Masonry Chimneys & Fireplaces
Chapter 10 2012 IRC

Presented by:
Brian Platz, Building Official
Town of New Canaan

D·E·S·I·G·N and TRADES CONFERENCE
2016 • 15TH ANNUAL

Construction Institute

PLEASE TURN DEVICES OFF OR TO SILENT

Chapter 10 of the 2012 IRC. Entitled;

“Chimneys & Fireplaces”

Chapters 3 & 6 of the 2012 IRC for fire blocking and draft stopping.

Chapter 11 of the 2012 IRC.

Chapter 4 of the 2012 IECC.

Sec. R1003 Masonry Chimneys

- R1003.1 Definition

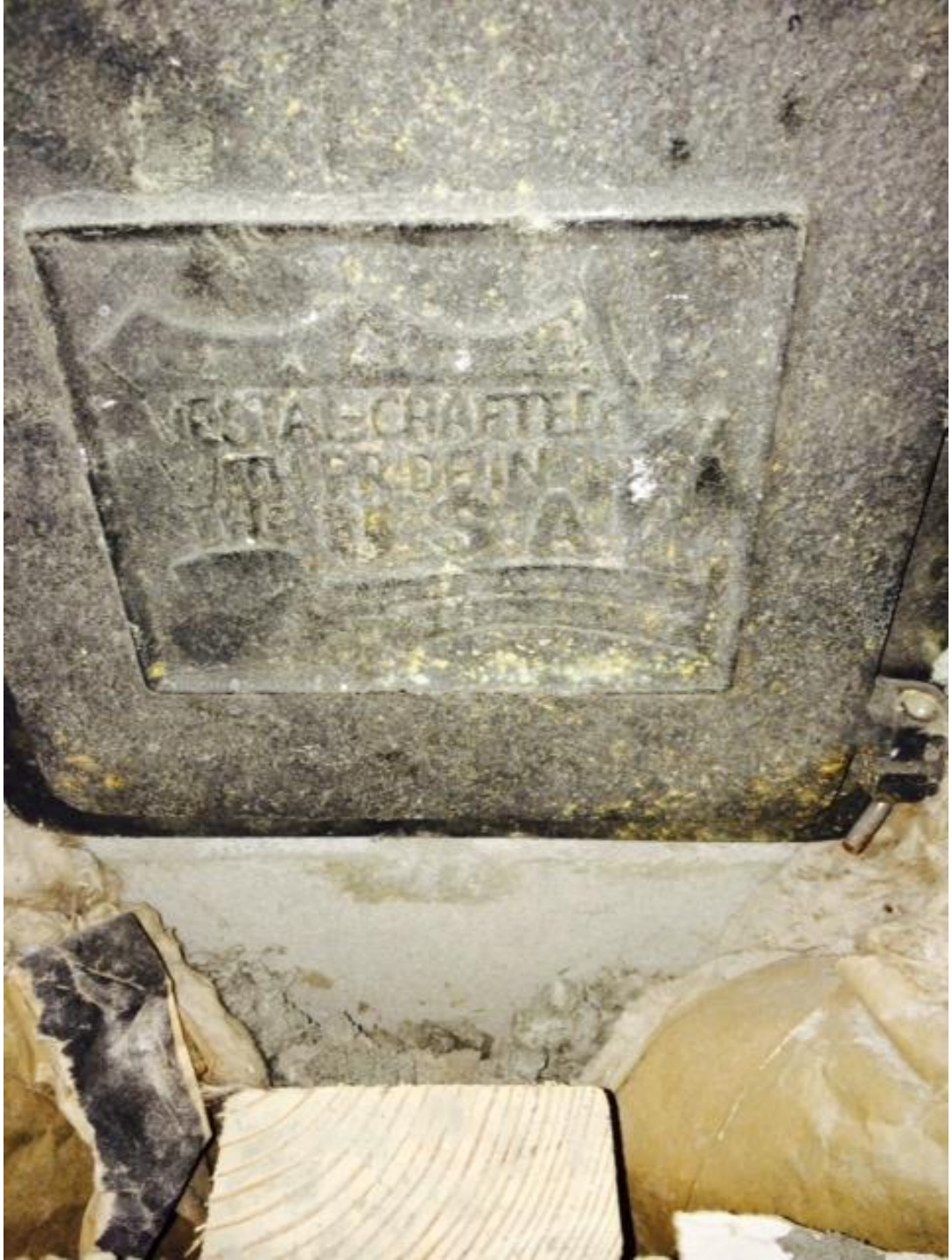
- A masonry chimney is a chimney constructed of **SOLID** masonry units, hollow masonry units grouted **SOLID**, stone or concrete, hereinafter referred to as masonry.

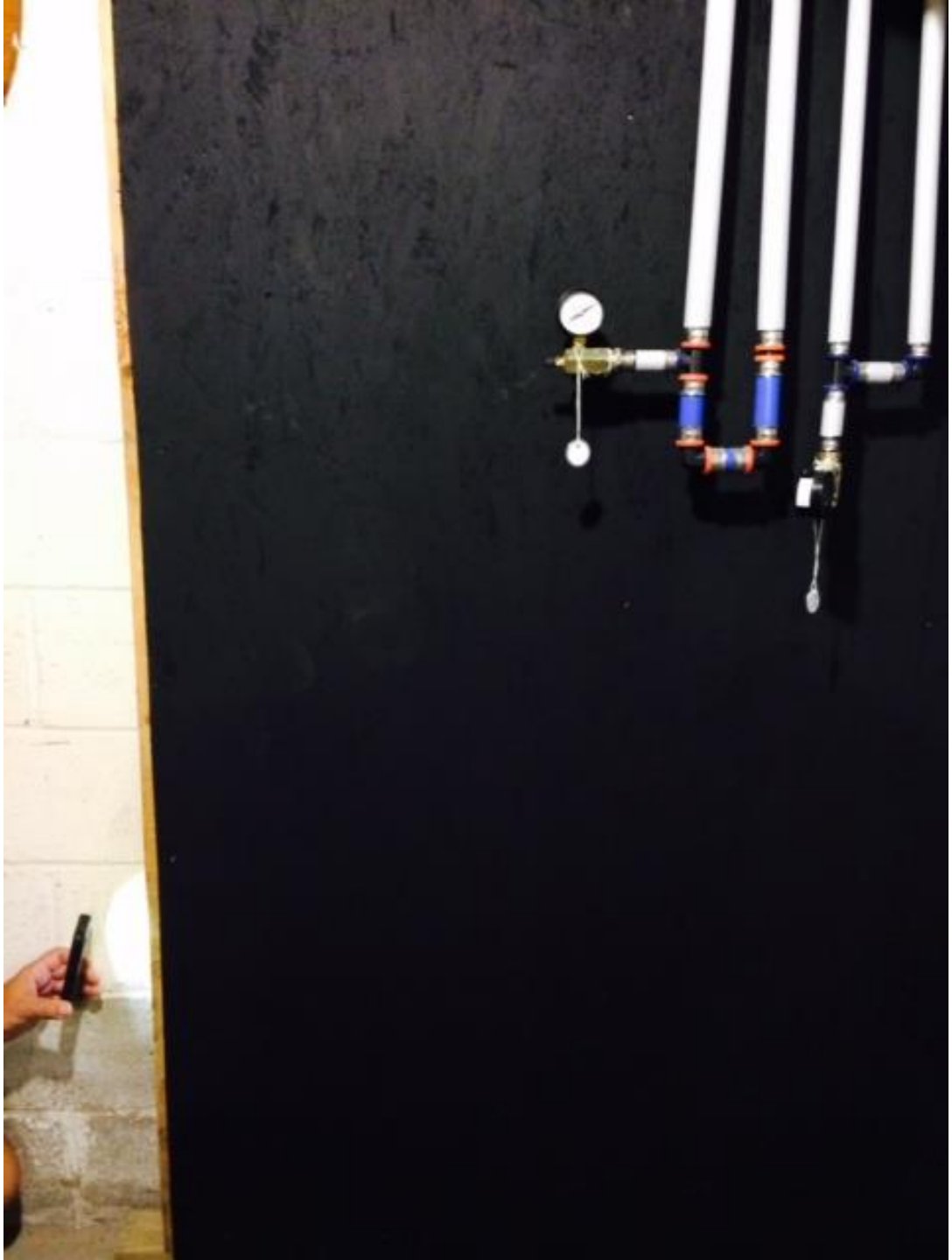
Sec R1001.2
Footings and Foundations

- Footings for masonry fireplaces and their chimneys shall be constructed of concrete or **SOLID** masonry at least 12” thick and shall extend at least 6” 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.

Sec R1001.2.1 Ash dump cleanout

- Cleanout openings located within foundation walls below fireboxes, when provided, shall be equipped with ferrous metal or masonry doors and frames constructed to remain tightly closed except when in use. Cleanouts shall be accessible and located so that ash removal will not create a hazard to combustible materials.





note

- Ash dumps **CAN** be used to run gas lines provided the ash dump at the floor of the firebox is sealed to prevent the escape of any leaked gas into the building. Keep in mind that the code governs other issues regarding fuel gas piping in concealed locations one of which is protecting the line from being in contact with corrosive material.

Sec R1001.5 Firebox walls

- Masonry fireboxes shall be constructed of **SOLID** masonry units, hollow masonry units grouted **SOLID,** stone or concrete. When a lining of fire brick at least 2” thick or other approved lining is provide, the minimum thickness of back and side walls shall each be 8” of **SOLID** masonry, including the lining.
- Note this dimension refers to the firebox walls **NOT** the entire chimney or walls surrounding the length of the flue.

Sec R1001.6 Firebox dimensions

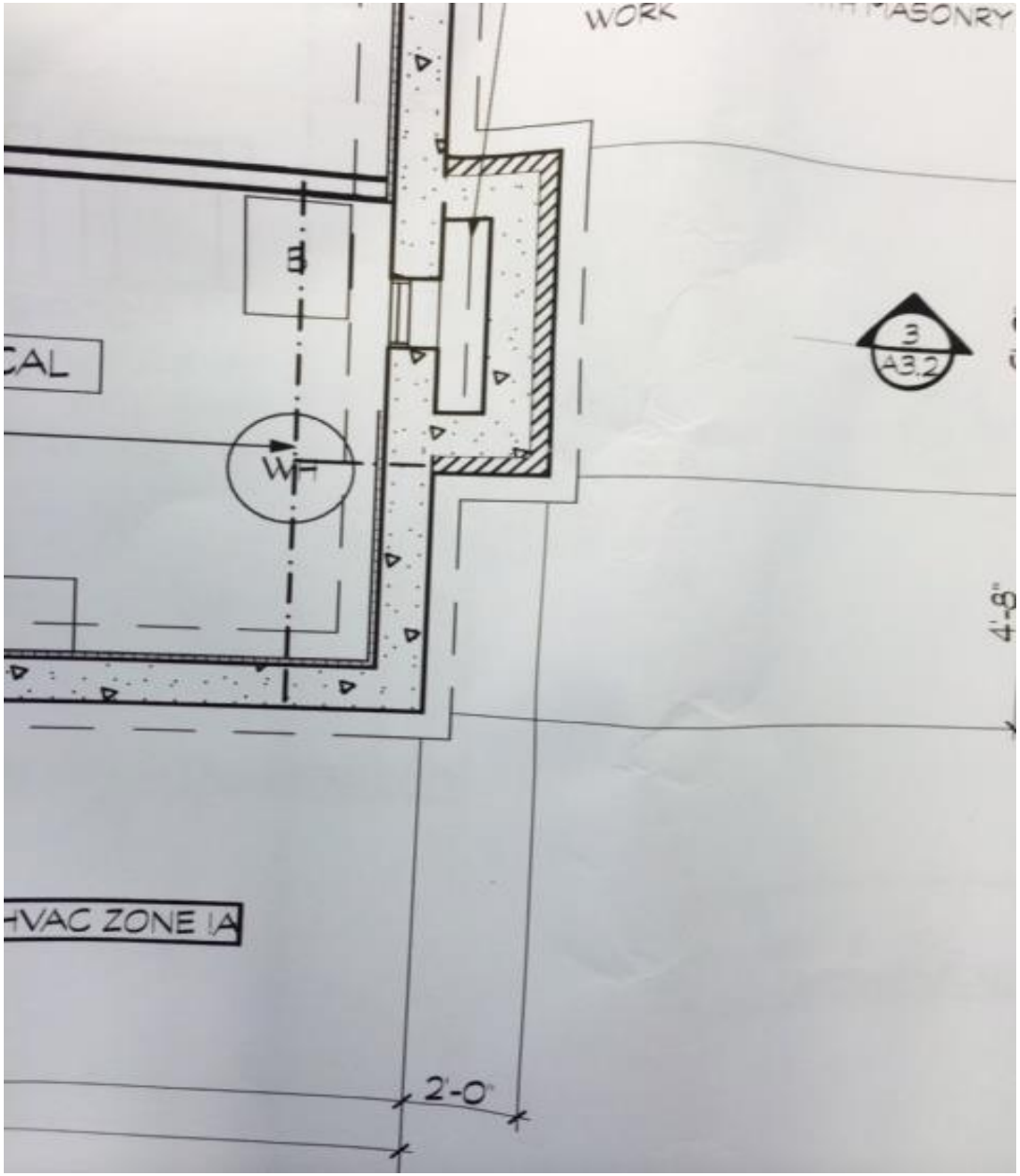
- The firebox of a concrete or masonry fireplace shall have a minimum depth of 20 inches. The throat shall be not less than 8 inches above the fireplace opening. The throat opening shall not be less than 4 inches deep. The cross-sectional area of the passageway above the firebox including the throat, damper, and smoke chamber, shall not be less than the cross-sectional area of the flue.

Sec R1001.6 Exception

- Rumford fireplaces shall be permitted provided that the depth of the fireplace is at least 12” and at least one-third of the width of the fireplace opening, that the throat is at least 12 “ above the lintel and is at least 1/20th the cross-sectional area of the fireplace opening.

Sec R1001.7 Lintel and throat

- Masonry over a fireplace opening shall be supported by a lintel of noncombustible material. The minimum required bearing on each end of the fireplace opening shall be 4”. The fireplace throat or damper shall be located a minimum of 8” above the lintel.


WORK
MASONRY
CAL
3
A3.2
WF
4'-8"
HVAC ZONE 1A
2'-0"

Sec R1001.8 Smoke chamber

- Smoke chamber walls shall be constructed of **SOLID** masonry units, hollow masonry units grouted **SOLID**, stone or concrete. The total minimum thickness of front, back and side walls shall be 8 inches of **SOLID** masonry. The inside surface shall be parged smooth with refractory mortar conforming to ASTM C 1261.

Sec R1001.9 Hearth & hearth ext.

- Masonry fireplace hearth & hearth ext. shall be constructed of concrete or masonry, supported by noncombustible materials, and reinforced to carry their own weight and all imposed loads. No combustible material shall remain against the underside of hearths and hearth extensions after construction.
- R1001.9.1 Hearth thickness min 4 inches
- R1001.9.2 Hearth ext. thickness min 2 inches

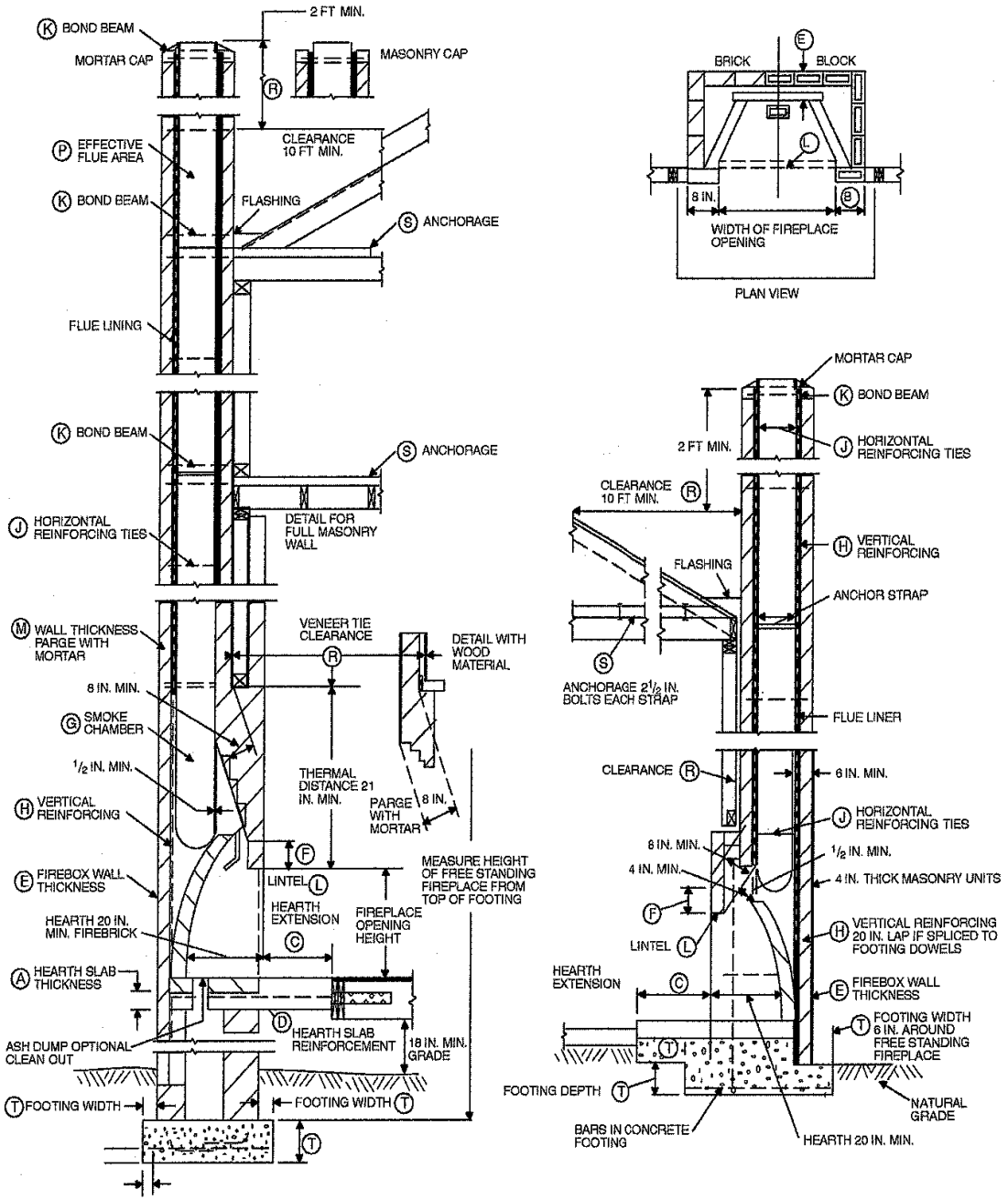

ALSO TRY

NOTE

- The code does not give a specific design criteria regarding the construction of the hearth ext. for the size or spacing of rebar etc.

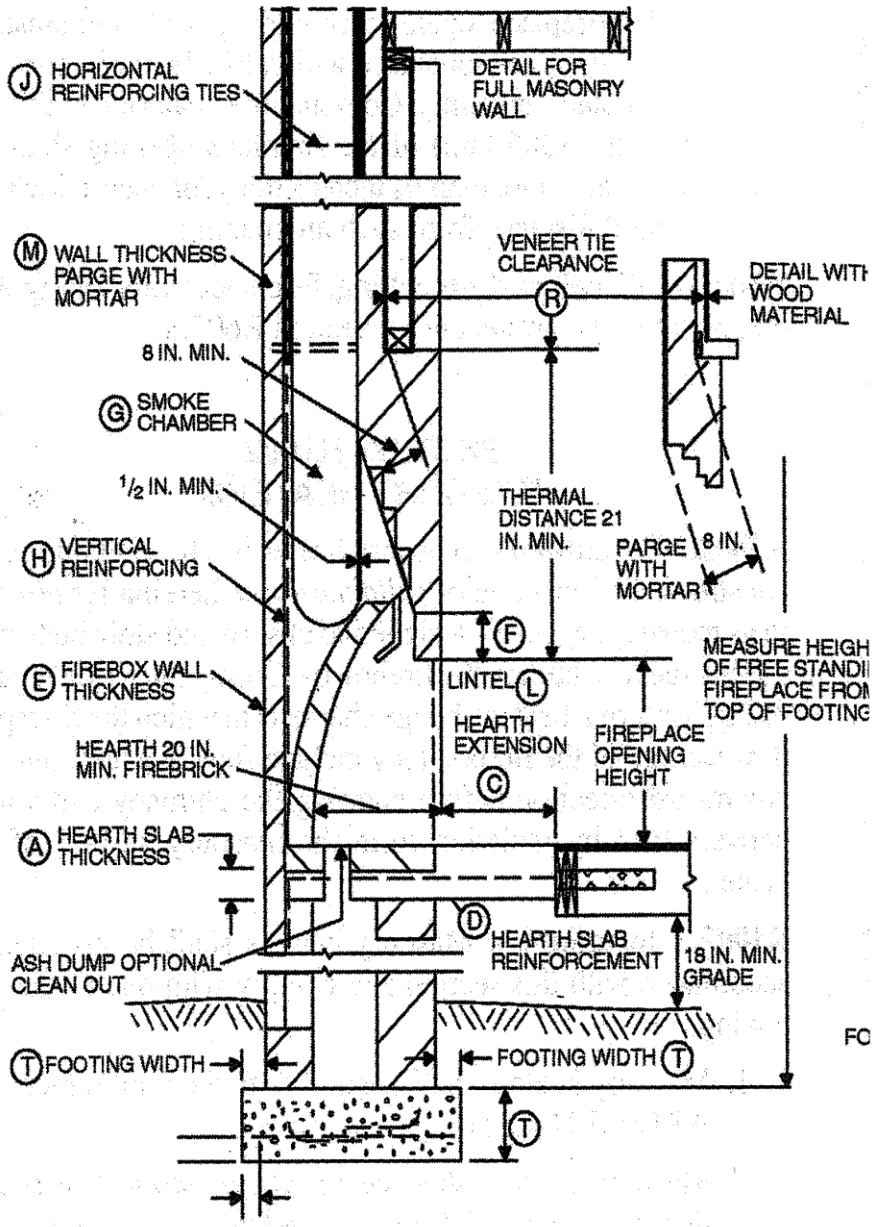
Sec R1001.10 Hearth ext. dimensions

- Hearth extensions shall extend at least 16” in front of and at least 8” beyond each side of the fireplace opening. Where the fireplace opening is 6 square feet or larger, the hearth ext. shall extend at least 20” in front of and at least 12” beyond each side of the fireplace opening.



BRICK FIREBOX AND CHIMNEY—SECTIONAL SIDE VIEW ON WOOD FLOOR

BRICK FIREBOX AND BLOCK CHIMNEY—SECTIONAL SIDE VIEW ON CONCRETE SLAB



BRICK FIREBOX AND CHIMNEY—
SECTIONAL SIDE VIEW ON WOOD FLOOR

TABLE R1001.1
SUMMARY OF REQUIREMENTS FOR MASONRY FIREPLACES AND CHIMNEYS

ITEM	LETTER[a]	REQUIREMENTS
Hearth slab thickness	A	4″
Hearth extension (each side of opening)	B	8″ fireplace opening < 6 square foot. 12″ fireplace opening ≥ 6 square foot.
Hearth extension (front of opening)	C	16″ fireplace opening < 6 square foot. 20″ fireplace opening ≥ 6 square foot.
Hearth slab reinforcing	D	Reinforced to carry its own weight and all imposed loads.
Thickness of wall of firebox	E	10″ solid brick or 8″ where a firebrick lining is used. Joints in firebrick $^1/_4$″ maximum.
Distance from top of opening to throat	F	8″
Smoke chamber wall thickness Unlined walls	G	6″ 8″
Chimney Vertical reinforcing[b]	H	Four No. 4 full-length bars for chimney up to 40″ wide. Add two No. 4 bars for each additional 40″ or fraction of width or each additional flue.
Horizontal reinforcing	J	$^1/_4$″ ties at 18″ and two ties at each bend in vertical steel.
Bond beams	K	No specified requirements.
Fireplace lintel	L	Noncombustible material.
Chimney walls with flue lining	M	Solid masonry units or hollow masonry units grouted solid with at least 4 inch nominal thickness.
Distances between adjacent flues	—	See Section R1003.13.
Effective flue area (based on area of fireplace opening)	P	See Section R1003.15.
Clearances: Combustible material Mantel and trim Above roof	R	 See Sections R1001.11 and R1003.18. See Section R1001.11, Exception 4. 3′ at roofline and 2′ at 10′.
Anchorage[b] Strap Number Embedment into chimney Fasten to Bolts	S	 $^3/_{16}$″ × 1″ Two 12″ hooked around outer bar with 6″ extension. 4 joists Two $^1/_2$″ diameter.
Footing Thickness Width	T	 12″ min. 6″ each side of fireplace wall.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

Note: This table provides a summary of major requirements for the construction of masonry chimneys and fireplaces. Letter references are to Figure R1001.1, which shows examples of typical construction. This table does not cover all requirements, nor does it cover all aspects of the indicated requirements. For the actual mandatory requirements of the code, see the indicated section of text.

a. The letters refer to Figure R1001.1.

b. Not required in Seismic Design Category A, B or C.

Sec R1001.11 Fireplace clearance

- All wood beams, joists, studs and other combustible material shall have a clearance of not less than 2” from the front faces and sides, and not less than 4” from the back faces of masonry fireplaces (change from CABO.) The air space shall not be filled, except to provide fire blocking in accordance with sec R1001.12

Note

- There is no mention of a clearance to combustibles for the front or sides of the hearth extension.

Exceptions

- 1) Masonry fireplaces listed and labeled for use in contact with combustibles in accordance wit UL 127 and installed in accordance with the manufacturer's installation instructions.
- 2) When masonry fireplaces are part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete walls less than 12" from the inside surface of the nearest firebox lining.

Exceptions continued

- 3) Exposed combustible trim and the edges of sheathing materials such as wood siding, flooring and drywall shall be permitted to abut the masonry fireplace side walls and hearth extension in accordance with R1001.11, provided such combustible trim or sheathing is a minimum of 12” from the nearest firebox lining.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Exceptions continued

- 4) Exposed combustible mantels or trim may be placed directly on the masonry fireplace front surrounding the fireplace opening providing such combustible materials are not placed within 6” of a fireplace opening. Combustible material within 12” of the fireplace opening shall not project more than 1/8” for each 1-inch distance from such an opening.

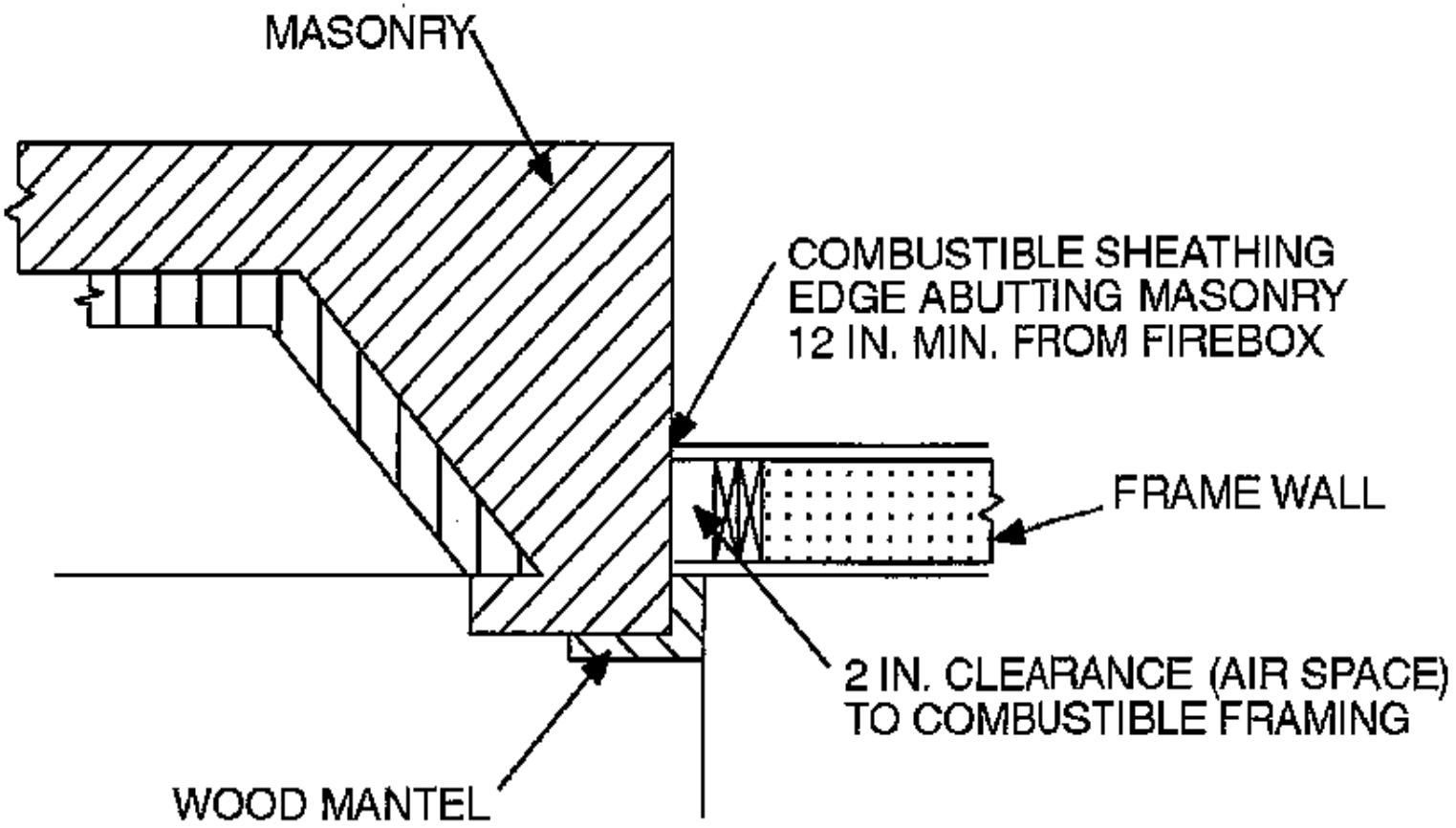
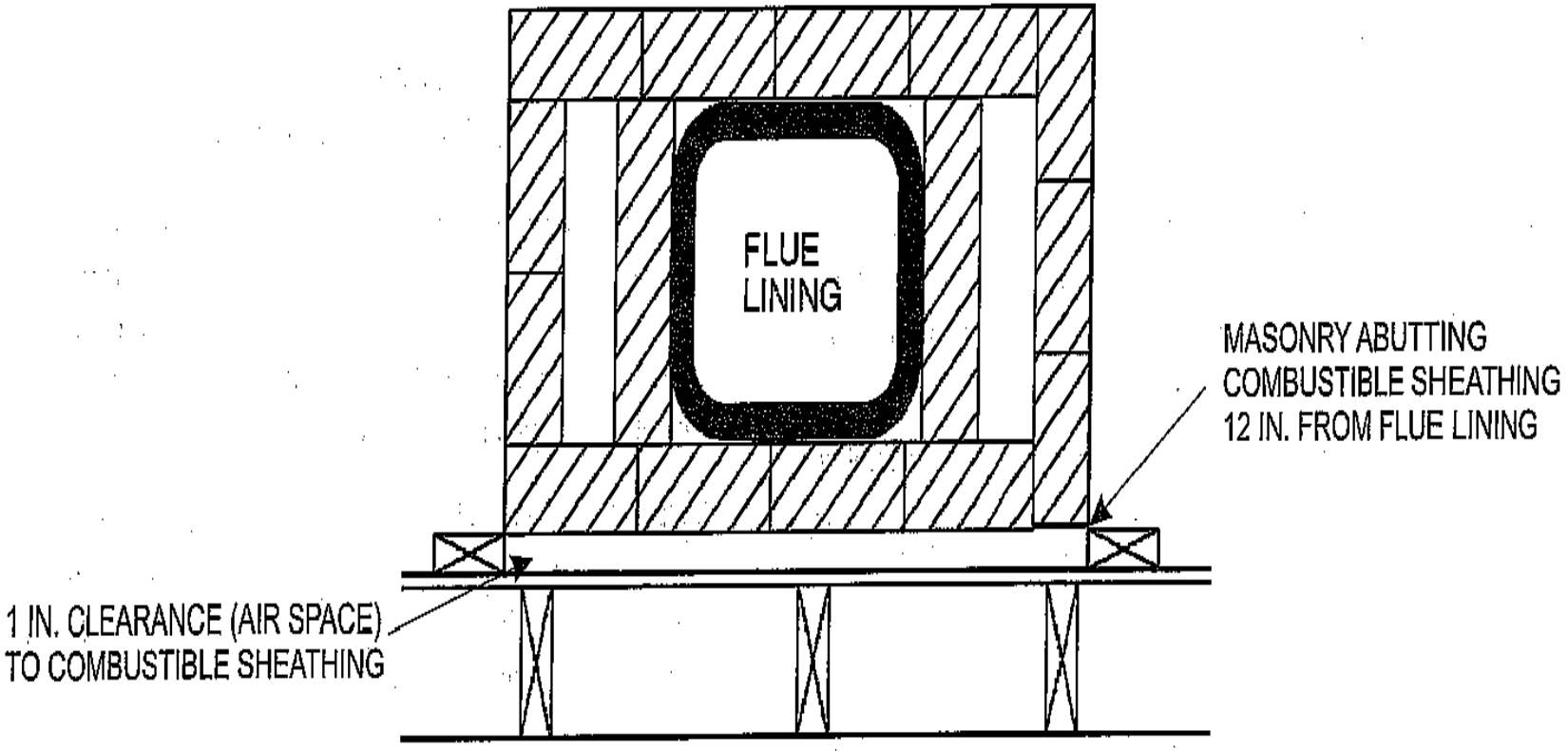


FIGURE R1001.11
CLEARANCE FROM COMBUSTIBLES



For SI: 1 inch = 25.4 mm.

Sec R1001.12 Fireplace fire blocking

- You’re gonna love this!!!!!!!!!!!

- Fireplace fire blocking shall comply with the provisions of sec R602.8

Sec R602.8 Fire blocking required

- Fire blocking shall be provided in accordance with sec R302.11

Sec R302.11 Fire blocking

- In combustible construction, fire blocking shall be provided to cut off all concealed draft openings (both vertical & horizontal) and to form an effective fire barrier between stories, and between a top story and the roof space.
  - Fire blocking shall be provided in wood frame construction in the following locations;

#5. For fire blocking of chimneys and fireplaces, see section R1003.19

Sec R1003.19 Chimney fire blocking

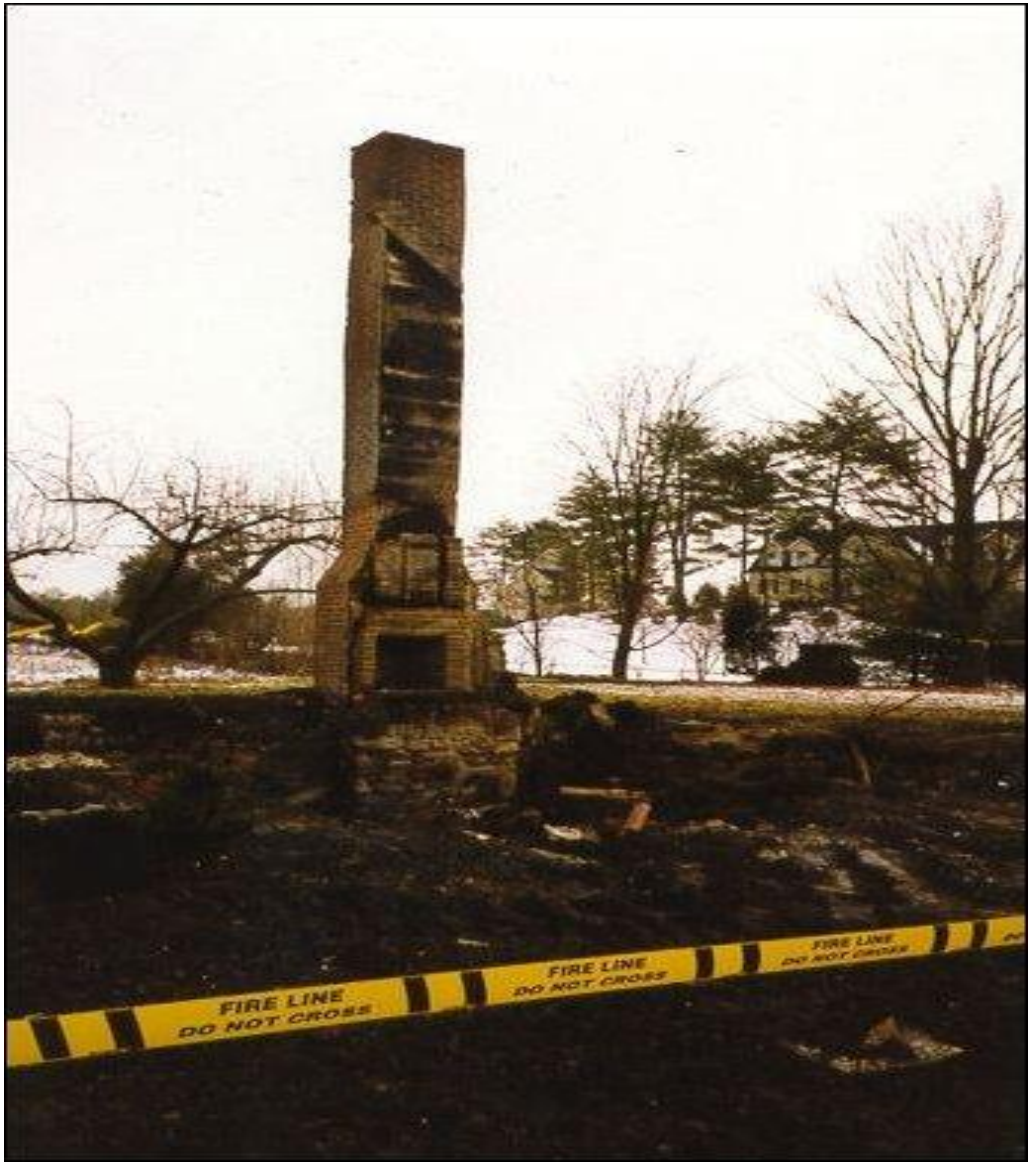
- **FINALLY WE'VE ARRIVED**

- **All spaces between chimneys and floors and ceilings through which chimneys pass shall be fire blocked with noncombustible material securely fastened in place. The fire blocking of spaces between chimneys and wood joists, beams, or headers shall be self-supporting or be placed on strips of metal or metal lath laid across the spaces between combustible material and the chimney.**


DRYGUARD

Sec R1003.8 Additional load

- Chimneys shall not support loads other than their own weight unless they are designed and constructed to support the additional load. Construction of masonry chimneys as part of the masonry walls or reinforced concrete walls of the building shall be permitted.
- This brings us back to R1001.11 fireplace clearance exception #2 which reads “when masonry fireplaces are part of masonry or concrete walls, combustible materials shall not be in contact with the masonry or concrete walls less than 12” from the inside surface of the nearest firebox lining.”
- This language is repeated in sec R1003.18 exception 2.

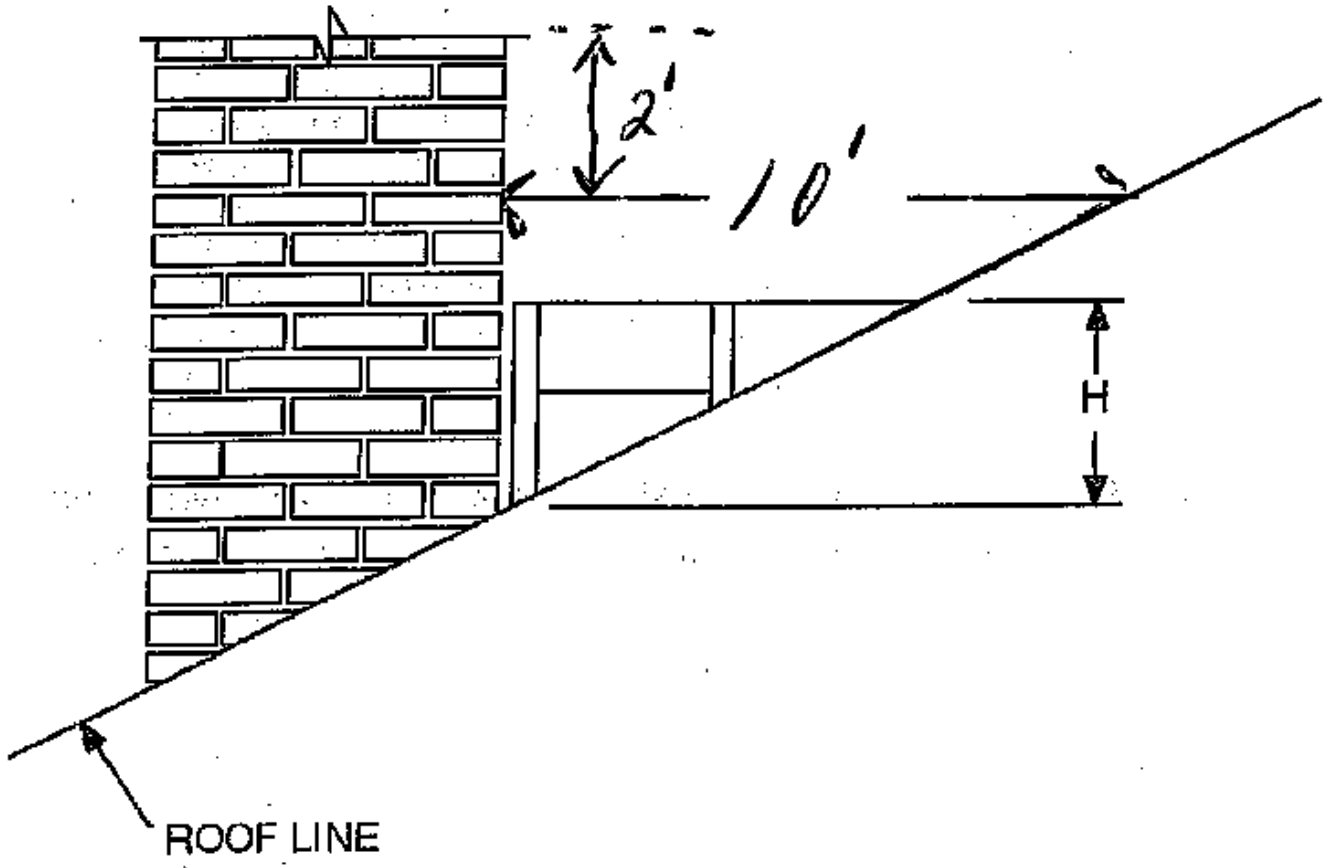

FIRE LINE
DO NOT CROSS
FIRE LINE
DO NOT CROSS
FIRE LINE
DO NOT CROSS

Sec R1003.8 Commentary (**not code**)

- Chimneys are subject to considerable stress resulting from thermal effects and therefore should not support any structural load other than their own weight, unless specifically designed as a supporting member for the additional load. Also because of its heavy mass, a chimney will tend to settle more than the building structures. As a consequence the chimney and any part of the building that it supports will settle at a greater rate and to a greater degree than the rest of the building, resulting in damage.

Sec R1003.9 Termination

- Chimneys shall extend at least 2 feet higher than any portion of the building within 10 feet, but shall not be less than 3 feet above the highest point where the chimney passes through the roof.


2'
10'
H
ROOF LINE

Sec R1003.9.1 Chimney caps

- Masonry chimneys shall have a concrete, metal, or stone cap, sloped to shed water, a drip edge and a caulked bond break around any flue liners in accordance with ASTM C 1283.

Sec R1003.9.3 Rain caps

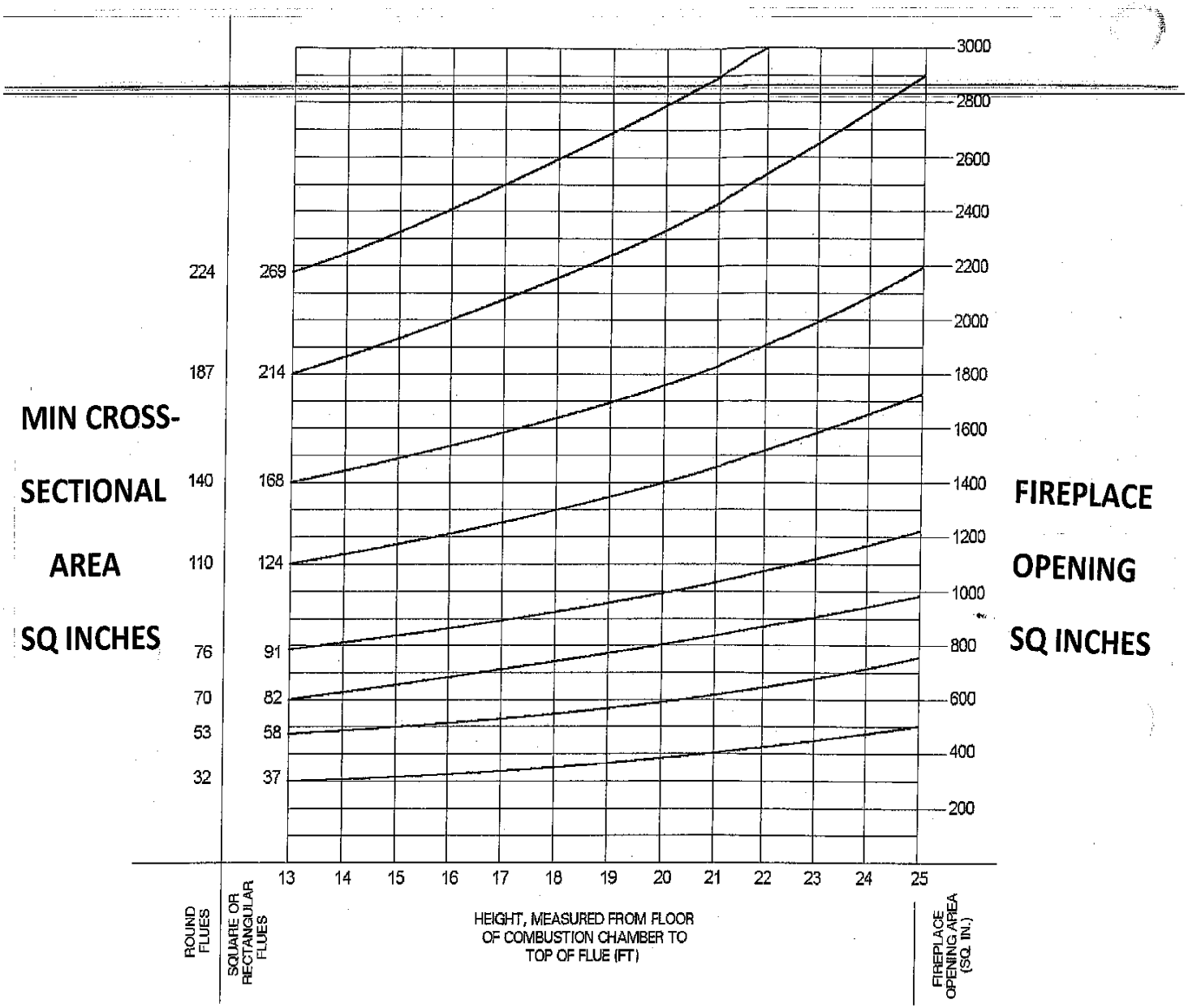
- Where a masonry or metal rain cap is installed on a masonry chimney, the net free area under the rain cap shall not be less than four times the net free area of the outlet of the chimney flue it serves.

Sec R1003.10 Wall thickness

- Masonry chimney walls shall be constructed of **solid** masonry units or hollow masonry units grouted **solid** with not less than a 4-inch nominal wall thickness.

Note

- Keep in mind we have three or more dissimilar materials in masonry chimney construction. These materials react very differently to temperature, time, and moisture.
- CMU’s
- Mortar
- Brick
- Clay tile
- Stone and or marble veneers



For SI: 1 foot = 304.8 mm, 1 square inch = 645.16 mm^2.

TABLE R1003.14(1)
NET CROSS-SECTIONAL AREA OF ROUND FLUE SIZES[a]

FLUE SIZE, INSIDE DIAMETER (inches)	CROSS-SECTIONAL AREA (square inches)
6	28
7	38
8	50
10	78
$10^{3}/_{4}$	90
12	113
15	176
18	254

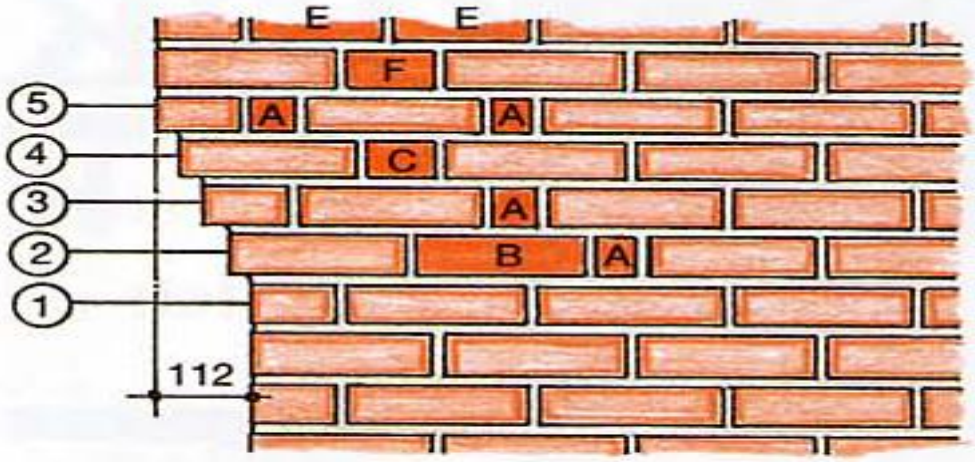
For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2.

a. Flue sizes are based on ASTM C 315.

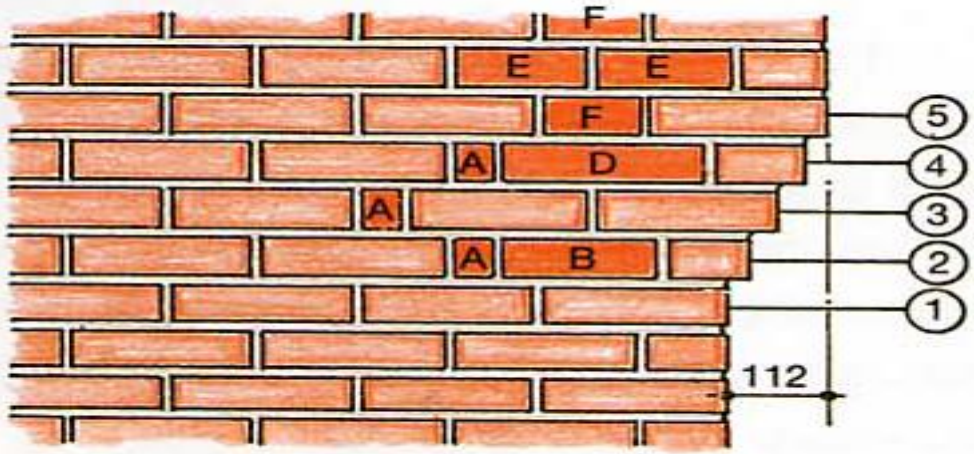
TABLE R1003.14(2)
NET CROSS-SECTIONAL AREA OF SQUARE AND RECTANGULAR FLUE SIZES

FLUE SIZE, OUTSIDE NOMINAL DIMENSIONS (inches)	CROSS-SECTIONAL AREA (square inches)
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
13 × 13	127
12 × 16	131
13 × 18	173
16 × 16	181
16 × 20	222
18 × 18	233
20 × 20	298
20 × 24	335
24 × 24	431

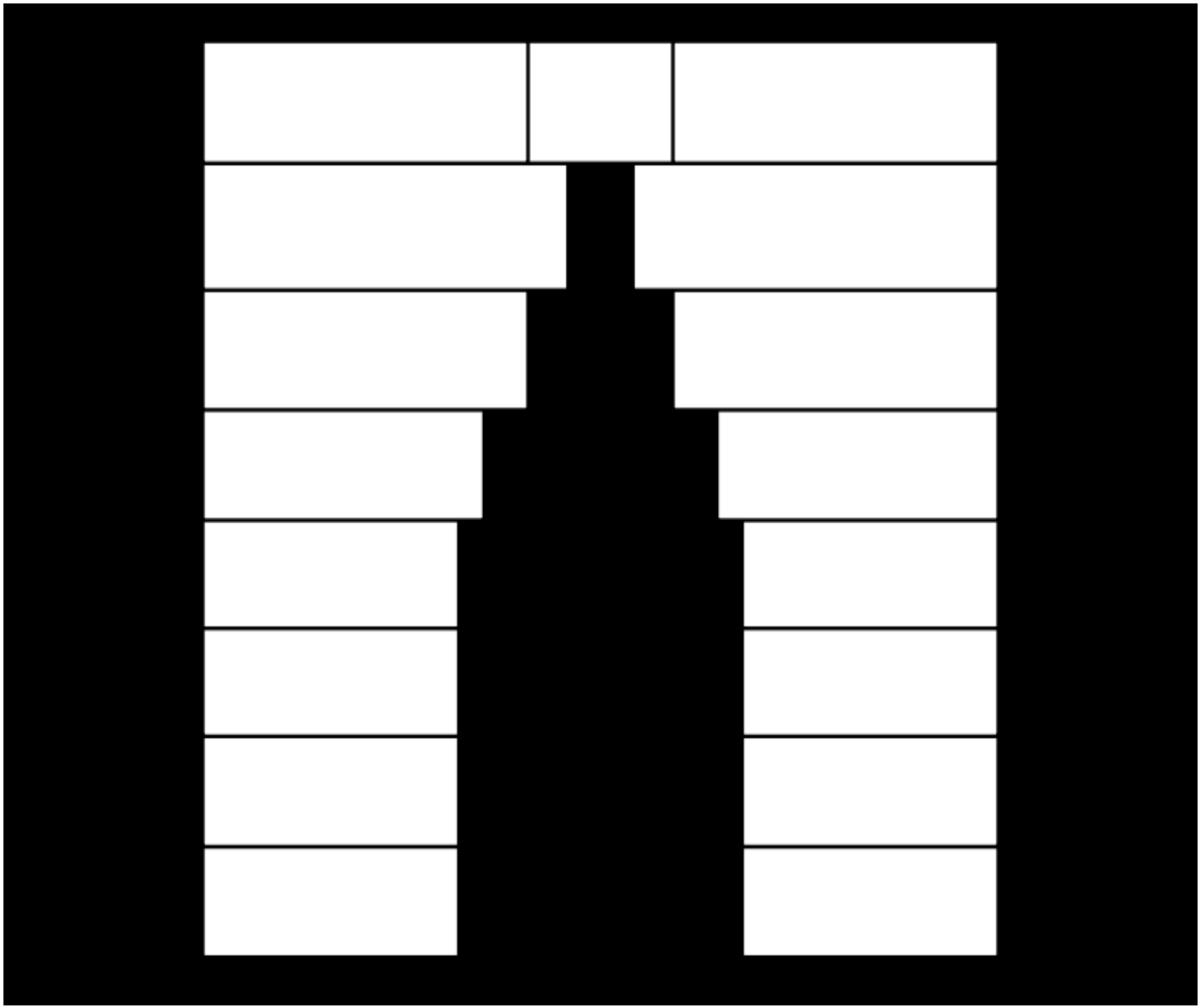
For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm^2.



Elevation A



Elevation B



Sec R1003.5 Corbeling

- Masonry chimneys shall not be corbeled more than one-half of the chimney's wall thickness from a wall or foundation, nor shall a chimney be corbeled from a wall or foundation that is less than 12" thick unless it projects equally on each side of the wall, except that on the second story of a two-story dwelling, corbeling of the chimneys on the exterior of the enclosing walls may equal the wall thickness. The projection of a single course shall not exceed one-half the unit height or one-third of the unit bed depth, whichever is less.

Sec R1006.0 Exterior air

- Factory built or masonry fireplaces covered in this chapter shall be equipped with an exterior air supply to assure proper fuel combustion unless the room is mechanically ventilated and controlled so that the indoor pressure is neutral or positive.

Sec R1006.2 Exterior air intake

- The exterior air intake shall be capable of supplying all combustion air from the exterior of the dwelling or from spaces within the dwelling ventilated with outside air such as non mechanically ventilated crawl or attic spaces. The exterior air intake shall **NOT** be located within the garage or basement of the dwelling nor shall the air intake be located at an elevation higher than the firebox (see sec R1006.5.) The exterior air intake shall be covered with a corrosion-resistant screen of ¼" mesh.

Sec R1006.4 Passageway

- The combustion air passageway shall be a minimum of 6 square inches ((Pi (3.14)-R squared)) and not more than 55 square inches, except that combustion air systems for listed fireplaces shall be constructed according to the fireplace manufacturer's instructions.

Sec R1006.5 Outlet

- Locating the exterior air outlet in the back (change from CABO)or sides of the firebox chamber or within 24” of the firebox opening on or near the floor is permitted. The outlet shall be closable and designed to prevent burning material from dropping into concealed combustible spaces.

Sec. N1102.4.2 Fireplaces

- New wood burning fireplaces shall have tight-fitting flue dampers and outside combustion air.

Table N1102.4.1.1
Air barrier & insulation installation

- An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

2012 IECC Table 402.4.1.1 Air barrier & insulation installation

- An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

“I don’t want no %#$&!@ gasketed doors on my fireplace!!!!!!!!!!!!”

GOOD NEWS

- The 2015 IRC and IECC both read that tight fitting dampers **OR** gasketed doors are required and OSBI is granting modifications to utilize this language.

First flue inspection

- Depth of the firebox.
- Fresh air intake, material and inlet/outlet.
- Smoke chamber, parged smooth.
- Clearance to combustibles.
- **SOLID** masonry where required.
- Offset of damper to flue.
- Air space between combustible sheathing & chimney.
- Hearth extension dimensions.
- These are tough violations to correct if not noted until the C of O inspection!

Final inspection

- Veneer is solidly grouted and sealed to face of fireplace.
- Hearth extension.
- Remove combustibles from underside of hearth extension.
- Access to ash dump cleanout.
- Combustible mantel and trim.
- Smoke curtain 8” from damper opening to firebox opening.
- Gasketed doors.

QUESTIONS

THANK YOU