Section 3.1. General

3.1.1. Scope and Definitions

3.1.1.1. Scope

1) The scope of this Part shall be as described in Subsection 1.3.3. of Division A.

3.1.1.2. Defined Words

1) Words that appear in italics are defined in Article 1.4.1.2. of Division A.

3.1.1.3. Use of Term Storage Tank

1) For the purposes of this Part, the term "storage tank" shall mean a vessel for *flammable liquids* or *combustible liquids* having a capacity of more than 230 L and designed to be installed in a fixed location.

3.1.1.4. Fire Protection Information

1) Information to be submitted regarding major components of fire protection shall conform to the requirements of Subsection 2.2.3. of Division C.

3.1.2. Classification of Buildings or Parts of Buildings by Major Occupancy

(See Note A-3.1.2.)

3.1.2.1. Classification of Buildings

1) Except as permitted by Articles 3.1.2.3. to 3.1.2.6., every *building* or part thereof shall be classified according to its *major occupancy* as belonging to one of the Groups or Divisions described in Table 3.1.2.1.
(See Note A-3.1.2.1.(1).)

2) A *building* intended for use by more than one *major occupancy* shall be classified according to all *major occupancies* for which it is used or intended to be used.

Table 3.1.2.1.
Major Occupancy Classification
Forming Part of Sentences 3.1.2.1.(1) and 3.1.2.2.(1)

Group	Division	Description of *Major Occupancies*
A	1	*Assembly occupancies* intended for the production and viewing of the performing arts
A	2	*Assembly occupancies* not elsewhere classified in Group A
A	3	*Assembly occupancies* of the arena type
A	4	*Assembly occupancies* in which occupants are gathered in the open air
B	1	*Detention occupancies*
B	2	*Treatment occupancies*
B	3	*Care occupancies*
C	–	*Residential occupancies*
D	–	*Business and personal services occupancies*
E	–	*Mercantile occupancies*
F	1	*High-hazard industrial occupancies*
F	2	*Medium-hazard industrial occupancies*
F	3	*Low-hazard industrial occupancies*

3.1.2.2. Occupancies of Same Classification

1) Any *building* is deemed to be occupied by a single *major occupancy*, notwithstanding its use for more than one *major occupancy*, provided that all *occupancies* are classified as belonging to the same Group classification or, where the Group is divided into Divisions, as belonging to the same Division classification described in Table 3.1.2.1.

3.1.2.3. Arena-Type Buildings

1) An arena-type *building* intended for occasional use for trade shows and similar exhibition purposes shall be classified as a Group A, Division 3 *occupancy*. (See Note A-3.1.2.3.(1).)

3.1.2.4. Police Stations

1) A police station with detention quarters is permitted to be classified as a Group B, Division 2 *major occupancy* provided the station is not more than 1 *storey* in *building height* and 600 m^2 in *building area*.

3.1.2.5. Convalescent, Children's Custodial, and Residential Care Homes

1) Convalescent homes and children's custodial homes are permitted to be classified as *residential occupancies* within the application of Part 3, provided that occupants are ambulatory and live as a single housekeeping unit in a *suite* with sleeping accommodation for not more than 10 persons.

2) A care facility accepted for residential use pursuant to provincial legislation is permitted to be classified as a *residential occupancy*, provided

a) occupants live as a single housekeeping unit in a *dwelling unit* with sleeping accommodation for not more than 10 persons,

b) *smoke alarms* are installed in conformance with Article 3.2.4.20.,

c) emergency lighting is provided in conformance with Subsection 3.2.7., and

d) the *building* is *sprinklered* throughout.

3.1.2.6. Group A, Division 2, Low Occupant Load

1) A *suite* of Group A, Division 2 *assembly occupancy*, except a child or infant daycare facility, is permitted to be classified as a Group D, *business and personal services occupancy* provided

a) the number of persons in the *suite* does not exceed 30, and

b) except as permitted by Sentence (2), the *suite* is separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 hr.

2) The *fire separation* required by Sentence (1) need not have a *fire-resistance rating* where the *suite* is located in a *building* that is *sprinklered* throughout.

3) A permanent sign, with lettering not less than 50 mm high with a 12 mm stroke, indicating the lesser of the *occupant load* for the *suite* or 30 persons, shall be posted in a conspicuous location near the *suite*'s principal entrance.

3.1.2.7. Storage of Combustible Fibres

1) *Buildings* or parts thereof used for the storage of baled *combustible fibres* shall be classified as *medium-hazard industrial occupancies*.

3.1.2.8. Daycare Facilities for Children

(See Note A-3.1.2.8.)

1) A daycare facility for children shall be classified as a Group A, Division 2 *assembly occupancy*. (See also Article 3.3.2.17.)

3.1.3. Multiple Occupancy Requirements

3.1.3.1. Separation of Major Occupancies

1) Except as permitted by Sentences (2) and (3), *major occupancies* shall be separated from adjoining *major occupancies* by *fire separations* having *fire-resistance ratings* conforming to Table 3.1.3.1.

2) In a *building* not more than 3 *storeys* in *building height*, if not more than 2 *dwelling units* are contained together with a Group E *major occupancy*, the *fire-resistance rating* of the *fire separation* between the 2 *major occupancies* need not be more than 1 h.

3) In a *building* conforming to the requirements of Articles 3.2.8.2. to 3.2.8.8., the requirements of Sentence (1) for *fire separations* between *major occupancies* do not apply at the vertical plane around the perimeter of an opening through the horizontal *fire separation*.

Table 3.1.3.1.
Major Occupancy Fire Separations(1)
Forming Part of Sentence 3.1.3.1.(1)

Major Occupancy	Minimum Fire-Resistance Rating of *Fire Separation*, h												
	Adjoining *Major Occupancy*												
	A-1	A-2	A-3	A-4	B-1	B-2	B-3	C	D	E	F-1	F-2	F-3
A-1	–	1	1	1	2	2	2	1	1	2	(2)	2	1
A-2	1	–	1	1	2	2	2	1(3)	1(4)	2	(2)	2	1
A-3	1	1	–	1	2	2	2	1	1	2	(2)	2	1
A-4	1	1	1	–	2	2	2	1	1	2	(2)	2	1
B-1	2	2	2	2	–	2	2	2	2	2	(2)	2	2
B-2	2	2	2	2	2	–	1	2	2	2	(2)	2	2
B-3	2	2	2	2	2	1	–	1	2	2	(2)	2	2
C	1	1(3)	1	1	2	2	1	–	1	2(5)	(2)	2(6)	1(7)
D	1	1(4)	1	1	2	2	2	1	–	–(8)	3	–(8)	–(8)
E	2	2	2	2	2	2	2	2(5)	–(8)	–	3	–	–
F-1	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	3	3	–	2	2
F-2	2	2	2	2	2	2	2	2(6)	–(8)	–	2	–	–
F-3	1	1	1	1	2	2	2	1(7)	–(8)	–	2	–	–

Notes to Table 3.1.3.1.:

(1) Section 3.3. contains requirements for the separation of *occupancies* and tenancies that are in addition to the requirements for the separation of *major occupancies*.

(2) See Sentence 3.1.3.2.(1).

(3) Where the *building* or part thereof is constructed in accordance with Article 3.2.2.48EMTC. or Article 3.2.2.50., a *fire separation* with a 2 h *fire-resistance rating* is required between the Group C and Group A, Division 2 *major occupancies*.

(4) Where the *building* or part thereof is constructed in accordance with Article 3.2.2.57EMTC. or Article 3.2.2.58., a *fire separation* with a 2 h *fire-resistance rating* is required between the Group D and Group A, Division 2 *major occupancies*.

(5) See Sentence 3.1.3.1.(2).

(6) See Sentence 3.1.3.2.(2).

(7) Where the *building* or part thereof is constructed in accordance with Article 3.2.2.48EMTC, a *fire separation* with a 2 h *fire-resistance rating* is required between the Group C *major occupancy* and *storage garages*.

(8) Where the *building* or part thereof is constructed in accordance with Article 3.2.2.57EMTC., a *fire separation* with a 1 h *fire-resistance rating* is required between the Group D and Group E or Group F, Division 2 or 3 *major occupancies*.

3.1.3.2. Prohibition of Occupancy Combinations

1) No *major occupancy* of Group F, Division 1 shall be contained within a *building* with any *occupancy* classified as Group A, B or C.

2) Not more than one *suite* of *residential occupancy* shall be contained within a *building* classified as a Group F, Division 2 *major occupancy*.

3) Reserved.

4) Reserved.

5) Reserved.

3.1.4. Combustible Construction

3.1.4.1. Combustible Materials Permitted

1) A *building* permitted to be of *combustible construction* is permitted to be constructed of *combustible* materials, with or without *noncombustible* components. (See Note A-3.1.4.1.(1).)

2) The *flame-spread rating* on any exposed surface of foamed plastic insulation, and on any surface that would be exposed by cutting through the insulation in any direction, shall be not more than 500.

3.1.4.2. Protection of Foamed Plastics

(See Note A-3.1.4.2.)

1) Except as permitted in Sentence (2), foamed plastics that form part of a wall or ceiling assembly in *combustible construction* shall be protected from adjacent spaces in the *building*, other than adjacent concealed spaces within *attic or roof spaces*, crawl spaces, and wall and ceiling assemblies,

a) by one of the interior finishes described in Subsections 9.29.4. to 9.29.9.,

b) provided the *building* does not contain a Group A, Group B or Group C *major occupancy*, by sheet metal

i) mechanically fastened to the supporting assembly independent of the insulation,

ii) not less than 0.38 mm thick, and

iii) with a melting point not below 650°C, or

c) by any thermal barrier that meets the requirements of Sentence 3.1.5.15.(2) (see Note A-3.1.4.2.(1)(c)).

(See Note A-3.1.4.2.(1).)

2) A walk-in cooler or freezer consisting of factory-assembled wall, floor or ceiling panels containing foamed plastics is permitted in a *building* permitted to be of *combustible construction*, provided the panels

a) are protected on both sides by sheet metal not less than 0.38 mm thick having a melting point not less than 650°C,

b) do not contain an air space, and

c) when a sample panel with an assembled joint typical of field installation is subjected to the applicable test described in Subsection 3.1.12., have a *flame-spread rating* not more than that permitted for the space in which they are located or the space that they bound, as applicable.

(See Note A-3.1.4.2.(2) and 3.1.5.7.(3).)

3) The *flame-spread rating* of doors containing foamed plastics shall comply with Sentences 3.1.13.2.(1) to (3).

3.1.4.3. Wires and Cables

1) Except as required by Sentence (2), optical fibre cables and electrical wires and cables with *combustible* insulation, jackets or sheathes that are installed in a *building* permitted to be of *combustible construction* shall

a) not convey flame or continue to burn for more than 1 min when tested in conformance with the Vertical Flame Test (FT1 rating) in CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables," or

b) be located in

i) totally enclosed *noncombustible* raceways (see Note A-3.1.4.3.(1)(b)(i)),

ii) masonry walls,

iii) concrete slabs, or

iv) totally enclosed non-metallic raceways conforming to Clause 3.1.5.23.(1)(b).

(See Note A-3.1.4.3.(1).)

(See also Sentence 3.6.4.3.(1).)

2) Except as permitted in Sentences (3) and (4), optical fibre cables and electrical wires and cables with *combustible* insulation, jackets or sheathes that are used for the transmission of voice, sound or data and are installed in a *plenum* in a *building* permitted to be of *combustible construction* shall exhibit the following characteristics when tested in conformance with CAN/ULC-S102.4, "Standard Method of Test for Fire and Smoke Characteristics of Electrical Wiring, Cables and Non-Metallic Raceways," (FT6 rating):

a) a horizontal flame distance of not more than 1.5 m,

b) an average optical smoke density of not more than 0.15, and

c) a peak optical smoke density of not more than 0.5.

3) Except as permitted in Sentence (4), where totally enclosed *noncombustible* raceways are used in a *plenum*, exposed components of wiring systems with *combustible* insulation, jackets or sheathes, including optical fibre cables and electrical wires and cables that are used for the transmission of voice, sound or data, that are installed in the *plenum* or that extend not more than 9 m from the *plenum*, including drop down to the floor level, are permitted, provided they exhibit a vertical char of not more than 1.5 m when tested in conformance with the Vertical Flame Test – Cables in Cable Trays (FT4 rating) in CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables."

4) Cables or wires within *plenums* that are used for the transmission of signals in fire alarm systems need not comply with the requirements of Sentence (2).

3.1.4.4. Non-metallic Raceways

1) Totally enclosed non-metallic raceways used in a *plenum* in a *building* permitted to be of *combustible construction* shall meet the requirements of Clause 3.1.5.23.(1)(a).

3.1.4.5. Fire-Retardant-Treated Wood

1) If *fire-retardant-treated wood* is specified in this Part, the wood shall

a) be pressure impregnated with fire-retardant chemicals in conformance with CAN/CSA-O80 Series, "Wood Preservation," and

b) have a *flame-spread rating* not more than 25.

3.1.4.6. Heavy Timber Construction Alternative

1) If *combustible construction* is permitted and is not required to have a *fire-resistance rating* more than 45 min, *heavy timber construction* is permitted to be used.

2) If *heavy timber construction* is permitted, it shall conform to Article 3.1.4.7.

3.1.4.7. Heavy Timber Construction

1) Wood elements in *heavy timber construction* shall be arranged in heavy solid masses and with essentially smooth flat surfaces to avoid thin sections and sharp projections.

2) Except as permitted by Sentences (3) to (6) and (12), the minimum dimensions of wood elements in *heavy timber construction* shall conform to Table 3.1.4.7.

Table 3.1.4.7.
Heavy Timber Dimensions
Forming Part of Sentence 3.1.4.7.(2)

Supported Assembly	Structural Element	Solid Sawn (width × depth), mm × mm	Glued-Laminated (width × depth), mm × mm	Round (diam), mm
Roofs only	Columns	140 × 191	130 × 190	180
	Arches supported on the tops of walls or abutments	89 × 140	80 × 152	–
	Beams, girders and trusses	89 × 140	80 × 152	–
	Arches supported at or near the floor line	140 × 140	130 × 152	–
Floors, floors plus roofs	Columns	191 × 191	175 × 190	200
	Beams, girders, trusses and arches	140 × 241 or	130 × 228 or	–
		191 × 191	175 × 190	

3) Where splice plates are used at splices of roof arches supported on the tops of walls or abutments, roof trusses, roof beams and roof girders in *heavy timber construction*, they shall be not less than 64 mm thick.

4) Floors in *heavy timber construction* shall be of glued-laminated or solid sawn plank not less than

a) 64 mm thick, splined or tongued and grooved, or

b) 38 mm wide and 89 mm deep set on edge and well spiked together.

5) Floors in *heavy timber construction* shall be laid

a) so that no continuous line of end joints will occur except at points of support, and covered with

i) tongued and grooved flooring not less than 19 mm thick laid crosswise or diagonally, or

ii) tongued and grooved phenolic-bonded plywood, strandboard or waferboard not less than 12.5 mm thick, and

b) not closer than 15 mm to the walls to provide for expansion, with the gap covered at the top or bottom.

6) Roofs in *heavy timber construction* shall be of tongued and grooved phenolic-bonded plywood, strandboard or waferboard not less than 28 mm thick, or glued-laminated or solid sawn plank that is

a) not less than 38 mm thick, splined or tongued and grooved, or

b) not less than 38 mm wide and 64 mm deep set on edge and laid so that no continuous line of end joints will occur except at the points of support.

7) Wood columns in *heavy timber construction* shall be continuous or superimposed throughout all *storeys*.

8) Superimposed wood columns in *heavy timber construction* shall be connected by

a) reinforced concrete or metal caps with brackets,

b) steel or iron caps with pintles and base plates, or

c) timber splice plates fastened to the columns by metal connectors housed within the contact faces.

9) Where beams and girders in *heavy timber construction* enter masonry, wall plates, boxes of the self-releasing type or hangers shall be used.

10) Wood girders and beams in *heavy timber construction* shall be closely fitted to columns, and adjoining ends shall be connected by ties or caps to transfer horizontal loads across the joints.

11) In *heavy timber construction*, intermediate wood beams used to support a floor shall be supported on top of the girders or on metal hangers into which the ends of the beams are closely fitted.

12) Roof arches supported on the top of walls or abutments, roof trusses, roof beams and roof girders in *heavy timber construction* are permitted to be not less than 64 mm wide provided

a) where two or more spaced members are used, the intervening spaces are

i) blocked solidly throughout, or

ii) tightly closed by a continuous wood cover plate not less than 38 mm thick secured to the underside of the members, or

b) the underneath of the roof deck or sheathing is *sprinklered*.

3.1.4.8. Exterior Cladding

1) The exterior cladding on each exterior wall of *buildings* conforming to Article 3.2.2.50. or 3.2.2.58. shall consist of

a) *noncombustible* cladding, or

b) a wall assembly that satisfies the criteria of Clause 3.1.5.5.(1)(b).

(See Note A-3.1.4.8.(1).) (See also Notes A-3.1.5.5.(1)(b)(i) and A-3.1.5.5.(1)(b)(ii).)

2) A wall assembly conforming to Clause (1)(b) that includes *combustible* cladding made of *fire-retardant-treated wood* shall be tested for fire exposure after the cladding has been subjected to the accelerated weathering test specified in ASTM D 2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing."

3) The solution described in Clause (1)(b) is not permitted where an *exposing building face* is required by Article 3.2.3.7. to have *noncombustible* cladding.

3.1.5. Noncombustible Construction

3.1.5.1. Noncombustible Materials

(See Note A-3.1.4.1.(1).)

1) Except as permitted by Sentences (2) to (4) and Articles 3.1.5.2. to 3.1.5.24., 3.1.13.4. and 3.2.2.16., a *building* or part of a *building* required to be of *noncombustible construction* shall be constructed with *noncombustible* materials. (See also Subsection 3.1.13. for the requirements regarding the *flame-spread rating* of interior finishes.)

2) Notwithstanding the definition of *noncombustible* materials stated in Article 1.4.1.2. of Division A, a material is permitted to be used in *noncombustible construction* provided that, when tested in accordance with ULC-S135, "Test Method for the Determination of Combustibility Parameters of Building Materials Using an Oxygen Consumption Calorimeter (Cone Calorimeter)," at a heat flux of 50 kW/m^2,

a) its average total heat release is not more than 3 MJ/m^2,

b) its average total smoke extinction area is not more than 1.0 m^2, and

c) the test duration is extended beyond the time stipulated in the referenced standard until it is clear that there is no further release of heat or smoke.

3) If a material referred to in Sentence (2) consists of a number of discrete layers and testing reveals that the surface layer or layers protect the underlying layers such that complete combustion of the underlying layers does not occur, the test shall be repeated by removing the outer layers sequentially until all layers have been exposed during testing, or until complete combustion has occurred.

4) The acceptance criteria for a material tested in accordance with Sentence (3) shall be based on the cumulative emissions from all layers, which must not exceed the criteria stated in Clauses (2)(a) and (b).

3.1.5.2. Minor Combustible Components

1) The following minor *combustible* components are permitted in a *building* required to be of *noncombustible construction*:

a) paint (see also Clause 3.1.13.1.(2)(b)),

b) self-adhesive tapes, mastics and caulking materials, including foamed plastic air sealants, applied to provide a seal between the major components of exterior wall construction, (see also Article 3.6.4.3. for limits on the use of *combustible* materials in *plenum* spaces),

c) *fire stops* and *fire blocks* conforming to Sentence 3.1.9.1.(1) and Article 3.1.11.7.,

d) tubing for pneumatic controls provided it has an outside diameter of not more than 10 mm,

e) adhesives, *vapour barriers* and sheathing papers,

f) electrical outlet and junction boxes,

g) wood blocking within wall assemblies intended for the attachment of handrails, fixtures, and similar items mounted on the surface of the wall, and

h) similar minor components.

3.1.5.3. Combustible Roofing Materials

1) *Combustible* roof covering that has an A, B, or C classification determined in conformance with Subsection 3.1.15. is permitted on a *building* required to be of *noncombustible construction*.

2) *Combustible* roof sheathing and roof sheathing supports installed above a concrete deck are permitted on a *building* required to be of *noncombustible construction* provided

a) the concrete deck is not less than 50 mm thick,

b) the height of the roof space above the deck is not more than 1 m,

c) the roof space is divided into compartments by *fire blocks* in conformance with Article 3.1.11.5.,

d) openings through the concrete deck other than for *noncombustible* roof drains and plumbing piping are protected by masonry or concrete shafts

   i) constructed as *fire separations* having a *fire-resistance rating* not less than 1 h, and

   ii) extending from the concrete deck to not less than 150 mm above the adjacent roof sheathing,

e) the perimeter of the roof is protected by a *noncombustible* parapet extending from the concrete deck to not less than 150 mm above the adjacent sheathing, and

f) except as permitted by Clause (d), the roof space does not contain any *building* services.

3) *Combustible* cant strips, roof curbs, nailing strips and similar components used in the installation of roofing are permitted on a *building* required to be of *noncombustible construction*.

4) Wood nailer facings to parapets, not more than 600 mm high, are permitted on a *building* required to be of *noncombustible construction*, if the facings and any roof membranes covering the facings are protected by sheet metal.

3.1.5.4. Combustible Glazing and Skylights

1) *Combustible* skylight assemblies are permitted in a *building* required to be of *noncombustible construction* if the assemblies have a *flame-spread rating* not more than

a) 150 provided the assemblies

   i) have an individual area not more than 9 m^2,

   ii) have an aggregate horizontal projected area of the openings through the ceiling not more than 25% of the area of the ceiling of the room or space in which they are located, and

   iii) are spaced not less than 2.5 m from adjacent assemblies and from required *fire separations*, or

b) 75 provided the assemblies

   i) have an individual area not more than 27 m^2,

   ii) have an aggregate horizontal projected area of the openings through the ceiling not more than 33% of the area of the ceiling of the room or space in which they are located, and

   iii) are spaced not less than 1.2 m from adjacent assemblies and from required *fire separations*.

(See Note A-3.1.5.4.(1).)

2) *Combustible* vertical glazing installed no higher than the second *storey* is permitted in a *building* required to be of *noncombustible construction*.

3) Except as permitted by Sentence (4), the combustible vertical glazing permitted by Sentence (2) shall have a *flame-spread rating* not more than 75.

4) The *flame-spread rating* of combustible glazing is permitted to be not more than 150 if the aggregate area of glazing is not more than 25% of the wall area of the *storey* in which it is located, and

a) the glazing is installed in a *building* not more than 1 *storey* in *building height*,

b) the glazing in the *first storey* is separated from the glazing in the second *storey* in accordance with the requirements of Article 3.2.3.17. for opening protection, or

c) the *building* is *sprinklered* throughout.

5) *Combustible* window sashes and frames are permitted in a *building* required to be of *noncombustible construction* provided

a) each window in an exterior wall face is an individual unit separated by *noncombustible* wall construction from every other opening in the wall,

b) windows in exterior walls in contiguous *storeys* are separated by not less than 1 m of *noncombustible construction*, and

c) the aggregate area of openings in an exterior wall face of a *fire compartment* is not more than 40% of the area of the wall face.

3.1.5.5. Combustible Cladding on Exterior Walls

(See Note A-3.1.5.5.)

1) Except as provided in Sentences (2) and (3), *combustible* cladding is permitted to be used on an exterior wall assembly in a *building* required to be of *noncombustible construction*, provided

a) the *building* is

i) not more than 3 *storeys* in *building height*, or

ii) *sprinklered* throughout, and

b) when tested in accordance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies," the wall assembly satisfies the following criteria for testing and conditions of acceptance (see Note A-3.1.5.5.(1)(b)):

i) flaming on or in the wall assembly does not spread more than 5 m above the opening (see Note A-3.1.5.5.(1)(b)(i)), and

ii) the heat flux during the flame exposure on the wall assembly is not more than 35 kW/m^2 measured at 3.5 m above the opening (see Note A-3.1.5.5.(1)(b)(ii)).

2) Except as permitted by Articles 3.2.3.10. and 3.2.3.11., where the *limiting distance* in Tables 3.2.3.1.-B to 3.2.3.1.-E permits an area of *unprotected openings* of not more than 10% of the *exposing building face*, the construction requirements of Table 3.2.3.7. shall be met.

3) A wall assembly permitted by Sentence (1) that includes *combustible* cladding of *fire-retardant-treated wood* shall be tested for fire exposure after the cladding has been subjected to an accelerated weathering test as specified in ASTM D 2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing."

3.1.5.6. Combustible Components in Exterior Walls

(See Note A-3.1.5.6.)

1) *Combustible* components, other than those permitted by Article 3.1.5.5., are permitted to be used in an exterior wall assembly of a *building* required to be of *noncombustible construction*, provided

a) the *building* is

i) not more than 3 *storeys* in *building height*, or

ii) *sprinklered* throughout, and

b) the wall assembly

i) meets the requirements of Clause 3.1.5.5.(1)(b), or

ii) is protected by masonry or concrete cladding not less than 25 mm thick (see Note A-3.1.5.5.(1)(b)).

3.1.5.7. Factory-Assembled Panels

1) Except as provided in Sentence (2), factory-assembled wall and ceiling panels containing foamed plastic insulation with a *flame-spread rating* not more than 500 are permitted to be used in a *building* required to be of *noncombustible construction*, provided

a) the *building*

i) is *sprinklered*,

ii) is not more than 18 m high, measured from *grade* to the underside of the roof, and

iii) does not contain a Group A, Group B, or Group C *major occupancy*, and

b) the panels

i) do not contain an air space,

ii) when tested in accordance with CAN/ULC-S138, "Test for Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration," meet the criteria defined therein, and

iii) when a sample panel with an assembled joint typical of field installation is subjected to the applicable test described in Subsection 3.1.12., have a *flame-spread rating* not more than that permitted for the room or space that they bound.

2) Factory-assembled exterior wall panels containing thermosetting foamed plastic insulation are permitted to be used in a *building* required to be of *noncombustible construction*, provided

a) the *building*

i) is not more than 18 m high, measured from *grade* to the underside of the roof, and

ii) does not contain a Group B or Group C *major occupancy*, and

b) the wall panels

i) do not contain an air space,

ii) are protected on both sides by sheet steel not less than 0.38 mm thick,

iii) remain in place for not less than 10 min when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," where the exposed surface includes typical vertical and horizontal joints, and

iv) when a sample panel with an assembled joint typical of field installation is subjected to the applicable test described in Subsection 3.1.12., have a *flame-spread rating* not more than that permitted for the room or space that they bound.

3) A walk-in cooler or freezer consisting of factory-assembled wall, floor or ceiling panels containing foamed plastic insulation with a *flame-spread rating* not more than 500 is permitted to be used in a *building* required to be of *noncombustible construction*, provided

a) the *building* is *sprinklered*, and

b) the panels

i) are protected on both sides by sheet metal not less than 0.38 mm thick with a melting point not less than 650°C,

ii) do not contain an air space,

iii) when tested in accordance with CAN/ULC-S138, "Test for Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration," meet the criteria defined therein, and

iv) when a sample panel with an assembled joint typical of field installation is subjected to the applicable test described in Subsection 3.1.12., have a *flame-spread rating* not more than that permitted for the space in which they are located or the space that they bound, as applicable.

(See Note A-3.1.4.2.(2) and 3.1.5.7.(3).)

3.1.5.8. Nailing Elements

1) Wood nailing elements attached directly to or set into a continuous *noncombustible* backing for the attachment of interior finishes are permitted in a *building* required to be of *noncombustible construction* provided the concealed space created by the wood elements is not more than 50 mm thick.

3.1.5.9. Combustible Millwork

1) *Combustible* millwork, including interior trim, doors and door frames, show windows together with their frames, aprons and backing, handrails, shelves, cabinets and counters, is permitted in a *building* required to be of *noncombustible construction*.

3.1.5.10. Combustible Flooring Elements

1) *Combustible stage* flooring supported on *noncombustible* structural members is permitted in a *building* required to be of *noncombustible construction*.

2) Wood members more than 50 mm but not more than 300 mm high applied directly to or set into a *noncombustible* floor slab are permitted for the construction of a raised platform in a *building* required to be of *noncombustible construction* provided the concealed spaces created are divided into compartments by *fire blocks* in conformance with Sentence 3.1.11.3.(2).

3) The floor system for the raised platform referred to in Sentence (2) is permitted to include a *combustible* subfloor and *combustible* finished flooring.

4) *Combustible* finished flooring is permitted in a *building* required to be of *noncombustible construction*.

3.1.5.11. Combustible Stairs in Dwelling Units

1) *Combustible* stairs are permitted in a *dwelling unit* in a *building* required to be of *noncombustible construction*.

3.1.5.12. Combustible Interior Finishes

1) Except as permitted in Sentences (2) and (3), *combustible* interior wall and ceiling finishes referred to in Clause 3.1.13.1.(2)(b) that are not more than 1 mm thick are permitted in a *building* required to be of *noncombustible construction*.

2) *Combustible* interior wall finishes, other than foamed plastics, that are not more than 25 mm thick are permitted in a *building* required to be of *noncombustible construction*, provided they have a *flame-spread rating* not more than 150 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction.

3) Except as provided in Sentence (4), *combustible* interior ceiling finishes, other than foamed plastics, that are not more than 25 mm thick are permitted in a *building* required to be of *noncombustible construction*, provided they have a *flame-spread rating* not more than 25 on any exposed surface or on any surface that would be exposed by cutting through the material in any direction, except that not more than 10% of the ceiling area within each *fire compartment* is permitted to have a *flame-spread rating* not more than 150.

4) *Combustible* interior ceiling finishes made of *fire-retardant-treated wood* are permitted in a *building* required to be of *noncombustible construction*, provided they are not more than 25 mm thick or are exposed *fire-retardant-treated wood* battens.

3.1.5.13. Gypsum Board

1) Gypsum board with a tightly adhering paper covering not more than 1 mm thick is permitted in a *building* required to be of *noncombustible construction* provided the *flame-spread rating* on the surface is not more than 25.

3.1.5.14. Combustible Insulation

(See Notes A-3.1.4.2. and A-3.1.4.2.(1).)

1) Foamed plastic insulation shall conform to Article 3.1.5.15.

2) *Combustible* insulation with a *flame-spread rating* not more than 25 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in a *building* required to be of *noncombustible construction*.

3) *Combustible* insulation is permitted to be installed above roof decks, outside of *foundation* walls below ground level, and beneath concrete slabs-on-ground of *buildings* required to be of *noncombustible construction*.

4) Except as provided in Sentences (5) and (6), *combustible* insulation with a *flame-spread rating* more than 25 but not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in a *building* required to be of *noncombustible construction*, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier consisting of

a) not less than 12.7 mm thick gypsum board mechanically fastened to a supporting assembly independent of the insulation,

b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,

c) masonry, or

d) concrete.

5) *Combustible* insulation with a *flame-spread rating* more than 25 but not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in the exterior walls of a *building* required to be of *noncombustible construction* that is not *sprinklered* and is more than 18 m high, measured from *grade* to the underside of the roof, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier consisting of

a) gypsum board not less than 12.7 mm thick, mechanically fastened to a supporting assembly independent of the insulation and with all joints either backed or taped and filled,

b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,

c) masonry or concrete not less than 25 mm thick, or

d) any thermal barrier that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," will not develop an average temperature rise more than 140°C or a maximum temperature rise more than 180°C at any point on its unexposed face within 10 min (see Note A-3.1.5.14.(5)(d)) (see also Article 3.2.3.7.).

6) *Combustible* insulation with a *flame-spread rating* more than 25 but not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in the interior walls, within ceilings and within roof assemblies of a *building* required to be of *noncombustible construction* that is not *sprinklered* and is more than 18 m high, measured from *grade* to the underside of the roof, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier consisting of

a) Type X gypsum board not less than 15.9 mm thick, mechanically fastened to a supporting assembly independent of the insulation and with all joints either backed or taped and filled, conforming to

i) ASTM C 1177/C 1177M, "Glass Mat Gypsum Substrate for Use as Sheathing,"

ii) ASTM C 1178/C 1178M, "Coated Glass Mat Water-Resistant Gypsum Backing Panel,"

iii) ASTM C 1396/C 1396M, "Gypsum Board,"

iv) ASTM C 1658/C 1658M, "Glass Mat Gypsum Panels," or

v) CAN/CSA-A82.27-M, "Gypsum Board,"

b) non-*loadbearing* masonry or concrete not less than 50 mm thick,

c) *loadbearing* masonry or concrete not less than 75 mm thick, or

d) any thermal barrier that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials,"

i) does not develop an average temperature rise more than 140°C or a maximum temperature rise more than 180°C at any point on its unexposed face within 20 min, and

ii) remains in place for not less than 40 min.

3.1.5.15. Foamed Plastic Insulation

(See Notes A-3.1.4.2. and A-3.1.4.2.(1).)

1) Foamed plastic insulation is permitted to be installed above roof decks, outside of *foundation* walls below ground level, and beneath concrete slabs-on-ground of a *building* required to be of *noncombustible construction*.

2) Except as provided in Sentences (3) and (4), foamed plastic insulation with a *flame-spread rating* not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in a *building* required to be of *noncombustible construction*, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier consisting of

a) not less than 12.7 mm thick gypsum board mechanically fastened to a supporting assembly independent of the insulation,

b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,

c) masonry,

d) concrete, or

e) any thermal barrier that meets the requirements of classification B when tested in conformance with CAN/ULC-S124, "Test for the Evaluation of Protective Coverings for Foamed Plastic."

3) Foamed plastic insulation with a *flame-spread rating* more than 25 but not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in the exterior walls of a *building* required to be of *noncombustible construction* that is not *sprinklered* and is more than 18 m high, measured from *grade* to the underside of the roof, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier consisting of

a) gypsum board not less than 12.7 mm thick, mechanically fastened to a supporting assembly independent of the insulation and with all joints either backed or taped and filled,

b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,

c) masonry or concrete not less than 25 mm thick, or

d) any thermal barrier that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," does not develop an average temperature rise more than 140°C or a maximum temperature rise more than 180°C at any point on its unexposed face within 10 min (see Note A-3.1.5.14.(5)(d)) (see also Article 3.2.3.7.).

4) Foamed plastic insulation with a *flame-spread rating* more than 25 but not more than 500 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, is permitted in the interior walls, within ceilings and within roof assemblies of a *building* required to be of *noncombustible construction* that is not *sprinklered* and is more than 18 m high, measured from *grade* to the underside of the roof, provided the insulation is protected from adjacent space in the *building*, other than adjacent concealed spaces within wall assemblies, by a thermal barrier consisting of

a) Type X gypsum board not less than 15.9 mm thick, mechanically fastened to a supporting assembly independent of the insulation and with all joints either backed or taped and filled, conforming to

   i) ASTM C 1177/C 1177M, "Glass Mat Gypsum Substrate for Use as Sheathing,"

   ii) ASTM C 1178/C 1178M, "Coated Glass Mat Water-Resistant Gypsum Backing Panel,"

   iii) ASTM C 1396/C 1396M, "Gypsum Board," or

   iv) CAN/CSA-A82.27-M, "Gypsum Board,"

b) non-*loadbearing* masonry or concrete not less than 50 mm thick,

c) *loadbearing* masonry or concrete not less than 75 mm thick, or

d) any thermal barrier that, when tested in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials,"

   i) does not develop an average temperature rise more than 140°C or a maximum temperature rise more than 180°C at any point on its unexposed face within 20 min, and

   ii) remains in place for not less than 40 min.

3.1.5.16. Combustible Elements in Partitions

1) Except as permitted by Sentence (2), solid lumber *partitions* not less than 38 mm thick and wood framing in *partitions* located in a *fire compartment* not more than 600 m^2 in area are permitted to be used in a *building* required to be of *noncombustible construction* in a *floor area* that is not *sprinklered* throughout provided the *partitions*

a) are not required *fire separations*, and

b) are not located in a *care*, *treatment* or *detention occupancy*.

2) *Partitions* installed in a *building* of *noncombustible construction* are permitted to contain wood framing provided

a) the *building* is not more than 3 *storeys* in *building height*,

b) the *partitions* are not located in a *care*, *treatment* or *detention occupancy*, and

c) the *partitions* are not installed as enclosures for *exits* or *vertical service spaces*.

3) Solid lumber *partitions* not less than 38 mm thick and *partitions* that contain wood framing are permitted to be used in a *building* required to be of *noncombustible construction* provided

a) the *building* is *sprinklered* throughout, and

b) the *partitions* are not

i) located in a *care*, *treatment* or *detention occupancy*,

ii) installed as enclosures for *exits* or *vertical service spaces*, or

iii) used to satisfy the requirements of Clause 3.2.8.1.(1)(a).

3.1.5.17. Storage Lockers in Residential Buildings

1) Storage lockers in storage rooms are permitted to be constructed of wood in a *building* of *residential occupancy* required to be of *noncombustible construction*.

3.1.5.18. Combustible Ducts

1) Except as required by Sentence 3.6.4.3.(1), *combustible* ducts, including *plenums* and duct connectors, are permitted to be used in a *building* required to be of *noncombustible construction* provided these ducts and duct connectors are used only in horizontal runs.

2) *Combustible* duct linings, duct coverings, duct insulation, vibration isolation connectors, duct tape, pipe insulation and pipe coverings are permitted to be used in a *building* required to be of *noncombustible construction* provided they conform to the appropriate requirements of Subsection 3.6.5.

3) In a *building* required to be of *noncombustible construction*, *combustible* ducts need not comply with the requirements of Sentences 3.6.5.1.(1) and (2) provided the ducts are

a) part of a duct system conveying only ventilation air, and

b) contained entirely within a *dwelling unit*.

3.1.5.19. Combustible Piping Materials

1) Except as permitted by Clause 3.1.5.2.(1)(d) and Sentences (2) and (3), *combustible* piping and tubing and associated adhesives are permitted to be used in a *building* required to be of *noncombustible construction* provided that, except when concealed in a wall or concrete floor slab, they

a) have a *flame-spread rating* not more than 25, and

b) if used in a *building* described in Subsection 3.2.6., have a smoke developed classification not more than 50.

2) *Combustible* sprinkler piping is permitted to be used within a *sprinklered floor area* in a *building* required to be of *noncombustible construction*. (See also Article 3.2.5.13.)

3) Polypropylene pipes and fittings are permitted to be used for drain, waste and vent piping for the conveyance of highly corrosive materials and for piping used to distribute distilled or dialyzed water in laboratory and hospital facilities in a *building* required to be of *noncombustible construction*, provided

a) the *building* is *sprinklered* throughout,

b) the piping is not located in a vertical shaft, and

c) piping that penetrates a *fire separation* is sealed at the penetration by a *fire stop* that has an FT rating not less than the *fire-resistance rating* of the *fire separation* when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side.

3.1.5.20. Combustible Plumbing Fixtures

1) *Combustible* plumbing fixtures, including wall and ceiling enclosures that form part of the plumbing fixture, are permitted in a *building* required to be of *noncombustible construction* provided they are constructed of material having a *flame-spread rating* and smoke developed classification not more than that permitted for the wall surface of the room or space in which they are installed.

3.1.5.21. Wires and Cables

1) Except as required by Sentence (2) and Article 3.1.5.22., optical fibre cables and electrical wires and cables with *combustible* insulation, jackets or sheathes are permitted in a *building* required to be of *noncombustible construction*, provided

a) the wires and cables exhibit a vertical char of not more than 1.5 m when tested in conformance with the Vertical Flame Test – Cables in Cable Trays (FT4 rating) in CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables,"

b) the wires and cables are located in

i) totally enclosed *noncombustible* raceways (see Note A-3.1.4.3.(1)(b)(i)),

ii) masonry walls,

iii) concrete slabs,

iv) a *service room* separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h, or

v) totally enclosed non-metallic raceways conforming to Clause 3.1.5.23.(1)(b), or

c) the wires and cables are communication cables used at the service entry to a *building* and are not more than 3 m long.

(See Note A-3.1.5.21.(1).)

2) Except as permitted in Sentences (3) and (4), optical fibre cables and electrical wires and cables with *combustible* insulation, jackets or sheathes that are used for the transmission of voice, sound or data and are not located in totally enclosed *noncombustible* raceways are permitted to be installed in a *plenum* in a *building* required to be of *noncombustible construction*, provided the wires and cables exhibit a horizontal flame distance of not more than 1.5 m, an average optical smoke density of not more than 0.15, and a peak optical smoke density of not more than 0.5 when tested in conformance with CAN/ULC-S102.4, "Standard Method of Test for Fire and Smoke Characteristics of Electrical Wiring, Cables and Non-Metallic Raceways," (FT6 rating).

3) Except as permitted in Sentence (4), where totally enclosed *noncombustible* raceways are used in a *plenum*, exposed components of wiring systems with *combustible* insulation, jackets or sheathes, including optical fibre cables and electrical wires and cables that are used for the transmission of voice, sound or data, that are installed in the *plenum* or that extend not more than 9 m from the *plenum* including drop down to the floor level, are permitted provided they exhibit a vertical char of not more than 1.5 m when tested in conformance with the Vertical Flame Test – Cables in Cable Trays (FT4 rating) in CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables."

4) Cables or wires within *plenums* that are used for the transmission of signals in fire alarm systems need not comply with the requirements of Sentences (2) and (3).

3.1.5.22. Combustible Travelling Cables for Elevators

1) *Combustible* travelling cables are permitted on elevating devices in a *building* required to be of *noncombustible construction*.

3.1.5.23. Non-metallic Raceways

1) Except as required in Sentence (2), subject to the limits on the size of elements that penetrate *fire separations* as stated in Sentence 3.1.9.3.(2), within a *fire compartment* of a *building* required to be of *noncombustible construction*, totally enclosed non-metallic raceways not more than 175 mm in outside diameter, or of an equivalent rectangular area, are permitted to be used to enclose optical fibre cables and electrical wires and cables, provided

a) where the wires and cables in the raceways meet or exceed the requirements of Clause 3.1.5.21.(1)(a), the non-metallic raceways meet the requirements for at least an FT4 rating in

   i) CAN/CSA-C22.2 No. 262, "Optical Fiber Cable and Communication Cable Raceway Systems," or

   ii) CAN/ULC-S143, "Fire Tests for Non-Metallic Electrical and Optical Fibre Cable Raceway Systems," and

b) where the wires and cables in the raceways do not meet or exceed the requirements of Clause 3.1.5.21.(1)(a), the non-metallic raceways exhibit a vertical char of not more than 1.5 m when tested in conformance with the Vertical Flame Test (FT4) – Conduit or Tubing on Cable Tray in Clause 6.16 of CSA C22.2 No. 211.0, "General Requirements and Methods of Testing for Nonmetallic Conduit."

2) Totally enclosed non-metallic raceways used in a *plenum* in a *building* required to be of *noncombustible construction* shall exhibit a horizontal flame distance of not more than 1.5 m, an average optical smoke density of not more than 0.15, and a peak optical smoke density of not more than 0.5 when tested in conformance with CAN/ULC-S102.4, "Standard Method of Test for Fire and Smoke Characteristics of Electrical Wiring, Cables and Non-Metallic Raceways," (FT6 rating).

3.1.5.24. Decorative Wood Cladding

1) On *buildings* required to be of *noncombustible construction*, decorative wood cladding is permitted to be used on the exterior fascias and soffits of marquees or canopies on the *building* face of a *storey* having direct access to a *street* or access route, provided the wood cladding is *fire-retardant-treated wood* that has been conditioned in conformance with ASTM D 2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing," before being tested in accordance with CAN/ULC-S102, "Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies."

3.1.6. Tents and Air-Supported Structures

(See Note A-3.1.6.)

3.1.6.1. Means of Egress

1) Tents and *air-supported structures* shall conform to Sections 3.3. and 3.4.

3.1.6.2. Restrictions

1) An *air-supported structure* shall not be located above the *first storey* on any *building*.

2) An *air-supported structure* shall not be used for Groups B, C, or Group F, Division 1 *major occupancies* or for classrooms.

3) An *air-supported structure* shall be designed as open floor space without interior walls, *mezzanines*, intermediate floors or similar construction.

3.1.6.3. Clearance to Other Structures

1) Except as permitted by Sentences (2), (3) and (4), every tent and *air-supported structure* shall conform to Subsection 3.2.3.

2) Tents and *air-supported structures*

a) shall not be erected closer than 3 m to other structures on the same property except as permitted by Sentences (3) and (4), and

b) shall be sufficiently distant from one another to provide an area to be used as a means of emergency egress.

3) Tents and *air-supported structures* not occupied by the public

a) need not be separated from one another, and

b) are permitted to be erected less than 3 m from other structures on the same property provided this spacing does not create a hazard to the public.

4) Tents not more than 120 m^2 in ground area, located on fair grounds or similar open spaces, need not be separated from one another provided this does not create a hazard to the public.

3.1.6.4. Clearance to Flammable Material

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

3.1.6.5. Flame Resistance

1) Every tent and *air-supported structure* and all tarpaulins and decorative materials used in connection with these structures shall conform to CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films."

3.1.6.6. Emergency Air Supply

1) An *air-supported structure* used as a place of assembly for more than 200 persons shall have either

a) an automatic emergency engine-generator set capable of powering one blower continuously for 4 h, or

b) a supplementary blower powered by an automatic internal combustion engine.

3.1.6.7. Electrical Systems

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

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

3.1.7. Fire-Resistance Ratings

3.1.7.1. Determination of Ratings

1) Except as permitted by Sentence (2) and Articles 3.1.7.2. and 3.6.3.5., the rating of a material, assembly of materials or a structural member that is required to have a *fire-resistance rating*, shall be determined on the basis of the results of tests conducted in conformance with CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

2) A material, assembly of materials or a structural member is permitted to be assigned a *fire-resistance rating* on the basis of Appendix D.

3) A ceiling assembly is permitted to be assigned a *fire-resistance rating* on the basis of Assembly Number R1 in Table A-9.10.3.1.-B.

4) A ceiling membrane is permitted to be assigned a *fire-resistance rating* on the basis of Assembly Number M1 or M2 in Table A-9.10.3.1.-B.

3.1.7.2. Exception for Exterior Walls

1) The limit on the rise of temperature on the unexposed surface of an assembly as required by the tests referred to in Sentence 3.1.7.1.(1) shall not apply to an exterior wall that has a *limiting distance* of 1.2 m or more, provided correction is made for radiation from the unexposed surface in accordance with Sentence 3.2.3.1.(9).

3.1.7.3. Exposure Conditions for Rating

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

2) *Firewalls* and interior vertical *fire separations* shall be rated for exposure to fire on each side.

3) Exterior walls shall be rated for exposure to fire from inside the *building*.

3.1.7.4. Minimum Fire-Resistance Rating

1) The use of materials or assemblies having a greater *fire-resistance rating* than required shall impose no obligation to exceed in whole or in part the minimum *fire-resistance ratings* required by this Part.

3.1.7.5. Rating of Supporting Construction

1) Except as permitted by Sentence (2) and by Articles 3.2.2.20. to 3.2.2.90. for mixed types of construction, all *loadbearing* walls, columns and arches in the *storey* immediately below a floor or roof assembly required to have a *fire-resistance rating* shall have a *fire-resistance rating* not less than that required for the supported floor or roof assembly.

2) *Loadbearing* walls, columns and arches supporting a *service room* or *service space* need not conform to Sentence (1).

3) Except as provided in Sentence (4) and except for *noncombustible* roof assemblies required by Clauses 3.2.2.50.(2)(c) and 3.2.2.58.(2)(c), if an assembly is required to be of *noncombustible construction* and have a *fire-resistance rating*, it shall be supported by *noncombustible construction*.

4) Except for portions of *buildings* constructed in accordance with Article 3.2.2.7. that are required to be of *noncombustible construction*, assemblies of *noncombustible construction* in *buildings* or portions of *buildings* permitted to be of *encapsulated mass timber construction* are permitted to be supported by *encapsulated mass timber construction*.

3.1.8. Fire Separations and Closures

3.1.8.1. General Requirements

1) Any wall, *partition* or floor assembly required to be a *fire separation* shall

a) except as permitted by Sentence (2), be constructed as a continuous element, and

b) as required in this Part, have a *fire-resistance rating* as specified (see Note A-3.1.8.1.(1)(b)).

2) Openings in a *fire separation* shall be protected with *closures*, shafts or other means in conformance with Articles 3.1.8.4. to 3.1.8.19. and Subsections 3.1.9. and 3.2.8. (See Note A-3.1.8.1.(2).)

3.1.8.2. Combustible Construction Support

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

3.1.8.3. Continuity of Fire Separations

1) Except as permitted by Sentence 3.6.4.2.(2), a *horizontal service space* or other concealed space located above a required vertical *fire separation*, including the walls of a vertical shaft, shall be divided at the *fire separation* by an equivalent *fire separation* within the *service space*.

2) The *fire separation* required by Sentence (1) shall terminate so that smoke-tight joints are provided where it abuts on or intersects

a) a floor,

b) a roof slab, or

c) a roof deck.

3) Except as required by Subsection 3.6.3. for a shaft penetrating a roof assembly, a shaft, including an *exit* enclosure, that penetrates a *fire separation*, shall

a) extend through any *horizontal service space* or any other concealed space, and

b) terminate so that smoke-tight joints are provided where the shaft abuts on or intersects

i) a floor,

ii) a roof slab, or

iii) a roof deck.

4) The continuity of a *fire separation* shall be maintained where it abuts another *fire separation*, a floor, a ceiling, a roof, or an exterior wall assembly. (See Note A-3.1.8.3.(4).)

3.1.8.4. Determination of Ratings and Classifications

1) Except as permitted by Sentences (2) and 3.1.8.16.(1), the *fire-protection rating* of a *closure* shall be determined in accordance with

a) CAN/ULC-S104, "Fire Tests of Door Assemblies,"

b) CAN4-S106-M, "Fire Tests of Window and Glass Block Assemblies," or

c) CAN/ULC-S112, "Fire Test of Fire Damper Assemblies."

(See Articles 3.1.8.17. to 3.1.8.19. for additional requirements for *closures*.)

2) Except as permitted by Sentence 3.1.8.12.(1), the *fire-protection rating* of a *closure* shall conform to Table 3.1.8.4. for the required *fire-resistance rating* of the *fire separation*.

3) The leakage rate of smoke dampers and combination smoke/*fire dampers* shall

a) be determined in accordance with the applicable provisions in CAN/ULC-S112.1, "Leakage Rated Dampers for Use in Smoke Control Systems," and

b) conform to Class I, II or III of that standard.

4) The leakage rate of a door assembly shall be determined in accordance with ANSI/UL-1784, "Air Leakage Tests of Door Assemblies and Other Opening Protectives."

Table 3.1.8.4.
Fire-Protection Rating of Closures
Forming Part of Sentences 3.1.8.4.(2) and 3.1.9.1.(1)

Fire-Resistance Rating of *Fire Separation*	Minimum *Fire-Protection Rating* of *Closure*
45 min	45 min
1 h	45 min
1.5 h	1 h
2 h	1.5 h
3 h	2 h
4 h	3 h

3.1.8.5. Installation of Closures

1) Except where *fire dampers*, window assemblies and glass block are used as *closures*, *closures* of the same *fire-protection rating* installed on opposite sides of the same opening are deemed to have a *fire-protection rating* equal to the sum of the *fire-protection ratings* of the *closures*. (See Note A-3.1.8.1.(2).)

2) Except as otherwise specified in this Part, every door, *fire damper*, window assembly or glass block used as a *closure* in a required *fire separation* shall be installed in conformance with NFPA 80, "Fire Doors and Other Opening Protectives." (See Note A-3.1.8.1.(2).)

3) Except as otherwise specified in this Part, every smoke damper or combination smoke/*fire damper* used as a *closure* in a required *fire separation* shall be installed in conformance with NFPA 105, "Smoke Door Assemblies and Other Opening Protectives."

4) If a door is installed such that it could damage the integrity of a *fire separation* if its swing is unrestricted, door stops shall be installed to prevent the damage.

5) Protective guarding devices shall be

a) provided where necessary to prevent damage to the mechanical components of doors in *fire separations*, and

b) installed so as not to interfere with the proper operation of the doors.

6) A leakage-rated door assembly complying with Sentence 3.1.8.4.(4) shall be installed in

a) *fire separations* in protected *floor areas* referred to in Clause 3.3.1.7.(1)(b),

b) *fire separations* in *care* or *treatment occupancies* referred to in Sentence 3.3.3.5.(4),

c) except as provided in Sentence (8), *fire separations* of *public corridors* serving *dwelling units* in *storeys* that are not *sprinklered*, and

d) *firewalls* that are a *horizontal exit* referred to in Sentence 3.3.3.5.(3).

7) Leakage-rated door assemblies required by Sentence (6) shall be installed in accordance with NFPA 105, "Smoke Door Assemblies and Other Opening Protectives."

8) A leakage-rated door assembly need not be installed where a *dwelling unit* served by a *public corridor* has

a) a second and separate *means of egress*, or

b) an open-air balcony that is sized to accommodate the number of occupants for which the *dwelling unit* is intended.

3.1.8.6. Maximum Openings

1) The size of an opening in an interior *fire separation* required to be protected with a *closure* shall be not more than 11 m^2, with no dimension more than 3.7 m, if a *fire compartment* on either side of the *fire separation* is not *sprinklered*.

2) The size of an opening in an interior *fire separation* required to be protected with a *closure* shall be not more than 22 m^2, with no dimension more than 6 m, provided the *fire compartments* on both sides of the *fire separation* are *sprinklered*.

3.1.8.7. Location of Fire Dampers and Smoke Dampers

1) Except as provided in Article 3.1.8.8., a *fire damper* having a *fire-protection rating* conforming to Sentence 3.1.8.4.(2) shall be installed in conformance with Article 3.1.8.10. in ducts or air-transfer openings that penetrate an assembly required to be a *fire separation*.

2) Except as provided in Article 3.1.8.9., a smoke damper or a combination smoke/*fire damper* shall be installed in conformance with Article 3.1.8.11. in ducts or air-transfer openings that penetrate an assembly required to be a *fire separation*, where the *fire separation*

a) separates a *public corridor*,

b) contains an egress door referred to in Sentence 3.4.2.4.(2),

c) serves an *assembly*, *care*, *treatment*, *detention* or *residential occupancy*, or

d) is installed to meet the requirements of Clause 3.3.1.7.(1)(b) or Sentence 3.3.3.5.(4).

3.1.8.8. Fire Dampers Waived

1) Except as provided in Sentence (2), the requirement for *fire dampers* stated in Sentence 3.1.8.7.(1) is permitted to be waived for

a) ducts that serve commercial cooking equipment (see also Article 6.3.1.7.),

b) continuous *noncombustible* ducts having a melting point above 760°C that penetrate a vertical *fire separation* required by Sentence 3.3.1.1.(1) between *suites* of *assembly*, *mercantile*, *low-hazard industrial*, *medium-hazard industrial* or *high-hazard industrial occupancy*,

c) ducts or air-transfer openings that penetrate a vertical *fire separation* not required to have a *fire-resistance rating*, or

d) *noncombustible* ducts or air-transfer openings that penetrate a horizontal *fire separation* not required to have a *fire-resistance rating*.

2) The requirement for *fire dampers* stated in Sentence 3.1.8.7.(1) is permitted to be waived for *noncombustible* branch ducts having a melting point above 760°C that penetrate a *fire separation*,

a) provided the ducts

i) have a cross-sectional area not more than 0.013 m^2 and serve only air-conditioning units or combined air-conditioning and heating units discharging air not more than 1.2 m above the floor, or

ii) extend not less than 500 mm inside *exhaust duct* risers that are under negative pressure and in which the airflow is upward as required by Article 3.6.3.4., or

b) where the *fire separation* separates a *vertical service space* from the remainder of the *building*, provided each individual duct exhausts directly to the outdoors at the top of the *vertical service space*.

3.1.8.9. Smoke Dampers Waived

1) Except as provided in Sentence (2), the requirement for smoke dampers or combination smoke/*fire dampers* stated in Sentence 3.1.8.7.(2) is permitted to be waived for ducts

a) that serve commercial cooking equipment (see also Article 6.3.1.7.),

b) in which all inlet and outlet openings serve not more than one *fire compartment*, or

c) that penetrate a vertical *fire separation* referred to in Clause 3.3.1.7.(1)(b) or in Sentence 3.3.3.5.(4), provided

i) the movement of air is continuous, and

ii) the configuration of the air-handling system prevents the recirculation of exhaust or return air under fire emergency conditions.

2) The requirement for smoke dampers or combination smoke/*fire dampers* stated in Sentence 3.1.8.7.(2) is permitted to be waived for *noncombustible* branch ducts having a melting point above 760°C that penetrate a *fire separation*,

a) provided the ducts

i) have a cross-sectional area not more than 0.013 m^2 and serve only air-conditioning units or combined air-conditioning and heating units discharging air not more than 1.2 m above the floor,

ii) extend not less than 500 mm inside *exhaust duct* risers that are under negative pressure and in which the airflow is upward as required by Article 3.6.3.4., or

iii) are required to function as part of a smoke control system, or

b) where the *fire separation* separates a *vertical service space* from the remainder of the *building*, provided each individual duct exhausts directly to the outdoors at the top of the *vertical service space*.

3.1.8.10. Installation of Fire Dampers

1) A *fire damper* shall be installed in the plane of the *fire separation* so as to stay in place should the duct become dislodged during a fire. (See Note A-3.1.8.10.(1).)

2) A *fire damper* shall be arranged so as to close automatically upon the operation of a fusible link conforming to ULC-S505, "Fusible Links for Fire Protection Service," or other heat-actuated or smoke-actuated device.

3) A heat-actuated device referred to in Sentence (2) shall

a) be located where it is readily affected by an abnormal rise in temperature in the duct, and

b) have a temperature rating approximately 30°C above the maximum temperature that would exist in the system, whether it is in operation or shut down.

4) A *fire damper* tested in the vertical or horizontal position shall be installed in the position in which it was tested.

5) A tightly fitted access door shall be installed for each *fire damper* to provide access for the inspection of the damper and the resetting of the release device. (See Note A-3.1.8.10.(5).)

3.1.8.11. Installation of Smoke Dampers

1) Where smoke dampers are used as a *closure* in an air-transfer opening, they shall be installed in the plane of the *fire separation*.

2) Where combination smoke/*fire dampers* are used as a *closure* in a duct, they shall be installed within 610 mm of the plane of the *fire separation*, provided there is no inlet or outlet opening between the *fire separation* and the damper.

3) Except as required by a smoke control system, smoke dampers and combination smoke/*fire dampers* shall be configured so as to close automatically upon a signal from an adjacent *smoke detector* located as described in CAN/ULC-S524, "Installation of Fire Alarm Systems," within 1.5 m horizontally of the duct or air-transfer opening in the *fire separation*

a) on both sides of the air-transfer opening, or

b) in the duct downstream of the smoke damper or combination smoke/*fire damper*.

4) Smoke dampers or combination smoke/*fire dampers* shall be installed in the vertical or horizontal position in which they were tested.

5) A tightly fitted access door shall be installed for each smoke damper and combination smoke/*fire damper* to provide access for their inspection and the resetting of the release device. (See Note A-3.1.8.10.(5).)

3.1.8.12. Twenty-Minute Closures

1) A door assembly having a *fire-protection rating* not less than 20 min is permitted to be used as a *closure* in

a) a *fire separation* not required to have a *fire-resistance rating* more than 1 h, located between

i) a *public corridor* and a *suite*,

ii) a corridor and adjacent sleeping rooms, or

iii) a corridor and adjacent classrooms, offices and libraries in Group A, Division 2 *major occupancies*, or

b) a *fire separation* not required to have a *fire-resistance rating* more than 45 min, located in a *building* not more than 3 *storeys* in *building height*.

2) The requirements for *noncombustible* sills and *combustible* floor coverings in NFPA 80, "Fire Doors and Other Opening Protectives," do not apply to a door described in Sentence (1).

3) A door described in Sentence (1) shall have clearances of not more than 6 mm at the bottom and not more than 3 mm at the sides and top.

3.1.8.13. Self-closing Devices

1) Except as permitted by Sentence (2), every door in a *fire separation*, other than doors to freight elevators and dumbwaiters, shall be equipped with a self-closing device designed to return the door to the closed position after each use.

2) A self-closing device need not be provided on a door that is located between

a) a classroom and a corridor providing *access to exit* from the classroom in a *building* that is not more than 3 *storeys* in *building height*,

b) a *public corridor* and an adjacent room of *business and personal services occupancy* in a *building* that is not more than 3 *storeys* in *building height* provided the door is not located in a dead-end portion of the corridor,

c) a patients' sleeping room and a corridor serving the patients' sleeping room, provided the room and corridor are within a *fire compartment* in a hospital or nursing home with *treatment* that complies with the requirements of Article 3.3.3.5., or

d) a patients' sleeping room and an adjacent room that serves the patients' sleeping room, provided these rooms are within a *fire compartment* in a hospital or nursing home with *treatment* that complies with the requirements of Article 3.3.3.5.

3.1.8.14. Hold-Open Devices

1) Except as provided in Sentences 3.1.8.10.(2) and 3.1.8.11.(3), a hold-open device is permitted to be used on a *closure* in a required *fire separation*, other than on an *exit* stair door in a *building* more than 3 *storeys* in *building height* and on a door for a vestibule required by Article 3.3.5.7., provided the device is designed to release the *closure* in conformance with this Article.

2) Except as provided in Sentences (5) and (6), where the *building* is provided with a fire alarm system, a hold-open device permitted by Sentence (1) shall release

a) in a single-stage system, upon any signal from the fire alarm system, and

b) in a 2-stage system,

i) upon any *alert signal* from the fire alarm system, or

ii) upon actuation of any adjacent *smoke detectors*.

3) Where the *building* is provided with a fire alarm system, a hold-open device permitted by Sentence (1) shall release upon a signal from a *smoke detector* connected to the fire alarm system and located as described in CAN/ULC-S524, "Installation of Fire Alarm Systems," where the hold-open device is used on

a) an *exit* door,

b) a door opening into a *public corridor*,

c) an egress door referred to in Sentence 3.4.2.4.(2),

d) a *closure* serving an *assembly*, *care*, *treatment*, *detention*, or *residential occupancy*,

e) a door in a *fire separation* referred to in Clause 3.3.1.7.(1)(b) or Sentence 3.3.3.5.(4), or

f) a door required to function as part of a smoke control system.

4) Where the *building* is not provided with a fire alarm system, a hold-open device permitted by Sentence (1) shall release upon a signal from a *smoke alarm* located on each side of the *fire separation* at ceiling level within 1.5 m horizontally of the *closure* opening in the *fire separation*, where the hold-open device is used on *closures* described in Clauses (3)(a) to (e).

5) Where a hold-open device is used on *closures* other than those described in Sentences (3) and (4), it is permitted to be released upon actuation of a heat-actuated device.

6) A hold-open device used on a door located between a corridor used by the public and an adjacent sleeping room in a *treatment occupancy* need not release automatically as stated in Sentence (2).

3.1.8.15. Door Latches

1) Except as permitted by Article 3.3.3.5., a swing-type door in a *fire separation* shall be equipped with a positive latching mechanism designed to hold the door in the closed position after each use.

3.1.8.16. Wired Glass and Glass Block

1) Except as permitted by Articles 3.1.8.18. and 3.1.8.19. for the separation of *exits*, an opening in a *fire separation* having a *fire-resistance rating* not more than 1 h is permitted to be protected with fixed wired glass assemblies or glass blocks installed in conformance with NFPA 80, "Fire Doors and Other Opening Protectives."

2) Wired glass assemblies permitted by Sentence (1) and described in Appendix D are permitted to be used as *closures* in vertical *fire separations* without being tested in accordance with Sentence 3.1.8.4.(1).

3) Glass blocks permitted by Sentence (1) shall be installed in accordance with Subsection 4.3.2. and reinforced with steel reinforcement in each horizontal joint.

3.1.8.17. Temperature Rise Limit for Doors

1) Except as permitted by Article 3.1.8.19., the maximum temperature rise on the opaque portion of the unexposed side of a door used as a *closure* in a *fire separation* in a location shown in Table 3.1.8.17. shall conform to the Table when tested in conformance with Sentence 3.1.8.4.(1).

Table 3.1.8.17.
Restrictions on Temperature Rise and Glazing for Closures
Forming Part of Articles 3.1.8.17. and 3.1.8.18.

Location	Minimum Required *Fire-Protection Rating* of Door	Maximum Temperature Rise on Opaque Portion of Unexposed Side of Door, °C	Maximum Area of Wired Glass in Door, m^2	Maximum Aggregate Area of Glass Block and Wired Glass Panels not in a Door, m^2
Between a dead-end corridor and an adjacent *occupancy* where the corridor provides the only *access to exit* and is required to have a *fire-resistance rating*	Less than 45 min	No limit	No limit	No limit
	45 min	250 after 30 min	0.0645	0.0645
Between an *exit* enclosure and the adjacent *floor area* in a *building* not more than 3 *storeys* in *building height*	All ratings	No limit	0.8	0.8
Between an *exit* enclosure and the adjacent *floor area* (except as permitted above)	45 min	250 after 30 min	0.0645	0.0645
	1.5 h	250 after 1 h	0.0645	0.0645
	2 h	250 after 1 h	0.0645	0.0645
In a *firewall*	1.5 h	250 after 30 min	0.0645	0
	3 h	250 after 1 h	0	0

3.1.8.18. Area Limits for Wired Glass and Glass Block

1) Except as permitted by Article 3.1.8.19., the maximum area of wired glass in a door used in the locations shown in Table 3.1.8.17. shall conform to the Table. (See Note A-3.1.8.18.(1).)

2) Except as permitted by Article 3.1.8.19., the maximum area of glass block and wired glass panels not in a door, used in the locations shown in Table 3.1.8.17., shall conform to the Table.

3.1.8.19. Temperature Rise and Area Limits Waived

1) The temperature rise limits and glass area limits required by Articles 3.1.8.17. and 3.1.8.18. are waived for a *closure* between an *exit* enclosure and an enclosed vestibule or corridor, provided

a) the vestibule or corridor is separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* not less than 45 min,

b) the *fire separation* required by Clause (a) contains no wired glass or glass block within 3 m of the *closure* into the *exit* enclosure, and

c) the vestibule or corridor contains no *occupancy*.

(See Note A-3.1.8.19.(1).)

3.1.9. Penetrations in Fire Separations and Fire-Rated Assemblies

(See Note A-3.1.9.)

3.1.9.1. Fire Stops

1) Except as provided in Sentences (2) to (5) and Article 3.1.9.4., penetrations of a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* shall be

a) sealed by a *fire stop* that, when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," has an F rating not less than the *fire-protection rating* required for *closures* in the *fire separation* in conformance with Table 3.1.8.4.,

b) cast in place (see Note A-3.1.9.1.(1)(b)), or

c) tightly fitted (see Note A-3.1.9.1.(1)(c)).

(See also Article 3.1.9.5. for requirements regarding penetrations by *combustible* drain, waste and vent piping.)

2) Penetrations of a *firewall* or a horizontal *fire separation* that is required to have a *fire-resistance rating* in conformance with Article 3.2.1.2. shall be sealed at the penetration by a *fire stop* that, when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," has an FT rating not less than the *fire-resistance rating* for the *fire separation*.

3) Penetrations of a *fire separation* in conformance with Sentence 3.6.4.2.(2) shall be sealed by a *fire stop* that, when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," has an FT rating not less than the *fire-resistance rating* for the *fire separation* of the assembly.

4) Sprinklers are permitted to penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* without having to meet the *fire stop* requirements of Sentences (1) to (3), provided the annular space created by the penetration of a fire sprinkler is covered by a metal escutcheon plate in accordance with NFPA 13, "Installation of Sprinkler Systems."

5) Unless specifically designed with a *fire stop*, *fire dampers* are permitted to penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* without having to meet the *fire stop* requirements of Sentences (1) to (3), provided the *fire damper* is installed in conformance with NFPA 80, "Fire Doors and Other Opening Protectives."

3.1.9.2. Combustibility of Service Penetrations

1) Except as permitted by Articles 3.1.9.3. and 3.1.9.5., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible*, unless the assembly was tested incorporating that service equipment. (See Note A-3.1.9.2.(1).)

3.1.9.3. Penetration by Wires, Cables and Outlet Boxes

1) Optical fibre cables and electrical wires and cables in totally enclosed *noncombustible* raceways are permitted to penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2.

2) Except as permitted by Sentence (3), totally enclosed non-metallic raceways conforming to Article 3.1.5.23., optical fibre cables, and electrical wires and cables, single or grouped, with *combustible* insulation, jackets or sheathes that conform to the requirements of Clause 3.1.5.21.(1)(a) and that are not installed in totally enclosed *noncombustible* raceways are permitted to penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the overall diameter of the single or grouped wires or cables, or the raceways is not more than 25 mm.

3) Single conductor metal sheathed cables with *combustible* jacketting that are more than 25 mm in overall diameter are permitted to penetrate a *fire separation* required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the cables are not grouped and are spaced a minimum of 300 mm apart.

4) *Combustible* totally enclosed raceways that are embedded in a concrete floor slab are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the concrete cover between the raceway and the bottom of the slab is not less than 50 mm.

5) *Combustible* outlet boxes are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the opening through the membrane into the box is not more than 0.016 m^2.

3.1.9.4. Penetration by Outlet Boxes

(See Note A-3.1.9.4.)

1) Except as provided in Sentence (2), outlet boxes are permitted to penetrate the membrane of an assembly required to have a *fire-resistance rating*, provided they are sealed at the penetration by a *fire stop* that has an FT rating not less than the *fire-resistance rating* of the *fire separation* when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems."

2) Except as provided in Sentences 3.1.9.1.(2) and (3), *noncombustible* outlet boxes that penetrate a vertical *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* need not conform to Sentence (1), provided

a) they do not exceed

i) 0.016 m^2 in area, and

ii) an aggregate area of 0.065 m^2 in any 9.3 m^2 of surface area, and

b) the annular space between the membrane and the *noncombustible* electrical outlet boxes does not exceed 3 mm.

3) In addition to the requirements of Sentence (2), outlet boxes on opposite sides of a vertical *fire separation* having a *fire-resistance rating* shall be separated by

a) a horizontal distance of not less than 600 mm, or

b) a *fire block* conforming to Article 3.1.11.7.

3.1.9.5. Combustible Piping Penetrations

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

2) *Combustible* water distribution piping is permitted to penetrate a *fire separation* that is required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the piping is protected at the penetration with a *fire stop* in conformance with Sentence (4).

3) Except as permitted by Sentences (4) to (5), *combustible* piping shall not be used in a drain, waste and vent piping system if any part of that system penetrates

a) a *fire separation* required to have a *fire-resistance rating*, or

b) a membrane that forms part of an assembly required to have a *fire-resistance rating*.

4) *Combustible* drain, waste and vent piping is permitted to penetrate a *fire separation* required to have a *fire-resistance rating* or a membrane that forms part of an assembly required to have a *fire-resistance rating*, provided

a) the piping is sealed at the penetration by a *fire stop* that has an F rating not less than the *fire-resistance rating* required for the *fire separation* when subjected to the fire test method in CAN/ULC-S115, "Fire Tests of Firestop Systems," with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side, and

b) the piping is not located in a *vertical service space*.

5) *Combustible* drain, waste and vent piping is permitted on one side of a vertical *fire separation* provided it is not located in a *vertical service space*.

6) *Combustible* piping for central vacuum systems is permitted to penetrate a *fire separation* provided the installation conforms to the requirements that apply to *combustible* drain, waste and vent piping specified in Sentence (4).

3.1.9.6. Openings for Ducts through a Membrane Ceiling

1) A membrane ceiling forming part of an assembly assigned a *fire-resistance rating* on the basis of Appendix D or Sentence 3.1.7.1.(4) is permitted to be penetrated by openings leading into ducts within the ceiling space, provided

a) the ducts are sheet steel, and

b) the number of openings and their protection conform to the requirements of Appendix D.

3.1.9.7. Plenums

1) A ceiling assembly used as a *plenum* shall conform to Article 3.6.4.3.

3.1.10. Firewalls

3.1.10.1. Prevention of Firewall Collapse

1) Except as permitted by Sentence (2), the connections and supports for structural framing members that are connected to or supported on a *firewall* and have a *fire-resistance rating* less than that required for the *firewall*, shall be designed so that the failure of the framing systems during a fire will not affect the integrity of the *firewall* during the fire.

2) Sentence (1) does not apply to a *firewall* consisting of two separate wall assemblies each tied to its respective *building* frame but not to each other, provided each wall assembly is

a) a *fire separation* having one half of the *fire-resistance rating* required for the *firewall* by Sentences 3.1.10.2.(1) and (2), and

b) designed so that the collapse of one wall assembly will not cause collapse of the other.

3) A *firewall* is permitted to be supported on the structural frame of a *building* of *noncombustible construction* provided the supporting frame has a *fire-resistance rating* not less than that required for the *firewall*.

4) Piping, ducts and totally enclosed *noncombustible* raceways shall be installed so that their collapse will not cause collapse of the *firewall*.

3.1.10.2. Rating of Firewalls

1) A *firewall* that separates a *building* or *buildings* with *floor areas* containing a Group E or a Group F, Division 1 or 2 *major occupancy* shall be constructed as a *fire separation* of *noncombustible construction* having a *fire-resistance rating* not less than 4 h, except that where the upper portion of a *firewall* separates *floor areas* containing other than Group E or Group F, Division 1 or 2 *major occupancies*, the *fire-resistance rating* of the upper portion of the *firewall* is permitted to be not less than 2 h.

2) A *firewall* that separates a *building* or *buildings* with *floor areas* containing *major occupancies* other than Group E or Group F, Division 1 or 2 shall be constructed as a *fire separation* of *noncombustible construction* having a *fire-resistance rating* not less than 2 h.

3) Except as permitted by Sentence (4), the required *fire-resistance rating* of a *firewall*, except for *closures*, shall be provided by masonry or concrete.

4) A *firewall* permitted to have a *fire-resistance rating* not more than 2 h need not be constructed of masonry or concrete, provided

a) the assembly providing the *fire-resistance rating* is protected against damage that would compromise the integrity of the assembly, and

b) the design conforms to Article 4.1.5.17.

(See Note A-3.1.10.2.(4).)

3.1.10.3. Continuity of Firewalls

1) A *firewall* shall extend from the ground continuously through, or adjacent to, all *storeys* of a *building* or *buildings* so separated, except that a *firewall* located above a *basement storage garage* conforming to Article 3.2.1.2. is permitted to commence at the floor assembly immediately above the *storage garage*. (See also Sentence 3.1.10.1.(3).)

2) A *firewall* is permitted to terminate on the underside of a reinforced concrete roof slab, provided

a) the roof slab on both sides of the *firewall* has a *fire-resistance rating* not less than

i) 1 h if the *firewall* is required to have a *fire-resistance rating* not less than 2 h, or

ii) 2 h if the *firewall* is required to have a *fire-resistance rating* not less than 4 h, and

b) there are no concealed spaces within the roof slab in that portion immediately above the *firewall*.

3.1.10.4. Parapets

1) Except as permitted by Sentences (2) and 3.1.10.3.(2), a *firewall* shall extend above the roof surface to form a parapet not less than

a) 150 mm high for a *firewall* required to have a *fire-resistance rating* not less than 2 h, and

b) 900 mm high for a *firewall* required to have a *fire-resistance rating* not less than 4 h.

2) A *firewall* that separates 2 *buildings* with roofs at different elevations need not extend above the upper roof surface to form a parapet, provided the difference in elevation between the roofs is more than 3 m.

3.1.10.5. Maximum Openings

1) Openings in a *firewall* shall conform to the size limits described in Article 3.1.8.6. and the aggregate width of openings shall be not more than 25% of the entire length of the *firewall*.

3.1.10.6. Exposure Protection for Adjacent Walls

1) The requirements of Article 3.2.3.14. shall apply to the external walls of 2 *buildings* that meet at a *firewall* at an angle less than 135°.

3.1.10.7. Combustible Projections

1) *Combustible* material shall not extend across the end of a *firewall* but is permitted to extend across a roof above a *firewall* that is terminated in conformance with Sentence 3.1.10.3.(2).

2) If *buildings* are separated by a *firewall*, *combustible* projections on the exterior of one *building*, including balconies, platforms, canopies, eave projections and stairs, that extend outward beyond the end of the *firewall*, shall not be permitted within 2.4 m of *combustible* projections and window or door openings of the adjacent *building*. (See also Article 3.2.3.6.)

3.1.11. Fire Blocks in Concealed Spaces

3.1.11.1. Separation of Concealed Spaces

1) Concealed spaces in interior wall, ceiling and crawl spaces shall be separated from concealed spaces in exterior walls and *attic or roof spaces* by *fire blocks* conforming to Article 3.1.11.7.

3.1.11.2. Fire Blocks in Wall Assemblies

1) Except as permitted by Sentence (2), *fire blocks* conforming to Article 3.1.11.7. shall be provided to block off concealed spaces within a wall assembly

a) at every floor level,

b) at every ceiling level where the ceiling forms part of an assembly required to have a *fire-resistance rating*, and

c) so that the maximum horizontal dimension is not more than 20 m and the maximum vertical dimension is not more than 3 m.

2) *Fire blocks* conforming to Sentence (1) are not required, provided

a) the wall space is filled with insulation,

b) the exposed construction materials and any insulation within the wall space are *noncombustible*,

c) the exposed materials within the space, including insulation but not including wiring, piping or similar services, have a *flame-spread rating* not more than 25 on any exposed surface, or on any surface that would be exposed by cutting through the material in any direction, and *fire blocks* are installed so that the vertical distance between them is not more than 10 m, or

d) the insulated wall assembly contains not more than one concealed air space, and the horizontal thickness of that air space is not more than 25 mm.

3.1.11.3. Fire Blocks between Nailing and Supporting Elements

1) In a *building* required to be of *noncombustible construction*, a concealed space in which there is an exposed ceiling finish with a *flame-spread rating* more than 25 shall be provided with *fire blocks* conforming to Article 3.1.11.7. between wood nailing elements so that the maximum area of the concealed space is not more than 2 m^2.

2) In a *building* required to be of *noncombustible construction*, *fire blocks* conforming to Article 3.1.11.7. shall be provided in the concealed spaces created by the wood members permitted by Sentence 3.1.5.10.(2) so that the maximum area of a concealed space is not more than 10 m^2.

3) In a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, a concealed space in which there is an exposed ceiling finish with a *flame-spread rating* more than 25 shall be provided with *fire blocks* conforming to Article 3.1.11.7. between wood nailing elements so that the maximum area of the concealed space is not more than 2 m^2.
(See Note A-3.1.11.3.(3).)

4) In a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, *fire blocks* conforming to Article 3.1.11.7. shall be provided in the concealed spaces created by the wood members permitted by Sentence 3.1.18.10.(1) so that the maximum area of a concealed space is not more than 10 m^2.

3.1.11.4. Fire Blocks between Vertical and Horizontal Spaces

1) *Fire blocks* conforming to Article 3.1.11.7. shall be provided

a) at all interconnections between concealed vertical and horizontal spaces in interior coved ceilings, drop ceilings and soffits in which the exposed construction materials within the space have a *flame-spread rating* more than 25, and

b) at the end of each run and at each floor level in concealed spaces between stair stringers in which the exposed construction materials within the space have a *flame-spread rating* more than 25.

3.1.11.5. Fire Blocks in Horizontal Concealed Spaces

1) Except for crawl spaces conforming to Sentence 3.1.11.6.(1) and as required in Sentence (3), horizontal concealed spaces within a floor assembly or roof assembly of *combustible construction*, in which sprinklers are not installed, shall be separated by construction conforming to Article 3.1.11.7. into compartments

a) not more than 600 m^2 in area with no dimension more than 60 m if the exposed construction materials within the space have a *flame-spread rating* not more than 25, and

b) not more than 300 m^2 in area with no dimension more than 20 m if the exposed construction materials within the space have a *flame-spread rating* more than 25.

(See Note A-3.1.11.5.(1).)

2) A concealed space in an exterior cornice, a mansard-style roof, a balcony or a canopy in which exposed construction materials within the space have a *flame-spread rating* more than 25, shall be separated by construction conforming to Article 3.1.11.7.

a) at locations where the concealed space extends across the ends of required vertical *fire separations*, and

b) so that the maximum dimension in the concealed space is not more than 20 m.

3) Except as provided in Sentence (5), in *buildings* or parts thereof conforming to Article 3.2.2.50. or 3.2.2.58., horizontal concealed spaces within a floor assembly or roof assembly of *combustible* construction shall be separated by construction conforming to Article 3.1.11.7. into compartments that are

a) not more than 600 m^2 in area with no dimension more than 60 m, if the exposed construction materials within the space have a *flame-spread rating* not more than 25, and

b) not more than 300 m^2 in area with no dimension more than 20 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25.

(See Note A-3.1.11.5.(3).)

4) Except for crawl spaces conforming to Sentence 3.1.11.6.(1) and except as provided in Sentence (5), in *buildings* or parts thereof conforming to Article 3.2.2.48EMTC. or 3.2.2.57EMTC., horizontal concealed spaces within a floor assembly or roof assembly of *encapsulated mass timber construction* shall be separated by construction conforming to Article 3.1.11.7. into compartments that are

a) not more than 600 m^2 in area with no dimension more than 60 m, if the exposed construction materials within the space have a *flame-spread rating* not more than 25, and

b) not more than 300 m^2 in area with no dimension more than 20 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25.

5) *Fire blocks* conforming to Sentence (3) or (4) are not required where the horizontal concealed space within the floor or roof assembly is entirely filled with *noncombustible* insulation such that any air gap between the top of the insulation and the floor or roof deck does not exceed 50 mm.

3.1.11.6. Fire Blocks in Crawl Spaces

1) A crawl space that is not considered as a *basement* by Article 3.2.2.9. and in which sprinklers are not installed, shall be separated by construction conforming to Article 3.1.11.7. into compartments not more than 600 m^2 in area with no dimension more than 30 m.

3.1.11.7. Fire Block Materials

1) Except as permitted by Sentences (2) to (5) and (8), *fire blocks* shall remain in place and prevent the passage of flames for not less than 15 min when subjected to the standard fire exposure in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

2) Gypsum board not less than 12.7 mm thick and sheet steel not less than 0.38 mm thick need not be tested in conformance with Sentence (1), provided all joints have continuous support.

3) In a *building* required to be of *noncombustible construction*, wood nailing elements described in Article 3.1.5.8. need not be tested in conformance with Sentence (1).

4) In a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, wood nailing elements referred to in Article 3.1.18.9. need not be tested in conformance with Sentence (1).

5) In a *building* permitted to be of *combustible construction*, in a *combustible* roof system permitted by Sentences 3.1.5.3.(2) and 3.1.18.5.(1), and in a raised platform permitted by Sentences 3.1.5.10.(2) and 3.1.18.10.(1), *fire blocks* are permitted to be

a) solid lumber or a structural composite lumber product conforming to ASTM D 5456, "Evaluation of Structural Composite Lumber Products," not less than 38 mm thick,

b) phenolic bonded plywood, waferboard, or oriented strandboard not less than 12.5 mm thick with joints supported, or

c) two thicknesses of lumber or a structural composite lumber product conforming to ASTM D 5456, "Evaluation of Structural Composite Lumber Products," each not less than 19 mm thick with joints staggered, where the width or height of the concealed space requires more than one piece of lumber or structural composite lumber product not less than 38 mm thick to block off the space.

6) Openings through materials referred to in Sentences (1) to (4) shall be protected to maintain the integrity of the construction.

7) Where materials referred to in Sentences (1) to (4) are penetrated by construction elements or by service equipment, a *fire stop* shall be used to seal the penetration. (See Note A-3.1.11.7.(7).)

8) In *buildings* permitted to be of *combustible construction*, semi-rigid fibre insulation board produced from glass, rock or slag is permitted to be used to block the vertical space in a double stud wall assembly formed at the intersection of the floor assembly and the walls, provided the width of the vertical space does not exceed 25 mm and the insulation board

a) has a density not less than 45 kg/m^3,

b) is securely fastened to one set of studs,

c) extends from below the bottom of the top plates in the lower *storey* to above the top of the bottom plate in the upper *storey*, and

d) completely fills the portion of the vertical space between the headers and between the wall plates.

(See Note A-3.1.11.7.(8).)

3.1.12. Flame-Spread Rating and Smoke Developed Classification

3.1.12.1. Determination of Ratings

1) Except as required by Sentence (2) and as permitted by Sentence (3), the *flame-spread rating* and smoke developed classification of a material, assembly, or structural member shall be determined on the basis of not less than three tests conducted in conformance with CAN/ULC-S102, "Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies."

2) The *flame-spread rating* and smoke developed classification of a material or assembly shall be determined on the basis of not less than three tests conducted in conformance with CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies," if the material or assembly

a) is designed for use in a relatively horizontal position with only its top surface exposed to air,

b) cannot be tested in conformance with Sentence (1) without the use of supporting material that is not representative of the intended installation, or

c) is thermoplastic.

3) A material, assembly, or structural member is permitted to be assigned a *flame-spread rating* and smoke developed classification on the basis of Appendix D.

3.1.13. Interior Finish

3.1.13.1. Interior Finishes, Furnishings and Decorative Materials

1) Except as otherwise provided by this Subsection, interior finishes, furnishings and decorative materials shall conform to Section 2.3. of Division B of the British Columbia Fire Code.

2) Interior finish material shall include any material that forms part of the interior surface of a floor, wall, *partition* or ceiling, including

a) interior cladding of plaster, wood or tile,

b) surfacing of fabric, paint, plastic, veneer or wallpaper,

c) doors, windows and trim,

d) lighting elements such as light diffusers and lenses forming part of the finished surface of the ceiling, and

e) carpet material that overlies a floor that is not intended as the finished floor.

3.1.13.2. Flame-Spread Rating

1) Except as otherwise required or permitted by this Subsection, the *flame-spread rating* of interior wall and ceiling finishes, including glazing and skylights, shall be not more than 150 and shall conform to Table 3.1.13.2.

Table 3.1.13.2.
Flame-Spread Ratings
Forming Part of Sentence 3.1.13.2.(1)

***Occupancy*, Location or Element**	**Maximum *Flame-Spread Rating* for Walls and Ceilings**	
	Sprinklered	**Not *Sprinklered***
Group A, Division 1 *occupancies*, including doors, skylights, glazing and light diffusers and lenses	150	75
Group B *occupancies*	150	75
Exits(1)	25	25
Lobbies described in Sentence 3.4.4.2.(2)	25	25
Covered vehicular passageways, except for roof assemblies of *heavy timber construction in the passageways*	25	25
Vertical service spaces	25	25

Notes to Table 3.1.13.2.:
(1) See Articles 3.1.13.8. and 3.1.13.10.

2) Except as permitted by Sentence (3), doors, other than those in Group A, Division 1 *occupancies*, need not conform to Sentence (1) provided they have a *flame-spread rating* not more than 200. (See Note A-3.1.13.2.(2).)

3) Doors within a *dwelling unit* need not conform to Sentences (1) and (2).

4) Up to 10% of the total wall area and 10% of the total ceiling area of a wall or ceiling finish that is required by Sentence (1) to have a *flame-spread rating* less than 150 is permitted to have a *flame-spread rating* not more than 150, except that up to 25% of the total wall area of lobbies described in Sentence 3.4.4.2.(2) is permitted to have a *flame-spread rating* not more than 150.

5) Except in the case of Group A, Division 1 *occupancies*, *combustible* doors, skylights, glazing and light diffusers and lenses shall not be considered in the calculation of wall and ceiling areas described in Sentence (4).

3.1.13.3. Bathrooms in Residential Suites

1) The *flame-spread rating* of interior wall and ceiling finishes for a bathroom within a *suite* of *residential occupancy* shall be not more than 200.

3.1.13.4. Light Diffusers and Lenses

1) The *flame-spread rating* of *combustible* light diffusers and lenses in all *occupancies* other than Group A, Division 1 is permitted to be more than the *flame-spread rating* limits required elsewhere in this Subsection, provided the light diffusers and lenses

a) have a *flame-spread rating* not more than 250 and a smoke developed classification not more than 600 when tested in conformance with CAN/ULC-S102.2, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies,"

b) fall to the bottom of the test apparatus before igniting when tested in conformance with CAN/ULC-S102.3, "Fire Test of Light Diffusers and Lenses,"

c) are not prevented from falling from the ceiling by construction located beneath the elements, and

d) are not used in a corridor that is required to be separated from the remainder of the *building* by a *fire separation* or in an *exit* shaft unless individual diffusers or lenses are not more than 1 m^2 in area and are not less than 1.2 m apart.

3.1.13.5. Skylights

1) Individual *combustible* skylights in a corridor that is required to be separated from the remainder of the *building* by a *fire separation* shall be not more than 1 m^2 in area and not less than 1.2 m apart.

3.1.13.6. Corridors

1) Except as permitted by Sentences (2) and (3), the *flame-spread rating* shall be not more than 75 for the interior wall finish of

a) a *public corridor*,

b) a corridor used by the public in an *assembly occupancy*, or

c) a corridor serving classrooms.

2) The *flame-spread rating* for corridors specified in Sentence (1) is permitted to be waived, provided the *flame-spread rating* is not more than

a) 25 on the upper half of the wall, and

b) 150 on the lower half of the wall.

3) Where the *floor area* is *sprinklered* throughout, the *flame-spread ratings* for corridors specified in Sentences (1) and (2) shall be not more than 150.

4) The *flame-spread ratings* specified in Sentences (1), (2) and (3) apply to *occupancies* in the corridor as well as to the corridor itself.

5) Except as provided in Sentence (6), the interior ceiling finish of corridors and *occupancies* referred to in Sentences (1) and (4) shall have a *flame-spread rating* not more than 25.

6) Where the *floor area* is *sprinklered* throughout, the *flame-spread rating* of the interior ceiling finish of corridors and *occupancies* referred to in Sentences (1) and (4) shall be not more than 150.

3.1.13.7. High Buildings

1) Except as permitted by Sentences (2) to (4), the interior wall, ceiling and floor finishes in a *building* regulated by the provisions of Subsection 3.2.6. shall conform to the *flame-spread rating* requirements in Articles 3.1.13.2. and 3.1.13.11. and to the *flame-spread rating* and smoke developed classification values in Table 3.1.13.7.

Table 3.1.13.7.
Flame-Spread Rating and Smoke Developed Classification in High Buildings
Forming Part of Sentence 3.1.13.7.(1)

Location or Element	Maximum *Flame-Spread Rating*			Maximum Smoke Developed Classification		
	Wall Surface	Ceiling Surface[1]	Floor Surface	Wall Surface	Ceiling Surface[1]	Floor Surface
Exit stairways, vestibules to *exit* stairs and lobbies described in Sentence 3.4.4.2.(2)	25	25	25	50	50	50
Corridors not within *suites*	[2]	[2]	300	100	50	500
Elevator cars	75	75	300	450	450	450
Elevator vestibules	25	25	300	100	100	300
Service spaces and *service rooms*	25	25	25	50	50	50
Other locations and elements	[2]	[2]	No Limit	300	50	No Limit

Notes to Table 3.1.13.7.:
(1) See Article 3.1.13.4. for lighting elements.
(2) Other requirements of this Part apply.

2) Except for a *building* of Group B *major occupancy* and elevator cars, the *flame-spread rating* and smoke developed classification of interior wall, floor and ceiling finishes need not conform to the values in Table 3.1.13.7., provided the *building* is *sprinklered*.

3) Trim and millwork in an *exit* stairway, a vestibule to an *exit* stairway, a lobby described in Sentence 3.4.4.2.(2), or a corridor not within a *suite* need not conform to the *flame-spread rating* and smoke developed classification requirements of Sentence (1) provided they have

a) a *flame-spread rating* not more than 150,

b) a smoke developed classification not more than 300, and

c) an aggregate area not more than 10% of the area of the wall or ceiling on which they occur.

4) A door serving an *exit* stairway, a vestibule to an *exit* stairway, a lobby described in Sentence 3.4.4.2.(2), or a corridor not within a *suite* need not conform to the *flame-spread rating* and smoke developed classification requirements of Sentence (1) provided

a) it has a *flame-spread rating* not more than 200,

b) it has a smoke developed classification not more than 300, and

c) the aggregate area of all doors is not more than 10% of the area of the wall in which they are located.

3.1.13.8. Noncombustible Construction

1) In a *building* required to be of *noncombustible construction*,

a) the *flame-spread ratings* required by Subsection 3.1.5. shall apply in addition to the requirements in this Subsection, and

b) the *flame-spread ratings* for *exits* in this Subsection shall also apply to any surface in the *exit* that would be exposed by cutting through the material in any direction, except that this requirement does not apply to doors, *heavy timber construction* in a *sprinklered building* and *fire-retardant-treated wood*.

3.1.13.9. Underground Walkways

1) Except for paint, the interior wall and ceiling finishes of an underground *walkway* shall be of *noncombustible* materials.

3.1.13.10. Exterior Exit Passageway

1) The wall and ceiling finishes of an exterior *exit* passageway that provides the only *means of egress* from the rooms or *suites* it serves, including the soffit beneath and the *guard* on the passageway, shall have a *flame-spread rating* not more than 25, except that a *flame-spread rating* not more than 150 is permitted for up to 10% of the total wall area and for up to 10% of the total ceiling area.

3.1.13.11. Elevator Cars

1) The wall and ceiling surfaces of elevator cars shall have a *flame-spread rating* not more than 75.

2) The wall, ceiling and floor surfaces of elevator cars shall have a smoke developed classification not more than 450.

3.1.13.12. Encapsulated Mass Timber Construction

1) In a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*,

a) the *flame-spread ratings* required by Subsection 3.1.18. shall apply in addition to the requirements in this Subsection, and

b) the *flame-spread ratings* for *exits* required by this Subsection shall also apply to any surface in the *exit* that would be exposed by cutting through the material in any direction, except that this requirement does not apply to doors, structural mass timber elements conforming to Sentence 3.1.18.4.(3), *heavy timber construction*, and *fire-retardant-treated wood*.

3.1.14. Roof Assemblies

3.1.14.1. Fire-Retardant-Treated Wood Roof Systems

1) If a *fire-retardant-treated wood* roof system is used to comply with the requirements of Subsection 3.2.2., the roof deck assembly shall meet the conditions of acceptance of CAN/ULC-S126, "Test for Fire Spread Under Roof-Deck Assemblies."

2) Supports for the roof deck assembly referred to in Sentence (1) shall consist of

a) *fire-retardant-treated wood*,

b) *heavy timber construction*,

c) *noncombustible construction*, or

d) a combination thereof.

3.1.14.2. Metal Roof Deck Assemblies

1) Except as permitted by Sentence (2), a metal roof deck assembly shall meet the conditions of acceptance of CAN/ULC-S126, "Test for Fire Spread Under Roof-Deck Assemblies," if

a) it supports a *combustible* material above the deck that could propagate a fire beneath the roof deck assembly, and

b) the deck is used to comply with the requirements of Sentences 3.2.2.25.(2), 3.2.2.32.(2), 3.2.2.60.(2), 3.2.2.66.(2), 3.2.2.76.(2) and 3.2.2.83.(2) for *noncombustible construction*.

2) The requirements of Sentence (1) are waived provided

a) the *combustible* material above the roof deck is protected by not less than 12.7 mm thick gypsum board, mechanically fastened to a supporting assembly if located beneath the roof deck, or by a thermal barrier conforming to one of Clauses 3.1.5.15.(2)(c) to (e) that is located

i) on the underside of the *combustible* material, or

ii) beneath the roof deck,

b) the *building* is *sprinklered* throughout, or

c) the roof assembly has a *fire-resistance rating* not less than 45 min.

3.1.15. Roof Covering

3.1.15.1. Roof Covering Classification

1) A roof covering classification shall be determined in conformance with CAN/ULC-S107, "Fire Tests of Roof Coverings."

3.1.15.2. Roof Coverings

1) Except as provided in Sentences (2), (3) and (4) every roof covering shall have a Class A, B or C classification as determined in accordance with Article 3.1.15.1.

2) A roof covering is not required to have a Class A, B or C classification for

a) a tent,

b) an *air-supported structure*,

c) a *building* of Group A, Division 2 *occupancy* not more than 2 *storeys* in *building height* and not more than 1 000 m^2 in *building area* provided the roof covering is underlaid with *noncombustible* material, or

d) a steel *building* system referred to in Article 4.3.4.3., provided the roof covering consists of brick, masonry, concrete, metal sheets or metal shingles.

3) Except as provided in Sentence (5), roof coverings on *buildings* conforming to Article 3.2.2.50. or 3.2.2.58. shall have a Class A classification where the roof height is greater than 25 m measured from the floor of the *first storey* to the highest point of the roof.

4) Except as provided in Sentence (5), roof coverings in *buildings* or parts of *buildings* permitted to be of *encapsulated mass timber construction* shall have a Class A classification where the roof height is greater than 25 m measured from the floor of the *first storey* to the highest point of the roof.

5) Where *buildings* or parts thereof conforming to Article 3.2.2.48EMTC., 3.2.2.50., 3.2.2.57EMTC., or 3.2.2.58. include non-contiguous roof assemblies at different elevations, the roof coverings referred to in Sentences (3) and (4) are permitted to be evaluated separately to determine the roof covering classification required.

3.1.16. Fabrics

3.1.16.1. Fabric Canopies and Marquees

1) Fabrics used as part of an awning, canopy or marquee that is located within or attached to a *building* of any type of construction shall conform to CAN/ULC-S109, "Flame Tests of Flame-Resistant Fabrics and Films."

3.1.17. Occupant Load

3.1.17.1. Occupant Load Determination

1) The *occupant load* of a *floor area* or part of a *floor area* shall be based on

a) the number of seats in an *assembly occupancy* having fixed seats,

b) 2 persons per sleeping room in a *dwelling unit*, or

c) the number of persons for which the area is designed, but not less than that determined from Table 3.1.17.1. for *occupancies* other than those described in Clauses (a) and (b), unless it can be shown that the area will be occupied by fewer persons.

2) If a *floor area* or part thereof has been designed for an *occupant load* other than that determined from Table 3.1.17.1., a permanent sign indicating that *occupant load* shall be posted in a conspicuous location.

Table 3.1.17.1.
Occupant Load
Forming Part of Article 3.1.17.1.

Type of Use of *Floor Area* or Part Thereof	Area per person, m^2
Assembly uses	
space with fixed seats	(1)
space with non-fixed seats	0.75
stages for theatrical performances	0.75
space with non-fixed seats and tables	0.95
standing space	0.40
stadia and grandstands	0.60
bowling alleys, pool and billiard rooms	9.30
classrooms	1.85
school shops and vocational rooms	9.30
reading or writing rooms or lounges	1.85
dining, beverage and cafeteria space	1.20
laboratories in schools	4.60
Care, *treatment* or detention uses	
suites	(2)
care, *treatment* and sleeping room areas	10.00
detention quarters	11.60
Residential uses	
dwelling units	(2)
dormitories	4.60
Business and personal services uses	
personal services shops	4.60
offices	9.30
Mercantile uses	
basements and *first storeys*	3.70
second *storeys* having a principal entrance from a pedestrian thoroughfare or a parking area	3.70
other *storeys*	5.60
Industrial uses	
manufacturing or process rooms	4.60
storage garages	46.00
storage spaces (warehouse)	28.00
aircraft hangars	46.00
Other uses	
cleaning and repair goods	4.60

Table 3.1.17.1. *(continued)*
Occupant Load
Forming Part of Article 3.1.17.1.

Type of Use of *Floor Area* or Part Thereof	Area per person, m^2
kitchens	9.30
storage	46.00
public corridors intended for *occupancies* in addition to pedestrian travel	3.70(3)

Notes to Table 3.1.17.1.:

(1) See Clause 3.1.17.1.(1)(a).

(2) See Clause 3.1.17.1.(1)(b) (apply values for *dwelling units* to *suites* of *care occupancy*).

(3) See Note A-3.3.

3) For the purposes of this Article, *mezzanines*, tiers and balconies shall be regarded as part of the *floor area*.

4) If a room or group of rooms is intended for different *occupancies* at different times, the value to be used from Table 3.1.17.1. shall be the value which gives the greatest number of persons for the *occupancies* concerned.

3.1.18. Encapsulated Mass Timber Construction

(See Note A-3.1.18.)

3.1.18.1. Scope

1) *Encapsulated mass timber construction* permitted in this Part shall conform to this Subsection.

3.1.18.2. Materials Permitted

1) Except as otherwise provided in this Part and Sentence 6.4.3.1.(1), materials used in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* shall conform to Subsection 3.1.5.

3.1.18.3. Structural Mass Timber Elements

(See Note A-3.1.18.3.)

1) Except as otherwise provided in this Subsection and Articles 3.2.2.16. and 3.2.3.19., a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* is permitted to include structural mass timber elements, including beams, columns, arches, and wall, floor and roof assemblies, provided they comply with Sentences (2) and (3).

2) Structural mass timber elements referred to in Sentence (1) shall

a) except as permitted in Sentence (4), be arranged in heavy solid masses containing no concealed spaces,

b) have essentially smooth flat surfaces with no thin sections or sharp projections, and

c) except as provided in Article 3.1.18.15., conform to the minimum dimensions stated in Table 3.1.18.3.

Table 3.1.18.3.
Minimum Dimensions of Structural Mass Timber Elements in Encapsulated Mass Timber Construction(1)
Forming Part of Sentence 3.1.18.3.(2)

Structural Wood Elements	Minimum Thickness, mm	Minimum Width x Depth, mm x mm
Walls that are *fire separations* or exterior walls (1-sided exposure)	96	--
Walls that require *fire-resistance rating*, but are not *fire separations* (2-sided exposure)	192	--
Floors and roofs (1-sided exposure)	96	--
Beams, columns and arches (2- or 3-sided fire exposure)-sided exposure)	--	192 × 192
Beams, columns and arches (4-sided fire exposure)	--	224 × 224

Notes to Table 3.1.18.3.:
(1) See Note A-Table 3.1.18.3.

3) Adhesives used in structural mass timber elements referred to in Sentence (1) that are constructed of cross-laminated timber shall conform to the elevated temperature performance requirements in ANSI/APA PRG 320 "Standard for Performance-Rated Cross-Laminated Timber."

4) Concealed spaces are permitted within structural mass timber elements referred to in Sentence (2) and need not comply with Sentence 3.1.18.4.(1) provided the concealed spaces are

a) *sprinklered*, and divided into compartments by *fire blocks* in conformance with Subsection 3.1.11.,

b) completely filled with rock or slag fibre insulation conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," and having a density of not less than 32 kg/m^3,

c) if horizontal, lined with not less than a single layer of 12.7 mm Type X gypsum board or *noncombustible* material providing an *encapsulation rating* of not less than 25 min, or

d) if vertical, lined with not less than a single layer of 12.7 mm Type X gypsum board or *noncombustible* material providing an *encapsulation rating* of not less than 25 min and vertically divided into compartments by *fire blocks* in conformance with Subsection 3.1.11.

3.1.18.4. Encapsulation of Mass Timber Elements

(See Note A-3.1.18.3.)

1) Except as provided in Sentences (3) to (6), Sentences 3.1.18.3.(4) and 3.1.18.14.(2), and Articles 3.1.18.5., 3.1.18.10. and 3.1.18.15., the exposed surfaces of structural timber elements conforming to Article 3.1.18.3. shall be protected from adjacent spaces in the *building*, including adjacent concealed spaces within wall, floor and roof assemblies, by a material or assembly of materials conforming to Sentence (2) that provides an *encapsulation rating* of not less than 50 min.

(See Note A-3.1.18.4.(1).)

2) Except as provided in Sentence 3.1.18.9.(1), the material or assembly of materials referred to in Sentence (1) shall consist of

a) gypsum board,

b) gypsum concrete,

c) *noncombustible* materials,

d) materials that conform to Sentences 3.1.5.1.(2) to (4), or

e) any combination of the materials listed in Clauses (a) to (d).

3) Except as provided in Sentence (5), the exposed surfaces of mass timber beams, columns and arches within a *suite* or *fire compartment* need not be protected in accordance with Sentence (1), provided

a) their aggregate surface area does not exceed 10% of the total wall area of the perimeter of the *suite* or *fire compartment* in which they are located, and

b) the *flame-spread rating* on any exposed surface is not more than 150.

(See Note A-3.1.18.4.(3) to (6).)

4) Except as provided in Sentences (5) and (6), the exposed surfaces of mass timber walls within a *suite* need not be protected in accordance with Sentence (1), provided

a) each exposed surface faces the same direction, and

b) the *flame-spread rating* on any exposed surface is not more than 150.

(See Notes A-3.1.18.4.(4) and A-3.1.18.4.(3) to (6).)

5) The aggregate exposed surface area of mass timber elements within a *suite* permitted in Sentences (3) and (4) shall not exceed 35% of the total wall area of the perimeter of the *suite*.
(See Note A-3.1.18.4.(3) to (6).)

6) The exposed surfaces of mass timber ceilings within a *suite* need not be protected in accordance with Sentence (1), provided their aggregate area does not exceed

a) 10% of the total ceiling area of the *suite*, where the exposed surfaces have a *flame-spread rating* not more than 150, or

b) 25% of the total ceiling area of the *suite*, where

i) the *suite* contains no mass timber walls with exposed surfaces, and

ii) the exposed surfaces of the mass timber ceiling have a *flame-spread rating* not more than 75.

(See Note A-3.1.18.4.(3) to (6).)

3.1.18.5. Combustible Roofing Materials

1) Wood roof sheathing and roof sheathing supports that do not conform to Articles 3.1.18.3. and 3.1.18.4. are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided they are installed

a) above a concrete deck in accordance with Clauses 3.1.5.3.(2)(a) to (f), or

b) above a deck of *encapsulated mass timber construction*, where

i) said deck is permitted to be encapsulated between the roof sheathing supports by a material or assembly of materials conforming to Sentence 3.1.18.4.(2) that provides an *encapsulation rating* of not less than 50 min,

ii) the height of the roof space is not more than 1 m,

iii) the roof space is divided into compartments by *fire blocks* in conformance with Article 3.1.11.5.,

iv) openings through the deck other than for *noncombustible* roof drains and plumbing piping are protected by shafts constructed as *fire separations* having a *fire-resistance rating* not less than 1 h that extend from the deck to not less than 150 mm above the adjacent sheathing, and

v) except as permitted by Subclause (iv), the roof space does not contain any *building* services.

2) *Combustible* cant strips, roof curbs, nailing strips and similar components used in the installation of roofing are permitted on a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*.

3) Wood nailer facings to parapets not more than 600 mm high, are permitted on a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided the facings and any roof membranes covering the facings are protected by sheet metal.

3.1.18.6. Combustible Window Sashes and Frames

1) *Combustible* window sashes and frames are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided

a) each window in an exterior wall face is an individual unit separated from every other opening in the wall by *noncombustible* wall construction or mass timber wall construction conforming to the dimensions stated in Table 3.1.18.3.,

b) windows in exterior walls in contiguous *storeys* are separated by not less than 1 m of *noncombustible* wall construction or mass timber wall construction conforming to the dimensions stated in Table 3.1.18.3., and

c) the aggregate area of openings in an exterior wall face of a *fire compartment* is not more than 40% of the area of the wall face.

3.1.18.7. Exterior Cladding

1) Except as provided in Sentences (2), (3) and (6), cladding on an exterior wall assembly of a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* shall be *noncombustible*.
(See Note A-3.1.18.7.(1) and (2).)

2) Except as provided in Sentences (3) to (5) and (7), cladding on an exterior wall assembly of a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* is permitted to consist of

a) *combustible* cladding that

i) is not contiguous over more than 4 *storeys*,

ii) represents not more than 10% of the cladding on each exterior wall of each *storey*,

iii) is not more than 1.2 m in width,

iv) has a *flame-spread rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction,

v) is separated from other portions of *combustible* cladding on adjacent *storeys* by a horizontal distance of not less than 2.4 m, and

vi) is separated from other portions of *combustible* cladding by a horizontal distance of not less than 1.2 m,

b) *combustible* cladding that,

i) is not contiguous across adjacent *storeys*,

ii) represents not more than 10% of the cladding on each exterior wall of each *storey*,

iii) has a *flame-spread rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, and

iv) is separated from other portions of *combustible* cladding on adjacent *storeys* by a horizontal distance of not less than 2.4 m,

c) *combustible* cladding representing up to 100% of the cladding on exterior walls of the *first storey*, provided all portions of the cladding can be directly accessed and are located not more than 15 m from a *street* or access route conforming to Article 3.2.5.6., measured horizontally from the face of the *building*,

d) a wall assembly that satisfies the criteria of Clause 3.1.5.5.(1)(b), or

e) a combination of *noncombustible* cladding and the cladding described in Clauses (a) to (d).

(See Note A-3.1.18.7.(1) and (2).)

3) The permitted area of *combustible* cladding in Clause (2)(a) or (b) shall not exceed 5% of the cladding on each exterior wall of each *storey* where the time from receipt of notification of a fire by the fire department until the arrival of the first fire department vehicle at the *building* exceeds 10 min in 10% or more of all fire department calls to the *building*.
(See Note A-3.2.3.1.(8).)

4) An exterior wall assembly constructed in conformance with Appendix D-6 is deemed to satisfy the criteria of Clause (2)(d).

5) Except as provided in Article 3.2.3.10., where the *limiting distance* in Table 3.2.3.1.-D or 3.2.3.1.-E permits an area of *unprotected openings* of not more than 10% of the *exposing building face*, the construction requirements of Table 3.2.3.7. shall be met.

6) A wall assembly conforming to Clause (2)(d) that includes *combustible* cladding made of *fire-retardant-treated wood* shall be tested for fire exposure after the cladding has been subjected to the accelerated weathering test specified in ASTM D 2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing."

7) Where *combustible* cladding conforming to Clause (2)(a) or (b) on an exterior wall of a *fire compartment* is exposed to *combustible* cladding conforming to Clause (2)(a) or (b) on an exterior wall of the same *fire compartment* or of another *fire compartment*, and the planes of the two walls are parallel or at an angle less than 135° measured from the exterior of the *building*, the different portions of *combustible* cladding shall

a) be separated by a horizontal distance of not less than 3 m, and

b) not be contiguous over more than 2 *storeys*.

3.1.18.8. Combustible Components in Exterior Walls

1) Except as provided in Sentence (2), *combustible* components, other than those permitted by Article 3.1.18.7., are permitted to be used in an exterior wall assembly of a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided the wall assembly meets the requirements of Clause 3.1.18.7.(2)(d).

2) An exterior wall assembly constructed in conformance with Appendix D-6 is deemed to satisfy the criteria of Sentence (1).

3) Non-*loadbearing* wood elements permitted in Article 3.1.5.6. need not conform to Article 3.1.18.3. in a *building* or part thereof permitted to be of *encapsulated mass timber construction*.

3.1.18.9. Nailing Elements

1) Wood nailing elements are permitted to be used for the attachment of a material or assembly of materials to provide an *encapsulation rating* in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided the concealed space created by the wood nailing elements is not more than 25 mm deep.

2) Except as permitted by Sentence 3.1.18.14.(2) and Article 3.1.19.2., wood nailing elements are permitted to be used for the attachment of interior finishes in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided the concealed space created by the wood nailing elements is not more than 50 mm deep and

a) exposed surfaces in the concealed space have a *flame-spread rating* not more than 25, or

b) the concealed space is filled with *noncombustible* insulation.

3.1.18.10. Combustible Flooring Elements

1) Wood members more than 50 mm but not more than 300 mm high are permitted to be used for the construction of a raised platform in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, and need not conform to Articles 3.1.18.3. and 3.1.18.4. provided

a) the concealed spaces created by the wood members are divided into compartments by *fire blocks* in conformance with Sentence 3.1.11.3.(4), and

b) the wood members are

i) applied directly to or set into a *noncombustible* floor slab, or

ii) applied directly to a mass timber floor assembly that conforms to the requirements of Article 3.1.18.3.

2) The upper surface of the mass timber floor assembly referred to in Subclause (1)(b)(ii) is permitted to be encapsulated only between the wood members by a material or assembly of materials conforming to Sentences 3.1.18.4.(1) and (2).

3) The floor system for the raised platform referred to in Sentence (1) is permitted to include a *combustible* subfloor and *combustible* finished flooring.

3.1.18.11. Combustible Stairs

1) Wood stairs and landings conforming to the requirements for floor assemblies in Article 3.1.18.3. and Sentences 3.1.18.4.(1) and (2) are permitted in an *exit* stairwell in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*.

2) Wood stairs in a *suite* in a *building* or part of a *building* permitted to be of *encapsulated mass timber* construction need not conform to Articles 3.1.18.3. and 3.1.18.4.

3.1.18.12. Combustible Interior Finishes

1) Except as provided in Sentences (2) and (3), *combustible* interior wall and ceiling finishes referred to in Clause 3.1.13.1.(2)(b) that are not more than 1 mm thick are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction.*

2) Except as provided in Sentences 3.1.18.4.(3) and (4), *combustible* interior wall finishes, other than foamed plastics, that are not more than 25 mm thick are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided they have a *flame-spread rating* not more than 150 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction.

3) Except as provided in Sentences (4) and 3.1.18.4.(3) and (6), *combustible* interior ceiling finishes, other than foamed plastics, that are not more than 25 mm thick are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided they have a *flame-spread rating* not more than 25 on any exposed surface or on any surface that would be exposed by cutting through the material in any direction, except that not more than 10% of the ceiling area within each *fire compartment* is permitted to have a *flame-spread rating* not more than 150. (See Note A-3.1.11.3.(3).)

4) *Combustible* interior ceiling finishes made of *fire-retardant-treated wood* are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided they are not more than 25 mm thick or are exposed *fire-retardant-treated wood* battens.

3.1.18.13. Combustible Elements in Partitions

1) Solid lumber *partitions* not less than 38 mm thick and *partitions* containing wood framing that do not conform to Article 3.1.18.3. are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided the *partitions* are

a) protected on each face with not less than

i) a single layer of 12.7 mm thick Type X gypsum board, with all joints either backed or taped and filled, conforming to ASTM C 1396/C 1396M, "Gypsum Board," or CAN/CSA-A82.27-M, "Gypsum Board,"

ii) a single layer of 19 mm thick *fire-retardant-treated wood*, on solid lumber *partitions*, or

iii) a single layer of 19 mm thick *fire-retardant-treated wood*, on *partitions* containing wood framing, with wood stud cavities filled with *noncombustible* insulation, and

b) not installed as enclosures for *exits* or *vertical service spaces.*

3.1.18.14. Exposed Construction Materials and Components in Concealed Spaces

1) Except as provided in Sentence (2) and Article 3.1.11.7., and except as otherwise provided in this Subsection, only construction materials and components permitted in *noncombustible construction* shall be permitted in concealed spaces within floor, roof, and wall assemblies in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction.*

2) Exposed surfaces are permitted in a concealed space created by the attachment of a material or assembly of materials conforming to Sentence 3.1.18.4.(1), provided the concealed space is not more than 25 mm deep.

3.1.18.15. Penetration by Outlet Boxes

1) The minimum dimension requirements for structural mass timber elements in Clause 3.1.18.3.(2)(c) need not apply to the locations where outlet boxes are installed in the element in accordance with Article 3.1.9.4. (See Note A- 3.1.9.2.(1).)

2) The exposed surfaces of cut-outs in the mass timber elements for the outlet boxes described in Sentence (1) need not be protected in accordance with Sentence 3.1.18.4.(1).

3) Outlet boxes on opposite sides of a vertical structural mass timber element having a *fire-resistance rating* shall be separated by a distance of not less than 600 mm.

3.1.19. Encapsulation Ratings

3.1.19.1. Determination of Ratings

1) Except as provided in Article 3.1.19.2., the rating of a material or assembly of materials that is required to have an *encapsulation rating* shall be determined on the basis of the results of tests conducted in conformance with CAN/ULC-S146, "Test for the Evaluation of Encapsulation Materials and Assemblies of Materials for the Protection of Structural Timber Elements."

3.1.19.2. Encapsulation Materials

(See Note A-3.1.19.2.)

1) Gypsum-concrete topping and concrete not less than 38 mm thick are deemed to have an *encapsulation rating* of 50 min when installed on the upper side of a mass timber floor or roof assembly.

2) Two layers of Type X gypsum board each not less than 12.7 mm thick are deemed to have an *encapsulation rating* of 50 min when installed on a mass timber element, provided they

a) are mechanically fastened directly to the mass timber element with

   i) screws of sufficient length to penetrate the mass timber element not less than 20 mm spaced not more than 400 mm o.c. and 20 mm to 38 mm from the boards' edges, or

   ii) screws fastened to wood nailing elements or resilient metal or steel furring channels not more than 25 mm thick spaced not more than 400 mm o.c.,

b) are installed with the joints in each layer staggered from those in the adjacent layer,

c) are attached by a minimum of two rows of fasteners in each layer,

d) are installed in conformance with ASTM C 840, "Application and Finishing of Gypsum Board," except that their joints need not be taped and finished, and

e) conform to

   i) ASTM C 1396/C 1396M, "Gypsum Board," or

   ii) CAN/CSA-A82.27-M, "Gypsum Board."

(See Note A-3.1.19.2.(2).)