

National Building Code of Canada 1995

Third Revisions and Errata

Issued by the Canadian Commission on Building and Fire Codes

June 2001

The attached pages identify third revisions and errata to the National Building Code of Canada 1995.

The revisions have been approved by the Canadian Commission on Building and Fire Codes. The revisions contained herein include updates from 01 November 1999 to 28 February 2001.

The errata are corrections that have been identified and are included to facilitate the use of the Code.

Third revisions are indicated with an **r3**; third errata are indicated with an **e3**.

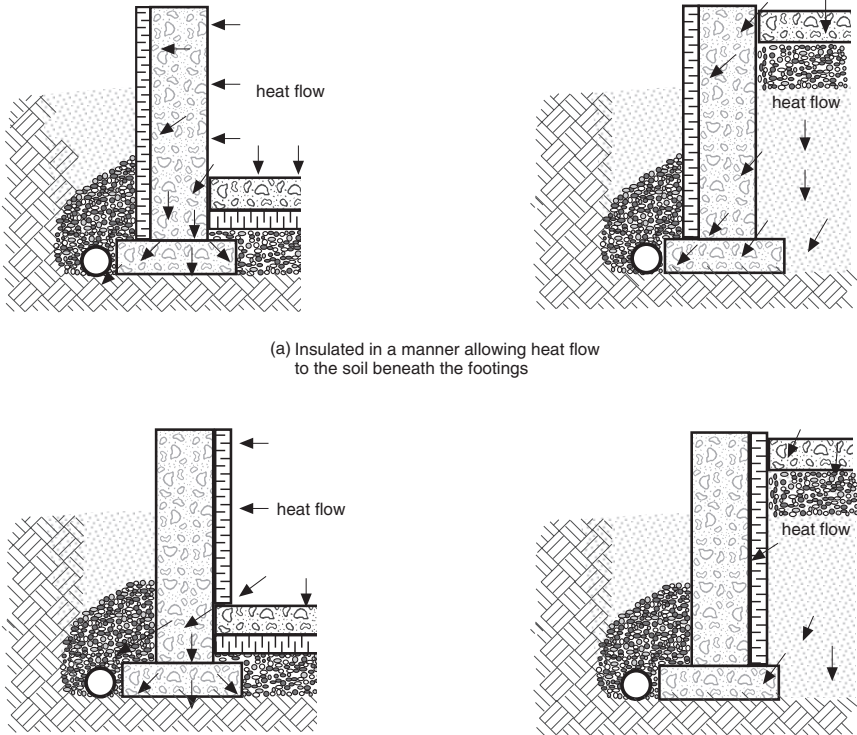
For your convenience, change pages have been provided for many of these new revisions and errata. Simply replace the current page in your document with the updated page provided. A table has been provided listing all the new errata and revisions, including minor errata for which change pages have not been provided. Change pages follow the table.

General updates, such as new addresses, as well as minor changes resulting from improvements in publishing techniques, such as the re-sequencing of table notes, are listed in the attached pages for information purposes only.

e3 / r3	Code Reference	Change
e3	1.1.1.1.(1)	Change date on last line in Sentence from 1995 to 1985
update	1.1.4.1.	CGA reference updated to read: now part of CSA International. See CSA. CSA reference updated to read: CSA International. Address remains the same with the exception that the city name is now Toronto. NLGA address updated to read: 406 - First Capital Place, 960 Quayside Drive, New Westminster, British Columbia V3M 6G2 TPIC address updated to read: c/o 16 Nixon Road, Bolton, Ontario L7E 1K3, Attn: Ken Co
e3	Part 2	Under title of Part, add: (See Appendix A.)
e3	2.1.3.1.(1)(a)	Reference should read: (see Appendix A-9.1.1.1.(1)),
e3	2.7.2.1.	Article title changed to: Conflict Between Code and Referenced Documents
e3	2.7.3.2.(1)	Add (See Appendix A.) at Sentence end
e3	Table 3.1.2.1.	Add vertical change indication line ⁽¹⁾ beside Group A Division 4 and Group B Division 2 entries
e3	3.1.2.5.	Second printing only: article erroneously numbered 23.1.2.5.
e3	3.2.4.21.(3)	On the second line of the Sentence, italicize: smoke alarm
e3	3.5.2.1.(1)(b)	Appendix note reference moved because it applies to entire Sentence, as follows: <p align="center">1) The design, construction, installation and <i>alteration</i> of every elevator, escalator and dumbwaiter shall conform to</p> <ul style="list-style-type: none"> a) provincial, territorial, or municipal regulations, or, b) CAN/CSA-B44, "Safety Code for Elevators," in the absence of regulations referred to in Clause (a). <p align="center">(See Appendix A.) e3</p>
e3	3.6.3.4.(1)	Italicize: exhaust duct
update	4.1.6.4.(1)	In the second printing of the NBC, Sentence 4.1.6.4.(1) was reorganized due to a change in publishing techniques, as follows (the meaning remains identical): <p align="center">1) The following shall be designed to carry not less than the specified load required for the <i>occupancy</i> they serve, provided they cannot be used by an assembly of people as a viewing area:</p> <ul style="list-style-type: none"> a) corridors, lobbies and aisles not more than 1 200 mm wide, b) all corridors above the <i>first storey</i> of residential areas of apartments, hotels and motels, and c) interior balconies and <i>mezzanines</i>.
e3	4.1.7.1.	Move the (See Appendix A.) reference that appears at the end of Sentence (7) to immediately following the Article title, since the Appendix note applies to all of Article 4.1.7.1.

e3 / r3	Code Reference	Change
update	4.1.9.1.	In subsequent printings of the NBC, all references to Sentence 4.1.9.1.(1), 4.1.9.1.(2), etc., within Article 4.1.9.1. will be changed to read Sentence (1), Sentence (2), etc. This is a style change that does not impact the meaning of the Article.
update/ e3	4.1.9.1.(28)	In the second printing of the NBC, Sentence 4.1.9.1.(28) was reorganized (with the meaning remaining identical) due to a change in publishing techniques, as follows. Note that third errata is change of references from <u>Sentence 4.1.9.1.(13)(a)</u> to <u>Clause (13)(a)</u> , and change of two references of word “above” to “following”. Change Page provided
e3	4.1.10.4.	Move the (See Appendix A.) reference that appears at the end of the Article to immediately following the Article title, since the Appendix note applies to all of Article 4.1.10.4.
r3	5.1.1.1.(1)	Sentence (1) replaced. Change page provided
r3	5.1.2.1.	Article replaced. Change page provided
update	5.8.2.2.(8)(b)	In subsequent printings of the NBC, due to a change in publishing techniques, 5.8.2.2.(8)(b) will read as follows (the meaning remains identical): <p style="margin-left: 40px;">8) ... a) ... b) materials covered in the scope of the following standards are permitted to be installed to provide the required resistance to moisture transfer where those materials conform to the requirements of the standards: i) CGSB 37-GP-6Ma, “Asphalt, Cutback, Unfilled, for Dampproofing,” or ii) CGSB 37-GP-18Ma, “Tar, Cutback, Unfilled, for Dampproofing.”</p> (See Appendix A.)
e3	6.2.3.15.(4)	Sentence 6.2.3.15.(4) should read: <p style="margin-left: 40px;">4) Evaporative cooling sections or towers whose main structure exceeds a volume of 55 m³ shall comply with the requirements of NFPA 214, “Water-Cooling Towers.”</p> e3
r3	Table 6.2.9.3.	Table 6.2.9.3. replaced. Change page provided
e3	9.9.5.5.(2) and (3)	Replace the word “which” on the second line of both Sentence (2) and Sentence (3) with the word “that.”
e3	Table 9.10.2.1.	Table note should read: See A-3.1.2.1.(1) in Appendix A.
e3	9.10.9.13.(2)	(Errata is for users of second printing only.) Italicize: suites
r3	9.10.9.16.(3)	Sentence (3) replaced with sentences (3), (4) and (5). Change page provided
r3	9.10.9.17.(3) and (4)	New sentences (3) and (4) added after Sentence (2). Change page provided
e3	9.10.14.6.	Reference under Article title should read: (See A-3.2.3.11.(1) in Appendix A.)
r3	9.10.14.12.(1)	Sentence (1) replaced. Change page provided

e3 / r3	Code Reference	Change
r3	9.12.2.2.(6)	Sentence (6) replaced. Change page provided
update	Table 9.15.3.3.	In subsequent printings of the NBC, table note references in columns 2 and 3 will be moved to their respective column headings as follows: Supporting Exterior Walls ⁽²⁾ and Supporting Interior Walls ⁽³⁾
e3	9.15.4.4.(2)(b)	Reference should read: <u>Sentence</u> 9.20.9.4.(3)
e3	9.15.4.5.(1)	Italicize: cavity walls
e3	9.16.3.2.(1)	Change ground water levels to: <i>groundwater levels</i>
e3	9.18.1.3.(3)	Italicize: vapour barrier
e3	9.20.13.9.(3)	On the second last line of Sentence (3), change sheathing paper to: sheathing membrane
e3	9.23.9.4.	Reference following Sentence 9.23.9.4.(5) that reads: (See A-9.23.4.2.(2) in Appendix A.) should be moved just below the Article title, because it applies to the entire Article.
e3	9.25.2.1.(1)	Reference should read: (See A-9.1.1.1.(1) in Appendix A.)
update	Table 9.27.5.4.	In subsequent printings of the NBC, mm (o.c.) references in last column will be moved. Measurement will now be located in column heading as follows: Maximum Nail or Staple Spacing, mm (o.c.)
e3	Table 9.32.2.2.	Italicize both words in all references to: floor area
r3	9.33.4.7.	New article added. Change page provided
update	Span tables	In subsequent printings of the NBC, due to a change in publishing techniques, table notes may be resequenced. All table note references continue to refer to same table note text as before. Information remains unchanged.
e3	A-3.2.4.11.	Appendix note number should read: A-3.2.4.11.(1)
e3	A-3.3.3.1.	Appendix note number should read: A-3.3.3.1.(1)
e3	A-3.3.3.4.	Appendix note number should read: A-3.3.3.4.(1)
e3	A-3.3.4.5.	Appendix note number should read: A-3.3.4.5.(1)
e3	A-3.7.2.1.	Appendix note number should read: A-3.7.2.1.(1)
e3	A-3.8.1.4.	Appendix note number should read: A-3.8.1.4.(1)
e3	A-3.8.2.2.(1)	Figure numbers and references to them should read A-3.8.2.2.(1).A. and A-3.8.2.2.(1).B.
e3	A-3.8.3.9.	Appendix note number should read: A-3.8.3.9.(1)
e3	A-4.1.4.3.	Appendix note number should read: A-4.1.4.3.(1)
e3	A-4.1.7.1.(1)-(7)	Appendix note number should read: A-4.1.7.1.
e3	A-4.1.10.1. and 4.1.10.2.	Appendix note number should read: A-4.1.10.1. and 4.1.10.2.(1)
e3	A-4.2.2.1.	Appendix note number should read: A-4.2.2.1.(1)
e3	A-4.2.4.4.	Appendix note number should read: A-4.2.4.4.(1) Change page provided
e3	A-4.2.4.5.	Appendix note number should read: A-4.2.4.5.(1) Change page provided
e3	A-4.2.5.1.	Appendix note number should read: A-4.2.5.1.(1) Change page provided

e3 / r3	Code Reference	Change
e3	A-4.2.6.1.	Appendix note number should read: A-4.2.6.1.(1) Change page provided
e3	A-4.2.7.1.	Appendix note number should read: A-4.2.7.1.(1) Change page provided
e3	A-4.3.3.1.	Appendix note number should read: A-4.3.3.1.(1) Change page provided
e3	A-4.3.4.1.	Appendix note number should read: A-4.3.4.1.(1) Change page provided
e3	A-4.3.4.2.	Appendix note number should read: A-4.3.4.2.(1) Change page provided
r3	A-5.1.1.1.(1)	Appendix note replaced. Change page provided
r3	A-5.1.2.1.(1)	Appendix note replaced. Change page provided
e3	A-6.2.2.5.	Appendix note number should read: A-6.2.2.5.(1)
r3	A-9.10.9.16.(3)	Appendix note A-9.10.9.16.(3) replaced with Appendix note A-9.10.9.16.(4). Change page provided
update	A-9.11.1.1.(1)	Change last two words in paragraph 4, “the illustration”, to: Figure A-9.11.1.1.
e3	A-9.12.2.2.(2)	<p>Replace Figure A-9.12.2.2. with the following (this graphic, originally from the Part 9 User’s Guide, is an improvement over the original NBC graphic):</p>  <p>(a) Insulated in a manner allowing heat flow to the soil beneath the footings</p> <p>(b) Insulated in a manner that will reduce heat flow to the soil beneath the footings</p> <p style="text-align: right;">EC00381A</p>
e3	A-9.13.1.3.	Remove the words “the decay products of” in the 6 th and 7 th lines of the second paragraph
update	A-9.13.7. and 9.13.8.	On the last line of the first paragraph, replace “the following drawings” with “Figures A-9.13.7.A. and B.”
e3	Table A-9.25.1.2.B.	Add vertical change indication line ⁽¹⁾ to table

e3 / r3	Code Reference	Change
update	B-3.2.6.3.(1)	Add titles to the three figures: Figure B-3.2.6.3.(1).A. Buildings connected by a tunnel Figure B-3.2.6.3.(1).B. Buildings connected at a firewall Figure B-3.2.6.3.(1).C. Buildings connected by a bridge
update	Appendix C Wind speeds table	Table is now numbered C-1
update e3	Appendix C Design data table	Table is now numbered C-2 In the original table, the 15 minute rain data for Halifax and Dartmouth were transposed. The value for Halifax should be 15 mm and that for Dartmouth should be 18 mm.
update		The following place names under the Territory name of Northwest Territories have been moved under the new Territory name of Nunavut: Aklavik, Alert, Arctic Bay, Arviat/Eskimo Point, Baker Lake, Cambridge Bay, Chesterfield Inlet, Clyde River, Coppermine, Coral Harbour, Echo Bay/Port Radium, Eureka, Fort Resolution, Iqaluit, Isachsen, Nottingham Island, Rankin Inlet, Resolute and Resolution Island. All data associated with these places remains the same.
update	Appendix D	In subsequent printings of the NBC, due to a change in publishing techniques, all figure numbers ending in (a), (b), etc. will be changed to uppercase letters without parentheses: A., B., etc.
e3	Table D-2.3.5.	Title should read: Flooring <u>or</u> Roofing Membranes for Wood, Cold Formed Steel Members or Open-Web Steel Joists
e3	Table D-2.8.2.	Remove table-note references ^[(2)(3)] from column heading "Where kh is more than 3.7 m but not more than 7.3 m"
e3	Index	For the index entry: Air barrier systems, material standards, change reference 9.13.2.2. to read: 9.13.2.1. Anchorage, foundations (to), change reference 9.36.4.3. to read: 9.35.4.3. Building Height, garages as separate buildings, add: 3.2.1.2. Carports, columns, change reference 9.36.4.3. to read: 9.35.4.3. Carports, walls, change reference 9.36.4.3. to read: 9.35.4.3. Clearances, combustible material, change references 9.22.10.3. and 9.22.10.4. to read: 9.22.9.3. and 9.22.9.4. Clearances, ducts, change reference 9.22.10.4. to read: 9.22.9.4. Clearances, smoke chambers, change reference 9.22.10.3. to read: 9.22.9.3. Columns, carports, and garages, change references to 9.36.4.3. to read: 9.35.4.3. Detectors, smoke, add: 3.2.4.4. and 3.2.4.10. Doors, direction of swing, add: 3.4.6.9. and 3.6.2.7. Ducts, clearances, change reference 9.22.10.4. to read: 9.22.9.4. Exhaust, outlets, change reference 6.3.3.9. to read: 6.2.3.9. Fire alarm and detection systems, add: 9.10.17. Fireplaces, clearances, change reference 9.22.10. to read: 9.22.9. Fireplaces, dampers, change reference 9.22.7.1. to read : 9.22.6.1. Fireplaces, factory-built, change reference 9.22.9. to read: 9.22.8. Fireplaces, fire chamber, change reference 9.22.5. to read: 9.22.4. Fireplaces, hearth, change reference 9.22.6. to read: 9.22.5. Fireplaces, inserts, change reference 9.22.11. to read: 9.22.10. Fireplaces, smoke chambers, change reference 9.22.8. to read: 9.22.7. Hearths, fireplace, change reference 9.22.6. to read: 9.22.5. Hearths, extensions, change reference 9.22.6.1. to read: 9.22.5.1. Hearths, support, change reference 9.22.6.2. to read: 9.22.5.2.

Continued...

		<p>For the index entry:</p> <p>Industrial occupancy (Group F), delete: standpipe and hose systems, 9.10.1.3. Interior finishes, add: 3.1.5.10. Linen chutes, change reference 9.10.1.11. to read: 9.10.1.3. Machinery rooms, building height exception, change reference 9.10.4.5. to read: 9.10.4.4. Refuse, chutes, change reference 9.10.1.11. to read: 9.10.1.3. Smoke chambers, change reference 9.22.8. to read: 9.22.7. Smoke chambers, clearances, change reference 9.22.10.3. to read: 9.22.9.3. Smoke chambers, slope, change reference 9.22.8.1. to read: 9.22.7.1. Smoke chambers, wall thickness, change reference 9.22.8.2. to read: 9.22.7.2. Smoke detectors, add: 3.2.4.4. and 3.2.4.10. Sprinkler systems, add: (see Automatic sprinkler systems) Standpipe systems, change reference 9.10.1.10. to read: 9.10.1.3. (first printing only) Storage of materials, change reference 9.10.1.8. to read: 9.10.1.3. Unprotected openings, in floors, change reference 9.10.1.6. to read: 9.10.1.3. Vertical service spaces, change reference 9.10.1.11. to read: 9.10.1.3. Walls, masonry veneer, change reference 9.20.6.3. to read: 9.20.6.4.</p>									
e3	Conversion table	<p>Correct last row to read:</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">To Convert ng/(Pa • s • m³)</td> <td style="text-align: center;">To perms</td> <td style="text-align: right;">Multiply by 0.0174</td> </tr> </table> <p>Add the following 2 rows:</p> <table border="0" style="width: 100%;"> <tr> <td style="text-align: left;">To Convert Pa</td> <td style="text-align: center;">To in. of water</td> <td style="text-align: right;">Multiply by 0.004014</td> </tr> <tr> <td style="text-align: left;">W</td> <td style="text-align: center;">Btu/h</td> <td style="text-align: right;">3.412</td> </tr> </table>	To Convert ng/(Pa • s • m ³)	To perms	Multiply by 0.0174	To Convert Pa	To in. of water	Multiply by 0.004014	W	Btu/h	3.412
To Convert ng/(Pa • s • m ³)	To perms	Multiply by 0.0174									
To Convert Pa	To in. of water	Multiply by 0.004014									
W	Btu/h	3.412									

Notes to Table:

- (1) For further information about change indication lines, please see the National Building Code of Canada 1995, page xiv, "Change Indication."

18) All fasteners and anchors in a ductile connection, such as bolts, inserts, welds, or dowels, shall be capable of developing 3 times the yield load of the body of the connection.

19) The values of S_p in Sentences (15) and (16) for mechanical/electrical components shall be equal to

$$S_p = C_p \cdot A_r \cdot A_x$$

where

C_p = seismic coefficient for components of mechanical and electrical equipment as given in Table 4.1.9.1.E.

A_r = 1.0 for components that are both rigid and rigidly connected and for non-brittle pipes and ducts,
 = 1.5 for components located on the ground that are flexible or flexibly connected except for non-brittle pipes and ducts,
 = 3.0 for all other cases,

A_x = $1.0 + (h_x/h_n)$.

20) For the purpose of applying Sentence (19)

- a) components that are both rigid and rigidly connected are defined as those having a fundamental period for the component and connection less than or equal to 0.06 s, and
- b) flexible components or connections are defined as those having a fundamental period greater than 0.06 s.

21) Floors and roofs acting as diaphragms shall be designed for a minimum force corresponding to a value of S_p equal to 0.7 applied to loads tributary from that *storey*, unless a greater force F_x is assigned to the level under consideration as in Sentences (13) and (14).

22) When the mass of a tank plus contents is greater than 10% of the mass of the supporting floor, the lateral forces shall be determined by rational analysis.

23) The overturning moment, M , at the base of the structure shall be multiplied by a reduction coefficient, J , where

- a) $J = 1$ where T is less than 0.5,
- b) $J = (1.1 - 0.2T)$ where T is not less than 0.5, but not more than 1.5, and
- c) $J = 0.8$ where T is greater than 1.5.

24) The overturning moment M_x at any level x shall be

- a) multiplied by J_x where

$$J_x = J + (1 - J) (h_x/h_n)^3$$

and

- b) distributed as required in Sentences (25), (26) and (27).

25) The incremental changes in the design overturning moments, in the *storey* under consideration, shall be distributed to the various resisting elements in the same proportion as the distribution of shears in the resisting system.

26) Where other vertical members are provided which are capable of partially resisting the overturning moments, a redistribution may be made to these members if framing members of sufficient strength and stiffness to transmit the required loads are provided.

27) Where a vertical-resisting element is discontinuous, the overturning moment carried by the lowest *storey* of that element shall be carried down as loads to the *foundation*.

28) Torsional moments about a vertical axis of the *building* shall be calculated as:

- a) for an analysis carried out in accordance with Clause (13)(a), the torsional moments applied at each level throughout the *building* shall be derived for each of the following load cases considered separately, where F_x is the lateral floor force at each level as given by Clause (13)(a) and the term $0.1 D_{nx} F_x$ represents the accidental torsional moment applied at each level and where each element in the *building* is designed for the most severe effect of the following load cases:
 - i) $T_x = F_x(1.5e_x + 0.1 D_{nx})$
 - ii) $T_x = F_x(1.5e_x - 0.1 D_{nx})$
 - iii) $T_x = F_x(0.5e_x + 0.1 D_{nx})$
 - iv) $T_x = F_x(0.5e_x - 0.1 D_{nx})$; or
- b) the effects of accidental torsional moments applied at each level throughout the *building* shall be derived for each of the following load cases considered separately and shall be added to the effects of a three dimensional dynamic analysis where each element in the *building* is designed for the most severe effect of the following load cases and F_x is the lateral floor force at each level as given by Clause (13)(a):
 - i) $T_x = + 0.1 D_{nx} F_x$
 - ii) $T_x = - 0.1 D_{nx} F_x$

(See Appendix A.)

29) The *building* design shall take full account of the possible effects of setbacks. (See Appendix A.)

4.1.9.2. Deflections

1) Lateral deflections of a structure shall be calculated in accordance with accepted practice and based on the loads and requirements defined in this Section.

4.1.9.2.

2) Lateral deflections obtained from an elastic analysis using the loads given in Sentences 4.1.9.1.(13) and (14) and incorporating the effects of torsion shall be multiplied by R to give realistic values of anticipated deflections.

3) The interstorey deflections based on the lateral deflections as calculated in Sentence (2) shall be limited to $0.01 h_s$ for *post-disaster buildings* and $0.02 h_s$ for all other *buildings*.

4) All portions of the structure shall be designed to act as integral units in resisting horizontal forces, unless separated by adequate clearances which permit horizontal deflections of the structure consistent with values of deflections calculated in accordance with Sentence (2).

5) The nonstructural components shall be designed so as not to transfer to the structural system any forces unaccounted for in the design, and any interaction of rigid elements such as walls and the structural system shall be designed so that the capacity of the structural system is not impaired by the action or failure of the rigid elements.

6) Adjacent structures shall either be separated by the sum of their individual deflections as calculated in Sentence (2), or shall be connected to each other.

7) The method of connection required in Sentence (6) shall take into account the mass, stiffness, strength, ductility and anticipated motion of the connected *buildings* and the character of the connection.

8) The deflections as calculated in Sentence (2) shall be used to account for sway effects due to seismic loading as required by Sentence 4.1.1.5.(2).

9) The connected *buildings* referred to in Sentence (6) shall be assumed to have the lowest R value of the *buildings* connected, unless the use of a higher value can be justified by rational analysis.

4.1.9.3. Special Provisions

1) *Buildings* more than 3 storeys in building height in velocity- or acceleration-related seismic zones of 2 and higher shall have a structural system as described in Cases 1-8, 10-14, 16-18 or 20-21 in Table 4.1.9.1.B.

2) For *buildings* more than 60 m in height with a structural system having $R = 2.0$ or $R = 1.5$ as determined from Table 4.1.9.1.B. or as determined from Clause 4.1.9.1.(9)(b), the value of V shall be increased by 50% in velocity-related seismic zones of 4 and higher.

3) Elevated tanks plus full contents not supported by a *building*, shall be designed using $R = 1$ in the formula in Sentence 4.1.9.1.(4), with the conditions

- a) the minimum and maximum value of the product $S \cdot I$ shall be taken as 1.5 and 3.0, respectively,
- b) the overturning moment reduction coefficient, J , as set forth in Sentence 4.1.9.1.(2) shall be 1.0, and
- c) the torsional requirements of Sentence 4.1.9.1.(28) shall apply.

4) For *buildings* in velocity- or acceleration-related seismic zones of 2 and higher in which discontinuities in columns or shear walls occur, special design provisions shall be made to ensure that failure at the point of discontinuity will not occur before the capacity of the remaining portion of the structure has been realized.

5) In velocity- or acceleration-related seismic zones of 2 and higher, reinforcement conforming to Clause 6.3.3. of CSA S304.1, "Masonry Design for Buildings (Limit States Design)," shall be provided for masonry construction in

- a) *loadbearing* and lateral-load-resisting masonry,
- b) masonry enclosing elevator shafts and stairways, or used as exterior cladding, and
- c) masonry *partitions*, except for *partitions* which
 - i) do not exceed 200 kg/m^2 in weight, and
 - ii) do not exceed 3 m in height and are laterally supported at the top.

4.1.9.4. Foundation Provisions

1) *Foundations* shall be designed so that yielding will occur first in the superstructure and not the *foundations*, unless the design specifically provides otherwise.

2) Except in velocity-related seismic Zone 0, individual *pile* footings, drilled piers and *caissons* shall be interconnected by ties in not less than 2 directions.

3) Ties required in Sentence (2) shall be designed to carry by tension or compression a horizontal force equal to the greatest factored *pile* cap loading multiplied by a factor $0.5 v$, but not exceeding 10% of the greatest factored *pile* cap load, unless it can be demonstrated that equivalent restraints can be provided by other means. (See Appendix A.)

4) Except in velocity-related seismic Zone 0, *piles* shall be connected to the *pile* cap or structure by reinforcement having sufficient anchorage to develop the yield strength of the reinforcement, and the top of the *piles* (below the *pile* cap) shall be reinforced to allow ductile behaviour if the design depends upon such action.

5) Except in velocity-related seismic Zones 0 and 1, *basement* walls shall be designed to resist

Part 5 Environmental Separation

(See Appendix A.)

Section 5.1. General

5.1.1. Scope

5.1.1.1. Scope

- r3
- 1) This Part is concerned with
 - a) the control of condensation
 - i) in *building* components and assemblies, and
 - ii) on *building* materials, components and assemblies, and
 - b) the transfer of heat, air and moisture through
 - i) *building* materials, components and assemblies, and
 - ii) interfaces between *building* materials, components and assemblies.

(See Appendix A.)

5.1.2. Application

5.1.2.1. Exposure to Exterior Space or the Ground and Separation of Environments

- r3
- 1) This Part applies, as described in Section 2.1., to
 - a) *building* materials, components and assemblies exposed to exterior space or the ground, including those separating interior space from exterior space or separating interior space from the ground,
 - b) *building* materials, components and assemblies separating environmentally dissimilar interior spaces, and
 - c) site materials, components, assemblies and grading that may affect environmental loads on *building* materials, components and assemblies exposed to exterior space or the ground.

(See Appendix A.)

5.1.3. Definitions

5.1.3.1. Defined Words

- 1) Words that appear in italics are defined in Part 1.

5.1.4. Environmental Separation Requirements

5.1.4.1. Resistance to Environmental Loads

- 1) *Building* components and assemblies that separate dissimilar environments shall

- a) be designed to have sufficient capacity and integrity to resist or accommodate all environmental loads and effects of those loads that may be reasonably expected, having regard to
 - i) the intended use of the *building*, and
 - ii) the environment to which the components and assemblies are subject, and
- b) satisfy the requirements of this Part.

5.1.4.2. Resistance to Deterioration

(See Appendix A.)

1) Except as provided in Sentence (2), materials that comprise *building* components and assemblies that separate dissimilar environments shall be:

- a) compatible with adjoining materials, and
- b) resistant to any mechanisms of deterioration which would be reasonably expected, given the nature, function and exposure of the materials.

2) Material compatibility and deterioration resistance are not required where it can be shown that incompatibility or uncontrolled deterioration will not adversely affect any of

- a) the health or safety of *building* users,
- b) the intended use of the *building*, or
- c) the operation of *building* services.

5.1.5. Other Requirements

5.1.5.1. Requirements in Other Parts of the Code

1) Acoustical, structural and fire safety requirements of other Parts of this Code shall apply.

Section 5.2. Loads and Procedures

5.2.1. Environmental Loads

5.2.1.1. Exterior Environmental Loads

1) Except as provided in Sentences (2) and (3), climatic loads shall be determined according to Section 2.2.

2) Except as provided in Sentence (3), below ground exterior environmental loads not described

5.2.1.1.

in Section 2.2. shall be determined from existing geological and hydrological data or from site tests.

3) Where local design and construction practice has shown *soil* temperature analysis to be unnecessary, *soil* temperatures need not be determined. (See Appendix A.)

5.2.1.2. Interior Environmental Loads

1) Interior environmental loads shall be derived from the intended use of the space. (See Appendix A.)

5.2.2. Procedures

5.2.2.1. Calculations

1) Heat, air and moisture transfer calculations shall conform to good practice such as described in the ASHRAE Handbooks.

2) For the purposes of any analysis conducted to indicate conformance to the thermal resistance levels required in Article 5.3.1.2., *soil* temperatures shall be determined based on annual average *soil* temperature, seasonal amplitude of variation and attenuation of variation with depth.

3) Wind load calculations shall conform to Subsection 4.1.8.

Section 5.3. Heat Transfer

(See Appendix A.)

5.3.1. Thermal Resistance of Assemblies

5.3.1.1. Required Resistance to Heat Transfer

(See Appendix A.)

1) Except as provided in Sentence (2), where a *building* component or assembly will be subjected to an intended temperature differential, the component or assembly shall include materials to resist heat transfer in accordance with the remainder of this Subsection.

2) The installation of materials to resist heat transfer in accordance with the remainder of this Subsection is not required where it can be shown that uncontrolled heat transfer will not adversely affect any of

- a) the health or safety of *building* users,
- b) the intended use of the *building*, or
- c) the operation of *building* services.

5.3.1.2. Properties to Resist Heat Transfer

(See Appendix A.)

1) Materials and components installed to provide the required resistance to heat transfer shall provide sufficient resistance, for the interior and exterior design temperatures,

- a) to minimize surface condensation on the warm side of the component or assembly,
- b) in conjunction with other materials and components in the assembly, to minimize condensation within the component or assembly, and
- c) in conjunction with systems installed for space conditioning, to meet the interior design thermal conditions for the intended *occupancy*.

2) Except as provided in Sentence (3), where materials or components are installed to provide the required resistance to heat transfer and are covered in the scope of the standards listed below, the materials and components shall conform to the requirements of the respective standards:

- a) CAN/CGSB-12.8-M, "Insulating Glass Units,"
- b) CAN/ULC-S701, "Thermal Insulation, Polystyrene, Boards and Pipe Covering,"
- c) CGSB 51-GP-21M, "Thermal Insulation, Urethane and Isocyanurate, Unfaced,"
- d) CAN/ULC-S705.1, "Thermal Insulation—Spray-Applied Rigid Polyurethane Foam, Medium Density, Material Specification,"
- e) CAN/CGSB-51.25-M, "Thermal Insulation, Phenolic, Faced,"
- f) CAN/CGSB-51.26-M, "Thermal Insulation, Urethane and Isocyanurate, Boards, Faced,"
- g) CGSB 51-GP-27M, "Thermal Insulation, Polystyrene, Loose Fill,"
- h) CAN/CGSB-51.60-M, "Cellulose Fibre Loose Fill Thermal Insulation,"
- i) CAN/CGSB-82.1-M, "Sliding Doors,"
- j) CAN/CGSB-82.5-M, "Insulated Steel Doors,"
- k) CAN/ULC-S702, "Thermal Insulation, Mineral Fibre, for Buildings," or
- l) CAN/CSA-A247-M, "Insulating Fibreboard."

(See Appendix A.)

3) The requirements for *flame-spread ratings* contained in the standards listed in Sentence (2) need be applied only as required in Part 3.

4) Except as provided in Sentence (5), all metal-framed glazed assemblies separating interior *conditioned space* from interior unconditioned space or exterior space shall incorporate a thermal break to minimize condensation.

6.2.6.2. Venting

1) Every incinerator shall be served by a *chimney flue* conforming to Section 6.3.

6.2.7. Unit Heaters**6.2.7.1. Clearances**

1) Every *unit heater* using either steam or hot water as the heating medium shall be installed with a clearance of not less than 25 mm between the *appliance* and adjacent *combustible* material.

6.2.8. Radiators and Convectors**6.2.8.1. Lining or Backing**

1) A *noncombustible* lining or backing shall be provided for every steam or hot water radiator and convector

- located in a recess or concealed space, or
- attached to the face of a wall of *combustible construction*.

6.2.9. Piping for Heating and Cooling Systems**6.2.9.1. Piping Materials and Installation**

- Piping shall be made from materials designed to withstand the effects of temperatures and pressures that may occur in the system. (See Articles 3.1.5.15., 3.1.9.1., 9.10.9.6. and 9.10.9.7. for fire safety requirements.)
- Every pipe used in a heating or air-conditioning system shall be installed to allow for expansion and contraction due to temperature changes.
- Supports and anchors for piping in a heating or air-conditioning system shall be designed and installed to ensure that undue stress is not placed on the supporting structure.

6.2.9.2. Insulation and Coverings

- Insulation and coverings on pipes shall be composed of material which will withstand deterioration from softening, melting, mildew and mould at the operating temperature of the system.
- Pipes that are exposed to human contact shall be insulated so that the temperature of the exposed surface does not exceed 70°C. (See Appendix A.)

6.2.9.3. Clearances

1) Clearances between *combustible* material and bare pipes carrying steam or hot water shall conform to Table 6.2.9.3.

Table 6.2.9.3.
Clearance between Steam or Hot Water Pipes and Combustible Material
Forming Part of Article 6.2.9.3.

r3

Steam or Water Temperature, °C	Minimum Clearance, mm
Up to 95	No clearance
Above 95 to 120	15
Above 120	25

6.2.9.4. Surface Temperature

1) The exposed surface temperature of a steam or hot water radiator shall not exceed 70°C unless precautions are taken to prevent human contact.

6.2.9.5. Protection

- Where a pipe carrying steam or hot water at a temperature above 120°C passes through a *combustible* floor, ceiling or wall, the construction shall be protected by a sleeve of metal or other *noncombustible* material not less than 50 mm larger in diameter than the pipe.
- Unprotected steam or hot water pipes that pass through a storage space shall be covered with not less than 25 mm of *noncombustible* insulation to prevent direct contact with the material stored.

6.2.9.6. Piping in Shafts

1) Where piping for heating or air-conditioning systems is enclosed in a shaft, the requirements of Article 3.6.3.1. for shafts shall apply.

6.2.10. Refrigerating Systems and Equipment for Air-Conditioning**6.2.10.1. Cooling Units**

- Where a cooling unit is combined with a fuel-fired *furnace* in the same duct system, the cooling unit shall be installed
 - in parallel with the heating *furnace*,
 - upstream of the *furnace* provided the *furnace* is designed for such application, or
 - downstream of the *furnace* provided the cooling unit is designed to prevent excessive temperature or pressure in the refrigeration system.

6.2.11.

6.2.11. Storage Bins

6.2.11.1. Storage Bins

1) Service pipes passing through a storage bin for solid fuel shall be protected or so located as to avoid damage to the pipes.

2) Except for fuel-thawing pipes, every pipe designed to operate at a temperature of 50°C or above shall be located where fuel cannot be stored in contact with it.

3) A storage bin for solid fuel shall not be located above a sewer opening or drain opening.

4) Storage bins for solid fuel shall be designed and constructed so that the air temperature in the bin or the surface temperature of any part of the floor or walls is below 50°C.

6.2.11.2. Ash Storage Bins

1) Every ash storage bin shall be constructed of *noncombustible* material.

2) Where an ash storage bin is not covered, the ceiling of the room in which it is located shall be of *noncombustible* material.

3) Every opening in an ash storage bin shall be protected by a tight-fitting metal door with metal frame securely fastened to the bin.

Section 6.3. Chimneys and Venting Equipment

6.3.1. General

6.3.1.1. Requirement for Venting

1) Except as provided in Articles 6.3.1.2. and 6.3.1.3., the products of combustion from oil-, gas- and solid-fuel burning *appliances* shall be vented in conformance with the requirements in the applicable *appliance* installation standard listed in Article 6.2.1.5.

6.3.1.2. Masonry or Concrete Chimneys

1) Rectangular *masonry or concrete chimneys* not more than 12 m in height shall conform to Part 9 if they serve

- a) *appliances* with a combined total rated heat output of 120 kW or less, or
- b) fireplaces.

2) *Masonry or concrete chimneys* other than those described in Sentence (1) shall be designed and installed in conformance with the appropriate requirements in NFPA 211, "Chimneys, Fireplaces, Vents, and Solid-Fuel-Burning Appliances."

6.3.1.3. Metal Smoke Stacks

1) Single wall metal smoke stacks shall be designed and installed in conformance with NFPA 211, "Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances."

6.3.1.4. Lightning Protection Systems

1) A lightning protection system, when provided, shall conform to the requirements of the appropriate provincial or territorial legislation or, in the absence of such legislation, to CAN/CSA-B72-M, "Installation Code for Lightning Protection Systems."

6.3.1.5. Access Ladders

1) Access ladders for *chimneys*, when provided, shall consist of steel or bronze rungs, built into the walls of the *chimneys*.

2) Rungs for external ladders shall begin at not less than 2.5 m from ground level.

occupancies by a fire separation having not less than a 1.5 h fire-resistance rating.

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

r3 **3)** Where a *storage garage* serves only the *dwelling unit* to which it is attached or built in, it shall be considered as part of that *dwelling unit* and the fire separation required in Sentence (2) need not be provided between the garage and the *dwelling unit*.

r3 **4)** Except as provided in Sentence (5), where a *storage garage* is attached to or built into a *building of residential occupancy*

- a) an *air barrier system* conforming to Subsection 9.25.3. shall be installed between the garage and the remainder of the *building* to provide an effective barrier to gas and exhaust fumes, and
- b) every door between the garage and the remainder of the *building* shall conform to Article 9.10.13.15.

(See Appendix A.)

r3 **5)** Where membrane materials are used to provide the required airtightness in the *air barrier system*, all joints shall be sealed and structurally supported.

9.10.9.17. Separation of Repair Garages

1) Except as provided in Sentence (2), a *repair garage* shall be separated from other occupancies by a fire separation having a fire-resistance rating of not less than 2 h.

2) Ancillary spaces directly serving a *repair garage*, including waiting rooms, reception rooms, tool and parts storage areas and supervisory office space, need not be separated from the *repair garage* but shall be separated from other occupancies as required in Sentence (1).

r3 **3)** Except as provided in Sentence (4), where a *building* containing a *repair garage* also contains a *dwelling unit*, an *air barrier system* conforming to Subsection 9.25.3. shall be installed between the *dwelling unit* and the *suite* containing the garage to provide an effective barrier to gas and exhaust fumes. (See A-9.10.9.16.(4) in Appendix A.)

r3 **4)** Where membrane materials are used to provide the required airtightness in the *air barrier system*, all joints shall be sealed and structurally supported.

9.10.9.18. Exhaust Ducts Serving More Than One Fire Compartment

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

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

9.10.9.19. Central Vacuum Systems

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

9.10.10. Service Rooms

9.10.10.1. Application

1) This Subsection applies to *service rooms* in all *buildings* except rooms located within a *dwelling unit*.

9.10.10.2. Service Room Floors

1) The *fire-resistance rating* requirements in this Subsection do not apply to the floor assembly immediately below a *service room*.

9.10.10.3. Separation of Service Rooms

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

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

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

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

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

- a) not more than one room or *suite*, or
- b) a *building* with a *building area* of not more than 400 m² and a *building height* of not more than 2 *storeys*.

9.10.10.5. Incinerators

1) *Service rooms* containing incinerators shall be separated from the remainder of the *building* by a fire separation having a fire-resistance rating of not less than 2 h.

2) The design, construction, installation and alteration of each indoor incinerator shall conform to NFPA 82, "Incinerators, Waste and Linen Handling Systems and Equipment."

3) Every incinerator shall be connected to a *chimney flue* conforming to the requirements in Section 9.21. and serving no other *appliance*.

4) An incinerator shall not be located in a room with other fuel-fired *appliances*.

9.10.10.6. Storage Rooms

1) Rooms for the temporary storage of *combustible refuse* in all occupancies or for public storage

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in *residential occupancies* shall be separated from the remainder of the *building* by a *fire separation* having not less than a 1 h *fire-resistance rating*, except that a 45 min *fire separation* is permitted where the *fire-resistance rating* of the floor assembly is not required to exceed 45 min, or where such rooms are *sprinklered*.

9.10.11. Firewalls

9.10.11.1. Required Firewalls

1) Except as provided in Article 9.10.11.2., a *party wall* on a property line shall be constructed as a *firewall*.

9.10.11.2. Firewalls Not Required

1) In a *building of residential occupancy* in which there is no *dwelling unit* above another *dwelling unit*, a *party wall* on a property line between *dwelling units* need not be constructed as a *firewall* provided it is constructed as a *fire separation* having not less than a 1 h *fire-resistance rating*.

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

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

9.10.11.3. Construction of Firewalls

1) Where *firewalls* are used, the requirements in Part 3 shall apply.

9.10.12. Prevention of Fire Spread at Exterior Walls and between Storeys

9.10.12.1. Separation of Exterior Openings

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

- a) a wall not less than 1 m in vertical dimension, or
- b) a canopy or balcony not less than 1 m in width.

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

9.10.12.2. Termination of Floors or Mezzanines

1) Except as provided in Sentence (2) and in Articles 9.10.1.3. and 9.10.9.5., the portions of a *floor area* or *mezzanine* that do not terminate at an exterior wall, a *firewall* or a vertical shaft, shall terminate at a vertical *fire separation* having a *fire-resistance rating* not less than that required for the floor assembly that terminates at the separation.

2) A *mezzanine* need not terminate at a vertical *fire separation* where the *mezzanine* is not required to be considered as a *storey* in Articles 9.10.4.1. and 9.10.4.2.

9.10.12.3. Location of Skylights

1) Where a wall in a *building* is exposed to a fire hazard from an adjoining roof of a separate unsprinklered *fire compartment* in the same *building*, the roof shall contain no skylights within a horizontal distance of 5 m of the windows in the exposed wall.

9.10.12.4. Exterior Walls Meeting at an Angle

1) Except as provided in Article 9.9.4.5., where exterior walls of a *building* meet at an external angle of 135° or less, the horizontal distance from an opening in one wall to an opening in the other wall shall be not less than 1.2 m, where the openings are in different *fire compartments*.

2) The exterior wall of each *fire compartment* referred to in Sentence (1) within the 1.2 m distance shall have a *fire-resistance rating* not less than that required for the interior vertical *fire separation* between the compartment and the remainder of the *building*.

9.10.12.5. Protection of Soffits

1) Except as provided in Sentences (2) and (3), where a common *attic* or *roof space* spans more than 2 *suites* of *residential occupancy* and projects beyond the exterior wall of the *building*, the portion of any soffit or other surface enclosing the projection that is less than 2.5 m vertically above a window or door and less than 1.2 m from either side of the window or door, shall have no *unprotected openings* and shall be protected by

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

Table 9.10.14.11.
Minimum Construction Requirements for Exposing Building Faces
 Forming Part of Sentence 9.10.14.11.(1)

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

e2 9.10.14.12. Alternate Approach to Exposing Building Face

r3 **1)** For the purposes of this Article, where maximum area of glazed openings is determined using Table 9.10.14.1., an *exposing building face* may be considered to be made up of any number of separate portions and the requirements for *fire-resistance rating* and cladding material and the limits on glazed openings for each portion may be determined based on the *limiting distance* for that portion. (See Appendix A.)

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

- a) has a *fire-resistance rating* of not less than 45 min where the *limiting distance* is less than 1.2 m, and
- b) is clad with *noncombustible* material where the *limiting distance* is less than 0.6 m.

3) Glazed openings in the *exposing building face* referred to in Sentence (2)

- a) shall not be permitted where the *limiting distance* is less than 1.2 m, and
- b) shall be limited in conformance with the requirements for *unprotected openings* in Article 9.10.14.1., where the *limiting distance* is 1.2 m or greater.

4) Cladding on the *exposing building face* described in Sentence (2) may be vinyl when the *limiting distance* is less than 0.6 m provided the cladding

- a) conforms to Subsection 9.27.13.,

- b) is installed directly over 12.7 mm gypsum sheathing,
- c) has a *flame-spread rating* not greater than 25 when tested in accordance with Sentence 3.1.12.1.(2), and
- d) does not exceed 2 mm in thickness exclusive of fasteners, joints and local reinforcements.

9.10.14.13. Combustible Projections

1) Except for *buildings* containing 1 or 2 *dwelling units* only, *combustible* projections on the exterior of a wall that are more than 1 m above ground level, such as balconies, platforms, canopies, eave projections and stairs, and that could expose an adjacent *building* to fire spread, shall not be permitted within

- a) 1.2 m of a property line or the centreline of a *public way*, or
- b) 2.4 m of a *combustible* projection on another *building* on the same property.

9.10.14.14. Detached Garage Serving One Dwelling Unit

1) Except as required in Article 9.10.14.3., the *exposing building face* of a garage or accessory *building* that serves one *dwelling unit* only and is detached from any *building* shall have a *fire-resistance rating* of not less than 45 min, except that no *fire-resistance rating* is required where the *limiting distance* is 0.6 m or greater.

2) The exterior cladding of detached garages or accessory *buildings* described in Sentence

9.10.14.14.

(1) is not required to be *noncombustible* regardless of the *limiting distance*.

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

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

- a) the detached garage or accessory *building* serves only one *dwelling unit*,
- b) the detached garage or accessory *building* is located on the same property as that *dwelling unit*, and
- c) the *dwelling unit* served by the detached garage or accessory *building* is the only *major occupancy* on the property.

9.10.14.15. Heavy Timber and Steel Columns

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

9.10.14.16. Low Fire Load Occupancies

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

9.10.15. Fire Stops

9.10.15.1. Required Fire Stops in Concealed Spaces

1) Vertical concealed spaces in interior walls and exterior walls shall be separated by fire stops

- a) one from the other, and
- b) from horizontal concealed spaces.

2) Horizontal concealed spaces in attics, roof spaces, ceilings, floors, and crawl spaces shall be separated by fire stops

- a) one from the other, and
- b) from vertical concealed spaces.

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

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

5) In unsprinklered *buildings* of *combustible construction*, every concealed space created by a ceiling, roof space or unoccupied attic space shall be separated by fire stops into compartments

- a) not more than 60 m in greatest dimension, and
- b) where such space contains exposed construction materials having a surface *flame-spread rating* greater than 25, not more than 300 m² in area.

6) No dimension of the concealed space described in Clause (5)(b) shall exceed 20 m. **e**

7) Concealed spaces in mansard or gambrel style roofs, exterior cornices, balconies and canopies of *combustible construction* in which the exposed construction materials within the space have a surface *flame-spread rating* exceeding 25 shall have vertical fire stops at intervals of not more than 20 m and at points where such concealed spaces extend across the ends of required vertical *fire separations*.

9.10.15.2. Required Fire Stops in Wall Assemblies

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

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

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

- a) the width of the concealed wall space does not exceed 25 mm,
- b) the exposed construction materials within the space are *noncombustible*,
- c) the exposed construction materials within the space, including insulation, but not including wiring, piping or similar services, have a *flame-spread rating* of not more than 25, or
- d) the concealed wall space is filled with insulation.

9.10.15.3. Fire Stop Materials

1) Fire stops shall be constructed of not less than

r 9.10.21. Fire Protection for Gas and Electric Ranges

(See A-9.10.21. in Appendix A.)

9.10.21.1. Installation of Ranges

1) Except as required in Sentence (2), natural gas *ranges* shall be installed in accordance with CAN/CGA-B149.1-M, "Natural Gas Installation Code." (See Article 9.34.1.1.)

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

9.10.21.2. Vertical Clearances

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

2) The vertical clearance described in Sentence (1) for framing, finishes and cabinets located directly above the location of the *range* may be reduced to 600 mm above the level of the elements or burners provided the framing, finishes and cabinets

- a) are *noncombustible*, or
- b) are protected by
 - i) asbestos millboard not less than 6 mm thick, covered with sheet metal not less than 0.33 mm thick, or
 - ii) a metal hood with a 125 mm projection beyond the framing, finishes and cabinets.

9.10.21.3. Horizontal Clearances

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

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

3) Except for cabinetry described in Article 9.10.21.2., cabinetry located not less than 450 mm above the level of the heating elements or burners need not be protected as described in Sentence (1).

Section 9.11. Sound Control

9.11.1. Sound Transmission Class Rating (Airborne Sound)

9.11.1.1. Determination of Sound Transmission Class Ratings

1) Sound transmission class ratings shall be determined in accordance with ASTM E 413, "Classification for Rating Sound Insulation," using results from measurements in accordance with

- a) ASTM E 90, "Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements," or
- b) ASTM E 336, "Measurement of Airborne Sound Insulation in Buildings."

(See Appendix A.)

9.11.2. Required Sound Control Locations (Airborne Sound)

9.11.2.1. Minimum Sound Transmission Class Ratings

1) Except as provided in Sentence (2), every *dwelling unit* shall be separated from every other space in a *building* in which noise may be generated by a construction providing a sound transmission class rating of at least 50, measured in accordance with Subsection 9.11.1. or as listed in A-9.10.3.1. in Appendix A.

2) Where a *dwelling unit* is adjacent to an elevator shaft or a refuse chute, the separating construction shall have a sound transmission class rating of at least 55, measured in accordance with Subsection 9.11.1. or as listed in A-9.10.3.1. in Appendix A.

Section 9.12. Excavation

9.12.1. General

9.12.1.1. Removal of Topsoil and Organic Matter

1) The topsoil and vegetable matter in all unexcavated areas under a *building* shall be removed.

9.12.1.1.

2) In localities where termite infestation is known to be a problem, all stumps, roots and other wood debris shall be removed from the *soil* to a depth of not less than 300 mm in unexcavated areas under a *building*.

3) The bottom of every *excavation* shall be free of all organic material.

9.12.1.2. Standing Water

1) *Excavations* shall be kept free of standing water.

9.12.1.3. Protection from Freezing

1) The bottom of *excavations* shall be kept from freezing throughout the entire construction period.

9.12.2. Depth

9.12.2.1. Excavation to Undisturbed Soil

1) *Excavations* for *foundations* shall extend to undisturbed *soil*.

9.12.2.2. Minimum Depth of Foundations

1) Except as provided in Sentences (4) and (5), the minimum depth of *foundations* below finished ground level shall conform to Table 9.12.2.2.

2) Where a *foundation* is insulated in a manner that will reduce heat flow to the *soil* beneath the footings, the *foundation* depth shall conform to that required for *foundations* containing no heated space. (See Appendix A.)

3) The minimum depth of *foundations* for exterior concrete steps with more than 2 risers shall conform to Sentences (1) to (5).

4) Concrete steps with 1 and 2 risers are permitted to be laid on ground level.

5) The *foundation* depths required in Sentence (1) are permitted to be decreased where experience with local *soil* conditions shows that lesser depths are satisfactory, or where the *foundation* is designed for lesser depths.

6) The *foundation* depths required in Sentence (1) do not apply to *foundations* for

- a) *buildings* that are not of masonry or masonry veneer construction and whose superstructure conforms with the requirements of the deformation resistance test in CAN/CSA-Z240.2.1, "Structural Requirements for Mobile Homes," and
- b) *buildings* that are used as accessory *buildings* of not more than 1 *storey* in *building height* and not more than 55 m² in *building area* and that are not of masonry or masonry veneer construction.

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

Type of <i>Soil</i>	Minimum Depth of <i>Foundation</i> Containing Heated <i>Basement</i> or <i>Crawl Space</i> ⁽¹⁾		Minimum Depth of <i>Foundation</i> Containing No Heated <i>Space</i> ⁽²⁾	
	Good <i>Soil Drainage</i> ⁽³⁾	Poor <i>Soil Drainage</i>	Good <i>Soil Drainage</i> ⁽³⁾	Poor <i>Soil Drainage</i>
<i>Rock</i>	No limit	No limit	No limit	No limit
Coarse grained <i>soils</i>	No limit	No limit	No limit	Below the depth of frost penetration
Silt	No limit	No limit	Below the depth of frost penetration	Below the depth of frost penetration
Clay or <i>soils</i> not clearly defined ⁽⁴⁾	1.2 m	1.2 m	1.2 m but not less than the depth of frost penetration	1.2 m but not less than the depth of frost penetration

Notes to Table 9.12.2.2.:

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

⁽²⁾ Including *foundations* insulated to reduce heat loss through the footings.

⁽³⁾ Good soil drainage to not less than the depth of frost penetration.

⁽⁴⁾ See Appendix A.

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9.33.4.4. Expansion, Contraction and System Pressure

1) Heating and cooling systems shall be designed to allow for expansion and contraction of the heat transfer fluid and to maintain the system pressure within the rated working pressure limits of all components of the system.

9.33.4.5. Structural Movement

1) Mechanical systems and equipment shall be designed and installed to accommodate the maximum amount of structural movement provided for in the construction of the *building*.

9.33.4.6. Asbestos

1) Asbestos shall not be used in air distribution systems or equipment in a form or in a location where asbestos fibres could enter the air supply or return systems.

r3 9.33.4.7. Contaminant Transfer

1) Systems serving garages, and systems serving other occupied parts of the *dwelling unit* but located in or running through a garage, shall be designed and constructed in a manner such that means are not provided for the transfer of contaminants from the garage into other spaces in the *dwelling unit*.

9.33.5. Heating and Air-Conditioning Appliances

9.33.5.1. Capacity of Heating Appliances

1) The required capacity of heating *appliances* located in a *dwelling unit* and serving only that *dwelling unit*, shall be determined in accordance with CAN/CSA-F280-M, "Determining the Required Capacity of Residential Space Heating and Cooling Appliances," except that the design temperatures shall conform to Subsection 9.33.3.

9.33.5.2. Appliance Installation Standards

1) Except as provided in Articles 9.33.5.3. and 9.33.5.4., the installation of heating and air-conditioning equipment, including mechanical refrigeration equipment, and including provisions for mounting, clearances and air supply, shall conform to appropriate provincial or territorial requirements or, in the absence of such requirements, to

- a) CAN/CGA-B149.1-M, "Natural Gas Installation Code,"
- b) CAN/CGA-B149.2-M, "Propane Installation Code,"
- c) CSA B51, "Boiler, Pressure Vessel, and Pressure Piping Code,"
- d) CSA B52, "Mechanical Refrigeration Code,"
- e) CAN/CSA-B139-M, "Installation Code for Oil Burning Equipment,"
- f) CAN/CSA-B365-M, "Installation Code for Solid-Fuel-Burning Appliances and Equipment,"

- g) CSA C22.1, "Canadian Electrical Code, Part I," or
- h) CAN/CSA-C445-M, "Design and Installation of Earth Energy Heat Pump Systems for Residential and Other Small Buildings."

9.33.5.3. Solid-Fuel Burning Stoves, Ranges and Space Heaters

1) The design and installation of solid-fuel burning stoves, *ranges* and *space heaters*, including the requirements for combustion air, shall conform to CAN/CSA-B365-M, "Installation Code for Solid-Fuel-Burning Appliances and Equipment."

9.33.5.4. Fireplaces

- 1) Fireplaces shall conform to Section 9.22.

9.33.6. Air Duct Systems

9.33.6.1. Application

1) The design, construction and installation of air duct distribution systems serving heating systems in which the rated heat input does not exceed 120 kW shall conform to this Subsection.

2) Air duct distribution systems in which the rated heat input exceeds 120 kW shall conform to Part 6 and Subsection 3.6.5.

9.33.6.2. Materials in Air Duct Systems

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

2) Ducts, associated fittings and *plenums* are permitted to contain *combustible* material provided they

- a) conform to the appropriate requirements for Class 1 duct materials in CAN/ULC-S110-M, "Fire Tests for Air Ducts,"
- b) conform to Article 3.1.5.14. and Subsection 3.1.9.,
- c) are not used in vertical runs serving more than 2 *storeys*, and
- d) are not used in air duct systems in which the air temperature may exceed 120° C.

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

4) Duct connectors that contain *combustible* materials and that are used between ducts and air outlet units shall

- a) conform to the appropriate requirements for Class 1 air duct materials in CAN/

9.33.6.2.

ULC-S110-M, "Fire Tests for Air Ducts,"

- b) be limited to 4 m in length,
- c) be used only in horizontal runs, and
- d) not penetrate required *fire separations*.

5) *Combustible* ducts that are part of a duct system carrying only ventilation air and that are contained entirely within a *dwelling unit* need not comply with the requirements of Sentences (1) to (4).

6) Materials referred to in Sentences (1) to (5), when used in a location where they may be subjected to excessive moisture, shall

- a) have no appreciable loss of strength when wet, and
- b) be corrosion-resistant.

9.33.6.3. Tape

1) Tape used for sealing duct joints in air ducts, *plenums* and other parts of air duct systems shall meet the flame-resistance requirements for fabric in CAN/ULC-S109-M, "Flame Tests of Flame-Resistant Fabrics and Films."

9.33.6.4. Coverings, Linings, Adhesives and Insulation

1) Coverings, linings and associated adhesives and insulation of air ducts, *plenums* and other parts of air duct systems shall be of *noncombustible* material when exposed to heated air or radiation from heat sources that would result in the exposed surface exceeding a temperature of 120°C.

2) Except as provided in Sentence (3), when *combustible* coverings and linings, including associated adhesives and insulation, are used, they shall have

- a) a *flame-spread rating* of not more than 25 on any exposed surface or any surface that would be exposed by cutting through the material in any direction, and
- b) a smoke developed classification of not more than 50.

3) The outer covering of ducts, *plenums* and other parts of air duct systems used within an assembly of *combustible construction* are permitted to have

- a) an exposed surface *flame-spread rating* of not more than 75, and
- b) a smoke developed classification greater than 50.

4) *Combustible* coverings and linings described in Sentences (2) and (3) shall not flame, glow, smoulder or smoke when tested in accordance with the method of test in ASTM C 411, "Hot-Surface Performance of High-Temperature Thermal Insulation," at the maximum temperature to which the coverings and linings are to be exposed in service.

5) Except as provided in Sentence (6), foamed plastic insulation shall not be used as part of an air duct or for insulating an air duct.

6) Foamed plastic insulation is permitted to be used in a ceiling space that acts as a return air *plenum* provided the foamed plastic insulation is protected from exposure to the *plenum* in accordance with Sentence 3.1.5.11.(2). e2

7) *Combustible* coverings and linings of ducts, including associated adhesives and insulation, shall be interrupted

- a) at the immediate area of operation of heat sources in a duct system, such as electric resistance heaters or fuel-burning heaters or *furnaces*, and
- b) where the duct penetrates a *fire separation*.

8) Linings of ducts shall be installed so that they will not interfere with the operation of volume or balancing dampers or of *fire dampers*, *fire stop flaps* and other *closures*.

9.33.6.5. Galvanized Steel or Aluminum Supply Ducts

1) Galvanized steel or aluminum *supply ducts* shall conform to Table 9.33.6.5.

2) The design of fittings for ducts shall conform to SMACNA, "HVAC Duct Construction Standards – Metal and Flexible," except that metal thicknesses shall conform to Table 9.33.6.5.

necessary for the “other suitably qualified person” to be someone responsible to the designer. In these cases the authority having jurisdiction may wish to order that the review be done by the designer.

A-4.2.4.1.(1) Innovative Designs. It is important that innovative approaches to foundation design be carried out by a person especially qualified in the specific method applied and that the design gives a level of safety and performance at least equivalent to that provided for or implicit in the design carried out by the methods referred to in Part 4. Provision must be made for monitoring the subsequent performance of such structures so that the long term sufficiency of the design can be evaluated.

A-4.2.4.4.(1) Limit States Design of Foundations. Information on limit states design of foundations, including terminology and resistance factors, is contained in the Commentary on Foundations in Structural Commentaries on the National Building Code of Canada 1995.

A-4.2.4.5.(1) Design of Foundations for Differential Movements. Information on design of foundations for differential movements is contained in the Commentary on Foundations in Structural Commentaries on the National Building Code of Canada 1995.

A-4.2.4.6.(1) Depth of Foundations. When adfreezing has occurred and subsequent freezing results in soil expansion beneath this area, the resulting uplift effect is sometimes referred to as frost jacking.

A heated building insulated to prevent heat loss through the foundation walls should be considered as an unheated structure unless the effect of the insulation is taken into account in determining the maximum depth of frost penetration.

A-4.2.5.1.(1) Excavations. Information on excavations can be found in the Commentary on Foundations in Structural Commentaries on the National Building Code of Canada 1995.

A-4.2.6.1.(1) Shallow Foundations. Information on shallow foundations can be found in the Commentary on Foundations in Structural Commentaries on the National Building Code of Canada 1995.

A-4.2.7.1.(1) Deep Foundation Units. A deep foundation unit can be pre-manufactured or cast-in-place; it can be driven, jacked, jetted, screwed, bored or excavated; it can be of wood, concrete or steel or a combination thereof.

A-4.2.7.2.(1) Deep Foundations. Information on deep foundations can be found in the Commentary on Foundations in Structural Commentaries on the National Building Code of Canada 1995.

A-4.2.7.2.(2) Load Testing of Piles. ASTM D 1143, “Piles Under Static Axial

Compressive Load,” defines routine load test procedures which have been used extensively.

A-4.3.3.1.(1) Precast Concrete. CSA A23.3, “Design of Concrete Structures,” requires precast concrete members to conform to CSA A23.4, “Precast Concrete Materials and Construction.”

A-4.3.4.1.(1) Welded Construction. Qualification for fabricators and erectors of welded construction is found in Clause 23.3 of CAN/CSA-S16.1, “Limit States Design of Steel Structures.”

A-4.3.4.2.(1) Cold Formed Stainless Steel Members. Currently there is no Canadian standard for the design of cold formed stainless steel structural members. As an interim measure, design may be carried out using the limits states design provisions of ANSI/ASCE 8, “Design of Cold Formed Stainless Steel Structural Members,” except that load factors, load combinations and load combination factors shall be in accordance with Article 4.1.4.2.

A-5 Environmental Separation. The requirements provided in Part 5 pertain to the separation of environmentally dissimilar spaces. Most obvious is the need to separate indoor conditioned spaces from unconditioned spaces, the outdoors or the ground. There are also cases where separation is needed between interior spaces which are intended to provide different environments. (See also Appendix notes A-5.1.1.1.(1) and A-5.1.2.1.(1).)

A-5.1.1.1.(1) Scope. Part 5 provides explicit requirements related to the transfer of heat, air and moisture in various forms. Control of ingress of radon and other soil gases is addressed by the requirements related to air leakage.

A-5.1.2.1.(1) Application. Section 2.1. specifies that the requirements of Part 5 apply to all buildings except those within the scope of Part 9 or the scope of the National Farm Building Code of Canada. Because of their intended use, many buildings need only provide a limited degree of separation from the outdoor environment or the ground, or between interior spaces. The requirements of Part 5 are written to allow exemptions for these buildings.

The requirements in Part 5 apply to building elements that separate dissimilar environments and to site conditions that may affect environmental loading on the building envelope.

The requirements address

- the design and construction, or selection, of building components such as windows and doors,
- the design and construction of building assemblies such as walls, floors and roofs,

A-5.1.2.1.(1)

- the design and construction of the interfaces between the elements identified in the previous points, and
- the design or selection, and installation, of site materials, components and assemblies, such as back-fill and drainage, and grading.

The requirements apply not only to building elements that separate indoor space from outdoor space, but also to those elements that separate indoor space from the ground and that separate adjacent indoor spaces that have significantly different environments.

Indoor spaces that would require separation include interior conditioned spaces adjacent to indoor unconditioned spaces, and adjacent interior conditioned spaces that are intended to provide different environments. An extreme example of the last would be a wall that separates an indoor ice rink from a swimming pool.

Some building elements are exposed to exterior environmental loads but do not separate dissimilar environments. Solid guards on exterior walkways are one example. Such constructions are subject to the requirements in Part 5.

A-5.1.4.2. Deterioration. Environmental loads that must be considered include but are not limited to: sound, light and other types of radiation, temperature, moisture, air pressure, acids and alkalis. Requirements related to sound are provided in Part 3.

Mechanisms of deterioration include:

- structural (impact, air pressure)
- hygrothermal (freeze-thaw, differential movement due to thermal expansion and contraction, ice lensing)
- electrochemical (oxidation, electrolytic action, galvanic action, solar deterioration)
- biochemical (biological attack, intrusion by insects and rodents).

Information on the effects of deformations in building elements can be found in *Effects of Deformations in Building Components in the Structural Commentaries on the National Building Code of Canada 1995*.

Resistance to deterioration may be determined based on field performance, accelerated testing or compliance with guidelines provided by evaluation agencies recognized by the authority having jurisdiction.

Building components must be designed with some understanding of the length of time over which they will effectively perform their intended function. Actual service life will depend on the materials used and the environment to which they are exposed. The design should take into consideration these factors, the particular function of the compo-

nent and the implications of premature failure, the ease of access for maintenance, repair or replacement, and the cost of repair or replacement.

In cases where it is known or expected that maintenance, repair or replacement is likely to be required for certain elements before the building is subject to a major retrofit, special consideration should be given to providing easy access to those elements.

Where the use of a building or space, or the services for a building or space, are changed significantly, an assessment of the impact of the changes on the environmental separators should be conducted to preclude premature failures that could create hazardous conditions.

A-5.2.1.1.(3) Soil Temperatures. In theory, soil temperatures are needed to determine the conformance of a design to the requirements related to heat transfer and vapour diffusion. In practice, standard construction in a particular area may have proven to perform quite adequately and detailed calculations of soil temperature are unnecessary. (See also Sentence 5.2.2.1.(1).)

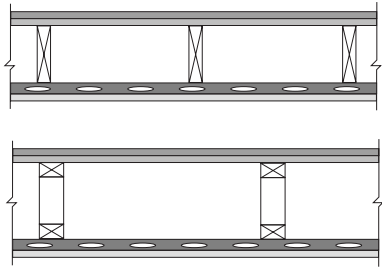
A-5.2.1.2.(1) Interior Environmental Loads. The interior environmental conditions required depend on the intended use of the spaces in the building as defined in the building program. Spaces in different types of buildings and different spaces within a single building may impose different loads on the separators between interior and exterior spaces and between adjacent interior spaces. The separators must be designed to withstand the expected loads.

A-5.3. Heat Transfer. In addressing issues related to health and safety, Section 5.3. calls up levels of thermal resistance needed to minimize condensation on or within environmental separators, and to ensure thermal conditions appropriate for the building use. Energy regulations, where they exist, specify levels of thermal resistance required for energy efficiency or call up energy performance levels, which relate to levels of thermal resistance. Where Part 5 calls for levels of thermal resistance higher than those required by the energy regulations, the requirements of Part 5 take precedence.

A-5.3.1.1. Required Resistance to Heat Transfer. The control of heat flow is required wherever there is an intended temperature difference across the building assembly. The use of the term “intended” is important since, whenever interior space is separated from exterior space, temperature differences will occur.

The interior of an unheated warehouse, for example, will often be at a different temperature from the exterior due to solar radiation, radiation from the

Table A-9.10.3.1.B. (Continued)

Type of Assembly	Assembly Number	Description	Fire Resistance Rating	Typical Sound Transmission Class ⁽¹⁾⁽²⁾
	F6	<ul style="list-style-type: none"> • gypsum-concrete or lightweight concrete topping • subfloor of 19 mm tongue and groove lumber or 15.5 mm plywood, OSB or waferboard • on wood joists spaced not more than 400 mm o.c., or on wood trusses⁽⁴⁾ spaced not more than 600 mm o.c. • with or without absorptive material in the cavity • resilient metal channels spaced at 200 mm o.c. • 1 layer of gypsum board 		
	F6a	F6 with <ul style="list-style-type: none"> • 19 mm gypsum-concrete or lightweight concrete topping (at least 34 kg/m²) • absorptive material in cavity⁽⁵⁾ • 15.9 mm Type X gypsum board⁽³⁾ 	45 min	55
	F6b	F6 with <ul style="list-style-type: none"> • 38 mm lightweight concrete topping (at least 70 kg/m²) • absorptive material in cavity⁽⁵⁾ • 15.9 mm Type X gypsum board⁽³⁾ 	45 min	60
	F6c	F6 with <ul style="list-style-type: none"> • 38 mm lightweight concrete topping (at least 70 kg/m²) • no absorptive material in cavity • 15.9 mm Type X gypsum board⁽³⁾ 	45 min	57
Roofs				
Wood Roof Trusses	R1	<ul style="list-style-type: none"> • wood roof trusses⁽⁴⁾ spaced not more than 600 mm o.c. • 1 layer 15.9 mm Type X gypsum board⁽³⁾ 	45 min	N/A

A-9.10.9.6.(1)

Table A-9.10.3.1.B. (Continued)

Type of Assembly	Assembly Number	Description	Fire Resistance Rating	Typical Sound Transmission Class ⁽¹⁾⁽²⁾
Rating Provided by Membrane Only				
	M1	<ul style="list-style-type: none"> supporting members spaced not more than 600 mm o.c. 1 layer 15.9 mm Type X gypsum board⁽³⁾ 	30 min	N/A
	M2	<ul style="list-style-type: none"> supporting members spaced not more than 600 mm o.c. 2 layers 15.9 mm Type X gypsum board⁽³⁾ 	1 h	N/A

Notes to Table A-9.10.3.1.B.:

- (1) Sound ratings listed are based on the most reliable laboratory test data available for specimens conforming to installation details required by CSA A82.31-M, "Gypsum Board Application." Results of specific tests may differ slightly because of measurement precision and minor variations in construction details. These results should only be used where the actual construction details, including spacing of fasteners and supporting framing, correspond exactly to the details of the test specimens on which the ratings are based. Assemblies with sound transmission class ratings of 50 or more require acoustical sealant applied around electrical boxes and other openings, and at the junction of intersecting walls and floors.
- (2) Sound ratings are only valid where there are no discernible cracks or voids in the visible surfaces.
- (3) The complete descriptions of indicated finishes are as follows:
 - 12.7 mm Type X gypsum board – 12.7 mm special fire-resistant Type X gypsum board conforming to Article 9.29.5.2.
 - 15.9 mm Type X gypsum board – 15.9 mm special fire-resistant Type X gypsum board conforming to Article 9.29.5.2.
 - The outer layer of finish must have its joints taped and finished.
 - Fastener types and spacing must conform to CSA A82.31-M, "Gypsum Board Application."
- (4) Floor and roof trusses must have wood framing members not less than 38 mm x 89 mm with metal connector plates not less than 1 mm thick with teeth not less than 8 mm in length.
- (5) Sound absorptive material includes fibre processed from rock, slag, or glass and must fill at least three-quarters of the cavity depth to provide the listed STC. If the cavity is not over-filled to the point of producing significant outward pressure on the finishes, use of cellulose fibre will provide the same sound transmission class (STC); however, the fire ratings shown in this table cannot be assumed to apply when cellulose fibre is used, since no fire rating data are available for these assemblies using cellulose fibre.

A-9.10.9.6.(1) Penetration of Fire-Rated Assemblies by Service Equipment. This Sentence, together with Article 3.1.9.1., is intended to ensure that the integrity of fire-rated assemblies is maintained where they are penetrated by various types of service equipment.

For buildings regulated by the requirements in Part 3, fire stop materials used to seal openings around building services, such as pipes, ducts and electrical outlet boxes, must meet a minimum level of performance demonstrated by standard test criteria.

This is different from the approach in Part 9. Because of the type of construction normally used for buildings regulated by the requirements in Part 9, it is assumed that this requirement is satisfied by the use of generic fire stop materials such as mineral wool, gypsum plaster or Portland cement mortar.

Building assemblies incorporating an air barrier system will perform adequately with respect to gas tightness, provided all joints in the airtight material are sealed and reasonable care is exercised where the wall or ceiling is pierced by building services. Where a garage is open to the adjacent attic space above the dwelling unit it serves, a gas-tight barrier in the ceiling of the dwelling unit will also provide protection. Unit masonry walls forming the separation between a dwelling unit and an adjacent garage should be provided with two coats of sealer or plaster, or covered with gypsum wallboard on the side of the wall exposed to the garage. All joints must be sealed to ensure continuity of the barrier. (See also Sentences 9.25.3.3.(3) to (8).)

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A-9.10.9.16.(4) Separation Between Dwelling Units and Storage or Repair Garages. The gas-tight barrier between a dwelling unit and an attached garage is intended to provide protection from carbon monoxide and gasoline fumes entering the dwelling unit.