# 2024 IRC Chapter 10 — Chimneys and Fireplaces

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Chapter 10 covers the construction, seismic reinforcing and anchorage of masonry chimneys and fireplaces, and sets the standards for factory-built chimneys, fireplaces and masonry heaters. Masonry work follows the prescriptive requirements below; factory-built units are approved by listing and labeling.

## Table R1001.1 — Summary of requirements for masonry fireplaces and chimneys

**A — Hearth slab thickness**
4 inches.

**B — Hearth extension, each side of opening**
8 inches where the fireplace opening is less than 6 square feet; 12 inches where the opening is 6 square feet or more.

**C — Hearth extension, front of opening**
16 inches where the fireplace opening is less than 6 square feet; 20 inches where the opening is 6 square feet or more.

**D — Hearth slab reinforcing**
Reinforced to carry its own weight and all imposed loads.

**E — Firebox wall thickness**
10-inch solid brick, or 8 inches where a firebrick lining is used. Joints in firebrick 1/4 inch maximum.

**F — Top of opening to throat**
8 inches.

**G — Smoke chamber wall thickness**
6 inches lined; 8 inches for unlined walls.

**H — Chimney vertical reinforcing**
Four No. 4 full-length bars for chimneys up to 40 inches wide. Add two No. 4 bars for each additional 40 inches or fraction of width, or each additional flue.

**J — Horizontal reinforcing**
1/4-inch ties at 18 inches, and two ties at each bend in vertical steel.

**K — Bond beams**
No specified requirements.

**L — Fireplace lintel**
Noncombustible material.

**M — Chimney walls with flue lining**
Solid masonry units, or hollow masonry units grouted solid, not less than 4-inch nominal thickness.

**Distance between adjacent flues**
See Section R1003.13.

**P — Effective flue area**
Based on the area of the fireplace opening; see Section R1003.15.

**R — Clearances**
Combustible material: see Sections R1001.11 and R1003.18. Mantel and trim: see Section R1001.11, Exception 4. Above roof: 3 feet at the roofline and 2 feet at 10 feet.

**S — Anchorage**
Two 3/16-inch × 1-inch straps, embedded 12 inches into the chimney, hooked around the outer bar with a 6-inch extension, fastened to 4 joists with two 1/2-inch diameter bolts.

# Section R1001 — Masonry fireplaces

### R1001.1 General
Masonry fireplaces shall be constructed in accordance with this section and the applicable provisions of Chapters 3 and 4.

### R1001.2 Footings and foundations
Footings for masonry fireplaces and their chimneys shall be concrete or solid masonry not less than 12 inches thick, extending not less than 6 inches beyond the face of the fireplace or foundation wall on all sides. Footings shall be founded on natural, undisturbed earth or engineered fill below frost depth. In areas not subject to freezing, footings shall be not less than 12 inches below finished grade.

### R1001.2.1 Ash dump cleanout
Cleanout openings located within foundation walls below fireboxes, where provided, shall be equipped with ferrous metal or masonry doors and frames constructed to remain tightly closed except when in use. Cleanouts shall be located to allow access so that ash removal will not create a hazard to combustible materials.

### R1001.3 Seismic reinforcing
Masonry or concrete chimneys in Seismic Design Category D0, D1 or D2 shall be reinforced. Reinforcing shall conform to Table R1001.1 and Section R606.

### R1001.3.1 Vertical reinforcing
For chimneys up to 40 inches wide, four No. 4 continuous vertical bars shall be placed between wythes of solid masonry or within the cells of hollow unit masonry and grouted per Section R606. Grout shall be prevented from bonding with the flue liner so the liner is free to move with thermal expansion. For chimneys more than 40 inches wide, two additional No. 4 vertical bars shall be provided for each additional flue or each additional 40 inches of width or fraction thereof.

### R1001.3.2 Horizontal reinforcing
Vertical reinforcement shall be placed within 1/4-inch ties, or other reinforcing of equivalent net cross-sectional area, placed in the bed joints per Section R606 at not less than every 18 inches of vertical height. Two such ties shall be installed at each bend in the vertical bars.

### R1001.4 Seismic anchorage
Masonry or concrete chimneys in Seismic Design Category D0, D1 or D2 shall be anchored at each floor, ceiling or roof line more than 6 feet above grade, except where constructed completely within the exterior walls.

### R1001.4.1 Anchorage
Two 3/16-inch by 1-inch straps shall be embedded not less than 12 inches into the chimney, hooked around the outer bars and extending 6 inches beyond the bend. Each strap shall be fastened to not less than four ceiling or floor joists or rafters with two 1/2-inch bolts.

### R1001.4.1.1 Cold-formed steel framing
Where cold-formed steel framing is used, the location where the 1/2-inch bolts attach the straps to the framing shall be reinforced with not less than a 3-inch × 3-inch × 0.229-inch steel plate on top of the strap, screwed to the framing with not fewer than seven No. 6 screws for each bolt.

### R1001.5 Firebox walls
Masonry fireboxes shall be constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete. Where a firebrick lining not less than 2 inches thick or other approved lining is provided, back and side walls shall each be not less than 8 inches of solid masonry including the lining. Joints between firebricks shall not exceed 1/4 inch. Where no lining is provided, back and side walls shall total not less than 10 inches of solid masonry. Firebrick shall conform to ASTM C27 or C1261 and be laid with medium-duty refractory mortar conforming to ASTM C199.

### R1001.5.1 Steel fireplace units
Steel fireplace units incorporating a steel firebox lining shall be constructed with steel not less than 1/4 inch thick and an air-circulating chamber ducted to the interior of the building. The firebox lining shall be encased with solid masonry to a total thickness at the back and sides of not less than 8 inches, of which not less than 4 inches shall be solid masonry or concrete. Circulating air ducts shall be metal or masonry.

### R1001.6 Firebox dimensions

The firebox shall have a depth of not less than 20 inches. The throat shall be not less than 8 inches above the fireplace opening, and the throat opening not less than 4 inches deep. The cross-sectional area of the passageway above the firebox — including throat, damper and smoke chamber — shall be not less than the cross-sectional area of the flue. Exception: Rumford fireplaces are permitted where the depth is not less than 12 inches and not less than one-third of the width of the opening, the throat is not less than 12 inches above the lintel, and the throat is not less than one-twentieth the cross-sectional area of the fireplace opening.

### R1001.7 Lintel and throat

Masonry over a fireplace opening shall be supported by a lintel of noncombustible material with a minimum bearing length of 4 inches on each end. The fireplace throat or damper shall be located not less than 8 inches above the lintel.

### R1001.7.1 Damper

Masonry fireplaces shall be equipped with a ferrous metal damper located not less than 8 inches above the top of the fireplace opening. Dampers shall be installed in the fireplace or the chimney venting the fireplace and shall be operable from the room containing the fireplace.

### R1001.8 Smoke chamber

Smoke chamber walls shall be solid masonry units, hollow masonry units grouted solid, stone or concrete. Front, back and side walls shall total not less than 8 inches of solid masonry, and the inside surface shall be parged smooth with refractory mortar conforming to ASTM C199. Where a lining of firebrick not less than 2 inches thick, or vitrified clay not less than 5/8 inch thick, is provided, the total minimum thickness shall be 6 inches of solid masonry including the lining. Firebrick shall conform to ASTM C1261, laid with medium-duty refractory mortar conforming to ASTM C199; vitrified clay linings shall conform to ASTM C315.

## Section R1002 — Masonry heaters

### R1002.1 Definition

A masonry heater is a heating appliance constructed of concrete or solid masonry, designed to absorb and store heat from a solid-fuel fire built in the firebox by routing exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes horizontal or downward flow before entering the chimney, and that delivers heat by radiation from the masonry surface.

### R1002.2 Installation

Masonry heaters shall comply with ASTM E1602, or be listed and labeled in accordance with UL 1482 or CEN 15250 and installed per the manufacturer's instructions.

### R1002.3 Footings and foundation

The firebox floor shall be not less than 4 inches of noncombustible material, supported on a noncombustible footing and foundation per Section R1003.2.

### R1002.4 Seismic reinforcing

In Seismic Design Categories D0, D1 and D2, masonry heaters shall be anchored to the masonry foundation per Section R1003.3. Seismic reinforcing is not required within the body of a masonry heater whose height is 3.5 times its body width or less and where the masonry chimney serving the heater is not supported by the body of the heater. Where the chimney shares a common wall with the heater facing, the chimney portion shall be reinforced per Section R1003.

### R1002.5 Masonry heater clearance

Combustible materials shall not be placed within 36 inches of the outside surface of a masonry heater per NFPA 211, and the required space shall be fully vented to permit free airflow around all heater surfaces. Exception 1: Where the heater wall is not less than 8 inches of solid masonry and the heat exchange channel wall not less than 5 inches of solid masonry, combustibles shall not be placed within 4 inches of the heater, and not less than 8 inches shall be provided between the gas-tight capping slab and a combustible ceiling. Exception 2: Listed and labeled heaters shall be installed per the listing and the manufacturer's instructions.

## Section R1003 — Masonry chimneys

### R1003.1 Definition

A masonry chimney is a chimney constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete. Masonry chimneys shall be constructed, anchored, supported and reinforced as required in this chapter.

**R1003.2 Footings and foundations**
Footings shall be concrete or solid masonry not less than 12 inches thick, extending not less than 6 inches beyond the face of the foundation or support wall on all sides, founded on natural undisturbed earth or engineered fill below frost depth. In areas not subject to freezing, footings shall be not less than 12 inches below finished grade.

**R1003.3 Seismic reinforcing**
In Seismic Design Category D0, D1 or D2, masonry and concrete chimneys shall be reinforced and anchored as detailed in Sections R1003.3.1, R1003.3.2 and R1003.4. In Seismic Design Category A, B or C, reinforcement and seismic anchorage are not required.

**R1003.3.1 Vertical reinforcing**
For chimneys up to 40 inches wide, four No. 4 continuous vertical bars anchored in the foundation shall be placed in the concrete, between wythes of solid masonry, or within the cells of hollow unit masonry and grouted per Section R608.1.1. Grout shall be prevented from bonding with the flue liner. For chimneys more than 40 inches wide, two additional No. 4 vertical bars shall be installed for each additional 40 inches of width or fraction thereof.

**R1003.3.2 Horizontal reinforcing**
Vertical reinforcement shall be enclosed within 1/4-inch ties, or reinforcing of equivalent net cross-sectional area, spaced not more than 18 inches on center in concrete, or placed in the bed joints of unit masonry at not less than every 18 inches of vertical height. Two ties shall be installed at each bend in the vertical bars.

**R1003.4 Seismic anchorage**
Chimneys and foundations in Seismic Design Category D0, D1 or D2 shall be anchored at each floor, ceiling or roof line more than 6 feet above grade, except where constructed completely within the exterior walls.

**R1003.4.1 Anchorage**
Two 3/16-inch by 1-inch straps shall be embedded not less than 12 inches into the chimney, hooked around the outer bars and extending 6 inches beyond the bend. Each strap shall be fastened to not less than four floor joists with two 1/2-inch bolts.

**R1003.4.1.1 Cold-formed steel framing**
Where cold-formed steel framing is used, the bolt locations shall be reinforced with not less than a 3-inch × 3-inch × 0.229-inch steel plate on top of a strap screwed to the framing with not fewer than seven No. 6 screws for each bolt.

**R1003.11.6 Notice of usage**
Where a flue is relined with a material not complying with Section R1003.11.1, the chimney shall be permanently identified by a label adjacent to where the connector enters the chimney reading: THIS CHIMNEY FLUE IS FOR USE ONLY WITH [TYPE OR CATEGORY OF APPLIANCE] APPLIANCES THAT BURN [TYPE OF FUEL]. DO NOT CONNECT OTHER TYPES OF APPLIANCES.

**R1003.12 Clay flue lining (installation)**
Clay flue liners shall be installed per ASTM C1283 and extend from a point not less than 8 inches below the lowest inlet — or, for fireplaces, from the top of the smoke chamber — to a point above the enclosing walls. The lining shall be carried up vertically with a slope not greater than 30 degrees from vertical. Liners shall be laid in medium-duty water-insoluble refractory mortar conforming to ASTM C199 with tight joints left smooth on the inside, installed to maintain an airspace or insulation not exceeding the thickness of the flue liner between liner and the interior face of the chimney masonry. Flue liners shall be supported on all sides, using only enough mortar to make the joint and hold the liners in position.

**R1003.12.1 Listed materials**
Listed materials used as flue linings shall be installed in accordance with the terms of their listings and the manufacturer's instructions.

**R1003.12.2 Space around lining**
The space surrounding a chimney lining system or vent installed within a masonry chimney shall not be used to vent any other appliance. Exception: This shall not prevent the installation of a separate flue lining per the manufacturer's instructions.

**R1003.13 Multiple flues**
Where two or more flues are located in the same chimney, masonry wythes not less than 4 inches thick shall be built between adjacent flue linings and bonded into the walls of the chimney. Exception: Where venting only one appliance, two flues may adjoin with only the flue lining separation between them, with joints of adjacent linings staggered not less than 4 inches.

**R1003.14 Flue area (appliance)**
Chimney flues shall not be smaller in area than the area of the connector from the appliance. Sizing of a chimney flue serving multiple appliance venting systems shall be in accordance with Section M1805.3.

**R1003.16 Inlet**
Inlets to masonry chimneys shall enter from the side and shall have a thimble of fireclay, rigid refractory material or metal that will prevent the connector from pulling out of the inlet or from extending beyond the wall of the liner.

**R1003.17 Cleanout openings**
Cleanout openings shall be provided within 6 inches of the base of each flue within every masonry chimney. The upper edge of the cleanout shall be not less than 6 inches below the lowest chimney inlet opening, the height of the opening shall be not less than 6 inches, and the cleanout shall have a noncombustible cover. Exception: Chimney flues serving masonry fireplaces where cleaning is possible through the fireplace opening.

**R1003.18 Chimney clearances**
Any portion of a masonry chimney located in the interior of the building or within an exterior wall shall have a minimum airspace clearance to combustibles of 2 inches. Chimneys located entirely outside the exterior walls, including those passing through the soffit or cornice, shall have a minimum airspace clearance of 1 inch. The airspace shall not be filled except to provide fireblocking per Section R1003.19. Exception 1: Chimneys with a lining system listed and labeled for use in contact with combustibles per UL 1777, installed per the manufacturer's instructions, may have combustible material in contact with exterior surfaces. Exception 2: Where chimneys are built as part of masonry or concrete walls, combustible materials shall not contact the wall less than 8 inches from the inside surface of the nearest flue lining. Exception 3: Combustible materials may abut the chimney side walls per Figure R1003.18 provided they are not less than 8 inches from the inside surface of the nearest flue lining.

**R1003.19 Chimney fireblocking**
Spaces between chimneys and the floors and ceilings through which they pass shall be fireblocked with noncombustible material securely fastened in place. Fireblocking of spaces between chimneys and wood joists, beams or headers shall be self-supporting or placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney.

**R1003.20 Chimney crickets**
Chimneys shall be provided with crickets where the dimension parallel to the ridgeline is greater than 30 inches and does not intersect the ridgeline. The intersection of the cricket and the chimney shall be flashed and counterflashed in the same manner as normal roof-chimney intersections. Crickets shall comply with Figure R1003.20 and Table R1003.20.

## Reference tables

**Table R1003.14(1) — round flue area**

| Inside dia. (in.) | Area (sq in.) |
|---|---|
| 6 | 28 |
| 7 | 38 |
| 8 | 50 |
| 10 | 78 |
| 10 3/4 | 90 |
| 12 | 113 |
| 15 | 176 |
| 18 | 254 |

**Table R1003.14(2) — square/rect. flue area**

| Nominal (in.) | Area (sq in.) |
|---|---|
| 4.5 × 8.5 | 23 |
| 4.5 × 13 | 34 |
| 8 × 8 | 42 |
| 8.5 × 8.5 | 49 |
| 8 × 12 | 67 |
| 8.5 × 13 | 76 |
| 12 × 12 | 102 |
| 8.5 × 18 | 101 |

**Table R1003.20 — cricket dimensions**

| Roof slope | H |
|---|---|
| 12:12 | 1/2 of W |
| 8:12 | 1/3 of W |
| 6:12 | 1/4 of W |
| 4:12 | 1/6 of W |
| 3:12 | 1/8 of W |

Summarized from the 2024 International Residential Code, Chapter 10 (Sections R1001, R1002, R1003 and Table R1001.1). Flue sizes based on ASTM C315. For reference only — local amendments, the appliance listing and an on-site inspection govern.