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CITY of NAPA

### MASONRY FIREPLACE AND CHIMNEY CONSTRUCTION 1998 California Building Code Requirements

Uniform Building Code Chapter 31 requires fireplace and chimney construction to conform to the prescriptive provisions of this chapter or be designed by a California licensed engineer or architect. This handout was created to assist homeowners who are interested in completely demolishing their existing fireplace chimney and constructing, new masonry fireplace / chimney per detailed prescriptive requirements that follow below. An engineering design prepared by a licensed engineer or architect shall be submitted to the building division if any masonry fireplace chimney is to, be repaired or does, not conform to the UBC prescriptive requirements of UBC 3102.4 and 3102.7. Submit two sets of plans to the Napa Building Division showing conformance with the following:

#### Construction Requirements:

Each chimney shall be constructed as to safely convey flue gases not exceeding the maximum temperatures for the type of construction as set forth in Table 31-B and shall be capable of producing a draft at the appliance not less than that required for safe operation. UBC 3102.3.2. Clearance to combustible materials shall be as required by UBC Table. 31-B. UBC 3102.3.3

Chimney shall be lined with clay flue tile firebrick, molded refractory units or other approved lining not less than, 5/8 thick as set forth in UBC Table 31-.B. Chimney liners shall be carefully bedded in approved medium duty refractory mortar with close fitting joints left smooth on the inside. Medium duty refractory mortar shall be in accordance with UBC 3503, 3504, and ASTM C 199. UBC 3102.3.4.

The minimum net cross-sectional area of the chimney flue for fireplaces shall be determined in accordance with UBC Figure 31-1. The minimum cross sectional area shown or a flue size providing equivalent net cross sectional area shall be used. The height of the chimney shall be measured from the fire box floor to the top of the last chimney flue tile. UBC 3102.3.5

Every chimney shall extend above the roof and the highest elevation of any part of a building as shown in UBC Table 31-B. UBC; 3102.3.6. Cleanout openings shall be provided with in 6 Inches of the base of every masonry chimney. UBC 3102.3.7. A spark arrester shall be installed. UBC 3102.3.8

Masonry or concrete chimney shall be reinforced with not less than four number #4 reinforcing bars. The bars shall extend the full height of the chimney and shall be spliced in accordance with applicable requirements of Chapter 19 and 21. In masonry chimneys, the vertical bars shall have a minimum cover of 1/2 inch of grout or mortar tempered to a pouring consistency. The bars shall be tied horizontally at 18 inch intervals with not less than 1/4 inch diameter steel ties. The slope of the inclined portion of the offset in vertical bars shall not exceed 2 units vertical in 1 unit horizontal. Two ties shall also be placed at each bend in vertical bars. Where the width of the chimney exceeds 40 inches, two additional #4 vertical bars shall be provided for each additional 40 inches in width or fraction thereof.

All forms and handouts are available on [www.cityofnapa.org](http://www.cityofnapa.org)

All masonry and concrete chimneys shall be anchored at each floor or ceiling line more than 6 ft. above grade. Anchorage shall consist of two 3/16 inch by 1 inch steel straps cast at least 12 inches into the chimney with a 180 degree bend with a 6 inch extension around the vertical reinforcing bars in the outer face of the chimney. Each strap shall be fastened to the structural framework of the building with two inch diameter bolts per strap. Where the joists do not head into the chimney, the anchor strap shall be connected to 2 inch x 4 inch ties crossing a minimum of four joists. The ties shall be connected to each joist with two 16d common nails. As an alternate, use 2-1/2 inch diameter bolts in an approved manner. UBC 3102.4.3

Masonry chimneys may be offset at a slope of not more than 4 units vertical in 24 inches horizontal but not more than one third of the dimension of the chimney, in the direction of offset. The slope of the transition from the fireplace to the chimney shall not exceed 2 units vertical in 1 unit horizontal. UBC 3102.4.4 Masonry chimneys shall not change in size or shape within 6 inches above or below any combustible floor, ceiling or roof component penetrated by the chimney. UBC 3102.4.5

Every inlet to any masonry chimney shall enter the side thereof and shall not be of less than 1/8 inch thick metal or 5/8 inch refractory material. Where there is no other opening below the inlet other than the cleanout, a masonry plug shall be constructed in the chimney not more than 16 inches below the inlet and the cleanout shall be located where it is accessible above the plug. If the plug is located less than 6 inches below the inlet, the inlet may serve as the cleanout. UBC 3102.4.7

Foundations for masonry and concrete fireplaces shall not be less than 12 inches thick, extend not less than 6 inches outside the fireplace wall and project below the natural ground surface in accordance with the depth of foundations set forth in UBC Table 18-1-C. .

Masonry walls of fireplaces shall not be less than 8 inches in thickness. Walls of fireboxes shall not be less than 10 inches in thickness, except that where lining of firebrick is used, such as walls shall not be less than total of 8 inches in thickness. The firebox shall not be less than 20 inches in depth. Joints in firebrick shall not exceed 1/4 inch. UBC 3102.7.3

Front and side walls shall not be less than 8 inches in thickness. Smoke chamber back walls shall not be less than 6 inches in thickness. A minimum 5/8 inch thick clay flue lining, complying with sections 3503, 3504, and shall be permitted to form the inside surface of the 8 inch and 6 inch smoke chamber walls. UBC 3102.7.6

Combustible materials shall not be placed within 2 inches of fireplace, smoke chamber or chimney walls. Combustible material shall not be placed within 6 inches of the fireplace opening. No such combustible material within 12 inches of the fireplace opening shall project more than 1/8 inch for each 1 inch clearance from such opening UBC 3102.7.8,

The throat shall be at least 8 inches above the fireplace opening and shall be at least 4 inches in depth. The net cross sectional area of the flue and of the throat between the firebox and the smoke chamber of a fireplace shall not be less than that set forth in Figure 31-1 or Table 31-A Metal dampers equivalent to not less than 0.097 inch steel shall not be less than 90 percent of the required flue area. UBC 3102.7.9

Masonry fireplaces shall be provided with brick, concrete, stone, or other approved noncombustible hearth slab. This slab shall not be less than 4 inches thick and shall be supported by noncombustible materials or reinforced to carry its own weight and all imposed loads. Combustible forms and centering shall be removed. UBC 3102.7.11. Masonry over the fireplace opening shall be supported by a noncombustible lintel unless the masonry is self-supporting. UBC 3102.7.10. Fire blocking between chimneys and combustible construction shall meet the requirements specified in UBC 708.

Hearths shall extend at least 16 inches from the front of and at least 8 inches beyond each side of the fireplace opening. Where the fireplace opening is 6 square feet or larger, the hearth extension shall extend at least 20 inches in front of and at least 12 inches beyond each side of the fireplace opening. The hearth slab shall be readily distinguishable from the surrounding or adjacent floor UBC 3102.7.12

Refer to page 3 for referenced figures and tables listed above and refer to page 4 for a typical cross section of a fireplace showing illustration of code requirements.

**TABLE 31-A—MINIMUM PASSAGEWAY AREAS FOR MASONRY CHIMNEYS<sup>1</sup>**

MINIMUM CROSS-SECTIONAL AREA			
x 645 for mm <sup>2</sup>			
Type of Masonry Chimney	Tile Lined		Lined with Firebrick or Unlined
	Round	Square or Rectangle	
1. Residential (other than fireplaces)	50 square inches	50 square inches	85 square inches
2. Fireplace	See Figure 31-1	See Figure 31-1	<sup>1</sup> / <sub>8</sub> of opening minimum 100 square inches
3. Low heat	50 square inches	57 square inches	135 square inches
4. Incinerator Apartment type 1 opening 2 to 6 openings 7 to 14 openings 15 or more openings	196 square inches 324 square inches 484 square inches 484 square inches plus 10 square inches for each additional opening		Not applicable

**NOTE:** For altitudes over 2,000 feet (610 m) above sea level, the building official shall be consulted in determining the area of the passageway.  
<sup>1</sup>Areas for medium- and high-heat chimneys shall be determined using accepted engineering methods and as approved by the building official.

**TABLE 31-B—CONSTRUCTION, CLEARANCE AND TERMINATION REQUIREMENTS FOR MASONRY AND CONCRETE CHIMNEYS**

CHIMNEYS SERVING	THICKNESS (min. inches)		HEIGHT ABOVE ROOF OPENING (feet)	HEIGHT ABOVE ANY PART OF BUILDING WITHIN (feet)			CLEARANCE TO COMBUSTIBLE CONSTRUCTION (inches)	
	× 25.4 for mm			× 304.8 for mm			× 25.4 for mm	
	Walls	Lining		10	25	50	Int. Inst.	Ext. Inst.
<b>1. RESIDENTIAL-TYPE APPLIANCES<sup>1,2</sup></b> (Low Btu input) Clay, shale or concrete brick Reinforced concrete Hollow masonry units Stone  Unburned clay units	4 <sup>3</sup> 4 <sup>3</sup> 4 <sup>4</sup> 12  8	5/8 fire-clay tile or 2 firebrick   4 1/2 firebrick	2	2			2	1 or 1/2 gypsum <sup>5</sup>
<b>2. BUILDING HEATING AND INDUSTRIAL-TYPE LOW-HEAT APPLIANCES<sup>1,2</sup></b> [1,000°F (538°C) operating temp.—1,400°F (760°C) maximum] Clay, shale or concrete brick Hollow masonry units Reinforced concrete Stone	8 8 <sup>4</sup> 8 12	5/8 fire-clay tile or 2 firebrick	3	2			2	2
<b>3. MEDIUM-HEAT INDUSTRIAL-TYPE APPLIANCES<sup>1,6</sup></b> [2,000°F (1093°C) maximum] Clay, shale or concrete brick Hollow masonry units (Grouted solid) Reinforced concrete Stone	8 8 8 12	4 1/2 medium-duty firebrick	10		10		4	4
<b>4. HIGH-HEAT INDUSTRIAL-TYPE APPLIANCES<sup>1,6</sup></b> [Over 2,000°F (1093°C)] Clay, shale or concrete brick Hollow masonry units (Grouted solid) Reinforced concrete	16 <sup>7</sup> 16 <sup>7</sup> 16 <sup>7</sup>	4 1/2 high-duty firebrick	20			20	8	8
<b>5. RESIDENTIAL-TYPE INCINERATORS</b> Same as for residential-type appliances as shown above.								
<b>6. CHUTE-FED AND FLUE-FED INCINERATORS WITH COMBINED HEARTH AND GRATE AREA 7 SQ. FT. (0.65 m<sup>2</sup>) OR LESS</b> Clay, shale or concrete brick or hollow units Portion extending to 10 ft. (3048 mm) above combustion chamber roof Portion more than 10 ft. (3048 mm) above combustion chamber roof	4 8	4 1/2 medium-duty firebrick 5/8 fire-clay tile liner	3	2			2	2
<b>7. CHUTE-FED AND FLUE-FED INCINERATORS—COMBINED HEARTH AND GRATE AREAS LARGER THAN 7 SQ. FT. (0.65 m<sup>2</sup>)</b> Clay, shale or concrete brick or hollow units grouted solid or reinforced concrete Portion extending to 40 ft. (12 192 mm) above combustion chamber roof Portion more than 40 ft. (12 192 mm) above combustion chamber roof  Reinforced concrete	4 8 8	4 1/2 medium-duty firebrick 5/8 fire-clay tile liner 4 1/2 medium-duty firebrick laid in medium-duty refract mortar		10			2	2
<b>8. COMMERCIAL OR INDUSTRIAL-TYPE INCINERATORS<sup>2</sup></b> Clay or shale solid brick Reinforced concrete	8 8	4 1/2 medium-duty firebrick laid in medium-duty refract mortar		10			4	4

<sup>1</sup>See Table 8-B of the Mechanical Code for types of appliances allowed with each type of chimney.

<sup>2</sup>Lining shall extend from bottom to top of chimney.

<sup>3</sup>Chimneys having walls 8 inches (203 mm) or more in thickness may be unlined.

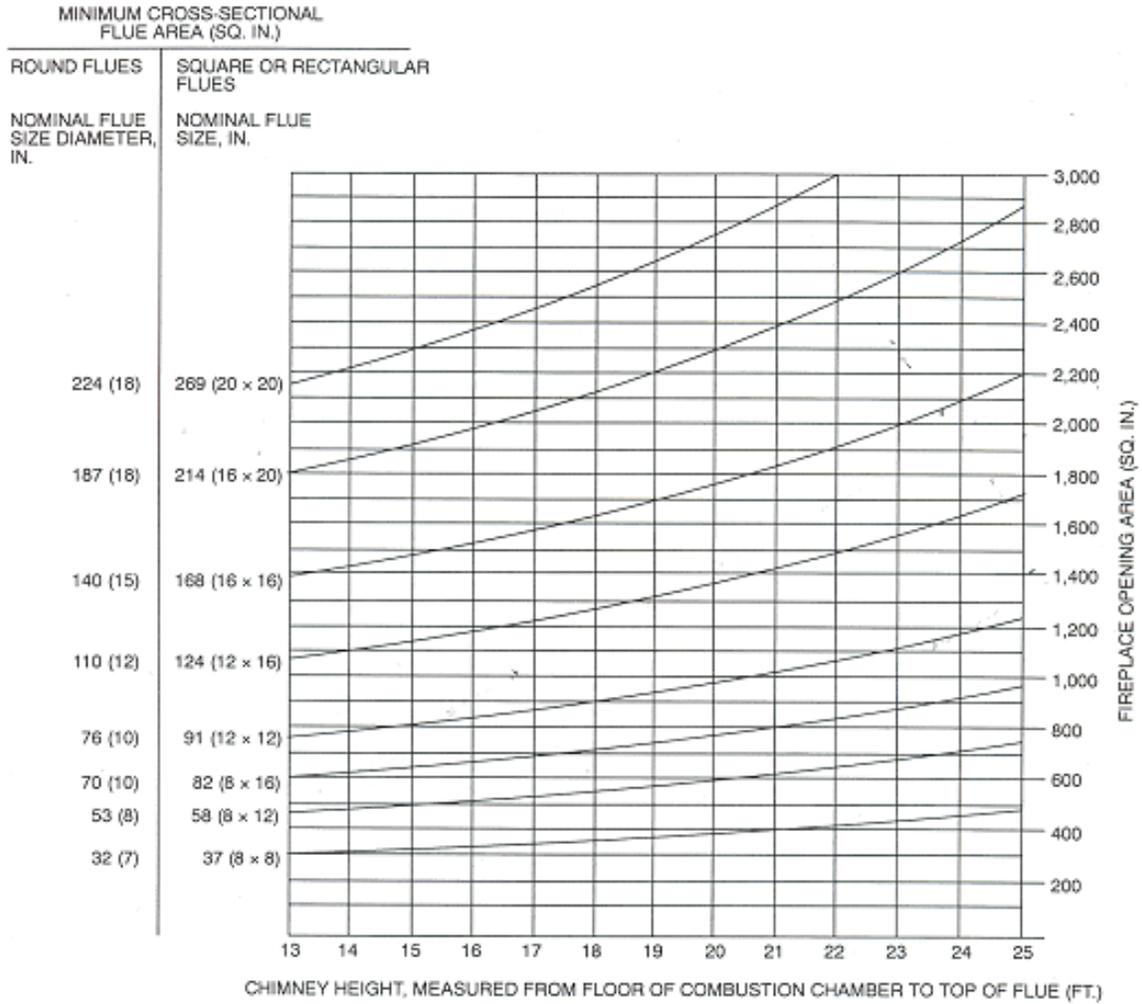
<sup>4</sup>Equivalent thickness including grouted cells when grouted solid. The equivalent thickness may also include the grout thickness between the liner and masonry unit.

<sup>5</sup>Chimneys for residential-type appliances installed entirely on the exterior of the building. For fireplace and barbecue chimneys, see Section 3102.7.8.

<sup>6</sup>Lining to extend from 24 inches (610 mm) below connector to 25 feet (7620 mm) above.

<sup>7</sup>Two 8-inch (203 mm) walls with 2-inch (51 mm) airspace between walls. Outer and inner walls may be of solid masonry units or reinforced concrete or any combination thereof.

<sup>8</sup>Clearance shall be approved by the building official and shall be such that the temperature of combustible materials will not exceed 160°F (710°C).



For SI: 1 inch = 25.4 mm, 1 square inch = 654.16 mm<sup>2</sup>, 1 foot = 304.8 mm.

**FIGURE 31-1—FLUE SIZES FOR MASONRY CHIMNEYS<sup>1</sup>**

The smaller flue area shall be utilized where the fireplace opening area and the chimney height selected intersect between flue area curves.