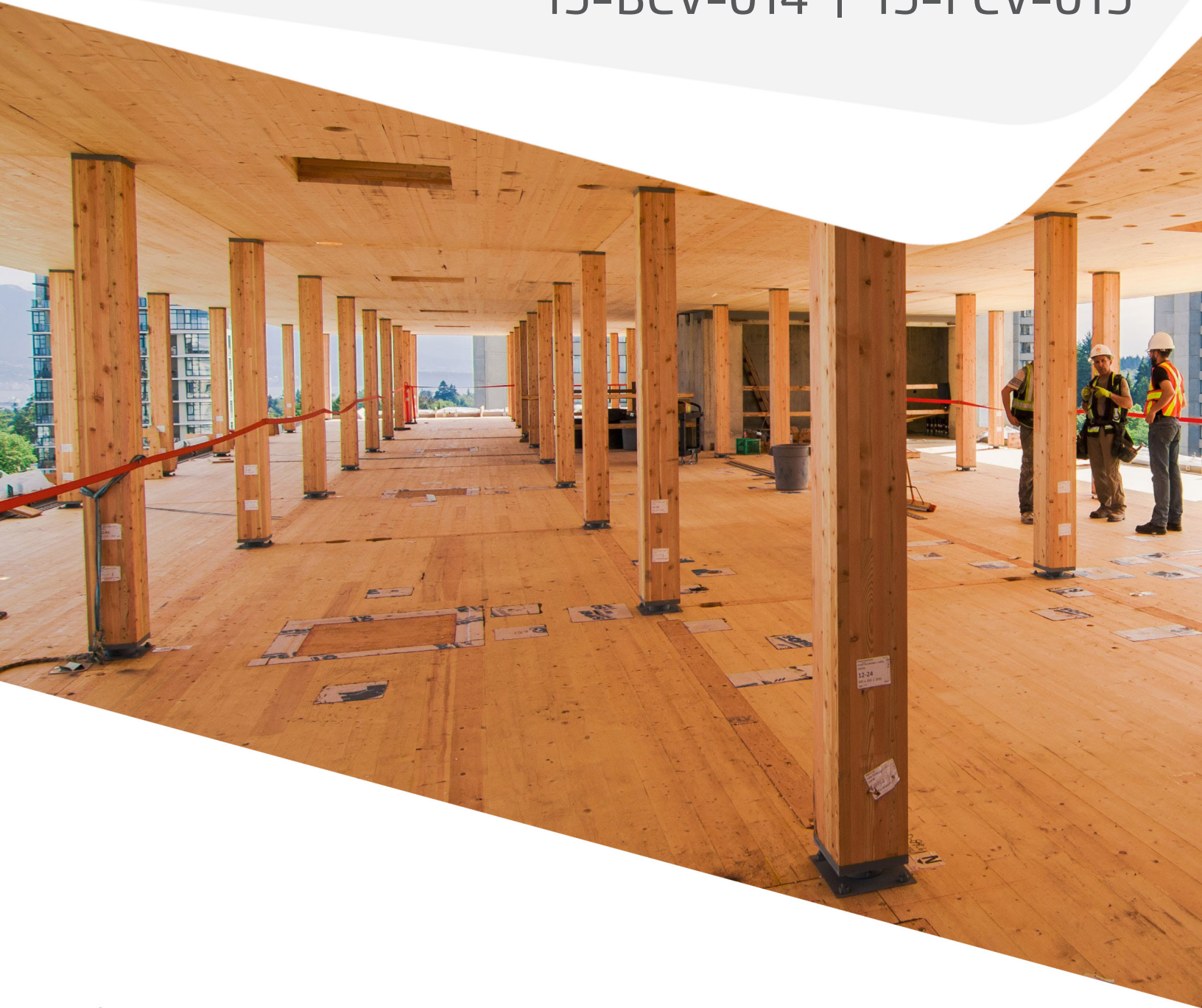


12-STOREY ENCAPSULATED MASS TIMBER CONSTRUCTION

STANDATA USERS GUIDE

19-BCV-014 | 19-FCV-019



**12-STOREY
ENCAPSULATED MASS TIMBER CONSTRUCTION
STANDATA USERS GUIDE 19-BCV-014/19-FCV-019**

To be used in conjunction with the National Building Code – 2019 Alberta Edition
and the National Fire Code – 2019 Alberta Edition

Excerpts from the National Building Code – 2019 Alberta Edition and the National
Fire Code – 2019 Alberta Edition are reproduced with the permission of the
National Research Council of Canada, copyright holder.

Disclaimer:

*The information in this guide is not intended to provide professional design advice. If
professional expertise is required with respect to a specific issue or circumstance,
the services of a professional should be sought.*

Cover photo courtesy of Acton Ostry Architects
Photographer: Pollux Chung

12-STOREY ENCAPSULATED MASS TIMBER CONSTRUCTION

PURPOSE

The purpose of this variance is to permit the construction of buildings of up to 12-storeys in building height of encapsulated mass timber construction (EMTC), as an alternative solution to the National Building Code–2019 Alberta Edition (NBC(AE)) and the National Fire Code-2019 Alberta Edition (NFC(AE)).

DISCUSSION

The 2020 editions of the National Building Code of Canada (NBCC) and National Fire Code of Canada (NFCC) will contain requirements for EMTC up to 12 storeys in building height. The upcoming code provisions were developed by the National Research Council and the Canadian Commission on Building and Fire Codes. EMTC refers to buildings where the mass timber components of the building are surrounded or encapsulated with fire-resistive material. This allows for equivalent or better fire protection compared to other construction types currently permitted by the NBCC and NBC(AE). The upcoming code provisions also include additional requirements for fire protection during construction and ongoing maintenance.

The NBCC 2020 and NFCC 2020 are anticipated to be published in early 2021 and Alberta will automatically enforce the national codes with minimal provincial variations 12 months from their publication date. In order to advance the use of EMTC in Alberta, this variance will permit EMTC up to 12 storeys in building height anywhere in Alberta provided the conditions in this variance are complied with. A variance provides an alternative solution of approximately equivalent or greater safety performance to the prescriptive requirements of the codes. Any construction that complies with this variance is permitted just as if the building was constructed under code requirements.

The conditions in this variance are based on the unpublished code provisions in the upcoming 2020 editions of the NBCC and NFCC. As such, when the next code editions are adopted and brought into force in Alberta, the requirements for EMTC of up to 12 storeys will essentially be unchanged. Any construction under this variance will be allowed to continue under the conditions in this variance even when the next codes are adopted and come into force in Alberta. This variance also includes additional conditions for fire protection during construction and ongoing maintenance.

Unless otherwise stated references are to Division B of the National Building Code-2019 Alberta Edition

Issue of this STANDATA is authorized by
the Provincial Building and Fire Administrators

The logo for the province of Alberta, featuring the word "Alberta" in a stylized, cursive font with a small blue square at the end of the word.

[Original Signed]
Paul Chang

[Original Signed]
Tina Parker

Construction Categories

The current prescriptive requirements in the NBC(AE) separate buildings into two construction type categories: combustible construction and noncombustible construction. The provisions severely restrict the height and area of buildings of combustible construction whereas they permit unlimited height and area for buildings of noncombustible construction. The combustible/noncombustible construction classification system was introduced in the National Codes over 50 years ago and is increasingly being regarded as being outdated and unnecessarily restrictive.

The definition of 'combustible construction' in Article 1.4.1.2. of Division A, along with Subsection 3.1.5. of Division B of the NBC(AE), prohibit the use of combustible structural elements in noncombustible buildings. Therefore, the use of such elements is restricted to smaller buildings permitted to be of combustible construction.

The restriction on the use of combustible structural elements could affect building construction in three ways:

- (a) the building height and building area cannot exceed the limits currently placed on all forms of combustible construction;
- (b) the building cannot contain any combustible structural elements; or
- (c) the designer must submit an alternative solution for approval by the authority having jurisdiction (AHJ) on a project-by-project basis.

This process can require significant resources and expertise, both for the designer to develop and alternative solution and for the AHJ to evaluate it.

Even with the increased use of performance-based design, some code users will continue to prefer to comply via prescriptive provisions, whether for simplicity, efficiency, cost-effectiveness or other reasons. In order to provide code users with the ability to explore construction methods for taller buildings using renewable resources, this variance aims to make designs using EMTC more attainable.

The NBC(AE) requires that buildings greater than 6 storeys in height be of noncombustible construction. This variance permits the construction of EMTC buildings of certain occupancy classifications up to 12 storeys in height.

APPLICATION

This variance applies to construction of buildings or parts thereof using encapsulated mass timber construction. Chapters 1 through 3 and 5 apply to construction. Chapter 4 applies to fire safety for areas undergoing construction and ongoing maintenance.

VARIANCE

This variance provides approximately equivalent or greater safety performance with respect to persons and property as that provided for by the Safety Codes Act, the NBC(AE) and NFC(AE).

Buildings or parts thereof up to 12 storeys in height that are constructed of encapsulated mass timber are permitted, provided the following criteria are met:

See Appendix A

This VARIANCE is applicable throughout the province of Alberta.

Appendix A

Numbering System

The first number indicates the Chapter of the Variance; and the second, the Item in the Chapter. Items may be broken down into Clauses and Subclauses. This structure is illustrated as follows:

3	Chapter
3.5	Item
3.5(a)	Clause
3.5(a)(i)	Subclause

1 GENERAL REQUIREMENTS

- 1.1 Except as specifically varied in this Variance, the NBC(AE) and NFC(AE) apply to a *building* regulated by this Variance.
- 1.2 Except as provided in Item 1.3, all words and terms in italics in this Variance shall have the meanings assigned to them in Article 1.4.1.2. of Division A of the NBC(AE).
- 1.3 The following words and terms in italics in this Variance shall have the following meaning:
- Combustible construction* means that type of construction that does not meet the requirements for *noncombustible construction* or *encapsulated mass timber construction*.
- Encapsulated mass timber construction* means that type of construction in which a degree of fire safety is attained by the use of encapsulated mass timber elements with an *encapsulation rating* and minimum dimensions for structural members and other *building* assemblies.
- Encapsulation rating* means the time in minutes that a material or assembly of materials will delay the ignition and combustion of encapsulated mass timber elements when it is exposed to fire under specified conditions of test and performance criteria, or as otherwise prescribed by this Variance.
- 1.4 Where documents are referenced in this Variance, they shall be the editions designated in Table 1.

Table 1
Documents Referenced in this Variance
 Forming Part of Item 1.4

Issuing Agency	Document Number ⁽¹⁾	Title of Document ⁽²⁾	Variance Reference
ANSI/APA	ANSI/APA PRG 320-19	Performance-Rated Cross-Laminated Timber	2.4
ASTM	C 840-19b	Application and Finishing of Gypsum Board	2.46(c)
ASTM	C 1396/C 1396M-17	Gypsum Board	2.38(a) 2.46(d)
ASTM	D 2898-10	Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing	2.22 3.20(c) Table 5
ASTM	D 5456-19	Evaluation of Structural Composite Lumber Products	3.6(a) & (c)
CSA	CAN/CSA-A82.27-M91	Gypsum Board	2.38(a) 2.46(d)
CSA	O86-19	Engineering Design in Wood	5.7 5.8 5.9(b) 5.11 5.12
ULC	CAN/ULC-S101-14-Rev1	Fire Endurance Tests of Building Construction and Materials	5.1
ULC	CAN/ULC-S102-10	Test for Surface Burning Characteristics of Building Materials and Assemblies	Table 5
ULC	CAN/ULC-S110-13	Test for Air Ducts	3.24(a)
ULC	CAN/ULC-S134-13	Fire Test of Exterior Wall Assemblies	5.13 Table 5
ULC	CAN/ULC-S146-19	Test for The Evaluation of Encapsulation Materials and Assemblies of Materials for the Protection of Structural Timber Elements	2.44
ULC	CAN/ULC-S702.1-14-AMD1	Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification	2.5(b) Table 5

Notes to Table 1

⁽¹⁾ Some documents may have been reaffirmed or reapproved. Check with the applicable issuing agency for up-to-date information.

⁽²⁾ Some titles have been abridged to omit superfluous wording.

- 1.5 A *building* classified as Group C is permitted to conform to Item 1.6, provided
- a) it is *sprinklered* throughout,
 - b) it is not more than 12 *storeys* in *building height*,
 - c) it has a height not more than 42 m measured between the floor of the *first storey* and the uppermost floor level that does not serve a rooftop enclosure for elevator machinery, a stairway or a *service room* used only for service to the *building*, and
 - d) it has a *building area* not more than 6 000 m².

- 1.6 Except as provided in Article 3.2.2.16. of the NBC(AE), the *building* referred to in Item 1.5 is permitted to be of *encapsulated mass timber construction* or *noncombustible construction*, used singly or in combination, and
- except as provided in Item 1.7, floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
 - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 1.7 In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3) of the NBC(AE), the floor assemblies, including floors over *basements*, that are entirely contained within these *dwelling units* shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.
- 1.8 Group A, Division 2 *major occupancies*, Group E *major occupancies* and *storage garages* located in a *building* or part of a *building* within the scope of Item 1.5 are permitted to be constructed in accordance with Items 1.6 and 1.7, provided
- the Group A, Division 2 *major occupancy* is located below the fourth *storey*,
 - the Group E *major occupancy* is located below the third *storey*, and
 - the *storage garage* is located below the fifth *storey*.
- 1.9 A *building* classified as Group D is permitted to conform to Item 1.10, provided
- it is *sprinklered* throughout,
 - it is not more than 12 *storeys* in *building height*,
 - it has a height not more than 42 m measured between the floor of the *first storey* and the uppermost floor level that does not serve a rooftop enclosure for elevator machinery, a stairway or a *service room* used only for service to the *building*, and
 - it has a *building area* not more than 7 200 m².
- 1.10 Except as provided in Article 3.2.2.16. of the NBC(AE), the *building* referred to in Item 1.9 is permitted to be of *encapsulated mass timber construction* or *noncombustible construction*, used singly or in combination, and
- floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
 - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 1.11 Group A, Division 2 *major occupancies*, Group E *major occupancies*, Group F, Division 2 and 3 *major occupancies*, and *storage garages* located in a *building* or part of a *building* within the scope of Item 1.9 are permitted to be constructed in accordance with Item 1.10, provided
- the Group A, Division 2 *major occupancy* is located below the fourth *storey*,
 - the Group E *major occupancy* and Group F, Division 2 or 3 *major occupancy* are located below the third *storey*, and
 - the *storage garage* is located below the fifth *storey*.

- 1.12 Except as permitted by Sentence 3.2.2.18.(2) of the NBC(AE), an automatic sprinkler system conforming to the requirements of Item 1.13, Articles 3.2.4.7., 3.2.4.8., 3.2.4.9. and Sentences 3.2.5.12.(1) to (6) and (8) to (11) of the NBC(AE) shall be installed throughout the *building*.
- 1.13 Notwithstanding the requirements of the standards referenced in Sentences 3.2.5.12.(1) and (2) of the NBC(AE) regarding the installation of automatic sprinkler systems, sprinklers shall be provided for balconies and decks exceeding 610 mm in depth measured perpendicular to the exterior wall.
- 1.14 A *fire separation* with a 2 h *fire-resistance rating* is required between the Group C and Group A, Division 2 *major occupancies*.
- 1.15 A *fire separation* with a 2 h *fire-resistance rating* is required between the Group D and Group A, Division 2 *major occupancies*.
- 1.16 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*.
- 1.17 Except for portions of *buildings* constructed in accordance with Item 3.15 and Sentences 3.2.2.7.(2) to (4) of the NBC(AE) that are required to be of *noncombustible construction*, assemblies of *noncombustible construction* in *buildings* or portions of *buildings* of *encapsulated mass timber construction* are permitted to be supported by *encapsulated mass timber construction*.
- 1.18 A *building* or part of a *building* constructed in accordance with Items 1.9 to 1.11 in which the floor level of the highest *storey* is more than 18 m above *grade* shall comply with Subsection 3.2.6. of the NBC(AE).

2 ENCAPSULATED MASS TIMBER CONSTRUCTION

- 2.1 Except as otherwise provided in this Variance, a *building* or part of a *building* of *encapsulated mass timber construction* shall conform to Subsection 3.1.5. of the NBC(AE).
- 2.2 Except as otherwise provided in this Chapter, Items 3.21 and 3.22, Article 3.2.2.16. of the NBC(AE), a *building* or part of a *building* 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 Items 2.3 and 2.4.
- 2.3 Structural mass timber elements referred to in Item 2.2 shall
- except as provided in Item 2.5, be arranged in heavy solid masses containing no concealed spaces,
 - have essentially smooth flat surfaces with no thin sections or sharp projections, and
 - except as provided in Item 2.41, conform to the minimum dimensions stated in Table 2.

Table 2
Minimum Dimensions of Structural Mass Timber Elements in Encapsulated Mass Timber Construction
 Forming Part of Item 2.3

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

- 2.4 Adhesives used in structural mass timber elements referred to in Item 2.2 that are constructed of cross-laminated timber shall conform to the elevated temperature performance requirements in ANSI/APA PRG 320 “Performance-Rated Cross-Laminated Timber.”
- 2.5 Concealed spaces are permitted within structural mass timber elements referred to in Item 2.3 and need not comply with Item 2.6 provided the concealed spaces are
- a) *sprinklered*, and divided into compartments by *fire blocks* in conformance with Subsection 3.1.11. of the NBC(AE) and Items 3.1 to 3.8,
 - b) completely filled with rock or slag fibre insulation conforming to CAN/ULC-S702.1, “Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification” and having a minimum density of 32 kg/m³,
 - 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. of the NBC(AE) and Items 3.1 to 3.8.
- 2.6 Except as provided in Items 2.5, 2.9 to 2.15, 2.29 to 2.31 and 2.40 to 2.43, the exposed surfaces of structural mass timber elements conforming to Items 2.2 to 2.5 shall be protected from adjacent spaces in the *building*, including adjacent concealed spaces within wall, floor and roof assemblies, by a material or assemblage of materials conforming to Item 2.7 that provides an *encapsulation rating* of not less than 50 min.

- 2.7 Except as provided in Item 2.27, the material or assemblage of materials referred to in Item 2.6 shall consist of
- gypsum board,
 - gypsum concrete,
 - noncombustible* materials,
 - materials that conform to Sentences 3.1.5.1.(2) to (4) of the NBC(AE), or
 - any combination of the materials listed in Clauses (a) to (d).
- 2.8 In addition to the information required in Article 2.2.3.1. of Division C of the NBC(AE), the source of information for the *encapsulation ratings* of mass timber elements of construction shall be indicated on large-scale sections.
- 2.9 Except as provided in Item 2.12, the exposed surfaces of mass timber beams, columns and arches within a *suite* or *fire compartment* need not be protected in accordance with Item 2.6, provided
- 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
 - the *flame-spread rating* on any exposed surface is not more than 150.
- 2.10 The exposed surfaces of mass timber walls within a *suite* need not be protected in accordance with Item 2.6, provided
- each exposed surface faces the same direction, and
 - the *flame-spread rating* on any exposed surface is not more than 150.
- 2.11 The aggregate exposed surface area of mass timber elements within a *suite* permitted in Items 2.9 and 2.10 shall not exceed 35% of the total wall area of the perimeter of the *suite*.
- 2.12 The exposed surfaces of mass timber ceilings within a *suite* need not be protected in accordance with Item 2.6, provided their aggregate area does not exceed
- 10% of the total ceiling area of the *suite*, where the exposed surfaces have a *flame-spread rating* not more than 150, or
 - 25% of the total ceiling area of the *suite*, where
 - the *suite* contains no mass timber walls with exposed surfaces, and
 - the exposed surfaces of the mass timber ceiling have a *flame-spread rating* not more than 75.
- 2.13 Wood roof sheathing and roof sheathing supports that do not conform to Items 2.2 to 2.7 and 2.9 to 2.12 are permitted, provided they are installed
- above a concrete deck in accordance with Clauses 3.1.5.3.(2)(a) to (f) of the NBC(AE), or
 - above a deck of *encapsulated mass timber construction*, where
 - the deck is permitted to be encapsulated between the roof sheathing supports by a material or assembly of materials conforming to Item 2.7 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 Items 3.3. and 3.4, and Sentences 3.1.11.5.(1) to (3) of the NBC(AE),
 - 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*.
- 2.14 *Combustible* cant strips, roof curbs, nailing strips and similar components used in the installation of roofing are permitted.
- 2.15 Wood nailer facings to parapets not more than 600 mm high are permitted, provided the facings and any roof membranes covering the facings are protected by sheet metal.
- 2.16 *Combustible* window sashes and frames are permitted, 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 2,
 - 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 2, 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.
- 2.17 Except as provided in Items 2.18, 2.19 and 2.22, cladding on an exterior wall assembly shall be *noncombustible*.
- 2.18 Except as provided in Items 2.19 to 2.21, cladding on an exterior wall assembly 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. of the NBC(AE), measured horizontally from the face of the *building*,
 - d) a wall assembly that satisfies the criteria of Item 5.13 or Clause 3.1.5.5.(1)(b) of the NBC(AE), or
 - e) a combination of *noncombustible* cladding and the cladding described in Clauses (a) to (d).
- 2.19 The permitted area of *combustible* cladding in Clauses 2.18(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 first fire department vehicle capable of beginning suppression activities arrives at the *building* exceeds 10 min in 10% or more of all fire department calls to the *building*.
- 2.20 An exterior wall assembly constructed in conformance with Item 5.13 is deemed to satisfy the criteria of Clause 2.18(d).
- 2.21 Except as provided in Article 3.2.3.10. of the NBC(AE), where the *limiting distance* in Table 3.2.3.1.-D or 3.2.3.1.-E of the NBC(AE) permits an area of *unprotected openings* of not more than 10% of the *exposing building face*, the construction requirements of Table 3 shall be met.
- 2.22 A wall assembly conforming to Clause 2.18(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."
- 2.23 Where *combustible* cladding conforming to Clause 2.18(a) or (b) on an exterior wall of a *fire compartment* is exposed to *combustible* cladding conforming to Clause 2.18(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*.
- 2.24 *Combustible* components, other than those permitted by Items 2.17 to 2.23, are permitted to be used in an exterior wall assembly, provided the wall assembly meets the requirements of Clause 2.18(d).

- 2.25 An exterior wall assembly constructed in conformance with Item 5.13 is deemed to comply with Item 2.24.
- 2.26 Non-*loadbearing* wood elements permitted in Article 3.1.5.6. of the NBC(AE) need not conform to Items 2.2 to 2.5.
- 2.27 Wood nailing elements are permitted to be used for the attachment of a material or assembly of materials to provide an *encapsulation rating*, provided the concealed space created by the wood nailing elements is not more than 25 mm deep.
- 2.28 Except as permitted by Items 2.40, 2.45 and 2.46, wood nailing elements are permitted to be used for the attachment of interior finishes, 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.
- 2.29 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, and need not conform to Items 2.2 to 2.7 and 2.9 to 2.12 provided
- a) the concealed spaces created by the wood members are divided into compartments by *fire blocks* in conformance with Item 3.2, 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 Items 2.2 to 2.5.
- 2.30 The upper surface of the mass timber floor assembly referred to in Subclause 2.29(b)(ii) is permitted to be encapsulated only between the wood members by a material or assembly of materials conforming to Items 2.6 and 2.7.
- 2.31 The floor system for the raised platform referred to in Item 2.29 is permitted to include a *combustible* subfloor and *combustible* finished flooring.
- 2.32 Wood stairs and landings conforming to the requirements for floor assemblies in Items 2.2 to 2.7 are permitted in an *exit* stairwell.
- 2.33 Wood stairs in a *suite* need not conform to Items 2.2 to 2.7 and 2.9 to 2.12.
- 2.34 Except as provided in Items 2.35 and 2.36, *combustible* interior wall and ceiling finishes referred to in Clause 3.1.13.1.(2)(b) of the NBC(AE) that are not more than 1 mm thick are permitted.
- 2.35 Except as provided in Items 2.9 and 2.10, *combustible* interior wall finishes, other than foamed plastics, that are not more than 25 mm thick are permitted, 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.
- 2.36 Except as provided in Items 2.9, 2.12 and 2.37, *combustible* interior ceiling finishes, other than foamed plastics, that are not more than 25 mm thick are permitted, 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.
- 2.37 *Combustible* interior ceiling finishes made of *fire-retardant-treated wood* are permitted, provided they are not more than 25 mm thick or are exposed *fire-retardant-treated wood* battens.
- 2.38 Solid lumber *partitions* not less than 38 mm thick and *partitions* containing wood framing that do not conform to Items 2.2 to 2.5 are permitted, 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*.
- 2.39 Except as provided in Items 2.40 and 3.5 to 3.8, and Sentences 3.1.11.7.(1) to (3) of the NBC(AE), and except as otherwise provided in Items 2.1 to 2.7 and 2.9 to 2.43, only construction materials and components permitted in *noncombustible construction* shall be permitted in concealed spaces within floor, roof, and wall assemblies.
- 2.40 Exposed surfaces are permitted in a concealed space created by the attachment of a material or assembly of materials conforming to Item 2.6, provided the concealed space is not more than 25 mm deep.
- 2.41 The minimum dimensions stated in Table 2 need not apply at cutouts in structural mass timber elements where outlet boxes are installed in accordance with Article 3.1.9.4. of the NBC(AE).
- 2.42 The exposed surfaces of cutouts described in Item 2.41 need not be protected in accordance with Item 2.6.
- 2.43 Outlet boxes on opposite sides of a vertical structural mass timber element having a *fire-resistance rating* shall be separated by a horizontal distance of not less than 600 mm.

- 2.44 Except as provided in Items 2.45 and 2.46, 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."
- 2.45 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.
- 2.46 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 fastened with a minimum of two rows of screws in each layer
 - i) directly to the mass timber element with screws of sufficient length to penetrate not less than 20 mm into the mass timber element that are spaced not more than 400 mm o.c. and 20 mm to 38 mm from the boards' edges, or
 - ii) to wood furring or resilient metal or steel furring channels not more than 25 mm thick spaced not more than 400 mm o.c. on the mass timber element,
 - b) are installed with the joints in each layer staggered from those in the adjacent layer,
 - c) 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
 - d) conform to
 - i) ASTM C 1396/C 1396M, "Gypsum Board," or
 - ii) CAN/CSA-A82.27-M, "Gypsum Board."

3 ADDITIONAL CONSTRUCTION REQUIREMENTS

- 3.1 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 Items 3.5 to 3.8 and Sentences 3.1.11.7.(1) to (3) of the NBC(AE) between wood nailing elements so that the maximum area of the concealed space is not more than 2 m².
- 3.2 *Fire blocks* conforming to Items 3.5 to 3.8 and Sentences 3.1.11.7.(1) to (3) of the NBC(AE) shall be provided in the concealed spaces created by the wood members permitted by Item 2.29 so that the maximum area of a concealed space is not more than 10 m².
- 3.3 Except for crawl spaces conforming to Sentence 3.1.11.6.(1) of the NBC(AE) and except as provided in Item 3.4, horizontal concealed spaces within a floor assembly or roof assembly of *encapsulated mass timber construction* shall be separated by construction conforming to Items 3.5 to 3.8 and Sentences 3.1.11.7.(1) to (3) of the NBC(AE) into compartments that are
- a) not more than 600 m² 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 m² 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.
- 3.4 *Fire blocks* conforming to Item 3.3 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.
- 3.5 Wood nailing elements referred to in Items 2.27 and 2.28 need not be tested in conformance with Sentence 3.1.11.7.(1) of the NBC(AE).
- 3.6 In a *combustible* roof system permitted by Item 2.13 and Sentence 3.1.5.3.(2) of the NBC(AE), and in a raised platform permitted by Item 2.29 and Sentence 3.1.5.10.(2) of the NBC(AE), *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.
- 3.7 Openings through materials referred to in Item 3.5 and 3.6 and Sentences 3.1.11.7.(1) to (3) of the NBC(AE) shall be protected to maintain the integrity of the construction.
- 3.8 Where materials referred to in Item 3.5 and 3.6 and Sentences 3.1.11.7.(1) to (3) of the NBC(AE) are penetrated by construction elements or by service equipment, a *fire stop* shall be used to seal the penetration.
- 3.9 The *flame-spread ratings* required by Chapter 2 shall apply in addition to the requirements in Subsection 3.1.13. of the NBC(AE).
- 3.10 The *flame-spread ratings* for *exits* required by Subsection 3.1.13. of the NBC(AE) shall 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 Item 2.9, *heavy timber construction* and *fire-retardant-treated wood*.
- 3.11 Except as provided in Item 3.12, roof coverings shall have a Class A classification as determined in accordance with Article 3.1.15.1. of the NBC(AE) where the roof height is greater than 25 m measured from the floor of the *first storey* to the highest point of the roof.

- 3.12 Where *buildings* or parts of *buildings* include non-contiguous roof assemblies at different elevations, the roof coverings referred to in Item 3.11 are permitted to be evaluated separately to determine the roof covering classification required.
- 3.13 The exterior wall of a *basement* that is required to be a *fire separation* with a *fire-resistance rating* in accordance with Sentence 3.2.1.2.(1) of the NBC(AE) is permitted to be penetrated by openings that are not protected by *closures* provided
- a) the *storage garage* is *sprinklered* throughout,
 - b) every opening in the exterior wall is separated from *storeys* above the opening by a projection of the floor or roof assembly above the *basement*, extending not less than 2 m beyond the exterior face of the *storage garage*, or
 - c) the exterior walls of any *storeys* located above the floor or roof assembly referred to in Sentence 3.2.1.2.(1) of the NBC(AE) are recessed behind the outer edge of the assembly by not less than 2 m.
- 3.14 Except as permitted by Items 1.8, 1.11 and 3.15, Article 3.2.2.8. and Sentence 3.2.2.7.(2) of the NBC(AE), in a *building* containing more than one *major occupancy*, the requirements of Subsection 3.2.2. of the NBC(AE) for the most restricted *major occupancy* contained shall apply to the whole *building*.
- 3.15 Except as provided in Items 1.8 and 1.11, Article 3.2.2.8. and Sentence 3.2.2.18.(2) of the NBC(AE), in a *building* in which one *major occupancy* is located entirely above another *major occupancy*, the requirements in Subsection 3.2.2. of the NBC(AE) for each portion of the *building* containing a *major occupancy* shall apply to that portion as if the entire *building* were of that *major occupancy*.
- 3.16 The floor assembly of an exterior balcony shall be
- a) of *noncombustible construction*, or
 - b) constructed in accordance with Items 2.2 to 2.5, but need not comply with Item 2.6.
- 3.17 Except as provided in Items 3.19 and 3.20 and Articles 3.2.3.10. and 3.2.3.11. of the NBC(AE), the *fire-resistance rating*, construction and cladding for *exposing building faces* of *buildings* or *fire compartments* of Group A, Division 2, C, D or Group F, Division 3 *occupancy* classification shall comply with Table 3.
- 3.18 Except as provided in Items 3.19 and 3.20 and Article 3.2.3.10. of the NBC(AE), the *fire-resistance rating*, construction and cladding for *exposing building faces* of *buildings* or *fire compartments* of Group E or Group F, Division 2 *occupancy* classification shall comply with Table 3.

Table 3
Minimum Construction Requirements for Exposing Building Faces
 Forming Part of Items 3.17 and 3.18

<i>Occupancy Classification of Building or Fire Compartment</i>	<i>Maximum Area of Unprotected Openings Permitted, % of Exposing Building Face Area</i>	<i>Minimum Required Fire-Resistance Rating</i>	<i>Type of Construction Required</i>	<i>Type of Cladding Required</i>
Group A, Division 2, C, D, or Group F, Division 3	0 to 10	1 h	<i>Noncombustible</i>	<i>Noncombustible</i>
	> 10 to 25	1 h	<i>Combustible, Encapsulated mass timber, or Noncombustible</i>	<i>Noncombustible</i>
	> 25 to 50	45 min	<i>Combustible, Encapsulated mass timber, or Noncombustible</i>	<i>Noncombustible</i>
	> 50 to < 100	45 min	<i>Combustible, Encapsulated mass timber, or Noncombustible</i>	<i>Combustible or Noncombustible⁽¹⁾</i>
Group E or Group F, Division 2	0 to 10	2 h	<i>Noncombustible</i>	<i>Noncombustible</i>
	> 10 to 25	2 h	<i>Combustible, Encapsulated mass timber, or Noncombustible</i>	<i>Noncombustible</i>
	> 25 to 50	1 h	<i>Combustible, Encapsulated mass timber, or Noncombustible</i>	<i>Noncombustible</i>
	> 50 to < 100	1 h	<i>Combustible, Encapsulated mass timber, or Noncombustible</i>	<i>Combustible or Noncombustible</i>

Note to Table 3:

⁽¹⁾ The cladding on Group C or Group D *buildings* shall conform to Item 2.18 or be *noncombustible*.

- 3.19 Except as provided in Items 2.17 to 2.23 and Article 3.1.4.8. of the NBC(AE), the requirement in Table 3 for *noncombustible* cladding for *buildings* or *fire compartments* where the maximum permitted area of *unprotected openings* is more than 10% of the *exposing building face* is permitted to be waived for exterior wall assemblies that comply with Article 3.1.5.5. of the NBC(AE).
- 3.20 Except as provided in Items 2.17 to 2.23 and Article 3.1.4.8. of the NBC(AE), the requirement in Table 3 for *noncombustible* cladding for *buildings* or *fire compartments* where the maximum permitted area of *unprotected openings* is more than 25% but not more than 50% of the *exposing building face* is permitted to be waived where
- a) the *limiting distance* is greater than 5 m,
 - b) the *building* or *fire compartment* and all *combustible* attic and roof spaces are *sprinklered* throughout,
 - c) the cladding
 - i) conforms to Subsections 9.27.6. , 9.27.7. , 9.27.8. , 9.27.9. or 9.27.10. of the NBC(AE),
 - ii) is installed without furring members, or on furring not more than 25 mm thick, over gypsum sheathing at least 12.7 mm thick or over masonry, and
 - iii) after conditioning in conformance with ASTM D 2898, "Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing", has a *flame-spread rating* not greater than 25 on the exterior face when tested in accordance with Sentence 3.1.12.1.(1) of the NBC(AE),
 - d) the cladding
 - i) conforms to Subsection 9.27.12. of the NBC(AE),
 - ii) is installed with or without furring members over gypsum sheathing at least 12.7 mm thick or over masonry,
 - iii) has a *flame-spread rating* not greater than 25 when tested in accordance with Sentence 3.1.12.1.(2) of the NBC(AE), and
 - iv) does not exceed 2 mm in thickness exclusive of fasteners, joints and local reinforcements, or
 - e) the exterior wall assembly complies with Article 3.1.5.5. of the NBC(AE).
- 3.21 Except as provided in Item 3.22, a *walkway* connected to a *building* or part of a *building* of *encapsulated mass timber construction* shall be of *noncombustible construction* or *encapsulated mass timber construction*.
- 3.22 A *walkway* connected to a *building* required to be of *noncombustible construction* or a *building* or part of a *building* of *encapsulated mass timber construction* is permitted to be of *heavy timber construction*, provided
- a) not less than 50% of the area of any enclosing perimeter walls is open to the outdoors, and
 - b) the *walkway* is at ground level.

- 3.23 A concealed space used as a *plenum* within a floor assembly or within a roof assembly need not conform to Item 3.24 and Sentences 3.1.5.18.(1), 3.6.5.1.(1) and (3) to (5) of the NBC(AE), provided
- a) all materials within the concealed space have a *flame-spread rating* not more than 25 and a smoke developed classification not more than 50, except for
 - i) tubing for pneumatic controls,
 - ii) 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 conform to Sentences 3.1.4.3.(2) and 3.1.5.21.(2) of the NBC(AE),
 - iii) totally enclosed non-metallic raceways with an FT6 rating, when tested in accordance with Clause 3.1.5.23.(1)(a) of the NBC(AE), and
 - b) the supports for the ceiling membrane are of *noncombustible* material having a melting point not below 760°C.
- 3.24 Except as permitted by Sentence 3.6.5.1.(3) of the NBC(AE), ducts, associated fittings and *plenums* are permitted to contain *combustible* material provided they
- a) conform to the appropriate requirements for Class 1 duct materials in CAN/ULC-S110, "Test for Air Ducts",
 - b) conform to Article 3.1.5.18. of the NBC(AE) in a *building* required to be of *noncombustible construction* or in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*,
 - c) conform to Subsection 3.1.9. of the NBC(AE),
 - d) are used only in horizontal runs, and
 - e) are not used in air duct systems in which the air temperature could be more than 120°C.
- 3.25 Except as permitted by Sentence 3.6.5.5.(5) of the NBC(AE), where *combustible* insulation is used on piping in a *horizontal service space* or a *vertical service space*, the insulation and coverings on that piping shall have a *flame-spread rating* not more than 25, on any exposed surface and on any surface that would be exposed by cutting through the material in any direction.
- 3.26 A *noncombustible* lining or backing shall be provided for every steam or hot water radiator and convector
- a) located in a recess or concealed space, or
 - b) attached to the face of a wall of *combustible construction* or *encapsulated mass timber construction*.

4 FIRE SAFETY

- 4.1 Where encapsulation materials or an assembly of materials that provide protection for mass timber elements are damaged or removed so as to effect their integrity, they shall be repaired or replaced so that the *encapsulation rating* of the materials is maintained.

- 4.2 Where encapsulation materials or an assembly of materials described in Item 4.1 are repaired or replaced, the repairs or replacements shall be in conformance with this Variance.
- 4.3 Required clearances between *chimneys, flue pipes or appliances* and *encapsulated mass timber construction* shall be maintained in conformance with the NBC(AE).
- 4.4 *Buildings* or parts thereof shall comply with Articles 5.6.3.2., 5.6.3.6. and 5.6.3.8., and Sentences 5.6.3.3.(1) and 5.6.3.4.(2) of the NFC(AE).
- 4.5 A sign identifying the floor level, stair location and civic address shall be posted at each floor in a stairway required by Item 4.8.
- 4.6 A clearance of not less than 3 m between *exits* or any portion of the *building* and containers used for the disposal of *combustible* refuse shall be maintained, or equivalent protection shall be provided as specified in the fire safety plan.
- 4.7 An adequate water supply for firefighting shall be provided in accordance with Article 3.2.5.7. of the NBC(AE) as soon as *combustible or encapsulated mass timber construction* material arrives on the site.
- 4.8 During construction and in addition to the requirements of Sentences 5.6.1.4.(2) and (3) of the NFC(AE), at least two stairways shall be provided that
- a) consist of treads and risers complying with the dimensional requirements of Article 3.4.6.8. of the NBC(AE),
 - b) are equipped with one handrail conforming to Sentences 3.4.6.5.(5), (6), (7), (11), (13), and (14) of the NBC(AE),
 - c) are not less than 900 mm wide, and
 - d) are equipped with *guards* that are
 - i) not less than 920 mm high when measured vertically to the top of the *guard* from a line drawn through the outside edges of the stair nosings, and
 - ii) not less than 1070 mm high around landings.
- 4.9 At least two stairways conforming to Item 4.8 shall be
- a) extended upward as each floor is installed in new construction, or
 - b) maintained for each floor still remaining during demolition.
- 4.10 Stairways referred to in Item 4.8 and 4.9
- a) shall be separated from the remainder of the *storey* by a wall assembly having a *fire-resistance rating* not less than 30 min, and
 - b) shall have doorways that are provided with
 - i) 45 mm solid core wood doors,
 - ii) hollow metal doors,
 - iii) doors constructed of not less than 12.7 mm thick gypsum board mechanically fastened to not less than 12.7 mm thick plywood with the gypsum board facing the floor area, or
 - iv) door assemblies having a *fire-protection rating* not less than 20 min.

- 4.11 Doors for stairways described in Item 4.10(b) shall
- a) swing on the vertical axis, and
 - b) be equipped with
 - i) latches, and
 - ii) a means to close automatically.
- 4.12 For each new level at which hose valves are installed, the standpipe system shall be subjected to
- a) a pneumatic test at 275 kPa for not less than 24 h, or
 - b) a hydrostatic test at 1 380 kPa for not less than 2 h.
- 4.13 The standpipe system shall be corrected and re-tested if the drop in pressure
- a) when tested in accordance with Clause 4.12(a), is in excess of 21 kPa, or
 - b) when tested in accordance with Clause 4.12(b), is in excess of 35 kPa.
- 4.14 Where a standpipe system is maintained dry,
- a) after each test or re-test carried out in accordance with Item 4.12, it shall be provided with supervisory air not greater than 172 kPa and not less than 35 kPa,
 - b) each fire department connection shall be provided with
 - i) an audible warning system that sounds when the supervisory air is less than 35 kPa, or
 - ii) an air pressure gauge indicating the supervisory air pressure,
 - c) a manual air release with one or more valves of a minimum 30 mm diam shall be provided immediately adjacent to each fire department connection such that the air pressure from a pneumatic test is released in not more than 3 min,
 - d) each fire department connection shall be provided with signage
 - i) indicating that the dry standpipe system is pressurized with air, and
 - ii) showing the location of the manual air release, and
 - e) provisions shall be made to drain water in any trapped sections of the dry standpipe system that are subject to freezing.
- 4.15 Where a standpipe system is maintained wet, each fire department connection shall be provided with a water pressure gauge.
- 4.16 The standpipe system, whether a temporary system or a permanent system being installed progressively, shall be in operable condition at all times when it is not actively being worked on, until the permanent standpipe system is completed.
- 4.17 Except as provided in Items 4.18 and 4.19, a protective encapsulation material or an assemblage of materials providing an *encapsulation rating* of not less than 25 min, as determined in accordance with Item 2.44, shall be installed
- a) such that not more than 20% of the area of the underside of each mass timber floor assembly on each *storey* is exposed during construction,
 - b) on the interior side of stairways required by Item 4.8 and of *vertical service spaces* where the enclosures are constructed of mass timber elements,

- c) on each face of solid lumber or mass timber *partitions* not less than 38 mm thick and of *partitions* containing wood framing as permitted by Item 2.38, and
 - d) such that not more than 35% of the total area of structural mass timber walls within the *storey* is exposed during construction.
- 4.18 Not more than the four uppermost contiguous *storeys* are permitted to be unprotected as required by Item 4.17 during construction.
- 4.19 The encapsulation material or assemblage of materials used to meet the requirements of Item 4.17 is permitted to consist of a single layer of Type X gypsum board not less than 12.7 mm thick conforming to Clauses 2.46(a), (c) and (d).

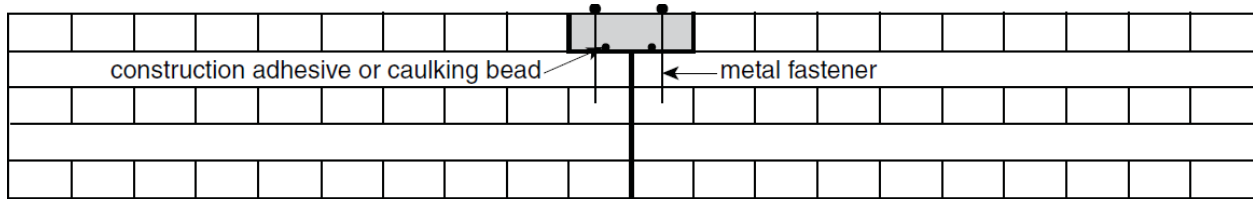
5 FIRE-RESISTANCE RATING CALCULATION

- 5.1 The calculation methods described in Items 5.2 to 5.12 are intended to be used to determine *fire-resistance ratings* for structural mass timber elements on the basis of the elements being subjected to the standard fire exposure conditions described in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."
- 5.2 *Loadbearing* mass timber members, such as beams and columns, subjected to the conditions described in Item 5.1 are assigned a *fire-resistance rating* that relates to the time at which the applied load is no longer sustained.
- 5.3 Mass timber wall, floor and roof assemblies subjected to the conditions described in Item 5.1 are assigned a *fire-resistance rating* that relates to the lesser of the times at which
- a) an average temperature rise of 140°C or a maximum temperature rise of 180 °C at any location is recorded on the unexposed side,
 - b) there is passage of flame or passage of gases hot enough to ignite cotton pads through the unexposed side, or,
 - c) the applied load is no longer being sustained, where the assembly is *loadbearing*.
- 5.4 The method described in D-2.11.2. in Appendix D of the NBC(AE) applies to glued-laminated timber beams and columns required to have *fire-resistance ratings* greater than those afforded under the provisions of Article 3.1.4.6. of the NBC(AE).
- 5.5 The method described in Items 5.7 to 5.12 applies to mass timber elements, including solid sawn timber and glued-laminated timber beams and columns, required to have *fire-resistance ratings* greater than those afforded under the provisions of Article 3.1.4.6. of the NBC(AE).
- 5.6 The methods of calculation in D-2.11.2. in Appendix D of the NBC(AE) and Items 5.7 to 5.12 are separate and independent methods that use different approaches to determine the *fire-resistance ratings* for mass timber elements.
- 5.7 The *fire-resistance rating* of structural mass timber members, such as beams and columns constructed of glued-laminated timber, solid sawn timber, or structural

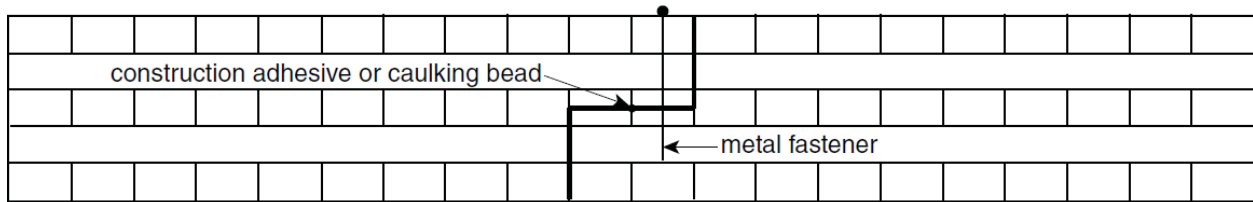
composite lumber, is permitted to be determined using the calculation method described in Annex B of CSA O86, "Engineering Design in Wood."

- 5.8 Except as provided in Items 5.9 to 5.12, the *fire-resistance rating* of mass timber wall, floor and roof assemblies, including those constructed of cross-laminated timber, is permitted to be determined using the calculation method described in Annex B of CSA O86, "Engineering Design in Wood."
- 5.9 Except as provided in Item 5.10, the assemblies described in Item 5.8 shall be protected to maintain the integrity and thermal insulation properties of the assembly for the time period corresponding to the calculated *fire-resistance rating* as follows:
- a) except as provided in Clause (b), for floor and roof assemblies, at least one of the following protection methods applied to the unexposed surface:
 - i) OSB or plywood not less than 12.5 mm thick, with the joints in the layer staggered relative to those in the assembly,
 - ii) concrete topping not less than 38 mm thick, or
 - iii) gypsum-concrete topping not less than 25 mm thick,
 - b) for plank decking designed in accordance with Clause B.10 of CSA O86, "Engineering Design in Wood," at least one of the protection methods for the unexposed surface listed in Clause B.10.4 of CSA O86 applied to the unexposed surface,
 - c) for interior wall assemblies, by applying at least one of the following layers to at least one side of the assembly, with the joints in the layer staggered relative to those in the assembly:
 - i) OSB or plywood not less than 12.5 mm thick, or
 - ii) Type X gypsum board not less than 12.7 mm thick, and
 - d) for exterior wall assemblies, by applying at least one of the following layers to at least one side of the assembly, with the joints in the layer staggered relative to those in the assembly:
 - i) OSB or plywood not less than 12.5 mm thick,
 - ii) Type X gypsum board not less than 12.7 mm thick,
 - iii) gypsum sheathing not less than 12.7 mm thick applied to the exterior side of the assembly, or
 - iv) rock or slag insulation sheathing not less than 50 mm thick applied to the exterior side of the assembly.
- 5.10 For wall, floor and roof assemblies constructed of cross-laminated timber, the joints between cross-laminated timber panels in the assembly need not be protected in accordance with Item 5.9, provided the joints are either lapped or splined to maintain the integrity and thermal insulation properties of the assembly for the time period corresponding to the calculated *fire-resistance rating*. (See Figure 5.10)

Figure 5.10
Joints between cross-laminated timber panels in wall, floor and roof assemblies






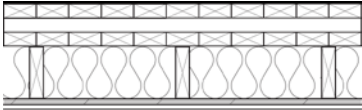
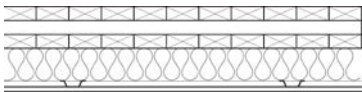
Side view of splined joint between cross-laminated timber panels



Side view of lapped joint between cross-laminated timber panels

- 5.11 For interior wall assemblies, the additional times assigned in Clause B.8.1 of CSA O86, “Engineering Design in Wood,” shall only be applied to the calculated *fire-resistance rating* where both sides of the assembly are protected in accordance with Clause B.8 of CSA O86. Where the level of protection differs on the two sides, the additional time corresponding to the lesser level of protection shall be applied.
- 5.12 For exterior wall assemblies, the additional times assigned in Clause B.8.1 of CSA O86, “Engineering Design in Wood,” shall only be applied to the calculated *fire-resistance rating* where
 - a) the interior side of the assembly is protected in accordance with Clause B.8 of CSA O86, and
 - b) except where the assembly is constructed of cross-laminated timber panels with lapped or splined joints as described in Item 5.10, the exterior side of the assembly is protected in accordance with Clause 5.9(d).
- 5.13 Table 5 shows construction specifications for exterior wall assemblies that are deemed to satisfy the criteria of Clause 3.1.5.5.(1)(b) of the NBC(AE) when tested in accordance with CAN/ULC-S134, “Fire Test of Exterior Wall Assemblies.”

Table 5
Construction Specifications for Exterior Wall Assemblies that are Deemed to Satisfy the
Criteria of Clause 3.1.5.5.(1)(b) when Tested in Accordance with CAN/ULC-S134
 Forming part of Item 5.13

Wall Number	Structural Members	Absorptive Material	Sheathing	Cladding	Design
EXTW-1	38 mm x 89 mm wood studs spaced at 400 mm o.c. ⁽¹⁾⁽²⁾	89 mm thick rock or slag fibre in cavities formed by studs ⁽³⁾⁽⁴⁾	-	12.7 mm thick fire-retardant-treated plywood siding ⁽⁵⁾	
EXTW-2	38 mm x 140 mm wood studs spaced at 400 mm o.c. ⁽¹⁾⁽²⁾	140 mm thick rock or slag fibre in cavities formed by studs ⁽³⁾⁽⁴⁾	Gypsum sheathing ≥ 12.7 mm thick	<i>Noncombustible</i> exterior cladding	
EXTW-3	38 mm x 140 mm wood studs spaced at 400 mm o.c. ⁽¹⁾⁽²⁾	140 mm thick rock or slag fibre in cavities formed by studs ⁽³⁾⁽⁴⁾	15.9 mm thick fire-retardant-treated plywood ⁽⁶⁾	<i>Noncombustible</i> exterior cladding	
EXTW-4	38 mm x 140 mm wood studs spaced at 600 mm o.c. attached to cross-laminated timber wall panels ≥ 38 mm thick ⁽¹⁾⁽⁷⁾⁽⁸⁾	140 mm thick glass, rock or slag fibre in cavities formed by studs ⁽³⁾	Gypsum sheathing ≥ 12.7 mm thick	<i>Noncombustible</i> exterior cladding	
EXTW-5	89 mm horizontal Z-bars spaced at 600 mm o.c. attached	89 mm thick rock or slag fibre in cavities formed by Z-bars ⁽³⁾⁽⁴⁾	-	<i>Noncombustible</i> exterior cladding attached to 19 mm vertical hat channels spaced at 600	

	to cross-laminated timber wall panels \geq 105 mm thick ⁽⁸⁾			mm o.c.	
--	--	--	--	---------	--

Notes to Table 5:

- (1) The stated stud dimensions are maximum values. Where wood studs with a smaller depth are used, the thickness of absorptive material in the cavities formed by the studs must be reduced accordingly.
- (2) Horizontal blocking between the vertical studs or horizontal stud plates must be installed at vertical intervals of at most 2 324 mm, such that the maximum clear length between the horizontal blocking or stud plates is 2 286 mm.
- (3) The absorptive material must conform to CAN/ULC-S702.1, "Mineral Fibre Thermal Insulation for Buildings, Part 1: Material Specification."
- (4) The absorptive material must have a density not less than 32kg/m³.
- (5) The fire-retardant-treated plywood siding must conform to the requirements of Article 3.1.4.5. of the NBC(AE) and must have 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, "Test for Surface Burning Characteristics of Building Materials and Assemblies."
- (6) The fire-retardant-treated plywood must conform to the requirements of Article 3.1.4.5. of the NBC(AE).
- (7) Horizontal blocking between the vertical studs or horizontal stud plates must be installed at vertical intervals of at most 2 438 mm, such that the maximum clear length between the horizontal blocking or stud plates is 2 400 mm.
- (8) A water-resistant barrier may be attached to the face of the cross-laminated timber wall panels.

Division C

2.2.3. Fire Protection Components

2.2.3.1. Information Required for Fire Protection Components

1) Information shall be submitted to show the major components of fire protection including

- a) the division of the *building* by *firewalls*,
- b) the *building area*,
- c) the degree of *fire separation* of *storeys*, shafts and special rooms or areas, including the location and rating of *closures* in *fire separations*,
- d) the source of information for *fire-resistance ratings* of elements of construction (to be indicated on large-scale sections),
- e) the location of *exits*, and
- f) fire detection, suppression and alarm systems.

Division B

3.1.4.3. Wires and Cables

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, "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.

3.1.4.6. 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.

Division B

3.1.4.8. Exterior Cladding

1) Not less than 90% of 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."

3.1.5. 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/m²,

- a) its average total heat release is not more than 3 MJ/m²,
- b) its average total smoke extinction area is not more than 1.0 m², 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 m²,
 - 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 m²,
 - 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
- the glazing is installed in a *building* not more than 1 storey in *building height*,
 - 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
 - the *building* is *sprinklered* throughout.
- 5)** *Combustible* window sashes and frames are permitted in a *building* required to be of *noncombustible construction* provided
- each window in an exterior wall face is an individual unit separated by *noncombustible* wall construction from every other opening in the wall,
 - windows in exterior walls in contiguous storeys are separated by not less than 1 m of *noncombustible construction*, and
 - 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

- 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
- the *building* is
 - not more than 3 storeys in *building height*, or
 - sprinklered* throughout, and
 - 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)):
 - 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
 - the heat flux during the flame exposure on the wall assembly is not more than 35 kW/m² 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

- 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
- the *building* is
 - not more than 3 storeys in *building height*, or
 - sprinklered* throughout, and
 - the wall assembly
 - meets the requirements of Clause 3.1.5.5.(1)(b), or
 - 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 m² 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, "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, “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, “Test for Surface Burning Characteristics of Building Materials and Assemblies.”

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

(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 m².

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 m² in area, and
 - ii) an aggregate area of 0.065 m² in any 9.3 m² 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*.

Division B

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 through a Membrane Ceiling

1) A membrane ceiling forming part of an assembly assigned a *fire-resistance rating* on the basis of Appendix D 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.

3.1.11. 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 m².

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 m².

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 m² 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 m² 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 (4), in *buildings* 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 m² 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 m² 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) *Fire blocks* conforming to Sentence (3) 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 m² in area with no dimension more than 30 m.

3.1.11.7. Fire Block Materials

1) Except as permitted by Sentences (2) to (4) and (7), *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* permitted to be of *combustible construction*, in a *combustible* roof system permitted by Sentence 3.1.5.3.(2), and in a raised platform permitted by Sentence 3.1.5.10.(2), *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.

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

6) 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.(6).)

7) 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/m³,
- 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.(7).)

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, "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 NFC(AE).

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 <i>Flame-Spread Rating</i> for Walls and Ceilings	
	<i>Sprinklered</i>	<i>Not Sprinklered</i>
Group A, Division 1 <i>occupancies</i> , including doors, skylights, glazing and light diffusers and lenses	150	75
Group B <i>occupancies</i>	150	75
<i>Exits</i> ⁽¹⁾	25	25
Lobbies described in Sentence 3.4.4.2.(2)	25	25
Covered vehicular passageways, except for roof assemblies of <i>heavy timber construction</i> in the passageways	25	25
<i>Vertical service spaces</i>	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 m² 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 m² 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 <i>Flame-Spread Rating</i>			Maximum Smoke Developed Classification		
	Wall Surface	Ceiling Surface ⁽¹⁾	Floor Surface	Wall Surface	Ceiling Surface ⁽¹⁾	Floor Surface
<i>Exit</i> stairways, vestibules to <i>exit</i> stairs and lobbies described in Sentence 3.4.4.2.(2)	25	25	25	50	50	50
Corridors not within <i>suites</i>	(2)	(2)	300	100	50	500
Elevator cars	75	75	300	450	450	450
Elevator vestibules	25	25	300	100	100	300
<i>Service spaces</i> and <i>service rooms</i>	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.

3.1.15. 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."

3.2.1.2. Storage Garage Considered as a Separate Building

1) A *basement* used primarily as a *storage garage* is permitted to be considered as a separate *building* for the purposes of Subsection 3.2.2. and Sentences 3.2.5.12.(2) and (3), provided the floor and roof assemblies above the *basement* and the exterior walls of the *basement* above the adjoining ground level are constructed as *fire separations* of *noncombustible construction* having a *fire-resistance rating* not less than 2 h and protected in conformance with Clause 3.1.10.2.(4)(a), except as permitted by Sentence (2). (See Notes A-3.1.10.2.(4) and A-3.2.5.12.(2).)

3.2.2. Building Size and Construction Relative to Occupancy

3.2.2.1. Application

1) Except as permitted by Article 3.2.2.3., a *building* shall be constructed in conformance with this Subsection to prevent fire spread and collapse caused by the effects of fire. (See Subsection 3.1.3. for *fire separations* between *major occupancies*.)

3.2.2.2. Special and Unusual Structures

1) A structure that cannot be identified with the characteristics of a *building* in Articles 3.2.2.20. to 3.2.2.90. shall be protected against fire spread and collapse in conformance with good fire protection engineering practice. (See Note A-3.2.2.2.(1).) (See also Notes A-3 and A-3.2.5.12.(1).)

2) Underground service passageways shall be considered unusual structures under Sentence (1).

3.2.2.3. Exceptions to Structural Fire Protection

- 1)** Fire protection is not required for
- a) steel lintels above openings not more than 2 m wide in *loadbearing* walls and not more than 3 m wide in *non-loadbearing* walls,
 - b) steel lintels above openings more than 2 m wide in *loadbearing* walls and more than 3 m wide in *non-loadbearing* walls provided the lintels are supported at intervals of not more than 2 m by structural members with the required *fire-resistance rating*,

- c) the bottom flanges of shelf angles and plates that are not a part of the structural frame,
- d) steel members for framework around elevator hoistway doorways, steel for the support of elevator and dumbwaiter guides, counterweights and other similar equipment, that are entirely enclosed in a hoistway and are not a part of the structural frame of the *building*,
- e) steel members of stairways and escalators that are not a part of the structural frame of a *building*,
- f) steel members of porches, exterior balconies, exterior stairways, fire escapes, cornices, marquees and other similar appurtenances, provided they are outside an exterior wall of a *building*, and
- g) *loadbearing* steel or concrete members wholly or partly outside a *building* face in a *building* not more than 4 storeys in *building height* and classified as Group A, B, C, D or F, Division 3 *major occupancy* provided the members are
 - i) not less than 1 m away from any *unprotected opening* in an exterior wall, or
 - ii) shielded from heat radiation in the event of a fire within the *building* by construction that will provide the same degree of protection that would be necessary if the member was located inside the *building*, with the protection extending on either side of the member a distance equal to the projection of the member from the face of the wall.

(See also Article 3.2.3.9.)

3.2.2.4. Buildings with Multiple Major Occupancies

1) The requirements restricting fire spread and collapse for a *building* of a single *major occupancy* classification are provided in this Subsection according to its *building height* and *building area*.

2) If a *building* contains more than one *major occupancy*, classified in more than one Group or Division, the requirements of this Subsection concerning *building size* and construction relative to *major occupancy* shall apply according to Articles 3.2.2.5. to 3.2.2.8.

3.2.2.5. Applicable Building Height and Area

1) In determining the fire safety requirements of a *building* in relation to each of the *major occupancies* contained therein, the *building height* and *building area* of the entire *building* shall be used.

3.2.2.6. Multiple Major Occupancies

1) Except as permitted by Articles 3.2.2.7. and 3.2.2.8., in a *building* containing more than one *major occupancy*, the requirements of this Subsection for the most restricted *major occupancy* contained shall apply to the whole *building*.

3.2.2.7. Superimposed Major Occupancies

1) Except as provided in Sentences (3) and (4), Article 3.2.2.8. and Sentence 3.2.2.18.(2), in a *building* in which one *major occupancy* is located entirely above another *major occupancy*, the requirements in this Subsection for each portion of the *building* containing a *major occupancy* shall apply to that portion as if the entire *building* were of that *major occupancy*.

2) If one *major occupancy* is located above another *major occupancy*, the *fire-resistance rating* of the floor assembly between the *major occupancies* shall be determined on the basis of the requirements of this Subsection for the lower *major occupancy*. (See also Article 3.1.3.1.)

3) A *building* that is wholly constructed in accordance with the *building area* and construction requirements of Article 3.2.2.50. shall not contain

- a) Group A, Division 2 and Group E *major occupancies* above the second storey, or
- b) a *storage garage* above the third storey (see also Sentence 4.4.2.1.(1)).

- 4) A *building* that is wholly constructed in accordance with the *building area* and construction requirements of Article 3.2.2.58. shall not contain
- Group A, Division 2, Group E, and Group F, Division 2 or 3 *major occupancies* above the second *storey*, or
 - a *storage garage* above the third *storey* (see also Sentence 4.4.2.1.(1)).

3.2.2.8. Exceptions for Major Occupancies

1) In a *building* in which the aggregate area of all *major occupancies* in a particular Group or Division is not more than 10% of the *floor area* of the *storey* in which they are located, these *major occupancies* need not be considered as *major occupancies* for the purposes of this Subsection, provided they are not classified as Group F, Division 1 or 2 *occupancies*.

3.2.2.9. Crawl Spaces

1) For the purposes of Articles 3.1.11.6., 3.2.1.4. and 3.2.1.5., a crawl space shall be considered as a *basement* if it is

- more than 1.8 m high between the lowest part of the floor assembly and the ground or other surface below,
- used for any *occupancy*,
- used for the passage of *flue pipes*, or
- used as a *plenum* in *combustible construction*.

2) A floor assembly immediately above a crawl space is not required to be constructed as a *fire separation* and is not required to have a *fire-resistance rating* provided the crawl space is not required to be considered as a *basement* by Sentence (1).

3.2.2.10. Streets

1) Every *building* shall face a *street* located in conformance with the requirements of Articles 3.2.5.4. and 3.2.5.5. for access routes.

2) For the purposes of Subsections 3.2.2. and 3.2.5. an access route conforming to Subsection 3.2.5. is permitted to be considered as a *street*.

3) A *building* conforming to Article 3.2.2.50. or 3.2.2.58. is considered to face 1 *street* where not less than 25% of the *building* perimeter is located within 15 m of a *street* or *streets*.

4) A *building* is considered to face 2 *streets* provided not less than 50% of the *building* perimeter is located within 15 m of the *street* or *streets*.

5) A *building* is considered to face 3 *streets* provided not less than 75% of the *building* perimeter is located within 15 m of the *street* or *streets*.

6) Enclosed spaces, tunnels, bridges and similar structures, even though used for vehicular or pedestrian traffic, are not considered as *streets* for the purpose of this Part.

3.2.2.11. Exterior Balconies

1) An exterior balcony shall be constructed in accordance with the type of construction required by Articles 3.2.2.20. to 3.2.2.90., as applicable to the *occupancy* classification of the *building*.

3.2.2.12. Exterior Passageways

1) An elevated exterior passageway used as part of a *means of egress* shall conform to the requirements of Articles 3.2.2.20. to 3.2.2.90. for *mezzanines*.

3.2.2.13. Occupancy on Roof

1) A portion of a roof that supports an *occupancy* shall be constructed in conformance with the *fire separation* requirements of Articles 3.2.2.20. to 3.2.2.90. for floor assemblies, and not the *fire-resistance rating* for roof assemblies.

3.2.2.14. Roof-Top Enclosures

- 1) A roof-top enclosure for elevator machinery or for a *service room* shall be constructed in accordance with the type of construction required by Articles 3.2.2.20. to 3.2.2.90.
- 2) A roof-top enclosure for elevator machinery or for a *service room*, not more than one *storey* high, is not required to have a *fire-resistance rating*.
- 3) A roof-top enclosure for a stairway shall be constructed in accordance with the type of construction required by Articles 3.2.2.20. to 3.2.2.90.
- 4) A roof-top enclosure for a stairway need not have a *fire-resistance rating* nor be constructed as a *fire separation*.

3.2.2.15. Storeys below Ground

- 1) If a *building* is erected entirely below the adjoining finished ground level and does not extend more than one *storey* below that ground level, the minimum precautions against fire spread and collapse shall be the same as are required for *basements* under a *building* of 1 *storey* in *building height* having the same *occupancy* and *building area*.
- 2) If any portion of a *building* is erected entirely below the adjoining finished ground level and extends more than one *storey* below that ground level, the following minimum precautions against fire spread and collapse shall be taken:
 - a) the *basements* shall be *sprinklered* throughout,
 - b) a floor assembly below the ground level shall be constructed as a *fire separation* with a *fire-resistance rating* not less than
 - i) 3 h if the *basements* are used as Group E or Group F, Division 1 or 2 *occupancies*, or
 - ii) 2 h if the *basements* are not used as Group E or Group F, Division 1 or 2 *occupancies*, and
 - c) all *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the construction that they support.

3.2.2.16. Heavy Timber Roof Permitted

- 1) Unless otherwise permitted by Articles 3.2.2.20. to 3.2.2.90., a roof assembly in a *building* up to 2 *storeys* in *building height* is permitted to be of *heavy timber construction* regardless of *building area* or type of construction required, provided the *building* is *sprinklered* throughout.
- 2) If Sentence (1) permits a roof assembly to be of *heavy timber construction*, structural members in the *storey* immediately below the roof assembly are permitted to be of *heavy timber construction*.

3.2.2.17. Arena-Type Building Roof Assembly

- 1) The requirements for a roof assembly to have a *fire-resistance rating* are permitted to be waived for a gymnasium, a *swimming pool*, an arena, or a rink if no part of the roof assembly is less than 6 m above the main floor or balcony and the roof carries no loads other than normal roof loads, including permanent access walks, and ventilating, sound and lighting equipment, except that the restriction concerning minimum distance shall not apply to
 - a) an inclined and stepped floor ascending from the main floor which is used for seating purposes only, or
 - b) a balcony used for seating purposes only.

3.2.2.18. Automatic Sprinkler System Required

- 1) Except as permitted by Sentence (2), an automatic sprinkler system conforming to the requirements of Articles 3.2.4.7., 3.2.4.8., 3.2.4.9. and 3.2.5.12. shall be installed throughout a *building* regulated by one or more of Articles 3.2.2.20., 3.2.2.21., 3.2.2.22., 3.2.2.23., 3.2.2.24., 3.2.2.26., 3.2.2.27., 3.2.2.29., 3.2.2.31., 3.2.2.33., 3.2.2.36., 3.2.2.37., 3.2.2.38., 3.2.2.39., 3.2.2.40., 3.2.2.41., 3.2.2.42., 3.2.2.43., 3.2.2.44., 3.2.2.45., 3.2.2.46.,

3.2.2.47., 3.2.2.48., 3.2.2.49., 3.2.2.50., 3.2.2.51., 3.2.2.54., 3.2.2.55., 3.2.2.57., 3.2.2.58., 3.2.2.59., 3.2.2.61., 3.2.2.63., 3.2.2.64., 3.2.2.65., 3.2.2.67., 3.2.2.69., 3.2.2.70., 3.2.2.71., 3.2.2.72., 3.2.2.74., 3.2.2.75., 3.2.2.77., 3.2.2.79., 3.2.2.80., 3.2.2.82., 3.2.2.84., 3.2.2.86. and 3.2.2.88.

2) If a *storey* in a *building* or a *floor area* is required to have an automatic sprinkler system installed throughout in accordance with one or more of Articles 3.2.2.20. to 3.2.2.90. or Section 3.3., the automatic sprinkler system shall also be installed throughout all lower *storeys* in the *building* notwithstanding permission in Articles 3.2.2.20. to 3.2.2.90. to construct one or more of those *storeys* without installing automatic sprinkler protection. (See Note A-3.2.2.18.(2).)

3) Except for roof assemblies regulated by Articles 3.2.2.50. and 3.2.2.58., the requirements in Articles 3.2.2.20. to 3.2.2.90. for roof assemblies to have a *fire-resistance rating* are permitted to be waived provided

- a) the *building* is *sprinklered*,
- b) the sprinkler system in Clause (a) is electrically supervised in conformance with Sentence 3.2.4.9.(3),
- c) the operation of the sprinkler system in Clause (a) will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4), and
- d) the roof does not support any *occupancy* other than for servicing or maintenance (see Article 3.2.2.13. for roofs intended for *occupancy*).

4) Except for *mezzanines* regulated by Articles 3.2.2.50. and 3.2.2.58., the requirements in Articles 3.2.2.20. to 3.2.2.90. for *mezzanines* to have a *fire-resistance rating* are permitted to be waived where the *building* is *sprinklered* and the *mezzanine* is 240 m² or less in area.

3.2.2.19. Buildings Containing Impeded Egress Zones

1) A *building* containing an *impeded egress zone* and conforming to the appropriate requirements of Articles 3.2.2.20. to 3.2.2.90. is not required to conform to the requirements of Articles 3.2.2.36. and 3.2.2.37. for a Group B, Division 1 *major occupancy* provided

- a) the *building* is *sprinklered* throughout,
- b) it is not more than 1 *storey* in *building height*,
- c) it does not include
 - i) a *contained use area*,
 - ii) sleeping accommodation,
 - iii) a *high-hazard industrial occupancy*, or
 - iv) a *mercantile occupancy*,
- d) the *building area* is not more than 6 400 m² if the *building* includes a *medium-hazard industrial occupancy*,
- e) the *impeded egress zone* does not extend beyond the boundaries of the *fire compartment* in which it is located, and
- f) the *occupant load* of the *impeded egress zone* is not more than 100.

3.2.2.20. Group A, Division 1, Any Height, Any Area, Sprinklered

1) Except as permitted by Articles 3.2.2.21. and 3.2.2.22., a *building* classified as Group A, Division 1 shall conform to Sentence (2).

2) Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.21. Group A, Division 1, One Storey, Limited Area, Sprinklered

- 1)** A *building* classified as Group A, Division 1 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 1 *storey* in *building height*,
 - c) it has less than 40% of the area of the *building* as 2 *storeys* for the purpose of
 - i) development of productions, including preparation of scenery and costumes and rehearsal of performers,
 - ii) organization of performers, scenery and sound equipment,
 - iii) preparation by performers for a performance,
 - iv) managerial functions, or
 - v) toilets, rest rooms and similar public facilities,
 - d) it has no *occupancy* above or below the auditorium other than one which serves it or is dependent on it,
 - e) it is not more than 600 m² in *building area*, and
 - f) the *occupant load* is not more than 600.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations*
 - i) with a *fire-resistance rating* not less than 45 min, or
 - ii) of *heavy timber construction*, and
 - b) *loadbearing walls*, columns and arches shall
 - i) have a *fire-resistance rating* not less than that required for the supported assembly, or
 - ii) be of *heavy timber construction*.

3.2.2.22. Group A, Division 1, One Storey, Sprinklered

- 1)** A *building* classified as Group A, Division 1 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 1 *storey* in *building height*,
 - c) no part of an auditorium floor is more than 5 m above or below *grade*,
 - d) no *occupancy* is above or below the auditorium other than one which serves it or is dependent on it, and
 - e) the *occupant load* of the auditorium floor is not more than 300.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly, or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
 - c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*, and
 - d) *loadbearing walls*, columns and arches supporting a *fire separation* shall have a *fire-resistance rating* not less than that required for the *fire separation*.

3.2.2.23. Group A, Division 2, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Sentences 3.2.2.7.(3) and (4) and Articles 3.2.2.24. to 3.2.2.28., a *building* classified as Group A, Division 2 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,

- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.24. Group A, Division 2, up to 6 Storeys, Any Area, Sprinklered

1) Except as permitted by Sentences 3.2.2.7.(3) and (4), a *building* classified as Group A, Division 2, that is not limited by *building area*, is permitted to conform to Sentence (2), provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout, and
- b) it is not more than 6 *storeys* in *building height*.

2) Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.25. Group A, Division 2, up to 2 Storeys

(See also Article 3.2.1.7.)

1) A *building* classified as Group A, Division 2 is permitted to conform to Sentence (2) provided

- a) it is not more than 2 *storeys* in *building height*, and
- b) it has a *building area* not more than the value in Table 3.2.2.25.

Table 3.2.2.25.
Maximum Building Area, Group A, Division 2, up to 2 Storeys
 Forming Part of Sentence 3.2.2.25.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 600	2 000	2 400
2	800	1 000	1 200

2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
- c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1., and the *building area* is not more than
 - i) 800 m² if facing one *street*,
 - ii) 1 000 m² if facing 2 *streets*, or
 - iii) 1 200 m² if facing 3 *streets*, and
- d) *loadbearing walls, columns and arches* supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.26. Group A, Division 2, up to 2 Storeys, Increased Area, Sprinklered

- 1)** A *building* classified as Group A, Division 2 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 2 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 4 800 m² if 1 *storey* in *building height*, or
 - ii) 2 400 m² if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
 - c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.27. Group A, Division 2, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group A, Division 2 is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 2 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 2 400 m² if 1 *storey* in *building height* with no *basement*,
 - ii) 1 200 m² if 1 *storey* in *building height*, or
 - iii) 600 m² if 2 *storeys* in *building height*.

3.2.2.28. Group A, Division 2, One Storey

- 1)** A *building* classified as Group A, Division 2 is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, provided
- a) it is not more than 1 *storey* in *building height*, and
 - b) except as permitted by Sentence (2), it has a *building area* not more than
 - i) 400 m² if facing one *street*,
 - ii) 500 m² if facing 2 *streets*, or
 - iii) 600 m² if facing 3 *streets*.
- 2)** In a *building* referred to in Sentence (1) without a *basement*, the *building area* limits of Sentence (1) are permitted to be doubled provided a *fire separation* with a *fire-resistance rating* not less than 1 h is used to separate the *building* into *fire compartments*, each one of which does not exceed the limits of Clause (1)(b).

3.2.2.29. Group A, Division 3, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Articles 3.2.2.30. to 3.2.2.34., a *building* classified as Group A, Division 3 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
 - b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
 - c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.30. Group A, Division 3, up to 2 Storeys

(See also Article 3.2.1.7.)

- 1)** A *building* classified as Group A, Division 3 is permitted to conform to Sentence (2) provided
 - a) it is not more than 2 *storeys* in *building height*, and
 - b) it has a *building area* not more than the value in Table 3.2.2.30.

Table 3.2.2.30.
Maximum Building Area, Group A, Division 3, up to 2 Storeys
 Forming Part of Sentence 3.2.2.30.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	4 000	5 000	6 000
2	2 000	2 500	3 000

- 2)** Except as permitted by Clauses (c) and (d), the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
 - a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
 - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h,
 - c) roof assemblies shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *heavy timber construction*, and
 - d) *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly, except that arches and structural members within the *storey* immediately below a roof assembly are permitted to be of *heavy timber construction*.

3) If intended for occasional use for trade shows and similar exhibition purposes, a *building* referred to in Sentence (1) that is more than 1 500 m² in *building area* shall be *sprinklered* throughout.

3.2.2.31. Group A, Division 3, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group A, Division 3 is permitted to conform to Sentence (2) provided
 - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 2 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 12 000 m² if 1 *storey* in *building height*, or
 - ii) 6 000 m² if 2 *storeys* in *building height*.

- 2)** Except as permitted by Clause (c) and Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
 - a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
 - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - c) *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly, except that arches are permitted to be of *heavy timber construction*.

3.2.2.32. Group A, Division 3, One Storey, Increased Area

(See also Article 3.2.1.7.)

- 1)** A *building* classified as Group A, Division 3 is permitted to conform to Sentence (2) provided
- a) it is not more than 1 *storey* in *building height*, and
 - b) it has a *building area* not more than
 - i) 2 400 m² if facing one *street*,
 - ii) 3 000 m² if facing 2 *streets*, or
 - iii) 3 600 m² if facing 3 *streets*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
 - b) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1., and the *building area* is not more than
 - i) 1 200 m² if facing one *street*,
 - ii) 1 500 m² if facing 2 *streets*, or
 - iii) 1 800 m² if facing 3 *streets*, and
 - c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.
- 3)** If intended for occasional use for trade shows and similar exhibition purposes, a *building* referred to in Sentence (1) that is more than 1 500 m² in *building area* shall be *sprinklered* throughout.

3.2.2.33. Group A, Division 3, One Storey, Sprinklered

- 1)** A *building* classified as Group A, Division 3 is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 1 *storey* in *building height*, and
 - c) it has a *building area* not more than 7 200 m².

3.2.2.34. Group A, Division 3, One Storey

- 1)** A *building* classified as Group A, Division 3 is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination provided
- a) it is not more than 1 *storey* in *building height*, and
 - b) it has a *building area* not more than
 - i) 1 000 m² if facing one *street*,
 - ii) 1 250 m² if facing 2 *streets*, or
 - iii) 1 500 m² if facing 3 *streets*.

3.2.2.35. Group A, Division 4

- 1)** Except as permitted by Sentences (2) and (3), a *building* classified as Group A, Division 4 shall be of *noncombustible construction*.
- 2)** Roof assemblies and supporting arches and columns are permitted to be of *heavy timber construction*.
- 3)** A *building* classified as Group A, Division 4 is permitted to be of *combustible construction* provided
- a) the *occupant load* is less than 1 500, and
 - b) the *building* has a *limiting distance* not less than 6 m.

4) Sprinklers shall be installed in all spaces below tiers of seats in a *building* classified as Group A, Division 4 if those spaces are used for *occupancy*. (See Note A-3.2.2.35.(4).)

3.2.2.36. Group B, Division 1, Any Height, Any Area, Sprinklered

1) Except as permitted by Article 3.2.2.37., a *building* classified as Group B, Division 1 shall conform to Sentence (2).

2) Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.37. Group B, Division 1, up to 3 Storeys, Sprinklered

1) A *building* classified as Group B, Division 1 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 3 *storeys* in *building height*, and
- c) it has a *building area*
 - i) that is not limited if the *building* is not more than 1 *storey* in *building height*,
 - ii) not more than 12 000 m² if 2 *storeys* in *building height*, or
 - iii) not more than 8 000 m² if 3 *storeys* in *building height*.

2) Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.38. Group B, Division 2, Any Height, Any Area, Sprinklered

1) Except as permitted by Articles 3.2.2.39. to 3.2.2.41., a *building* classified as Group B, Division 2 shall conform to Sentence (2).

2) Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing* walls, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.39. Group B, Division 2, up to 3 Storeys, Sprinklered

1) A *building* classified as Group B, Division 2 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 3 *storeys* in *building height*, and
- c) it has a *building area*
 - i) that is not limited if the *building* is not more than 1 *storey* in *building height*,

- ii) not more than 12 000 m² if 2 storeys in building height, or
- iii) not more than 8 000 m² if 3 storeys in building height.

2) Except as permitted by Article 3.2.2.16., the building referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.40. Group B, Division 2, up to 2 Storeys, Sprinklered

1) A building classified as Group B, Division 2 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
- b) it is not more than 2 storeys in building height, and
- c) it has a *building area* not more than
 - i) 2 400 m² if 1 storey in building height, or
 - ii) 1 600 m² if 2 storeys in building height.

2) The building referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.41. Group B, Division 2, One Storey, Sprinklered

1) A building classified as Group B, Division 2 is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
- b) it is not more than 1 storey in building height, and
- c) it has a *building area* not more than 500 m².

3.2.2.42. Group B, Division 3, Any Height, Any Area, Sprinklered

1) Except as permitted by Articles 3.2.2.43. to 3.2.2.46., a building classified as Group B, Division 3 shall conform to Sentence (2).

2) Except as permitted by Article 3.2.2.16., the building referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building shall be *sprinklered* throughout,
- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.43. Group B, Division 3, up to 3 Storeys (Noncombustible), Sprinklered

1) A building classified as Group B, Division 3 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
- b) it is not more than 3 storeys in building height, and
- c) it has a *building area*
 - i) that is not limited if the building is not more than 1 storey in building height,

- ii) not more than 12 000 m² if 2 storeys in building height, or
- iii) not more than 8 000 m² if 3 storeys in building height.

2) Except as permitted by Article 3.2.2.16., the building referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.44. Group B, Division 3, up to 3 Storeys, Sprinklered

1) A building classified as Group B, Division 3 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
- b) it is not more than 3 storeys in building height, and
- c) it has a *building area* not more than
 - i) 5 400 m² if 1 storey in building height,
 - ii) 2 700 m² if 2 storeys in building height, or
 - iii) 1 800 m² if 3 storeys in building height.

2) The building referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.45. Group B, Division 3, up to 2 Storeys, Sprinklered

1) A building classified as Group B, Division 3 is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
- b) it is not more than 2 storeys in building height, and
- c) it has a *building area* not more than
 - i) 2 400 m² if 1 storey in building height, or
 - ii) 1 600 m² if 2 storeys in building height.

2) The building referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.46. Group B, Division 3, One Storey, Sprinklered

1) A building classified as Group B, Division 3 is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
- b) it is not more than 1 storey in building height, and
- c) it has a *building area* not more than 600 m².

3.2.2.47. Group C, Any Height, Any Area, Sprinklered

1) Except as permitted by Articles 3.2.2.48. to 3.2.2.54., a building classified as Group C shall conform to Sentence (2).

- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
 - except as permitted by Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
 - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 3)** In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

3.2.2.48. Group C, up to 6 Storeys, Sprinklered, Noncombustible Construction

- 1)** A *building* classified as Group C is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - it is not more than 6 *storeys* in *building height*, and
 - it has a *building area*
 - that is not limited if the *building* is not more than 2 *storeys* in *building height*,
 - not more than 12 000 m² if 3 *storeys* in *building height*,
 - not more than 9 000 m² if 4 *storeys* in *building height*,
 - not more than 7 200 m² if 5 *storeys* in *building height*, or
 - not more than 6 000 m² if 6 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
 - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.
- 3)** In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

3.2.2.49. Group C, up to 3 Storeys, Noncombustible Construction, Sprinklered

- 1)** A *building* classified as Group C is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - it is not more than 3 *storeys* in *building height*, and
 - it has a *building area*
 - that is not limited if the *building* is not more than 2 *storeys* in *building height*, or
 - that is not more than 12 000 m² if 3 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
 - mezzanines* shall have a *fire-resistance rating* not less than 1 h,
 - roof assemblies shall have a *fire-resistance rating* not less than 1 h, and
 - loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

3.2.2.50. Group C, up to 6 Storeys, Sprinklered

1) A *building* classified as Group C is permitted to conform to Sentence (2), provided

- a) it is *sprinklered* throughout,
- b) it is not more than 6 *storeys* in *building height*,
- c) it has a height not more than 18 m measured between the floor of the *first storey* and the uppermost floor level that does not serve a rooftop enclosure for elevator machinery, a stairway or a *service room* used only for service to the *building*, and
- d) it has a *building area* not more than
 - i) 9 000 m² if 1 *storey* in *building height*,
 - ii) 4 500 m² if 2 *storeys* in *building height*,
 - iii) 3 000 m² if 3 *storeys* in *building height*,
 - iv) 2 250 m² if 4 *storeys* in *building height*,
 - v) 1 800 m² if 5 *storeys* in *building height*, or
 - vi) 1 500 m² if 6 *storeys* in *building height*.

2) *Buildings* referred to in Sentence (1) are permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, and

- a) except as provided in Sentence (3), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) roof assemblies shall have a *fire-resistance rating* not less than 1 h,
- c) except as provided in Sentence (4), where the roof assembly has a height greater than 25 m measured from the floor of the *first storey* to the highest point of the roof assembly, the roof assembly shall be constructed of *noncombustible construction* or *fire-retardant-treated wood* conforming to Article 3.1.4.5.,
- d) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- e) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including those over *basements*, that are entirely contained within these *dwelling units* shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

4) Where *buildings* conforming to Sentence (2) include non-contiguous roof assemblies at different elevations, the roof assemblies are permitted to be evaluated separately to determine which ones are required to be constructed in accordance with Clause (2)(c).

3.2.2.51. Group C, up to 4 Storeys, Sprinklered

1) A *building* classified as Group C is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 4 *storeys* in *building height*, and
- c) it has a *building area* not more than
 - i) 7 200 m² if 1 *storey* in *building height*,
 - ii) 3 600 m² if 2 *storeys* in *building height*,
 - iii) 2 400 m² if 3 *storeys* in *building height*, or
 - iv) 1 800 m² if 4 *storeys* in *building height*.

2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) except as permitted by Sentences (3) and (4), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,

- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 1 h but need not be constructed as *fire separations*.

4) In a *building* in which there is no *dwelling unit* above another *dwelling unit*, the *fire-resistance rating* for floor assemblies entirely within the *dwelling unit* is waived.

3.2.2.52. Reserved

3.2.2.53. Reserved

3.2.2.54. Group C, up to 3 Storeys, Sprinklered

- 1)** A *building* classified as Group C is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 3 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 5 400 m² if 1 *storey* in *building height*,
 - ii) 2 700 m² if 2 *storeys* in *building height*, or
 - iii) 1 800 m² if 3 *storeys* in *building height*.

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) except as permitted by Sentences (3) and (4), floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
 - c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) In a *building* that contains *dwelling units* that have more than one *storey*, subject to the requirements of Sentence 3.3.4.2.(3), the floor assemblies, including floors over *basements*, which are entirely contained within these *dwelling units*, shall have a *fire-resistance rating* not less than 45 min but need not be constructed as *fire separations*.

4) In a *building* in which there is no *dwelling unit* above another *dwelling unit*, the *fire-resistance rating* for floor assemblies entirely within the *dwelling unit* is waived.

3.2.2.55. Group D, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Articles 3.2.2.56. to 3.2.2.63., a *building* classified as Group D shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
 - b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
 - c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - d) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.56. Group D, up to 6 Storeys

1) A *building* classified as Group D is permitted to conform to Sentence (2) provided

- a) it is not more than 6 *storeys* in *building height*, and
- b) it has a *building area* not more than the value in Table 3.2.2.56.

Table 3.2.2.56.
Maximum Building Area, Group D, up to 6 Storeys
 Forming Part of Sentence 3.2.2.56.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	not limited	not limited	not limited
2	7 200	not limited	not limited
3	4 800	6 000	7 200
4	3 600	4 500	5 400
5	2 880	3 600	4 320
6	2 400	3 000	3 600

2) The *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h,
- c) roof assemblies shall have a *fire-resistance rating* not less than 1 h, except that in a *building* not more than 1 *storey* in *building height* this requirement is waived, and
- d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.57. Group D, up to 6 Storeys, Sprinklered, Noncombustible Construction

1) A *building* classified as Group D is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 6 *storeys* in *building height*, and
- c) it has a *building area*
 - i) that is not limited if the *building* is not more than 2 *storeys* in *building height*,
 - ii) not more than 14 400 m² if 3 *storeys* in *building height*,
 - iii) not more than 10 800 m² if 4 *storeys* in *building height*,
 - iv) not more than 8 640 m² if 5 *storeys* in *building height*, or
 - v) not more than 7 200 m² if 6 *storeys* in *building height*.

2) Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.58. Group D, up to 6 Storeys, Sprinklered

1) A *building* classified as Group D is permitted to conform to Sentence (2), provided

- a) it is *sprinklered* throughout,
- b) it is not more than 6 *storeys* in *building height*,

- c) it has a height not more than 18 m measured between the floor of the *first storey* and the uppermost floor level that does not serve a rooftop enclosure for elevator machinery, a stairway or a *service room* used only for service to the *building*, and
- d) it has a *building area* not more than
 - i) 18 000 m² if 1 *storey* in *building height*,
 - ii) 9 000 m² if 2 *storeys* in *building height*,
 - iii) 6 000 m² if 3 *storeys* in *building height*,
 - iv) 4 500 m² if 4 *storeys* in *building height*,
 - v) 3 600 m² if 5 *storeys* in *building height*, or
 - vi) 3 000 m² if 6 *storeys* in *building height*.

2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction*, used singly or in combination, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) roof assemblies shall have a *fire-resistance rating* not less than 1 h,
- c) except as provided in Sentence (3), where the roof assembly has a height greater than 25 m measured from the floor of the *first storey* to the highest point of the roof assembly, the roof assembly shall be constructed of *noncombustible construction* or *fire-retardant-treated wood* conforming to Article 3.1.4.5.,
- d) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- e) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3) Where *buildings* conforming to Sentence (2) include non-contiguous roof assemblies at different elevations, the roof assemblies are permitted to be evaluated separately to determine which ones are required to be constructed in accordance with Clause (2)(c).

3.2.2.59. Group D, up to 4 Storeys, Sprinklered

1) A *building* classified as Group D is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 4 *storeys* in *building height*, and
- c) it has a *building area* not more than 3 600 m².

2) The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and

- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
- b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.60. Group D, up to 3 Storeys

1) A *building* classified as Group D is permitted to conform to Sentence (2) provided

- a) it is not more than 3 *storeys* in *building height*, and
- b) it has a *building area* not more than the value in Table 3.2.2.60.

Table 3.2.2.60.
Maximum Building Area, Group D, up to 3 Storeys
 Forming Part of Sentence 3.2.2.60.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	4 800	6 000	7 200
2	2 400	3 000	3 600
3	1 600	2 000	2 400

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
 - c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 storey in *building height*, the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1. and the *building area* is not more than
 - i) 2 400 m² if facing one street,
 - ii) 3 000 m² if facing 2 streets, or
 - iii) 3 600 m² if facing 3 streets, and
 - d) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.61. Group D, up to 3 Storeys, Sprinklered

- 1)** A *building* classified as Group D is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 3 storeys in *building height*, and
 - c) it has a *building area* not more than
 - i) 14 400 m² if 1 storey in *building height*,
 - ii) 7 200 m² if 2 storeys in *building height*, or
 - iii) 4 800 m² if 3 storeys in *building height*.

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
 - c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.62. Group D, up to 2 Storeys

- 1)** A *building* classified as Group D is permitted to conform to Sentence (2) provided
- a) it is not more than 2 storeys in *building height*, and
 - b) it has a *building area* not more than the value in Table 3.2.2.62.

Table 3.2.2.62.
Maximum Building Area, Group D, up to 2 Storeys
 Forming Part of Sentence 3.2.2.62.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 000	1 250	1 500
2	800	1 000	1 200

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
 - loadbearing walls, columns and arches* supporting an assembly required to have a *fire-resistance rating* shall
 - have a *fire-resistance rating* not less than 45 min, or
 - be of *noncombustible construction*.

3.2.2.63. Group D, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group D is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - it is not more than 2 *storeys* in *building height*, and
 - it has a *building area* not more than
 - 3 000 m² if 1 *storey* in *building height*, or
 - 2 400 m² if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
 - loadbearing walls, columns and arches* supporting an assembly required to have a *fire-resistance rating* shall
 - have a *fire-resistance rating* not less than 45 min, or
 - be of *noncombustible construction*.

3.2.2.64. Group E, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Sentences 3.2.2.7.(3) and (4) and Articles 3.2.2.65. to 3.2.2.69., a *building* classified as Group E shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
 - floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
 - mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.65. Group E, up to 4 Storeys, Sprinklered

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - it is not more than 4 *storeys* in *building height*, and
 - it has a *building area* not more than 1 800 m².

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
 - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.66. Group E, up to 3 Storeys

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- a) it is not more than 3 *storeys* in *building height*, and
 - b) it has a *building area* not more than the value in Table 3.2.2.66.

Table 3.2.2.66.
Maximum Building Area, Group E, up to 3 Storeys
 Forming Part of Sentence 3.2.2.66.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 500	1 500	1 500
2	1 200	1 500	1 500
3	800	1 000	1 500

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
 - c) roof assemblies shall have a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided the roof assembly is of *noncombustible construction* or is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1.,
 - d) *loadbearing walls, columns and arches* supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*, and
 - e) *loadbearing walls, columns and arches* supporting a *fire separation* shall have a *fire-resistance rating* not less than that required for the *fire separation*.

3.2.2.67. Group E, up to 3 Storeys, Sprinklered

- 1)** A *building* classified as Group E is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 3 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 7 200 m² if 1 *storey* in *building height*,
 - ii) 3 600 m² if 2 *storeys* in *building height*, or
 - iii) 2 400 m² if 3 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,

- b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
- c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*, and
- d) *loadbearing walls*, columns and arches supporting a *fire separation* shall have a *fire-resistance rating* not less than that required for the *fire separation*.

3.2.2.68. Group E, up to 2 Storeys

1) A *building* classified as Group E is permitted to conform to Sentence (2) provided

- a) it is not more than 2 *storeys* in *building height*, and
- b) it has a *building area* not more than the value in Table 3.2.2.68.

Table 3.2.2.68.
Maximum Building Area, Group E, up to 2 Storeys
 Forming Part of Sentence 3.2.2.68.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 000	1 250	1 500
2	600	750	900

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min, and
 - b) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.69. Group E, up to 2 Storeys, Sprinklered

1) A *building* classified as Group E is permitted to conform to Sentence (2) provided

- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
- b) it is not more than 2 *storeys* in *building height*, and
- c) it has a *building area* not more than
 - i) 3 000 m² if 1 *storey* in *building height*, or
 - ii) 1 800 m² if 2 *storeys* in *building height*.

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min, and
 - b) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.70. Group F, Division 1, up to 4 Storeys, Sprinklered

1) Except as permitted by Articles 3.2.2.71. to 3.2.2.73., a *building* classified as Group F, Division 1 shall conform to Sentence (2) provided

- a) it is not more than 4 *storeys* in *building height*, and
- b) it has a *building area* not more than
 - i) 9 000 m² if 1 *storey* in *building height*,
 - ii) 4 500 m² if 2 *storeys* in *building height*,
 - iii) 3 000 m² if 3 *storeys* in *building height*, or
 - iv) 2 250 m² if 4 *storeys* in *building height*.

- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
 - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
 - b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
 - c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.71. Group F, Division 1, up to 3 Storeys, Sprinklered

- 1)** A *building* classified as Group F, Division 1 is permitted to conform to Sentence (2) provided
 - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 3 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 3 600 m² if 1 *storey* in *building height*,
 - ii) 1 800 m² if 2 *storeys* in *building height*, or
 - iii) 1 200 m² if 3 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination, and
 - a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min, and
 - b) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.72. Group F, Division 1, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group F, Division 1 is permitted to conform to Sentence (2) provided
 - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 2 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 2 400 m² if 1 *storey* in *building height*, or
 - ii) 1 200 m² if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
 - a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
 - b) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.73. Group F, Division 1, One Storey

- 1)** A *building* classified as Group F, Division 1 is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination provided
 - a) it is not more than 1 *storey* in *building height*, and
 - b) it has a *building area* not more than 800 m².

3.2.2.74. Group F, Division 2, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Sentence 3.2.2.7.(4) and Articles 3.2.2.75. to 3.2.2.79., a *building* classified as Group F, Division 2 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
 - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,

- b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h,
- c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
- d) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.75. Group F, Division 2, up to 4 Storeys, Increased Area, Sprinklered

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 4 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 18 000 m² if 1 *storey* in *building height*,
 - ii) 9 000 m² if 2 *storeys* in *building height*,
 - iii) 6 000 m² if 3 *storeys* in *building height*, or
 - iv) 4 500 m² if 4 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
 - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - c) *loadbearing walls, columns and arches* shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.76. Group F, Division 2, up to 3 Storeys

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
- a) it is not more than 3 *storeys* in *building height*, and
 - b) it has a *building area* not more than the value in Table 3.2.2.76.

Table 3.2.2.76.
Maximum Building Area, Group F, Division 2, up to 3 Storeys
 Forming Part of Sentence 3.2.2.76.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 500	1 500	1 500
2	1 500	1 500	1 500
3	1 070	1 340	1 500

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
 - c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided that the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1.,

- d) *loadbearing walls, columns and arches supporting an assembly required to have a fire-resistance rating shall*
 - i) *have a fire-resistance rating not less than 45 min, or*
 - ii) *be of noncombustible construction, and*
- e) *loadbearing walls, columns and arches supporting a fire separation shall have a fire-resistance rating not less than that required for the fire separation.*

3.2.2.77. Group F, Division 2, up to 4 Storeys, Sprinklered

- 1)** A building classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
 - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the building is *sprinklered* throughout,
 - b) it is not more than 4 storeys in building height, and
 - c) it has a building area not more than
 - i) 9 600 m² if 1 storey in building height,
 - ii) 4 800 m² if 2 storeys in building height,
 - iii) 3 200 m² if 3 storeys in building height, or
 - iv) 2 400 m² if 4 storeys in building height.
- 2)** The building referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
 - a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
 - c) *loadbearing walls, columns and arches supporting an assembly required to have a fire-resistance rating shall*
 - i) *have a fire-resistance rating not less than 45 min, or*
 - ii) *be of noncombustible construction, and*
 - d) *loadbearing walls, columns and arches supporting a fire separation shall have a fire-resistance rating not less than that required for the fire separation.*

3.2.2.78. Group F, Division 2, up to 2 Storeys

- 1)** A building classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
 - a) it is not more than 2 storeys in building height, and
 - b) it has a building area not more than the value in Table 3.2.2.78.

Table 3.2.2.78.
Maximum Building Area, Group F, Division 2, up to 2 Storeys
 Forming Part of Sentence 3.2.2.78.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 000	1 250	1 500
2	600	750	900

- 2)** The building referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
 - a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
 - b) *loadbearing walls, columns and arches supporting an assembly required to have a fire-resistance rating shall*
 - i) *have a fire-resistance rating not less than 45 min, or*
 - ii) *be of noncombustible construction.*

3.2.2.79. Group F, Division 2, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group F, Division 2 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 2 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 4 500 m² if 1 *storey* in *building height*, or
 - ii) 1 800 m² if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
 - b) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.80. Group F, Division 3, Any Height, Any Area, Sprinklered

- 1)** Except as permitted by Sentences 3.2.2.7.(3) and (4) and Articles 3.2.2.82. to 3.2.2.90., a *building* classified as Group F, Division 3 shall conform to Sentence (2).
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* shall be *sprinklered* throughout,
 - b) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 2 h, except that floor assemblies are permitted to be *fire separations* with a *fire-resistance rating* not less than 1 h in a *storage garage* with all *storeys* constructed as *open-air storeys*,
 - c) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - d) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.81. Reserved**3.2.2.82. Group F, Division 3, up to 6 Storeys, Sprinklered**

- 1)** Except as permitted by Sentences 3.2.2.7.(3) and (4), a *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided
- a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 6 *storeys* in *building height*, and
 - c) it has a *building area*
 - i) that is not limited if the *building* is not more than 1 *storey* in *building height*,
 - ii) not more than 21 600 m² if 2 *storeys* in *building height*,
 - iii) not more than 14 400 m² if 3 *storeys* in *building height*,
 - iv) not more than 10 800 m² if 4 *storeys* in *building height*,
 - v) not more than 8 640 m² if 5 *storeys* in *building height*, or
 - vi) not more than 7 200 m² if 6 *storeys* in *building height*.
- 2)** Except as permitted by Article 3.2.2.16., the *building* referred to in Sentence (1) shall be of *noncombustible construction*, and
- a) floor assemblies shall be *fire separations* with a *fire-resistance rating* not less than 1 h,
 - b) *mezzanines* shall have a *fire-resistance rating* not less than 1 h, and
 - c) *loadbearing walls*, columns and arches shall have a *fire-resistance rating* not less than that required for the supported assembly.

3.2.2.83. Group F, Division 3, up to 3 Storeys

(See also Article 3.2.1.7.)

- 1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided
 - a) it is not more than 3 *storeys* in *building height*, and
 - b) it has a *building area* not more than the value in Table 3.2.2.83.

Table 3.2.2.83.
Maximum Building Area, Group F, Division 3, up to 3 Storeys
 Forming Part of Sentence 3.2.2.83.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	4 800	6 000	7 200
2	2 400	3 000	3 600
3	1 600	2 000	2 400

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
 - a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min,
 - c) roof assemblies shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, except that in a *building* not more than 1 *storey* in *building height*, the *fire-resistance rating* is permitted to be waived provided the roof assembly is constructed as a *fire-retardant-treated wood* roof system conforming to Article 3.1.14.1., and the *building area* is not more than
 - i) 2 400 m² if facing one *street*,
 - ii) 3 000 m² if facing 2 *streets*, or
 - iii) 3 600 m² if facing 3 *streets*, and
 - d) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.84. Group F, Division 3, up to 4 Storeys, Sprinklered

- 1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided
 - a) except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - b) it is not more than 4 *storeys* in *building height*, and
 - c) it has a *building area* not more than
 - i) 14 400 m² if 1 *storey* in *building height*,
 - ii) 7 200 m² if 2 *storeys* in *building height*,
 - iii) 4 800 m² if 3 *storeys* in *building height*, or
 - iv) 3 600 m² if 4 *storeys* in *building height*.

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
 - a) floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min,
 - b) *mezzanines* shall have, if of *combustible construction*, a *fire-resistance rating* not less than 45 min, and
 - c) *loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - i) have a *fire-resistance rating* not less than 45 min, or
 - ii) be of *noncombustible construction*.

3.2.2.85. Group F, Division 3, up to 2 Storeys

- 1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided
- it is not more than 2 *storeys* in *building height*, and
 - it has a *building area* not more than the value in Table 3.2.2.85.

Table 3.2.2.85.
Maximum Building Area, Group F, Division 3, up to 2 Storeys
 Forming Part of Sentence 3.2.2.85.(1)

No. of Storeys	Maximum Area, m ²		
	Facing 1 Street	Facing 2 Streets	Facing 3 Streets
1	1 600	2 000	2 400
2	800	1 000	1 200

- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
 - loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - have a *fire-resistance rating* not less than 45 min, or
 - be of *noncombustible construction*.

3.2.2.86. Group F, Division 3, up to 2 Storeys, Sprinklered

- 1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,
 - it is not more than 2 *storeys* in *building height*, and
 - it has a *building area* not more than
 - 7 200 m² if 1 *storey* in *building height*, or
 - 2 400 m² if 2 *storeys* in *building height*.
- 2)** The *building* referred to in Sentence (1) is permitted to be of *combustible construction* or *noncombustible construction* used singly or in combination, and
- floor assemblies shall be *fire separations* and, if of *combustible construction*, shall have a *fire-resistance rating* not less than 45 min, and
 - loadbearing walls*, columns and arches supporting an assembly required to have a *fire-resistance rating* shall
 - have a *fire-resistance rating* not less than 45 min, or
 - be of *noncombustible construction*.

3.2.2.87. Group F, Division 3, One Storey

- 1)** A *building* classified as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination provided
- it is not more than 1 *storey* in *building height*, and
 - it has a *building area* not more than
 - 5 600 m² if facing one *street*,
 - 7 000 m² if facing 2 *streets*, or
 - 8 400 m² if facing 3 *streets*.

3.2.2.88. Group F, Division 3, One Storey, Sprinklered

- 1)** A *building* classified as Group F, Division 3 is permitted to be of *heavy timber construction* or *noncombustible construction* used singly or in combination provided
- except as permitted by Sentences 3.2.2.7.(1) and 3.2.2.18.(2), the *building* is *sprinklered* throughout,

- b) it is not more than 1 *storey* in *building height*, and
- c) it has a *building area* not more than 16 800 m².

3.2.2.89. Group F, Division 3, One Storey, Any Area, Low Fire Load Occupancy

- 1)** A *building* classified as Group F, Division 3 is permitted to conform to Sentence (2) provided it is
 - a) not more than 1 *storey* in *building height*,
 - b) used solely for low *fire load occupancies* such as
 - i) power generating plants, or
 - ii) plants for the manufacture or storage of *noncombustible* materials, and
 - c) not limited in *building area*.
- 2)** The *building* referred to in Sentence (1) shall be of *noncombustible construction*.

3.2.2.90. Group F, Division 3, Storage Garages up to 22 m High

- 1)** A *building* used as a *storage garage* with all *storeys* constructed as *open-air storeys* and having no other *occupancy* above it is permitted to have its floor, wall, ceiling and roof assemblies constructed without a *fire-resistance rating* provided it is
 - a) of *noncombustible construction*,
 - b) not more than 22 m high, measured between *grade* and the ceiling level of the top *storey*,
 - c) not more than 10 000 m² in *building area*, and
 - d) designed so that every portion of each *floor area* is within 60 m of an exterior wall opening.

3.2.3. Spatial Separation and Exposure Protection

(See Note A-3.2.3.)

3.2.3.1. Limiting Distance and Area of Unprotected Openings

- 1)** Except as permitted by Articles 3.2.3.10. to 3.2.3.12., the area of *unprotected openings* in an *exposing building face* for the applicable *limiting distance* shall be not more than the value determined in accordance with
 - a) Table 3.2.3.1.-B or 3.2.3.1.-C for an *exposing building face* conforming to Article 3.2.3.2. of a *building* or *fire compartment* which is not *sprinklered*, or
 - b) Table 3.2.3.1.-D or 3.2.3.1.-E for an *exposing building face* conforming to Article 3.2.3.2. of a *sprinklered fire compartment* that is part of a *building* which is *sprinklered* in conformance with Section 3.2.

(See Note A-3.)

(See also Article 3.1.6.3.)

- 2)** The area of the *unprotected openings* in an *exposing building face* shall be the aggregate area of *unprotected openings* expressed as a percentage of the area of the *exposing building face* in Table 3.2.3.1.-B, 3.2.3.1.-C, 3.2.3.1.-D or 3.2.3.1.-E. (See Sentence 3.2.3.2.(1).)

- 3)** For the purpose of determining the type of construction and cladding and the *fire-resistance rating* of an exterior wall,

- a) the *exposing building face* shall be taken as the projection of the exterior wall onto a vertical plane located so that no portion of the exterior wall of the *building* or of a *fire compartment*, if the *fire compartment* complies with the requirements of Article 3.2.3.2., is between the vertical plane and the line to which the *limiting distance* is measured, and
- b) the area of *unprotected openings* shall be determined from Table 3.2.3.1.-B, 3.2.3.1.-C, 3.2.3.1.-D or 3.2.3.1.-E.

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

3.2.3.10. Unlimited Unprotected Openings

1) An *exposing building face* in a *storage garage* with all *storeys* constructed as *open-air storeys* is permitted to have unlimited *unprotected openings* provided it has a *limiting distance* not less than 3 m.

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

3.2.3.11. Low Fire Load, One Storey Building

1) An *exposing building face* of a *building* of *low-hazard industrial occupancy* conforming to Article 3.2.2.89. is permitted to be of *noncombustible construction* without a *fire-resistance rating* provided

- a) it is not a *loadbearing wall*, and
- b) the *limiting distance* is not less than 3 m.

3.2.4.7. Signals to Fire Department

1) A single stage fire alarm system installed in a *building of assembly occupancy* that has an *occupant load* more than 300 shall be designed to notify the fire department, in conformance with Sentence (4), that an *alarm signal* has been initiated.

2) A fire alarm system that includes waterflow-indicating devices shall be designed to notify the fire department in conformance with Sentence (4) when an alarm is initiated.

3) A 2-stage fire alarm system shall be designed to notify the fire department, in conformance with Sentence (4), that an *alert signal* has been initiated.

4) Notification of the fire department, as required by Sentences (1), (2) and (3), shall be provided in conformance with CAN/ULC-S561, "Installation and Services for Fire Signal Receiving Centres and Systems." (See Note A-3.2.4.7.(4).)

5) Where a single stage fire alarm system is installed in a *building* that is not *sprinklered* throughout and Sentence (1) does not apply, a legible notice that is not easily removed shall be affixed to the wall near each manual station stating

- a) that the fire department is to be notified in the event of a fire emergency, and
- b) the emergency telephone number for the municipality or for the fire department (see Note A-3.2.4.7.(5)(b)).

6) Helicopter landing areas on roofs shall be provided with telephone extensions or means to notify the fire department.

7) The *owner* of a *building* for which Sentences (1) to (3) require signals to the fire department shall provide evidence of compliance to the *authority having jurisdiction* by means of a Fire Protective Signalling Certificate from a certified listing agency showing

- a) the address of the *building*,
- b) the listed fire alarm installation company, and
- c) the listed fire alarm monitoring company.

3.2.4.8. Annunciator and Zone Indication

1) Except as permitted by Sentences (3) to (5), an annunciator shall be installed in close proximity to a *building* entrance that faces a *street* or an access route for fire department vehicles that complies with Sentence 3.2.5.5.(1).

2) Except as permitted by Sentence (6), the annunciator required by Sentence (1) shall have separate zone indication of the actuation of the alarm initiating devices in each

- a) *floor area* so that the area of coverage for each zone in a *building* that is not *sprinklered* is not more than 2 000 m²,
- b) *floor area* so that the area of coverage for each zone is neither
 - i) more than one *storey*, nor
 - ii) more than the system area limits specified in NFPA 13, "Installation of Sprinkler Systems,"
- c) shaft required to be equipped with *smoke detectors*,
- d) air-handling system required to be equipped with *smoke detectors*,
- e) fire extinguishing system required by NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations,"
- f) *contained use area*,
- g) *impeded egress zone*, and
- h) *fire compartment* required by Sentence 3.3.3.5.(2).

(See Note A-3.2.4.8.(2).)

3) An annunciator need not be provided for a fire alarm system if not more than one zone indicator is required by Sentence (2).

4) If an annunciator is not installed as part of a fire alarm system in conformance with Sentence (1), a visual and audible trouble signal device shall be provided inside the main entrance of the *building*.

- 5)** The requirements of Sentence (1) are waived in a *building*
- a) in which an automatic sprinkler system is not installed,

- b) that has an aggregate area for all *storeys* of not more than 2 000 m², and
- c) that is not more than 3 *storeys* in *building height*.

6) The area limits of Clause (2)(a) are waived for an interior undivided open space used as an arena, a rink, or a *swimming pool* provided that other spaces in the *building* that are separated from the open space are individually zoned in accordance with the requirements of Sentence (2).

7) A fire alarm control unit installed in close proximity to a *building* entrance that faces a *street* or an access route for fire department vehicles that complies with Sentence 3.2.5.5.(1) is deemed to satisfy the requirement for an annunciator, provided all indicators required for an annunciator or trouble signal device are included on the control unit.

3.2.4.9. Electrical Supervision

1) Electrical supervision shall be provided for a fire alarm system.

2) If a fire alarm system in a *building* is required to have an annunciator by Sentence 3.2.4.8.(1), except for hose valves, all valves controlling water supplies in a standpipe system shall be equipped with an electrically supervised switch for transmitting a trouble signal to the annunciator in the event of movement of the valve handle.

3) An automatic sprinkler system shall be electrically supervised to indicate a supervisory signal on the *building* fire alarm system annunciator for each of the following:

- a) movement of a valve handle that controls the supply of water to sprinklers,
- b) loss of excess water pressure required to prevent false alarms in a wet pipe system,
- c) loss of air pressure in a dry pipe system,
- d) loss of air pressure in a pressure tank,
- e) a significant change in water level in any water storage container used for firefighting purposes,
- f) loss of power to any automatically starting fire pump (see Note A-3.2.4.9.(3)(f)), and
- g) a temperature approaching the freezing point in any dry pipe valve enclosure or water storage container used for firefighting purposes.

4) A fire pump shall be electrically supervised as stipulated in NFPA 20, "Installation of Stationary Pumps for Fire Protection."

5) Indication of a supervisory signal in accordance with Sentence (3) shall be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4).

3.2.5.6. Access Route Design

1) A portion of a roadway or yard provided as a required access route for fire department use shall

- a) have a clear width not less than 6 m, unless it can be shown that lesser widths are satisfactory,
- b) have a centre-line radius not less than 12 m,
- c) have an overhead clearance not less than 5 m,
- d) have a change of gradient not more than 1 in 12.5 over a minimum distance of 15 m,
- e) be designed to support the expected loads imposed by firefighting equipment and be surfaced with concrete, asphalt or other material designed to permit accessibility under all climatic conditions,
- f) have turnaround facilities for any dead-end portion of the access route more than 90 m long, and
- g) be connected with a public thoroughfare.

(See Note A-3.2.5.6.(1).)

2) For *buildings* conforming to Article 3.2.2.50. or 3.2.2.58., no portion of the access route described in Sentence 3.2.2.10.(3) shall be more than 20 m below the uppermost floor level.

3.2.5.7. Water Supply

(See Note A-3.2.5.7.)

1) Except as provided in Sentences (3) to (5), and except for a *building* that is neither more than 3 *storeys* in *building height* nor more than 600 m² in *building area*, a *building* shall have water available for firefighting purposes that is provided by a

- a) piped municipal water supply capable of being delivered at a
 - i) rate of not less than 3 800 L/min, and
 - ii) residual pressure of not less than 140 kPa, or
- b) private water supply that is not less than the quantity derived from the following formula:

$$Q = V \times O \times S$$

where

- Q = minimum water supply (litres),
 V = total *building* volume (cubic metres),
 O = water supply coefficient (from Table 3.2.5.7.),
 S = spatial coefficient whose value is 1.5 for a *building* that has any *limiting distance* less than 7.5 m, otherwise whose value is 1.0.

Table 3.2.5.7.
Water Supply Coefficient
 Forming Part of Sentence 3.2.5.7.(1)

Type of Construction	Classification by Group and Division in Accordance with Table 3.1.2.1.				
	A-1, A-3, F-3	A-2, B-1, B-2, B-3, C, D	A-4	E, F-2	F-1
	Applicable Water Supply Coefficient				
A building of noncombustible construction with all loadbearing walls, columns and arches, having a fire-resistance rating at least equivalent to that required for the supported assembly, but not less than 45 min	11	10	14	17	23
A building of noncombustible construction in accordance with Article 3.1.5.1.	17	15	20	25	34
A building having all structural members of noncombustible material, or if of combustible material, a fire-resistance rating of at least 45 min, or of heavy timber construction	22	19	27	34	45
A building of combustible construction	34	27	40	50	67

- 2)** The private water supply referred to in Clause (1)(b) shall be
 - a) capable of being delivered at a rate of not less than
 - i) 2 700 L/min for a *building* required to have a quantity less than 75 000 L, and
 - ii) 3 800 L/min for a *building* required to have a quantity of 75 000 L or greater, and
 - b) provided with a
 - i) dry hydrant conforming to Chapter 8 of NFPA 1142, “Water Supplies for Suburban and Rural Fire Fighting,” or
 - ii) pressurized hydrant conforming to the requirements of NFPA 24, “Installation of Private Fire Service Mains and Their Appurtenances.”

- 3)** Capacity requirements under Sentence (1) do not apply to a *building* having a standpipe system conforming to the requirements of NFPA 14, “Installation of Standpipe and Hose Systems.”

- 4)** Capacity requirements under Sentence (1) do not apply to a *building* that is *sprinklered* in conformance with
 - a) NFPA 13, “Installation of Sprinkler Systems,”
 - b) NFPA 13R, “Installation of Sprinkler Systems in Low-Rise Residential Occupancies,” or
 - c) NFPA 13D, “Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes.”

- 5)** Sentence (1) does not apply to a *building* classified as a *medium-hazard industrial occupancy* or *low-hazard industrial occupancy*, provided
 - a) the *building* is
 - i) not more than 1 200 m² in *building area*,
 - ii) not more than 1 *storey* in *building height*,
 - iii) of *noncombustible construction*, and
 - iv) not intended for the manufacture or storage of *combustible materials* and does not contain a *mercantile occupancy*,
 - b) any *business and personal services occupancy* contained within the *building* occupies not more than 10% of the *building area*,
 - c) a single stage fire alarm system is installed in the *building* in accordance with Subsection 3.2.4., and additionally,
 - i) the fire alarm system is provided with an alarm bell on the exterior of the *building*,

- ii) the fire alarm system is designed to notify the fire department, in conformance with Sentence 3.2.4.7.(4), that an *alarm signal* has been initiated, and
 - iii) the *owner* provides evidence of compliance to the *authority having jurisdiction* as required by Sentence 3.2.4.7.(7),
- d) the *floor area* of the *building* is primarily an open space with minimal subdivision into smaller rooms or spaces,
- e) the travel distance to an *exit* does not exceed 20 m,
- f) portable fire extinguishers are installed in accordance with NFPA 10, "Portable Fire Extinguishers," except that
 - i) the permitted area for each extinguisher is one half that permitted in the standard,
 - ii) the capacity of each extinguisher is double that required by the standard, or
 - iii) an equivalent combination of Subclauses (f)(i) and (f)(ii) is used, and
- g) the highest point of the *building* is not more than 10 m above *grade*.

3.2.5.12. Automatic Sprinkler Systems

1) Except as permitted by Sentences (2), (3) and (4), an automatic sprinkler system shall be designed, constructed, installed and tested in conformance with NFPA 13, "Installation of Sprinkler Systems." (See Note A-3.2.5.12.(1).)

- 2)** Except as provided in Sentences (10) and (11), NFPA 13R, "Installation of Sprinkler Systems in Low-Rise Residential Occupancies," is permitted to be used for the design, construction and installation of an automatic sprinkler system installed
- a) in a *building of residential occupancy* throughout that
 - i) is not more than 4 *storeys* in *building height* and conforms to one of Articles 3.2.2.47. to 3.2.2.54., or
 - ii) is not more than 3 *storeys* in *building height* and conforms to Article 9.10.1.3., or
 - b) in a *building of care occupancy* with not more than 10 occupants that is not more than 3 *storeys* in *building height* and conforms to one of Articles 3.2.2.42. to 3.2.2.46.

(See Note A-3.2.5.12.(2).)

- 3)** Instead of the requirements of Sentence (1), NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," is permitted to be used for the design, construction and installation of an automatic sprinkler system installed

- a) in a *building of residential occupancy* throughout that contains not more than 2 *dwelling units*, or
- b) in a *building of care occupancy*, provided
 - i) it contains not more than 2 *suites of care occupancy*,
 - ii) it has not more than 5 residents throughout, and
 - iii) a 30-minute water supply demand can be met.

(See Note A-3.2.5.12.(2).)

- 4)** If a *building* contains fewer than 9 sprinklers, the water supply for these sprinklers is permitted to be supplied from the domestic water system for the *building* provided the required flow for the sprinklers can be met by the domestic system.

- 5)** If a water supply serves both an automatic sprinkler system and a system serving other equipment, control valves shall be provided so that either system can be shut off independently.

- 6)** Notwithstanding the requirements of the standards referenced in Sentences (1) and (2) regarding the installation of automatic sprinkler systems, sprinklers shall not be omitted in any room or closet in the *storey* immediately below a roof assembly.

(See Note A-3.2.5.12.(6).)

- 8)** Sprinklers in elevator machine rooms shall have a temperature rating not less than that required for an intermediate temperature classification and shall be protected against physical damage. (See Note A-3.2.5.12.(8).)

- 9)** If a *sprinklered building* receives its water supply for the sprinkler system from sources other than a piped municipal water system, external provision shall be made for the fire department to use the water supply.

- 10)** Notwithstanding the requirements of Sentence (2) regarding the installation of automatic sprinkler systems and except for *buildings* constructed in accordance with Article 3.2.2.50., in *buildings of combustible construction*, sprinklers shall be required in

- a) porches and balconies,
- b) *public corridors*,
- c) stairs that are open and attached,
- d) attics and floor/ceiling spaces,
- e) penthouse equipment rooms,
- f) elevator machine rooms,
- g) concealed spaces dedicated exclusively to and containing only *dwelling unit* ventilation equipment,
- h) crawl spaces,

Division B

- i) closets or storage rooms on exterior balconies, and
- j) other concealed spaces that are not used or intended for living purposes or storage and do not contain fuel-fired *appliances*.

(See also Article 3.1.11.5. for requirements on the protection of concealed spaces in *buildings* conforming to Article 3.2.2.50.)

11) A concealed space referred to in Sentence (10) need not be equipped with sprinklers, provided the concealed space meets one of the criteria described in Clause 8.15.1.2 of NFPA 13, “Installation of Sprinkler Systems.”

3.2.6. Additional Requirements for High Buildings

(See Note A-3.2.6.)

3.2.6.1. Application

- 1)** This Subsection applies to a *building*
 - a) of Group A, D, E or F *major occupancy* classification that is more than
 - i) 36 m high, measured between *grade* and the floor level of the top *storey*, or
 - ii) 18 m high, measured between *grade* and the floor level of the top *storey*, and in which the cumulative or total *occupant load* on or above any *storey* above *grade*, other than the *first storey*, divided by 1.8 times the width in metres of all *exit* stairs at that *storey*, exceeds 300,
 - b) containing a Group B *major occupancy* in which the floor level of the highest *storey* of that *major occupancy* is more than 18 m above *grade*,
 - c) containing a *floor area* or part of a *floor area* located above the third *storey* designed or intended as a Group B, Division 2 or 3 *occupancy*, or
 - d) containing a Group C *major occupancy* whose floor level is more than 18 m above *grade*.

3.2.6.2. Limits to Smoke Movement

1) A *building* to which this Subsection applies shall be designed in accordance with Sentences (2) to (6) and Article 3.2.6.3. to limit the danger to occupants and firefighters from exposure to smoke in a *building* fire.

2) A *building* referred to in Sentence (1) shall be designed so that, during a period of 2 h after the start of a fire, each *exit* stair serving *storeys* below the lowest *exit level* will not contain more than 1% by volume of contaminated air from the fire floor, assuming an outdoor temperature equal to the January design temperature on a 2.5% basis determined in accordance with Subsection 1.1.3. (See Note A-3.2.6.2.(2).)

- 3)** Each stairway that serves *storeys* above the lowest *exit level* shall have a vent to the outdoors, at or near the bottom of the stair shaft, that
- has an openable area of 0.05 m² for every door between the stair shaft and a *floor area*, but not less than 1.8 m²,
 - opens directly to the outdoors or into a vestibule that has a similar opening to the outdoors, and
 - has a door or *closure* that
 - is openable manually, and
 - can remain in the open position during a fire emergency.
- (See Note A-3.2.6.2.(3).)

4) Measures shall be taken to limit movement of smoke from a fire in a *floor area* below the lowest *exit storey* into upper *storeys*. (See Note A-3.2.6.2.(4).)

5) Except for exhaust fans in kitchens, washrooms and bathrooms in *dwelling units*, and except for fans used for smoke venting as required by Article 3.2.6.6., air moving fans in a system that serves more than 2 *storeys* shall be designed and installed so that in the event of a fire these fans can be stopped by means of a manually operated switch at the central alarm and control facility.

6) Except as provided in Article 3.2.4.12. or where there is a conflict with other smoke control measures in the *building*, air-handling systems used to provide make-up air to *public corridors* serving *suites* in a Group C *major occupancy* shall not shut down automatically upon activation of the fire alarm so as to maintain corridor pressurization.

3.2.6.3. Connected Buildings

1) If a *building* described in Article 3.2.6.1. is connected to any other *building*, measures shall be taken to limit movement of contaminated air from one *building* into another during a fire. (See Note A-3.2.6.3.(1).)

3.2.6.4. Emergency Operation of Elevators

1) Elevators shall comply with the Elevating Devices Codes Regulation made pursuant to the Safety Codes Act.

2) Special Emergency Services, as defined in the Elevating Devices Codes Regulation made pursuant to the Safety Codes Act, shall be provided in all elevators.

3) Manual emergency recall shall be provided for all elevators serving *storeys* above the *first storey*.

4) Key-operated switches for emergency recall required by Sentence (3) shall be provided in a conspicuous location at

- each elevator lobby on the recall level, and
- the central alarm and control facility required by Article 3.2.6.7.

5) In-car emergency service switches shall be provided in all elevator cars.

6) Keys to operate the switches required by Sentences (4) and (5) shall be

- provided in a suitably identified box conspicuously located on the outside of an elevator hoistway near the central alarm and control facility required by Article 3.2.6.7., and

- kept at the central alarm and control facility.

3.2.6.5. Elevator for Use by Firefighters

1) All elevators shall be capable of operation on emergency power.

2) Not more than one elevator at one time is required to operate on emergency power.

3) At least one elevator shall be provided with features described in Sentences (4) to (8).

4) The elevator referred to in Sentence (3) shall have a useable platform area not less than 2.2 m² and shall be capable of carrying a load of 900 kg to the top floor that

it serves from a landing on the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5. within 1 min.

- 5)** Each elevator for use by firefighters shall
 - a) be provided with a *closure* at each shaft opening so that the interlock mechanism remains mechanically engaged and electrical continuity is maintained in the interlock circuits and associated wiring for a period of not less than 1 h when the assembly is subjected to the standard fire exposure described in CAN/ULC-S104, "Fire Tests of Door Assemblies,"
 - b) be protected with a vestibule containing no *occupancy* and separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* not less than 45 min, or
 - c) be protected with a corridor containing no *occupancy* and separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than 1 h.
- 6)** Except as permitted by Sentence (7), an elevator referred to in Sentence (3) shall be capable of providing transportation from the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5. to every floor that is above *grade* in the *building* and that is normally served by the elevator system.
- 7)** If it is necessary to change elevators to reach any floor referred to in Sentence (6), the system shall be designed so that not more than one change of elevator is required when travelling to any floor in the *building* from the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5.
- 8)** Electrical conductors for the operation of the elevator referred to in Sentence (3) shall be
 - a) installed in *service spaces* conforming to Section 3.6. that do not contain other *combustible* material, or
 - b) protected against exposure to fire from the service entrance of the emergency power supply, or the normal service entrance of the normal power supply, to the equipment served, to ensure operation for a period of 1 h when subjected to the standard fire exposure described in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," (see Note A-3.2.6.5.(8)(b)).

3.2.6.6. Venting to Aid Firefighting

- 1)** Means of venting each *floor area* to the outdoors shall be provided by windows, wall panels, smoke shafts, or the *building* exhaust system. (See Note A-3.2.6.6.(1).)
- 2)** Fixed glass windows shall not be used for the venting required by Sentence (1) if the breaking of the windows could endanger pedestrians below.
- 3)** Openable windows used for the venting required by Sentence (1) shall be permanently marked so that they are easily identifiable.
- 4)** Elevator hoistways shall not be designed for the venting required by Sentence (1).

3.2.6.7. Central Alarm and Control Facility

- 1)** A central alarm and control facility shall be provided on the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4. and 3.2.5.5. in a location that
 - a) is readily accessible to firefighters entering the *building*, and
 - b) takes into account the effect of background noise likely to occur under fire emergency conditions, so that the facility can properly perform its required function under these conditions.
 (See Note A-3.2.6.7.(1).)
- 2)** The central alarm and control facility required by Sentence (1) shall include
 - a) means to control the voice communication system required by Article 3.2.6.8., so that messages can be sent to
 - i) all loudspeakers simultaneously,

Division B

- ii) individual *floor areas*, and
- iii) *exit* stairwells,
- b) means to indicate audibly and visually *alert signals* and *alarm signals* and a switch to
 - i) silence the audible portion of these signals, and
 - ii) indicate visually that the audible portion has been silenced,
- c) means to indicate visually that elevators are on emergency recall,
- d) an annunciator conforming to Article 3.2.4.8.,
- e) means to transmit *alert signals* and *alarm signals* to the fire department in conformance with Article 3.2.4.7.,
- f) means to release hold-open devices on doors to vestibules,
- g) means to manually actuate *alarm signals* in the *building* selectively to any zone or zones,
- h) means to silence the *alarm signals* referred to in Clause (g) in conformance with Sentences 3.2.4.22.(2) and 3.2.4.22.(3),
- i) means, as appropriate to the measure for fire safety provided in the *building*, to
 - i) actuate auxiliary equipment identified in Articles 3.2.6.2., 3.2.6.3. and 3.2.6.6., or
 - ii) communicate with a continually staffed auxiliary equipment control centre,
- j) means to communicate with telephones in elevator cars, separate from connections to firefighters' telephones, if elevator cars are required to be equipped with a telephone by the Elevating Devices Codes Regulation made pursuant to the Safety Codes Act,
- k) means to indicate visually, individual sprinkler system waterflow signals,
- l) means to indicate audibly and visually, sprinkler and standpipe system supervisory signals and trouble signals,
- m) a switch to silence the audible portion of a supervisory signal or a trouble signal, and
- n) visual indication that the audible portion of a supervisory signal or a trouble signal has been silenced.

(See Note A-3.2.6.7.(2).)

3.2.6.8. Voice Communication System

- 1)** A voice communication system conforming to Article 3.2.4.22. shall be provided in a *building* if
- a) the floor of the top *storey* is more than 36 m above *grade*, or
 - b) a *floor area* or part of a *floor area* located above the third *storey* is designed or intended for use as a Group B, Division 2 or 3 *occupancy*.

3.2.6.9. Testing

- 1)** The systems for control of smoke movement and mechanical venting required by Articles 3.2.6.2. and 3.2.6.6. shall be tested to ensure satisfactory operation. (See Note A-3.2.6.9.(1).)

3.3.4. Residential Occupancy**3.3.4.2. Fire Separations**

3) Floor assemblies within a *dwelling unit* need not be constructed as *fire separations* provided

- a) the distance between the lowest floor level and the uppermost floor level within the *dwelling unit* is not more than 6 m, and
- b) the *dwelling unit* is separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* not less than
 - i) 1 h if the *building* is not *sprinklered* throughout,
 - ii) 45 min if the *building* is *sprinklered* throughout and it is not more than 3 *storeys* in *building height*, or
 - iii) 1 h if the *building* is *sprinklered* throughout and it is more than 3 *storeys* in *building height*.

3.4.6.5. Handrails

5) Handrails shall be continuously graspable along their entire length, be free of any sharp or abrasive elements, and have

- a) a circular cross-section with an outside diameter not less than 30 mm and not more than 43 mm, or
- b) a non-circular cross-section with a perimeter not less than 100 mm and not more than 125 mm and whose largest cross-sectional dimension is not more than 45 mm.

6) The height of handrails on stairs, on aisles with steps and on ramps shall be measured vertically from the top of the handrail to

- a) a straight line drawn tangent to the tread nosings of the stair or aisle step served by the handrail (see Note A-9.8.7.4.), or
- b) the surface of the ramp, floor or landing served by the handrail.

7) Except as provided in Sentence (8) and Clause 3.8.3.5.(1)(e), the height of handrails on stairs, on aisles with steps and on ramps shall be

- a) not less than 865 mm, and
- b) not more than 1 070 mm.

11) Handrails shall be terminated in a manner that will not obstruct pedestrian travel or create a hazard. (See Note A-3.4.6.5.(10).)

13) The clearance between a handrail and any surface behind it shall be not less than

- a) 50 mm, or
- b) 60 mm if the surface behind the handrail is rough or abrasive.

14) Handrails and their supports shall be designed and constructed to withstand the loading values specified in Sentence 4.1.5.14.(7).

3.4.6.8. Treads and Risers

(See Note A-9.8.4.)

- 1)** Except as permitted for *dwelling units* and by Sentence 3.4.7.5.(1) for fire escapes, steps for stairs shall have a *run* of not less than 280 mm between successive steps.
- 2)** Steps for stairs referred to in Sentence (1) shall have a rise between successive treads not less than 125 mm and not more than 180 mm.
- 3)** Except as provided in Article 3.3.4.7. and except for fire escape stairs, stairs that are principally used for maintenance and service, and stairs that serve *industrial occupancies* other than *storage garages*, steps for stairs shall have no open risers.
- 4)** Except in fire escape stairs and where an exterior stair adjoins a *walkway* as permitted in Sentence 3.4.6.3.(3), risers, measured as the vertical nosing-to-nosing distance, shall be of uniform height in any one *flight*, with a maximum tolerance of
 - a) 5 mm between adjacent treads or landings, and
 - b) 10 mm between the tallest and shortest risers in a *flight*.
- 5)** Except in fire escape stairs, treads shall have a uniform *run* with a maximum tolerance of
 - a) 5 mm between adjacent treads, and
 - b) 10 mm between the deepest and shallowest treads in a *flight*.
- 6)** Treads and risers shall not differ significantly in *run* and rise in successive *flights* in any stair system.
- 7)** The slope of treads or landings shall not exceed 1 in 50.
- 8)** Except as permitted by Sentence (10), the top of the nosing of stair treads shall have a rounded or beveled edge extending not less than 6 mm and not more than 13 mm measured horizontally from the front of the nosing.
- 9)** The front edge of stair treads in *exits* and public *access to exits* shall be at right angles to the direction of *exit* travel.
- 10)** If resilient material is used to cover the nosing of a stair tread, the minimum rounded or beveled edge required by Sentence (8) is permitted to be reduced to 3 mm.

3.6.5. Air Duct and Plenum Systems**3.6.5.1. Duct Materials**

- 1)** Except as permitted by Sentences (2) to (5) and Article 3.6.4.3., all ducts, duct connectors, associated fittings and *plenums* used in air duct systems shall be constructed of steel, aluminum alloy, copper, clay or other *noncombustible* material.

- 3)** *Combustible* ducts which are part of a duct system conveying only ventilation air and are contained entirely within a *dwelling unit* need not comply with the requirements of Sentences (1) and (2).

- 4)** Duct sealants shall have a *flame-spread rating* not more than 25 and a smoke developed classification not more than 50.

- 5)** Duct connectors that contain *combustible* materials and that are used between ducts and air outlet units shall
 - a) conform to the appropriate requirements for Class 1 air duct materials in CAN/ULC-S110, "Test for Air Ducts,"
 - b) be not more than 4 m long,
 - c) be used only in horizontal runs, and
 - d) not penetrate a required *fire separation*.

3.6.5.5. Insulation and Coverings

- 5)** No *flame-spread rating* or smoke developed classification limits are required for *combustible* insulation and coverings used on piping located within a
 - a) concealed space in a wall,
 - b) floor slab, or
 - c) *noncombustible* enclosure.

9.27.6. Lumber Siding**9.27.6.1. Materials**

1) Lumber siding shall be sound, free of knot holes, loose knots, through checks or splits.

9.27.6.2. Thickness and Width

1) Drop, rustic, novelty, lapped board and vertical wood siding shall be not less than 14.3 mm thick and not more than 286 mm wide.

2) Bevel siding shall be

- a) not less than 5 mm thick at the top, and
- b) not less than
 - i) 12 mm thick at the butt for siding 184 mm or less in width, and
 - ii) 14.3 mm thick at the butt for siding wider than 184 mm.

3) Bevel siding shall be not more than 286 mm wide.

9.27.6.3. Joints

1) Lumber siding shall prevent water from entering at the joints by the use of lapped or matched joints or by vertical wood battens.

2) Siding shall overlap not less than 1 mm per 16 mm width of lumber, but not less than

- a) 9.5 mm for matched siding,
- b) 25 mm for lapped bevel siding, or
- c) 12 mm for vertical battens.

9.27.7. Wood Shingles and Shakes**9.27.7.1. Materials**

1) Shingles and shakes shall conform to

- a) CSA O118.1, "Western Red Cedar Shakes and Shingles,"
- b) CSA O118.2, "Eastern White Cedar Shingles," or
- c) CSA O118.3, "Northern Pine Tapersawn Shakes."

2) Western cedar shakes shall be not less than No. 1 or Handsplit grade, and western cedar shingles not less than No. 2 grade, except that No. 3 grade may be used for undercoursing.

3) Eastern white cedar shingles shall be at least B (clear) grade, except that C grade may be used for the lower course of double course applications.

9.27.7.2. Width

1) Shingles and shakes shall be not less than 65 mm or more than 350 mm wide.

9.27.7.3. Fasteners

1) Shingles or shakes shall be fastened with nails or staples located approximately 20 mm from each edge and not less than 25 mm above the exposure line for single-course applications, or approximately 50 mm above the butt for double-course applications.

9.27.7.4. Offsetting of Joints

1) In single-course application, joints in succeeding courses shall be offset not less than 40 mm so that joints in any 2 of 3 consecutive courses are staggered.

2) In double-course application, joints in the outer course shall be offset from joints in the under-course by not less than 40 mm, and joints in succeeding courses shall be offset not less than 40 mm.

9.27.7.5. Fastening to Lath

- 1)** When lath is used with double-course application [see Sentence 9.27.5.1.(4)], it shall be spaced according to the exposure and securely fastened to the framing.
- 2)** The butts of the under-course of the application referred to in Sentence (1) shall rest on the top edge of the lath.
- 3)** The outer course of the application referred to in Sentence (1) shall be fastened to the lath with nails of sufficient length to penetrate through the lath.
- 4)** The butts of the shingles or shakes shall be so located that they project not less than 12 mm below the bottom edge of the lath referred to in Sentence (1).
- 5)** If wood lath is not used, the butts of the under-course shingles or shakes of the application referred to in Sentence (1) shall be located 12 mm above the butts of the outer course.

9.27.7.6. Exposure and Thickness

- 1)** The exposure and butt thickness of shingles and shakes shall conform to Table 9.27.7.6.

**Table 9.27.7.6.
Exposure and Thickness of Wood Shingles and Shakes
Forming Part of Sentence 9.27.7.6.(1)**

Shake or Shingle Length, mm	Maximum Exposure, mm		Minimum Butt Thickness, mm
	Single Coursing	Double Coursing	
400	190	305	10
450	216	356	11
600	292	406	13

9.27.8. Plywood

9.27.8.1. Material Standards

- 1)** Plywood cladding shall be exterior type conforming to
 - a) ANSI/HPVA HP-1, "Hardwood and Decorative Plywood,"
 - b) CSA O121, "Douglas Fir Plywood,"
 - c) CSA O151, "Canadian Softwood Plywood," or
 - d) CSA O153, "Poplar Plywood."

9.27.8.2. Thickness

- 1)** Plywood cladding shall be not less than 6 mm thick when applied directly to sheathing.
- 2)** When applied directly to framing or over furring strips, plywood cladding thickness shall conform to Table 9.27.8.2.

**Table 9.27.8.2.
Minimum Plywood Cladding Thickness
Forming Part of Sentence 9.27.8.2.(2)**

Spacing of Supports, mm	Minimum Thickness, mm	
	Face Grain Parallel to Supports	Face Grain Right Angles to Supports
400	8	6
600	11	8

- 3)** The thickness of grooved or textured plywood cladding shall be measured at the point of least thickness.

9.27.8.3. Edge Treatment

- 1) The edges of plywood cladding shall be treated with a suitable paint or sealer.

9.27.8.4. Panel Cladding

- 1) Plywood applied in panels shall have all edges supported.
- 2) Not less than a 2 mm gap shall be provided between panels referred to in Sentence (1).
- 3) Vertical joints in cladding referred to in Sentence (1) shall be protected with batten strips or sealant when the plywood joints are not matched.
- 4) Horizontal joints in cladding referred to in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

9.27.8.5. Lapped Strip Siding

- 1) Plywood applied in horizontal lapped strips shall have not less than a 2 mm gap provided at the butted ends, which shall be caulked.
- 2) The horizontal joints of siding described in Sentence (1) shall be lapped not less than 25 mm.
- 3) Wedges shall be inserted under all vertical butt joints and at all corners when horizontal lapped plywood is applied without sheathing.

9.27.9. Hardboard**9.27.9.1. Material Standards**

- 1) Factory-finished hardboard cladding shall conform to CAN/CGSB-11.5-M, "Hardboard, Precoated, Factory Finished, for Exterior Cladding."
- 2) Hardboard cladding that is not factory finished shall conform to Types 1, 2 or 5 in CAN/CGSB-11.3-M, "Hardboard."

9.27.9.2. Thickness

- 1) Type 1 or 2 hardboard cladding shall be not less than
 - a) 6 mm thick when applied over sheathing that provides continuous support, and
 - b) 7.5 mm thick when applied over furring or framing members not more than 400 mm o.c.
- 2) Type 5 hardboard cladding shall be not less than 9 mm thick when applied over sheathing that provides continuous support or over furring or framing members spaced not more than 400 mm o.c.
- 3) Where hardboard cladding is grooved, the grooves shall not extend more than 1.5 mm into the minimum required thickness. (See Note A-9.27.9.2.(3).)

9.27.9.3. Panel Cladding

- 1) Hardboard cladding applied in panels shall have all edges supported with not less than a 5 mm gap provided between sheets.
- 2) Vertical joints in cladding described in Sentence (1) shall be protected with batten strips or sealant when the joints are not matched.
- 3) Horizontal joints in cladding described in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

9.27.9.4. Lapped Strip Siding

- 1) Hardboard applied in horizontal lapped strips shall have not less than a 5 mm gap provided at the butted ends, which shall be sealed or otherwise protected with suitable mouldings.

2) The horizontal joints of siding described in Sentence (1) shall overlap not less than 1 mm per 16 mm width of siding board but not less than 9.5 mm for matched joint siding or 25 mm for lapped siding.

9.27.9.5. Clearance

1) Not less than 3 mm clearance shall be provided between hardboard cladding and door or window frames.

9.27.10. OSB and Waferboard

9.27.10.1. Material Standard

1) OSB and waferboard cladding shall conform to CSA O437.0, "OSB and Waferboard."

9.27.10.2. Thickness

1) OSB conforming to O-2 grade shall be not less than 6.0 mm thick where applied directly to sheathing.

2) OSB conforming to O-2 grade applied directly to framing or over furring strips shall conform to the thickness shown for plywood in Table 9.27.8.2. (See Note A-9.27.10.2.(2).)

3) OSB conforming to O-1 grade and waferboard conforming to R-1 grade shall be not less than 7.9 mm thick where applied directly to sheathing.

4) Where applied directly to framing or over furring strips, OSB conforming to O-1 grade and waferboard conforming to R-1 grade shall be not less than

- a) 9.5 mm thick on supports spaced not more than 400 mm o.c., and
- b) 12.7 mm thick on supports spaced not more than 600 mm o.c.

9.27.10.3. Panel Cladding

1) OSB and waferboard applied in panels shall have all edges supported and treated with a primer or sealer.

2) Not less than a 3 mm gap shall be provided between sheets in cladding described in Sentence (1).

3) Vertical joints in cladding described in Sentence (1) shall be protected with batten strips or sealant when the OSB and waferboard joints are not matched.

4) Horizontal joints in cladding described in Sentence (1) shall be lapped not less than 25 mm or shall be suitably flashed.

9.27.10.4. Clearance

1) Not less than a 3 mm clearance shall be provided between OSB and waferboard cladding and door or window frames.

4) Aluminum sheet cladding shall conform to CAN/CGSB-93.1-M, "Sheet, Aluminum Alloy, Prefinished, Residential," and shall have a thickness of not less than 0.58 mm, except that siding supported by backing or sheathing shall have a thickness of not less than 0.46 mm. (See Note A-9.27.11.1.(3) and (4).)

9.27.12. Vinyl Siding

9.27.12.1. Material Standard

1) Vinyl siding, including flashing and trim accessories, shall conform to CAN/CGSB-41.24, "Rigid Vinyl Siding, Soffits and Fascia."

9.27.12.2. Attachment

1) The attachment of vinyl siding shall conform to the requirements in Subsection 9.27.5. for metal siding.

9.27.13. Exterior Insulation Finish Systems

9.27.13.1. Application

1) Except as provided in Sentence (2), this Subsection applies to exterior insulation finish systems (EIFS) that

- a) are covered in the scope of CAN/ULC-S716.1, "Exterior Insulation and Finish Systems (EIFS) - Materials and Systems," and
- b) have a geometrically defined drainage cavity with a minimum cavity depth of 10 mm and an open area equal to not less than 13% of the area of a full-size EIFS panel.

(See Note A-9.27.13.1.(1).)

2) EIFS that are not covered by Sentence (1) shall comply with Part 5.

9.27.13.2. Materials

1) The materials used in EIFS shall conform to CAN/ULC-S716.1, "Exterior Insulation and Finish Systems (EIFS) - Materials and Systems."

2) The substrate on which the EIFS is installed shall

- a) be compatible with that particular system (see Note A-9.27.13.2.(2)(a)), and
- b) comply with the structural requirements for sheathing materials stated in Section 9.23.

9.27.13.3. Design and Installation

1) The design and installation of EIFS on the substrate described in Sentence 9.27.13.2.(2) shall comply with

- a) CAN/ULC-S716.2, "Exterior Insulation and Finish Systems (EIFS) - Installation of EIFS Components and Water Resistive Barrier," and
- b) CAN/ULC-S716.3, "Exterior Insulation and Finish System (EIFS) - Design Application."

Section 9.28. Stucco

9.28.1. General

9.28.1.1. Sheathing beneath Stucco

1) Sheathing shall be provided beneath stucco applied over wood-frame walls except as permitted in Article 9.28.4.2.

2) Where applied beneath stucco, sheathing shall conform to Subsection 9.23.17.

Section 5.6. Construction and Demolition Sites

5.6.1. General

5.6.1.1. Application

(See Note A-5.6.1.1.)

1) This Section applies to fire safety for *buildings*, parts of *buildings*, facilities, adjacent *buildings* or facilities, and associated areas undergoing construction, alteration or demolition operations.

5.6.1.4. Access for Firefighting

2) A means shall be provided to allow firefighters to perform their duties on all levels of the *building*.

3) Provision shall be made for the use of existing elevators, hoists or lifts to assist firefighting personnel in reaching all levels of the *building*.

5.6.3.2. Smoking Restrictions

1) Where smoking is permitted on a construction, alteration, or demolition site, it shall only be permitted in designated smoking areas, which shall

- a) be located not less than 3 m away from the *building* or part of the *building* under construction, demolition, or alteration,
- b) be identified with appropriate signage,
- c) be provided with safe receptacles for the disposal of smoking materials, and
- d) have a clearance of not less than 3 m from any combustible storage or combustible refuse maintained at all times.

5.6.3.6. Hydrant Access

1) Hydrants on a construction, alteration, or demolition site shall

- a) be clearly marked with a sign,
- b) be accessible, and
- c) have an unobstructed clearance of not less than 2 m at all times.

5.6.3.8. Site Security

(See also Article 8.2.1.3. of Division B of the NBC(AE).)

1) A strongly constructed fence, boarding or barricade not less than 1.8 m high shall be erected around the perimeter of the construction or demolition site.

- 2)** Barricades shall have
- a) a reasonably smooth surface facing the outside, and
 - b) no openings other than those required for access.

3) Access openings through barricades shall be equipped with gates, which shall be

- a) kept closed and locked when the site is unattended, and
- b) maintained in place until completion of the construction or demolition activity.

4) Fencing, boarding and barricades shall be constructed and maintained in a manner that does not restrict access to the construction or demolition site for firefighting purposes or to fire protection equipment.

5.6.3.3. Site Identification

1) A sign identifying the civic address of the construction or demolition site shall be visible from the access route at the entrance to the site at all times.

5.6.3.4. Disposal of Combustible Refuse

2) Disposal chutes described in Clause 8.2.5.2.(1)(b) of Division B of the NBC(AE) shall

- a) be constructed of noncombustible material, or
- b) terminate not less than 2 m above the disposal bin they serve.

D-2.11. Glued-Laminated Timber Beams and Columns

D-2.11.1. Applicability of Information

The information in Subsection D-2.11. applies to glued-laminated timber beams and columns required to have fire-resistance ratings greater than those afforded under the provisions of Article 3.1.4.6.

D-2.11.2. Method of Calculation

- 1)** The fire-resistance rating of glued-laminated timber beams and columns in minutes shall be equal to
 - a) $0.1 fB [4 - 2(B/D)]$ for beams that may be exposed to fire on 4 sides,
 - b) $0.1 fB [4 - (B/D)]$ for beams that may be exposed to fire on 3 sides,
 - c) $0.1 fB [3 - (B/D)]$ for columns that may be exposed to fire on 4 sides, and
 - d) $0.1 fB [3 - (B/2D)]$ for columns that may be exposed to fire on 3 sides,

where

- f = the load factor shown in Figure D-2.11.2.-A,
- B = the full dimension of the smaller side of a beam or column in millimetres before exposure to fire [see Figure D-2.11.2.-B],
- D = the full dimension of the larger side of a beam or column in millimetres before exposure to fire [see Figure D-2.11.2.-B],
- k = the effective length factor obtained from CSA O86, "Engineering Design in Wood,"
- L = the unsupported length of a column in millimetres.

- 2)** The factored resistance of a beam or column shall be determined by using the specified strengths in CSA O86, "Engineering Design in Wood."

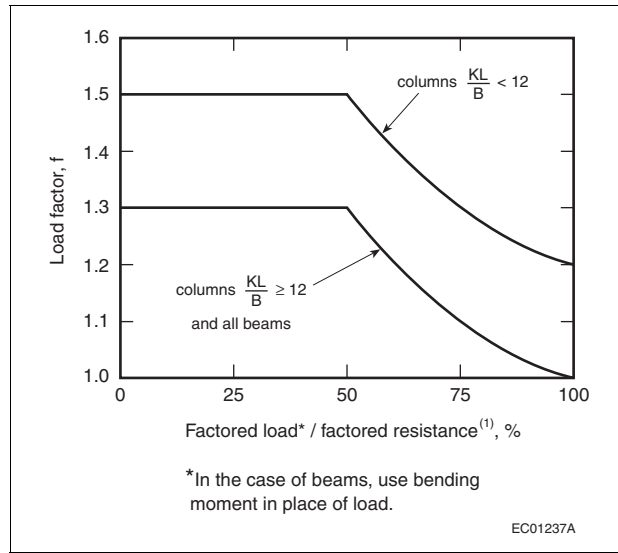


Figure D-2.11.2-A
Factors to compensate for partially loaded columns and beams

Note to Figure D-2.11.2-A:

(1) See Sentence (2).

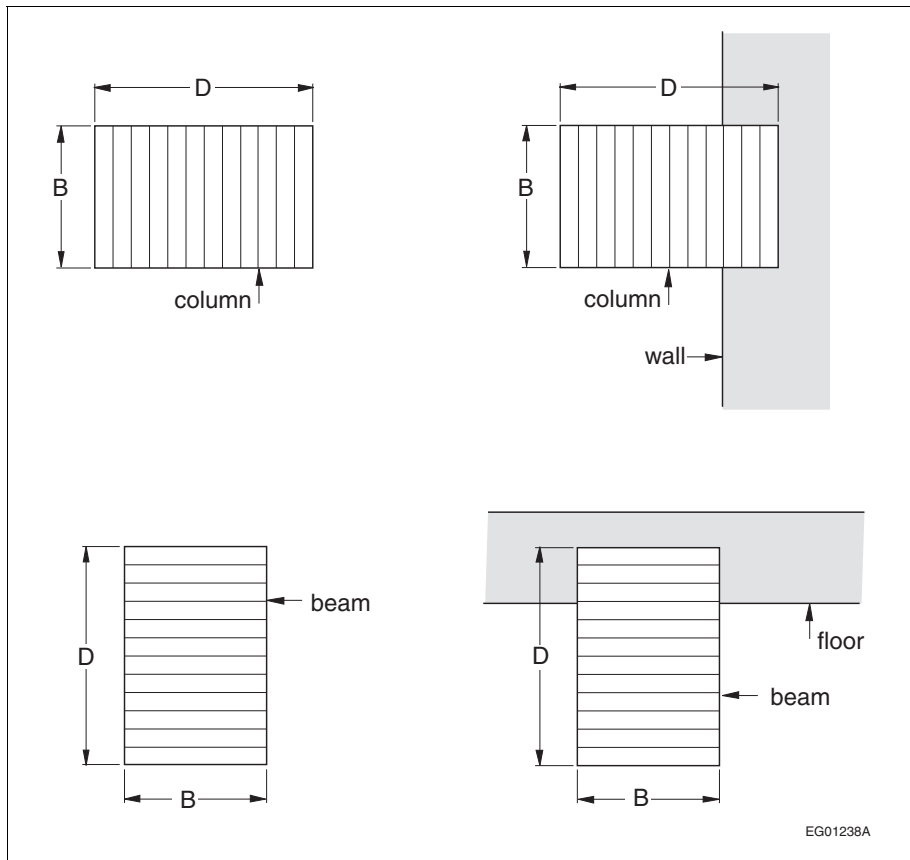


Figure D-2.11.2-B
Full dimensions of glued-laminated beams and columns