38 x 286						3.57
Roof and ceiling only	2 - 38 x 89	1.27	1.11	1.01	0.93	0.87	0.93
	2 - 38 x 140	1.93	1.66	1.48	1.35	1.25	1.35
	2 - 38 x 184	2.35	2.02	1.80	1.64	1.52	1.64
	2 - 38 x 235	2.88	2.47	2.20	2.01	1.84	2.01
	2 - 38 x 286	3.34	2.87	2.56	2.33	2.09	2.33
Roof, ceiling and 1 *storey*[5]	2 - 38 x 89	1.05	0.96	0.89	0.84	0.79	0.74
	2 - 38 x 140	1.49	1.37	1.27	1.19	1.13	1.02
	2 - 38 x 184	1.82	1.67	1.55	1.44	1.33	1.20
	2 - 38 x 235	2.22	2.04	1.89	1.73	1.59	1.45
	2 - 38 x 286	2.58	2.36	2.15	1.96	1.81	1.66
Roof, ceiling and 2 *storeys*[5]	2 - 38 x 89	0.94	0.88	0.83	0.79	0.76	0.64
	2 - 38 x 140	1.34	1.26	1.19	1.13	1.06	0.88
	2 - 38 x 184	1.63	1.53	1.44	1.33	1.25	1.05
	2 - 38 x 235	1.99	1.87	1.72	1.60	1.50	1.27
	2 - 38 x 286	2.31	2.12	1.96	1.82	1.71	1.45
Roof, ceiling and 3 *storeys*[5]	2 - 38 x 89	0.88	0.83	0.80	0.77	0.74	0.59
	2 - 38 x 140	1.25	1.19	1.14	1.08	1.02	0.81
	2 - 38 x 184	1.52	1.44	1.35	1.27	1.21	0.97
	2 - 38 x 235	1.86	1.73	1.62	1.53	1.45	1.17
	2 - 38 x 286	2.11	1.96	1.84	1.74	1.66	1.35
Column 1	2	3	4	5	6	7	8

Notes to Table A-17:

(1) Spans are calculated based on a maximum supported joist or rafter length of 4.9 m and a maximum supported truss length of 9.8 m. Spans may be increased by 5% for supported lengths not more than 4.3 m, or by 10% for supported lengths not more than 3.7 m. Supported length means half the span of the longest supported member.

(2) If floor joists span the full width of the *building* without support, lintels 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*".

(3) For ends of lintels fully supported by walls, provide minimum 38 mm of bearing for lintel spans up to 3 m, or minimum 76 mm or bearing for lintel spans greater than 3 m.

(4) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(5) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

Table A-18
Maximum Spans for Spruce - Pine - Fir Lintels - No. 1 or No. 2 Grade - Structural Sheathing[1]
Forming Part of Sentences 9.23.12.3.(1) and (3)

Lintel Supporting	Lintel Size, mm [5]	Maximum Span, m[2][3][4]				
		Exterior Walls				
		Specified Snow Load, kPa				
		1.0	1.5	2.0	2.5	3.0
Roof and ceiling only	2 - 38 x 89	1.40	1.23	1.11	1.03	0.97
	2 - 38 x 140	2.21	1.93	1.73	1.57	1.45
	2 - 38 x 184	2.75	2.36	2.10	1.92	1.77
	2 - 38 x 235	3.36	2.89	2.57	2.34	2.16
	2 - 38 x 286	3.90	3.35	2.99	2.72	2.51
Roof, ceiling and 1 *storey*[6]	2 - 38 x 89	1.16	1.08	1.01	0.96	0.92
	2 - 38 x 140	1.74	1.60	1.48	1.39	1.32
	2 - 38 x 184	2.12	1.95	1.81	1.69	1.60
	2 - 38 x 235	2.59	2.38	2.21	2.07	1.93
	2 - 38 x 286	3.01	2.76	2.56	2.38	2.19
Roof, ceiling and 2 *storeys*[6]	2 - 38 x 89	1.09	1.03	0.97	0.92	0.88
	2 - 38 x 140	1.56	1.47	1.39	1.32	1.26
	2 - 38 x 184	1.90	1.79	1.69	1.61	1.51
	2 - 38 x 235	2.33	2.19	2.07	1.94	1.81
	2 - 38 x 286	2.70	2.54	2.37	2.20	2.05
Roof, ceiling and 3 *storeys*[6]	2 - 38 x 89	1.02	0.97	0.93	0.89	0.86
	2 - 38 x 140	1.46	1.39	1.33	1.28	1.23
	2 - 38 x 184	1.78	1.69	1.62	1.54	1.46
	2 - 38 x 235	2.17	2.07	1.96	1.84	1.74
	2 - 38 x 286	2.52	2.38	2.22	2.09	1.98
Column 1	2	3	4	5	6	7

Notes to Table A-18:

(1) A minimum 9.5 mm thick structural panel conforming to CSA O121-M, CSA O151-M, CAN/CSA-O325.0 or CAN/CSA-O437.0 shall be fastened with at least 2 rows of fasteners conforming to Table 9.23.3.5. to the exterior face of the lintel, and a single row to the top plates and studs.

(2) Spans are calculated based on a maximum supported joist or rafter length of 4.9 m and a maximum supported truss length of 9.8 m. Spans may be increased by 5% for supported lengths not more than 4.3 m, or by 10% for supported lengths not more than 3.7 m. Supported length means half the span of the longest supported member.

(3) If roof joists span the full width of the *building* without support, lintels spans shall be reduced by 15% for "Roof, ceiling and one storey", by 20% for "Roof, ceiling and two storeys", and by 25% for "Roof, ceiling and three storeys".

(4) For ends of lintels fully supported by walls, provide minimum 38 mm of bearing for lintel spans up to 3 m, or minimum 76 mm of bearing for lintel spans greater than 3 m.

(5) A single piece of 89 mm thick lumber may be used in lieu of 2 pieces of 38 mm thick lumber on edge.

(6) Spans apply only where the floors serve residential areas as described in Table 4.1.6.3., or the uniformly distributed *live load* on the floor does not exceed that specified for residential areas as described in Table 4.1.6.3.

Table A-19
Maximum Spans for Built-up Lintels - Roof and Ceiling Load Only - No. 1 or No. 2 Grade
Forming Part of Sentences 9.23.12.3.(1) and (3)

Commercial Designation	Lintel Size, mm	Maximum Span, m[1][2] Specified Snow Load, kPa				
		1.0	1.5	2.0	2.5	3.0
Douglas Fir - Larch (includes Douglas Fir and Western larch)	3 - 38 x 184	2.76	2.38	2.12	1.93	1.78
	4 - 38 x 184	3.19	2.74	2.44	2.22	2.05
	5 - 38 x 184	3.57	3.07	2.73	2.49	2.30
	3 - 38 x 235	3.38	2.90	2.59	2.35	2.18
	4 - 38 x 235	3.90	3.35	2.99	2.72	2.51
	5 - 38 x 235	4.36	3.75	3.34	3.04	2.81
	3 - 38 x 286	3.92	3.37	3.00	2.73	2.52
	4 - 38 x 286	4.53	3.89	3.47	3.15	2.91
	5 - 38 x 286	5.06	4.35	3.87	3.53	3.26
Hem - Fir (includes Western Hemlock and Amabilis Fir)	3 - 38 x 184	2.90	2.49	2.22	2.02	1.87
	4 - 38 x 184	3.35	2.88	2.56	2.33	2.15
	5 - 38 x 184	3.73	3.22	2.86	2.61	2.41
	3 - 38 x 235	3.54	3.05	2.71	2.47	2.28
	4 - 38 x 235	4.09	3.52	3.13	2.85	2.63
	5 - 38 x 235	4.57	3.93	3.50	3.19	2.95
	3 - 38 x 286	4.11	3.53	3.15	2.87	2.62
	4 - 38 x 286	4.75	4.08	3.63	3.31	3.06
	5 - 38 x 286	5.31	4.56	4.06	3.70	3.42
Spruce - Pine - Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	3 - 38 x 184	3.00	2.58	2.30	2.09	1.93
	4 - 38 x 184	3.30	2.88	2.62	2.42	2.23
	5 - 38 x 184	3.55	3.10	2.82	2.62	2.46
	3 - 38 x 235	3.67	3.15	2.81	2.56	2.36
	4 - 38 x 235	4.21	3.64	3.24	2.95	2.73
	5 - 38 x 235	4.54	3.96	3.60	3.30	3.05
	3 - 38 x 286	4.26	3.66	3.26	2.97	2.74
	4 - 38 x 286	4.92	4.23	3.76	3.43	3.17
	5 - 38 x 286	5.49	4.73	4.21	3.83	3.54
Column 1	2	3	4	5	6	7

Notes to Table A-19:

(1) Spans are calculated based on a maximum supported length of 4.9 m. Spans may be increased by 15% for supported lengths not more than 3.7 m, or by 35% for supported lengths not more than 2.4 m. Supported length means half span of the trusses, roof joists or rafters supported by the lintel plus the length of the overhang beyond the lintel.

(2) For ends of lintels fully supported by the wall, provide minimum 38 mm of bearing for lintel spans up to 3 m, or minimum 76 mm of bearing for lintel spans greater than 3 m.

Table A-20
Maximum Spans for Glued-Laminated Timber Lintels
20f-E Stress Grade - Exterior Walls - Roof and Ceiling Load Only

Forming part of Sentences 9.23.12.3.(1) and (3)

Lintel Size, mm	Maximum Span, m[1][2][3]														
	Specified Snow Load, kPa														
	1.0			1.5			2.0			2.5			3.0		
	Supported length m[4][5]			Supported length m[4][5]			Supported length m[4][5]			Supported length m[4][5]			Supported length m[4][5]		
	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8	2.4	3.6	4.8
130 x 304	6.23	5.63	5.24	5.63	5.09	4.73	5.24	4.73	4.40	4.95	4.48	4.17	4.73	4.28	3.87
80 x 380	6.52	5.89	5.48	5.89	5.32	4.96	5.48	4.96	4.52	5.19	4.69	4.11	4.96	4.39	3.80
130 x 342	6.80	6.15	5.72	6.15	5.56	5.17	5.72	5.17	4.81	5.41	4.89	4.55	5.17	4.67	4.35
80 x 418	7.00	6.33	5.89	6.33	5.72	5.32	5.89	5.32	4.96	5.57	5.03	4.52	5.32	4.81	4.18
130 x 380	7.36	6.65	6.19	6.65	6.01	5.59	6.19	5.59	5.21	5.86	5.29	4.92	5.59	5.06	4.70
80 x 456	7.48	6.76	6.29	6.76	6.10	5.68	6.29	5.68	5.29	5.95	5.37	4.93	5.68	5.13	4.56
130 x 418	7.91	7.15	6.65	7.15	6.46	6.01	6.65	6.01	5.59	6.29	5.68	5.29	6.01	5.43	5.05
80 x 494	7.94	7.17	6.68	7.17	6.48	6.03	6.68	6.03	5.61	6.31	5.71	5.31	6.03	5.45	4.94
80 x 532	8.39	7.58	7.06	7.58	6.85	6.38	7.06	6.38	5.93	6.67	6.03	5.61	6.38	5.76	5.32
130 x 456	8.44	7.63	7.10	7.63	6.89	6.41	7.10	6.41	5.97	6.71	6.07	5.65	6.41	5.80	5.39
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Notes to Table A-20:

[1] Spans are valid for glued-laminated timber conforming to CAN/CSA-O122-M and CAN/CSA-O177-M.

[2] Provide minimum 89 mm bearing. (Alternatively, the bearing length may be calculated in accordance with Part 4.)

[3] Top edge of lintel assumed to be fully laterally supported.

[4] Supported length means half the length of trusses or rafters, plus the length of overhang beyond the wall.

[5] For intermediate supported lengths, straight line interpolation may be used.