

### 9.20.15. Reinforcement for Earthquake Resistance

#### 9.20.15.1. Amount of Reinforcement

(1) Where reinforcement is required in this Section, masonry walls shall be reinforced horizontally and vertically with steel having a total cross-sectional area of not less than 0.002 times the horizontal cross-sectional area of the wall, so that not less than one-third of the required steel area is installed either horizontally or vertically and the remainder in the other direction.

#### 9.20.15.2. Installation Standard

(1) Where reinforcement for masonry is required in this Section, it shall be installed in conformance with the requirements for reinforced masonry as contained in CAN3-A371, "Masonry Construction for Buildings".

### 9.20.16. Corrosion Resistance

#### 9.20.16.1. Corrosion Resistance of Connectors

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

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

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

Notes to Table 9.20.16.1.:

<sup>(1)</sup> ASTM A123 does not apply to metal less than 3.18 mm (0.125 in) thick.

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

## Section 9.21. Chimneys and Flues

### 9.21.1. General

#### 9.21.1.1. Application

- (1) Except when otherwise specifically stated herein, this Section applies to
- (a) rectangular *chimneys* of brick masonry or concrete not more than 12 m (39 ft 4 in) in height serving fireplaces or *appliances* having a combined total rated heat output of 120 kW (410,000 Btu/h) or less, and
  - (b) *flue pipes* serving *appliances* regulated by Article 9.33.1.2.

(2) *Chimneys* and *flue pipes* other than those described in Sentence (1) shall conform to Section 6.3.

#### 9.21.1.2. Factory-Built Chimneys

(1) *Factory-built chimneys* serving solid fuel-burning *appliances*, and their installation, shall conform to CAN/ULC-S629, "650°C Factory-Built Chimneys". (See Appendix A.)

#### 9.21.1.3. Chimneys, Gas Vents or Flue Pipes

(1) Except as provided in Sentence (2), *chimneys* (other than those described in Sentences 9.21.1.1.(1) and 9.21.1.2.(1)), *gas vents* and *flue pipes* serving gas-, oil- or solid fuel-burning *appliances* and associated equipment shall conform to Section 6.3. (Note: vents for gas- or oil-burning *appliances* are regulated by Standards administered by other agencies.)

(2) *Flue pipes* serving solid fuel-burning *stoves*, *ranges* and *space heaters* shall conform to CAN/CSA-B365-M, "Installation Code for Solid-Fuel Burning Appliances and Equipment".

#### 9.21.1.4. Chimney or Flue Pipe Walls

(1) The walls of any *chimney* or *flue pipe* shall be constructed to be smoke- and flame-tight.

## 9.21.2. Chimney Flues

### 9.21.2.1. Chimney Flue Limitation

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

### 9.21.2.2. Connections of More Than One Appliance

(1) Except as required in Article 9.21.2.1., two or more fuel-burning *appliances* are permitted to be connected to the same *chimney flue* provided adequate draft is maintained for the connected *appliances* and the connections are made as described in Sentences (2) and (3).

(2) Where 2 or more solid fuel-burning *appliances* are connected to the same *chimney flue*, the *appliances* must be located on the same *storey*.

(3) The connection referred to in Sentence (2) for a solid fuel-burning *appliance* shall be below connections for *appliances* burning other fuels.

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

### 9.21.2.3. Inclined Chimney Flues

(1) *Chimney flues* shall not be inclined more than 45° to the vertical.

### 9.21.2.4. Size of Chimney Flues

(1) Except for *chimneys* serving fireplaces, the size of a *chimney flue* shall conform to the requirements of the solid fuel-burning *appliance* installation standards referenced in Sentence 6.2.1.4.(1) and Article 9.33.1.2.

(2) Where a *chimney flue* serves only one solid fuel-burning *appliance*, the *flue* area shall be at least equal to that of the *flue pipe* connected to it.

### 9.21.2.5. Fireplace Chimneys

(1) The size of a *chimney flue* serving a masonry fireplace shall be within the allowable range specified in Table 9.21.2.5.A. or Table 9.21.2.5.B.

Table 9.21.2.5.A  
Diameter of Round Flues for Fireplace Chimneys  
Forming Part of Sentence 9.21.2.5.(1)

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

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

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

**9.21.2.6. Oval Chimney Flues**

(1) The width of an oval *chimney flue* shall be not less than two-thirds its breadth.

**9.21.3. Chimney Lining**

**9.21.3.1. Lining Materials**

(1) Every *masonry or concrete chimney* shall have a lining of clay, concrete, firebrick or metal.

**9.21.3.2. Joints in Chimney Liners**

(1) Joints of *chimney liners* shall be sealed to provide a barrier to the passage of flue gases and condensate into the cavity between the liner and the surrounding masonry.

(2) Joints of clay, concrete or firebrick *chimney liners* shall be struck flush to provide a straight, smooth, aligned chimney *flue*.

**9.21.3.3. Clay Liners**

(1) Clay liners shall conform to CAN/CSA-A324-M, "Clay Flue Linings".

(2) Liners referred to in Sentence (1) shall be not less than 15.9 mm (5/8 in) thick and shall be capable of resisting,

without softening or cracking, a temperature of 1100°C (2012°F).

**9.21.3.4. Firebrick Liners**

(1) Firebrick liners shall conform to ASTM C27, "Classification of Fireclay and High Alumina Refractory Brick".

(2) Firebrick liners shall be laid with high temperature cement mortar conforming to CAN/CGSB-10.3, "Air Setting Refractory Mortar".

**9.21.3.5. Concrete Liners**

(1) Concrete *flue* liners shall conform to Clause 4.2.6.4. of CAN/CSA-A405, "Design and Construction of Masonry Chimneys and Fireplaces".

**9.21.3.6. Metal Liners**

(1) Metal liners shall be constructed of at least 0.3 mm (0.012 in) thick stainless steel.

(2) Except as permitted in Sentence 9.22.10.2.(3), metal liners referred to in Sentence (1) shall only be used in *chimneys* serving gas-, or oil-burning *appliances*. (See Appendix A.)

**9.21.3.7. Installation of Chimney Liners**

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

**9.21.3.8. Spaces between Liners and Surrounding Masonry**

(1) A space not less than 10 mm wide shall be left between a *chimney liner* and the surrounding masonry.

(2) The space required in Sentence (1) shall not be filled with mortar.

**9.21.3.9. Mortar for Chimney Liners**

(1) *Chimney liners* used in *chimneys* for solid fuel-burning *appliances* shall be laid in a full bed of

- (a) high temperature cement mortar conforming to CAN/CGSB 10.3, "Air Setting Refractory Mortar", or
- (b) mortar consisting of 1 part portland cement to 3 parts sand by volume.

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

**9.21.3.10. Extension of Chimney Liners**

(1) *Chimney liners* shall extend from a point not less than 200 mm (7<sup>7</sup>/<sub>8</sub> in) below the lowest *flue pipe* connection to a point not less than 50 mm (2 in) or more than 100 mm (4 in) above the *chimney cap*.

**9.21.4. Masonry and Concrete Chimney Construction****9.21.4.1. Unit Masonry**

(1) Unit masonry shall conform to Section 9.20.

**9.21.4.2. Concrete**

(1) Concrete shall conform to Section 9.3.

**9.21.4.3. Footings**

(1) Footings for *masonry chimneys* and concrete *chimneys* shall conform to the requirements in Section 9.15.

**9.21.4.4. Height of Chimney Flues**

- (1) A *chimney flue* shall extend not less than
  - (a) 900 mm (2 ft 11 in) above the highest point at which the *chimney* comes in contact with the roof, and
  - (b) not less than 600 mm (23<sup>3</sup>/<sub>8</sub> in) above the highest roof surface or structure within 3 m (9 ft 10 in) of the *chimney*.

(See Appendix A.)

**9.21.4.5. Lateral Stability**

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

- (2) A *chimney* need not be laterally braced provided
  - (a) no horizontal outside dimension is less than 400 mm (15<sup>3</sup>/<sub>8</sub> in), and
  - (b) the *chimney* extends not more than 3.6 m (11 ft 10 in) above a roof or the masonry wall of which it forms a part.

(See Appendix A.)

**9.21.4.6. Chimney Caps**

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

(2) The cap required in Sentence (1) shall slope from the lining and be provided with a drip not less than 25 mm (1 in) from the *chimney wall*.

(3) Cast-in-place concrete caps shall be separated from the *chimney liner* by a bond break and be sealed at that location.

(4) Jointed precast concrete or masonry *chimney caps* shall have flashing installed beneath the cap extending from the liner to the drip edge.

**9.21.4.7. Cleanout**

(1) Except for a *chimney flue* constructed to serve a masonry fireplace, a cleanout opening with a metal frame and tight-fitting metal door shall be installed near the base of the *chimney flue*.

**9.21.4.8. Wall Thickness**

(1) The walls of a *masonry chimney* shall be built of

solid units not less than 70 mm (2¾ in) thick.

#### 9.21.4.9. Separation of Flue Liners

(1) *Flue* liners in the same *chimney* shall be separated by not less than 70 mm (2¾ in) of masonry or concrete exclusive of liners where clay liners are used, or 90 mm (3½ in) of firebrick where firebrick liners are used.

(2) *Flue* liners referred to in Sentence (1) shall be installed to prevent significant lateral movement.

#### 9.21.4.10. Flashing

(1) Junctions with adjacent materials shall be adequately flashed to shed water.

### 9.21.5. Clearance from Combustible Construction

#### 9.21.5.1. Clearance from Combustible Materials

(1) The clearance between *masonry or concrete chimneys* and *combustible* framing material shall be not less than

- (a) 50 mm (2 in) for interior *chimneys*, and
- (b) 12 mm (½ in) for exterior *chimneys*.

(See Appendix A.)

(2) A clearance of not less than 150 mm (5¾ in) shall be provided between a cleanout opening and *combustible* material.

(3) *Combustible* flooring, subflooring and ceiling finishes shall have not less than a 12 mm (½ in) clearance from *masonry or concrete chimneys*.

#### 9.21.5.2. Sealing of Spaces

(1) All spaces between *masonry or concrete chimneys* and *combustible* material shall be sealed top or bottom with *noncombustible* material.

#### 9.21.5.3. Support of Joists or Beams

(1) Joists or beams may be supported on masonry walls which enclose *chimney flues* provided the *combustible* members are separated from the *flue* by a minimum of 290 mm (11¾ in) of solid masonry.

## Section 9.22. Fireplaces

### 9.22.1. General

#### 9.22.1.1. Application

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

#### 9.22.1.2. Masonry and Concrete

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

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

#### 9.22.1.3. Footings

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

#### 9.22.1.4. Combustion Air

(1) Every solid fuel-fired fireplace, including a factory-built fireplace, shall have a supply of combustion air from outdoors in accordance with Sentences (2) to (7).

(2) The combustion air shall be supplied by a *noncombustible* and corrosion-resistant supply duct.

(3) The supply duct shall have

- (a) a diameter of not less than 100 mm (4 in) or equivalent area, and
- (b) an exterior intake for entry of air from the outdoors.

(4) The supply duct shall contain a tight-fitting damper that shall be located close to the interior outlet and be operable from the room containing the fireplace.

(5) The operating mechanism shall clearly indicate the actual position of the damper.

(6) The interior outlet shall

- (a) be located as close as possible to the opening in the face of the fireplace, and
- (b) be designed to prevent embers from entering the supply duct.

(7) Where a supply of combustion air is provided directly to the fire chamber of a fireplace, including a factory-built fireplace or a steel fireplace liner, the installation shall comply with the "Outdoor Air Supply" requirements provided in CAN/CSA-A405-M, "Design and Construction of Masonry Chimneys and Fireplaces".

## 9.22.2. Fireplace Liners

### 9.22.2.1. Brick or Steel Liners

(1) Except where a fireplace is equipped with a steel liner, every fireplace shall have a firebrick liner.

### 9.22.2.2. Firebrick Liners

- (1) Fireplace liners shall be not less than
  - (a) 50 mm (2 in) thick for the sides and back, and
  - (b) 25 mm (1 in) thick for the floor.

(2) Firebrick liners shall be laid with high temperature cement mortar conforming to CAN/CGSB 10.3, "Air Setting Refractory Mortar".

(3) Joints between a firebrick liner and the adjacent back-up masonry shall be offset.

### 9.22.2.3. Steel Liners

(1) Steel liners for fireplaces shall conform to CAN/ULC-S639M, "Standard for Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplaces", and shall be installed in accordance with the installation instructions in that Standard.

## 9.22.3. Fireplace Walls

### 9.22.3.1. Thickness of Walls

(1) Except as provided in Sentence (2), the thickness of the back and sides of a fireplace, including the thickness of any firebrick liner, shall consist of not less than 190 mm (7½ in) thick where a metal liner or a firebrick liner less than 50 mm (2 in) is used.

(2) When a steel fireplace liner is used with an air circulating chamber surrounding the firebox, the back and sides of the fireplace shall consist of

- (a) solid masonry units not less than 90 mm (3½ in) thick, or
- (b) hollow masonry units not less than 190 mm (7½ in) thick.

## 9.22.4. Fire Chamber

### 9.22.4.1. Fire Chamber Dimensions

(1) The distance from the back of the fire chamber to the plane of the fireplace opening shall be not less than 300 mm (11¾ in).

## 9.22.5. Hearth

### 9.22.5.1. Hearth Extension

(1) Except as required in Sentence (2), fireplaces shall have a *noncombustible* hearth extending not less than 400 mm (15¾ in) in front of the fireplace opening measured from the facing, and not less than 200 mm (7⅞ in) beyond each side of the fireplace opening.

(2) Where the fire chamber floor is elevated more than 150 mm (5⅞ in) above the hearth, the dimension of the hearth measured perpendicular to the plane of the fireplace opening shall be increased by not less than

- (a) 50 mm (2 in) for an elevation above 150 mm (5⅞ in) and not more than 300 mm (11¾ in), and
- (b) an additional 25 mm (1 in) for every 50 mm in elevation above 300 mm (11¾ in).

### 9.22.5.2. Support of Hearth

(1) Except as permitted in Sentence (2), the fire chamber floor and hearth shall be supported on a reinforced concrete slab not less than a 100 mm (4 in) thick at its supports and, if cantilevered, not less than 50 mm (2 in) thick at its unsupported edge.

(2) A hearth for a fireplace with an opening raised not less than 200 mm (7⅞ in) from a *combustible* floor is permitted to be supported on that floor provided the requirements of Clauses 5.3.6.5. to 5.3.6.7. of CAN/CSA-A405-M, "Design and Construction of Masonry Chimneys and Fireplaces" are followed.

## 9.22.6. Damper

### 9.22.6.1. Required Damper and Size

(1) The throat of every fireplace shall be equipped with a metal damper sufficiently large to cover the full area of the throat opening.

## 9.22.7. Smoke Chamber

### 9.22.7.1. Slope of Smoke Chamber

(1) The sides of the smoke chamber connecting a fireplace throat with a *flue* shall not be sloped at an angle greater than 45° to the vertical.

### 9.22.7.2. Wall Thickness

(1) The thickness of masonry walls surrounding the smoke chamber shall be not less than 190 mm (7½ in) at the sides, front and back, except that the portions of the back exposed to the outside may be 140 mm (5½ in) thick.

## 9.22.8. Factory-Built Fireplaces

### 9.22.8.1. Conformance to Standard

(1) Factory-built fireplaces and their installation shall conform to CAN/ULC S610-M, "Factory-Built Fireplaces".

## 9.22.9. Clearance of Combustible Material

### 9.22.9.1. Clearance to the Fireplace Opening

(1) *Combustible* material shall not be placed on or near the face of a fireplace within 150 mm (5¾ in) of the fireplace opening, except that where the *combustible* material projects more than 38 mm (1½ in) out from the face of the fireplace above the opening, such material shall be at least 300 mm (11¾ in) above the top of the opening.

### 9.22.9.2. Metal Exposed to the Interior

(1) Metal exposed to the interior of a fireplace such as the damper control mechanism shall have at least a 50 mm (2 in) clearance from any *combustible* material on the face of the fireplace where such metal penetrates through the face of the fireplace.

### 9.22.9.3. Clearance to Combustible Framing

(1) Not less than a 100 mm (4 in) clearance shall be provided between the back and sides of a solid fuel burning fireplace and *combustible* framing, except that a 50 mm (2 in) clearance is permitted where the fireplace is located in an exterior wall.

(2) Not less than a 50 mm (2 in) clearance shall be provided between the back and sides of the smoke chamber of a solid fuel burning fireplace and *combustible* framing, except that a 25 mm (1 in) clearance is permitted where the fireplace is located in an exterior wall.

## 9.22.9.4. Heat Circulating Duct Openings

(1) The clearance of *combustible* material above heat circulating duct openings from those openings shall be not less than

- (a) 300 mm (11¾ in) where the *combustible* material projects more than 38 mm (1½ in) from the face, and
- (b) 150 mm (5¾ in) where the projection is less than 38 mm (1½ in).

## 9.22.10. Fireplace Inserts

### 9.22.10.1. Installation Standard

(1) Fireplace inserts and hearth mounted *stoves* vented through the throat of a fireplace shall conform to ULC S628, "Standard for Fireplace Inserts".

### 9.22.10.2. Installation

(1) The installation of fireplace inserts and hearth mounted *stoves* vented through the throat of a fireplace shall conform to CAN/CSA-B365-M, "Installation Code for Solid-Fuel Burning Appliances and Equipment".

(2) Fireplace inserts and hearth mounted *stoves* vented through the throat of a fireplace described in Sentence (1) may be installed in existing fireplaces only if a minimum thickness of 190 mm (7½ in) of solid masonry is provided between the smoke chamber and any existing *combustible* materials, unless the insert is listed for lesser clearances.

(3) A fireplace insert installed in a masonry fireplace shall have,

- (a) a *listed* metal *chimney* liner installed from the insert collar to the top of the *chimney*,
- (b) a direct sealed connection to the *chimney flue* where such provision is part of an insert conforming to Sentence 9.22.10.1.(1), or
- (c) a direct sealed connection to the smoke chamber and a cleanout provided to any inaccessible part of the smoke chamber.