2019 VBBL Consolidated Changes to 2020Jul01

Last edit: 2020Sep10

These unofficial documents consolidate amendments to the 2019 Vancouver Building By-law from the originally published version to July 01, 2020. These documents are provided as courtesy to construction and design professionals, building owners, and other stakeholders wishing to familiarize themselves with the general substance of changes of the Building By-law (General & Plumbing Systems). Users of these documents are hereby notified that these are transitory documents provided "as is", that will neither be supported nor updated, and will be superseded by the final published documents. Users are advised that By-law development can occur quickly, and users should contact the City of Vancouver for the latest information.

Changes are in purple text and are prefaced with green text identifying the specific amendment and effective date.

The included amendments are as follows:

12512 – Upcoming 2020 & 2021Energy Efficiency and Plumbing Requirements
12609 – 2020 Annual Fee Amendments
12630 – General Housekeeping Amendments
12683 – Upcoming 2023 1-3 Storey Energy Efficiency requirements
12692 – Energy Efficiency Housekeeping Amendments
12715 – Encapsulated Mass Timber
12717 – Non-potable water use and *Legionella* mitigation requirements
12752 – Housekeeping Amendments

This document supplements future dated changes with respect to energy efficiency and legionella prevention to assist the construction industry in preparing for new requirements effective in 2021 and 2022.

Future dated changes can be found at:

- https://vancouver.ca/files/cov/vancouver-building-bylaw-part-10-unoffical-wording-effective-jan-1-2021.pdf
- https://vancouver.ca/files/cov/consolidtion-legionella-prevention-changes.pdf

Should there be a conflict between the contents of this document, and the Building By-law or other requirements determined by the Chief Building Official of the City of Vancouver, the Building By-law or other requirements shall apply.

Preface Text - Book I (General) and Book II (Plumbing Systems)

Rev.: N/A - Eff.Date: 2020Jul01

General Requirements

Building By-law - Book I (General) requirements must address at least one of the Code's five stated objectives:

- safety
- health
- accessibility for persons with disabilities
- fire and structural protection of buildings
- environment

Code provisions do not necessarily address all the characteristics of buildings that might be considered to have a bearing on the Code's objectives. The design of a technically sound building depends upon many factors beyond simple compliance with building regulations. Such factors include the availability of knowledgeable practitioners who have received appropriate education, training and experience and who have some degree of familiarity with the principles of good building practice and experience using textbooks, reference manuals and technical guides.

Further, since code development is typically based on accumulated test data and past experience, interpretations of literal By-law requirements should also consider typical building sizes and construction methodologies. Buildings that are atypical, or that do not fit within the commonly expected parameters of conventional building practice, should be approached with some caution by code users.

The Building By-law does not list acceptable proprietary building products. It establishes the criteria that building materials, products and assemblies must meet. Some of these criteria are explicitly stated in the By-law while others are incorporated by reference to material or product standards published by standards development organizations. Only those portions of the standards related to the objectives of this By-law are mandatory.

Rev.: N/A - Eff.Date: 2020Jul01

Unique to Vancouver Indication

All text in the By-law that is Unique to Vancouver (UTV) is provided with a grey background wherever practical. This identifier was utilized to provide the user of the By-law with a means by which to differentiate the Vancouver provisions of this By-law from those of the 2018 British Columbia Building and Plumbing Codes. Where the provisions of Vancouver have required the deletion of the 2018 British Columbia Building and Plumbing Code text, and no Vancouver text has replaced the deleted text, the word "deleted" has been used to alert the user that a deletion has been made and that there is a difference from the 2018 British Columbia Building and Plumbing Codes text.

Revision Indication

From time to time, the provisions of the Building By-law may be amended. Where this occurs, updated text is marked by a sidebar with text in brackets indicating a Revision. In some cases, text that was originally included as part of the Building By-law is amended and would result in substantial renumbering of associated portions of the Building By-law. In these circumstances the removed text may be replaced with the words "**[UTV Deleted].**" to preserve the existing numbering structure.

Book I (General) – Division B

Book I – Division B, Part 1 Changes

Rev.: 12692, 12715 - Eff.Date: 2020Jul01

1.3.1.2. Applicable Editions

1) Where documents are referenced in this By-law, they shall be the editions designated in Table 1.3.1.2.

Table 1.3.1.2.
Documents Referenced in Book I (General) of the Building By-law(1)
Forming Part of Sentence 1.3.1.2.(1)

Issuing Agency	Document Number(2)	Title of Document(3)	By-law Reference
AAMA	501-05	Test for Exterior Walls	A-5.9.2.2.(2)
AAMA	501.1-05	Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure	A-5.9.2.2.(2)
AAMA	501.2-09	Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems	A-5.9.2.2.(2)
AAMA	501.4-09	Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstorey Drifts	A-5.9.2.2.(2)
AAMA	501.5-07	Thermal Cycling of Exterior Walls	A-5.9.2.2.(2)
AAMA	501.6-09	Recommended Dynamic Test Method For Determining The Seismic Drift Causing Glass Fallout From A Wall System	A-5.9.2.2.(2)
AAMA	1304-02	Voluntary Specification for Forced Entry Resistance of Side-Hinged Door Systems	9.7.5.2.(2)
ACGIH	28th Edition	Industrial Ventilation: A Manual of Recommended Practice for Design	A-6.3.1.6.
AISI	S201-12	North American Standard for Cold-Formed Steel Framing – Product Data	9.24.1.2.(1)
ANSI	A208.1-2009	Particleboard	9.23.15.2.(3) 9.29.9.1.(1) 9.30.2.2.(1)
ANSI/APA	PRG 320-2018	Standard for Performance-Rated Cross-Laminated Timber	3.1.18.3.(3)
ANSI/CSA	ANSI Z21.10.3-2013/ CSA 4.3-2013	Gas-Fired Water Heaters, Volume III, Storage Water Heaters With Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous	10.2.2.12.(1)(d)
ANSI/CSA	ANSI Z83.8-2013/CSA 2.6-2013	Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters and Gas-Fired Duct Furnaces	10.2.2.14.(1)

ASCE	ASCE/SEI 7-10	Minimum Design Loads for Buildings and Other Structures	A-4.1.8.18.(15) and (16)(c)
ASCE	ASCE/SEI 8-02	Design of Cold-Formed Stainless Steel Structural Members	A-4.3.4.2.(1)
ASCE	ASCE/SEI 49-12	Wind Tunnel Testing for Buildings and Other Structures	4.1.7.12.(1)
ASHRAE	2013	ASHRAE Handbook – Fundamentals	A-10.2.2.6.
ASHRAE	Guideline 12-2000	Minimizing the Risk of Legionellosis Associated with Building Water Systems	6.3.2.15.(4) 6.3.2.16.(3)
ASHRAE	ANSI/ASHRAE 62-2001 (except Addendum n)	Ventilation for Acceptable Indoor Air Quality (except Addendum n)	6.3.1.1.(2) 10.2.2.2.(1)(b) 10.2.2.3.(1)(b) A-9.25.5.2.
ASHRAE	ANSI/ASHRAE 62.1-2007	Ventilation for Acceptable Indoor Air Quality	6.3.2.2.(1)
ASHRAE	ANSI/ASHRAE 90.1-2016	Energy Standard for Buildings Except Low-Rise Residential Buildings	10.2.2.2.(1) Table 10.2.2.5.A 11.7.1.1.(3)
ASME/CSA	ASME A17.1-2016/CSA B44-16	Safety Code for Elevators and Escalators	3.2.6.7.(2) 3.5.2.1.(3) 3.5.4.1.(3) 3.8.3.7.(1) 3.5.4.2.(1) A-3.5.2.1.(1) 3.8.3.7.(1) Table 4.1.5.11. Table 4.1.8.18.
ASME	B18.6.1-1981	Wood Screws (Inch Series)	Table 5.9.1.1. 9.23.3.1.(3) A-9.23.3.1.(3)
ASTM	A 123/A 123M-13	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products	Table 5.9.1.1. Table 9.20.16.1.
ASTM	A 153/A 153M-09	Zinc Coating (Hot-Dip) on Iron and Steel Hardware	Table 5.9.1.1. Table 9.20.16.1.
ASTM	A 252-10	Welded and Seamless Steel Pipe Piles	4.2.3.8.(1)
ASTM	A 283/A 283M-13	Low and Intermediate Tensile Strength Carbon Steel Plates	4.2.3.8.(1)
ASTM	A 390-06	Zinc-Coated (Galvanized) Steel Poultry Fence Fabric (Hexagonal and Straight Line)	Table 9.10.3.1.-B
ASTM	A 653/A 653M-13	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process	Table 5.9.1.1. 9.3.3.2.(1)

ASTM	A 792/A 792M-10	Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process	9.3.3.2.(1)
ASTM	A 1008/A 1008M-13	Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable	4.2.3.8.(1)
ASTM	A 1011/A 1011M-14	Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength	4.2.3.8.(1)
ASTM	C 4-04	Clay Drain Tile and Perforated Clay Drain Tile	Table 5.9.1.1. 9.14.3.1.(1)
ASTM	C 27-98	Fireclay and High-Alumina Refractory Brick	9.21.3.4.(1)
ASTM	C 73-10	Calcium Silicate Brick (Sand-Lime Brick)	Table 5.9.1.1. 9.20.2.1.(1)
ASTM	C 126-13	Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units	Table 5.9.1.1. 9.20.2.1.(1)
ASTM	C 177-13	Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus	9.36.2.2.(1)
ASTM	C 212-14	Structural Clay Facing Tile	Table 5.9.1.1. 9.20.2.1.(1)
ASTM	C 260/C 260M-10a	Air-Entraining Admixtures for Concrete	9.3.1.8.(1)
ASTM	C 411-11	Hot-Surface Performance of High-Temperature Thermal Insulation	3.6.5.4.(4) 3.6.5.5.(1) 9.33.6.4.(4) 9.33.8.2.(2)
ASTM	C 412M-11	Concrete Drain Tile (Metric)	Table 5.9.1.1. 9.14.3.1.(1)
ASTM	C 444M-03	Perforated Concrete Pipe (Metric)	Table 5.9.1.1. 9.14.3.1.(1)
ASTM	C 494/C 494M-13	Chemical Admixtures for Concrete	9.3.1.8.(1)
ASTM	C 516-08	Vermiculite Loose Fill Thermal Insulation	A-9.25.2.4.(5)
ASTM	C 553-13	Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications	Table 5.9.1.1.
ASTM	C 612-14	Mineral Fiber Block and Board Thermal Insulation	Table 5.9.1.1.
ASTM	C 700-13	Standard Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated	Table 5.9.1.1. 9.14.3.1.(1)
ASTM	C 726-12	Mineral Wool Roof Insulation Board	Table 5.9.1.1. 9.25.2.2.(1)

ASTM	C 754-11	Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products	Table A-9.11.1.4.-A Table A-9.11.1.4.-B Table A-9.11.1.4.-C Table A-9.11.1.4.-D
ASTM	C 834-10	Latex Sealants	Table 5.9.1.1. 9.27.4.2.(2)
ASTM	C 840-13	Application and Finishing of Gypsum Board	3.1.19.2.(2) Table 5.9.1.1.
ASTM	C 920-14	Elastomeric Joint Sealants	Table 5.9.1.1. 9.27.4.2.(2)
ASTM	C 954-11	Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness	9.24.1.4.(1)
ASTM	C 991-08e1	Flexible Fibrous Glass Insulation for Metal Buildings	Table 5.9.1.1.
ASTM	C 1002-07	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs	Table 5.9.1.1. 9.24.1.4.(1) 9.29.5.7.(1)
ASTM	C 1177/C 1177M-13	Glass Mat Gypsum Substrate for Use as Sheathing	3.1.5.14.(6) 3.1.5.15.(4) Table 5.9.1.1. Table 9.23.17.2.-A A-9.27.13.2.(2)(a)
ASTM	C 1178/C 1178M-13	Coated Glass Mat Water-Resistant Gypsum Backing Panel	3.1.5.14.(6) 3.1.5.15.(4) Table 5.9.1.1. 9.29.5.2.(1)
ASTM	C 1184-13	Structural Silicone Sealants	Table 5.9.1.1. 9.27.4.2.(2)
ASTM	C 1193-13	Use of Joint Sealants	A-Table 5.9.1.1. A-9.27.4.2.(1)
ASTM	C 1299-03	Selection of Liquid-Applied Sealants	A-Table 5.9.1.1. A-9.27.4.2.(1)
ASTM	C 1311-10	Solvent Release Sealants	Table 5.9.1.1. 9.27.4.2.(2)
ASTM	C 1330-02	Cylindrical Sealant Backing for Use with Cold Liquid-Applied	Table 5.9.1.1.

		Sealants	9.27.4.2.(3)
ASTM	C 1363-11	Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus	A-5.9.4.1.(1) 9.36.2.2.(4)
ASTM	C 1396/C 1396M-14	Gypsum Board	3.1.5.14.(6) 3.1.5.15.(4) 3.1.18.13.(1) 3.1.19.2.(2) Table 5.9.1.1. Table 9.23.17.2.-A 9.29.5.2.(1) Table 9.29.5.3.
ASTM	C 1472-10	Calculating Movement and Other Effects When Establishing Sealant Joint Width	A-Table 5.9.1.1. A-9.27.4.2.(1)
ASTM	C 1658/C 1658M-13	Glass Mat Gypsum Panels	3.1.5.14.(6) Table 5.9.1.1.
ASTM	D 323-08	Vapor Pressure of Petroleum Products (Reid Method)	1.4.1.2.(1)(4)
ASTM	D 1037-12	Evaluating Properties of Wood-Base Fiber and Particle Panel Materials	A-9.23.15.2.(4)
ASTM	D 1143/D 1143M-07	Deep Foundations Under Static Axial Compressive Load	A-4.2.7.2.(2)
ASTM	D 1227-95	Emulsified Asphalt Used as a Protective Coating for Roofing	Table 5.9.1.1. 9.13.2.2.(2) 9.13.3.2.(2)
ASTM	D 2178/D 2178M-13a	Asphalt Glass Felt Used in Roofing and Waterproofing	Table 5.9.1.1.
ASTM	D 2898-10	Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing	3.1.4.8.(2) 3.1.5.5.(3) 3.1.5.24.(1) 3.1.18.7.(6) 3.2.3.7.(4) 9.10.14.5.(3) 9.10.15.5.(3)
ASTM	D 3019-08	Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered	Table 5.9.1.1. 9.13.3.2.(2) Table 9.26.2.1.-B
ASTM	D 4479/D 4479M-07	Asphalt Roof Coatings – Asbestos-Free	Table 5.9.1.1. 9.13.2.2.(2) 9.13.3.2.(2) Table 9.26.2.1.-B
ASTM	D 4637/D 4637M-12	EPDM Sheet Used In Single-Ply Roof Membrane	Table 5.9.1.1.

			9.13.3.2.(2) Table 9.26.2.1.-B
ASTM	D 4811/D 4811M-06	Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing	Table 5.9.1.1. 9.13.3.2.(2) Table 9.26.2.1.-B
ASTM	D 5456-10a	Evaluation of Structural Composite Lumber Products	3.1.11.7.(5)
ASTM	D 6878/D 6878M-11a	Thermoplastic Polyolefin Based Sheet Roofing	Table 5.9.1.1. 9.13.3.2.(2) Table 9.26.2.1.-B
ASTM	E 90-09	Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements	5.8.1.2.(1) 5.8.1.4.(1) 9.11.1.2.(1)
ASTM	E 96/E 96M-13	Water Vapor Transmission of Materials	5.5.1.2.(3) 9.13.2.2.(2) 9.25.4.2.(1) 9.25.5.1.(1) 9.30.1.2.(1)
ASTM	E 283-04	Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen	5.9.3.4.(2) A-5.9.3.4.(2)
ASTM	E 330/E 330M-02	Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference	A-5.9.3.2.(1)
ASTM	E 331-00	Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference	5.9.3.5.(2) A-5.9.3.5.(2)
ASTM	E 336-11	Measurement of Airborne Sound Attenuation between Rooms in Buildings	5.8.1.2.(2) 5.8.1.4.(7) 9.11.1.2.(2) A-9.11.
ASTM	E 413-10	Classification for Rating Sound Insulation	A-1.4.1.2.(1)(4) 5.8.1.2.(1) 5.8.1.2.(2) 5.8.1.4.(7) 5.8.1.5.(3) 9.11.1.2.(1) 9.11.1.2.(2)
ASTM	E 492-09	Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine	A-9.11.

ASTM	E 547-00	Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference	5.9.3.5.(2) A-5.9.3.5.(2)
ASTM	E 597-95	Determining a Single Number Rating of Airborne Sound Insulation for Use in Multi-Unit Building Specifications	A-9.11.
ASTM	E 736-00	Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members	Table 9.10.3.1.-B
ASTM	E 779-10	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization	10.2.2.21.(1)
ASTM	E 783-02	Field Measurement of Air Leakage Through Installed Exterior Windows and Doors	A-5.9.2.3.(1) A-5.9.3.4.(2)
ASTM	E 1007-13b	Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures	A-9.11.
ASTM	E 1105-00	Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference	A-5.9.2.3.(1) A-5.9.3.5.(2)
ASTM	E 1300-12ae1	Standard Practice for Determining Load Resistance of Glass in Buildings	4.3.6.1.(1) 9.6.1.3.(1)
ASTM	E 2178-13	Air Permeance of Building Materials	5.4.1.2.(1)
ASTM	E 2190-10	Insulating Glass Unit Performance and Evaluation	Table 5.9.1.1. 9.6.1.2.(1)
ASTM	F 842-01 or 04	Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact	9.7.5.1.(3)
ASTM	F 1667-13	Driven Fasteners: Nails, Spikes, and Staples	9.23.3.1.(1) 9.26.2.3.(1) 9.29.5.6.(1)
AWPA	M4-11	Care of Preservative-Treated Wood Products	4.2.3.2.(2)
BC	B.C. Reg. 100/2004	Electrical Safety Regulation	3.3.6.2.(4) 3.6.1.2.(1) 3.6.2.1.(6) 3.6.2.7.(1) 6.2.1.5.(1) 9.31.6.2.(2) 9.33.5.2.(1) 9.34.1.1.(1)
BC	B.C. Reg. 101/2004	Elevating Devices Safety Regulation	3.5.2.1.(1) 3.5.2.1.(2) Table 4.1.5.11. Table 4.1.8.18.

BC	B.C. Reg. 103/2004	Gas Safety Regulation	6.2.1.5.(1) 9.10.22.1.(1) 9.31.6.2.(2) 9.33.5.2.(1)
BC	B.C. Reg. 104/2004	Power Engineers, Boiler, Pressure Vessel and Refrigeration Safety Regulation	6.2.1.5.(1) 9.31.6.2.(2) 9.33.5.2.(1)
BC	R.S.B.C. 1996 c.17	Architects Act	1.4.1.2.(1)(4)
BC	R.S.B.C. 1996 c.116	Engineers and Geoscientists Act	1.4.1.2.(1)(4)
BC	R.S.B.C. 1996 c.293	Mines Act	1.4.1.2.(1)(4)
BC	S.B.C. 1998 c.43	Strata Property Act	A-9.37.1.1.
BC	S.B.C. 2003 c.39	Safety Standards Act	6.2.1.5.(1) 6.2.1.5.(2) 9.31.6.2.(2) 9.33.5.2.(1) 9.33.5.2.(2)
BC	S.B.C. 2015	Building Act	2.2.1.1.(1)(4)
BNQ	BNQ 3624-115/2007	Polyethylene (PE) Pipe and Fittings – Flexible Pipes for Drainage – Characteristics and Test Methods	Table 5.9.1.1. 9.14.3.1.(1)
CCBFC	NRCC 35951	Guidelines for Application of Part 3 of the National Building Code of Canada to Existing Buildings	A-1.1.1.1.(1)(4)
CCBFC	NRCC 38732	National Farm Building Code of Canada 1995	1.1.1.1.(4)(4) A-1.4.1.2.(1)(4) A-Table 4.1.2.1. A-5.1.2.1.(1)
CCBFC	NRCC 40383	User's Guide – NBC 1995, Fire Protection, Occupant Safety and Accessibility (Part 3)	A-1.1.1.1.(1)(4)
CCBFC	NRCC 43963	User's Guide – NBC 1995, Application of Part 9 to Existing Buildings	A-1.1.1.1.(1)(4)
CCBFC	NRCC 56191	National Energy Code of Canada for Buildings 2015	A-2.1.1.2.(6)(4) A-2.2.1.1.(1)(4) A-3.2.1.1.(1)(4) Table 3.10.1.1.(1) 10.2.2.1.(1) Table 10.2.3.3.-A Table 10.2.3.3.-B 10.2.3.4.(1) A-10.2.3.3.(2)

			A-10.2.3.4.(1) A-10.2.3.4.(2) A-10.2.3.4.(3) A-2.2.8.1.(1)[5]
CCBFC	NRCC 56194	User's Guide – NBC 2015, Structural Commentaries (Part 4 of Division B)	A-1.1.1.1.(1)[4] A-4.1.1.3.(1) A-4.1.1.3.(2) A-4.1.2.1. A-4.1.2.1.(1) A-4.1.3. A-4.1.3.2.(2) A-4.1.3.2.(4) A-4.1.3.2.(5) A-4.1.3.3.(2) A-4.1.3.4.(1) A-4.1.3.5.(1) A-4.1.3.5.(3) A-4.1.3.6.(1) A-4.1.3.6.(2) A-4.1.3.6.(3) A-4.1.5.8. A-4.1.5.17. A-4.1.6.2. A-4.1.6.3.(2) A-4.1.6.4.(1) A-4.1.7.2.(1) and (2) A-4.1.7.3.(5)(c) A-4.1.7.3.(10) A-4.1.7.9.(1) A-4.1.8.2.(1) A-4.1.8.3.(4) A-4.1.8.3.(6) A-4.1.8.3.(7)(b) and (c) A-4.1.8.3.(8) A-4.1.8.4.(3) and Table 4.1.8.4.-A A-Table 4.1.8.5. A-Table 4.1.8.6. A-4.1.8.7.(1) A-4.1.8.9.(4) A-4.1.8.9.(5) A-4.1.8.10.(4) A-4.1.8.10.(5) A-4.1.8.10.(7) A-4.1.8.11.(3) A-

			4.1.8.12.(1)(a) A- 4.1.8.12.(1)(b) A-4.1.8.12.(3) A- 4.1.8.12.(4)(a) A-4.1.8.13.(4) A-4.1.8.15.(1) A-4.1.8.15.(3) A-4.1.8.15.(4) A-4.1.8.15.(5) A-4.1.8.15.(6) A-4.1.8.15.(7) A-4.1.8.15.(8) A-4.1.8.16.(1)
CCBFC	NRCC 56194	User's Guide – NBC 2015, Structural Commentaries (Part 4 of Division B) (continued)	A-4.1.8.16.(4) A- 4.1.8.16.(6)(a) A-4.1.8.16.(7) A- 4.1.8.16.(8)(a) A-4.1.8.16.(10) A-4.1.8.17.(1) A-4.1.8.18. A-4.1.8.18.(14) A-4.1.8.18.(15) and (16)(c) A- 4.1.8.19.(3)(a) A-4.1.8.19.(4) A- 4.1.8.21.(4)(a) A-4.1.8.21.(5) A-4.2.4.1.(3) A-4.2.4.1.(5) A-4.2.5.1.(1) A-4.2.6.1.(1) A-4.2.7.2.(1) A-4.3.6.1.(1) A-4.4.2.1.(1) A-5.1.4.2. A-5.2.2.2.(4) Appendix C
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CSA	S269.1-1975	Falsework for Construction Purposes	4.1.1.3.(4)
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CSA	S350-M1980	Code of Practice for Safety in Demolition of Structures	8.1.1.3.(1)
CSA	S367-12	Air-, Cable-, and Frame-Supported Membrane Structures	4.4.1.1.(1)
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CSA	Z662-11 Package	Oil and Gas Pipeline Systems/CSA Z662-11, Commentary on Oil and Gas Pipeline Systems	3.2.3.22.(1)
CSA	Z7396.1-12	Medical Gas Pipeline Systems – Part 1: Pipelines for Medical Gases, Medical Vacuum, Medical Support Gases, and Anaesthetic Gas Scavenging Systems	3.7.3.1.(1)
CWC	BPS No. 1-2000	Moisture and Wood-Frame Buildings	A-5.6.2.1.
CWC	1997	Introduction to Wood Building Technology	A-9.27.3.8.(4)
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ECC	2013	EIFS Practice Manual	A-5.9.4.1.(1) A-9.27.13.1.(1)
EPA	625/R-92/016 (1994)	Radon Prevention in the Design and Construction of Schools and Other Large Buildings	A-5.4.1.1. 6.2.1.1.(1)
FEMA	450-1-2003	NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures	A-4.1.8.18.(15) and (16)(c)
FEMA	P-750-2009	NEHRP Recommended Seismic Provisions for New Buildings and Other Structures	A-4.1.8.18.(15) and (16)(c)
FLL	2008	Guidelines for the Planning, Construction and Maintenance of Green Roofing	A-5.6.1.2.(2)
FM Approvals	2008	Approval Standard for Quick Response Storage Sprinklers for Fire Protection	A-3.2.5.12.(7)
FPI	Project 43-10C-024 (1988)	Deflection Serviceability Criteria for Residential Floors	A-9.23.4.2.(2)
FPI/RDH	SP-53-2013	Guide for Designing Energy-Efficient Building Enclosures for Wood-Frame Multi-Unit Residential Buildings in Marine to Cold Climate Zones in North America	A-5.6.2.1.
HC	H46-2/90-156E	Exposure Guidelines for Residential Indoor Air Quality	A-6.3.1.6. A-9.25.5.2.
HC	2007	Radon: A Guide for Canadian Homeowners	A-5.4.1.1.

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HC	2004	Fungal Contamination in Public Buildings: Health Effects and Investigation Methods	A-5.5.1.1.
HC	2008	Guide for Radon Measurements in Public Buildings (Schools, Hospitals, Care Facilities, Detention Centres)	A-5.4.1.1. A-6.2.1.1.
HC	2008	Guide for Radon Measurements in Residential Dwellings (Homes)	A-9.13.4.3.
HPVA	ANSI/HPVA HP-1-2009	Hardwood and Decorative Plywood	Table 5.9.1.1. 9.27.8.1.(1) 9.30.2.2.(1)
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HVI	HVI Publication 915-2013	Loudness Testing and Rating Procedure	9.32.3.10.(2) Table 9.32.3.10.-B
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IEC	60268-16:2011	Sound System Equipment – Part 16: Objective Rating of Speech Intelligibility by Speech Transmission Index	A- 3.2.4.22.(1)(b)
ISO	3864-1:2002	Graphical symbols – Safety colours and safety signs – Part 1: Design principles for safety signs and safety markings	3.4.5.1.(2) 9.9.11.3.(2)
ISO	7010:2003	Graphical symbols – Safety colours and safety signs – Registered safety signs	3.4.5.1.(2) A-3.4.5.1.(2)(c) 9.9.11.3.(2)
ISO	7240-19:2007	Fire Detection and Alarm Systems – Part 19: Design, Installation, Commissioning and Service of Sound Systems for Emergency Purposes	A- 3.2.4.22.(1)(b)
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ISO	15712-1:2005	Building Acoustics – Estimation of Acoustic Performance of Buildings From the Performance of Elements – Part 1: Airborne Sound Insulation Between Rooms	5.8.1.4.(1) 5.8.1.4.(2) 5.8.1.4.(4) 5.8.1.4.(5) 5.8.1.4.(6) 5.8.1.5.(1) 5.8.1.5.(2) 5.8.1.5.(5) 5.8.1.5.(6)
NEMA	SB 50-2008	Emergency Communications Audio Intelligibility Applications Guide	A- 3.2.4.22.(1)(b)
NFPA	2010 Edition	Fire Protection Guide to Hazardous Materials	A-6.9.1.2.(1)
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NFPA	34-2011	Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids	A-6.9.1.2.(1)
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NFPA	91-2010	Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids	6.3.4.3.(1) A-6.9.1.2.(1)
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NFPA	307-2011	Construction and Fire Protection of Marine Terminals, Piers, and Wharves	A-6.9.1.2.(1)
NFPA	409-2011	Aircraft Hangars	A-6.9.1.2.(1)
NFPA	415-2013	Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways	A-6.9.1.2.(1)
NFPA	484-2012	Combustible Metals	A-6.9.1.2.(1)
NFPA	654-2013	Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids	A-6.9.1.2.(1)
NFPA	655-2012	Prevention of Sulfur Fires and Explosions	A-6.9.1.2.(1)
NFPA	664-2012	Prevention of Fires and Explosions in Wood Processing and	A-6.9.1.2.(1)

		Woodworking Facilities	
NFPA	1142-2007	Standard on Water Supplies for Suburban and Rural Fire Fighting	A-3.2.5.7.(1)
NFPA	1710-2010	Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments	A-3.2.3.1.(8)
NFRC	100-2010	Determining Fenestration Product U-factors	A-10.2.2.7.(3)
NLGA	2014	Standard Grading Rules for Canadian Lumber	9.3.2.1.(1) A-9.3.2.1.(1) Table A-9.3.2.1.(1)-A A-Table 9.3.2.1. A-9.3.2.8.(1) A-9.23.10.4.(1)
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NRC-IRC	CBD 230	Applying Building Codes to Existing Buildings	A-1.1.1.1.(1)(4)
NRC-IRC	CBD 231	Moisture Problems in Houses	A-9.25.3.1.(1)
NRC-IRC	1988	Performance and Acceptability of Wood Floors – Forintek Studies	A-9.23.4.2.(2)
NRCA	2005	The NRCA Waterproofing Manual	A-5.6.2.1.
NRCA	2011	The NRCA Roofing Manual: Membrane Roof Systems	A-5.6.2.1.
NRCA	2nd Edition, 2009	Vegetative Roof Systems Manual	A-5.6.1.2.(2)
NRCan	R.S.C., 1985, c. E-17	Explosives Act	3.3.6.2.(3)
NRC Const.	2005	A Guide for the Wind Design of Mechanically Attached Flexible Membrane Roofs	A-5.2.2.2.(4)
NRC Const.	RR-331-2013	Guide to Calculating Airborne Sound Transmission in Buildings	A-5.8.1.4.
NYCDH	2008	Guidelines on Assessment and Remediation of Fungi in Indoor Environments	A-5.5.1.1.
OMMAH	2012	2012 Building Code Compendium, Volume 2, Supplementary Standard SB-7, Guards for Housing and Small Buildings	A-9.8.8.2.

SMACNA	ANSI/SMACNA 006-2006	HVAC Duct Construction Standards – Metal and Flexible	9.33.6.5.(2)
SMACNA	2012	Architectural Sheet Metal Manual, Seventh Edition	A-5.6.2.1.
SPRI	ANSI/GRHC/SPRI VR-1-2011	Investigating Resistance to Root Penetration on Vegetative Roofs	5.6.1.2.(2)
SPRI	ANSI/SPRI WD-1-2008	Wind Design Standard Practice for Roofing Assemblies	A-5.2.2.2.(4)
TC	SOR/96-433	Canadian Aviation Regulations – Part III	4.1.5.13.(1)
TC	SOR/2008-34	Transportation of Dangerous Goods Regulations (TDGR)	1.4.1.2.(1)(4) A-1.4.1.2.(1)(4) A-3.3.1.2.(1)
TIAC	2013	Mechanical Insulation Best Practices Guide	A-6.3.2.5.
TPIC	2014	Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses (Limit States Design)	9.23.14.11.(6)
TWC	1993	Details of Air Barrier Systems for Houses	Table A-9.25.5.1.(1)
TWC	1995	High-Rise Residential Construction Guide	A-5.6.2.1.
UL	ANSI/UL 300-2005	Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment	6.9.1.3.(1)
UL	ANSI/UL-1784-04	Air Leakage Tests of Door Assemblies and Other Opening Protectives	3.1.8.4.(4)
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ULC	CAN4-S106-M80	Fire Tests of Window and Glass Block Assemblies	3.1.8.4.(1)
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ULC	CAN/ULC-S540-13	Residential Fire and Life Safety Warning Systems: Installation, Inspection, Testing and Maintenance	3.2.4.21.(1) 9.10.19.8.(1)
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ULC	CAN/ULC-S639-M87	Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplaces	9.22.2.3.(1)
ULC	CAN/ULC-S701-11	Thermal Insulation, Polystyrene, Boards and Pipe Covering	Table 5.9.1.1. 9.15.4.1.(1) Table 9.23.17.2.-A 9.25.2.2.(1)
ULC	CAN/ULC-S702-09	Mineral Fibre Thermal Insulation for Buildings	3.1.18.3.(4) Table 5.9.1.1. A-5.9.1.1.(1) Table 9.23.17.2.-A 9.25.2.2.(1)
ULC	CAN/ULC-S703-09	Cellulose Fibre Insulation for Buildings	Table 5.9.1.1. 9.25.2.2.(1)
ULC	CAN/ULC-S704-11	Thermal Insulation, Polyurethane and Polyisocyanurate, Boards, Faced	Table 5.9.1.1. Table 9.23.17.2.-A 9.25.2.2.(1)
ULC	CAN/ULC-S705.1-01	Thermal Insulation – Spray Applied Rigid Polyurethane	Table 5.9.1.1.

		Foam, Medium Density – Material – Specification	9.25.2.2.(1)
ULC	CAN/ULC-S705.2-05	Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density – Application	Table 5.9.1.1. 9.25.2.5.(1)
ULC	CAN/ULC-S706-09	Wood Fibre Insulating Boards for Buildings	Table 5.9.1.1. 9.23.16.7.(3) Table 9.23.17.2.-A 9.25.2.2.(1) 9.29.8.1.(1)
ULC	CAN/ULC-S710.1-11	Thermal Insulation – Bead-Applied One Component Polyurethane Air Sealant Foam, Part 1: Material Specification	Table 5.9.1.1.
ULC	CAN/ULC-S711.1-11	Thermal Insulation – Bead-Applied Two Component Polyurethane Air Sealant Foam, Part 1: Material Specification	Table 5.9.1.1.
ULC	CAN/ULC-S716.1-12	Exterior Insulation and Finish Systems (EIFS) – Materials and Systems	5.9.4.1.(1) A-5.9.4.1.(1) 9.27.13.1.(1) 9.27.13.2.(1) A-9.27.13.2.(2)(a)
ULC	CAN/ULC-S716.2-12	Exterior Insulation and Finish Systems (EIFS) – Installation of EIFS Components and Water Resistive Barrier	A-5.9.4.1.(1) 9.27.13.3.(1)
ULC	CAN/ULC-S716.3-12	Exterior Insulation and Finish System (EIFS) – Design Application	A-5.9.4.1.(1) 9.27.13.3.(1)
ULC	CAN/ULC-S741-08	Air Barrier Materials – Specification	5.4.1.2.(1)
ULC	CAN/ULC-S1001-11	Integrated Systems Testing of Fire Protection and Life Safety Systems	3.2.9.1.(1) A-3.2.9.1.(1) 9.10.1.2.(1)
ULC	ULC/ORD-C199P-2002	Combustible Piping for Sprinkler Systems	3.2.5.13.(2) 3.2.5.13.(5)
ULC	ULC/ORD-C1254.6-1995	Fire Testing of Restaurant Cooking Area Fire Extinguishing System Units	6.9.1.3.(1)
USACE	Version 3-2012	Air Leakage Test Protocol for Building Envelopes	10.2.2.21.(1)
WCLIB	No. 17 (2004)	Standard Grading Rules	A-Table 9.3.2.1.
WWPA	2011	Western Lumber Grading Rules	A-Table 9.3.2.1.

Notes to Table 1.3.1.2.:
(1) See Table D-1.1.2. in Appendix D for the list of standards referenced therein.
(2) Some documents may have been reaffirmed or reapproved. Check with the applicable issuing agency for up-to-date information.
(3) Some titles have been abridged to omit superfluous wording.
(4) By-law reference is in Division A.
(5) By-law reference is in Division C.
(6) Notwithstanding the effective date stated in Sentence 1.3.1.1.(1), the August 2014 edition of CSA S304 is referenced as it better meets the intent of the By-law.
(7) The current version in effect.
(8)Notwithstanding the requirement stated in Sentence 4.3.1.1.(1), Update 1 to CSA O86-14 is not permitted to be used in the application of Subsection 4.1.8.

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1.3.2.1. Abbreviations of Proper Names

1) The abbreviations of proper names in this By-law shall have the meanings assigned to them in this Article.

AAMA American Architectural Manufacturers Association (www.aamanet.org)
APA APA – The Engineered Wood Association (www.apawood.org)
ACGIH American Conference of Governmental Industrial Hygienists (www.acgih.org)
AHAM Association of Home Appliance Manufacturers (www.aham.org)
AHRI Air-Conditioning, Heating and Refrigeration Institute (www.ahrinet.org)
AISI American Iron and Steel Institute (www.steel.org)
ANSI American National Standards Institute (www.ansi.org)
ASCE American Society of Civil Engineers (www.asce.org)
ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers (www.ashrae.org)
ASME American Society of Mechanical Engineers (www.asme.org)
ASTM American Society for Testing and Materials International (www.astm.org)
AWPA American Wood Protection Association (www.awpa.com)
BIA Brick Industry Association (www.bia.org)
BNQ Bureau de normalisation du Québec (www.bnq.qc.ca)
CAN National Standard of Canada designation (The number or name following the CAN designation represents the agency under whose auspices the standard is issued.)
CAN3 designates CSA
CAN4 designates ULC
CCBFC Canadian Commission on Building and Fire Codes (see NRC)
CCME Canadian Council of Ministers of the Environment (www.ccme.ca)
CGSB Canadian General Standards Board (www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html)
CHC Canadian Hydronics Council (www.ciph.com)
CISC Canadian Institute of Steel Construction (www.cisc.ca)
CMHC Canada Mortgage and Housing Corporation (www.cmhc.ca)
CoV City of Vancouver (www.vancouver.ca)
CRCA Canadian Roofing Contractors' Association (www.roofingcanada.com)
CSA CSA Group (www.csagroup.org)
CTI Cooling Technology Institute (www.cti.org)
CWC Canadian Wood Council (www.cwc.ca)
DOE Department of Energy (www.energy.gov)
EC Environment Canada (www.ec.gc.ca)
ECC EIFS Council of Canada (www.eifscouncil.org)
EPA Environmental Protection Agency (U.S.) (www.epa.gov)
FEMA Federal Emergency Management Agency (www.fema.gov)

FLL German Landscape Research, Development and Construction Society (www.fll.de/shop/english-publications.html)
FPI FPInnovations – Wood Products (formerly FCC – Forintek Canada Corporation) (www.fpinnovations.ca)
GRHC Green Roofs for Healthy Cities (www.greenroofs.org)
HC Health Canada (www.hc-sc.gc.ca)
HPVA Hardwood Plywood & Veneer Association (www.hpva.org)
HRAI Heating, Refrigeration and Air Conditioning Institute of Canada (www.hrai.ca)
HVI Home Ventilating Institute (www.hvi.org)
ICC International Code Council (www.iccsafe.org)
IEC International Electrotechnical Commission (www.iec.ch)
ISO International Organization for Standardization (www.iso.org)
NBC National Building Code of Canada 2015
NCMA National Concrete Masonry Association (www.ncma.org)
NECB National Energy Code of Canada for Buildings 2015
NEMA National Electrical Manufacturers Association (www.nema.org)
NFPA National Fire Protection Association (www.nfpa.org)
NFRC National Fenestration Rating Council (www.nfrc.org)
NLGA National Lumber Grades Authority (www.nlga.org)
NRC National Research Council of Canada (Ottawa, Ontario K1A 0R6; www.nrc-cnrc.gc.ca)
NRCA National Roofing Contractors Association (www.nrca.net)
NRCan Natural Resources Canada (www.nrcan.gc.ca)
NRC Const. NRC Construction (see NRC) (www.nrc.gc.ca/construction)
NRC-IRC National Research Council, Institute for Research in Construction (former name of NRC Construction)
NYCDH New York City Department of Health and Mental Hygiene (www.nyc.gov/health)
OMMAH Ontario Ministry of Municipal Affairs and Housing (www.mah.gov.on.ca)
SMACNA Sheet Metal and Air Conditioning Contractors' National Association (www.smacna.org)
SPRI Single Ply Roofing Industry (www.spri.org)
TC Transport Canada (www.tc.gc.ca)
TECA Thermal Environmental Comfort Association (www.teca.ca)
TIAC Thermal Insulation Association of Canada (www.tiac.ca)
TPIC Truss Plate Institute of Canada (www.tpic.ca)
TWC Tarion Warranty Corporation (formerly Ontario New Home Warranty Program) (www.tarion.com)
UL Underwriters Laboratories Inc. (www.ul.com)
ULC ULC Standards (canada.ul.com/ulcstandards)
USACE United States Army Corps of Engineers (www.erdc.usace.army.mil/Locations/CERL)
WCLIB West Coast Lumber Inspection Bureau (www.wclib.org)
WWPA Western Wood Products Association (www.wwpa.org)

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3.1.3.1. Separation of Major Occupancies

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

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

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

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

Major Occupancy	**Minimum Fire-Resistance Rating of *Fire Separation*, h**												
	Adjoining *Major Occupancy*												
	A-1	**A-2**	**A-3**	**A-4**	**B-1**	**B-2**	**B-3**	**C**(7)	**D**	**E**	**F-1**	**F-2**	**F-3**
A-1	–	1	1	1	2	2	2	1	1	2	(2)	2	1
A-2	1	–	1	1	2	2	2	1(3)	1(4)	2	(2)	2	1
A-3	1	1	–	1	2	2	2	1	1	2	(2)	2	1
A-4	1	1	1	–	2	2	2	1	1	2	(2)	2	1
B-1	2	2	2	2	–	2	2	2	2	2	(2)	2	2
B-2	2	2	2	2	2	–	1	2	2	2	(2)	2	2
B-3	2	2	2	2	2	1	–	1	2	2	(2)	2	2
C(7)	1	1(3)	1	1	2	2	1	–	1	2(5)	(2)	2(6)	1(8)
D	1	1(4)	1	1	2	2	2	1	–	– (9)	3	– (9)	– (9)
E	2	2	2	2	2	2	2	2(5)	– (9)	–	3	–	–
F-1	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	3	3	–	2	2
F-2	2	2	2	2	2	2	2	2(6)	– (9)	–	2	–	–
F-3	1	1	1	1	2	2	2	1(8)	– (9)	–	2	–	–

Notes to Table 3.1.3.1.:

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

(2) See Sentence 3.1.3.2.(1).
(3) Where the *building* or part thereof is constructed in accordance with Article 3.2.2.48EMTC. or Article 3.2.2.50., a *fire separation* with a 2 h *fire-resistance rating* is required between the Group C and Group A, Division 2 major occupancies.
(4) Where the *building* or part thereof is constructed in accordance with Article 3.2.2.57EMTC. or Article 3.2.2.58., a *fire separation* with a 2 h *fire-resistance rating* is required between the Group D and Group A, Division 2 *major occupancies*.
(5) See Sentence 3.1.3.1.(2).
(6) See Sentence 3.1.3.2.(2).
(7) See Article 3.2.1.7.
(8) Where the building or part thereof is constructed in accordance with Article 3.2.2.48EMTC., a fire separation with a 2 h fire-resistance rating is required between the Group C major occupancy and storage garages.
(9) Where the building or part thereof is constructed in accordance with Article 3.2.2.57EMTC., a fire separation with a 1 h fire-resistance rating is required between the Group D and Group E or Group F, Division 2 or 3 major occupancies.

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3.1.7.5. Rating of Supporting Construction

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

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

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

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

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3.1.11.3. Fire Blocks between Nailing and Supporting Elements

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

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

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

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

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3.1.11.5. Fire Blocks in Horizontal Concealed Spaces

1) Except for crawl spaces conforming to Sentence 3.1.11.6.(1) and as required in Sentence (3), horizontal concealed spaces within a floor assembly or roof assembly of *combustible construction*,

in which sprinklers are not installed, shall be separated by construction conforming to Article 3.1.11.7. into compartments
a) not more than 600 m^2 in area with no dimension more than 60 m if the exposed construction materials within the space have a *flame-spread rating* not more than 25, and
b) not more than 300 m^2 in area with no dimension more than 20 m if the exposed construction materials within the space have a *flame-spread rating* more than 25.
(See Note A-3.1.11.5.(1).)

2) A concealed space in an exterior cornice, a mansard-style roof, a balcony or a canopy in which exposed construction materials within the space have a *flame-spread rating* more than 25, shall be separated by construction conforming to Article 3.1.11.7.
a) at locations where the concealed space extends across the ends of required vertical *fire separations*, and
b) so that the maximum dimension in the concealed space is not more than 20 m.

3) Except as provided in Sentence (4), in *buildings* or parts thereof conforming to Article 3.2.2.50. or 3.2.2.58., horizontal concealed spaces within a floor assembly or roof assembly of *combustible* construction shall be separated by construction conforming to Article 3.1.11.7. into compartments that are
a) not more than 600 m^2 in area with no dimension more than 60 m, if the exposed construction materials
within the space have a *flame-spread rating* not more than 25, and
b) not more than 300 m^2 in area with no dimension more than 20 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25.
(See Note A-3.1.11.5.(3).)

4) Except for crawl spaces conforming to Sentence 3.1.11.6.(1) and except as provided in Sentence (5), in *buildings* or parts thereof conforming to Article 3.2.2.48EMTC. or 3.2.2.57EMTC., horizontal concealed spaces within a floor assembly or roof assembly of *encapsulated mass timber construction* shall be separated by construction conforming to Article 3.1.11.7. into compartments that are
a) not more than 600 m^2 in area with no dimension more than 60 m, if the exposed construction materials within the space have *a flame- spread rating* not more than 25, and
b) not more than 300 m^2 in area with no dimension more than 20 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25.

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

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

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

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

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

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

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

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

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

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

b) is securely fastened to one set of studs,

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

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

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

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3.1.13.12. Encapsulated Mass Timber Construction

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

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

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

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3.1.15.2. Roof Coverings

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

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

a) a tent,

b) an *air-supported structure*,

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

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

3) Except as provided in Sentence (4), roof coverings on *buildings* conforming to Article 3.2.2.50. or 3.2.2.58. shall have a Class A classification where the roof height is greater than 25 m measured from the floor of the *first storey* to the highest point of the roof.

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

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

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3.1.18. Encapsulated Mass Timber Construction

(See Note A-3.1.18.)

3.1.18.1. Scope

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

3.1.18.2. Materials Permitted

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

3.1.18.3. Structural Mass Timber Elements

(See Note A-3.1.18.3.)

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

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

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

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

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

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

Structural Wood Elements	Minimum Thickness, mm	Minimum Width x Depth, mm x mm
Walls that are *fire separations* or exterior walls (1-sided exposure)	96	--
Walls that require *fire-resistance rating*,		

but are not *fire separations* (2-sided exposure)	192	--
Floors and roofs (1-sided exposure)	96	--
Beams, columns and arches (2- or 3-sided fire exposure)-sided exposure)	--	192 x 192
Beams, columns and arches (4-sided fire exposure)	--	224 x 224

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

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

4) Concealed spaces are permitted within structural mass timber elements referred to in Sentence (2) and need not comply with Sentence 3.1.18.4.(1) provided the concealed spaces are
a) notwithstanding any exemptions permitted in NFPA 13, *sprinklered* and divided into compartments by *fire blocks* in conformance with Subsection 3.1.11.,
b) completely filled with rock or slag fibre insulation conforming to CAN/ULC-S702, "Mineral Fibre Thermal Insulation for Buildings," and having a density of not less than 32 kg/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.

3.1.18.4. Encapsulation of Mass Timber Elements

(See Note A-3.1.18.3.)

1) Except as provided in Sentences (3) to (6), Sentences 3.1.18.3.(4) and 3.1.18.14.(2), and Articles 3.1.18.5., 3.1.18.10. and 3.1.18.15., the exposed surfaces of structural timber elements conforming to Article 3.1.18.3. shall be protected from adjacent spaces in the *building*, including adjacent concealed spaces within wall, floor and roof assemblies, by a material or assembly of materials conforming to Sentence (2) that provides an *encapsulation rating* of not less than 50 min. (See Note A-3.1.18.4.(1).)

2) Except as provided in Sentence 3.1.18.9.(1), the material or assembly of materials referred to in Sentence (1) shall consist of
a) gypsum board,
b) gypsum concrete,
c) *noncombustible* materials,
d) materials that conform to Sentences 3.1.5.1.(2) to (4), or
e) any combination of the materials listed in Clauses (a) to (d).

3) Except as provided in Sentence (5), the exposed surfaces of mass timber beams, columns and arches within a *suite,* other than a *residential suite,* or fire *compartment* need not be protected in accordance with Sentence (1), provided
a) their aggregate surface area does not exceed 10% of the total wall area of the perimeter of the *suite* or *fire compartment* in which they are located, and

b) the *flame-spread rating* on any exposed surface is not more than 150.
(See Note A-3.1.18.4.(3) to (6).)

4) Except as provided in Sentences (5) and (6), the exposed surfaces of mass timber walls within a *suite,* other than a *residential suite,* need not be protected in accordance with Sentence (1), provided
a) each exposed surface faces the same direction, and
b) the *flame-spread rating* on any exposed surface is not more than 150.
(See Notes A-3.1.18.4.(4) and A-3.1.18.4.(3) to (6).)

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

6) The exposed surfaces of mass timber ceilings within a *suite,* other than a *residential suite,* need not be protected in accordance with Sentence (1), provided their aggregate area does not exceed
a) 10% of the total ceiling area of the *suite*, where the exposed surfaces have a *flame-spread rating* not more than 150, or
b) 25% of the total ceiling area of the *suite*, where
i) the *suite* contains no mass timber walls with exposed surfaces, and
ii) the exposed surfaces of the mass timber ceiling have a *flame-spread rating* not more than 75.
(See Note A-3.1.18.4.(3) to (6).)

3.1.18.5. Combustible Roofing Materials

1) Wood roof sheathing and roof sheathing supports that do not conform to Articles 3.1.18.3. and 3.1.18.4. are permitted in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided they are installed
a) above a concrete deck in accordance with Clauses 3.1.5.3.(2)(a) to (f), or
b) above a deck of *encapsulated mass timber construction*, where
i) said deck is permitted to be encapsulated between the roof sheathing supports by a material or assembly
ii) of materials conforming to Sentence 3.1.18.4.(2) that provides an *encapsulation rating* of not less than 50min,
iii) the height of the roof space is not more than 1 m,
iiii) the roof space is divided into compartments by *fire blocks* in conformance with Article 3.1.11.5.,
iv) openings through the deck other than for *noncombustible* roof drains and plumbing piping are protected by shafts constructed as *fire separations* having a *fire-resistance rating* not less than 1 h that extend from the deck to not less than 150 mm above the adjacent sheathing, and
v) except as permitted by Subclause (iv), the roof space does not contain any *building* services.

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

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

3.1.18.6. Combustible Window Sashes and Frames

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

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

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

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

3.1.18.7. Exterior Cladding

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

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

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

a) *combustible* cladding that

- i) is not contiguous over more than 4 *storeys*,
- ii) represents not more than 10% of the cladding on each exterior wall of each *storey*,
- iii) is not more than 1.2 m in width,
- iv) has a *flame-spread rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction,
- v) is separated from other portions of *combustible* cladding on adjacent storeys by a horizontal distance of not less than 2.4 m, and
- vi) is separated from other portions of combustible cladding by a horizontal distance of not less than 1.2 m,

b) *combustible* cladding that,

- i) is not contiguous across adjacent *storeys*,
- ii) represents not more than 10% of the cladding on each exterior wall of each *storey*,
- iii) has a *flame-spread rating* not more than 75 on any exposed surface, or any surface that would be exposed by cutting through the material in any direction, and
- iv) is separated from other portions of *combustible* cladding on adjacent *storeys* by a horizontal distance of not less than 2.4 m,

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

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

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

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

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

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

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

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

7) Where *combustible* cladding conforming to Clause (2)(a) or (b) on an exterior wall of a *fire compartment* is exposed to *combustible* cladding conforming to Clause (2)(a) or (b) on an exterior wall of the same *fire compartment* or of another *fire compartment*, and the planes of the two walls are parallel or at an angle less than 135° measured from the exterior of the building, the different portions of *combustible* cladding shall
a) be separated by a horizontal distance of not less than 3 m, and
b) not be contiguous over more than 2 *storeys*.

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3.1.18.8. Combustible Components in Exterior Walls

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

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

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

3.1.18.9. Nailing Elements

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

2) Except as permitted by Sentence 3.1.18.14.(2) and Article 3.1.19.2., wood nailing elements are permitted to be used for the attachment of interior finishes in a *building* or part of a *building* permitted to be of *encapsulated mass timber construction*, provided the concealed space created by the wood nailing elements is not more than 50 mm deep and
a) exposed surfaces in the concealed space have a *flame-spread rating* not more than 25, or
b) the concealed space is filled with *noncombustible* insulation.

3.1.18.10. Combustible Flooring Elements

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

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

b) the wood members are

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

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

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

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

3.1.18.11. Combustible Stairs

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

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

3.1.18.12. Combustible Interior Finishes

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

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

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

(See Note A-3.1.11.3.(3).)

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

3.1.18.13. Combustible Elements in Partitions

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

a) protected on each face with not less than

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

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

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

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

3.1.18.14. Exposed Construction Materials and Components in Concealed Spaces

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

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

3.1.18.15. Penetration by Outlet Boxes

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

(See Note A- 3.1.9.2.(1).)

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

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

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3.1.19. Encapsulation Ratings

3.1.19.1. Determination of Ratings

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

3.1.19.2. Encapsulation Materials

(See Note A-3.1.19.2.)

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

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

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

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

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

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

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

d) are installed in conformance with ASTM C 840, “Application and Finishing of Gypsum Board,” except that their joints need not be taped and finished, and
e) conform to
i) ASTM C 1396/C 1396M, “Gypsum Board,” or
ii) CAN/CSA-A82.27-M, “Gypsum Board.”
(See Note A-3.1.19.2.(2).)

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3.2.1.1. Exceptions in Determining Building Height

1) A roof-top enclosure shall not be considered as a *storey* in calculating the *building height* if it is provided for
a) elevator machinery,
b) a *service room*,
c) a stairway used for no purpose other than for access or egress,
d) an elevator lobby used for no purpose other than for access or egress, or
e) a combination thereof.

2) Space under tiers of seats in a *building* of the arena type shall not be considered as adding to the *building height* provided the space is used only for dressing rooms, concession stands and similar purposes incidental to the *major occupancy* of the *building*.

3) Except as required by Sentence (5), the space above a *mezzanine* need not be considered as a *storey* in calculating the *building height*, provided
a) not less than 60% of the horizontal plane separating the *mezzanine* from the room or floor space in which it is located is open, and
b) except as permitted in Sentences (7) and 3.3.2.13.(3), the space above the *mezzanine* is used as an open area without *partitions* or subdividing walls higher than 1 070 mm above the *mezzanine* floor.
(See Note A-3.2.1.1.(3).)

4) Except as required by Sentence (5), the space above a *mezzanine* need not be considered as a *storey* in calculating the *building height*, provided
a) the aggregate area of *mezzanines* that are not superimposed and do not meet the conditions of Sentence (3) does not exceed 10% of the *floor area* in which they are located, and
b) the area of a *mezzanine* in a *suite* does not exceed 10% of the area of that *suite*.
(See Note A-3.2.1.1.(4).)

5) Except as permitted by Sentence (6), each level of *mezzanine* that is partly or wholly superimposed above the first level of *mezzanine* shall be considered as a *storey* in calculating the *building height*.

6) Platforms intended solely for periodic inspection and elevated maintenance catwalks need not be considered as floor assemblies or *mezzanines* for the purpose of calculating *building height*, provided
a) they are not used for storage, and
b) they are constructed with *noncombustible* materials, unless the *building* is permitted to be of *combustible construction*.

7) The space above a *mezzanine* conforming to Sentence (3) is permitted to include an enclosed space whose area does not exceed 10% of the horizontal plane separating the *mezzanine* from the room or floor space in which the *mezzanine* is located, provided the enclosed space does not obstruct visual communication between the open space above the *mezzanine* and the room in which it is located. (See Figure A-3.2.1.1.(3)-D.)

8) A *service space* in which facilities are included to permit a person to enter and to undertake maintenance and other operations pertaining to *building* services from within the *service space* need not be considered a *storey* if it conforms to Articles 3.2.5.14. and 3.3.1.24., and Sentences 3.2.4.18.(10), 3.2.7.3.(2), 3.3.1.3.(7), 3.4.2.4.(3) and 3.4.4.4.(9). (See Note A-3.2.1.1.(8).)

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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).)

2) The exterior wall of a *basement* that is required to be a *fire separation* with a *fire-resistance rating* in accordance with Sentence (1) 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

i) 1 m beyond the exterior face of the *storage garage* if the upper *storeys* are required to be of *noncombustible construction*, or

ii) 2 m beyond the exterior face of the *storage garage* if the upper *storeys* are permitted to be of *combustible construction* or *encapsulated mass timber construction*, or

c) the exterior walls of any *storeys* located above the floor or roof assembly referred to in Sentence (1) are recessed behind the outer edge of the assembly by not less than

i) 1 m if the upper *storeys* are required to be of *noncombustible construction*, or

ii) 2 m if the upper *storeys* are permitted to be of *combustible construction* or *encapsulated mass timber construction*.

3) The floor or roof assembly projection referred to in Clause (2)(b) shall have a *fire-resistance rating* not less than 2 h and shall have no openings within the projection.

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3.2.1.7. Fire Containment in Combustible Buildings

1) All Group C *major occupancies* in a *building* of *combustible construction* greater than 2 *storeys* in *building height* shall be separated from all other *major occupancies* except as prohibited in Article 3.1.3.2. and except as permitted in Sentences (2) and (3), by a *fire separation* with at least a 2 h *fire-resistance rating* constructed of

a) concrete,

b) masonry, or

c) in a *sprinklered building*, encapsulated mass timber.

2) The *fire-resistance rating* required in Sentence (1) is permitted to be 1.5 h for a *storage garage*.

3) The *fire separation* of every *exit*, elevator and vertical service shaft that penetrates a concrete, masonry, or encapsulated mass timber floor assembly as required in Sentence (1) shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* determined by Sentences (1) or (2) for

a) the floor assembly above the *storey*, or

b) the floor assembly below the *storey*, if there is no floor assembly above.

4) Where a *building* of *combustible construction* or *encapsulated mass timber construction* greater than 2 *storeys* in *building height* contains an *occupancy* other than Group C or Group D on the second or third *storey* that is required to be constructed in accordance with Sentences 3.2.2.48EMTC.(4), 3.2.2.50.(5), 3.2.2.57EMTC.(3), or 3.2.2.58.(4), the *building* shall

a) be *sprinklered*,

b) be divided into at least two horizontal *fire compartments* on each *storey* containing a *major occupancy* other than Group C or Group D which are

i) not more than 1000 m^2 in area, and

ii) constructed as *fire separations* with at least a 2 h *fire-resistance rating*,

c) *exit* stairs serving *storeys* above the third *storey* shall be constructed as *fire separations* with at least a 2 h *fire-resistance rating*, and

d) each *fire compartment* required by Clause (b) shall be served by at least one *exit* stair.

(See Note A-3.2.1.7.(4))

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3.2.2.6. Multiple Major Occupancies

1) Except as permitted by Articles 3.2.2.7. and 3.2.2.8., and Sentences 3.2.2.48EMTC.(4), 3.2.2.50.(5), 3.2.2.57EMTC.(3) and 3.2.2.58.(4) 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*.

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3.2.2.7. Superimposed Major Occupancies

1) Except as provided in Article 3.2.2.8., Sentence 3.2.2.18.(2), and Sentences 3.2.2.48EMTC.(4), 3.2.2.50.(5), 3.2.2.57EMTC.(3) and 3.2.2.58.(4), 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.) (See Note A-3.2.2.7.(2).)

3) Reserved.

4) Reserved.

3.2.2.11. Exterior Balconies

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

2) The floor assembly of an exterior balcony in a *building* or part of a *building* conforming to Article 3.2.2.48EMTC. or 3.2.2.57EMTC. shall

a) be of *noncombustible construction*, or

b) be constructed in accordance with Article 3.1.18.3., but need not comply with Sentence 3.1.18.4.(1).

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3.2.2.14. Roof-Top Enclosures

1) A roof-top enclosure for elevator machinery, an elevator lobby 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, an elevator lobby or for a service room, not more than one storey high and that does not serve as part of a means of *egress* for an *occupancy* on a roof in accordance with Sentences 3.3.1.3.(4) to (6), 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 or an elevator lobby serving an *occupancy* on a roof that serves only one *dwelling unit* need not have a fire-resistance rating nor be constructed as a fire separation.

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3.2.2.18. Automatic Sprinkler System Required

1) Except as required by Sentence (2) and (3), 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., 3.2.2.48EMTC., 3.2.2.50., 3.2.2.51., 3.2.2.54., 3.2.2.55., 3.2.2.57., 3.2.2.57EMTC., 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 *buildings* described in Sentence 1.3.3.6.(2) of Division A, all newly constructed *buildings* shall be provided with an automatic *sprinkler system* designed and installed in accordance with Article 3.2.5.12.

4) Where an *assembly occupancy* is located in a *basement*, the *basement* shall be *sprinklered* throughout.

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3.2.2.48EMTC. Group C, up to 12 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 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, excluding any floor level within a rooftop enclosure that is not considered as a *storey* in calculating *building height* in accordance with Sentence 3.2.1.1.(1), and
d) it has a *building area* not more than 6 000 m^2.

2) Except as provided in Article 3.2.2.16., the *building* referred to in Sentence (1) is permitted to be of *encapsulated mass timber 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 2 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*, 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) 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 this Article are permitted to be constructed in accordance with this Article, provided
a) the Group A, Division 2 *major occupancy* is located below the fourth *storey*,
b) the Group E *major occupancy* is located below the third *storey*, and
c) the *storage garage* is located below the fifth *storey* (see also Article 4.4.2.1.).
(See Note A-3.2.2.48EMTC.(4) and 3.2.2.57EMTC.(3).)

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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 excluding any floor level within a rooftop enclosure that is not considered as a *storey* in calculating *building height* in accordance with Sentence 3.2.1.1.(1), 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 m^2 if 1 *storey* in *building height*,

ii) 4 500 m^2 if 2 *storeys* in *building height*,

iii) 3 000 m^2 if 3 *storeys* in *building height*,

iv) 2 250 m^2 if 4 *storeys* in *building height*,

v) 1 800 m^2 if 5 *storeys* in *building height*, or

vi) 1 500 m^2 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).

5) 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 this Article are permitted to be constructed in accordance with this Article provided

a) the Group A, Division 2 *major occupancy*, and Group E *major occupancy* is located below the third *storey*, and

b) the *storage garage* is located below the fourth *storey* (See also Sentence 4.4.2.1.(1).).

(See Note A-3.2.2.50.(5) and 3.2.2.58.(4).) (See also Article 3.2.1.7)

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3.2.2.57EMTC. Group D, up to 12 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 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, excluding any floor level within a rooftop enclosure that is not considered as

a *storey* in calculating *building height* in accordance with Sentence 3.2.1.1.(1), and it has a *building area* not more than 7 200 m^2.

2) Except as provided in Article 3.2.2.16., the *building* referred to in Sentence (1) is permitted to be of *encapsulated mass timber construction* or *noncombustible construction*, used singly or in combination, and

a) floor assemblies shall be f*ire separations* with a *fire-resistance rating* not less than 2 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) 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 this Article are permitted to be constructed in accordance with this Article, provided

a) the Group A, Division 2 *major occupancy* is located below the fourth *storey*,

b) the Group E *major occupancy* and Group F, Division 2 or 3 *major occupancy* are located below the third *storey*, and

c) the *storage garage* is located below the fifth *storey* (see also Article 4.4.2.1.).

(See Note A-3.2.2.48EMTC.(4) and 3.2.2.57EMTC.(3).)

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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 excluding any floor level within a rooftop enclosure that is not considered as a *storey* in calculating *building height* in accordance with Sentence 3.2.1.1.(1), 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 m^2 if 1 *storey* in *building height*,
- ii) 9 000 m^2 if 2 *storeys* in *building height*,
- iii) 6 000 m^2 if 3 *storeys* in *building height*,
- iv) 4 500 m^2 if 4 *storeys* in *building height*,
- v) 3 600 m^2 if 5 *storeys* in *building height*, or
- vi) 3 000 m^2 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).

4) 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 this Article are permitted to be constructed in accordance with this Article provided
a) the Group A, Division 2 *major occupancy*, and Group E *major occupancy*, and Group F, Division 2 and 3 *major occupancy* is located below the third *storey*, and
b) the *storage garage* is located below the fourth *storey* (See also Sentence 4.4.2.1.(1).).
(See Note A-3.2.2.50.(5) and 3.2.2.58.(4).) (See also Article 3.2.1.7.)

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3.2.3.7. Construction of Exposing Building Face

1) Except as provided in Sentences (3) and (4), and Articles 3.2.3.10. and 3.2.3.11., the *fire-resistance rating*, construction and cladding for *exposing building faces* of *buildings* or *fire compartments* of Group A, B, C, D or Group F, Division 3 *occupancy* classification shall comply with Table 3.2.3.7.

2) Except as provided in Sentences (3) and (4) and Article 3.2.3.10., the *fire-resistance rating*, construction and cladding for *exposing building faces* of *buildings* or *fire compartments* of Group E or Group F, Division 1 or 2 *occupancy* classification shall comply with Table 3.2.3.7.

Table 3.2.3.7.
Minimum Construction Requirements for Exposing Building Faces
Forming Part of Sentences 3.2.3.7.(1) and (2)

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

			timber, or *Noncombustible*	
	> 50 to < 100	1 h	*Combustible, Encapsulated mass timber,* or *Noncombustible*	*Combustible* or *Noncombustible*(1)

Notes to Table 3.2.3.7.:
(1) See also Article 3.1.4.8. for additional requirements for exterior cladding on *buildings* conforming to Article 3.2.2.50. and Article 3.2.2.58.
(2) The cladding on Group C *buildings* or parts thereof conforming to Article 3.2.2.48EMTC. and on Group D *buildings* or parts thereof conforming to Article 3.2.2.57EMTC. shall conform to Sentence 3.1.18.7.(2) or be *noncombustible*.

3) Except as provided in Article 3.1.4.8. and 3.1.18.7., the requirement in Table 3.2.3.7. 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.

4) Except as provided in Article 3.1.4.8. and 3.1.18.7., the requirement in Table 3.2.3.7. 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.,

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),

d) the cladding

i) conforms to Subsection 9.27.12.,

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), and

iv) does not exceed 2 mm in thickness exclusive of fasteners, joints and local reinforcements, or the exterior wall assembly complies with Article 3.1.5.5.

5) The construction requirements for the *exposing building face* stated in Sentences (1) and (2) shall be satisfied before increasing the *unprotected opening* area as permitted by Sentence 3.2.3.12.(1).

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3.2.3.19. Walkway Between Buildings

1) Except as required by Sentence 3.2.3.20.(2), if *buildings* are connected by a *walkway*, each *building* shall be separated from the *walkway* by a *fire separation* with a *fire-resistance rating* not less than 45 min.

2) Except as permitted by Sentence (3), a *walkway* connected to a *building* required to be of *noncombustible construction* shall also be of *noncombustible construction*.

3) Except as provided in Sentence (4), a *walkway* connected to a *building* or part of a *building* permitted to be of *encapsulated mass timber construction* shall be of *noncombustible construction* or *encapsulated mass timber construction*.

4) A *walkway* connected to a *building* required to be of *noncombustible construction* or part of a *building* permitted to be 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.

5) A *walkway* of *noncombustible construction* used only as a pedestrian thoroughfare need not conform to the requirements of Articles 3.2.3.14. and 3.2.3.15.

6) A *walkway* between *buildings* shall be not more than 9 m wide.

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3.2.4.18. Audibility of Alarm Systems

1) Audible signal devices forming part of a fire alarm system shall be installed in a building so that

a) alarm signals are clearly audible throughout the floor area and throughout any *occupancy* on a roof, and

b) alert signals are clearly audible in continuously staffed locations, and where there are no continuously staffed locations, throughout the floor area and throughout any *occupancy* on a roof.

2) The sound pattern of an *alarm signal* shall conform to the temporal pattern defined in Clause 4.2 of ISO 8201, "Acoustics – Audible emergency evacuation signal." (See Note A-3.2.4.18.(2).)

3) The sound patterns of *alert signals* shall be significantly different from the temporal patterns of *alarm signals*.

(See Note A-3.2.4.18.(3).)

4) The fire *alarm signal* sound pressure level shall be not more than 110 dBA in any normally occupied area.

(See Note A-3.2.4.18.(4).)

5) The sound pressure level in a sleeping room from a fire alarm audible signal device shall be not less than 75 dBA in a *building* of *residential* or *care occupancy* when any intervening doors between the device and the sleeping room are closed. (See Note A-3.2.4.18.(5).)

6) Except as required by Sentence (5), the sound pressure level from a fire alarm system's audible signal device within a *floor area* shall be not less than 10 dBA above the ambient noise level without being less than 65 dBA.

7) Except as permitted by Sentence (11), audible signal devices located within a *dwelling unit* shall include a means for them to be manually silenced for a period of not more than 10 min, after which time the devices shall restore themselves to normal operation. (See Note A-3.2.4.18.(7).)

8) Audible signal devices within a *dwelling unit* or a *suite* of *residential* or *care occupancy* shall be connected to the fire alarm system

a) in a manner such that a single open circuit or short circuit at one device will not impair the operation of other audible signal devices on that same circuit that serve the other *dwelling units* or *suites* of *residential* or *care occupancy*, or

b) on separate signal circuits that are not connected to the devices in any other *dwelling unit*, *public corridor* or *suite* of *residential* or *care occupancy*.

(See Note A-3.2.4.18.(8) and (9).)

9) Deleted.

10) Audible signal devices shall be installed in a *service space* referred to in Sentence 3.2.1.1.(8) and shall be connected to the fire alarm system.

11) Audible signal devices within *dwelling units* that are wired on separate signal circuits need not include a

means for silencing as required by Sentence (7) provided the fire alarm system includes a provision for an automatic signal silence within *dwelling units*, where

a) the automatic signal silence cannot occur within the first 60 s of operation or within the zone of initiation,
b) a subsequent alarm elsewhere in the *building* will reactuate the silenced audible signal devices within *dwelling units*,
c) after a period of not more than 10 min, the silenced audible signal devices will be restored to continuous audible signal if the alarm is not acknowledged, and
d) the voice communication system referred to in Article 3.2.4.22. has a provision to override the automatic signal silence to allow the transmission of voice messages through silenced audible signal device circuits that serve the *dwelling units*.
(See Note A-3.2.4.18.(7).)

12) If a 2-stage fire alarm system has been installed with an automatic signal silence as described in Sentence (11), the system shall be designed so that any silenced audible signal devices serving *dwelling units* are reactuated whenever an *alarm signal* is required to be transmitted as part of the second stage. (See Note A-3.2.4.18.(7).)

13) An audible signal device forming part of a fire alarm system provided so as to sound an alarm signals that are clearly audible throughout any occupancy on a roof or balcony, shall be located
a) in the vicinity of an exterior door providing access to a private residential roof deck or balcony, or
b) on exterior public roofs or balconies.

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3.2.4.19. Visible Signal Devices and Visible Warning Systems

1) Visible signal devices shall be installed in addition to *alarm signals*
a) in *buildings* or portions thereof intended for use primarily by persons are deaf or hard of hearing,
b) in *assembly occupancies* in which music and other sounds associated with performances could exceed 100 dBA,
c) in any *floor area* in which the ambient noise level is more than 87 dBA, and
d) in any *floor area* in which the occupants
    i) use ear protection devices,
    ii) are located in an audiometric booth, or
    iii) are located in sound-insulating enclosures.

2) Visible signal devices required by Sentence (1) shall be installed so that the signal from at least one device is visible throughout the *floor area* or portion thereof in which they are installed. (See Note A-3.2.4.19.(2).)

3) A visible warning system shall be installed in the rooms and spaces required by Section 3.8. and shall conform to
a) Sentence (4) where a fire alarm system is provided, and
b) Sentence (5) where a fire alarm system is not provided.

4) The visible warning system required by Sentences (2) and (3) shall consist of strobe lights conforming to CAN/ULC-S526, “Visible Signal Devices for Fire Alarm Systems, Including Accessories” that are designed to operate as part of the fire alarm system, and
a) have a luminous intensity of not less than
    i) 75 candela, if the strobe light is located in a sleeping room or bed space, and
    ii) 15 candela, if the strobe light is not located in a sleeping room or bed space,
b) produce between 1 and 3 flashes per second, with the flashes synchronized when more than one strobe light is visible from a single location,
c) have a clear or white translucent lens with the word “FIRE” clearly visible on the
    i) lens, or
    ii) attached nameplate,
d) be installed in each
    i) sleeping room or bed space,
    ii) room closed off from the living area by a door including bathrooms, and

iii) living area or hallway serving the living area, and

e) be located in conformance with the installation requirements for visible signal devices in CAN/ULC-S524, "Installation of Fire Alarm Systems."

5) Where a fire alarm system is not provided, the visible warning system required by Sentences (2) and (3) shall consist of strobe lights conforming to CAN/ULC-S526, "Visible Signal Devices for Fire Alarm Systems, Including Accessories" that shall

a) be connected to, and activated by,

i) the *smoke alarms* required by Article 3.2.4.20. and Article 9.10.19.1., or

ii) the *smoke detectors* permitted by Article 3.2.4.20., 3.2.4.21. or 9.10.19.8.,

b) have a luminous intensity of not less than

i) 75 candela, if the strobe light is located in a sleeping room or bed space, or

ii) 15 candela, if the strobe light is not located in a sleeping room or bed space,

c) produce between 1 and 3 flashes per second, with the flashes synchronized when more than one strobe light is visible from a single location,

d) have a clear or white translucent lens with the word "SMOKE" clearly visible on the

i) lens, or

ii) attached nameplate,

e) be installed in each

i) sleeping room or bed space,

ii) room closed off from the living area by a door including bathrooms, and

iii) living area or hallway serving the living area, and

f) be located not less than 2 100 mm above the floor on a wall or ceiling in a location that will maximize effectiveness.

6) The special outlet boxes and cover plates required by Sentence 3.8.2.12.(5). shall be

a) designed, located and wired specifically to allow strobe lights to operate in conformance with

i) Sentence (4) where a fire alarm system is provided, or

ii) Sentence (5) where a fire alarm system is not provided,

b) permanently identified as "FIRE – Strobe Light Connection Only,"

c) installed in each

i) sleeping room or bed space,

ii) room closed off from the living area by a door including bathrooms, and

iii) living area or hallway serving the living area, and

d) be located not less than 2 100 mm above the floor on a wall or ceiling in a location that will maximize effectiveness.

7) For the purposes of providing power to the strobe lights that may be connected to the outlets described in Sentence (6), it shall be assumed that the total special outlets for at least 20 percent of the *dwelling units* in the *building* are in use.

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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) Instead of the requirements of Sentence (1), 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 Group C *major occupancy* containing no other *major occupancies* that

i) is not more than 4 *storeys* in *building height* and conforms to Articles 3.2.2.47., 3.2.2.48., 3.2.2.50., 3.2.2.51. or 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*, installation and testing of an automatic *sprinkler system* installed

a) in a residential *building* with not more than two principal *dwelling units*, where
   i) each *dwelling unit* has its own sprinkler water supply, and
   ii) a one tank-type water closet is supplied with water from the sprinkler head which is located farthest from the main water supply,

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,

c) in a *building* of *residential occupancy* throughout that contains only *row housing* where
   i) all vertical *suite* separations are constructed as a *fire separation* having no less than a 1 h *fire-resistance rating*,
   ii) the *fire separation* described in Subclause (c)(ii) provides continuous protection from the top of the footing to the underside of the roof deck and any space between the top of the wall and the roof deck is tightly fitted with mineral wool or *noncombustible* material,
   iii) each *dwelling unit* has its own sprinkler water supply, and
   iv) one tank-type water closet is supplied with water from the sprinkler head which is located farthest from the main water supply, or

d) in an *ancillary residential building* where
   i) each bathroom, clothes closet, linen closet, and pantry must have sprinkler coverage, notwithstanding the exemptions set out in NFPA 13D,
   ii) sprinklers are provided in each attached garage or carport, notwithstanding the exemptions set out in NFPA 13D,
   iii) a one tank-type water closet is supplied with water from the sprinkler head which is located farthest from the main water supply,
   iv) the path of travel for firefighters complies with Clause 3.2.5.5.(3)(a), and
   v) each *dwelling unit* has direct access to an exterior *exit* facility complying with Sentence 3.3.4.4.(3);

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).)

7) Fast response sprinklers shall be installed in *residential occupancies*, *care occupancies*, *treatment occupancies* and *detention occupancies*. (See Note A-3.2.5.12.(7).)

8) Notwithstanding the requirements of the standards referenced in Sentences (1) and (2) regarding the installation of automatic sprinkler systems, in *buildings* conforming to Article 3.2.2.48EMTC., 3.2.2.50., 3.2.2.57EMTC. or. 3.2.2.58., sprinklers shall be provided for balconies and decks exceeding 610 mm in depth measured perpendicular to the exterior wall. (See Note A-3.2.5.12.(8).)

9) 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.(9).)

10) Except as provided in Subsection 3.2.8., closely spaced sprinklers and associated draft stops need not be installed around floor openings in conformance with NFPA 13, "Installation of Sprinkler Systems",

11) Notwithstanding Sentences (1) and (2) and except as permitted by Sentence (12), automatic sprinkler protection shall be provided for all unenclosed balconies, exterior decks, porches and patios of *buildings sprinklered* to NFPA 13R or NFPA 13 if

a) the framing or cladding is of *combustible construction*,

b) the depth of balcony, deck, porch, or patio is more than 1200 mm, and

c) the balcony, roof overhang or structure above is more than 300 mm overlapping the balcony, deck or patio below and is located less than 3 m above the finished floor of the balcony, deck or patio below.

12) Automatic sprinkler protection for an unenclosed exterior balcony of a residential *building* may be omitted if

a) the *building* is of *noncombustible construction*, and

b) the exterior wall assembly adjoining the balcony and the exterior ceiling assembly covering the balcony are constructed with *noncombustible* materials.

13) Notwithstanding the requirements of the standards referenced by Sentence (3) regarding the installation of automatic *sprinkler systems*, sprinklers shall be provided in any *storage garage* attached to a *building* of *residential occupancy* where a *fire separation* is not provided between the *storage garage* and adjacent *floor areas*.

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3.2.6.1. Application

1) Except as permitted by Sentence (2), this Subsection applies to a *building*

a) more than 18 m in height, measured between grade and the uppermost floor level of the top *storey*, or

b) with a *floor area* or part of a *floor area* located above the third *storey* designed or intended as a Group B, Division 2 or Group B, Division 3 *major occupancy*.

2) A *building* or that portion of a *building* separated in accordance with Division A, Article 1.3.3.4., need not comply with the requirements of this Subsection, provided

a) the *building* or that portion of a *building* does not exceed 6 storeys in *building height*,

b) the *building* or that portion of a *building* does not contain a *floor area* or part of a *floor area* located above the third *storey* designed or intended as a Group B, Division 2 or Group B, Division 3 *major occupancy*,

c) the principal entrance for fire fighters is located on the *storey* which requires vertical travel to the topmost floor level to be not more than 18 m,

d) except where vestibules designed to limit movement of smoke from a fire in a *floor area* below the lowest *exit storey* into upper *storeys* are provided, stairs and elevators shall not directly connect more than 6 consecutive *storeys* (See Note A-3.2.6.2.(4).),

e) *exit* stair enclosures are provided with not less than a 2 h *fire separation*, and

f) the *building* sprinklers are designed in accordance with NFPA 13 "Installation of Sprinkler Systems", except that the design area of the *floor areas* above the *basement* shall be twice the design area otherwise permitted by NFPA 13 "Installation of Sprinkler Systems" after all reductions in design area have been applied.

(See Note A-3.2.6.1.(2).)

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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,
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 by the Elevating Devices Safety Regulations to be equipped with a telephone,

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).)

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3.2.7.10. Protection of Electrical Conductors

1) Electrical and emergency conductors referred to in Clauses (a) to (c) shall be protected against exposure to fire, for a period of no less than 1 h, from the source of the emergency power supply to the branch circuits serving equipment, if

a) electrical conductors located within *buildings* identified in Article 3.2.6.1. are serving

i) fire alarms,
ii) emergency lighting, or
iii) emergency equipment within the scope of Articles 3.2.6.2. to 3.2.6.8.,

b) emergency conductors are serving fire pumps, and

c) electrical conductors are serving mechanical systems and auxillary equipment

i) that serve areas of refuge identified in Clause 3.3.3.6.(1)(b),
ii) *that serve contained use areas* identified in Clauses 3.3.3.7.(4)(a) and (b), or
iii) intended for fire and life safety purposes as a smoke management system.

(See Note A-3.2.7.10.(1).)

2) Except as otherwise required by Sentence (3) and permitted by this Article, electrical conductors that are used in conjunction with systems identified in Sentence (1) shall

a) conform to CAN/ULC-S139, “Fire Test for Evaluation of Integrity of Electrical Power, Data and Optical Fibre Cables,” including the hose stream application, to provide a circuit integrity rating of not less than 1 h (See Note A-3.2.7.10.(2)(a) and (3)(a).), or

b) be located in a *service space* that is separated from the remainder of the *building* by a *fire separation* that has a *ire-resistance rating* not less than 1 h.

3) Electrical conductors identified in Clause (1)(c) shall

a) conform to CAN/ULC-S139, “Fire Test for Evaluation of Integrity of Electrical Power, Data and Optical Fibre Cables,” including the hose stream application, to provide a circuit integrity rating of not less than 2 h

(See Note A-3.2.7.10.(2)(a) and (3)(a).), or

b) be located in a *service space* that is separated from the remainder of the *building* by a *fire separation* that has a *fire-resistance rating* not less than 2 h.

4) The *service spaces* referred to in Clauses (2)(b) and (3)(b) shall not contain any *combustible* materials other than the conductors being protected.

5) Except as stated in Sentences (7) and (9), the electrical conductors referred to in Sentence (1) are those that extend from the source of emergency power to

a) the equipment served, or

b) the distribution equipment supplying power to the equipment served, if both are in the same room. (See

Note A-3.2.7.10.(5)(b).)

6) If a fire alarm transponder or annunciator in one *fire compartment* is connected to a central processing unit or another transponder or annunciator located in a different *fire compartment*, the electrical conductors connecting them shall be protected in accordance with Sentence (2).

7) Fire alarm system branch circuits within a *storey* that connect transponders and individual devices need not conform to Sentence (2). (See Note A-3.2.7.10.(7).)

8) Except as permitted in Sentence (9), if a distribution panel supplies power to emergency lighting, the power supply conductors leading up to the distribution panel shall be protected in accordance with Sentence (2).

9) Conductors leading from a distribution panel referred to in Sentence (8) to emergency lighting units in the same *storey* need not conform to Sentence (2).

10) Distribution panels serving emergency lighting units located on other *storeys* shall be installed in a *service room* separated from the *floor area* by a *fire separation* having a *fire-resistance rating* of at least 1 h.

11) Conductors leading from a distribution panel to emergency lighting units located on other *storeys* shall be protected in accordance with Sentence (2) between the distribution panel and the *floor area* where the emergency lighting units are located.

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3.3.1.3. Means of Egress

(See Note 3.3.1.3.)

1) *Access to exit* within *floor areas* shall conform to Subsections 3.3.2. to 3.3.5., in addition to the requirements of this Subsection.

2) If a podium, terrace, platform or contained open space is provided, egress requirements shall conform to the appropriate requirements of Sentence 3.3.1.5.(1) for rooms and *suites*.

3) *Means of egress* shall be provided from every podium, terrace, platform or contained open space used or intended for *occupancy*, to *exits* in conformance with the requirements of Section 3.4.

4) *Means of egress* from an *occupancy* on a roof serving only a single *dwelling unit* shall be provided in conformance with Article 3.3.4.4.

5) Except as permitted by Sentence (4) and except as required by Sentence (6), a *means of egress* at the roof level, designed in conformance with the requirements for *exits* in Section 3.4., shall be provided from an *occupancy* on a roof.

6) At least two separate *means of egress* at the roof level, designed in conformance with the requirements for *exits* in Section 3.4., shall be provided from a roof used or intended for an *occupant load* more than 60.

7) For the purposes of Sentences (4) and (5), the occupied area of the *occupancy* on a roof shall be used in place of *floor area*.

8) A roof-top enclosure that does not serve as part of a *means of egress* for an *occupancy* on a roof in accordance with Sentence (5) or (6) shall be provided with an *access to exit* that leads to an *exit*

a) at the roof level, or

b) on the *storey* immediately below the roof.

9) A roof-top enclosure which is more than 200 m^2 in area shall be provided with at least 2 *means of egress*.

10) Two points of egress shall be provided for a *service space* referred to in Sentence 3.2.1.1.(8) if

a) the area is more than 200 m^2, or

b) the travel distance measured from any point in the *service space* to a point of egress is more than 25 m.

11) Except as permitted by Sentences 3.3.4.4.(5) and (6), each *suite* in a *floor area* that contains more than one *suite* shall have

a) an exterior *exit* doorway, or

b) a doorway

i) into a *public corridor*, or

ii) to an exterior passageway.

12) Except as permitted by this Section and by Sentence 3.4.2.1.(2), at the point where a doorway referred to in Sentence (8) opens onto a *public corridor* or exterior passageway, it shall be possible to go in opposite directions to each of 2 separate *exits*.

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3.3.2.14. Stages for Theatrical Performances

1) A *stage* for theatrical performances and ancillary spaces, including workshops, dressing rooms and storage areas, shall be *sprinklered*.

2) A *fire separation* with a *fire-resistance rating* not less than 1 h shall be provided between a *stage* for theatrical performances and ancillary spaces, including workshops, dressing rooms and storage areas.

3) Except as permitted by Sentence (6), a *stage* for theatrical performances and ancillary spaces, including workshops, dressing rooms and storage areas, shall be separated from the seating area by a *fire separation* having a *fire-resistance rating* not less than 1 h, except for a proscenium opening protected with

a) a sprinkler deluge system conforming to the requirements of NFPA 13, “Installation of Sprinkler Systems,”

b) an unframed fire curtain if the opening is not more than 20 m wide, or

c) a semi-rigid fire curtain if the opening is more than 20 m wide.

4) A fire curtain required by Sentence (3) shall be of a type *acceptable* to the *Chief Building Official* and designed to close

a) automatically upon the actuation of the *sprinkler system*,

b) automatically upon actuation of the fire alarm system, and

c) manually by remote control devices located at the curtain control panel and at each side of the *stage*.

5) At least 2 vents for the purpose of venting fire and smoke to the outside of a *building* shall be provided above a *stage* designed for theatrical performances and shall

a) have an aggregate area not less than one eighth of the area of the *stage* behind the proscenium opening, and

b) be arranged to open automatically upon actuation of the *sprinkler system*.

6) The *fire separation* referred to in Sentence (3) is not required between a *stage* and a seating area in a *building* that is *sprinklered* throughout, provided a sprinkler deluge system is installed at the boundary between the *stage* and the seating area.

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3.4.2.1. Protection of Electrical Conductors

1) Except as permitted by Sentences (2) to (4), every *floor area* intended for *occupancy* shall be served by at least 2 *exits*.

2) A *floor area* in a *building* not more than 2 *storeys* in *building height*, is permitted to be served by one *exit* provided the total *occupant load* served by the *exit* is not more than 60, and

a) in a *floor area* that is not *sprinklered* throughout, the *floor area* and the travel distance are not more than the values in Table 3.4.2.1.-A, or

b) in a *floor area* that is *sprinklered* throughout

i) the travel distance is not more than 25 m, and

ii) the *floor area* is not more than the value in Table 3.4.2.1.-B.

Table 3.4.2.1.-A
Criteria for One Exit (Floor Area Not Sprinklered Throughout)
Forming Part of Sentence 3.4.2.1.(2)

Occupancy* of *Floor Area	**Maximum *Floor Area*, m^2**	**Maximum Travel Distance, m**
Group A	150	15
Group B	75	10
Group C	100	15
Group D	200	25
Group E	150	15
Group F, Division 2	150	10
Group F, Division 3	200	15

Table 3.4.2.1.-B
Criteria for One Exit (Floor Area Sprinklered Throughout)
Forming Part of Sentence 3.4.2.1.(2)

Occupancy* of *Floor Area	**Maximum *Floor Area*, m^2**
Group A	200
Group B	100

Group C	150
Group D	300
Group E	200
Group F, Division 2	200
Group F, Division 3	300

3) Except as permitted by Sentence (4), if Sentence (2) permits a single *exit* from a *floor area* classified as Group B or Group C *occupancy*, the *exit* shall be an exterior doorway not more than 1.5 m above adjacent ground level.

4) The requirements of Sentences (1) and (2) are permitted to be waived for *dwelling units* that have an *access to exit* conforming to Sentences 3.3.4.4.(1) to (4) and 3.3.4.4.(7).

5) *Exits* are not required directly from roof-top enclosures that comply with Sentences 3.3.1.3.(8) and (9) or where they are served by a *means of egress* in conformance with Sentences 3.3.1.3.(4) to (5).

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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

a) have a rise between successive treads not less than 125 mm and not more than 180 mm,

b) have a closed riser, and

c) have

i) a riser with either no rakeback or a rakeback of not more than 38 mm, or

ii) if a nosing is provided, the underside of the nosing with an angle of not less than 60° from the horizontal.

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) The top of the nosing of stair treads shall

a) except as permitted in Sentence (10), have either a radius or a bevel between 6 mm and 10 mm in horizontal dimension,

b) have no abrupt angles on the underside, and

c) not project more than 38 mm.

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.

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3.4.6.16. Door Release Hardware

1) Except for devices on doors serving a *contained use area* or an *impeded egress zone* designed to be remotely released in conformance with Article 3.3.1.13., and except as permitted by Sentences (4) and (5) and Article 3.4.6.17., locking, latching and other fastening devices on a principal entrance door to a *building* as well as those on every *exit* door shall include release hardware complying with Clause 3.8.3.8.(1)(c) to permit the door to be readily opened from the inside with not more than one releasing operation and without requiring keys, special devices or specialized knowledge of the door-opening mechanism. (See Note A-3.4.6.16.(1).)

2) If a door is equipped with a latching mechanism, a device that will release the latch and allow the door to swing wide open when a force of not more than 90 N is applied to the device in the direction of travel to the *exit* shall be installed on

a) every *exit* door from a *floor area* containing an *assembly occupancy* having an *occupant load* more than 100,

b) every door leading to an *exit* lobby from an *exit* stair shaft, and every exterior door leading from an *exit* stair shaft in a *building* having an *occupant load* more than 100, and

c) every *exit* door from a *floor area* containing a *high-hazard industrial occupancy*.

3) Except as required by Sentence 3.8.3.6.(8), every *exit* door shall be designed and installed so that, when the latch is released, the door will open under a force of not more than 90 N, applied at the knob or other latch releasing device.

4) Except as permitted in Sentence (7), electromagnetic locks that do not incorporate latches, pins or other similar devices to keep the door in the closed position are permitted to be installed on doors, other than those leading directly from a *high-hazard industrial occupancy,* provided

a) the *building* is equipped with a fire alarm system,

b) the locking device releases upon actuation of the *alarm signal* from the *building's* fire alarm system,

c) the locking device releases immediately upon loss of power controlling the electromagnetic locking mechanism and its associated auxiliary controls,

d) except for locking devices installed in conformance with Sentence (5), the locking device releases immediately upon actuation of a manually operated switch readily accessible only to authorized personnel,

e) except as provided in Clause (k), a force of not more than 90 N applied to the door opening hardware initiates an irreversible process that will release the locking device within 15 s and not re-lock until the door has been opened,

f) upon release, the locking device must be reset manually by the actuation of the switch referred to in Clause (d),

g) a legible sign is permanently mounted on the door to indicate that the locking device will release within 15 s of applying pressure to the door-opening hardware,

h) the total time delay for all electromagnetic locks in any path of egress to release is not more than 15 s (See note A-3.4.6.16.(4)(h).),

i) where a bypass switch is installed to allow testing of the fire alarm system, actuation of the switch

i) can prevent the release of the locking device by the fire alarm system, as stated in Clause (b), during the test, and

ii) causes an audible and visual signal to be indicated at the fire alarm annunciator panel required by Article 3.2.4.9. and at the monitoring station specified in Sentence 3.2.4.8.(4),

j) emergency lighting is provided at each door, and
k) where they are installed on doors providing emergency crossover access to *floor areas* from *exit* stairs directly into a public corridor in accordance with Sentence 3.4.6.18.(2),
i) the locking device releases immediately upon the operation of a manual station for the fire alarm system located on the wall on the *exit* stair side not more than 600 mm from the door, and
ii) a legible sign with the words "re-entry door unlocked by fire alarm" written in letters at least 25 mm high with a stroke of at least 5 mm is permanently mounted on the door on the *exit* stair side.
(See Notes A-3.4.6.16.(4). and A-3.3.1.13.(7).)

5) Electromagnetic locks that do not incorporate latches, pins or other similar devices to keep the door in the closed position are permitted to be installed on doors in Group B, Division 2 and Division 3 *occupancies*, provided
a) the *building* is
    i) equipped with a fire alarm system, and
    ii) *sprinklered*,
b) the electromagnetic lock releases upon
    i) actuation of the *alarm signal* from the *building's* fire alarm system,
    ii) loss of its power supply and of power to its auxiliary controls,
    iii) actuation of a manually operated switch that is readily accessible at a constantly attended location within the locked space, and
    iv) actuation of the manual station installed within 0.5 m of each door and equipped with an auxiliary contact, which directly releases the electromagnetic lock,
c) upon release, the electromagnetic lock requires manual resetting by actuation of the switch referred to in Subclause (b)(iii),
d) a legible sign with the words "EMERGENCY EXIT UNLOCKED BY FIRE ALARM" written in letters at least 25 mm high with a stroke at least 5 mm wide is permanently mounted on the door,
e) the operation of any by-pass switch, where provided for testing of the fire alarm system, sets off an audible signal and a visual signal at the fire alarm annunciator panel and at the monitoring station referred to in Sentence 3.2.4.7.(4), and
f) emergency lighting is provided at the doors.
(See Note A-3.4.6.16.(5).)

6) Except as provided in Sentence 3.4.6.17.(9), door release hardware for the operation of the doors referred to in this Section shall be installed at a height between 900 mm and 1 100 mm above the finished floor.
(See also Subclause 3.8.3.6.(6)(a)(v).)

7) As an alternative to the requirements of Clauses (e), (f) and (g) in Sentence 3.4.6.16.(4), acceptable door release hardware for an electromagnetic lock shall be located in close proximity to the exit door and shall be equipped with
a) a push button together with a motion sensor or a pressure sensitive pad that will immediately release the locking device,
b) a push button that is
    i) directly connected to the electrical circuit that provides power to the locking device, without any intervening mechanism,
    ii) embossed with the word "EXIT" on the activation surface in text with dimensions of no less than 25 mm,
    iii) internally illuminated by a permanent LED type light source, and
    iv) labeled "DOOR RELEASE" in plain and legible characters, and
c) an electromagnetic lock that
    i) will reset automatically, except as provided in (c)(ii),
    ii) has an automatic reset feature that is not activated for at least 15 seconds, and
    iii) can only be reset by manual means after the activation of the fire alarm system.
(See Note A-3.4.6.16.(7).)

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3.5.4.1. Elevator Car Dimensions

1) Except as permitted in Sentence (3), if one or more elevators are provided in a *building*, each *storey* with access to an elevator shall be served by at least one elevator which has inside dimensions that will accommodate and provide adequate access for a patient stretcher 2 010 mm long and 610 mm wide in the prone position. (See Note A-3.5.4.1.(1).)

2) An elevator satisfying the requirements of Sentence (1) shall be clearly identified on the main entrance level of the *building*.

3) The requirement in Sentence (1) to accommodate and provide adequate access for a patient stretcher

a) is waived for a limited-use / limited-application elevator designed and installed in accordance with the Elevating Devices Safety Regulation, and

b) does not apply to a lift designed and installed in accordance with CAN/CSA-B355 “Lifts for Persons with Physical Disabilities”.

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3.8.2.2. Entrances

(See Note A-3.8.2.2.)

1) In addition to the *accessible* entrances required by Sentence (2), the principal entrance and not less than 50% of all pedestrian entrances, which shall include the principal entrance, of a *building* referred to in Sentence 3.8.2.1.(1) shall be *accessible* and shall lead from

a) the outdoors at sidewalk, roadway or *street* level, or

b) an *accessible* path of travel that complies with Subsection 3.8.3. and leads from a sidewalk, roadway or *street*.

2) A *suite* of *assembly occupancy*, *business and personal services occupancy* or *mercantile occupancy* that is located in the *first storey* of a *building*, or in a *storey* to which an *accessible* path of travel is provided, and that is completely separated from the remainder of the *building* so that there is no access to the remainder of the *building*, shall have at least one *accessible* entrance.

3) An *accessible* entrance required by Sentence (1) or (2) shall be designed in accordance with Subsection 3.8.3.

4) At an *accessible* entrance that includes more than one doorway, only one of the doorways is required to be designed in accordance with Subsection 3.8.3.

5) If a *walkway* or pedestrian bridge connects two *accessible storeys* in different *buildings*, the path of travel from one *storey* to the other *storey* by means of the *walkway* or bridge shall be *accessible*.

6) Where provided, an intercom system shall be installed at the principal entrance to an apartment or condominium building conforming to Sentence (1).

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3.8.3.1. Design Standards

1) *Buildings* or parts thereof and facilities that are required to be *accessible* shall be designed in accordance with

a) this Subsection, or

b)for each *accessible* application listed independent of other *accessible* applications, the applicable provisions of CSA B651, “Accessible Design for the Built Environment,” listed in Table 3.8.3.1. (See Note A-3.8.3.1.(1).)

2) The design for each *accessible* application listed in Table 3.8.3.1. shall comply entirely with Clause (1)(a) or Clause (1)(b).

3) Notwithstanding the requirements of Sentence (1), *buildings* required to comply with the requirements of Article 3.8.2.1.(6) shall be equipped with the following (See Note A-3.8.3.1.(2))

a) interior and exterior stairs and ramps that are *accessible* to the public, with a colour contrast or distinctive pattern, visible from both directions of travel, demarcating the leading edge of treads,
b) door opening hardware within *dwelling units* and common amenity areas which may be operated
i) without tight grasping or twisting of the wrist, and
ii) by application, of a force of not more than 38 N for exterior doors or 22 N for interior doors, at the
handle, push plate or latch-releasing device, except where the *Chief Building Official* determines that a greater force is necessary to ensure proper *building* function,
c) kitchen sinks and washbasins within *dwelling units* and common amenity spaces with faucets activated by levers or by devices that do not require tight grasping or twisting of the wrist,
d) wall assemblies reinforced adjacent to the toilet and bathtub to accommodate the future installation of grab bars,
e) an accessible path of travel from the main entrance and from any parking area or parking facility serving the *building* to the entry doors of *dwelling units* and to common amenity areas,
f) a clearance of not less 450 mm beside the latching jamb of *dwelling unit* entry doors
i) notwithstanding Clause 3.8.3.6.(11),
ii) Despite the provisions of this Clause, if the *dwelling unit* contains pre-wired outlet boxes for a residential style automatic door opener and related controls, and the *Chief Building Official* determines that provision of the required clearance is impractical, the *Chief Building Official* may waive the clearance requirement.
g) accessible gender neutral washrooms in public or common amenity areas of the *building*,
h) entry doors with level thresholds leading into each *dwelling unit*, except for ramps or other devices conforming to Article 3.8.3.7.,
i) a washroom at the main entry level of each *dwelling unit*, containing a washbasin and toilet, with a minimum clear doorway opening of 800 mm and a minimum floor space, clear of the door swing, of 750 mm by 1 200 mm in front of each of the washbasin and toilet,
j) all doors in the accessible path of travel equipped with a self-closer with a closing period of no less than 3 seconds, measured from a door open position of 70 degrees to a point 75 mm from the door closed position,
k) power-operated doors at the main *building* entrance and the entrance from the parking area, and
l) signage in public areas, amenity spaces and *exits* in multi-unit residential *buildings* in conformance with Article 3.8.3.9. of Division B.

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3.8.3.4. Passenger-Loading Zones and Parking Requirements

1) If a passenger-loading zone is provided, it shall have
a) an access aisle not less than 1 500 mm wide and 6 000 mm long adjacent and parallel to the vehicle pull-up space,
b) a curb ramp constructed in accordance with Sentence 3.8.3.3.(2), where there are curbs between the access aisle and the vehicle pull-up space and the difference in elevation between levels is not more than 200 mm, and
c) a clear height of not less than 2 750 mm at the pull-up space and along the vehicle access and egress routes.

2) Parking stalls for *persons with disabilities* shall comply with the Parking By-law (See Note A-3.8.3.4.(2).), and shall
a) have a firm, slip-resistant and level surface,
b) be located adjacent to an *accessible* path of travel, and
c) be marked with signage or symbols identifying such stalls as exclusively for the use of *persons with disabilities*.

3) Where parking stalls are provided for *persons with disabilities*, entry and *exit* controls, security controls, ticketing equipment, and pay stations serving such parking stalls shall be designed and

installed so that all user functions are located no more than 1 200 mm above the finished paved area, and are *accessible*.

4) This Article does not apply to *existing buildings* except for spaces created by

a) an *addition*,

b) the reconstruction of an existing space, and

c) the conversion of an existing space into an *ancillary residential unit*.

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3.8.3.5. Ramps

1) Except as provided in Sentence 3.8.3.3.(2), a ramp located in an *accessible* path of travel shall

a) have a clear width not less than

i) 1 500 mm,

ii) 915 mm if the ramp serves a passageway that is 6 m or less in width, or

iii) 915 mm if a second ramp with a clear width not less than 915 mm also serves a passageway that is greater than 6 m in width,

(See Note A-3.4.3.4.),

b) have a slope not more than 1 in 12 (See Note A-3.8.3.5.(1)(b).),

c) have a level area not less than 1 500 by 1 500 mm at the top and bottom and at intermediate levels of a ramp leading to a door, so that on the latch side the level area extends not less than

i) 600 mm beyond the edge of the door opening where the door opens towards the ramp, or

ii) 300 mm beyond the edge of the door opening where the door opens away from the ramp,

(See Note A-3.8.3.5.(1)(c).),

d) have a level area not less than1 500 mm long and at least the same width as the ramp

i) at intervals not more than 9 m along its length, and

ii) where there is an abrupt change in the direction of the ramp, and

e) except as provided in Sentences (2) and (3), be equipped with a handrail on each side of the ramp conforming to Article 3.4.6.5., except that they shall be not less than 865 mm and not more than 965 mm high, and

f) be equipped with *guards* conforming to Article 3.4.6.6.

2) Handrails installed in addition to required handrails need not comply with the height requirements stated in Clause (1)(e).

3) The requirement for handrails in Clause (1)(e) need not apply to a ramp serving as an aisle for fixed seating.

4) The surfaces of ramps and landings shall

a) be hard or resilient where the ramp is steeper than 1 in 15 (See Note A-3.8.3.5.(4)(a).),

b) have a cross slope no steeper than 1 in 50, and

c) where exposed to water, be designed to drain.

5) Ramps and landings not at ground level or adjacent to a wall shall have edge protection consisting of

a) a curb not less than 75 mm high, or

b) a raised barrier or rail located not more than 100 mm from the ramp or landing surface.

6) Reserved.

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3.8.3.6. Doorways and Doors

1) Except where stated otherwise, this Article applies to swinging and sliding doors.

2) Every doorway that is located in an *accessible* path of travel shall have a clear width not less than 850 mm a) for swinging doors, when measured from the face of the active leaf, in the open position of 90° to the doorway, to the outside edge of the stop on the door frame, and
b) for sliding doors, when measured from the edge of the door, in the open position, to the outside edge of the stop on the door frame.
(See Note A-3.8.3.6.(2).)
3) Doorways in an *accessible* path of travel to at least one bathroom within an *accessible suite* of *residential occupancy* shall have a clear width not less than 810 mm when measured in accordance with Clauses (2)(a) and (b).
(See Article 3.8.2.12. and Note A-3.8.3.6.(3).)
4) Door-operating devices shall be graspable and operable
a) in accordance with Clause 3.8.3.8.(1)(c), and
b) at a height between 900 mm and 1 100 mm above the floor.
(See also Sentence 3.3.1.13.(4) regarding door release operation.)
(See Note A-3.8.3.6.(4).)
5) A threshold for a doorway referred to in Sentences (2) and (3) shall conform to Sentence 3.3.1.13.(11).
6) Power operated doors required by Sentence 3.8.2.7.(1) shall
a) have operators that activate automatically or through the use of controls that
    i) function for passage in both directions when located in an *accessible* path of travel,
    ii) are marked with the International Symbol of Access,
    iii) are located clear of the door swing and not less than 600 mm and no more than 1 500 mm from that door swing,
    iv) comply with Subclause 3.8.3.8.(1)(b),
    v) are operable from a height between 150 mm and 300 mm as well as between 900 mm and 1 100 mm above the floor, and
    vi) are operable by touching or approaching any part of their surface with a fist, arm or foot, and
b) unless equipped with safety sensors, have operators that
    i) fully open the door in not less than 3 s, and
    ii) require a force not more than 65 N to stop movement of the door, and
c) have a clear and level space extending the height of the doorway and not less than 1 100 mm long by the width of the door assembly on both sides of the assembly plus the arc of the door swing on any side into which the door swings.
(See Note A-3.8.3.6.(6) and (7).)
7) A cane-detectable *guard* shall be installed on the hinged side of power-assisted doors that swing open into the path of travel. (See Note A-3.8.3.6.(6) and (7).)
8) Except as provided in Sentence (9) and except for a door with a power door operator complying with Sentence (6), when unlatched, a door in an *accessible* path of travel shall open when the force applied to the handle, push plate or latch-releasing device is not more than
a) 38 N in the case of an exterior swinging door,
b) 22 N in the case of an interior swinging door, or
c) 22 N in the case of a sliding door.
9) Sentence (8) does not apply to a door at the entrance to a *dwelling unit*, or where greater forces are required in order to close and latch the door against the prevailing difference in air pressure on opposite sides of the door.
(See Note A-3.8.3.6.(9).)
10) Except for a door at the entrance to a *dwelling unit*, a closer for a door in an *accessible* path of travel shall have a closing period of not less than 3 s measured from when the door is in an open position of 70° to the doorway, to when the door reaches a point 75 mm from the closed position, measured from the leading edge of the latch side of the door. (See Note A-3.8.3.6.(10).)

11) Unless equipped with a power door operator complying with Sentence (6), a door in an *accessible* path of travel shall have a clear and level space extending the height of the doorway and not less than

a) 1 500 mm deep by the width of the door assembly plus not less than 600 mm beside the latching jamb of the door on any side of the assembly into which a swinging door swings,

b) 1 200 mm deep by the width of the door assembly plus not less than 300 mm beside the latching jamb of the door on any side of the assembly into which a swinging door does not swing,

c) 1 200 mm deep by a width not less than 900 mm, including not less than 50 mm on the latching jamb side where the approach is perpendicular to a sliding door, and

d) 1 050 mm deep by a width not less than 1 350 mm, including not less than 540 mm on the latching jamb side where the approach is parallel to a sliding door.

(See Note A-3.8.3.6.(11).)

12) Doors in an *accessible* path of travel which are installed in series shall be separated by a distance of not less than 1 500 mm plus the width of any door that swings into the space in the path of travel from one door to another.

(See also Clauses 3.2.8.4.(1)(a) and 3.3.5.7.(4)(a).)

13) Only the active leaf in a multiple-leaf door in an *accessible* path of travel need conform to the requirements of this Article.

14) Except as provided in Clause 3.8.3.5.(1)(c), the floor surface on each side of a door in an *accessible* path of travel shall be level within a rectangular area

a) as wide as the door plus the clearance required on the latch side by Sentence (11), and

b) whose dimension perpendicular to the closed door is not less than the width of the *accessible* path of travel but need not exceed 1 500 mm.

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3.8.3.22. Sleeping Rooms and Bed Spaces

(See Note A-3.8.3.22.)

1) Sleeping rooms and bed spaces required to be *accessible* in Sentence 3.8.2.12.(1) shall have

a) a turning area of not less than 1 500 mm in diameter on one side of a bed,

b) a clearance of not less than 900 mm to allow for functional use of the room or space by persons using wheelchairs,

c) when a balcony is provided, an *accessible* balcony,

d) at least one closet that provides

i) a clear opening not less than 900 mm wide,

ii) clothes hanger rods capable of being lowered to a height of 1 200 mm,

iii) at least one shelf capable of being lowered to a height of 1 200 mm,

e) *accessible* light switches, thermostats and other controls that are specifically provided for use by the occupant located between 900 mm and 1 200 mm above the finished floor and operable in accordance with Clause 3.8.3.8.(1)(c),

f) *accessible* electrical outlets located in conformance with Clause 3.8.3.8.(1)(a), and

g) a bathroom, where provided as part of the sleeping room or bed space, or *access* to a bathroom, where not provided as part of the sleeping room or bed space

i) conforming to Clauses 3.8.3.11.(1)(a) and (d) with a water closet conforming to Article 3.8.3.13.,

ii) provided with grab bars conforming to Clauses 3.8.3.11.(1)(e) and (f),

iii) provided with a lavatory and mirror conforming to Article 3.8.3.15., and

iv) provided with a bathtub conforming to Article 3.8.3.17. or a shower conforming to Article 3.8.3.16. only to the extent of providing the same type of facilities provided in sleeping rooms and bed spaces where *access* is not required.

Table 3.10.1.1. – Insert the following in numerical order

3.3.1.13. Doors and Door Hardware	
(1)	(a),(b) [F10,F12-OS3.7]
	(c) [F10-OS3.7] [F30-OS3.1]
	(d) [F30-OS3.1]
(2)	[F30-OS3.1] [F10-OS3.7]
(3)	[F10-OS3.7]
(4)	[F10-OS3.7]
(5)	[F10-OS3.7]
	[F73-OA1]
(8)	[F12-OS3.7]
(9)	[F12-OS3.7]
(10)	[F12-OS3.7]
(11)	[F30-OS3.1]

Notes to Part 3 – Changes

Rev.: 12715 - Eff.Date: 2020Jul01

A-3.1.11.3.(3) Fire Blocks Between Nailing and Supporting Elements. Sentence 3.1.11.3.(3) addresses cases in buildings or parts of buildings permitted to be of encapsulated mass timber construction where, in accordance with Sentence 3.1.18.12.(3), 10% of the ceiling finish within a fire compartment is permitted to have a flame-spread rating not more than 150. Where such combustible ceiling finish is attached using nailing elements and a concealed space is formed above, exposed combustible elements in this space would require fire blocks to limit fire spread in this area.

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A-3.1.11.5.(1) Fire Blocks in Combustible Construction. Combustible construction referred to in Sentence 3.1.11.5.(1) includes all types of construction that do not comply with the requirements for noncombustible construction or encapsulated mass timber construction. All the elements within the concealed space can be combustible, unless required to be of noncombustible materials (e.g., certain categories of pipework and ducts), but the value of the flame-spread rating of the combustible materials determines the permitted extent of the concealed space between fire blocks. The materials to be considered include all construction materials regulated by this By-law, including the framing and building services that are located in the concealed space. When designing fire blocking, consideration should be given to avoid restricting venting capabilities within concealed spaces. (See also Note A-5.6.2.1.)

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A-3.1.11.5.(3) Fire Blocks in Concealed Spaces. To reduce the risk of fire spread in combustible concealed spaces within the types of buildings referred to in Sentences 3.1.11.5.(3) and (4), fire blocking is required regardless of whether the horizontal concealed space is protected by sprinklers or not, unless the space is filled with noncombustible insulation so that any air gap at the top of the insulation is very small. See also Note A-3.1.11.5.(1) for roof venting.

A 5- or 6-storey building constructed in accordance with Article 3.2.2.50. and buildings constructed in accordance with Article 3.2.2.48EMTC., 3.2.2.57EMTC., or 3.2.2.58. are required to be sprinklered in accordance with NFPA 13, "Installation of Sprinkler Systems" (see Article 3.2.5.12.).

NFPA 13 generally requires sprinklering of any concealed spaces of combustible construction or where large amounts of combustibles are present. However, NFPA 13 allows combustible concealed spaces to be unsprinklered in certain cases, including where concealed spaces are filled almost entirely with noncombustible insulation, where spaces contain only materials with a low flame-spread rating, and where limited access or the size of the space makes it impractical to install sprinklers. For certain types of construction in unsprinklered combustible concealed spaces, NFPA 13 mandates fire blocking beyond the minimum specified in Sentence 3.1.11.5.(3).

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A-3.1.11.7.(7) Integrity of Fire Blocks. Sentence 3.1.11.7.(7) together with Article 3.1.9.1., is intended to ensure that the integrity of fire blocks is maintained at areas where they are penetrated. This requirement is satisfied by the use of generic fire stops such as mineral wool, gypsum plaster or Portland cement mortar, as well as rated fire stops.

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A-3.1.11.7.(8) Fire Blocks. Figure A-3.1.11.7.(8) shows the location of the semi-rigid fibre insulation board at the intersection between walls and floors in wood-frame construction. The figure is intended to illustrate the fire block detail and not a design of a fire separation.

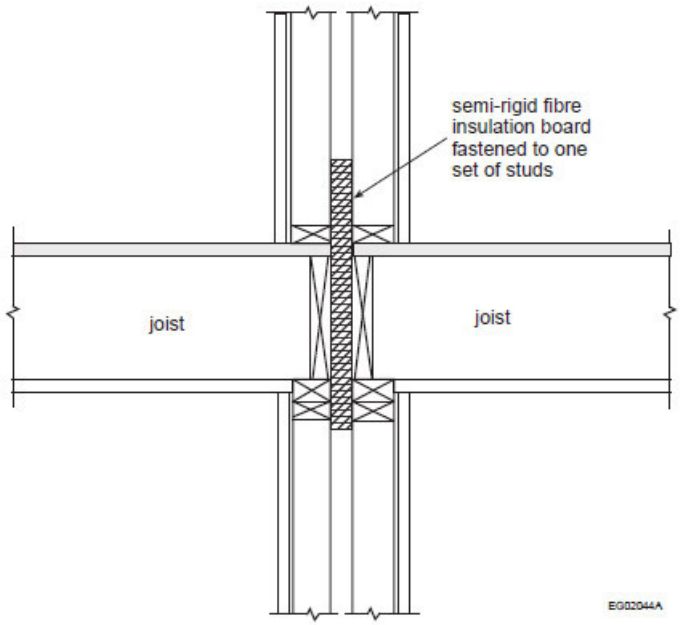

Figure A-3.1.11.7.(8)
Fire block

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A-3.1.18. Encapsulated Mass Timber Construction and Materials Permitted. The permission to use encapsulated mass timber construction and other combustible materials stated in Articles 3.1.18.2., 3.1.18.3., 3.1.18.7. and 3.1.18.8. does not waive the requirements regarding types of construction and cladding stated in Article 3.2.3.7.

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A-3.1.18.3. Structural Mass Timber Elements. Structural timber elements may consist of any number of large cross-section timber products, such as solid-sawn timber, glued-laminated timber (glulam), structural composite lumber (SCL), cross-laminated timber (CLT), and nail-laminated timber (NLT).

The minimum dimensions required for structural timber elements in encapsulated mass timber construction were established so that such elements will exhibit the fire performance characteristics of mass timber rather than those of lightweight, small-dimensioned wood elements (e.g., lumber), including reduced ignition propensity and reduced average rate of fuel contribution. Note that the dimensions stated in Table 3.1.18.3. do not reflect a specific fire-resistance rating; larger dimensions may be required to satisfy fire-resistance rating requirements.

The reference to Article 3.2.2.16. means that heavy timber construction is permitted to be used for the roof assembly (and its supports) in buildings of encapsulated mass timber construction that are sprinklered and not more than 2 storeys in building height. It follows that the minimum dimensions stated in Table 3.1.4.7. would apply to those elements rather than the ones stated in Table 3.1.18.3. Furthermore, the roof elements and supports made of heavy timber construction do not need to conform to the encapsulation requirements of Article 3.1.18.4., nor are they limited by the flame-spread rating or maximum thickness or cut-through requirements of Article 3.1.18.12.

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A-Table 3.1.18.3. Minimum Dimensions of Structural Timber Elements. The minimum dimensions for floor assemblies are also applicable to mezzanines and exterior balconies.

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A-3.1.18.4.(1) Encapsulation of Mass Timber Elements. The general intent of Sentence 3.1.18.4.(1) is that all exposed surfaces of the mass timber elements be encapsulated, including the upper surface of a mass timber floor assembly, but some exceptions do apply. The upper surface of a mass timber roof assembly need not be encapsulated when there is no concealed space above it. As well, the exterior side of a mass timber exterior wall assembly need not be encapsulated, however, the provisions of Article 3.1.18.7. and Subsection 3.2.3. for exterior walls still need to be considered. A number of concealed space arrangements are also exempt from this general requirement of encapsulation (i.e. Sentences 3.1.18.3.(4) and 3.1.18.14.(2), Articles 3.1.18.5., 3.1.18.10. and 3.1.18.15.).

Rev.: 12715 - Eff.Date: 2020Jul01

A-3.1.18.4.(3) to (6) Fire-Resistance Rating of Mass Timber with Exposed Surfaces. Portions of mass timber elements required to have a fire-resistance rating are permitted to be exposed in accordance with the permissions stated in Sentences 3.1.18.4.(3) to (6); however, it is important to note that applying those permissions does not waive the requirement for these elements to have a fire-resistance rating.

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A-3.1.18.4.(4) Exposed Surfaces of Mass Timber Walls. The primary objective of encapsulating mass timber elements is to limit the probability that these elements will significantly contribute to fire spread and fire duration in the event of a fire. Since thick wood members require a source of imposed heat flux to burn, the stipulation in Clause 3.1.18.4.(4)(a) that the exposed surfaces of mass timber walls face the same direction within a suite is intended to reduce the potential of re-radiation between burning mass timber surfaces that face each other, which could sustain flaming combustion into the decay phase of a fire if the sprinkler system failed to operate or to control the fire. Additionally, the maximum percentage of exposed surface area stated in Article 3.1.18.4. is low so that it is not sufficient to sustain a ventilation-controlled fire that might provide the radiation required to sustain flaming combustion into the decay phase of a fire if the sprinkler system failed to operate or to control the fire.

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A-3.1.18.7.(1) and (2) Exterior Cladding. The requirements in Sentences 3.1.18.7.(1) and (2) are intended to reduce the potential for fire spread on the exterior cladding of buildings of encapsulated mass timber construction through the use of noncombustible finishes on the exterior of the wall assembly or the use of a cladding/wall assembly that has been proven to resist flame propagation. These cladding/wall assembly combinations can be used as infill or panel-type walls between structural elements, or attached directly to a loadbearing structural system. Note that the requirements in Article 3.1.18.7. do not supersede the provisions in Subsection 3.2.3. regarding spatial separation and exposure protection.

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A-3.1.19.2. Encapsulation Materials. Research has been conducted on different types of encapsulation materials, such as gypsum board, gypsum concrete and cement board. The results of tests using an intermediate-scale furnace and of cone calorimeter tests indicate that a combustible timber element protected with a 38 mm thick layer of gypsum-concrete topping or with two layers of 12.7 mm Type X gypsum board will not ignite or contribute significant heat to a fire until average temperatures of 325–380°C are attained at the interface between the encapsulation material or assembly of materials and the combustible substrate. These temperatures are consistent with the ignition temperatures of wood-based materials.

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A-3.1.19.2.(2) Protection of Gypsum Board from Foot Traffic. Where gypsum board is used as the encapsulation material on the top of a mass timber floor assembly, it should be protected from physical impact arising from normal pedestrian traffic that could damage it and possibly compromise its encapsulation rating.

Rev.: 12630 - Eff.Date: 2020Jul01

[Delete note A-3.2.1.1.]

Rev.: 12630 - Eff.Date: 2020Jul01

[Delete note A-3.2.1.7.(5)]

Rev.: 12715 - Eff.Date: 2020Jul01

A-3.2.2.48EMTC.(4) and 3.2.2.57EMTC.(3) Occupancy Combinations in Buildings of Mixed Construction.

Buildings conforming to the building height and area limits and the other fire protection requirements of Article 3.2.2.48EMTC. or 3.2.2.57EMTC. may be entirely constructed of encapsulated mass timber construction and incorporate the occupancies specifically permitted by Sentence 3.2.2.48EMTC.(4) or 3.2.2.57EMTC.(3), for example, Group A, Division 2 major occupancies on the first to third storeys, Group E major occupancies on the first and second storeys, and a parking garage on the first to fourth storeys.

Alternatively, the requirements of Articles 3.2.2.4. to 3.2.2.8. for superimposed major occupancies can be applied, resulting in buildings of mixed construction conforming to the building height and area limits for encapsulated mass timber construction and in which the lower storeys are of noncombustible construction and the upper storeys are of encapsulated mass timber construction. For example, a Group A, Division 2 or Group B, Division 3 major occupancy could be located on the first 4 storeys of a 12-storey Group C building constructed in accordance with Article 3.2.2.48EMTC., as long as these first 4 storeys were constructed of noncombustible construction in accordance with Article 3.2.2.23. or 3.2.2.42., as applicable. (See also Articles 3.2.2.6. and 3.2.2.7.)

Rev.: n/a - Eff.Date: 2020Jul01

A-3.2.5.12.(3) Superimposed Residential Suites. Sentence 3.2.5.12.(3) provides for the application of NFPA 13D, “Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes,”

where a residential building contains not more than two principal dwelling units or row housing. However, designers should recognize that the provisions of NFPA 13D are based in fire testing of conventional single dwelling arrangements of the 1970's and U.S. NFIRS statistical data through to 2009 for conventional single dwellings, duplex, and mobile home arrangements as evidenced in the Annex notes to NPFA 13D. They are therefore intended only to allow for arrangements where dwelling units are located in a side-by-side (horizontally connected) configuration.

Residential arrangements wherein which dwelling units are superimposed above another unit (residential or commercial) are to be designed to NFPA 13 or 13R as permitted by Article 3.2.5.12. Ancillary Residential Units are the notable exception to these requirements and are addressed separately in Section 9.37.

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A-3.3.1.3 Means of Egress Serving Podiums and Terraces. The requirements for podiums and terraces in Sentence 3.3.1.3.(2) and (3) are intended for areas situated on a level that is not at the highest elevation in a building, and where the area can be accessed by a storey of the building. The requirements of Sentence 3.3.1.3.(4) to (9) are intended for roof-top areas, including "terraces" where the area is at the highest elevation of the building, and there is no access to a storey of the building at that level.

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A-3.3.1.7.(1) Temporary Refuge for Persons with Disabilities. These measures are intended to provide temporary refuge for persons with disabilities. It is acknowledged, however, that the measures cannot provide absolute safety for all occupants in the fire area. It may, therefore, be necessary to develop special arrangements in the fire safety plan to evacuate persons with disabilities from these areas. Details for a suitable plan are contained in the Vancouver Fire By-law.

The protected elevator referred to in Clause 3.3.1.7.(1)(a) is intended to be used by firefighters as a means for evacuating persons with disabilities. It is not intended that this elevator be used by persons with disabilities as a means of egress without the assistance of firefighters.

If an estimate is to be made of the number of persons with disabilities in a floor area who can be accommodated in each zone in Clause 3.3.1.7.(1)(b), this estimate may be based on Table 3.8.2.3., which is used to determine the minimum number of spaces to be provided for persons using wheelchairs in fixed seating areas. If more precise information is available, it should be used for sizing the zones if the requirements of Section 3.8. are impracticable. It is therefore intended that these requirements be applied with discretion in buildings of Group F, Division 2 or 3 major occupancy. However, where industrial buildings contain subsidiary occupancies, such as offices or showrooms, it is reasonable to require that accessibility be provided in these spaces.

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A-3.4.2.3.(1) Least Distance Between Exits. The least distance measurement does not apply to each combination of exits on a multi-exit storey. It only applies to at least 2 of the required exits from that storey.

The intent of this Sentence is to permit a reduced distance between exits where a public corridor exists. However in some buildings, due to prevailing business conditions the entire floor area of a storey may be converted into a full storey tenant space. This may be challenging when the location of the existing exits have been established based on the presumption that a public corridor remains in place. Provided that the existing corridor arrangement is maintained in its current state, it is considered reasonable to maintain the existing condition as a corridor used by the public for the purposes of determining compliance with this Sentence as this can readily be shown not to reduce the existing level of performance.

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A-3.2.6.1.(2) Six Storey Buildings. One of the key concerns for high-buildings is the potential for increased smoke movement in a fire as a consequence of stack-effect. One of the provisions of 3.2.6.1.(2) is to prohibit stairs or elevators from directly connecting more than 6 storeys consecutively. This prohibition is intended to limit the potential for smoke to enter the stairs or elevator shafts and contaminate floor areas above. However, this prohibition is not intended to restrict the potential for stairs or elevators to serve other floors or levels as long as they are provided with acceptable measures to limit the uncontrolled movement of smoke between floor levels. Designers may wish to consider the use of vestibules or other measures described in note A-3.2.6.2.(4) as part of a design solution to control smoke movement.

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A-3.8.2.2. Entrances. An accessible route should exist from the sidewalk or roadway and parking area to an accessible building entrance. This route should be located so that people do not have to pass through dedicated smoking areas or behind parked cars. Accessible routes should coordinate with the routes to other buildings and to public transportation stops.

To provide more general access to buildings, not less than 50% of the pedestrian entrances are required to be accessible. This should include a principal entrance. If the 50% calculation results in a fraction, the number of accessible entrances should be the next higher unit value. For the purpose of determining the number of entrances to a building, several adjacent doors in a bank of doors are considered to be a single entrance.

If an intercom system is provided, the system shall comply with the requirements for controls and should be useable by persons who communicate using visual language such as a video system.

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A-3.8.2.5. Parking Areas. In Vancouver, the design, adequacy, and number of accessible parking spaces for persons with physical disabilities determined in accordance with the Parking By-law (see Sentence 3.8.3.4.(2) for additional details).

Further to the Parking By-law requirements, where feasible designers should consider maintaining consistency with provincial guidelines, in that parking spaces for use by persons with physical disabilities should

(1) be not less than 2400 mm wide and provided on one side with an access aisle not less than 1500 mm wide,
(2) have a firm, slip-resistant and level surface,
(3) be located close to an entrance required to conform to Article 3.8.2.2.,
(4) be clearly marked as being for the use of persons with physical disabilities, and
(5) be identified by a sign located not less than 1500 mm above ground level, with the International Symbol of Access (Figure A-3.8.2.5.-A).

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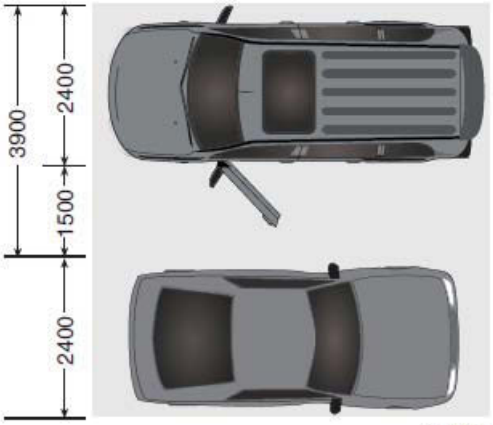
Figure A-3.8.2.5.-A
International Symbol of Access" sign

Asphalt, concrete and firm, compacted gravel are acceptable parking surfaces. Curb ramps should be not less than 1,500 mm wide. Parallel parking spaces should be not less than 7,000 mm long. If more than one parking space is provided for persons with physical disabilities, a single access aisle can serve two adjacent parking spaces. The arrangement shown in Figure A-3.8.2.5.-B allows the shared use of an access aisle to serve two adjacent parking spaces provided for use by persons with physical disabilities. Parking to accommodate vans and other vehicles equipped with platform lifts or side ramps should be provided greater dedicated space.

The design of the path of travel should accommodate loading to and from lifts and ramps, where intended. Vertical clearance must also be considered.



GG00048C

Figure A-3.8.2.5.-B
Shared access aisle

A-3.8.3.6.(6) and (7) Doors with Power Operators. Doors equipped with a power operator actuated by a pressure plate identified with the International Symbol of Access or, where security is required, by a key, card or radio transmitter, and that can otherwise be opened manually, meet the intent of the requirement. The location of these actuating devices should ensure that a wheelchair will not interfere with the operation of the door once it is actuated. Swinging doors equipped with power operators which are actuated automatically and open into passing pedestrian traffic should be provided with a guard or other device

designed to prevent pedestrians from stepping in the swing area of the door. These guards or devices should be detectable by blind persons. For example, inverted U-shaped guards should have an additional rail at a height not more than 680 mm so that it is detectable by the long cane. These doors should also have a device (mat or other sensor) on the swing side to prevent the door from opening if someone is standing in the swing area.

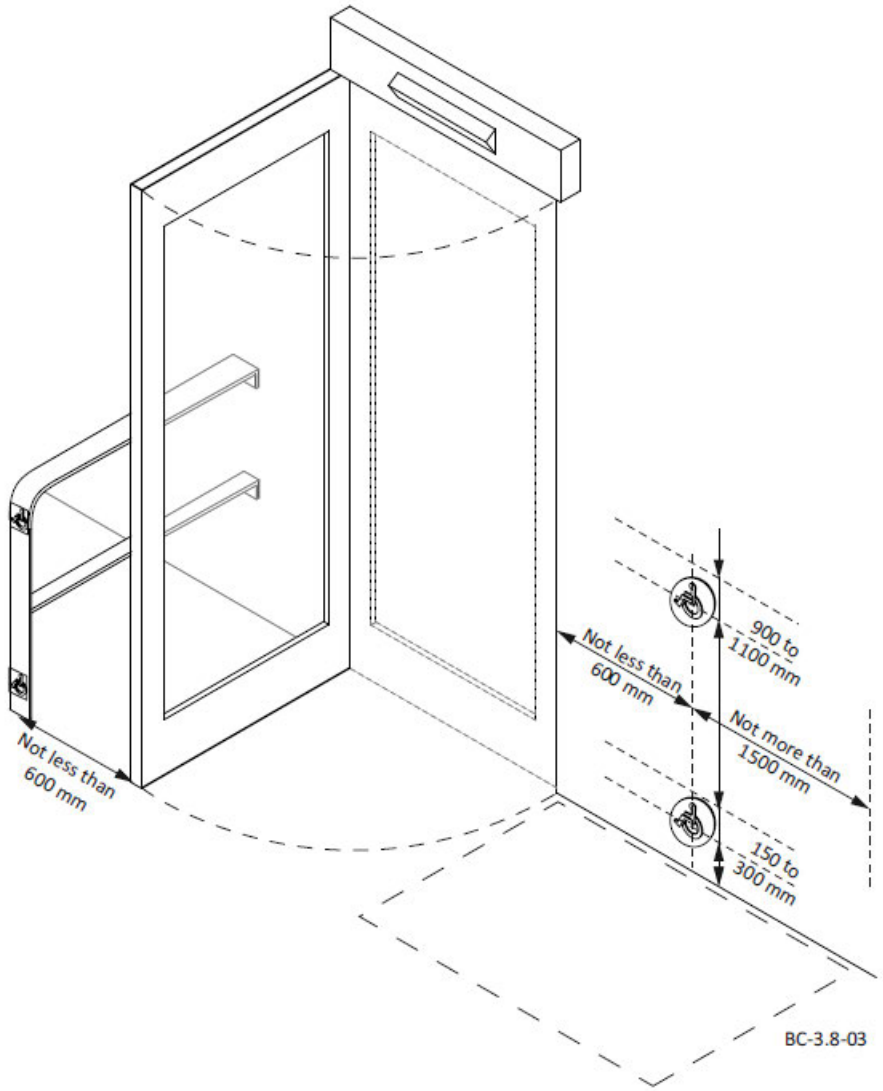


Figure A-3.8.3.6.(6) and (7)
Power operated doors

A-3.8.3.9.(3) Tactile Walking Surface Indicators. Figure 3.8.3.9.(3) illustrates acceptable designs of tactile walking surface indicators.

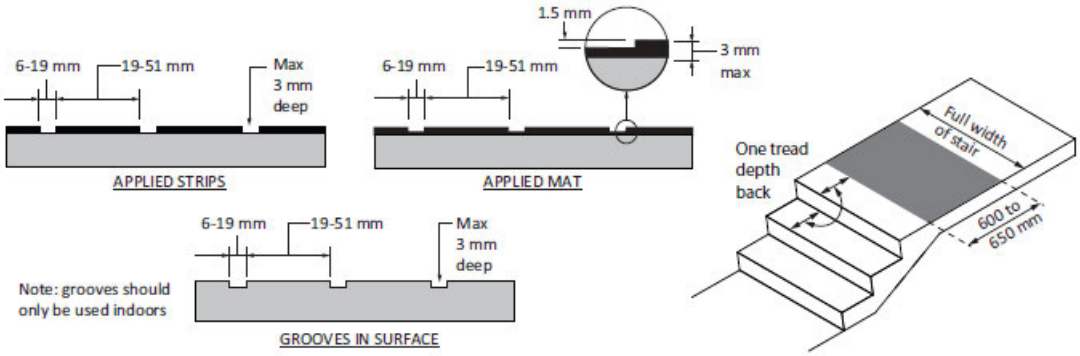


Figure A-3.8.3.9.(3)
Tactile walking surface indicators

Book I – Division B, Part 4 Changes

Table 4.1.2.1. Importance Categories for Buildings
Rev.: 12630 - Eff.Date: 2020Jul01

Table 4.1.2.1.
Importance Categories for Buildings
Forming Part of Sentence 4.1.2.1.(3)

Use and Occupancy	Importance Category
Buildings that represent a low direct or indirect hazard to human life in the event of failure, including: • low human-*occupancy buildings*, where it can be shown that collapse is not likely to cause injury or other serious consequences • minor storage *buildings*	Low(1)
All *buildings* except those listed in Importance Categories Low, High and Post-disaster	Normal
Buildings that are likely to be used as post-disaster shelters, including *buildings* whose primary use is: • as an elementary, middle or secondary school • as a community centre • Manufacturing and storage facilities containing toxic, explosive or other hazardous substances in sufficient quantities to be dangerous to the public if released(1)	High

Post-disaster buildings are *buildings* that are essential to the provision of services in the event of a disaster, and include:
• hospitals, emergency treatment facilities and blood banks
• telephone exchanges
• power generating stations and electrical substations
• control centres for air, land and marine transportation
• public water treatment and storage facilities, and pumping stations
• *sewage* treatment facilities and *buildings* having critical national defence functions
• *buildings* of the following types, unless exempted from this designation by the *Chief Building Official*:(2)
  ○ emergency response facilities
  ○ fire, rescue and police stations, and housing for vehicles, aircraft or boats used for such purposes
  ○ communications facilities, including radio and television stations
	Post-disaster

Notes to Table 4.1.2.1.:
(1) See Note A-Table 4.1.2.1.
(2) See Note A-1.4.1.2.(1), Post-disaster Buildings, in Division A.

Table 4.1.6.10 Arch Roofs, Curved Roofs and Domes
Rev.: 12630 - Eff.Date: 2020Jul01

3) For arch roofs with a slope at the edge ae ≤ 30° (See Figure 4.1.6.10.-A and Table 4.1.6.10.), Ca shall be
a) taken as θ on the upwind side of the peak, and

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4.1.8.3. General Requirements

1) Except as provided in Sentence (9), the *building* shall be designed to meet the requirements of this Subsection and of the design standards referenced in Section 4.3.

2) Structures shall be designed with a clearly defined load path, or paths, that will transfer the inertial forces generated in an earthquake to the supporting ground.

3) The structure shall have a clearly defined Seismic Force Resisting System(s) (SFRS), as defined in Article 4.1.8.2.

4) The SFRS shall be designed to resist 100% of the earthquake loads and their effects. (See Note A-4.1.8.3.(4).)

5) All structural framing elements not considered to be part of the SFRS must be investigated and shown to behave elastically or to have sufficient non-linear capacity to support their gravity loads while undergoing earthquake-induced deformations calculated from the deflections determined in Article 4.1.8.13.

6) Stiff elements that are not considered part of the SFRS, such as concrete, masonry, brick or precast walls or panels, shall be

a) separated from all structural elements of the *building* such that no interaction takes place as the *building* undergoes deflections due to earthquake effects as calculated in this Subsection, or

b) made part of the SFRS and satisfy the requirements of this Subsection.

(See Note A-4.1.8.3.(6).)

7) Stiffness imparted to the structure from elements not part of the SFRS, other than those described in Sentence (6), shall not be used to resist earthquake deflections but shall be accounted for

a) in calculating the period of the structure for determining forces if the added stiffness decreases the fundamental lateral period by more than 15%,

b) in determining the irregularity of the structure, except the additional stiffness shall not be used to make an irregular SFRS regular or to reduce the effects of torsion (See Note A-4.1.8.3.(7)(b) and (c).), and

c) in designing the SFRS if inclusion of the elements not part of the SFRS in the analysis has an adverse effect on the SFRS (See Note A-4.1.8.3.(7)(b) and (c).).

8) Structural modelling shall be representative of the magnitude and spatial distribution of the mass of the *building* and of the stiffness of all elements of the SFRS, including stiff elements that are not separated in accordance with Sentence 4.1.8.3.(6), and shall account for

a) the effect of cracked sections in reinforced concrete and reinforced masonry elements,

b) the effect of the finite size of members and joints,

c) sway effects arising from the interaction of gravity loads with the displaced configuration of the structure, and

d) other effects that influence the lateral stiffness of the *building*.

(See Note A-4.1.8.3.(8).)

9) Notwithstanding the requirement stated in Sentence 4.3.1.1.(1), Update 1 to CSA O86-14 is not permitted to be used in the application of Subsection 4.1.8.

Rev.: 12715 - Eff.Date: 2020Jul01

4.1.8.9. SFRS Force Reduction Factors, System Overstrength Factors, and General Restrictions

1) Except as provided in Sentence 4.1.8.20.(7), the values of R_d and R_o and the corresponding system restrictions shall conform to Table 4.1.8.9. and the requirements of this Subsection.
2) When a particular value of R_d is required by this Article, the corresponding R_o shall be used.
3) For combinations of different types of SFRS acting in the same direction in the same *storey*, R_dR_o shall be taken as the lowest value of R_dR_o corresponding to these systems.
4) For vertical variations of R_dR_o, excluding rooftop structures not exceeding two *storeys* in height whose weight is less than the greater of 10% of W and 30% of W_i of the level below, the value of R_dR_o used in the design of any *storey* shall be less than or equal to the lowest value of R_dR_o used in the given direction for the *storeys* above, and the requirements of Sentence 4.1.8.15.(6) must be satisfied. (See Note A-4.1.8.9.(4).)
5) If it can be demonstrated through testing, research and analysis that the seismic performance of a structural system is at least equivalent to one of the types of SFRS mentioned in Table 4.1.8.9., then such a structural system will qualify for values of R_d and R_o corresponding to the equivalent type in that Table. (See Note A-4.1.8.9.(5).)

Table 4.1.8.9.
SFRS Ductility-Related Force Modification Factors, R_d, Overstrength-Related Force Modification Factors, R_o, and General Restrictions(1)
Forming Part of Sentence 4.1.8.9.(1)

Type of SFRS	R_d	R_o	Restrictions(2)				
			Cases Where $I_EF_aS_a(0.2)$				Cases Where $I_EF_vS_a(1.0)$
			< 0.2	≥ 0.2 to < 0.35	≥ 0.35 to ≤ 0.75	> 0.75	> 0.3
Steel Structures Designed and Detailed According to CSA S16(3)(4)							
Ductile moment-resisting frames	5.0	1.5	NL	NL	NL	NL	NL
Moderately ductile moment-resisting frames	3.5	1.5	NL	NL	NL	NL	NL
Limited ductility moment-resisting frames	2.0	1.3	NL	NL	60	30	30
Moderately ductile concentrically braced frames							
Tension-compression braces	3.0	1.3	NL	NL	40	40	40
Tension only braces	3.0	1.3	NL	NL	20	20	20
Limited ductility concentrically braced							

frames							
Tension-compression braces	2.0	1.3	NL	NL	60	60	60
Tension only braces	2.0	1.3	NL	NL	40	40	40
Ductile buckling-restrained braced frames	4.0	1.2	NL	NL	40	40	40
Ductile eccentrically braced frames	4.0	1.5	NL	NL	NL	NL	NL
Ductile plate walls	5.0	1.6	NL	NL	NL	NL	NL
Limited ductility plate walls	2.0	1.5	NL	NL	60	60	60
Conventional construction of moment-resisting frames, braced frames or plate walls							
Assembly occupancies	1.5	1.3	NL	NL	15	15	15
Other *occupancies*	1.5	1.3	NL	NL	60	40	40
Other steel SFRS(s) not defined above	1.0	1.0	15	15	NP	NP	NP
Concrete Structures Designed and Detailed According to CSA A23.3							
Ductile moment-resisting frames	4.0	1.7	NL	NL	NL	NL	NL
Moderately ductile moment-resisting frames	2.5	1.4	NL	NL	60	40	40
Ductile coupled walls	4.0	1.7	NL	NL	NL	NL	NL
Moderately ductile coupled walls	2.5	1.4	NL	NL	NL	60	60
Ductile partially coupled walls	3.5	1.7	NL	NL	NL	NL	NL
Moderately ductile partially coupled walls	2.0	1.4	NL	NL	NL	60	60
Ductile shear walls	3.5	1.6	NL	NL	NL	NL	NL
Moderately ductile shear walls	2.0	1.4	NL	NL	NL	60	60
Conventional construction							
Moment-resisting frames	1.5	1.3	NL	NL	20	15	10[(5)]
Shear walls	1.5	1.3	NL	NL	40	30	30
Two-way slabs without beams	1.3	1.3	20	15	NP	NP	NP
Tilt-up construction							
Moderately ductile walls and frames	2.0	1.3	30	25	25	25	25

Limited ductility walls and frames	1.5	1.3	30	25	20	20	20[6]
Conventional walls and frames	1.3	1.3	25	20	NP	NP	NP
Other concrete SFRS(s) not listed above	1.0	1.0	15	15	NP	NP	NP
Timber Structures Designed and Detailed According to CSA O86							
Shear walls							
Nailed shear walls: wood-based panel	3.0	1.7	NL	NL	30	20	20
Shear walls: wood-based and gypsum panels in combination	2.0	1.7	NL	NL	20	20	20
Braced or moment-resisting frames with ductile connections							
Moderately ductile	2.0	1.5	NL	NL	20	20	20
Limited ductility	1.5	1.5	NL	NL	15	15	15
Other wood- or gypsum-based SFRS(s) not listed above	1.0	1.0	15	15	NP	NP	NP
Moderately ductile cross-laminated timber shear walls: platform-type construction	2.0	1.5	30	30	30	20	20
Limited ductility cross-laminated timber shear walls: platform-type construction	1.0	1.3	30	30	30	20	20
Masonry Structures Designed and Detailed According to CSA S304							
Ductile shear walls	3.0	1.5	NL	NL	60	40	40
Moderately ductile shear walls	2.0	1.5	NL	NL	60	40	40
Conventional construction							
Shear walls	1.5	1.5	NL	60	30	15	15
Moment-resisting frames	1.5	1.5	NL	30	NP	NP	NP
Unreinforced masonry	1.0	1.0	30	15	NP	NP	NP
Other masonry SFRS(s) not listed above	1.0	1.0	15	NP	NP	NP	NP
Cold-Formed Steel Structures Designed and Detailed According to CSA S136							
Shear walls							
Screw-connected shear walls – wood-	2.5	1.7	20	20	20	20	20

based panels							
Screw-connected shear walls – wood-based and gypsum panels in combination	1.5	1.7	20	20	20	20	20
Diagonal strap concentrically braced walls							
Limited ductility	1.9	1.3	20	20	20	20	20
Conventional construction	1.2	1.3	15	15	NP	NP	NP
Other cold-formed SFRS(s) not defined above	1.0	1.0	15	15	NP	NP	NP

Notes to Table 4.1.8.9.:
(1) See Article 4.1.8.10.
(2) NP = system is not permitted.
NL = system is permitted and not limited in height as an SFRS.
Numbers in this Table are maximum height limits above *grade*, in m.
Height may be limited in other Parts of the By-law.
The most stringent requirement governs.
(3) Higher design force levels are prescribed in CSA S16 for some heights of *buildings*.
(4) See Note A-Table 4.1.8.9.
(5) Frames limited to a maximum of 2 *storeys*.
(6) Frames limited to a maximum of 3 *storeys*.

4.1.8.10. Additional System Restrictions

Rev.: 12683, 12715 - Eff.Date: 2020Jul01

1) Except as required by Clause (2)(b), structures with a Type 6 irregularity, Discontinuity in Capacity – Weak *Storey*, as described in Table 4.1.8.6., are not permitted unless $I_E F_a S_a(0.2)$ is less than 0.2 and the forces used for design of the SFRS are multiplied by $R_d R_o$.

2) *Post-disaster buildings* shall

a) not have any irregularities conforming to Types 1, 3, 4, 5, 7 and 9 as described in Table 4.1.8.6., in cases where $I_E F_a S_a(0.2)$ is equal to or greater than 0.35,

b) not have a Type 6 irregularity as described in Table 4.1.8.6.,

c) have an SFRS with an R_d of 2.0 or greater, and

d) have no *storey* with a lateral stiffness that is less than that of the *storey* above it.

3) For *buildings* having fundamental lateral periods, T_a, of 1.0 s or greater, and where $I_E F_v S_a(1.0)$ is greater than 0.25, shear walls that are other than wood-based and form part of the SFRS shall be continuous from their top to the *foundation* and shall not have irregularities of Type 4 or 5 as described in Table 4.1.8.6.

4) For buildings constructed with more than 4 storeys of continuous wood construction and where $I_E F_a S_a(0.2)$ is equal to or greater than 0.35, timber SFRS consisting of shear walls with wood-based panels or of braced or moment-resisting frames as defined in Table 4.1.8.9. within the continuous wood construction shall not have Type 4 or Type 5 irregularities as described in Table 4.1.8.6. (See Note A-4.1.8.10.(4) and (5)).

5) For *buildings* constructed with more than 4 *storeys* of continuous wood construction and where $I_E F_a S_a(0.2)$ is equal to or greater than 0.35, timber SFRS consisting of moderately ductile cross-laminated timber shear walls, platform-type construction, or limited ductility cross-laminated timber

shear walls, platform-type construction, as defined in Table 4.1.8.9. within the continuous wood construction shall not have Type 4, 5, 6, 8, 9 or 10 irregularities as described in Table 4.1.8.6. (See Note A-4.1.8.10.(4) and (5)).

6) The ratio, α, for a Type 9 irregularity as described in Table 4.1.8.6. shall be determined independently for each orthogonal direction using the following equation:

$$\alpha = Q_G / Q_y$$

where

Q_G = gravity-induced lateral demand on the SFRS at the critical level of the yielding system, and

Q_y = the resistance of the yielding mechanism required to resist the minimum earthquake loads, which need not be taken as less than R_o multiplied by the minimum lateral earthquake force as determined in Article 4.1.8.11. or 4.1.8.12., as appropriate.

(See Note A-4.1.8.10.(5).)

7) For *buildings* with a Type 9 irregularity as described in Table 4.1.8.6. and where $I_E F_a S_a(0.2)$ is equal to or greater than 0.5, deflections determined in accordance with Article 4.1.8.13. shall be multiplied by 1.2.

8) Structures where the value of , as determined in accordance with Sentence (5), exceeds twice the limits specified in Table 4.1.8.6. for a Type 9 irregularity, and where $I_E F_a S_a(0.2)$ is equal to or greater than 0.5 are not permitted unless determined to be acceptable based on non-linear dynamic analysis studies. (See Note A-4.1.8.10.(7).)

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4.3.1.1. Design Basis for Wood

1) Except as provided in Sentence (2), *buildings* and their structural members made of wood shall conform to CSA O86, "Engineering Design in Wood," incorporating Update 1 to the original 2014 Standard. (See also the applicable row in Table 1.3.1.2.)

2) *Buildings* or parts of *buildings* of *encapsulated mass timber construction* and their structural members made of wood shall conform to CSA O86, "Engineering Design in Wood ." (See also the applicable row in Table 1.3.1.2.)

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[Revise the noted rows in Table 4.5.1.1. as follows:]

4.1.8.10. Additional System Restrictions	
(1)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(2)	(a) [F20-OP2.3] [F22-OP2.4]
	(b) [F20-OP2.3] [F22-OP2.4]
	(c) [F20-OP2.3] [F22-OP2.4]
	(d) [F20-OP2.3] [F22-OP2.4]
(3)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(4)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(5)	[F20-OS2.1]
	[F20-OP2.1] [F22-OP2.4]
(7)	[F22-OS2.3,OS2.4]
	[F22-OP2.3,OP2.4]
(8)	[F22-OS2.1]
	[F20-OP2.1] [F22-OP2.4]

4.3.1.1. Design Basis for Wood	
(1)	[F22,F21,F80-OH4]
	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F21,F22-OP2.4] [F80-OP2.3,OP2.4]
(2)	[F22,F21,F80-OH4]
	[F20-OS2.1] [F80-OS2.3]
	[F20-OP2.1] [F21,F22-OP2.4] [F80-OP2.3,OP2.4]

Book I – Division B, Part 6 Changes

Rev.: 12683 - Eff.Date: 2020Jul01

6.2.1.2. Outdoor Design Conditions

1) The outdoor conditions to be used in designing heating, ventilating and air-conditioning systems shall be determined in conformance with Subsection 1.1.3.
(See Note A-6.2.1.2.(1).)

2) Reserved.

3) Reserved.

Rev.: 12683 - Eff.Date: 2020Jul01

6.3.2.9. Supply, Return, Intake and Exhaust Air Openings

1) Supply, return and exhaust air openings located less than 2m above the floor in rooms or spaces in *buildings* shall be protected by grilles having openings of a size that will not allow the passage of a 15mm diameter sphere.

2) Outdoor air intakes shall be located so that

a) **reserved**, and

b) they are separated a minimum distance from sources of contaminants in accordance with Table 6.3.2.9.

Table 6.3.2.9.
Minimum Distances of Air Intakes from Sources of Contaminants
Forming Part of Sentence 6.3.2.9.(2)

Source of Contaminants	Minimum Distance of Outdoor Air Intake, m
Garage entry of a garage for 5 or more motor vehicles, automobile loading area and drive-in queue	4.5
Truck loading area or dock, and bus parking	7.6
Driveway, street, and parking space	1.5
Thoroughfare, arterial road, freeway, and highway	7.6
Garbage storage/pick-up area and dumpsters	4.5
Discharge from evaporative cooling tower, evaporative fluid cooler and evaporative condenser	7.6
Sanitary vent	3.5
Kitchen cooking exhaust	3.0
Vent for combustion products	3.0

3) Outdoor air intakes shall be installed not less than 0.3m above roofs, landscape grades or other surfaces, taking into account anticipated snow accumulation levels.

4) Exterior openings for outdoor air intakes and exhaust outlets shall be shielded from the entry of snow and rain and shall be fitted with corrosion-resistant screens of mesh having openings not larger than 15mm, except where experience has shown that climatic conditions require larger openings to prevent the screen openings from icing over.

5) Screens required in Sentence (4) shall be accessible for maintenance.

6) *Combustible* grilles, diffusers and other devices covering supply, return, intake and exhaust openings shall comply with Article 3.6.5.7.

Rev.: 12512 - Eff.Date: 2020Jan01

6.3.2.15. Evaporative Cooling Towers, Evaporative Fluid Coolers and Evaporative Condensers

(See Article 2.2.11.6. of Division B of Book II (Plumbing Systems) of this By-law.)

1) Discharge from evaporative cooling towers to ventilation air intakes shall comply with
a) Sentence 6.3.2.9.(2), and
b) CAN/CSA-Z317.2, "Special Requirements for Heating, Ventilation, and Air-Conditioning (HVAC) Systems in Health Care Facilities."
2) The distance between the air intakes of evaporative cooling towers, evaporative fluid coolers and evaporative condensers in relation to kitchen exhaust outlets, vegetation or other sources of organic matter shall be not less than 4.6 m.
3) Deleted.
4) Water treatment equipment for biological growth control shall be provided in accordance with Sub-Section
7.6.2. of ASHRAE Guideline12, "Minimizing the Risk of Legionellosis Associated with Building Water Systems."
5) Deleted.
6) Evaporative cooling towers, evaporative fluid coolers and evaporative condensers shall be provided with access ports, service platforms, fixed ladders and restraint connections to allow visual inspection, maintenance and testing.

Rev.: 12512 - Eff.Date: 2020Jul01

6.3.2.16. Evaporative Air Coolers, Misters, Atomizers, Air Washers and Humidifiers

(See Article 2.2.11.7. of Division B of Book II (Plumbing Systems) of this By-law.)

1) The filter and water evaporation medium of every air washer and evaporative air cooler enclosed within a *building* shall be made of *noncombustible* material.
2) Sumps for air washers and evaporative air coolers shall be constructed and installed so that they can be flushed and drained.
3) Evaporative air coolers, misters, atomizers, air washers and humidifiers shall be designed in accordance with Sections 8 and 9 of ASHRAE Guideline 12, "Minimizing the Risk of Legionellosis Associated with Building Water Systems."

Rev.: 12715 - Eff.Date: 2020Jul01

6.4.3.1. Lining or Backing

1) 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*.
2) Every steam or hot water radiator and convector shall be installed so as to conform to the clearance requirements of Table 6.7.1.2.

Rev.: 12683 - Eff.Date: 2020Jul01

6.9.3.1. Carbon Monoxide Alarms

1) This Article applies to every *building* that contains an *assembly occupancy*, a *care occupancy* with individual *suites* or containing sleeping rooms or bed spaces not within a *suite*, a *residential occupancy*, a *business and personal services occupancy*, or a *mercantile occupancy*, and that
a) is served by or contains a fuel-burning *appliance*, or
b) contains a *storage garage*.
2) Carbon monoxide (CO) alarms installed in a *residential occupancy* or a *care occupancy* as required by this Article shall
a) conform to CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"
b) be equipped with an integral alarm that satisfies the audibility requirements of CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"
c) have no disconnect switch between the overcurrent device and the CO alarm, where the CO alarm is powered by the electrical system serving the *suite* (see Note A-6.9.3.1.(2)(c)), and

d) be installed as recommended by the manufacturer.

3) Except as permitted by Sentence (9), where a fuel-burning *appliance* is installed in a *suite* of *residential occupancy* or in a *suite* of *care occupancy*, a CO alarm shall be installed

a) inside each sleeping room or bed space, or

b) outside each sleeping room or bed space, within 5 m of each door serving a sleeping room or bed space, measured following corridors and doorways.

4) Except as permitted by Sentence (9), where a fuel-burning *appliance* serves a *residential occupancy* or a *care occupancy* and is installed in a *service room* that is not in a *suite* of *residential occupancy* nor in a *suite* of *care occupancy*,

a CO alarm shall be installed

a) either inside each sleeping room or bed space, or if outside, within 5 m of each door serving a sleeping room or bed space, measured following corridors and doorways, in every *suite* of *residential occupancy* or *suite* of *care occupancy* that shares a wall or floor/ceiling assembly with the *service room*, and

b) in the *service room*.

5) Except as permitted by Sentence (9), for each *suite* of *residential occupancy* or *suite* of *care occupancy* that shares a wall or floor/ceiling assembly with a *storage garage* or that is adjacent to an attic or crawl space to which the *storage garage* is also adjacent, a CO alarm shall be installed

a) inside each sleeping room or bed space, or

b) outside each sleeping room or bed space, within 5 m of each bedroom door serving a sleeping room or bed space, measured following corridors and doorways.

6) CO alarms installed in an *assembly occupancy*, a *business and personal services occupancy*, or a *mercantile occupancy* as required by this Article shall conform to

a) CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices," notwithstanding the scope of that standard,

b) UL 2034, "Standard for Single and Multiple Station Carbon Monoxide Alarms," notwithstanding the scope of that standard, or

c) good engineering practice.

(See Note A-6.9.3.1.(6).)

7) Except as permitted by Sentence (9), where a fuel-burning *appliance* serves an *assembly occupancy*, *business and personal services occupancy*, or *mercantile occupancy*, a CO alarm shall be,

a) where the fuel-burning *appliance* is part of a system that could circulate or distribute CO to a *suite* of *assembly occupancy*, *business and personal services occupancy* or *mercantile occupancy*, installed

   i) on each *storey* of each *suite* that may be exposed, and

   ii) in a *suite* containing an *assembly major occupancy*, each classroom and dedicated gathering room or space, and

b) installed in the room or space in which the fuel-burning *appliance* is located.

(See Note A-6.9.3.1.(7).)

8) Except as permitted by Sentence (9), for each *suite* of *assembly occupancy*, *business and personal services occupancy*, or *mercantile occupancy* that shares a wall or floor/ceiling assembly with either a *storage garage* or a *service room* containing a fuel-burning *appliance*, or that is adjacent to either an attic or crawl space to which the *storage garage* or a *service room* containing a fuel-burning *appliance* is also adjacent, a CO alarm shall be installed

a) on each *storey* of the adjacent *suite*,

b) where the adjacent *suite* contains an *assembly major occupancy*, each classroom and dedicated room or space, and

c) in each *service room* containing a fuel-burning *appliance*.

(See Note A-6.9.3.1.(8).)

9) CO detectors are permitted to be installed in lieu of CO alarms required by this Article provided the CO detectors
a) sound audible signals within the location they serve, as described in Sentences (3) to (5), (7) and (8),
b) are installed in conformance with CAN/ULC-S524, "Installation of Fire Alarm Systems," and
c) form part of the fire alarm system.

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A-6.2.1.2.(1) Outdoor Design Conditions. In the past, the practice of ventilating buildings with outdoor air assumed that the outdoor air was of better quality than the indoor air. It has become evident that the outdoor air in some areas of Canada may not be of an acceptable quality for ventilating buildings unless certain particles and gases are first removed or reduced. In order to manage the air quality of a building's indoor environment, thus reducing the potential for adverse effects on occupants' health, the quality of outdoor air for building ventilation purposes must be addressed.

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A-6.9.3.1.(2)(c) Carbon Monoxide Alarms. Battery-powered carbon monoxide alarms are acceptable provided that they are installed as recommended by the manufacturer.

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A-6.9.3.1.(6) Carbon Monoxide Devices. Although the scope of CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices," and UL 2034, "Standard for Single and Multiple Station Carbon Monoxide Alarms," is limited to carbon monoxide alarms for residential applications, their use may be appropriate in some other locations where they are not subject to excessive contaminants or risk of damage, such as in classrooms and meeting spaces. The designer is also given the option to follow good engineering practice. For example, some carbon monoxide devices used in storage garages may be suitable for use in other applications.

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A-6.9.3.1.(7) Spaces Served by a Fuel-Burning Appliance. Where a fuel-burning appliance such as a furnace circulates or distributes air to a space there is the potential for leakage of combustion products into the duct system which could then circulate combustion products including carbon monoxide (CO) to that space, so a CO alarm is required to protect occupants of that space. Fuel-burning appliances such as a boiler do not have the same potential of the system circulating or distributing CO to the spaces served via the piping system. In both examples of a fuel-burning furnace and a fuel-burning boiler, a CO alarm is required in the service room containing the appliances.

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A-6.9.3.1.(8) Adjacent Suites. Suites that share a common attic or crawl space with a storage garage or service room, as well as suites that share a common wall or floor/ceiling assembly with a storage garage or service room are considered adjacent for the application of Sentence (8).

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9.5.3.1. Ceiling Heights of Rooms or Spaces

(See Note A-9.5.3.1.)

1) The ceiling heights and clear heights in rooms or spaces in *residential occupancies* shall conform to Table 9.5.3.1.

2) Reserved.

3) Reserved.

4) Areas in rooms or spaces over which ceiling height and clear height are not less than the minimum specified in Table 9.5.3.1. shall be contiguous with the entry or entries to those rooms or spaces.

Table 9.5.3.1.
Room Ceiling Heights
Forming Part of Sentences 9.5.3.1.(1) and (4)

Room or Space	Minimum Ceiling Height, m	Minimum Clear Height, m	Minimum Area Over Which Minimum Ceiling Height Shall Be Provided(1)
Living room or space	2.1		Lesser of area of the space or 10.0 m^2
Dining room or space	2.1		Lesser of area of the space or 5.2 m^2
Kitchen or kitchen space	2.1		Lesser of area of the space or 3.2 m^2
Master bedroom or bedroom space	2.1		Lesser of area of the space or 4.9 m^2
Other bedroom or sleeping space	2.1		Lesser of area of the space or 3.5 m^2
Unfinished *basement* including laundry area therein		2.0	Clear height under beams and in any location that would normally be used for passage
Bathroom, water-closet room or laundry area above *grade*	2.1		Lesser of area of the space or 2.2 m^2
Passage, hall or main entrance vestibule	2.1		Area of the space
Habitable rooms and spaces not specifically mentioned above	2.1		Lesser of area of the space or 2.2 m^2

Notes to Table 9.5.3.1.:

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

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9.7.4.2. Standards

1) Except as permitted by Sentence (2) and Article 9.7.4.3., windows, doors and skylights and their components shall conform to

a) AAMA/WDMA/CSA 101/I.S.2/A440, “NAFS – North American Fenestration Standard/Specification for
Windows, Doors, and Skylights” (Harmonized Standard), and
b) CSA A440S1, “Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS – North American
Fenestration Standard/Specification for Windows, Doors, and Skylights”.
(See Note A-9.7.4.2.(1).)

2) A door designated as a “Limited Water” door in accordance with the standard referenced in Clause (1)(a)
shall not be used unless the door

a) separates a *dwelling unit* from an unconditioned *storage garage* or a carport,
b) is designed
    i) with a clear width in conformance with Sentence 3.8.3.6.(2),
    ii) to not open onto a step,
    iii) with door-operating devices in conformance with Sentence 3.8.3.6.(4),
    iv) with a clear and level space for power operated doors in conformance with Clause 3.8.3.6.(4)(c) or for other doors, with a clear and level space in conformance with Sentence 3.8.3.6.(11), and
    v) with a door closure in conformance with Sentence 3.8.3.6.(10, or
c) is not required by Sentence 9.27.3.8.(3) to have flashing installed.

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9.8. Stairs, Ramps, Landings, Handrails and Guards

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

1) Where stairs, ramps, landings, handrails or guards are installed in garages that serve a single dwelling unit or a principal dwelling unit with *ancillary residential unit* including their common spaces, the garage shall be considered to be part of the dwelling unit and the requirements for stairs, ramps, landings, handrails and guards within dwelling units shall apply.

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9.8.2.2. Height over Stairs

1) The clear height over stairs shall be measured vertically, over the clear width of the stair, from a straight line tangent to the tread and landing nosings to the lowest point above. (See Note A-3.4.3.4. and Note A-9.5.3.1.)

2) Except as provided in Sentence (3), the clear height over stairs shall not be less than 2 050 mm.

3) The clear height over stairs serving a single *dwelling unit* shall not be less than 1 950 mm.

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9.8.4.1. Dimensions for Risers

(See Note A-9.8.4.)

1) Except for stairs serving areas only used as *service rooms* or *service spaces*, the rise, which is measured as the vertical nosing-to-nosing distance, shall comply with Table 9.8.4.1.

Table 9.8.4.1.
Rise for Rectangular Treads and Tapered Treads (Including Winders)
Forming Part of Sentence 9.8.4.1.(1)

Stair Type	Rectangular Treads *and Tapered Treads* (Including Winders)

	Rise, mm	
	Max.	Min.
Private(1)	200	125
Public(2)	180	125

Notes to Table 9.8.4.1.:
(1) Private stairs are exterior and interior stairs that serve
a) single *dwelling units*,
b) **deleted**, or
c) garages that serve houses described in Clause (a) or (b).
(2) Public stairs are all stairs not described as service stairs or private stairs.

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9.8.4.2. Dimensions for Rectangular Treads

1) Except for stairs serving areas only used as *service rooms* or *service spaces*, the *run* shall comply with Table 9.8.4.2.

Table 9.8.4.2.
Run for Rectangular Treads
Forming Part of Sentence 9.8.4.2.(1)

Stair Type	Rectangular Treads	
	***Run*, mm**	
	Max.	Min.
Private(1)	355	255
Public(2)	No limit	280

Notes to Table 9.8.4.2.:
(1) Private stairs are exterior and interior stairs that serve
a) single *dwelling units*,
b) **deleted**, or
c) garages that serve houses described in Clause (a) or (b).
(2) Public stairs are all stairs not described as service stairs or private stairs.

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9.8.5.3. Height over Ramps

1) The clear height over ramps shall be not less than 2 050 mm.

2) Deleted.

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9.8.6.2. Required Landings

1) Except as provided in Sentences (2) to (4) and Sentence 9.9.6.6.(2), a landing shall be provided
a) at the top and bottom of each *flight* of interior and exterior stairs, including stairs in garages,
b) at the top and bottom of every ramp with a slope greater than 1 in 50,
c) where a doorway opens onto a stair or ramp,
d) where a ramp opens onto a stair, and
e) where a stair opens onto a ramp.

2) Where a door at the top of a stair within a *dwelling unit* swings away from the stair, no landing is required between the doorway and the stair.

3) A landing may be omitted at the top of an exterior *flight* serving a secondary entrance to a single *dwelling unit*, provided

a) the stair does not contain more than 3 risers,

b) the principal door is a sliding door or swings away from the stair, and

c) only a storm or screen door, if any, swings over the stair and is equipped with hardware to hold it open.

4) A landing may be omitted at the bottom of an exterior stair or ramp provided there is no obstruction, such as a gate or door, within the lesser of the width of the stair or ramp or

a) 900 mm for stairs or ramps serving a single *dwelling unit*, and

b) 1 100 mm for stairs or ramps not described in Clause (a).

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9.9.3.3. Width of Corridors

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

2) Deleted.

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9.9.3.4. Clear Height

1) Except for stairways, doorways and *storage garages*, the minimum clear height in *exits* and *access to exits* shall be 2.1 m. (See Article 9.8.2.2. for stairs, Article 9.8.5.3. for ramps, Article 9.8.6.4. for landings and Article 9.9.6.2. for doorways.)

2) Deleted.

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9.9.4.2. Fire Separations for Exits

1) Except as provided in Sentences (2) and (5) and Article 9.9.8.5., every *exit* other than an exterior doorway shall be separated from each adjacent *floor area* or from another *exit*

a) where there is a floor assembly above the *floor area*, by a *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly above the *floor area* (See Article 9.10.9.10.), and

b) where there is no floor assembly above the *floor area*, by a *fire separation* having a *fire-resistance rating* not less than the greater of

i) that required by Subsection 9.10.8. for the floor assembly below, or

ii) 45 min.

2) Deleted.

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

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

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

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9.9.6.2. Clear Opening Height at Doorways

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

a) *exit* doors,
b) doors that open into or are located within a *public corridor*, and
c) doors that open into or are located within another facility that provides *access to exit* from a *suite*.

2) Doorways serving only a single dwelling unit need not comply with Sentences (1) and (2). (See also Article 9.5.5.1.)

3) Deleted.

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9.9.6.3. Clear Opening Width at Doorways

1) Except as provided in Sentence (4), the clear opening width of doorways shall comply with Sentence (2) at
a) *exit* doors, and
b) doors that open into or are located within a *public corridor* or other facility that provides *access to exit* from a *suite*.

2) Doorways described in Sentence (1) shall be
a) not less than 800 mm wide where there is only one door leaf,
b) not less than 800 mm wide where multiple-leaf doors are installed with only one active leaf having a latching mechanism described in Article 9.9.6.7., and
c) not less than 1 210 mm wide where multiple-leaf doors are installed with two active leaves.

3) In doorways described in Sentence (1) that have multiple-leaf doors installed,
a) no active leaf shall be less than 810 mm wide where only one leaf is active, and
b) no single leaf shall be less than 610 mm wide where two leaves are active.

4) Doorways serving only a single dwelling unit need not comply with Sentence (2). (See also Article 9.5.5.1.)

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

1) Except as required by Sentences (2) and (3) an *access to exit* shall be provided from every roof intended for occupancy and from every podium, terrace, platform or contained open space.

2) Except as required by Sentence (3), *means of egress* at the roof level, designed in conformance with the requirements for *exits* shall be provided from an *occupancy* on a roof serving more than a single *dwelling unit*.

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

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9.9.9.2 Two Separate Exits

1) Except as provided in Sentence 9.9.7.3.(1), where an egress door from a *dwelling unit* opens onto a *public corridor* or exterior passageway it shall be possible from the location where the egress door opens onto the corridor or exterior passageway to go in opposite directions to 2 separate *exits* unless the *dwelling unit* has a second and separate *means of egress*.

2) Deleted.

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9.9.9.3 Shared Egress Facilities

1) A *dwelling unit* shall be provided with a second and separate *means of egress* where an egress door from the *dwelling unit* opens onto
a) an *exit* stairway serving more than one *suite*,
b) a *public corridor*
    i) serving more than one *suite*, and

ii) served by a single *exit*,

c) an exterior passageway

i) serving more than one *suite*,

ii) served by a single *exit* stairway or ramp, and

iii) more than 1.5 m above adjacent ground level, or

d) a balcony

i) serving more than one *suite*,

ii) served by a single *exit* stairway or ramp, and

iii) more than 1.5 m above adjacent ground level.

2) Deleted.

3) Deleted.

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9.10.3.1 Fire-Resistance and Fire-Protection Ratings

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

2) Deleted.

3) Deleted.

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9.10.4.4. Roof-Top Enclosures

1) A roof-top enclosure shall not be considered as a *storey* in calculating the *building height* if the roof-top enclosure is provided for

a) elevator machinery,

b) a *service room*,

c) a stairway used for no purpose other than for access or egress,

d) an elevator lobby used for no purpose other than for access or egress, or

e) a combination thereof.

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9.10.8.8. Floors of Exterior Passageways

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

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

3) No *fire-resistance rating* is required for floors of exterior passageways serving

a) **reserved**,

b) a single *dwelling unit* where no *suite* is located above or below the *dwelling unit* (see also Sentence 9.9.9.3.(2)).

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9.10.8.10. Application to Houses

1) Table 9.10.8.1. does not apply to

a) a *dwelling unit* that has no other *dwelling unit* above or below it,

b) **deleted**, or

c) a *dwelling unit* that is not above or below another *major occupancy*.

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9.10.9.1. Application

1) This Subsection applies to

a) *fire separations* required between rooms and spaces in *buildings*, except between rooms and spaces within a *dwelling unit*, and

b) **reserved.**

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9.10.9.2. Continuous Barrier

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

2) Reserved.

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

4) All gypsum board joints in the assemblies described in Sentence (1) shall conform to CSA A82.31-M, "Gypsum Board Application," and penetrations in these assemblies shall be sealed using flexible sealant or tape to maintain the integrity over the entire surface.

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9.10.9.3. Openings to be Protected with Closures

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

2) Deleted.

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9.10.9.14. Separation of Residential Suites

1) Except as provided in Sentences (2) and (3) and Article 9.10.21.2., *suites* in *residential occupancies* shall be separated from adjacent rooms and *suites* by a *fire separation* having a *fire-resistance rating* of not less than 45 min.

2) Sleeping rooms in boarding and lodging houses where sleeping accommodation is provided for not more

than 8 boarders or lodgers need not be separated from the remainder of the *floor area* as required in Sentence (1) where the sleeping rooms form part of the proprietor's residence and do not contain cooking facilities.

3) *Dwelling units* that contain 2 or more *storeys* including *basements* shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of not less than 1 h. (See Note A-3.3.4.4.(1).)

4) Deleted.

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9.10.9.15. Separation of Public Corridors

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

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

a) the *floor area* is *sprinklered*,

b) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.9.(3), and

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

3) In other than *residential occupancies*, no *fire separation* is required between a *public corridor* and the remainder of the *building* if

a) the *floor area* is *sprinklered*,

b) the sprinkler system is electrically supervised in conformance with Sentence 3.2.4.9.(3),
c) the operation of the sprinkler system will cause a signal to be transmitted to the fire department in conformance with Sentence 3.2.4.7.(4), and
d) the corridor exceeds 5 m in width.

4) Deleted.

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9.10.10.4. Location of Fuel-Fired Appliances

1) Except as provided in Sentences (2) and (3) and Article 9.10.10.5., fuel-fired *appliances* shall be located in a *service room* separated from the remainder of the *building* by a *fire separation* having not less than a 1 h *fire-resistance rating*.

2) Except as required in the *appliance* installation standards referenced in Sentences 6.2.1.5.(1), 9.33.5.2.(1) and 9.33.5.3.(1), fuel-fired *space-heating appliances*, space-cooling *appliances*, *service water heaters* and laundry *appliances* need not be separated from the remainder of the *building* as required in Sentence (1), where the *appliances* serve

a) where the *appliances* serve
   i) not more than one room or *suite*, or
   ii) a *building* with a *building area* of not more than 400 m^2 and a *building height* of not more than 2 *storeys*, or

b) where the *appliances*
   i) serve a principal *dwelling unit*, ancillary residential unit, or their common spaces, and
   ii) are located in a *service room* separated from the *dwelling units* or their common spaces by a *fire separation* having a *fire-resistance rating* not less than the *fire-resistance rating* required for the *fire separation* between the *dwelling units* or common spaces.

3) Sentence (1) does not apply to fireplaces and cooking *appliances*.

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9.10.11.2. Firewalls Not Required

1) A *party wall* on a property line of a *building* of *residential occupancy* need not be constructed as a *firewall*, provided it is constructed as a *fire separation* having not less than a 1 h *fire-resistance rating*, where the *party wall* separates

a) two *dwelling units* where there is no *dwelling unit* above another *dwelling unit*,
b) a *dwelling unit* and a house with a *secondary suite* including their common spaces, or
c) two houses with a *secondary suite* including their common spaces.

2) Reserved.

3) The wall described in Sentence (1) shall provide continuous protection from the top of the footings to the
underside of the roof deck.

4) Any space between the top of the wall described in Sentence (1) and the roof deck shall be tightly filled with mineral wool or *noncombustible* material.

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9.10.15.1. Application

1) This Subsection applies to

a) residential *buildings* containing not more than two principal *dwelling units* where no principal *dwelling unit*, including their *contained ancillary residential unit*, is above another *dwelling unit* or *occupancy*.

b) accessory *buildings* that serve a *building* described in Clause (a).

9.10.16.3. Fire Block Materials

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1) Except as permitted by Sentences (2) and (3), *fire blocks* shall be constructed of materials that will remain in place and prevent the passage of flames for not less than 15 min when subjected to the standard fire exposure in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials."

2) *Fire blocks* are deemed to comply with Sentence (1) if they are constructed of not less than

a) 0.38 mm sheet steel,

b) 12.7 mm gypsum board,

c) 12.5 mm plywood, OSB or waferboard, with joints having continuous supports,

d) 2 layers of 19 mm lumber with joints staggered, or

e) 38 mm lumber.

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

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

b) is securely fastened to one set of studs,

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

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

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

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9.10.19.1. Required Smoke Alarms

1) Except as permitted by Article 9.10.19.8., *smoke alarms* conforming to CAN/ULC-S531, "Standard for
Smoke Alarms," shall be installed in

a) each *dwelling unit*, and

b) each sleeping room not within a *dwelling unit*, and

c) **deleted**.

2) All *smoke alarms* installed in *dwelling units* in unsprinklered *buildings* shall be equipped with a battery powered back up system and a wired in manually operated device which is capable of silencing a *smoke alarm* signal for a period of not more than 10 minutes and re-sounding the signal if smoke levels in the vicinity trigger the *smoke alarm*.

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9.10.19.5. Interconnection of Smoke Alarms

1) Where more than one *smoke alarm* is required in a *dwelling unit*, the *smoke alarms* shall be interconnected so that the actuation of one alarm will cause all alarms within the *dwelling unit* to sound.

2) Deleted.

3) Deleted.

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9.10.20.1. Windows or Access Panels Required

1) Except as provided in Sentence (3), a window or access panel providing an opening not less than 1 100 mm high and 550 mm wide and having a sill height of not more than 900 mm above the floor shall be provided on the second and third *storeys* of every *building* in at least one wall facing on a *street* if such *storeys* are not *sprinklered*.

2) Access panels required in Sentence (1) shall be readily openable from both inside and outside or be glazed with plain glass.

3) Access panels required in Sentence (1) need not be provided in
a) *buildings* containing only *dwelling units* where there is no *dwelling unit* above another *dwelling unit*, or
b) **deleted**.

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9.11.1.1 Required Protection

1) Except as provided in Sentences (3) and (4), a *dwelling unit* shall be separated from every other space in a *building* in which noise may be generated by
a) a separating assembly and adjoining constructions, which together provide an *apparent sound transmission class (ASTC)* rating of not less than 47, or
b) a separating assembly providing a *sound transmission class (STC)* rating of not less than 50 and adjoining constructions that conform to Article 9.11.1.4.
(See Note A-9.11.1.4.)

2) Deleted.

3) Construction separating a *dwelling unit* from an elevator shaft or refuse chute shall have an STC rating of not less than 55.

4) A *dwelling unit* in a *building* containing not more than 1 or 2 primary *dwelling units*, need not be separated from an adjoining storage garage containing not more than five stalls, provided that the adjoining separating assemblies are provided with exterior sheathing and at least 89 mm of insulation.

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9.13.4.2 Protection from Soil Gas Ingress

1) All wall, roof and floor assemblies separating *conditioned space* from the ground shall be protected by an *air barrier system* conforming to Subsection 9.25.3.

2) Except as permitted by Sentence (4), unless the space between the *air barrier system* and the ground is designed to be accessible for the future installation of a subfloor depressurization system, *dwelling units* and *buildings* containing *residential occupancies* shall be provided with the rough-in for a radon extraction system conforming to Article 9.13.4.3.

3) Except as permitted by Sentence (4), where *buildings* are used for *occupancies* other than those described in Sentence (2) and are intended to be occupied on average for greater than 4 hours within a 24 hour period, protection from radon ingress and the means to address high radon concentrations in the future shall conform to
a) Article 9.13.4.3., or
b) Parts 5 and 6 (See Article 5.4.1.1. and 6.2.1.1.).
(See Note A-9.13.4.2.(3).)

4) Locations requiring radon rough-ins shall be determined in accordance with Article 1.1.3.3. of Division B.

5) *Buildings* described in Clause 9.16.2.1.(2)(b) need not conform to Sentence (3).

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9.32.1.1 Application

1) Except as required by Article 9.32.4.2., this Section applies to the ventilation of rooms and spaces in residential occupancies by natural ventilation and to self-contained mechanical ventilation systems serving only one dwelling unit.

2) Mechanical ventilation systems other than self-contained systems serving a *single dwelling unit* shall conform to Part 6.

3) A storage garage for more than 5 motor vehicles shall be ventilated in accordance with Part 6.

4) Systems used for ventilation shall conform to the energy efficiency requirements in Part 10.

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9.32.3.4. Ventilation System Supply Air

(See Note A-9.32.3.4.)

1) Except as provided in Sentence (6), a principal ventilation system shall mechanically provide supply air in accordance with Sentence (2), (3), (4) or (5).

2) Where the principal ventilation system is a ducted forced-air heating system, the ducted forced-air heating system shall

a) provide supply air through the ducting to

i) each bedroom, and

ii) each floor level without a bedroom,

b) draw supply air from an outdoor inlet that is connected to the cabinet containing the furnace air circulating fan required by Clause (d) by ducting that measures, from that cabinet to the point at which the ducting intersects the return air plenum,

i) between 3 m and 4.5 m in length, or

ii) if a flow control device is used, not more than 4.5 m in length,

c) draw supply air through ducting that is

i) rigid ducting with an equivalent diameter of at least 100 mm, or

ii) flexible ducting with an equivalent diameter of at least 125 mm, and

d) have a furnace air circulating fan set to run continuously.

3) Where the principal ventilation system is a ducted forced-air heating system used in combination with a heat-recovery ventilator,

a) the ducted forced-air heating system shall conform to Clauses (2)(a),(c) and (d),

b) the heat-recovery ventilator shall draw supply air from an outdoor inlet into the return air plenum of the ducted forced-air heating system, and

c) the heat-recovery ventilator shall draw exhaust air, through dedicated ducting,

i) from one or more indoor inlets, at least one of which is located at least 2 m above the floor of the uppermost floor level, and

ii) at the capacity rating of the heat-recovery ventilator, which shall be no less than the air-flow rate specified in Table 9.32.3.5.

4) Where the principal ventilation system is a heat-recovery ventilator, the heat-recovery ventilator shall

a) provide supply air through dedicated ducting to

i) each bedroom, and

ii) each floor level without a bedroom, and

b) draw exhaust air, through dedicated ducting,

i) from one or more indoor inlets, at least one of which is located at least 2 m above the floor of the uppermost floor level, and

ii) at the capacity rating of the heat-recovery ventilator, which shall be no less than the air-flow rate specified in Table 9.32.3.5.

5) Where the principal ventilation system is a ducted central-recirculation ventilation system, the ducted central-recirculation ventilation system shall

a) draw supply air from an outdoor inlet connected upstream of the fan, and

b) draw air from

i) each bedroom and deliver it to a common area, or

ii) a common area and deliver it to each bedroom.

6) A principal ventilation system need not conform to Sentence (1) if the principal ventilation system

a) services a *dwelling unit* that

i) is located where the January design temperature, on a 2.5% basis determined in conformance with Article 1.1.3.1., is greater than −20°C,

ii) is a laneway house with an aggregate *floor area* of not more than 168 m^2,

iii) does not have a ducted forced-air heating system, and

iv) except for a *secondary suite*, is not located in a *building* conforming to Subsection 9.36.6. or 10.2.3., and

b) provides supply air passively from outdoors through dedicated inlets that

i) are located in each bedroom and at least one common area,

ii) are located at least 1 800 mm above the floor, and

iii) have an unobstructed vent area of not less than 25 cm^2.

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9.32.4.2 Carbon Monoxide Alarms

1) This Article applies to every *building* that contains a *residential occupancy,* a *business and personal services occupancy*, or a *mercantile occupancy* and that

a) is served by a fuel-burning *appliance*,

b) may be exposed to migration of carbon monoxide from a fuel-burning *appliance*, or

c) contains a *storage garage*.

2) Carbon monoxide (CO) alarms installed in a *residential occupancy* required by this Article shall

a) conform to CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"

b) be equipped with an integral alarm that satisfies the audibility requirements of CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices,"

c) have no disconnect switch between the overcurrent device and the CO alarm, where the CO alarm is powered by the *dwelling unit*'s electrical system, and

d) be installed as recommended by the manufacturer.

3) Where a room in a *residential occupancy* contains a solid-fuel-burning appliance, a CO alarm conforming to CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices," shall be mechanically fixed

a) at the manufacturer's recommended height where these instructions specifically mention solid-fuel-burning *appliances*, or

b) in the absence of specific instructions related to solid-fuel-burning *appliances*, on or near the ceiling.

4) Where a fuel-burning *appliance* is installed in a *suite* of *residential occupancy*, a CO alarm shall be installed

a) inside each bedroom, or

b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

5) Where a fuel-burning appliance is installed in a *residential occupancy* and is located in a service room that is not in a suite of residential occupancy, a CO alarm shall be installed

a) either inside each bedroom, or if outside, within 5 m of each bedroom door, measured following corridors and doorways, in every *suite* of *residential occupancy* that shares a wall or floor/ceiling assembly with the *service room*, and

b) in the *service room*.

6) For each *suite* of *residential occupancy* that shares a wall or floor/ceiling assembly with a *storage garage* or that is adjacent to an attic or crawl space to which the *storage garage* is also adjacent, a CO alarm shall be installed

a) inside each bedroom, or

b) outside each bedroom, within 5 m of each bedroom door, measured following corridors and doorways.

7) CO alarms installed in a *business and personal services occupancy*, or a *mercantile occupancy* as required by this Article shall conform to

a) CAN/CSA-6.19, "Residential Carbon Monoxide Alarming Devices," notwithstanding the scope of that standard,

b) NFPA 720, "Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment," or

c) good engineering practice.
(See Note A-6.9.3.1.(6) in Appendix A)

8) Except as permitted by Sentence (9), where a fuel-burning *appliance* serves a *business and personal services occupancy*, or *mercantile occupancy*, a CO alarm shall be installed in
a) each *suite* served by the fuel-fired appliance, and
b) the room or space in which the fuel-burning *appliance* is located.

9) For each *suite* of *business and personal services occupancy*, or *mercantile occupancy* that shares a wall or floor/ceiling assembly with a *storage garage,* that is adjacent to an attic or crawl space to which the *storage garage* is also adjacent, or that may be exposed to migration of carbon monoxide from a *storage garage*, a CO alarm shall be installed in each *suite.*

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9.33.1.1. Application

1) This Section applies to the design and installation of
a) heating systems, including requirements for combustion air, and air-conditioning systems serving only one *dwelling unit*, and
b) **reserved**.

2) The design and installation of heating systems, including requirements for combustion air, and airconditioning systems other than those described in Sentence (1) shall conform to Part 6. (See Article 9.33.4.1. and Subsection 9.10.10.)

3) Deleted.

4) Systems used for heating and air-conditioning shall conform to the energy efficiency requirements in Section 9.36.

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9.33.3.1. Indoor Design Temperatures

1) At the outside winter design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than
a) 22°C in all living spaces,
b) 18°C in unfinished *basements*,
c) **deleted**, and
d) 15°C in heated crawl spaces.

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9.33.4.3. Heating System Control

1) Where a single heating system serves a house with a *secondary suite*, individual temperature controls shall be provided in each *dwelling unit* served by the system. (See Note A-9.33.4.3.(1).)

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9.33.4.4. Access

1) Equipment forming part of a heating or air-conditioning system, with the exception of embedded pipes or ducts, shall be installed with provision for access for inspection, maintenance, repair and cleaning.

2) Deleted.

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9.34.2.7. Public and Service Areas

1) Every public or service area in *buildings* shall be provided with lighting outlets with fixtures controlled by a wall switch or panel to illuminate every portion of such areas.

2) When provided by incandescent lighting, illumination required in Sentence (1) shall conform to Table 9.34.2.7. (See Article 9.9.12.2. for lighting in *means of egress*.)

3) When other types of lighting are used, illumination equivalent to that shown in Table 9.34.2.7. shall be provided.

Table 9.34.2.7.
Lighting for Public Areas
Forming Part of Sentences 9.34.2.7.(2) and (3)

Room or Space	Minimum Illumination, lx	Minimum Lighting Power Density, W/m² of *floor area* (incandescent lighting)
Storage rooms	50	5
Service rooms and laundry areas	200	20
Rooms for storage of combustible refuse	200	20
Garages	50	5
Public water closet rooms	100	10
Service hallways and stairways	50	5
Recreation rooms	100	10

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Section 9.37 Ancillary Residential Units

9.37.1. General

9.37.1.1. Application

(See Note 9.37.1.1)

1) This Section applies to the construction of an *ancillary residential unit* in a *building* containing not more than 2 principal *dwelling units* or a *row house*. (See Note A-9.37.1.1.(1).)

9.37.1.2. Construction Requirements

1) An *ancillary residential unit*, and those parts of a *building* serving only the *principal dwelling unit,* its *ancillary residential unit* and their common spaces, shall conform to the requirements of this By-law except as permitted in this Section.

(See Note A-9.37.1.2.)

9.37.2. Specific Requirements

9.37.2.1. Heights of Rooms or Spaces

1) Except as permitted by Sentences (3), the minimum height of rooms or spaces in an *ancillary residential unit* or the common spaces serving a principal *dwelling unit* and its associated *ancillary residential unit* over the required minimum area as indicated in Table 9.5.3.1. shall be not less than 2.0 m.

2) It shall be possible to travel from the required area of one room to the required areas of all other rooms within an *ancillary residential unit* without reduction of the room height as required in Sentence (1).

3) The clear height over stairs, ramps and landings serving an *ancillary residential unit* or the common spaces serving a principal *dwelling unit* and its associated *ancillary residential unit* shall not be less than 1 950 mm.

4) The clear height in *public corridors* and *exit* corridors that serve only a principal *dwelling unit*, its associated *ancillary residential unit* and their common spaces, shall be not less than 2 m.

9.37.2.2. Deleted.

9.37.2.3. Stairs

1) *Exit* stairs serving a principal *dwelling unit,* its *ancillary residential unit* or their common spaces shall have a minimum width, measured between wall faces or guards, of not less than 860 mm. (See Note A-9.37.2.3.(1).)

2) Stairs within an *ancillary residential unit* or the common spaces serving a principal *dwelling unit* and its associated *ancillary residential unit* may be considered private stairs for the purposes of determining the dimensional requirements of Subsection 9.8.4.

3) Stairs within an *ancillary residential unit* or the common spaces serving a principal *dwelling unit* and its associated *ancillary residential unit* may include one set of winders between floor levels as described in 9.8.4.6.

9.37.2.4. Landings

1) Landings for exterior stairs serving an *ancillary residential unit* need not exceed 900 mm in length.

2) A landing may be omitted at the top of an exterior *flight* serving a secondary entrance to an *ancillary residential unit* or the common spaces serving a principal *dwelling unit* and its associated *ancillary residential unit*, provided

a) the stair does not contain more than 3 risers,

b) the principal door is a sliding door or swings away from the stair, and

c) only a storm or screen door, if any, swings over the stair and is equipped with hardware to hold it open.

9.37.2.5. Handrails and Guards

1) Handrails and *guards* serving an *ancillary residential unit* or the common spaces serving a principal *dwelling unit* and its associated *ancillary residential unit* shall conform to the requirements of Subsections 9.8.7. to 9.8.9. as if serving only one *dwelling unit*.

9.37.2.6. Means of Egress

1) The width of every *public corridor* and *exit* corridor that serves a principal *dwelling unit* and its *ancillary residential unit* shall be not less than 860 mm. (See Note A-9.37.2.6.(1).)

9.37.2.7. Fire Separations for Exits

1) Except as permitted by Sentence (2), every *exit* other than an *exit* doorway shall be separated from adjacent *floor areas* by a *fire separation*

a) having a *fire-resistance rating* of 45 min, or

b) having a *fire-resistance rating* of not less than 30 min where the *dwelling units* are equipped with *smoke alarms* as referenced in Article 9.37.2.19.

2) A *fire-resistance rating* is not required for a *fire separation* that separates an *exit* from adjacent *floor areas* where the *building* is *sprinklered*.

9.37.2.8. Openings Near Unenclosed Exit Stairs and Ramps

1) Where an unenclosed exterior *exit* stair or ramp provides the only *means of egress* from a *dwelling unit* in a *building* that contains an *ancillary residential unit* and the stair is exposed to the

hazards of fire from *unprotected openings* in the exterior wall of another *fire compartment*, the openings shall be protected in conformance with Articles 9.10.13.5. to 9.10.13.7. or 3.2.3.13.(5) (See Note A-9.37.2.8.(1).)

9.37.2.9. Doors in a Means of Egress

1) Every *exit* door or door that opens into or is located within a *public corridor* or other facility that provides *access to exit* from a principal *dwelling unit* and its *ancillary residential unit* shall

a) be not less than 1980 mm high,

b) have a clear opening width of not less than 800 mm, and

c) be permitted to swing inward.

9.37.2.10. Travel Limit to Exits or Egress Doors

1) In an *ancillary residential unit*, the travel limit from a floor level in the *dwelling unit* to an *exit* or egress door may exceed 1 *storey* provided the floor level within the *dwelling unit* is served by an operable window conforming to Article 9.9.10.1. and is located so that the window could provide egress from the *ancillary residential unit* if the other dwelling unit becomes inaccessible to the occupants due to a fire which originates in the *dwelling unit*.

9.37.2.11. Shared Egress Facilities

1) Except as provided in Article 9.9.7.3., where an egress door from a *dwelling unit* opens onto a *public corridor* or exterior passageway, it shall be possible from the location where the egress door opens onto the *public corridor* or exterior passageway to go in opposite directions to 2 separate *exits* unless the *dwelling unit* is served by a second and separate *means of egress* or an opening window conforming to Article 9.9.10.1.

2) Each *dwelling unit* shall be provided with a second and separate *means of egress* or an opening window conforming to Article 9.9.10.1. where the principal egress door from the *dwelling unit* opens onto

a) an *exit* stairway that serves more than one *suite*,

b) a *public corridor* serving more than one *suite* and served by a single *exit* stairway or ramp,

c) an exterior passageway serving more than one *suite* and served by a single *exit* stairway or ramp, or

d) a balcony serving more than one *suite* and served by a single *exit* stairway or ramp.

3) Where a *dwelling unit* is located above another *floor area* other than the principal *dwelling unit* to which it is associated or their common spaces, the *dwelling unit* shall be provided with a second and separate *means of egress* or an operable window conforming with Clause 9.9.9.1.(2)(a) and (b).

9.37.2.12. Exit Signs

1) *Exit* signs are not required within an *ancillary residential suite*.

9.37.2.13. Structural Fire Resistance

1) Table 9.10.8.1., Fire-Resistance Ratings for Structural Members and Assemblies, does not apply to an *ancillary residential unit.* (See Note A-9.37.2.13.)

9.37.2.14. Combustible Drain, Waste and Vent Piping

(See Note A-9.37.2.14.)

1) *Combustible* drain, waste and vent piping is permitted to be located within or penetrate a *fire separation* required to have a *fire-resistance rating* provided

a) except for the permitted penetration in Clause (b), the *combustible* piping is located within an assembly protected by a membrane of a minimum 12.7 mm gypsum board,

b) piping and tubing is tightly fitted, cast in place, or firestopped to ensure the integrity of the fire separation, and

c) the *combustible* piping does not penetrate the gypsum board protection membrane on the underside of a horizontal assembly.

2) *Combustible* drain, waste and vent piping enclosed in an assembly or protected as described in Sentence (1) is permitted on both sides of a *fire separation*.

9.37.2.15. Separation of Ancillary Residential Units

(See Note A-9.37.2.15.)

1) A principal *dwelling unit* and its a*ncillary residential unit* shall be separated from each other by

a) wall or partition assemblies consisting of

i) not less than one layer of 1/2" type C or 5/8" type X wall board on wood or steel studs on each side,

ii) resilient channel installed on at least one side, and

iii) *noncombustible* insulation of at least 3-1/2" depth throughout, and

b) floor assemblies consisting of

i) not less than one layer of 1/2" type C or 5/8" type X wall board,

ii) with resilient channel, and

iii) at least 3-1/2" of *noncombustible* insulation.

2) Openings in a separation required by Sentence (1) shall be protected by *closures* with a minimum 20 min *fire-protection rating*, or 45 mm thick solid core wood doors in accordance with 9.10.13.2.

9.37.2.16. Separation of Public Corridors

1) A *public corridor* serving only a principal *dwelling unit* and its *ancillary residential unit* shall be separated from the *dwelling units* by

a) wall or partition assemblies consisting of

i) not less than one layer of 1/2" type C or 5/8" type X wall board on wood or steel studs on each side, and

ii) *noncombustible* insulation of at least 3-1/2" depth throughout, and

b) floor assemblies consisting of

i) not less than one layer of 1/2" type C or 5/8" type X wall board, and

ii) at least 3-1/2" of *noncombustible* insulation.

2) Openings in a separation required by Sentence (1) shall be protected by *closures* with a minimum 20 min *fire-protection rating*, or 45 mm thick solid core wood doors in accordance with 9.10.13.2.

9.37.2.17. Ventilation, Air Ducts and Fire Dampers

(See Note A-9.37.2.17.)

1) Except as provided in Sentences (2) to (4) and notwithstanding Sentences 9.32.1.1.(1) and 9.33.1.1.(1), Sections 9.32 and 9.33 applies to a *building* that contains an *ancillary residential suite*.

2) In a residential *building* containing not more than two principal *dwelling units*, heating-season ventilation need not be provided for

a) *exits*,

b) *public corridors*, and

c) ancillary spaces that are not within a *dwelling unit*, except where that space contains an exhaust device.

3) Where a heating or ventilation duct system serves more than one *dwelling unit*, the system shall be designed and installed to prevent the circulation of smoke to adjacent *dwelling units* upon a signal from a duct-type *smoke detector* or *smoke alarm*

4) Ducts penetrating *fire separations* need not be equipped with *fire dampers* in conformance with Article 3.1.8.9. provided

a) they are *noncombustible* with all openings in the duct system serving only one *fire compartment*, or

b) they are of continuous solid steel ducting from an HRV located within the *dwelling unit* that it serves to the exterior.

5) Where a heating or air-conditioning system serves more than one *dwelling unit*, access required by Sentence 9.33.4.4.(1) from more than one *dwelling unit*, common space or ancillary space is not required.

9.37.2.18. Spatial Separation

1) Spatial separation shall conform to the applicable requirements of Subsection 9.10.14 or 9.10.15.

9.37.2.19. Smoke Alarms

(See Note A-9.37.2.19.)

1) The installation of *smoke alarms* shall conform to Subsection 9.10.19.

2) *Smoke alarms* shall be installed in each principal *dwelling unit* and each *ancillary residential unit,* and shall be of the photo-electric type hard-wired so that the activation of any smoke alarm will cause the smoke alarms in the principal *dwelling unit* and its *ancillary residential unit* to sound.

9.37.2.20. Sound Control

1) The assemblies separating the primary *dwelling unit* and its contained *ancillary residential suites* need not comply with the sound control requirements of Section 9.11. (See Note A-9.37.2.20.(1).)

9.37.2.21. Attic Space Access

1) An *attic space* access hatchway not less than 0.32 m2 in an area with no dimension less than 500 mm may serve a principle dwelling unit and its contained ancillary residential suites.

9.37.2.22. Garages and Carports

1) Section 9.35 is applicable to garages and carports serving a *building* that contains an *ancillary residential suite.*

9.37.2.23. Accessibility and Adaptability

1) *Ancillary residential units* shall be designed in conformance with Section 3.8.

9.37.2.24. Fire Sprinklers

1) Where a *building* is permitted to be sprinklered to NFPA 13D by Article 3.2.5.12., the sprinkler system serving an *ancillary residential unit* is permitted to be designed in accordance with NFPA 13D, provided the floor area of the *ancillary residential unit* is not superimposed above or below

a) principal *dwelling unit* other than the principal *dwelling unit* with which it is associated,

b) another *ancillary residential unit*, or

c) another *major occupancy*.

2) The sprinkler system referred to in Sentence (1) shall be supplied from the *Principal Dwelling Unit*.

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A-9.5.3.1. Ceiling Heights and Clear Heights. Figure A-9.5.3.1. shows ceiling heights in relation to clear heights and also clear heights over stairs described in Article 9.8.2.2.

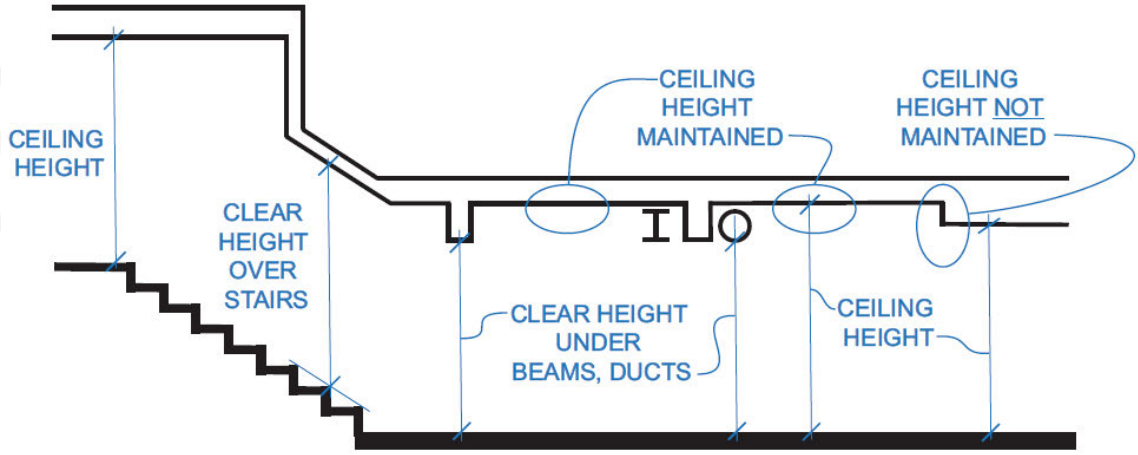

Figure A-9.5.3.1.
Ceiling Heights and Clear Heights

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A-9.32.3.1.(1) Required Ventilation.

Performance Approach [Clause 9.32.3.1.(1)(a)]
CAN/CSA-F326-M, "Residential Mechanical Ventilation Systems," is a comprehensive performance standard. It gives experienced ventilation system designers the flexibility to design a variety of residential ventilation systems that satisfy those requirements.

Prescriptive Approach [Clause 9.32.3.1.(1)(b)]
The prescriptively described systems are intended to provide a level of performance approaching that provided by systems complying with CAN/CSA-F326-M, "Residential Mechanical Ventilation Systems." They are included in the By-law for use by those less experienced in ventilation system design. Code users who do not find these prescriptively described systems satisfactory for their purposes, or who find them too restrictive, are free to use any other type of ventilation system that satisfies the performance requirements of CAN/CSA-F326-M.

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A-9.33.4.3.(1) Heating System Controls. Where a single heating system serves more than one dwelling unit, it must be possible for the occupants to control the temperature in their own suites. Sentence 9.33.4.3.(1), which applies only to electric, fuel-fired or unitary heaters and hydronic heating systems, specifies that separate temperature controls must be provided in each dwelling unit; however, the controls for shared spaces may be located in those spaces or in one of the suites.

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A-9.37.1.1. Application. The provisions of the Building By-law addressing ancillary residential units are intended to align with Provincial requirements, with minor modification to accommodate the Vancouver development context. Secondary suites, lock-off units, or other forms of housing ancillary to a primary dwelling, are intended to be treated in a uniform fashion, and rely upon a single ownership model in which the principal dwelling unit and ancillary residential unit form a single legal parcel, for which the owner bears the responsibility for the maintenance and safe function of all the contained units. As such, separation requirements normally required between separate suites of residential occupancy are relaxed due to this single ownership relationship.

It is intended that the definition reflects that an ancillary residential unit is an additional dwelling unit of limited size located within a house or row house. Many of the changes in Section 9.37. are premised on the condition of the limited size of the ancillary residential unit, which may directly or indirectly relate to issues such as occupant load, travel distance and egress dimensions.

The provisions of this By-law address only ancillary residential units in lower density forms of housing which include houses (one and two family dwellings) and row houses in which egress is non-complex, being generally direct to the exterior and at or near grade.

Dwelling units that would otherwise meet the definition of ancillary dwelling unit but are in denser or more complex arrangements (such as lock-off units in apartment buildings or strata titled arrangements) should be treated as separate suites of residential occupancy, and therefore comply with the general provisions of Part 3 or Part 9 as applicable.

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A-9.37.1.2. Construction Requirements. The requirements of Part 9 of the Building By-law apply to the construction of an ancillary residential unit and the alterations to a building to incorporate an ancillary residential unit, except those specifically referenced in Subsection 9.37.2.

An ancillary residential unit may be constructed in a building that has been in existence for many years that may not comply with current code requirements.

It is not the intent to retroactively apply the current By-law to all existing features in order to permit the construction of an ancillary residential unit in an existing building and the requirements of Part 11 of this By-law may facilitate the construction of such projects.

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A-9.37.2.3.(1) Exit Stairs. Existing internal and external stairs that formerly served one dwelling unit may now serve both the existing dwelling unit and the new ancillary residential unit. It is not the intent to apply all current By-law exit stair requirements in order to permit the construction of an ancillary residential unit in an existing building.

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A-9.37.2.6. Means of Egress. The additional occupant load created by an ancillary residential unit does not warrant increasing the width of a public corridor, common exit stair or landing used by both dwelling units. The stairs, corridors and landings formerly serving one dwelling unit are likely to be of adequate size to accommodate the occupant load of both suites.

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A-9.37.2.8. Openings Near Unenclosed Exit Stairs and Ramps. Unprotected door or window openings in other fire compartments adjacent to exit stairs, ramps and confined paths of travel should be protected from the other suite to provide safe passage to a safe area.

Normally such protection as required by Part 9 would extend both vertically and horizontally beyond the adjacent openings. This is considered excessive due to required fire safety measures and the relatively short travel distances in this type of building. The application of current Part 9 requirements would in many cases require the protection of all openings in entire faces of dwelling units, which could be very restrictive. Authorities should exercise judgment with regard to deciding which openings are close enough to the exit facility to pose a problem during the early stages of a fire and require appropriate opening protection. Those openings that directly pass the means of egress are required to be protected.

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A-9.37.2.13. Structural Fire Resistance of Ancillary Residential Units. The provisions of 9.37.2.13. address only the fire-resistive requirements of construction within the ancillary residential unit. The remainder of the requirements of a building, including the need for fire separations that support or separate other floor areas or portions of a building, or of the principal dwelling unit itself, continue to apply.

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A-9.37.2.14. Combustible Drain, Waste and Vent Piping. Exposed combustible drain, waste and vent piping that penetrates a fire separation is required to be protected as described. This protection is not required for exposed fixture traps and arms serving fixtures within the suite provided they are not exposed from the underside of a horizontal assembly. The intent is not to require removal of existing combustible piping which, as a result of the creation of an ancillary residential unit, may now be on both sides of a rated fire separation. Rather, the intent is to protect this piping where it is exposed.

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A-9.37.2.15 Separation of Ancillary Residential Suites. Separations between an ancillary residential unit and its associated principal dwelling unit are not required to be constructed as formal fire separations. Rather, these separations may be constructed with conventional techniques that incorporate low cost materials that will provide a degree of containment for fire, smoke, and sound to the dwelling unit of origin.

Likewise, openings between principal dwelling unit and its contained ancillary residential unit must meet certain minimum construction requirements, but need not be constructed as formal fire separations.

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A-9.37.2.17. Air Ducts and Fire Dampers. In order to prevent the migration of smoke from one suite to another during a fire, heating or ventilation systems incorporating ducts that serve both suites are permitted only if there is a mechanism to prevent smoke being circulated from one unit to the other. It is preferable for the secondary suite to have its own heating system independent of the rest of the building.

Other solutions to providing separate ventilation systems for the dwelling units must address smoke control. Although fire dampers restrict the spread of smoke by automatically closing in the event of a fire, their installation in a ventilation system that serves both dwelling units in a house with a secondary suite is not considered to be an ideal solution because they are very expensive, require regular inspection and maintenance, and must be reset after every activation.

Ventilation for Air Exchange

The provision of a ventilation system for the purpose of maintaining acceptable indoor air quality is a critical health issue. However, Sentence 9.37.2.17.(2) allows exits and public corridors serving ancillary residential units in residential buildings containing not more than 2 principal dwelling units to be unventilated. Lack of active ventilation of these spaces is considered acceptable because occupants do not spend long periods of time there and because exits are somewhat naturally ventilated when doors are opened.

Considering the cost of installing separate ventilation systems, Sentence 9.37.2.17.(2) also exempts ancillary spaces serving ancillary residential units in residential buildings containing not more than 2 principal dwelling units from the requirement to be ventilated, provided that ventilation system supply air is supplied in accordance with Article 9.32.3.4.

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A-9.37.2.19. Smoke Alarms. This Article requires an interconnected photoelectric smoke alarm in each suite where fire separations having a fire-resistance rating of 30 min are used. The purpose of these interconnected alarms is to provide early warning to both suites in the event of a fire in one suite.

Photoelectric type alarms are required as they are less prone to nuisance false alarms such as can occur during cooking, but careful consideration is still required as to their location.

It is important to note that these alarms are additional to the requirements of Subsection 9.10.19. and that each suite is still required to be provided with alarms in conformance with Subsection 9.10.19.

The additional smoke alarm should not be interconnected to the other smoke alarm(s) located within the same suite.

This additional smoke alarm system is not required when the fire-resistance ratings required in Articles 9.10.9.14. and 9.10.9.15. are not reduced, or when the building is sprinklered.

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A-9.37.2.20. Sound Control. Controlling sound transmission between dwelling units is important to the occupants' health and well-being. Meeting the By-law's level of sound transmission for ancillary residential units may be difficult and expensive, particularly in an existing building. As there is single ownership of both dwelling units, this requirement is not mandatory, but designers are encouraged to take the subject into consideration where feasible. A somewhat reduced level of performance is acceptable in the case of secondary suites because the occupants of the house containing a secondary suite are only affected by the sound of one other unit and, in many cases, it is the owner of the house who will decide on the desired level of protection. Sound resistance can be improved by selecting furnishings and finishings that absorb sound, such as carpet.

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Commercial Components

1) All *buildings*, except those included in 10.2.1.3 through 10.2.1.6.,
a) shall be designed in compliance with (See Note A-10.2.1.2.(1)(a).)
i) 10.2.2.2. or 10.2.2.3., or
ii) 10.2.2.2. in a *building* required to be designed to Part 9 by Division A, 1.3.3.3.,
b) **[UTV Deleted]**,
c) **[UTV Deleted]**,
d) **[UTV Deleted]**,
e) shall be provided with vestibules in compliance with Article 10.2.2.8.,
f) shall be provided with metering equipment in compliance with Article 10.2.2.9,
g) shall be provided with lighting in conformance with Article 10.2.2.10.,
h) **[UTV Deleted]**,
i) shall comply with Article 10.2.2.15. where gas-fired fireplaces are provided, and
j) may provide exterior heated spaces in compliance with Article 10.2.2.22.

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10.2.1.3. Residential Buildings of 7 Storeys or More, and Commercial Buildings (with or without residential components)

1) All *buildings* containing Group C, D, or E *Major Occupancies*, except those included in Articles 10.2.1.4. through 10.2.1.6.,
a) shall be designed in compliance with energy and emissions performance per Article 10.2.2.5,
b) **[UTV Deleted]**,
c) **[UTV Deleted]**,
d) **[UTV Deleted]**,
e) shall be provided with vestibules in compliance with Article 10.2.2.8.,
f) shall be provided with metering equipment in compliance with Article 10.2.2.9,
g) shall be provided with lighting in compliance with Article 10.2.2.10.,
h) **[UTV Deleted]**,
i) shall comply with Article 10.2.2.15., where domestic gas-fired fireplaces are provided,
j) shall provide airtightness testing in compliance with Article 10.2.2.21, and
k) may provide exterior heated spaces in compliance with Article 10.2.2.22.

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10.2.1.6. Residential Buildings with Not More Than 2 Principal Dwelling Units

1) Except as otherwise required in this Subsection, a Group C *building* of *residential* use throughout, containing not more than 2 primary *dwelling units* and their contained *ancillary residential suites* or subsidiary structures with conditioned space, shall (See Note A-10.2.1.6.(1).)
a) be designed with thermal performance in compliance with Article 10.2.2.6.,
b) be designed with exterior closures and fenestration with thermal performance in compliance with Article 10.2.2.7.,
c) be provided with metering equipment in compliance with Article 10.2.2.9.,
d) be provided with lighting in compliance with Article 10.2.2.10.,
e) comply with Article 10.2.2.11. through 10.2.2.13., where domestic hot water heating is provided,
f) comply with Article 10.2.2.14., where domestic gas heated furnaces or make-up air units are provided,
g) comply with Article 10.2.2.15. and 10.2.2.16., where domestic gas fireplaces are provided,
h) except for laneway houses, be provided with heat recovery ventilators in compliance with Article 10.2.2.17.,

i) be designed with a solar photovoltaic ready pipe run in compliance with Article 10.2.2.18 or 10.2.2.19.,
j) provide documentation in compliance with Article 10.2.2.20., and
k) provide airtightness testing in compliance with Article 10.2.2.21.

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10.2.2.2. ANSI/ASHRAE/IESNA 90.1

1) A *building* designed in accordance with this Article shall be designed and constructed in accordance with ANSI/ASHRAE/IESNA 90.1, "Energy Standard for Buildings, except Low-Rise Residential Buildings".

2) A *building* designed in accordance with Sentence (1), shall be designed, as applicable, with
a) a climate zone of 4,
b) no requirement to comply with the Fenestration Orientation provisions of ASHRAE 90.1, Article 5.5.4.5.,
c) ventilation in compliance with ASHRAE 62-2001 (except addendum n), or if applicable, Clause 6.2.2.1.(3)(b) of the Building By-law,
d) no requirement to comply with Automatic Receptacle Control, per ASHRAE 90.1, Article 8.4.2.,
e) lighting alterations in conformance with the following provisions, which replace Lighting Alterations, per ASHRAE 90.1, Article 9.1.2:

> **9.1.2 Lighting Alterations.**
> For the *alteration* of any *lighting system* in an interior *space* or exterior area, that *space* or area shall comply with the entirety of Chapter 9, as applicable to that *space* or area.
> **Exceptions to 9.1.2**
> 1. Interior lighting *alterations* where the total new wattage of all *replaced luminaires* on a project is 2,000 watts or less, the total wattage of *replaced luminaires* of a *lighting system* within a *space* shall be at least 50% below the total wattage of all *removed luminaires* of that *lighting system*, unless the *space* is at or below the LPD allowance of Table 9.6.1 or Section 9.6.2 as applicable.
>
> Controls shall comply with the requirement of either Section 9.4.1.1(h) or Section 9.4.1.1(i).
> 2. Exterior lighting *alterations* where the total number of *replaced luminaires* on a project is 10 or less, the total wattage of *replaced luminaires* shall be at least 50% below the total wattage of all *removed luminaires*, unless each altered area is at or below the LPD allowances of Table 9.4.2-2.
>
> Controls shall comply with the requirement of Section 9.4.1.4(a).
> 3. The replacement of a failed *lamp* or *ballast/driver* in an individual *luminaire* or the replacement of any failed lighting control.
>
> 4. The removal or relocation of interior or exterior *luminaires* as part of, or independent of, exceptions 1, 2, or 3.,

f) the 5% in Table 11.5.1.5. Building Envelope, Exception a., being replaced by 2%, if designed in compliance with ASHRAE 90.1, Section 11, and
g) the 5% in Table G3.1.5.a. Building Envelope, Exception 1., being replaced by 2%, if designed in compliance with ASHRAE 90.1, Appendix G.

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10.2.2.3. National Energy Code of Canada for Buildings

1) A *building*, other than a Part 9 *building*, designed in accordance with this Article shall be designed and constructed in accordance with the National Energy Code of Canada for Buildings (NECB), except that the provisions of this By-law shall apply where the NECB refers to the National Building Code of Canada (NBCC), and shall be designed as applicable with

a) a climate zone of 4,

b) ventilation in conformance with ASHRAE 62-2001 (except addendum n),

c) no requirement to comply with vestibules provision of NECB Article 3.2.2.1.,

d) window-to-wall and skylight-to-roof area ratios of the reference *building* identical to area ratios of the proposed *building*, to a maximum of 40% for windows and to a maximum of 5% for skylights, identical to area ratios of the proposed *building*,

e) a vertical glazing Solar Heat Gain Coefficient which does not exceed an assembly maximum of 0.36, and

f) a skylight Solar Heat Gain Coefficient for all types, which does not exceed an assembly maximum of 0.40, where the ratio of the aggregate skylight area to roof area is less than or equal to 3.0%.

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10.2.2.4. [UTV Deleted]

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10.2.2.12. Domestic Gas-Heated Hot Water Heaters

1) In a building required to comply with this Article, gas-heated appliances providing domestic hot water only shall have a uniform energy factor of not less than 0.78 or alternatively a thermal efficiency of not less than 90% as determined by the following

a) CSA P.3-04, “Testing Method for Measuring Energy Consumption and Determining Efficiencies of Gas-Fired Storage Water Heaters”,

b) CSA P.7-10, “Testing Method for Measuring Energy Loss of Gas-Fired Instantaneous Water Heaters”,

c) CSA C191-04, “Performance of electric storage tank water heaters for domestic hot water service”, or

d) CSA 4.3/ANSI Z21.10.3, “Gas Water Heaters Volume III, Storage Water Heaters, with Input Ratings above 75,000 Btu per hour, Circulating and Instantaneous”.

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10.2.2.22. System Requirements for Heating within Exterior Spaces

(See Note A-10.2.2.22.)

1) Any space heating or occupant heating within an exterior space associated with a *building* shall comply with the requirements of this Article.

2) The design and/or installation of space heating or occupant heating systems within exterior spaces shall be limited to spaces directly served by licensed beverage establishments or licensed food establishments.

3) Any exterior space designed with a heating system and directly served by a licensed beverage establishment or a licensed food establishment, shall prioritize the heating system design in the following order:

a) In-slab or in-floor radiant heat, using non fossil fuel or low-carbon system,

b) Electric fixed infrared radiant heat with metal-sheath element,

c) Heated seating, using non fossil fuel or low-carbon system,

d) Non-electric radiant heat using non fossil fuel system.

4) In spaces required to comply with Sentence (3), the design of exterior space heating or occupant heating systems shall comply with Table 10.2.2.22.,as applicable.

Table 10.2.2.22.

Exterior Space or Occupant Heating System Design Requirements Forming a part of 10.2.2.22.			
System Type	**Maximum output**	**Control type**	**Management Requirements**
In-slab or in-floor radiant heat	15 W/ft^2	Zone-based controls interconnected with centralized automatic control system	Independent zone management
Electric radiant heat	18 W/ft^2	Unit-based or Zone-based controls interconnected with centralized automatic control system	Independent unit or zone management
Heated seating	20 W per seat	Zone-based controls interconnected with i) individual seat shutoff, or ii) centralized automatic control system	Individual seat heater shutoff and independent zone management
Non-electric and non-fossil fuel radiant heat	18 W/ft^2	Unit-based controls interconnected with centralized automatic control system	Independent zone management

5) Heating systems designed to sentence (3) shall include
a) an automatic shut-off (ambient temperature sensor – lockout),
b) an automatic shut-off (space temperature sensors – integral/ zone), and
c) an automatic shut-off using programmable timeclock.
6) Heated zones within a zone-based design shall not exceed 4.8 kW per zone.
7) Heating systems designed with overhead radiant systems within a space containing a ceiling or roof of adequate height, shall be designed with circulation fans interconnected to heating mode operations, with an override for independent fan operation.
8) In a space required to comply with sentence (2), any exterior space designed with a combination of systems contained in sentence (3) shall
a) comply with the specific requirements pertaining to each system, without duplication of requirements, and
b) not contain an area where the combined heating exceeds the performance requirement of the least restrictive system.

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11.2.1.2. General Requirements

(See Note A-11.2.1.2.)

1) Where *construction* of *existing buildings* occurred before the effective date of this By-law, reconstruction or *alteration* of *existing buildings* is not a requirement of this By-law, except as required by Articles 11.2.1.3. to 11.2.1.11. inclusive.

2) Except as permitted by Sentences (3) to (9), and Articles 11.2.1.3. to 11.2.1.11., where an *alteration* is made to an *existing building*, the *alteration* shall comply with this By-law and the *existing building* shall be

a) upgraded to an *acceptable* level as defined in the *existing building* Upgrade Mechanism Model in Division B Appendix A, except that existing lighting exceeding the Lighting Power Density of ASHRAE 90.1-2016 shall be removed within existing spaces of a *suite* within the scope of a *project*,

b) upgraded to the satisfaction of the *Chief Building Official* where the *owner* demonstrates that the design levels, as defined by the Upgrade Mechanism Model in Division B Appendix A, present a hardship for the *owner,* or

c) upgraded to the satisfaction of the *Chief Building Official* through alternative upgrades, that demonstrate equivalent improvement where specific characteristics of the building are intended to be retained.

3) Except as required by Sentence (9) and changes of *major occupancy* in a *small suite*, where an *alteration* does not involve an *addition* or a change in *major occupancy*, further upgrading to an *existing building* is not a requirement of this By-law provided

a) *construction* or a full upgrade of the *building* occurred by means of a *building permit* issued on or after November 1, 1999,

b) all *unsafe conditions* are corrected to the satisfaction of the *Chief Building Official*, and

c) all new work is in compliance with this By-law.

4) Where a voluntary upgrade for fire alarm systems, *sprinkler systems*, *exits*, accessibility, seismic work, washrooms or kitchens for *single room accommodations*, energy efficiency or *building* envelope repair is carried out, no further upgrade of the *building* is required except that, where other work is included in the application, the upgrade requirement will only be based on the non-voluntary work proposed.

5) Where *building* envelope repair involves more than 60% of an opaque portion of a *building* face, the *building* envelope on the entire vertical section of that *building* face shall be replaced and upgraded to the thermal resistance and air-tightness requirements of Part 10, except where

a) the scope of work is limited to the replacement of windows

b) the *building* is two *storeys* in *building height* or less and is required to comply with Part 9 per Division A, Article 1.3.3.3., or

c) the *building* face has heritage merit and is required to be retained as part of an approved retention plan.

6) Where a *building* is altered and is a *post disaster building* as defined in Table 4.1.2.1., or where there is a major *addition* to a *post disaster building*, the entire *building* shall be upgraded to design upgrade levels F4, S4, N4, A4 and E4 as detailed in the Upgrade Mechanism Model in Division B Appendix A.

7) Where there is a temporary change of *major occupancy* in a *building* for a temporary emergency shelter or an *arts and culture indoor event*, the upgrade requirements shall be based solely on Section 11.6.

8) Where there is a change of *major occupancy* in a *building*, and the aggregate area of the change in *major occupancy* within any 5 year period is greater than 50% of the *building area* in a one *storey building* or greater than 100% of the *building area* in a *building* of more than one *storey*,

the entire *building* shall be upgraded to design upgrade levels F4, S4, N4, A4 and E3 as detailed in the Upgrade Mechanism Model in Division B Appendix A except where
a) the change in *major occupancy* is to a single *suite* and the work does not exceed 5% of the *building area* or more than 100 m^2 in area, or b) such upgrades are in conflict with an approved heritage retention plan.

9) The upgrade requirements for energy efficiency to *existing buildings* shall conform to the upgrade mechanism model in Division B Appendix A for energy efficiency except for
a) *buildings* designed and constructed in conformance with ASHRAE 90.1-2007 or as deemed acceptable to the *Chief Building Official*,
b) *buildings* designed and constructed in conformance with Article 9.25.2.1. Division B of Building By-law No. 9419,
c) *buildings* where the *alteration* is limited to the upgrade of energy related specific equipment, as listed in Table 11.2.1.2., provided the replacement equipment complies with industry standards for "high efficiency," and
d) *multi-family buildings* not more than 3 storeys in *building height* may comply with the energy efficiency upgrade requirements of Table 11.2.1.4.(2).

Table 11.2.1.2.
Energy Related Equipment
Forming part of sentence 11.2.1.2.(9)

Equipment Type Specific Equipment	Equipment Type Specific Equipment
Basic Building Systems	Boilers
	Furnaces
	Hot Water Tanks
	Lighting Systems
	Energy Reduction Sensors (occupant, light, etc.)
Renewable Energy Systems	Photovoltaic system
	Solar Thermal system
	Biofuel-based Energy system
	Geothermal Heating system
	Geothermal Electric system
	Wave & Tidal Power system
High Performance Energy Systems	Ground Source Heat Pump system
	Air Source Heat Pump system
	Waste Heat Recovery system

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11.2.1.4. Upgrade Requirements for a Residential Building Containing not more than Two Principal Dwelling Units

1) Except as permitted by Subsection 11.4, an *alteration* or *addition* to a residential *building* containing not more than two principal *dwelling units* shall comply with this By-law, and the existing portions of *building* shall be upgraded to an *acceptable* level as determined by Tables 11.2.1.4.(1)-A, 11.2.1.4.(1)-B, and 11.2.1.4.(1)-C.

Table 11.2.1.4.(1)-A
Fire and Life Safety Upgrade requirements for Residential Buildings containing not more than Two Principal Dwelling Units
Forming part of Sentence 11.2.1.4.(1)

Scope of Work	Smoke	CO Alarms(2)	Guards(3)	Spatial	Structural(5)

	Alarms[1]			Separation[4]	
Renovation	Y	Y	Y	N	N
Relocation or Reconstruction	Y	Y	Y	Y	Y
Horizontal Addition Floor Area					
up to 25%[6]	Y	Y	Y	N	N
over 25%[7]	Y	Y	Y	Y	Y
Vertical Addition Floor Area					
up to 25%[6]	Y	Y	Y	N	Y
over 25%[7]	Y	Y	Y	Y	Y

Notes to Table 11.2.1.4.(1)-A:

[1] Smoke Alarms: to be installed in conformance with Subsections 3.2.4. and 9.10.19. as applicable.

[2] CO Alarms: to be installed in conformance with Subsections 6.2.4. and 9.32.4. as applicable.

[3] Guards: all unsafe guards to be upgraded to the satisfaction of the *Chief Building Official*.

[4] Spatial Separation: Spatial separation of the building shall comply with Subsections 3.2.3., 9.10.14 or 9.10.15. as applicable; or as permitted by Section 11.3.

[5] All existing wood frame walls to be anchored to existing concrete foundation walls for seismic resistance

[6] Aggregate increase in floor area less than 25% of the building area (see flow chart #2 of A-11.2.1.2).

[7] Aggregate increase in floor area greater than 25% of the building area.

Table 11.2.1.4.(1)-B
Egress and Exit Upgrade requirements for Residential Buildings containing not more than Two Principal Dwelling Units
Forming part of Sentence 11.2.1.4.(1)

Scope of Work	Means of Egress[1]	Handrails[2]	Exit Exposure[3]	Stair Dimensions[4]	Building Services[5]	Falling Hazards[6]
Renovation	N	Y	N	N	N	N
Relocation or Reconstruction	Y	Y	Y	Y	Y	Y
Horizontal Addition Floor Area						
up to 25%[7]	Y	N	N	N	N	Y
over 25%[8]	Y	Y	Y	Y	Y	Y
Vertical Addition Floor Area						
up to 25%[7]	Y	Y	N	N	N	Y
over 25%[8]	Y	Y	Y	Y	Y	Y

Notes to Table 11.2.1.4.(1)-B:

[1] Means of Egress: confirm that access to exit (9.9.9.) and means of escape (9.9.10.) from all floor areas is compliant with regards to travel distance and fire separation (where applicable).

[2] Handrails: all unsafe handrails to be upgraded to the satisfaction of the *Chief Building Official*.

[3] Exit Exposure: *Exits* to be confirmed to be compliant with regards to exit exposure where applicable.

[4] Stair Dimensions: Existing stairs in means of egress to comply with the dimensional requirements of Subsection 9.8.2.

[5] Building Services: Restrain building service piping, conduit, and *appliances* to resist lateral movement due to earthquake.

[6] Falling hazards: Restrain falling hazards within 3 m of the egress path to resist lateral movement due to earthquake.

[7] Aggregate increase in floor area less than 25% of the building area (see flow chart #2 of A-11.2.1.2).

[8] Aggregate increase in floor area greater than 25% of the building area.

Table 11.2.1.4.(1)-C
Floor Areas Upgrade requirements for Residential Buildings containing not more than Two Principal Dwelling Units
Forming part of Sentence 11.2.1.4.(1)

Scope of Work	Flame Spread(1)	Floor Fire Separations(2)	Suite Fire Separations(3)	Lighting & Emergency Lights(4)	Door Hardware(5)
Renovation	N	N	N	N	N
Relocation or Reconstruction	Y	Y	Y	Y	Y
Horizontal Addition Floor Area					
Up to 25%(6)	N	N	N	N	N
Over 25%(7)	Y	Y	Y	Y	Y
Vertical Addition Floor Area					
Up to 25%(6)	N	N	N	Y	N
Over 25%(7)	Y	Y	Y	Y	Y

Notes to Table 11.2.1.4.(1)-C:
(1) Flame Spread Rating: Exposed wall and ceiling finishes of egress routes to meet the requirements of Subsection 9.10.17. in exits
(2) Floor *Fire separations*: Floor and occupied roof assemblies to be fire rated per Article 9.10.8.1.
(3) Suite *Fire Separations* (where applicable): Residential *suites* to be provided with a fire separation in accordance with Article 9.10.9.14. and
Section 9.37.
(4) Lighting & Emergency Lights (where applicable): Lighting and emergency lighting to be provided in means of egress in accordance with
Subsection 9.9.12.
(5) Door Hardware: Door hardware within existing floor areas to be made adaptable as per Subsection 3.8.5.
(6) Aggregate increase in floor area less than 25% of the building area (see flow chart #2 of A-11.2.1.2).
(7) Aggregate increase in floor area greater than 25% of the building area.

2) Where an *alteration* or *addition* is made to an existing residential *building*, containing not more than two principal *dwelling units,* the energy efficiency of a the *building* shall be upgraded to an *acceptable* level in conformance with Table 11.2.1.4.(2).

Table 11.2.1.4.(2)
Energy Efficiency Upgrade Requirements for Residential Buildings containing not more than Two Principal Dwelling Units (except as permitted by Clause 11.2.1.2.(9)(d))
Forming part of Sentence 11.2.1.4.(2)

Alteration construction ($) value	EnerGuide Assessment(1)	Air tightness upgrades(2)	Attic and Sloped Roof Insulation(3)	E6 - Upgrade Mechanism Model(4)
≥$20,000	Y	N	N	N
≥$75,000	Y	Y	Y	N*

Notes to Table 11.2.1.4.(2):
(1) An EnerGuide Assessment completed within the last 4 years must be submitted, a post-construction assessment must also be completed where the cost of construction exceeds $75,000.
(2) Where EGH>5 air changes per hour, air sealing is required.
(3) Where attic insulation <R12 (2.11RSI), increase to R28 (4.93RSI); where attic insulation ≥R12 (2.11RSI), increase to R40 (7.04RSI); Insulation in existing attics shall not exceed R43.7 (7.7RSI). All flat roof and cathedral ceiling insulation shall be upgraded to ≥R14 (2.47RSI).
(4) Reconstruction is defined in the Upgrade Mechanism Model in Appendix A Division B Part 11. A reconstruction project must meet the Part 10 energy efficiency requirements as per E6 in Table A-11.2.1.2.-C.

3) Where an *alteration* is made to an existing residential *building* containing not more than two principal residential *dwelling units*, that creates one or more new principal *dwelling units* or increases the size of an existing *dwelling unit*, a *sprinkler system* shall be installed
a) throughout the *building*, where the value of the *alteration* exceeds 50% of the replacement value of the *existing building*, (See Note A-11.2.1.4.(3)(a).)
b) throughout any *storey* on which a new principal *dwelling unit* is created, and all *storeys* below, or
c) throughout any *storey* on which an *alteration* to the *building* increases the aggregate area of an existing *dwelling unit* and the converted space is greater than 50% of the *floor area* of the original *dwelling unit*.

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11.2.1.5. Self-contained Volumetric Spaces

(See Note A-11.2.1.5)

1) Where an *alteration* to a *building* is a self-contained volumetric space that is separated from the remainder of the *building* by a *non-combustible* vertical *fire separation* with a 2 h *fire resistance rating*, the upgrade requirements of this Part do not apply to the remainder of the *building* provided
a) the self-contained volumetric space is upgraded in conformance with this By-law,
b) the self-contained volumetric space does not exit through the remainder of the *building*,
c) the *building area* of the self-contained volumetric space is not larger than 10% of the existing *building area*,
d) a *non-combustible* vertical *fire separation* with a 2 h *fire resistance rating* is constructed as a continuous vertical *fire separation* from the *building foundation* to the underside of the roof sheathing, and
e) the self-contained volumetric space does not reduce the existing structural capacity of the *building*.

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11.3.1.1. Application of Alternative Compliance Measures for Existing Conditions

(See Note A-11.3.1.1.)

1) Except as permitted in Sentence (3), the alternative compliance measures provided in this Section are to be applied to existing conditions only and are not to be applied to new *construction* (new *construction* must comply with the requirements of this By-law).
2) Where the *building* is a *heritage building*, the alternative compliance measures in Section 11.5 may be applied to existing conditions.
3) The alternative compliance measures provided in Subsection 11.3.2. do not apply to newly constructed *buildings*.
4) Alterations to newly constructed buildings, as determined by Sentence (3), shall comply with Parts 1 to 10 and Part 12 of Division B in Book I and Parts 1 to 2 of Division B in Book II.

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11.3.2.3. Group A2 in Building More Than 3 Storeys

1) A Group A, Division 2 *occupancy* may be permitted within the first 3 *storeys* of a *building* which is more than three *storeys* in *building height*, provided the *building* conforms to Sentence (2), and provided
a) where the *occupancy* is located on the third *storey* or where the *building area* exceeds 400 m^2, the entire *building* shall be *sprinklered* or
b) where the *occupancy* is located on *the first storey* or second *storey* or *the building area* does not exceed 400 m^2 the building shall be *sprinklered* up to and including the *storey* containing the Group A2 *occupancy*.
2) A *building* referred to in Sentence (1) shall conform to Sentences 11.3.2.4.(2) and (3).

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11.3.3.4. Existing Unprotected Openings

1) Where the *limiting distance* is less than 900 mm, existing *unprotected openings* may be retained, provided

a) the openings are constructed with non-operable *closures* of glass block, wired glass, tempered glass or laminated safety glass, and the *building* is *sprinklered* using fast-response heads,

b) the openings are constructed of glass block, wired glass, tempered glass or laminated safety glass in operable frames, the *building* is *sprinklered* using fast-response and openings are protected with close spaced sprinkler in accordance with Sentence 3.2.3.13.(5)., or

c) *acceptable* self-closing fire protection shutters are installed at the existing opening locations, where the fire shutter operation is not obstructed by the openable window, and where the opening is not required for an escape function as outlined in Article 9.9.10.1.

2) Where a *limiting distance* is 900 mm or more, existing *unprotected openings* which have a total area exceeding the values listed in or extrapolated from Tables 3.2.3.1.B, 3.2.3.1.C, 3.2.3.1.D, 3.2.3.1.E or 9.10.14.4.A, may be retained, provided

a) the openings are constructed of glass blocks or wired glass in fixed frames, or

b) the *building* is to be *sprinklered* using fast-response heads.

3) Where *construction* on an *existing building* consists of renovation where the *exposing building face* is not being altered, the existing *unprotected openings* of that *building* face may be retained and no additional protection shall be required provided

a) the work consists of a interior work only,

b) no additional principal *dwelling units* are being added,

c) the openings on the vertical *building* face are less than 10% of the entire *exposing building face*, and

d) the *limiting distance* is greater than 600 mm.

4) Notwithstanding the requirements of this Article, the replacement of existing windows that do not substantially alter the existing spatial separation configuration by more than 2% shall not require additional protection provided that the openings are constructed of glass block, wired glass, tempered glass or laminated safety glass. (See Note A-11.3.3.4.(4).)

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11.4.2.1. General Requirements

1) An existing residential *building* containing not more than two principal *dwelling units* may be converted or

partially converted into a *community care facility*, *group residence* or *child care facility* provided

a) the *occupant load* does not exceed

- i) 10 residents in a *community care facility*,
- ii) 6 residents in a *group residence*, or
- iii) 8 *children* in a *child care facility*,

b) the community care facility or group residence is

- i) separated from the residential portions of the *building* containing not more than one principal *dwelling unit* by a *fire separation* with a *fire resistance rating* of 1 h,
- ii) separated from the residential portions of the *building* containing not more than two principal *dwelling units* by a *fire separation* with a *fire resistance rating* of 2 h,
- iii) completely *sprinklered*, and
- iv) equipped with a fire alarm system, emergency lights and *smoke* and *heat detectors* installed throughout the *building*.

c) the *child care facility* conforms with Clauses 3.1.2.8.(1)(a) and (b),

d) firefighter access conforms with this By-law,

e) the *building area* is no more than 300 m^2,

f) all *unsafe conditions* are corrected to the satisfaction of the *Chief Building Official*, and

g) the *building* shall be upgraded to conform to upgrade design levels F2, S2, N2, A2 as defined in the Upgrade Mechanism Model in Division B Appendix A and the energy upgrade requirements of Article 11.2.1.4.

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11.4.3.1. Alternative Compliance Measures

1) Except as required in Sentences (2) and (3), where an *existing building* containing not more than two principal *dwelling units* is altered to create an *ancillary residential suite*, the *existing building* shall conform to the requirements of Section 9.37, except as permitted by Table 11.4.3.1., provided the *building* was constructed under a *building permit* issued on or prior to June 22, 2004. (See Note A-11.4.3.1.(1).)

2) Where the *alteration* in Sentence (1) includes an *addition*, the *addition* shall conform to the requirements of this By-law.

3) Where an *existing building* was constructed with a *building permit* issued on or after June 22, 2004, the *existing building* and the *alteration* shall conform to Part 9.37 of Division B.

4) Notwithstanding the requirements of Sentence 9.34.1.1.(1), circuits and receptacles in the *ancillary residential suite* shall have a minimum of

a) two kitchen counter duplex receptacles

i) supplied by two appliance circuits, and

ii) wired on single circuits or a split circuit,

b) two duplex receptacles located on different walls in each bedroom, and

c) three duplex receptacles located on different walls in the living area.

5) Notwithstanding the requirements of Sentence 9.34.1.1. (1)

a) where a single existing panel board is located in a common area within the *building* accessible to all occupants of the *building*, the panel board may supply electrical loads for both the principal dwelling and the *ancillary residential suite*,

b) any electrical range and equipment loads provided for the *ancillary residential suite* shall be calculated with demand factors in conformance with Sentence 9.34.1.1.(2), and

c) general circuit branch wiring may be interconnected between outlets located in the principal dwelling and the *ancillary residential suite*.

Table 11.4.3.1.
Fire Safety Requirements for Ancillary Residential Suite Conversions
Forming Part of Article 11.4.3.1.

Item	Item Details	Alternative Compliance Measure
Spatial Separation	Existing windows and doors	Original openings may remain and new openings to conform to Part 9
Fire Containment within a Principal *Dwelling Unit*	Separation between a principal *dwelling unit* and its contained *ancillary residential units*	Existing lath and plaster in good condition or 13 mm gypsum wall board on wood studs at maximum 450 mm on centre. Where possible, stud cavity to be filled with minimum 90 mm (3 ½") mineral wool insulation. Caulk joints where floor and ceiling meet wall GWB. Use resilient acoustic channels where possible.
	Ducts common to both units through *suite* separations	*Fire dampers* not required if sheet metal ducting extends a minimum of 1800 mm (6'-0") beyond the suite separation and the opening is firecaulked. Acoustic insulation is to be used within the common duct extending a minimum of 1500 mm (60") from either side of the suite separation.

	Plumbing and sprinkler plastic piping that penetrate *fire separations*	Shall be tightly fitted, cast in place, or caulked as per product listing.
	Suite entry doors between the principal *dwelling unit* and its contained *ancillary residential unit*	Existing solid core doors and frames with or without wired glass in good condition. Doors to be provided with positive latching hardware and self-closing devices.
Resistance to Forced Entry	Solid Blocking	Solid blocking may be omitted for doors described in Sentence 9.7.5.2.(9) where the interior wall finish adjacent the door is in place prior to the construction of an *ancillary residential suite*.
Exits	Egress from each *dwelling unit*	In combination with the Egress Windows requirement of Sentence 9.9.10.1., at least one conforming *exit* is required from the principal dwelling and one from the *ancillary residential suite.*
	Windows and doors adjacent to *exits*	No requirements where the *suite* is *sprinklered,* provided with a *closure* or provided with intervening construction extending out by at least 600 mm.
Fire Department Access	Access Path	Existing path designated for fire department is permitted to be minimum 860 mm
Flame Spread Rating	*Exits*	≤150
	Remainder of *building*	No requirement
Sprinklers		Sprinklers are not required provided the value of the alteration is less than or equal to 50% of the replacement(1) value of the *existing building*.
Heating Systems	Furnace room enclosure	No separation required but provide proper combustion air and required clearances from all equipment (2)
Smoke Alarms	Entire *building*	Interconnected *smoke alarms* to be intalled on each storey including basements, in each sleeping room and in a location between the sleeping room and the remainder of the storey and if the sleeping room is served by a hallway, the smoke alarm to be located in the hallway. Installed by permanent connections to an electrical circuit in conformance with Subsection 9.10.19. Division B. Provided with battery backup and manual silencing devices which will silence the alarm in conformance with Article 9.10.19.6. of Division B. Carbon Monoxide detectors to be provided in accordance with the 9.32.4.2.(3)
Stairs and Handrails	Entire *building*	Existing stairs to comply with Section 9.8, excepting the following dimensions: tread depth 235-355 mm, rise 125-200 mm and run 210-355 mm, unless considered to present an *unsafe condition* as determined by the *Chief Building Official*. All existing stairs to have at least one handrail in conformance with Subsection 9.8.7
Guardrail Protection	Entire *building*	Existing *guards* may be retained provided they are structurally sound, non-climbable and ≥900 mm high.

Existing Headroom	Entire *building*	May be reduced to 1 950 mm over 80% of the *suite* area and all egress routes. The minimum clear height under the remaining *suite floor area* shall be not less than 1 850 mm, except *public corridors* and *exits* which shall be not less than 2 000 mm.
	Doorways Opening Sizes	Other than, *exit* doors, and doors serving *public corridors* and *exit* corridors that serve principle *dwelling units* in a *building* containined an *ancillary residential units,* doorway openings shall be designed to accommodate swing-type and folding doors not less than 1 980 mm high, except doorway openings within an *ancillary residential unit* which may be reduced to not less than 1 890 mm high.
Unsafe Conditions	Entire *building*	Any condition within or around the *building* which could cause undue hazard or risk to persons to be corrected as directed by the *Chief Building Official*.
Sound Separation	Between the principal *dwelling unit* and its contained *ancillary residential unit*	Not required. Fill cavity spaces of *suite* separation with mineral wool in walls and floor assemblies of new construction.

Notes to Table 11.4.3.1.:
(1) See Note A-11.2.1.4.(3)(a).
(2) The Gas Code places restrictions on locating gas furnaces adjacent to sleeping rooms or bathrooms.
(3) See Note A-11.4.3.1.(1) Interconnected Smoke Alarms and Carbon Monoxide Detectors

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11.4.7.1. Alternative Compliance Measures

1) Except as permitted by Sentence (2), an *existing building* or parcel may be converted into 2 or more strata lots, if the entire *building* is
a) upgraded to design upgrade levels F4, S4, N4, A4 and E4 as detailed in the upgrade mechanism model in Division B Appendix A, and
b) fully *sprinklered*.
2) An existing parcel containing one or more buildings, may be converted into 2 or more strata lots, if the existing buildings are not otherwise altered, and
a) upgraded to comply with the exposure requirements of Subsection 3.2.3., 9.10.14. or 9.10.15. as applicable,
b) upgraded to comply with the fire department access path of travel in accordance with Articles 3.2.5.5. and 3.2.5.6.,
c) upgraded to design upgrade levels S4 and N4, as detailed in the upgrade mechanism model in Division B Note A-11.2.1.2., and
d) fully sprinklered.
(See Note A-11.4.7.1.(2).)

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11.5.1.1. Alternative Acceptable Solutions

1) This Subsection provides alternative *acceptable* solutions for the restoration and rehabilitation of *heritage buildings*.
2) The alternative *acceptable* solutions provided in Table 11.5.1.1. apply to existing conditions only and do not apply to new work which must conform to the requirements for new *construction* in other Parts of this By-law.

3) Site-built and custom-built replica wood doors, wood framed windows and wood framed skylights, intended to preserve the *heritage* look of a *building* that separated conditioned space and unconditioned space from the exterior, are exempt from the provisions of Subsection 9.7.4. and Article 5.10.2.2. provided the replica
a) complies with Clause 9.7.5.1.(1)(a) or 9.7.5.1.(1)(b) as applicable,
b) does not create an *unsafe condition*, and
c) is *acceptable* to the *Chief Building Official*.
(See Appendix A.)

Table 11.5.1.1.
Alternate Compliance Measures for Heritage Buildings
Forming part of Sentence 11.5.1.1.(2)

No.	By-law Requirement	Alternate Compliance Method
1	***Fire Separations*** Sentence 3.1.3.1.(1) and Table 3.1.3.1.; Subsection 9.10.9. 2 h *fire separation* required between some *major occupancies*.	Except for F1 *occupancies*, 1 h *fire separation* is *acceptable*, if the *building* is *sprinklered*.
2	**Fire Separations** Sentence 3.1.3.1.(1) and 3.1.3.1.; Subsection 9.10.9. 1 h *fire separation* required between some *major occupancies*.	1/2 h *fire separation* is *acceptable* if the *building* is *sprinklered*.
3	***Noncombustible Construction*** Subsection 3.1.5. and Article 9.10.6.1. All materials used in *noncombustible construction* must be *noncombustible* unless otherwise permitted.	1. Roofs may be of *combustible construction* provided the *building* is *sprinklered*. 2. Up to 10% gross *floor area* to a maximum of 10% of any one *floor area* may be of *combustible construction* provided the *building* is *sprinklered*.
4	***Fire-resistance Rating*** Sentence 3.1.7.1.(1); Article 9.10.3.1. Where a material, assembly of materials or structural member is required to have a *fire-resistance rating* it shall be tested in accordance with CAN/ULC-S101.	A *fire-resistance rating* may also be used based on: 1. HUD No. 8 Guideline on Fire Ratings of Archaic Materials and Assemblies. 2. Fire Endurance of Protected Steel Columns and Beams, DBR Technical Paper No. 194. 3. Fire Endurance of Unit Masonry Walls, DBR Technical Paper No. 207. 4. Fire Endurance of Light-Framed and Miscellaneous Assemblies, DBR Technical Paper No. 222.
5	**Rating of Supporting Construction** Article 3.1.7.5.; Article 9.10.8.3. Supporting assemblies to have *fire resistance rating* at least equivalent to that of the supported floor.	Heavy timber construction is permitted to have a *fire resistance rating* less than would be required by the By-law provided the *building*: (a) is *sprinklered*, and (b) does not exceed 6 *storeys* in *building height*.
6	**Continuity of *Fire Separations*** Sentence 3.1.8.3.(1) and 3.1.8.3.(2); Article 9.10.9.2. *Fire separations* are required to be continuous above the ceiling space.	*Fire separations* are not required to be continuous above the ceiling space where: (a) the ceiling space is *non-combustible construction*, (b) both *fire compartments* are *sprinklered*, or (c) the ceiling has a minimum rating of 30 minutes.
7	**Wired Glass** Sentences 3.1.8.5.(1) and 3.1.8.14.(2); Articles 9.10.13.1. and 9.10.13.5. 6 mm wired glass in steel frame required in	For fixed transoms or sidelights, 6 mm wired glass fixed to a wood frame of at least 50 mm thickness with steel stops is permitted in a required *fire separation*.

	fire separations.	
8	***Mezzanines*** Sentences 3.2.1.1.(3) to 3.2.1.1.(6); Article 9.10.4.1. *Mezzanines* enclosing more than 10% above the horizontal plane are considered as *storey* in *building height*.	Enclosed *mezzanines* may be up to 40% of the *storey* in which they occur and not be considered a *storey* in *building height* if the *building* is *sprinklered*.
9	***Building Height*** Articles 3.2.2.20. to 3.2.2.88. *Noncombustible construction* required for *buildings* over 3 *storeys* in *building height*.	*Buildings* may be of *combustible construction* up to 6 *storeys* provided: (a) the *building* is *sprinklered* (b) the *building* contains Group C, D, E, F2 or F3 *occupancies*, and (c) floor assemblies not required to exceed 1 h *fire separation* requirements may be of *heavy timber construction*.
10	**Spatial Separation** Subsection 3.2.3.; Subsection 9.10.14. The area of *unprotected opening* shall not exceed the limits in Tables 3.2.3.1.A to 3.2.3.1.E	The area of existing *unprotected opening* is not limited provided: (a) the *limiting distance* is a minimum 1 m, (b) the *building* has a supervised *sprinkler system* in conformance with Article 3.2.4.9., (c) the existing *unprotected openings* are protected with close spaced sprinklers per clause 11.3.3.4.(b), and (d) the *sprinkler system* is designed to notify the fire department in conformance with Article 3.2.4.7.
11	**Construction of *Exposing Building Face*** Article 3.2.3.7.; Article 9.10.14.5. The *exposing building face* is required to have a *fire-resistance rating* and/or be of *noncombustible construction*.	*Exposing building face* is not required to have a *fire resistance rating* if the *building* is *sprinklered*. Also, the *exposing building face* is not required to be of *noncombustible construction* if it is protected by an exterior *sprinkler system* conforming to NFPA 13.
12	**Roof Covering Rating** Sentence 3.1.15.2.(1) Class A, B or C roof covering in conformance with CAN/ULC-S107 required.	For existing roofs not covered by a Class A, B or C roofing, a manually operated deluge system in accordance with NFPA 13 is permitted.
13	***Smoke Alarms*** Sentences 3.2.4.21.(5) and 3.2.4.21.(6); Sentence 9.10.18.3.(1) *Smoke alarms* are required to be connected to an electric circuit.	*Smoke alarms* may be battery operated in a residential *building* containing not more than one principal *dwelling unit*.
14	***Interconnected Floor Space*** Subsection 3.2.8.; Sentence 9.10.1.3.(6)	1. Open stairs in *buildings* of maximum 4 *storeys* in *building height* need not comply with Subsection 3.2.8. provided: (a) the *building* contains a Group C or D *occupancy*, (b) the *building* is *sprinklered* with fast-response sprinklers, (c) corridors opening into the *interconnected floor space* are separated from the *interconnected floor space* by a *fire separation* with the rating required for the corridor, and (d) *smoke detectors* are installed in the rooms opening into the *interconnected floor space* and the *smoke detectors* are connected to the fire alarm system. 2. Open stairs in *buildings* of maximum 3 *storeys* in *building height*, or the first 2 *storeys* and basement, need not comply with Subsection 3.2.8. provided: (a) the *building* contains a Group C or D *occupancy*, (b) the *building* is *sprinklered* with fast-response sprinklers, (c) *smoke detectors* are installed in the rooms opening into the

		interconnected floor space and the *smoke detectors* are connected to the fire alarm system, and (d) at least one *means of egress* is not through the *interconnected floor space*.
15	**Separation of *Suites*** Article 3.3.1.1.; Article 9.10.9.13., Article 9.10.9.14. *Suites* are required to be separated from adjoining *suites* by 3/4 h or 1 h rated *fire separations*.	Existing *fire separations* of 30 min, such as wood lath and plaster in good condition, are *acceptable* in *sprinklered buildings* not exceeding 6 *storeys* in *building height*.
16	**Corridor *Fire Separation*** Article 3.3.1.4.; Article 9.10.9.15. *Public corridors* are required to be separated from the remainder of the *building* by a *fire separation* having a *fire resistance rating* of at least 3/4 h.	Existing corridors with 30 min *fire-resistance ratings*, such as wood lath and plaster in good condition, are *acceptable* in *residential occupancies* provided the *building*: (a) does not exceed 6 *storeys* in *building height*, and (b) is fully *sprinklered* with fast-response sprinklers.
17	**Corridor Width** Articles 3.3.1.9. and Subsection 3.4.3.; Article 9.9.3.3. *Public corridors* and *exit* corridors are permitted to have a minimum width of 1 100 mm.	*Public corridors* and *exit* corridors are required with a minimum width of 800 mm provided: (a) the *occupant load* of the *building* is maximum 20 people, and (b) the *building* does not exceed 3 *storeys* in *building height*.
18	**Door Swing** Articles 3.3.1.10. and 3.4.6.12.; Article 9.9.6.5. Doors required to swing in the direction of *exit* travel.	Second egress door from a room is not required to swing in the direction of *exit* travel provided: (a) the *building* is *sprinklered* and the system is supervised in conformance with Sentence 3.2.4.9.(2), and (b) the *occupant load* of the *building* is a maximum of 100 people.
19	**Stairs, Ramps, Handrails and *Guards*** Article 3.3.1.14., Article 3.3.1.16., Article 3.3.1.18., Article 3.4.6.2. through Article 3.4.6.9.; Section 9.8.	Existing conditions that do not comply fully with the requirements are permitted if they are *acceptable* to the *Chief Building Official*.
20	**Transparent Doors and Panels** Article 3.3.1.19.; Article 9.6.1.4. Glass in doors and sidelights are required to be protected by *guards* and to be safety glass.	Existing glass or transparent panels that do not comply fully with the requirements are permitted if sufficiently discernible or *guards* are provided in hazardous situations.
21	**Dead-end Corridors** Sentence 3.3.1.9.(7); Article 9.9.7.3. Dead-end corridors are permitted to a maximum length of 6 m.	1. Dead-end corridors are permitted to a maximum length of 10 m in Group C occupancies provided: (a) the *building* is *sprinklered* with fast-response sprinklers, and (b) *smoke detectors* are installed in the corridor system. 2. Dead-end corridors are permitted to a maximum of 15 m in length in Group D, E, F2 and F3 *occupancies* provided: (a) the *building* is *sprinklered* with fast-response sprinklers, and (b) *smoke detectors* are installed in the corridor system.
22	***Exits*** Article 3.4.2.1.; Article 9.9.8.2. *Floor areas* shall be served by not fewer than 2 *exits* except as permitted by Sentence 3.4.2.1.(2)	*Floor areas* may be served by a single *exit* within the limits of Sentence 3.4.2.1.(2) provided: (a) the *building* does not exceed 3 *storeys* in *building height*, (b) the *building* is *sprinklered* with fast-response sprinklers, and (c) all *floor areas* are protected by a system of *smoke detectors* connected to a fire alarm system.
23	**Reduction of *Exit* Width**	Existing swinging doors in their swing are permitted to reduce the

	Sentence 3.4.3.3.(2); Article 9.9.6.1. Swinging doors in their swing shall not reduce the effective width of *exit* stairs and landings to less than 750 mm.	effective width of *exit* stairs and landings to a minimum of 550 mm provided: (a) they serve Group C or D *occupancies*, (b) the *building* does not exceed 4 *storeys* in *building height*, and (c) the *building* is *sprinklered*.
24	***Fire Separation* of *Exits*** Article 3.4.4.1.; Subsection 9.9.4. Article 3.4.4.1.; Subsection 9.9.4. *Exits* are required to be separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* of not less than 3/4 h.	1. *Buildings* of 3 *storeys* or less may have *exits* that are separated by a *fire separation* that does not have a *fire-resistance rating* provided: (a) the *building* is *sprinklered* with fast-response sprinklers, and (b) the *sprinkler system* is supervised in accordance with Sentence 3.2.4.9.(2). 2. *Buildings* not exceeding 6 *storeys* in *building height* may have *exits* that are separated by a 45 min *fire separation* provided the *building* is *sprinklered*.
25	***Exits* Through Lobbies** Article 3.4.4.2.; Article 9.9.8.5. Rooms adjacent to the lobby are required to be separated by a *fire separation*.	Rooms adjacent to the lobby are not required to be separated by a *fire separation* provided: (a) the *floor area* is *sprinklered* with fast-response sprinklers, and (b) *smoke detectors* are installed in the adjacent rooms.
26	**Rooms Opening into an *Exit*** Sentence 3.4.4.4.(7); Article 9.9.5.9. *Service rooms* and ancillary rooms are not permitted to open directly into an *exit*.	*Service rooms* and ancillary rooms may open directly into an *exit* provided: (a) the rooms are *sprinklered* with fast-response sprinklers, and (b) weather stripping is installed on the doors to prevent the passage of smoke.
27	**Illumination of *Exit* Signs** Sentences 3.4.5.1.(2) and 3.4.5.1.(4); Sentences 9.9.11.3.(3) to 9.9.11.3.(4) *Exit* signs are required to be illuminated continuously while the *building* is occupied.	Where *exit* signage may compromise historic appearances, or authenticity of displays, *exit* signs may be installed to light only on an emergency condition, such as by the fire alarm system or due to power failure.
28	**Clearance from *Exit* Doors** Sentence 3.4.6.11.(1); Article 9.9.6.6. Stair risers shall not be closer than 300 mm from an *exit* door.	Except as permitted in Sentences 3.4.6.10.(2) or 9.9.6.6.(2), existing *exit* doors shall not extend beyond the first riser.
29	**Fire Escapes** Subsection 3.4.7.; Sentence 9.9.2.1.(2) Fire escapes are required to conform to Subsection 3.4.7.	Existing fire escapes that do not completely conform to Subsection 3.4.7. are *acceptable* provided: (a) the fire escapes are *acceptable*, and (b) the *building* is *sprinklered*.
30	**Fire Escape *Construction*** 3.4.7.2.; Sentence 9.9.2.1.(2)	Existing *combustible* fire escapes are permitted if the *building* is permitted to be of *combustible construction* by Part 3, Part 9 or by this table.
31	**Protection of Fire Escapes** Article 3.4.7.4.; Sentence 9.9.2.1.(2) Openings in the exterior wall adjacent to the fire escape are required to be protected by closures.	Existing openings in the exterior wall adjacent to the fire escape are not required to be protected by closures provided: (a) the *building* is *sprinklered*, and (b) a sprinkler head is located within 1.5 m of the opening required to be protected by Article 3.4.7.4.
32	***Vertical Service Space*** Article 3.6.3.1. *Vertical service spaces* are required to be separated from the adjacent *floor area* by a rated *fire separation*.	Existing *vertical service spaces* that do not completely conform to the rated *fire separation* requirements are *acceptable* provided the *vertical service spaces* are *sprinklered*.
33	**Height and Area of Rooms** Subsection 3.7.1.; Section 9.5.	Existing rooms are not required to comply to the minimum dimension requirements of Subsection 3.7.1. or Subsection 9.5.3.

	The height and area of rooms are required to comply to minimum dimension requirements.	
34	**Washroom Requirements** Subsection 3.7.2.; Section 9.31. *Buildings* are required to be provided with a minimum number of washroom fixtures.	Existing facilities are not required to completely comply to the requirements of Subsection 3.7.2. or Section 9.31. provided it is *acceptable* to the *Chief Building Official*.
35	**Access for Persons with Disabilities** Section 3.8.	Sentences 3.8.1.1.(3) and 3.8.4.1.(1) shall apply to *existing buildings*.
36	**Seismic Anchorage of Exterior Decoration** Subsection 4.1.8.	Existing exterior decorations are not required to fully comply to the anchorage requirements of Subsection 4.1.8. provided: (a) adequate means of protection is provided, or (b) there is no exposure to the public.
37	**Mechanical and Plumbing Systems** Part 6 and Part 7	Existing mechanical systems in buildings are not required to fully comply to the requirements of Parts 6 or 7 provided: (a) it is not an *unsafe condition*, and (b) it is *acceptable* to the *Chief Building Official*.
38	**Energy and Water Efficiency** Parts 9, 10 and 11	The existing level of energy and water efficiency in a building is not required to comply with the requirements of Parts 9, 10 or 11 provided the level of energy efficiency is acceptable to the *Chief Building Official*.

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11.6.1.1. Application

1) The alternative compliance measures in this Section apply to
a) *arts and culture indoor events* in *existing buildings*,
b) temporary *buildings*,
c) special event facilities in existing or temporary *buildings*, and
d) temporary emergency shelters in *existing buildings*.
2) Subject to the provisions of Article 1.6.7.3. of Division C, "temporary" in this Section means
a) in relation to special event facilities, no more than two months,
b) in relation to temporary *buildings*, no more than one year, and
c) in relation to emergency shelters, no more than one year or a fixed term acceptable to the *Chief Building Official*.

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11.6.2.1. Alternative Compliance Measures

1) Where the *occupancy* of an *existing building* or portion of an *existing building* is classified as Group D offices, Group E retail, Group F Division 2 production or rehearsal studio, wholesale, warehouse, or factory, or Group F Division 2 *artist studio* without living accommodations, the *major occupancy* may be changed to a temporary Group A Division 2 *major occupancy* for an *arts and culture indoor event* if
a) the maximum *occupant load* is no more than 250 persons,
b) the *arts and culture indoor event* is located in the *first storey* or the *storey* below the *first storey* and has at least one *exit* that conforms to Clauses 3.8.3.19.(1)(d) or (e),
c) emergency lighting is provided
i) inside washrooms or, in the case of a single toilet room, immediately outside the entrance door and visible under the closed toilet room door, and
ii) in locations leading from the *arts and culture indoor event* to the *street* as described in Sentence 3.2.7.3.(1),

d) portable fire extinguishers are installed in accordance with the Fire By-law, with at least one extinguisher at the main entrance and at each egress door leading from the *arts and culture indoor event floor area*,
e) an approved fire emergency procedures and security plan with approved maximum *occupant load* is posted beside each portable extinguisher at the main entrance and at each egress door leading from the *arts and culture indoor event*,
f) the *building* is equipped with a fire alarm system, or *supervisory staff* are designated to monitor egress and *exit* doors and to carry out an emergency evacuation in accordance with approved fire emergency procedure, and g) the *storey* below the *first storey* used for an *arts and culture indoor event* is equipped with a *sprinkler system*,
h) the *arts and culture indoor event* has at least one *accessible* entrance, and
i) the *arts and culture indoor event* has a *means of egress* in accordance with Article 3.8.3.19.

2) The floor of a *building* used for an *arts and culture indoor event* shall be
a) constructed of concrete supported by solid ground without suspended slab, or
b) certified by a *registered professional*, after a structural review, to be safe for *assembly occupancy* and designed to a minimum specified uniformly distributed *live load* of 4.8 kPa.

3) Cooking which generates grease-laden vapour is not permitted at an *arts and culture indoor event*, unless commercial cooking and ventilation equipment, installed under *permit* and conforming with Article 6.3.1.7., is used.

4) An approved maximum *occupant load* from the Vancouver Fire and Rescue Services, and a Vancouver Police Department security assessment shall be obtained for *arts and culture indoor events* in accordance with Table 11.6.2.1.

5) The number of *exits*, designated *supervisory staff*, and *exit* signs for *arts and culture indoor events* shall be provided in accordance with Table 11.6.2.1.

Table 11.6.2.1.
Requirements for Arts and Culture Indoor Events
Forming part of Article 11.6.2.1.

Occupant Load **for Event**	***Occupant Load*** **Approval Required(1)**	**Minimum number of *Exits* Required**	***Exit*** **Signage Required**	***Supervisory Staff*** **at Egress/*Exit* Door Required(2)**	**VPD Security Assessment Required(5)**
≤ 60 people for private SOL(3) or dry event(4)	Yes	1	No	1	No
≤ 60 people for public SOL(3)	Yes	1	No	1	Yes
61-250 people for private SOL(3) dry event(4) or public SOL(3)	Yes	2	Yes	2	Yes

Notes to Table 11.6.2.1.:
(1) Vancouver Fire and Rescue Services will assess and approve the maximum temporary *occupant load* for *arts and culture indoor events*.
(2) *Supervisory staff* is required to monitor all egress/*exit* doors. One supervisory staff must be provided at each required *exit* door at all times.
(3) SOL means Special Occasion License issued by the British Columbia Liquor Control and Licensing Branch.
(4) Dry event means an event at which there is no liquor service.
(5) VPD means Vancouver Police Department.

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11.6.3.2. Additional Requirements for Emergency Shelters

1) Notwithstanding the provisions of this By-law, a temporary emergency shelter is permitted in an *existing building*, except that there shall be

a) no cooking in the *building*, other than food re-heated by microwave,

b) no less than one staff for each 20 shelter spaces on duty at all times,

c) no more than one shelter bed for every 3.7 m^2 of *floor area* or, if bunk beds are provided, no more than two shelter beds for every 3.7 m^2 of *floor area*,

d) aisles no less than 900 mm wide on both sides of every shelter bed,

e) at least 2 *means of egress*,

f) *exit* signs on all *exit* doors,

g) additional directional *exit* signs, in any circumstance where *exit* signs over *exit* doors are not visible from any location in the shelter,

h) *exit* signs which comply with Subsection 3.4.5.,

i) *smoke alarms* conforming to Article 3.2.4.20. installed throughout the entire *building*,

j) at least one water closet for every 20 shelter spaces,

k) at least one lavatory for every 5 water closets, and

l) all staff shall have training in first aid and emergency evacuations.

2) A fixed term transitional housing or emergency shelter complying with the requirements of this Sentence is permitted to remain for not more than 3 years provided

a) the *building* is constructed as a

i) temporary emergency shelter complying with the requirements of Sentence (1), or

ii) factory constructed building complying with CSA Z240 MH except as required by 1.1.1.1.(2)(g) of Division A,

b) the *building* is *sprinklered* with quick response or residential sprinklers,

c) the *building* is provided with a single stage fire alarm system, and

d) the *owner* provides an operating agreement stating the intended fixed term of occupancy, maximum occupant load, and minimum operating staff level, as acceptable to the *Chief Building Official*.

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11.7.1.1. Application to Existing Buildings

1) Except as permitted by Sentence (2), *alterations* to a *building* shall be in conformance with this Subsection for the purposes of energy and emissions performance.

2) A structure that cannot be identified by the characteristics of a *building* in this Subsection shall comply with the requirements of Article 11.7.1.2., or as deemed *acceptable* to the *Chief Building Official*.

3) Except as permitted in Sentence (5) and Articles 11.7.1.2. through 11.7.1.6., *alterations* to a *building* shall comply with

a) alterations clauses within ANSI/ASHRAE/IES 90.1, “Energy Standard for Buildings Except Low-Rise Residential Buildings,” and Sentence 10.2.2.2.(2), or

b) the “Alteration Language Supporting NECB 2015” (See Note A-11.7.1.1.(3).).

4) Where a *building* contains one or more *major occupancies* that conform to Article 10.2.2.5., the remaining *major occupancies* shall comply with Clause (3)(a) or (b).

5) Spaces never previously occupied, shall be designed and constructed to new *building* requirements, in compliance with

a) Article 10.2.2.3, if the *building* was designed or upgraded to NECB, or

b) Article 10.2.2.2.,

(See Note A-11.7.1.1.(5).)

6) The design requirements of Subsection 10.2.2. shall form an integral part of this Subsection, except where otherwise indicated.

7) Compliance with the requirements of this Subsection does not exempt upgrades that are otherwise required by this Part.

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11.7.1.2. Buildings without Residential or Commercial Components

1) Alterations to energy systems or components of a *building*, except those included in Articles 11.7.1.3. through 11.7.1.6., shall comply with

a) the *alteration* requirements of

i) Clause 11.7.1.1.(3)(a) except as required by Clause (ii), or

ii) Clause 11.7.1.1.(3)(b) where the building was designed or upgraded to NECB, and

b) Articles 10.2.2.8 through 10.2.2.22. as applicable.

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11.7.1.3. Residential Buildings of 7 Storeys or More, and Commercial Buildings (with or without residential components)

1) Alterations to energy systems or components of a *building* containing Group C, D, or E *Major Occupancies*, except those included in Articles 11.7.1.4 through 11.7.1.6., shall comply with

a) the *alteration* requirements of Clause 11.7.1.1.(3)(b),

b) Articles 10.2.2.8 through 10.2.2.20. as applicable,

c) the airtightness performance of Article 10.2.2.21. for reconstruction projects, and

d) Article 10.2.2.22. as applicable.

Notes to Part 11 Changes

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A-11.6.3.2.(2) Fixed Term Transitional Housing or Emergency Shelter. The requirements for fixed term transitional housing or emergency shelters described in Sentence 11.6.3.2.(2) are intended to accommodate temporary, but longer term housing that may be deployed for a fixed duration to address ongoing housing concerns.

Fixed term housing or shelters may be consist of temporarily repurposed buildings, or may be constructed as modular factory built structures in accordance with CSA Z240 MH to the extent permitted by Division A (See also note A-1.1.1.1.(3) of Division A) or other regulatory requirements.

The requirements of Sentence 11.6.3.2.(2) and Division C Article 1.6.8.1.(1) require that the term of occupancy be limited. This reflects the potential risk that the form of construction may not be appropriate for permanent use, either as a consequence of the inability to maintain the building due to ongoing use, or due to reduced durability. However, this term may be extended once by the Chief Building Official in accordance with Article 1.6.8.8., provided that it can be shown that the building will be able to support extended use.

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A-11.7.1.1.(3) Alteration Language Supporting NECB 2015. The term “alteration language” is used in Section 11.7 to describe the design upgrade requirements pertaining to the energy efficiency performance of buildings that are being altered from their existing condition. These requirements are fully described in the living document available on the City of Vancouver website and which is updated from time to time.

This document contains an introduction that clarifies Intent, Implementation, Scope, and Application and is reproduced here for convenience. By-law users are reminded of the need to keep up to date with the current requirements.

Alteration Language to Support the Application of the NECB 2015

Version: June 1, 2020

ACKNOWLEDGEMENT

The City of Vancouver would like to acknowledge the permission granted by ASHRAE for use of their alteration language, from the ASHRAE 90.1-2016 standard, as the foundation for this document. ASHRAE's willingness to support consistency within a jurisdiction with multiple energy standards is very much appreciated.

INTENT

The intention of this document is to provide building rehabilitation requirements to support the NECB in a manner consistent with the existing requirements pertaining to the ASHRAE 90.1-2016 standard.

With the implementation of NECB 2015 within Vancouver's Building Bylaw on June 3, 2019, this document provides the minimum requirements for alterations to existing buildings designed and constructed to NECB 2011 and those buildings subject to this document through 11.7 of Division B.

SCOPE

This document pertains to the application of existing buildings, specifically buildings:
- designed to NECB 2011,
- designed to ZEBP (10.2.2.5), or
- subject to 11.7.1.1(3)(c) requirements.

APPLICATION

This document applies to the alteration of any and all building components with prescriptive requirements listed within NECB 2015, with the exception of Solar Heat Gain Coefficient requirements being applicable to the City of Vancouver only.

DEFINITIONS

Alteration means a replacement or *addition* to a *building* or its *systems* and *equipment*; routine maintenance, *repair*, and service or a change in a building's use classification or category shall not constitute an *alteration*.

Equipment means devices for comfort conditioning, electric power, lighting, transportation, or *service water*, including but not limited to, furnaces, boilers, air conditioners, heat pumps, chillers, water heaters, lamps, luminaires, ballasts, elevators, escalators, or other devices or installations.

Existing building means a *building* or portion thereof that was previously occupied or approved for *occupancy* by the *authority having jurisdiction*.

Existing system means a *system* or *systems* previously installed in an e*xisting building*.

Fenestration area means the total area of the *fenestration* measured using the rough opening and including the glazing, *sash*, and *frame*. For doors where the glazed vision is less than 50% of the door area, the *fenestration area* is the glazed vision area.
For all other doors, the *fenestration area* is the door area.

Solar Heat Gain Coefficient (SHGC*) means the ratio of the solar heat gain entering the *space* through the *fenestration area* to the incident radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation, which is then reradiated, conducted, or convected into the space.
*All SHGC references within this document apply to the City of Vancouver only

Space means an enclosed *space* within a *building*.

System means a combination of *equipment* and auxiliary devices (e.g., controls, accessories, interconnecting means, and terminal elements) by which energy is transformed so it performs a specific function such as HVAC, *service water*, or lighting.

1.1 General

1.1.1 Instructions

This document shall be read in conjunction with NECB 2015. Words that appear in italics are defined in this document unless already defined within NECB 2015. All references to Parts are referring to the Parts within NECB 2015.

1.1.1.1 Additions to Existing Buildings. An extension or increase in the floor area or height of a *building*
outside of the *existing building envelope* shall be considered *additions* to *existing buildings* and shall comply with 1.2 of this document.

1.1.1.2 Alterations of Existing Buildings. *Alterations* of *existing buildings* shall comply with 1.2 of this
document.

1.1.1.3 Replacement of Portions of Existing Buildings. Portions of a *building envelope*, heating, ventilating, air-conditioning, *service water*, power, lighting, and other *systems* and *equipment* that are being replaced shall be considered as *alterations* of *existing buildings* and shall comply with 1.2 of this document.

1.2 Compliance

1.2.1 Compliance Paths

1.2.1.1 Additions to Existing Buildings. Additions to *existing buildings* shall comply with either the
provisions of Parts 3, 4, 5, 6, and 7, or Part 8.

Exception: When an *addition* to an *existing building* cannot comply by itself, trade-offs will be allowed by modification to one or more of the existing components of the *existing building*. Modelling of the modified components of the *existing building* and *addition* shall employ the procedures of NECB's Part 8; the *addition* shall not increase the energy consumption of the *existing building* plus the *addition* beyond the energy that would be consumed by the *existing building* plus the *addition* if the *addition* alone did comply.

1.2.1.2 Alterations of Existing Buildings. *Alterations* of *existing buildings* shall comply with the provisions of Parts 3, 4, 5, 6, and 7, or Part 8.

Exception:

a. A *building* that has been specifically designated as a Heritage building by the *authority having jurisdiction*, need not comply with these requirements.

2.1 Building Components and *Systems*

2.1.1 Building Envelope (supports Part 3 of the NECB 2015)

2.1.1.1 Envelope Alterations. *Alterations* to the *building envelope* shall comply with the requirements of
Part 3 for insulation, air leakage, and *fenestration* applicable to those specific portions of the building that are being altered. Fenestration must also comply with the SHGC values of 10.2.2.3 of the Vancouver Building Bylaw.

Exceptions: The following *alterations* need not comply with these requirements, provided such *alterations* will not increase the energy usage of the building:

a. Installation of storm windows or glazing panels over existing glazing, provided the storm window or glazing panel contains a low-emissivity coating. However, a low-emissivity coating is not required where the existing glazing already has a low-emissivity coating. Installation is permitted to be either on the inside or outside of the existing glazing.

b. Replacement of glazing in existing sash and frame provided the U-factor and *SHGC* (Vancouver only) will be equal to or lower than before the glass replacement.

c. *Alterations* to roof, wall, or floor cavities that are insulated to full depth with insulation having a minimum
nominal value of R-3.0/in.

d. *Alterations* to walls and floors, where the existing structure is without framing cavities and no new framing

cavities are created.
e. Roof recovering
f. Removal and replacement of a roof membrane where there is existing roof insulation integral to or below
the roof deck.
g. Replacement of existing doors that separate a conditioned *space* from the exterior shall not require the
installation of a vestibule or revolving door, provided that an existing vestibule that separates a conditioned
space from the exterior shall not be removed.
h. Replacement of existing fenestration, provided that the area of the replacement fenestration does not exceed 25% of the total *fenestration area* of an *existing building* and that the U-factor and *SHGC* (Vancouver only) will be equal to, or lower than before the fenestration replacement.

2.1.2 Lighting (supports Part 4 of the NECB 2015)

2.1.2.1 Lighting *Alterations*. For the *alteration* of any lighting *system* in an interior *space* or *exterior area*, that *space* shall comply with the entirety of Part 4, as applicable to that *space* or area.

Exceptions:

1. Interior lighting *alterations* where the total new wattage of all *replaced luminaires* on a project is 2,000 watts or less, the total wattage of *replaced luminaires* of a *lighting system* within a *space* shall be at least 50% below the total wattage of all *removed luminaires* of that *lighting system*, unless the *space* is at or below the *LPD* allowances of Part 4.

   Controls shall comply with the requirement of 4.2.2.1.(20).

2. Exterior lighting *alterations* where the total number of *replaced luminaires* on a project is 10 or less, the total wattage of *replaced luminaires* shall be at least 50% below the total wattage of all *removed luminaires*, unless each altered area is at or below the *LPD* allowances of Part 4.

   Controls shall comply with the requirement of 4.2.4.

3. The replacement of a failed *lamp* or *ballast/driver* in an individual *luminaire* or the replacement of any failed lighting control.

4. The removal or relocation of interior or exterior *luminaires* as part of, or independent of, exceptions 1, 2, or 3.

2.1.3 HVAC (supports Part 5 of the NECB 2015)

2.1.3.1 Additions to Existing Buildings. Mechanical *equipment* and *systems* serving the heating, cooling, or ventilating needs of additions to *existing buildings* shall comply with the requirements of Part 5.

Exception: When HVAC to an addition is provided by existing HVAC *systems* and *equipment*, such *existing systems* and *equipment* shall not be required to comply with Part 5. However, any new *systems* or *equipment* installed must comply with specific requirements applicable to those *systems* and *equipment*.

2.1.3.2 *Alterations* to Heating, Ventilating, and Air Conditioning in *Existing Buildings*

2.1.3.2.1 New HVAC equipment as a direct replacement of existing HVAC equipment shall comply
with the specific minimum efficiency requirements of Part 5, applicable to that equipment.

2.1.3.2.2 New cooling systems installed to serve previously uncooled spaces shall comply with 5.1.1.3.
2.1.3.2.3 Alterations to existing cooling systems shall not decrease economizer capability unless the
system complies with 5.2.2.8 and 5.2.2.9,
2.1.3.2.4 New and replacement ductwork shall comply with 5.2.2 and,
2.1.3.2.5 New and replacement piping shall comply with 5.2.5.
Exceptions: Compliance shall not be required:
a. for *equipment* that is being modified or repaired but not replaced, provided that such modifications and/
or repairs will not result in an increase in the annual energy consumption of the *equipment* using the same
energy type;
b. where a replacement or *alteration* of *equipment* requires extensive revisions to other *systems*, *equipment*, or elements of a building, and such replaced or altered *equipment* is a like-for-like replacement, or better;
c. for a refrigerant change of existing *equipment*;
d. for the relocation of existing *equipment*; or
e. for ducts and pipes where there is insufficient *space* or access to meet these requirements.

2.1.4 Service Water Systems (supports Part 6 of the NECB 2015)

2.1.4.1 Additions to Existing Buildings. Service water *systems* and *equipment* shall comply with the
requirements of Part 6.
Exception: When the service water *system* to an addition is provided by existing service water *systems* and *equipment*, such *systems* and *equipment* shall not be required to comply with Part 6. However, any new *systems* or *equipment* installed must comply with specific requirements applicable to those *systems* and *equipment*.
2.1.4.2 Alterations to Existing Buildings. Building service water *systems equipment* installed as a direct
replacement for *existing building* service water *system equipment* shall comply with the requirements of Part 6 applicable to the *equipment* being replaced. New and replacement piping shall comply with 6.2.3.
Exception: Compliance shall not be required where there is insufficient *space* or access to meet these requirements.

2.1.5 Power (supports Part 7 of the NECB 2015)

2.1.5.1 Addition to Existing Buildings. Equipment installed in addition to existing buildings shall comply with the requirements of Part 7.
2.1.5.2 Alterations to Existing Buildings.
Exception: Compliance shall not be required for the relocation or reuse of existing *equipment* at the same site.
2.1.5.3 *Alterations* to building service *equipment* or *systems* shall comply with the requirements of this section applicable to those specific portions of the building and its *systems* that are being altered.
2.1.5.4 Any new *equipment* subject to the requirements of this section that is installed in conjunction with the
alterations, as a direct replacement of existing *equipment* shall comply with the specific requirements applicable to that *equipment*.

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A-11.6.3.2.(2) Fixed Term Transitional Housing or Emergency Shelter. The requirements for fixed term transitional housing or emergency shelters described in Sentence 11.6.3.2.(2) are intended to accommodate

temporary, but longer term housing that may be deployed for a fixed duration to address ongoing housing concerns.

Fixed term housing or shelters may be consist of temporarily repurposed buildings, or may be constructed as modular factory built structures in accordance with CSA Z240 MH to the extent permitted by Division A (See also note A-1.1.1.1.(3) of Division A) or other regulatory requirements.

The requirements of Sentence 11.6.3.2.(2) and Division C Article 1.6.8.1.(1) require that the term of occupancy be limited. This reflects the potential risk that the form of construction may not be appropriate for permanent use, either as a consequence of the inability to maintain the building due to ongoing use, or due to reduced durability. However, this term may be extended once by the Chief Building Official in accordance with Article 1.6.8.8., provided that it can be shown that the building will be able to support extended use.

Book I – Division B, Notes to Part 11 Changes

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DESIGN UPGRADE LEVEL TABLES

Table A-11.2.1.2.-B
DESIGN UPGRADE LEVELS FOR FIRE, LIFE AND HEALTH SAFETY (F), STRUCTURAL SAFETY(S), NON-STRUCTURAL SAFETY (N), and ACCESSIBILITY (A)

DESIGN LEVEL(1)	OBJECTIVE STATEMENT	ALTERNATIVE ACCEPTABLE SOLUTIONS
F1	Exiting to be reviewed to ensure that the exits do not present an unsafe condition.	**Project Area** - Exits to be upgraded with respect to number, capacity, and fire separations only.
S1	Proposed work must not have an adverse effect on the structural capacity of the existing structure.	**Entire Building** - Proposed work must not reduce the structural integrity of the existing building.
N1	Project area to be reviewed to ensure safety from overhead falling hazards.	**Project Area -** Restrain all ceiling supporting frames, T-bars assemblies, ceiling gypsum wall boards, all overhead mechanical ducts, sprinklers, and equipment, overhead electrical conduits and lights
A1	The proposed work must not adversely affect the existing accessibility level of the building.	**Project Area** - Existing level of accessibility must be maintained throughout the project area. No additional accessibility enhancements are required.
F2	Existing building to meet the fire & life safety requirements of the Building By-law within the project area and have conforming exits leading from the project area to an acceptable open space.	**Project Area** - Alarms and detectors (only where existing devices are provided), emergency lights, access to exit, exits, exit signs, and exit lights. **Public Area** (leading from project area to an acceptable open space) - emergency lights, exit signs, access to exit, exits, and flame spread ratings.
S2	Limited structural upgrade required in order to provide minimum protection to building occupants during a seismic event within the project area.	**Project Area** - Non-structural elements and falling hazards must be restrained to resist lateral loads due to earthquakes within the project area.
N2	Project area and means of egress to be reviewed to ensure safety from overhead falling hazards.	**Project Area Means of Egress -** Restrain interior partition walls. Restrain all ceiling supporting frames, T-bars assemblies, ceiling gypsum wall boards, sprinklers, all overhead mechanical ducts, and equipment, overhead electrical conduits and lights. Restrain cladding veneer,

		parapets, canopies and ornaments over exit and extended to 5 m on either side of exit
A2	A limited level of upgrade shall be provided within the project area to ensure access for persons with disabilities.	**Project Area** - door clearances, door hardware, and areas of refuge.
F3	Existing building to meet fire, life and health safety requirements within the project area. Existing building to meet fire, life & health safety requirements within the public areas.	**Project Area** – Alarms & detectors (only where existing devices are provided), emergency lighting, access to exit, exits, exit signs, exit lights, flame spread ratings, floor assemblies & supports, occupancy separation, standpipes and sprinklers, washrooms. **Public Area** - Alarms & detectors (only where existing devices are provided), emergency lighting, access to exit, exits, exit signs, exit lights. **Entire Building** – Fire fighter's access.
S3	The building structure shall be upgraded to an acceptable level in order to provide a minimum level of property and life safety to unreinforced masonry or other buildings having less than 30 percent of the current required seismic resistance. Falling hazards that may impact adjacent properties and over public ways must be addressed.	**Entire Building** — Building to be upgraded to resist 50 percent of the current By-law specified lateral force levels, where the building is evaluated as having less than 30 percent of the current required seismic resistance. Restrain falling hazards from major building components such as cantilevered walls, parapets, exterior ornaments, towers, chimneys, or other appendages, which could impact adjacent properties and public ways to resist forces due to a seismic event.
N3	Building exits and to acceptable open space to be reviewed to ensure safety from overhead falling hazards.	**Entire Building Exits** - Restrain interior partition walls. Restrain ceiling supporting frames, T-bars assemblies, ceiling gypsum wall boards, overhead mechanical equipment, sprinklers, and services, overhead electrical equipment and services. Restrain falling hazards to resist forces due to a seismic event from non-structural elements including cladding, veneer, cornices, canopies, awnings, and ornaments over exit and extended to 5 m on either side of exit.
A3	The existing building shall be upgraded to an acceptable level in order to ensure complete access within the project area as well as access to the remainder of the building.	**Project Area** — Door clearances, door hardware, accessible washrooms, and areas of refuge. **Public Area** — Door clearances, door hardware, areas of refuge, washrooms, ramps, and elevators.
F4	Entire building to substantially meet the intent of health, fire and life safety requirements of the VBBL as well as provide protection to adjacent property.	**Entire Building** — Alarms & detectors, emergency lighting, access to exit, exits, exit signs, exit lights, flame spread ratings, firefighting access & water supply, floor assemblies & support, spatial separation, occupancy separation, standpipes & sprinklers, washrooms, high building requirements, lighting levels, sound transmission classifications, ventilation, building envelope review, and radio antenna systems.
S4	The entire building structure shall be brought up to an acceptable level in order to meet seismic requirements of the VBBL.	**Entire Building** — Building to be upgraded to resist 75 percent of the current By-law specified lateral force levels, where the building is evaluated as having less than 60 percent of the current required seismic resistance.
N4	Entire Building and to acceptable open space to be reviewed to ensure safety from	**Entire Building** — Restrain all interior partition walls. Restrain all ceiling supporting frames, T-bars assemblies,

	overhead falling hazards.	ceiling gypsum wall boards, sprinklers, overhead mechanical equipment and services, overhead electrical equipment and services. Restrain exterior falling hazards to resist forces due to a seismic event from cladding, veneer, cornices, parapets, canopies, awnings, and ornaments attached to the exterior of the building.
A4	The existing building shall be upgraded in order to provide the minimum accessibility requirements of the VBBL.	**Entire Building** — Building to meet accessibility provisions of the current VBBL.

Notes to Table A-11.2.1.2.-B:

(1) Where there is one or more upgrade level(s) within the same category preceding the design upgrade level in Table A-11.2.1.2.-B, then the design upgrade level shall also include all of the preceding upgrade levels. For example, where the design upgrade level is F3, then all of the upgrade requirements under F2 and F1 also apply.

Book I – Division B, Appendix C Changes

[replace Table C-3 as follows]

Table C-3
Seismic Design Data for Selected Locations in Vancouver

Location	Seismic Data							
	$S_a(0.2)$	$S_a(0.5)$	$S_a(1.0)$	$S_a(2.0)$	$S_a(5.0)$	$S_a(10.0)$	PGA	PGV
Burnaby (General)(1)	0.673	0.386	0.236	0.076	0.027	0.333	0.500	0.768
North Vancouver(1)	0.699	0.399	0.243	0.077	0.027	0.345	0.518	0.794
Richmond(1)	0.885	0.787	0.443	0.266	0.083	0.029	0.383	0.578
Vancouver (City Hall)	0.848	0.751	0.425	0.257	0.080	0.029	0.369	0.553
Vancouver (Granville & 41 Ave)	0.863	0.765	0.432	0.261	0.081	0.029	0.375	0.563

Notes to Table C-3:

(1) Data for regions immediately adjoining Vancouver provided here for context.

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Appendix D
Fire Performance Ratings

This Appendix is included for explanatory purposes only and does not form part of the requirements except as defined in Division A, Sentence 1.1.3.1.(1). The bold face reference numbers that introduce each item do not relate to specific requirements in this Division.

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D-1.1.1. Scope

1) This fire-performance information is presented in a form closely linked to the performance requirements and the minimum materials specifications of this By-law.

2) The ratings have been assigned only after careful consideration of all available literature on assemblies of common building materials, where they are adequately identified by description. The assigned values based on this information will, in most instances, be conservative when compared to the ratings determined on the basis of actual tests on individual assemblies.

3) The fire-performance information set out in this Appendix applies to materials and assemblies of materials that comply in all essential details with the minimum structural design standards described in Part 4. Additional requirements, where appropriate, are described in other Sections of this Appendix.

4) Section D-2 assigns fire-resistance ratings for walls, floors, roofs, columns and beams related to CAN/ULC-S101, “Fire Endurance Tests of Building Construction and Materials,” and describes methods for determining these ratings.

5) Section D-3 assigns flame-spread ratings and smoke developed classifications for surface materials related to CAN/ULC-S102, “Test for Surface Burning Characteristics of Building Materials and Assemblies,” and CAN/ULC-S102.2, “Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.”

6) Section D-4 describes noncombustibility in building materials when tested in accordance with CAN/ULC-S114, “Test for Determination of Non-Combustibility in Building Materials.”

7) Section D-5 contains requirements for the installation of fire doors and fire dampers in fire-rated stud wall assemblies.

8) Article D-6.1.1. contains 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, “Fire Test of Exterior Wall Assemblies.

9) Section D-7 contains background information regarding fire test reports, obsolete materials and assemblies, assessment of archaic assemblies and the development of the component additive method.

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D-1.1.2. Referenced Documents

1) Where documents are referenced in this Appendix, they shall be the editions designated in Table D-1.1.2.

Table D-1.1.2.
Documents Referenced in Appendix D, Fire-Performance Ratings

Issuing Agency	Document Number(1)	Title of Document(2)	By-law Reference
ANSI	A208.1-2009	Particleboard	D-3.1.1.
ASTM	C 330/C 330M-13	Lightweight Aggregates for Structural Concrete	D-1.4.3.
ASTM	C 840-13	Application and Finishing of Gypsum Board	D-2.3.9.

ASTM	C 1396/C 1396M-14	Gypsum Board	D-1.5.1. D-3.1.1.
ASTM	D2898-10	Accelerated Weathering of Fire-Retardant-Treated Wood for fire Testing	Table D-6.1.1.
CCBFC	NRCC 30629	Supplement to the National Building Code of Canada 1990	D-6.2. D-6.3. D-6.4.
CGSB	4-GP-36M-1978	Carpet Underlay, Fiber Type	D-3.1.1.
CGSB	CAN/CGSB-4.129-97	Carpets for Commercial Use	D-3.1.1.
CGSB	CAN/CGSB-11.3-M87	Hardboard	D-3.1.1.
CGSB	CAN/CGSB-92.2-M90	Trowel or Spray Applied Acoustical Material	D-2.3.4.
CSA	A23.1-14/A23.2-14	Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete	D-1.4.3.
CSA	A23.3-14	Design of Concrete Structures	D-2.1.5. D-2.6.6. D-2.8.2.
CSA	CAN/CSA-A82-14	Fired Masonry Brick Made from Clay or Shale	D-2.6.1.
CSA	A82.22-M1977	Gypsum Plasters	D-3.1.1.
CSA	CAN/CSA-A82.27-M91	Gypsum Board	D-1.5.1. D-3.1.1.
CSA	A82.30-M1980	Interior Furring, Lathing and Gypsum Plastering	D-1.7.2. D-2.3.9. D-2.5.1.
CSA	A165.1-14	Concrete Block Masonry Units	D-2.1.1.
CSA	O86-14	Engineering Design in Wood	D-2.11.2. D-2.12.1.
CSA	O86-19	Engineering Design in Wood incorporating Update No.1 to the original 2014 Standard	D-2.11.4.
CSA	O112.10-08	Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure)	D-2.3.6.
CSA	O121-08	Douglas Fir Plywood	D-3.1.1.
CSA	O141-05	Softwood Lumber	D-2.3.6. D-2.4.1.
CSA	O151-09	Canadian Softwood Plywood	D-3.1.1.
CSA	O153-13	Poplar Plywood	D-3.1.1.

CSA	O325-07	Construction Sheathing	D-3.1.1.
CSA	O437.0-93	OSB and Waferboard	D-3.1.1.
CSA	S16-14	Design of Steel Structures	D-2.6.6.
NFPA	80-2013	Fire Doors and Other Opening Protectives	D-5.2.1.
ULC	CAN/ULC-S101-14	Fire Endurance Tests of Building Construction and Materials	D-1.1.1. D-1.12.1. D-2.3.2. D-2.11.1.
ULC	CAN/ULC-S102-10	Test for Surface Burning Characteristics of Building Materials and Assemblies	D-1.1.1. D-6.1.1. Table D-6.1.1.
ULC	CAN/ULC-S102.2-10	Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies	D-1.1.1. D-3.1.1.
ULC	CAN/ULC-S112.2-07	Fire Test of Ceiling Firestop Flap Assemblies	D-2.3.10. D-2.3.11.
ULC	CAN/ULC-S114-05	Test for Determination of Non-Combustibility in Building Materials	D-1.1.1. D-4.1.1. D-4.2.1.
ULC	CAN/ULC-S134-13	Fire Test of Exterior Wall Assemblies	D-1.1.1. D-6.1.1.
ULC	CAN/ULC-S702-09	Mineral Fibre Thermal Insulation for Buildings	D-2.3.4. D-2.3.5. D-2.6.1. Table D-6.1.1.
ULC	CAN/ULC-S703-09	Cellulose Fibre Insulation for Buildings	D-2.3.4.
ULC	CAN/ULC-S706-09	Wood Fibre Insulating Boards for Buildings	D-3.1.1.

Notes to Table D-1.1.2.:

(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.

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D-2.1.2. Applicability of Ratings

1) Ratings obtained as described in Article D-2.1.1. apply to either loadbearing or non-loadbearing walls, except for walls described in Sentences (2) to (6).

2) Ratings for walls with a thickness less than the minimum thickness prescribed for loadbearing walls in this By-law apply to non-loadbearing walls only.

3) Masonry cavity walls (consisting of 2 wythes of masonry with an air space between) that are loaded to a maximum allowable compressive stress of 380 kPa have a fire resistance at least as great as that of a solid wall of a thickness equal to the sum of the equivalent thicknesses of the 2 wythes.

4) Masonry cavity walls that are loaded to a compressive stress exceeding 380 kPa are not considered to be within the scope of this Appendix.

5) A masonry wall consisting of 2 types of masonry units, either bonded together or in the form of a cavity wall, shall be considered to have a fire-resistance rating equal to that which would apply if the whole of the wall were of the material that gives the lesser rating.

6) A non-loadbearing cavity wall made up of 2 precast concrete panels with an air space or insulation in the cavity between them shall be considered to have a fire-resistance rating as great as that of a solid wall of a thickness equal to the sum of the thicknesses of the 2 panels.

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D-2.6.6. Concrete Filled Hollow Steel Columns

1) A fire-resistance rating, R, is permitted to be assigned to concentrically loaded hollow steel columns that are filled with plain concrete, steel-fibre reinforced concrete or bar-reinforced concrete, that are fabricated and erected within the tolerances stipulated in CSA S16, "Design of Steel Structures," and that comply with Sentences (2) and (3), provided:

$$C \leq C_{max}$$

where

C = axial compressive force due to dead and live loads without load factors, kN,

$$C_{max} = \left(\frac{a(f'_c + 20)D^{2.5}}{R(KL - 1000)}\right)^2$$

but shall not exceed

a) 1.0 C'_r for plain concrete filling (PC),

b) 1.1 C'_r for steel-fibre reinforced concrete filling (FC), and

c) 1.7 C'_r for bar-reinforced concrete filling (RC),

where

$$C'_r = 0.85\varphi_c f'_c A_c \lambda_c^{-2}\left(\sqrt{1 + 0.25\lambda_c^{-4}} - 0.5\lambda_c^{-2}\right)$$

where

a = constant obtained from Table D-2.6.6.-A,

f'_c = specified compressive strength of concrete in accordance with CSA A23.3, "Design of Concrete Structures," MPa,

r_c = radius of gyration of the concrete area,

A_c = area of concrete, mm^2,

D = outside diameter of a round column or outside width of a square column, mm,

E_c = initial elastic modulus for concrete, considering the effects of long-term loading for normal-weight concrete = $\left(1 + \frac{S}{T}\right) 2500\sqrt{f'_c}$, where f'_c is expressed in MPa, S is the short-term load, and T is the total load on the column,

R = specified fire-resistance rating, min,

KL = effective length of column as defined in CSA S16, "Design of Steel Structures," mm,

$$\lambda_c = \frac{KL}{r_c}\sqrt{\frac{f'_c}{w^2 E_c}}, \text{ and}$$

$$\phi_c = 0.60$$

subject to the validity limits stated in Table D-2.6.6.-B.

Table D-2.6.6.-A
Values of Constant "a"

Filling Type	Concrete Type(1)	Steel Reinforcement	Circular Columns	Square Columns
PC	S	n/a	0.070	0.060

FC	S	≈ 2%	0.075	0.065
RC	S	1.5%-3%	0.080	0.070
RC	S	3%-5%	0.085	0.075
PC	N	n/a	0.080	0.070
FC	N	≈ 2%	0.085	0.075
RC	N	1.5%-3%	0.090	0.080
RC	N	3%-5%	0.095	0.085

Notes to Table D-2.6.6.-A:
(1) See Subsection D-1.4.

2) A pair of steam vent holes shall be provided at each end of the hollow steel column and at each intermediate floor level, and the holes shall be

a) not less than 13 mm in diameter,
b) located on opposite faces, 150 mm above or below a base plate, cap plate or concrete slab,
c) orientated so that adjacent pairs are perpendicular, and
d) not obstructed by other building elements.

3) Load application and reaction shall be through end bearing in accordance with CSA S16, "Design of Steel Structures."

Table D-2.6.6.-B
Validity Limits

Parameter	Type of Concrete Filling		
	PC	FC	RC
f'c (MPa)	20 to 40	20 to 55	20 to 55
D (round) (mm)	140 to 410	140 to 410	165 to 410
D (square) (mm)	140 to 305	102 to 305	175 to 305
Reinforcement (%)	n/a	≈ 2% of the concrete mix by mass	1.5% to 5% of cross-sectional area(1)
Concrete Cover (mm)	n/a	n/a	≥ 25
R (min)	≤ 120	≤ 180	≤ 180
KL (mm)	2 000 to 4 000	2 000 to 4 500	2 000 to 4 500
Class(2)	1, 2 or 3	1, 2 or 3	1, 2 or 3

Notes to Table D-2.6.6.-B:
(1) Limits on size, number and spacing of bars and ties in accordance with CSA A23.3, "Design of Concrete Structures."
(2)(2) Classification of sections in accordance with CSA S16, "Design of Steel Structures."

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D-2.11. Mass Timber Elements

D-2.11.1. Determination of Rating

1) The design methodologies described in this Section are intended to be used to establish fire resistance ratings on the basis of the structural elements being exposed to the standard fire exposure conditions in accordance with CAN/ULC–S101.
2) In a standard fire-resistance test, loadbearing timber beams and columns are assigned a fire-resistance rating that relates to the time in the test at which the applied load can no longer be sustained. Wall, floor and roof assemblies are assigned a fire-resistance rating that relates to the time in the test that is the lesser of any 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.

D-2.11.2. Applicability of Methods
1) The method of calculation in Article D-2.11.3. 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.
2) The method of calculation in Article D-2.11.4. applies to mass timber members required to have a fire-resistance rating, 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.
3) The two methods of calculation in Articles D-2.11.3. and D-2.11.4. are separate and independent methodologies that use different approaches to the development of fire-resistance ratings for mass timber elements.

D-2.11.3. Method A - Glued-Laminated Timber Beams and Columns
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-2.11.3.-A,
B = the full dimension of the smaller side of a beam or column in millimetres before exposure to fire [see Figure D-2.11.3.-B],
D = the full dimension of the larger side of a beam or column in millimetres before exposure to fire [see Figure D-2.11.3.-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.”

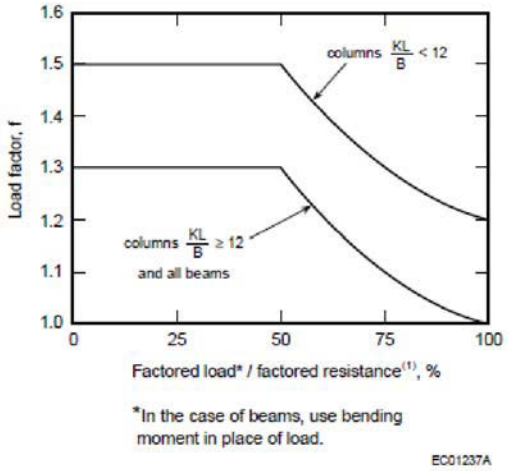

Figure D-2.11.3.-A
Factors to compensate for partially loaded columns and beams
Note to Figure D-2.11.3-A:
(1) See Sentence (2).

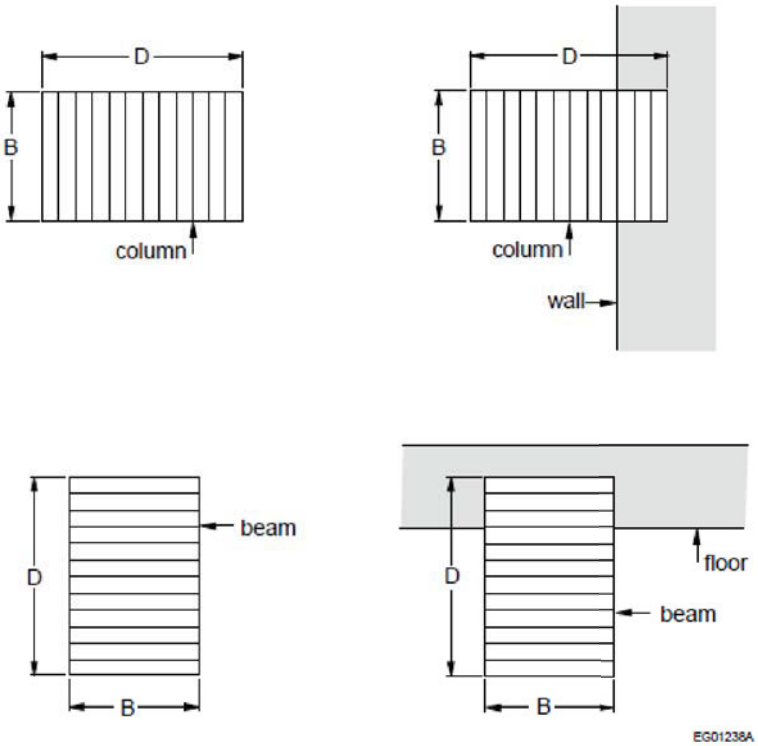

Figure D-2.11.3.-B
Full dimensions of glued-laminated beams and columns

D-2.11.4. Method B - Mass Timber Members and Elements

1) A fire-resistance rating is permitted to be assigned to mass timber structural members, such as beams and columns of glued-laminated timber, solid-sawn timber and structural composite lumber, using the method of calculation in Annex B, “Fire resistance of large cross-section wood elements”, of CSA O86, “Engineering Design in Wood”.

2) Except as required in Sentence (3) and provided in Sentences (4) to (6), a fire-resistance rating is permitted to be assigned to mass timber wall, floor and roof assemblies, including those constructed of cross-laminated timber, using the method of calculation in Annex B, "Fire resistance of large cross-section wood elements", of CSA O86, "Engineering Design in Wood".
3) Except as permitted in Sentence (4), for wall, floor and roof assemblies described in Sentence (2), protection shall be applied to the assembly to ensure the integrity and thermal insulation properties of the assembly for the fire-resistance rating period calculated, consisting of
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) not less than 12.5 mm thick OSB or plywood, with staggering of joints from the joints in the mass timber assembly
ii) not less than 38 mm thick concrete topping, or
iii) not less than 25 mm thick gypsum-concrete topping
b) for plank decking designed in accordance with Clause B.10, at least one of the protection methods for the unexposed surface listed in Clause B.10.4 applied to the unexposed surface
c) for interior wall assemblies, at least one of the following protection methods applied to at least one side of the assembly, with staggering of joints from the joints in the mass timber assembly
i) not less than 12.5 mm thick OSB or plywood, or
ii) not less than 12.7 mm thick Type X gypsum board, and
d) for exterior wall assemblies, at least one of the following protection methods applied to at least one side of the assembly, with staggering of joints from the joints in the mass timber assembly
i) not less than 12.5 mm thick OSB or plywood,
ii) not less than 12.7 mm thick Type X gypsum board,
iii) not less than 12.7 mm thick gypsum sheathing on the exterior side of the assembly, or
iv) not less than 50 mm thick rock or slag insulation sheathing on the exterior side of the assembly.
4) For wall, floor and roof assemblies constructed of cross-laminated timber, the joints between mass timber panels need not be protected using one of the protection methods in Sentence (3) provided the joints are either lapped or splined to ensure the integrity and thermal insulation properties of the assembly for the fire-resistance rating period calculated. [see Figure D-2.11.4.(4)].

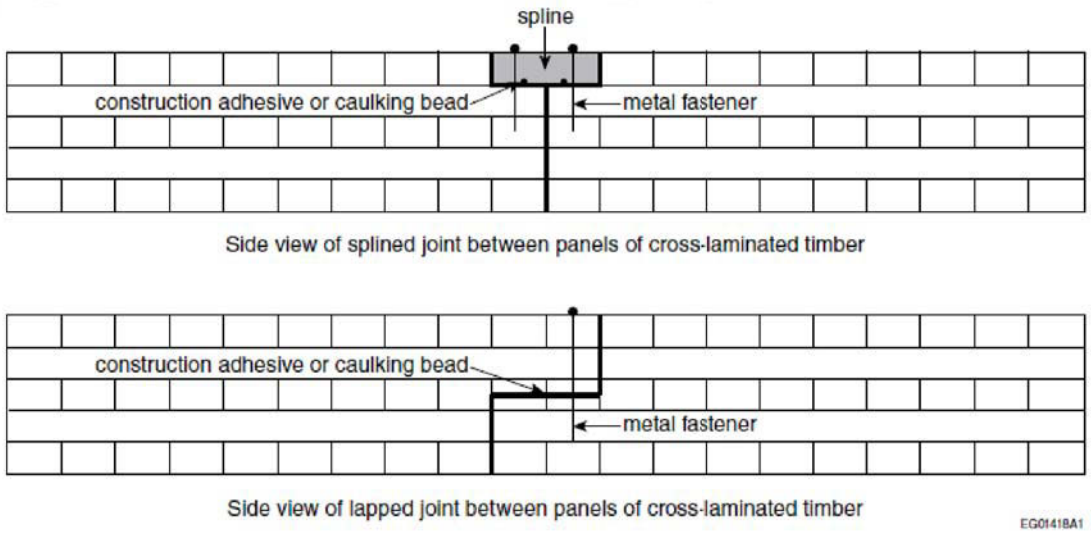

Figure D-2.11.4.
Structural joint details in cross-laminated timber elements

5) For interior wall assemblies, the additional fire-resistance times assigned in Clause B.8.1 shall only be applicable when both sides of the wall assembly are protected using one of the options in Clause B.8. When the level of protection differs on the two sides, the additional fire-resistance time assigned is the lesser of the two values for the different levels of protection being used.
6) For exterior wall assemblies, the additional fire-resistance times assigned in Clause B.8.1 shall only be applicable when
a) the protection is applied to the interior (fire-exposed) side of the wall assembly, and
b) except for wall assemblies constructed of cross-laminated timber as described in Sentence (4), there is at least one of the protection methods in Subclauses (3)(d)(i) to (iv) applied on the exterior (unexposed) side of the assembly.

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D-2.12. Cross Laminated Timber

D-2.12.1. Applicability of Information

As a developing technology, it is expected that designers follow best practice in the use of this material. To this end, in addition to compliance with the CSA-086-14 standard (as amended), designers should consider the information and criteria contained in published good engineering practice references such as the Canadian Wood Council Wood Design Manual (2017) and CLT handbook which are recognized to represent much of the current information related to the design of cross laminated timber (CLT) assemblies. In addition, research by the NRC, Canadian Wood Council, and other groups have shown that the type and arrangement of connections and penetrations, and the adhesive used as part of the CLT play a major role in the fire-resistive performance of these assemblies. Designers are therefore urged to carefully consider the impacts of such details as a part of their design.

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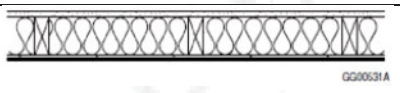
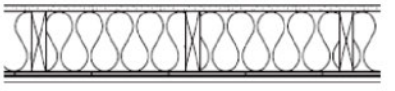
Section D-6 Fire Performance of Exterior Wall Assemblies

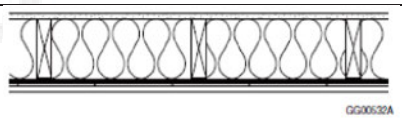
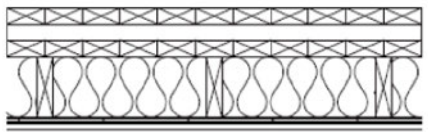
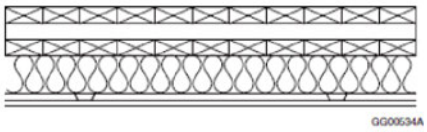
D-6.1. Scope

D-6.1.1. Exterior Wall Assemblies

Table D-6.1.1. shows 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, “Fire Test of Exterior Wall Assemblies.” These exterior wall assemblies are suitable for use in buildings permitted to be of encapsulated mass timber construction.

Table D-6.1.1.
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

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	140 mm thick rock or slag fibre in cavities formed by	Gypsum sheathing ≥ 12.7 mm thick	Noncombustible exterior cladding	

	o.c.[1][2]	studs[3][4]			
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	Noncombustible exterior cladding	
EXTW-4	38 mm x 140 mm wood studs spaced at 400 mm o.c.[1][2] attached to cross-laminated timber (CLT) wall panels ≥ 38 mm thick[8]	140 mm thick glass, rock or slag fibre in cavities formed by studs[3]	Gypsum sheathing ≥ 12.7 mm thick	Noncombustible exterior cladding	
EXTW-5	89 mm horizontal Z-bars spaced at 600 mm o.c. attached to CLT wall panels ≥ 105 mm thick[8]	89 mm thick rock or slag fibre in cavities formed by Z-bars[3][4]	-	Noncombustible exterior cladding attached to 19 mm vertical hat channels spaced at 600 mm o.c.	

Notes to Table D-6.1.1.:

[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, "Mineral Fibre Thermal Insulation for Buildings."

[4] The absorptive material must have a density not less than 32 kg/m^3.

[5] The fire-retardant-treated plywood siding must conform to the requirements of Article 3.1.4.5. 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.

[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 CLT wall panels.

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Section D-7 Background Information

D-7.1. Fire Test Reports

Summaries of available fire test information have been published by NRC as follows:

(1) M. Galbreath, Flame Spread Performance of Common Building Materials. Technical Paper No. 170, Division of Building Research, National Research Council Canada, Ottawa, April 1964. NRCC 7820.
(2) M. Galbreath and W.W. Stanzak, Fire Endurance of Protected Steel Columns and Beams. Technical Paper No. 194, Division of Building Research, National Research Council Canada, Ottawa, April 1965. NRCC 8379.

(3) T.Z. Harmathy and W.W. Stanzak, Elevated-Temperature Tensile and Creep Properties of Some Structural and Prestressing Steels. American Society for Testing and Materials, Special Technical Publication 464, 1970, p. 186 (DBR Research Paper No. 424) NRCC 11163.
(4) T.Z. Harmathy, Thermal Performance of Concrete Masonry Walls in Fire. American Society for Testing and Materials, Special Technical Publication 464, 1970, p. 209 (DBR Research Paper No. 423) NRCC 11161.
(5) L.W. Allen, Fire Endurance of Selected Non-Loadbearing Concrete Masonry Walls. DBR Fire Study No. 25, Division of Building Research, National Research Council Canada, Ottawa, March 1970. NRCC 11275.
(6) A. Rose, Comparison of Flame Spread Ratings by Radiant Panel, Tunnel Furnace, and Pittsburgh-Corning Apparatus. DBR Fire Study No. 22, Division of Building Research, National Research Council Canada, Ottawa, June 1969. NRCC 10788.
(7) T.T. Lie and D.E. Allen, Calculation of the Fire Resistance of Reinforced Concrete Columns. DBR Technical Paper No. 378, Division of Building Research, National Research Council Canada, Ottawa, August 1972. NRCC 12797.
(8) W.W. Stanzak, Column Covers: A Practical Application of Sheet Steel as a Protective Membrane. DBR Fire Study No. 27, Division of Building Research, National Research Council Canada, Ottawa, February 1972. NRCC 12483.
(9) W.W. Stanzak, Sheet Steel as a Protective Membrane for Steel Beams and Columns. DBR Fire Study No. 23, Division of Building Research, National Research Council Canada, Ottawa, November 1969. NRCC 10865.
(10)W.W. Stanzak and T.T. Lie, Fire Tests on Protected Steel Columns with Different Cross-Sections. DBR Fire Study No. 30, Division of Building Research, National Research Council Canada, Ottawa, February 1973. NRCC 13072.
(11) G. Williams-Leir and L.W. Allen, Prediction of Fire Endurance of Concrete Masonry Walls. DBR Technical Paper No. 399, Division of Building Research, National Research Council Canada, Ottawa, November 1973. NRCC 13560.
(12) G. Williams-Leir, Prediction of Fire Endurance of Concrete Slabs. DBR Technical Paper No. 398, Division of Building Research, National Research Council Canada, Ottawa, November 1973. NRCC 13559.
(13) A. Rose, Flammability of Fibreboard Interior Finish Materials. Building Research Note No. 68, Division of Building Research, National Research Council Canada, Ottawa, October 1969.
(14) L.W. Allen, Effect of Sand Replacement on the Fire Endurance of Lightweight Aggregate Masonry Units. DBR Fire Study No. 26, Division of Building Research, National Research Council Canada, Ottawa, September 1971. NRCC 12112.
(15) L.W. Allen, W.W. Stanzak and M. Galbreath, Fire Endurance Tests on Unit Masonry Walls with Gypsum Wallboard. DBR Fire Study No. 32, Division of Building Research, National Research Council Canada, Ottawa, February 1974, NRCC 13901.
(16)W.W. Stanzak and T.T. Lie, Fire Resistance of Unprotected Steel Columns. Journal of Structural Division, Proc., Am. Soc. Civ. Eng., Vol. 99, No. ST5 Proc. Paper 9719, May 1973 (DBR Research Paper No. 577) NRCC 13589.
(17) T.T. Lie and T.Z. Harmathy, Fire Endurance of Concrete-Protected Steel Columns. A.C.I. Journal, January 1974, Title No. 71-4 (DBR Technical Paper No. 597) NRCC 13876.
(18) T.T. Lie, A Method for Assessing the Fire Resistance of Laminated Timber Beams and Columns. Can. J. Civ. Eng., Vol. 4, No. 2, June 1977 (DBR Technical Paper No. 718) NRCC 15946.
(19) T.T. Lie, Calculation of the Fire Resistance of Composite Concrete Floor and Roof Slabs. Fire Technology, Vol. 14, No. 1, February 1978 (DBR Technical Paper No. 772) NRCC 16658.
(20) M.A. Sultan, Y.P. Séguin and P. Leroux. Results of Fire Resistance Tests on Full-Scale Floor Assemblies, Institute for Research in Construction, National Research Council Canada, Ottawa, May 1998, IRC-IR-764.
(21) M.A. Sultan, J.C. Latour, P. Leroux, R.C. Monette, Y.P. Séguin and J.P. Henrie, Results of Fire Resistance Tests on Full-Scale Floor Assemblies - Phase II, Institute for Research in Construction, National Research Council Canada, Ottawa, March 2005, RR-184.
(22) M.A. Sultan and G.D. Lougheed, Results of Fire Resistance Tests on Full-Scale Gypsum Board Wall Assemblies, Institute for Research in Construction, National Research Council Canada, Ottawa, August 2002, IRC-IR-833.
(23) V.K.R. Kodur, M.A. Sultan, J.C. Latour, P. Leroux, R.C. Monette, Experimental Studies on the Fire Resistance of Load-Bearing Steel Stud Walls, Research Report, National Research Council Canada, Ottawa, August 2013, RR-343.
(24) E. Gibbs, B.C. Taber, G.D. Lougheed, J.Z. Su and N. Bénichou, Solutions for Mid-Rise Wood Construction: Full-Scale Standard Fire Test for Exterior Wall Assembly Using Lightweight Wood Frame Construction with Gypsum Sheathing (Test EXTW-1), Report to Research Consortium for Wood and Wood-Hybrid Mid-Rise Buildings, National Research Council Canada, Ottawa, December 2014, A1-100035-01.4.
(25) E. Gibbs, B.C. Taber, G.D. Lougheed, J.Z. Su and N. Bénichou, Solutions for Mid-Rise Wood Construction: Full-Scale Standard Fire Test for Exterior Wall Assembly Using a Simulated Cross-Laminated Timber Wall Assembly with Gypsum Sheathing (Test EXTW-2), Report to Research Consortium for Wood and Wood-Hybrid Mid-Rise Buildings, National Research Council Canada, Ottawa, December 2014, A1-100035-01.5.

(26) E. Gibbs, B.C. Taber, G.D. Lougheed, J.Z. Su and N. Bénichou, Solutions for Mid-Rise Wood Construction: Full-Scale Standard Fire Test for Exterior Wall Assembly Using Lightweight Wood Frame Construction with Interior Fire-Retardant-Treated Plywood Sheathing (Test EXTW-3), Report to Research Consortium for Wood and Wood-Hybrid Mid-Rise Buildings, National Research Council Canada, Ottawa, December 2014, A1-100035-01.6.
(27) E. Gibbs and J. Su, Full Scale Exterior Wall Test on Nordic Cross-Laminated Timber System, National Research Council Canada, Ottawa, January 2015, A1-006009.1.

D-7.2. Obsolete Materials and Assemblies

Building materials, components and structural members and assemblies in buildings constructed before 1995 may have been assigned ratings based on earlier editions of the Supplement to the National Building Code of Canada or older reports of fire tests. To assist users in determining the ratings of these obsolete assemblies and structural members, the following list of reference documents has been prepared. Although some of these publications are out of print, reference copies are available through NRC.

(1) M. Galbreath, Fire Endurance of Unit Masonry Walls. Technical Paper No. 207, Division of Building Research, National Research Council Canada, Ottawa, October 1965. NRCC 8740.
(2) M. Galbreath, Fire Endurance of Light Framed and Miscellaneous Assemblies. Technical Paper No. 222, Division of Building Research, National Research Council Canada, Ottawa, June 1966. NRCC 9085.
(3) M. Galbreath, Fire Endurance of Concrete Assemblies. Technical Paper No. 235, Division of Building Research, National Research Council Canada, Ottawa, November 1966. NRCC 9279.
(4) Guideline on Fire Ratings of Archaic Materials and Assemblies. Rehabilitation Guideline #8, U.S. Department of Housing and Urban Development, Germantown, Maryland 20767, October 1980.
(5) T.Z. Harmathy, Fire Test of a Plank Wall Construction. Fire Study No. 2, Division of Building Research, National Research Council Canada, Ottawa, July 1960. NRCC 5760.
(6) T.Z. Harmathy, Fire Test of a Wood Partition. Fire Study No. 3, Division of Building Research, National Research Council Canada, Ottawa, October 1960. NRCC 5769.\

D-7.3. Assessment of Archaic Assemblies

Information in this document applies to new construction. Please refer to early editions of the Supplement to the National Building Code of Canada for the assessment or evaluation of assemblies that do not conform to the information in this edition of the National Building Code. As with other documents, this By-law is revised according to the information presented to the standing committee responsible for its content, and with each update new material may be added and material that is not relevant may be deleted.

D-7.4. Development of the Component Additive Method

The component additive method was developed based upon the following observations and conclusions drawn from published as well as unpublished test information.

Study of the test data showed that structural failure preceded failure by other criteria (transmission of heat or hot gases) in most of the tests of loadbearing wood-framed assemblies. The major contributor to fire resistance was the membrane on the fire-exposed side.

Fire tests of wood joist floors without protective ceilings resulted in structural failure between 8 and 10 min. Calculation of the time for wood joists to approach breaking stress, based upon the charring rate of natural woods, suggested a time of 10 min for structural failure. This time was subtracted from the fire-resistance test results of wood joist floors and the remainder considered to be the contribution of the membrane. The figures obtained for the contribution of membranes were then applied to the test results for open web steel joist floors and wood and steel stud walls and values of 20 min for the contribution of wood stud framing and 10 min for steel framing were derived.

The fire-resistance rating has been limited to 1.5 h as this method of developing ratings for framed assemblies was new and untried.

Although this is the subject of current review, no decision has been made to extend the ratings beyond 1.5 h.

(1) M. Galbreath, G. C. Gosselin, and R. B. Chauhan, Historical Guide to Chapter 2 of the Supplement to the National Building Code of Canada, Committee Paper FPR 1-3, Prepared for the Standing Committee on Fire Performance Ratings, May 1987.

Example showing fire-resistance rating of a typical membrane assembly, calculated using the component additive method.

1 hour Gypsum Board/Wood Stud Interior Partition
A 1 h fire-resistance rating is required for an interior wood framed partition, using 12.7 mm Type X gypsum board.

a) Since gypsum board is used (Sentence D-2.3.4.(2) and Table D-2.3.4.-A) time assigned to 12.7 mm Type X gypsum board membrane on the fire-exposed side of the partition = 25 min
b) Time assigned to wood framing members at 400 mm o.c. (Sentence D-2.3.4.(3) and Table D-2.3.4.-E) = 20 min
c) Time assigned to insulation, if the spaces between the studs are filled with preformed insulation of rock or slag fibres conforming to CAN/ULC-S702, “Mineral Fibre Thermal Insulation for Buildings,” (Sentence D-2.3.4.(4) and Table D-2.3.4.-G) = 15 min
d) Time assigned to the membrane on the non-fire-exposed side (Sentence D-2.3.5.(1)) = 0 min
e) Fire-resistance rating = 25 + 20 + 15 = 60 min