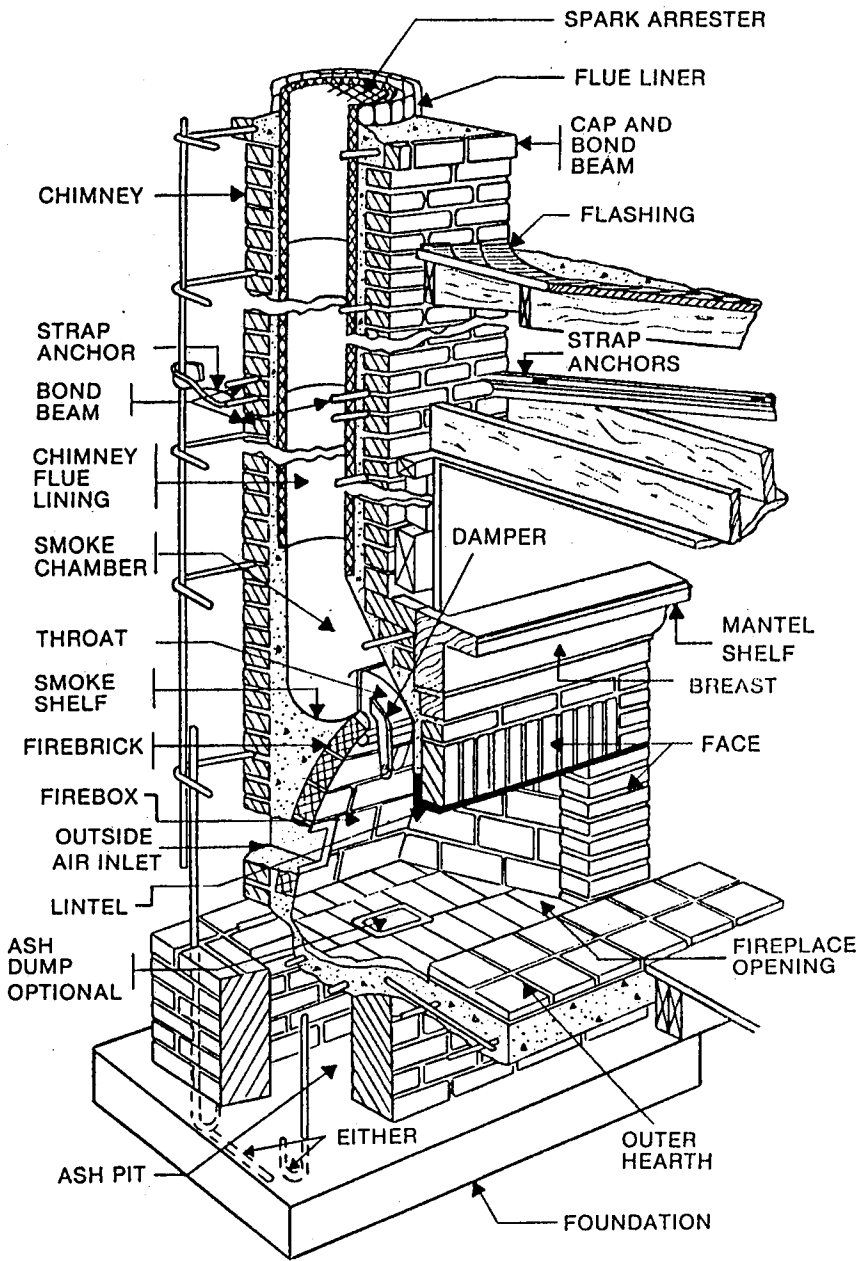


RESIDENTIAL MASONRY FIREPLACE AND CHIMNEY CONSTRUCTION DETAILS AND SPECIFICATIONS



PARTS OF A FIREPLACE AND CHIMNEY

Date _____

Tract No. or Job Location _____

Name & Address—Owner _____

Name & Address—Contractor _____

DIMENSIONS

Dimensions shall be not less than listed in table of General Code Requirements unless special approval is obtained.

Width of Opening _____ Height of Opening _____

Depth of Firebox _____ Size of Flue _____

Width of Jambs Each Side of Opening _____

Height: Top of Foundation to Top of Chimney _____

Ash Dump & Clean-out Fittings Required: Yes _____ No _____

Special Items & modifications applying to this Job:



**Masonry
Institute of
America**

2550 Beverly Boulevard
Los Angeles, CA 90057-1085
(213) 388-0472

MIA 703 7-90 3M

SPECIFICATIONS

Scope:

The following specifications, including special items and modifications, shall govern the construction of the fireplace and chimney.

Work Not Included:

Any concrete work or reinforcement embedded in concrete including vertical dowels.

Work Included:

All labor, materials, equipment, appliances, anchors, bolts, miscellaneous iron work and all other reinforcing steel, including setting of vertical steel as indicated on the plans and as herein specified.

Materials:

Materials shall be as follows:
Water shall be clean and potable.

Sand conforming to "Aggregate for Masonry Mortar" ASTM C 144.

Portland cement conforming to ASTM C 150 Type I or II.

Hydrated lime conforming to "Hydrated Lime for Masonry Purposes" ASTM C 207, Type S.

Steel Reinforcing conforming to "Deformed Billet Steel Bars Concrete Reinforcement" ASTM A 615 - Grade 40 or 60.

Brick, meeting the requirements for "Building Brick" ASTM C 62.

Block meeting the requirements for "Hollow Load Bearing Concrete Masonry Units" ASTM C90.

Clay flue liners conforming to "Clay Flue Linings" ASTM C 315 or "Concrete Flue Liners" conforming to ICBO E.R. No. 2602 or L.A. City R.R. No. 23878.

Mortar Proportions:

Mortar shall be proportioned by volume as follows: One part Portland Cement, one-half part hydrated lime and four-and-a-half parts dry, loose sand.

Mixing of Mortar:

All cementitious materials and aggregates shall be mixed for a

minimum period of three minutes, with the amount of water required to produce the desired workability.

Re-tempering:

Permitted only by adding water within a basin formed of mortar and the mortar reworked into the water. Mortar which has become harsh and non-plastic shall not be re-tempered or used. Mortar that has set for more than 2 1/2 hours shall not be used.

Grout:

Grout may be composed of mortar retempered with water.

Joints:

All joints exposed to the weather shall be tooled.
Joints in firebrick shall not exceed 1/4".

Construction:

When the bricks are being laid, they shall be sufficiently damp, and the mortar sufficiently soft, so that the mortar will remain plastic to permit the units to be leveled and plumbed immediately after being laid without losing bond. All masonry work shall be accurately executed and in conformity with the plans. No brick less than 1/2 length shall be used in exposed work. Head and bed joints shall be solidly filled with mortar and brick shall be shoved into place.

Fireplaces are generally of two types. One type is constructed on concrete slab floors and the other type is constructed in a frame floor using a cantilevered hearth.

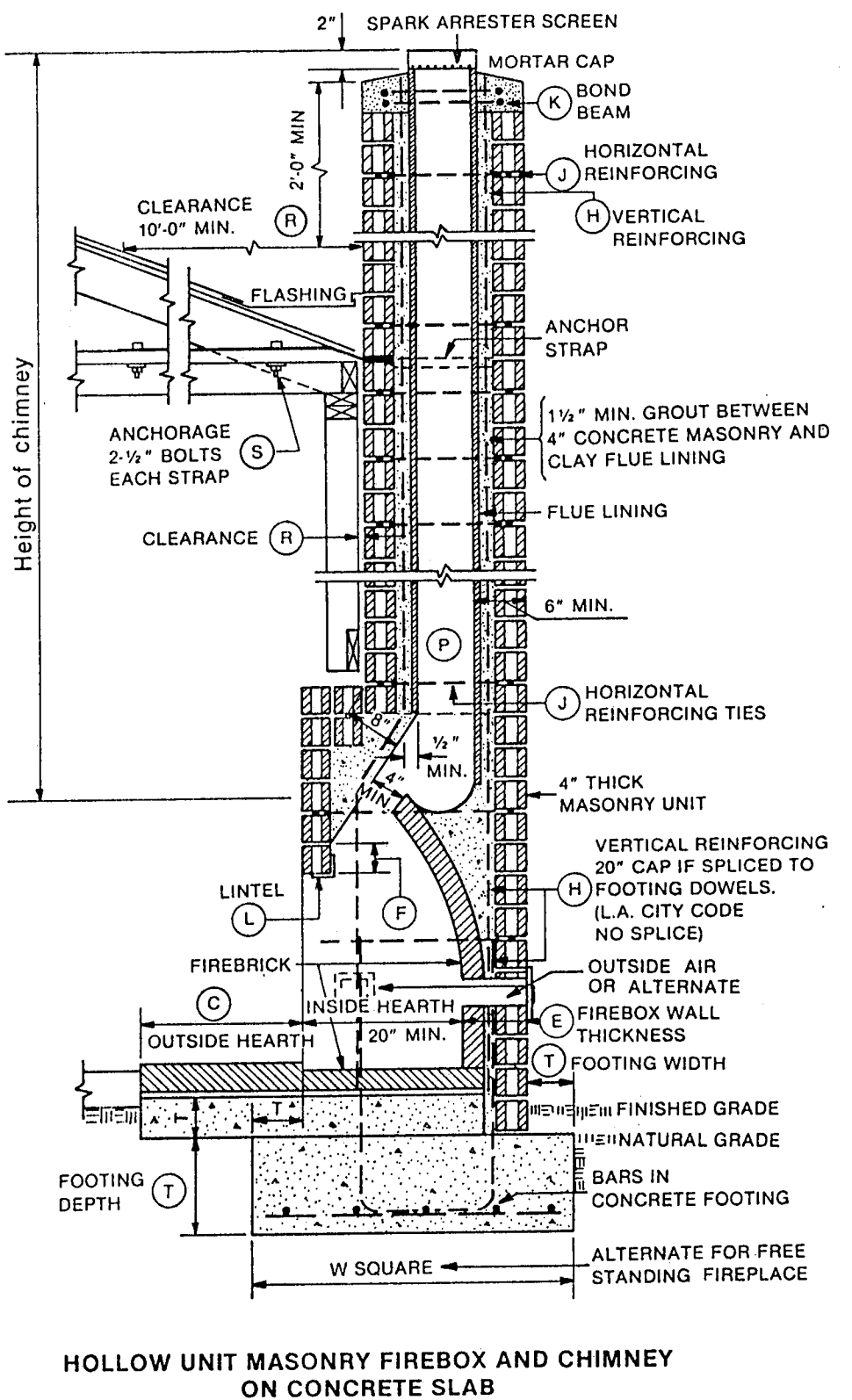
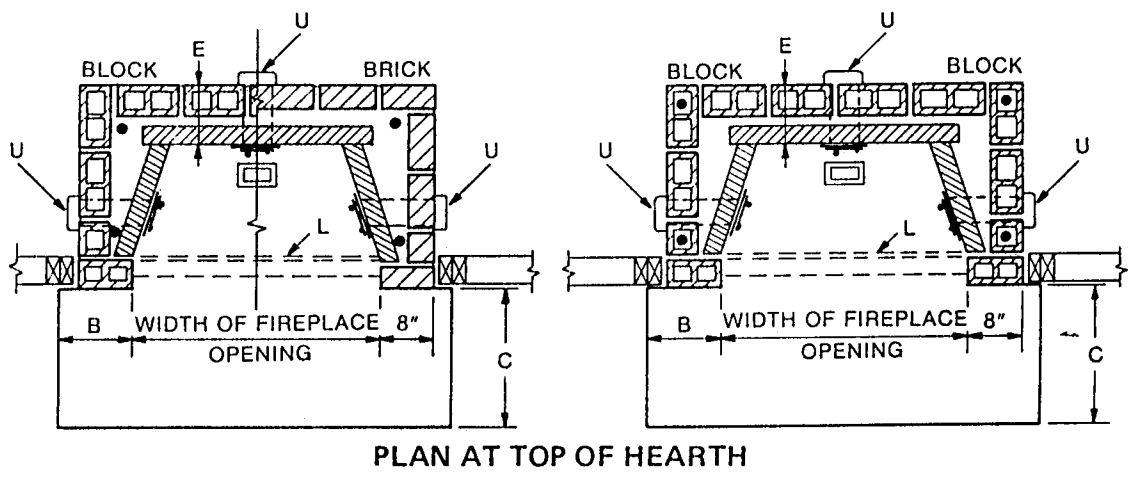
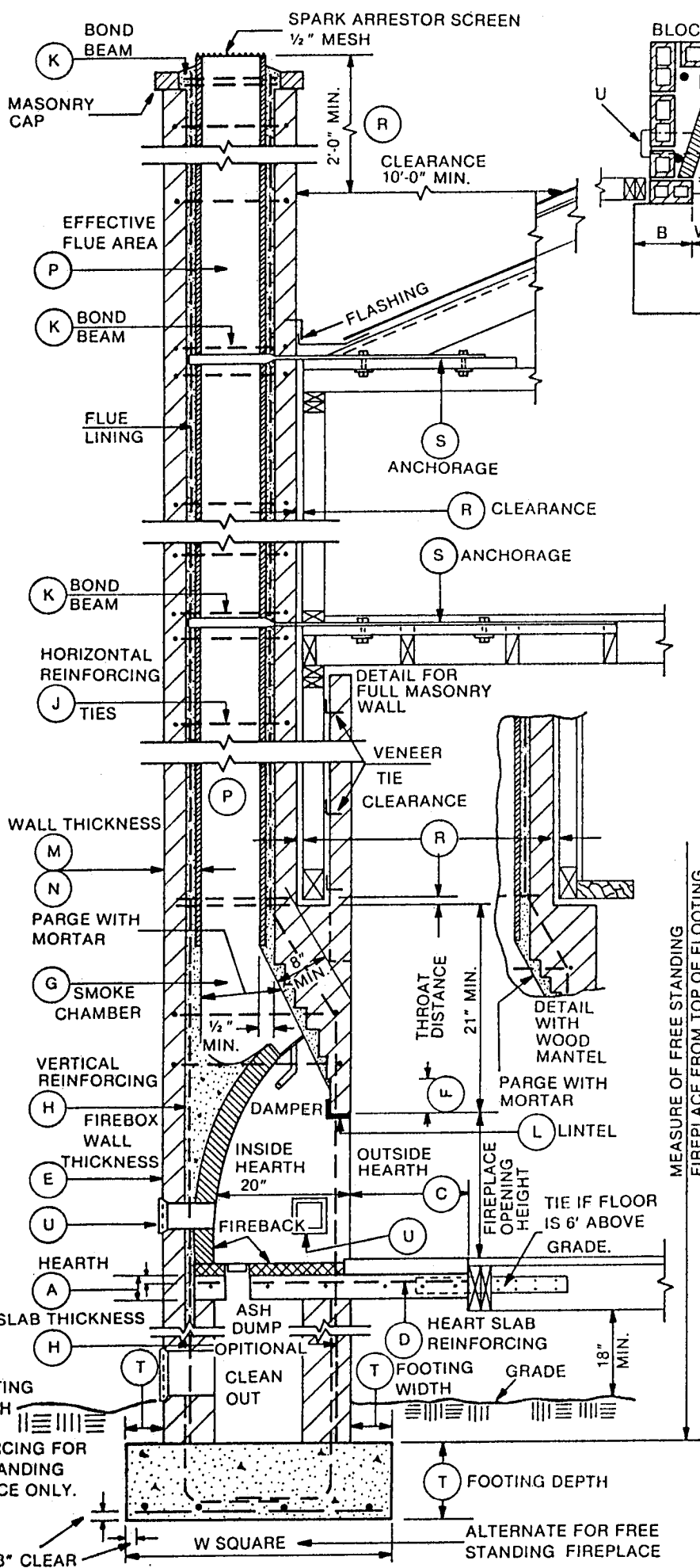
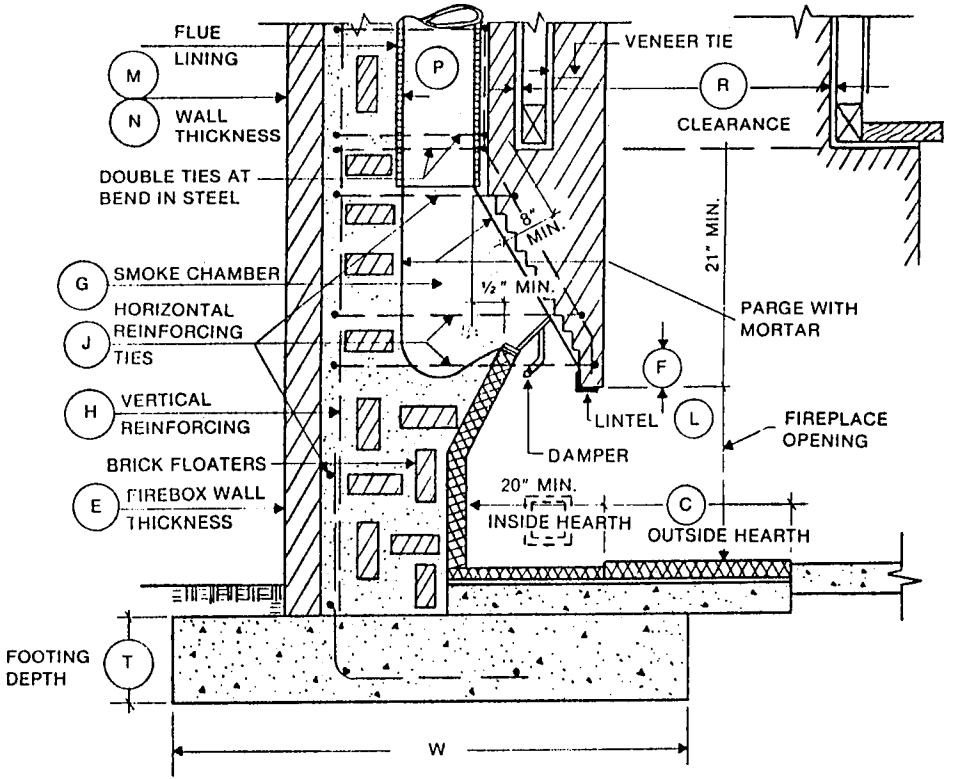
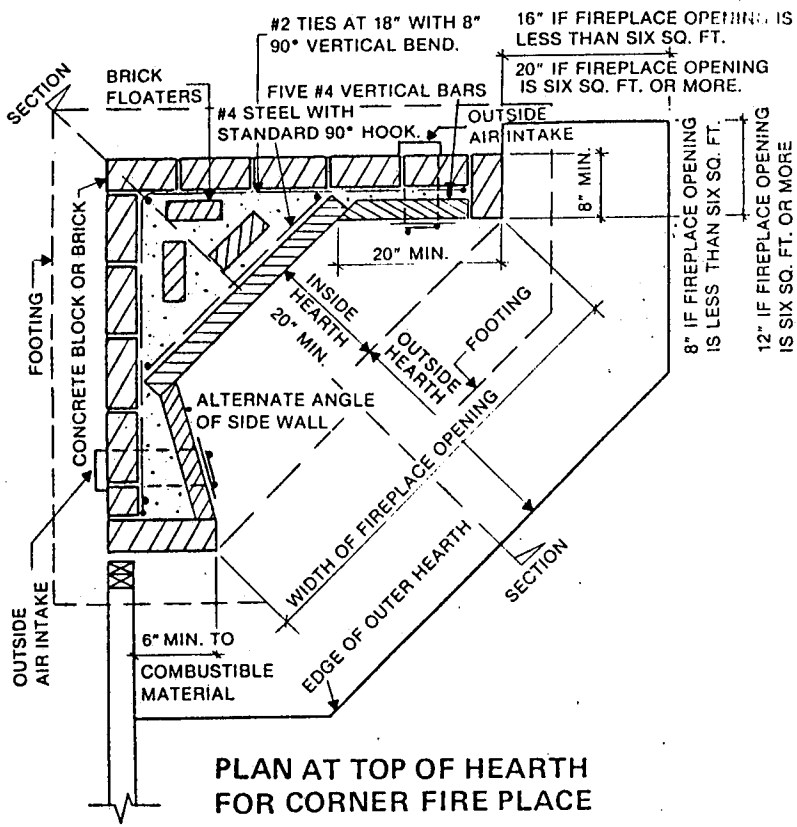
The generally accepted method of construction of a fireplace from the hearth up is as follows: The fireplace is laid out; the back of the fireplace is constructed to a scaffold height approximately five feet; and then the firebox is constructed and back-filled with tempered mortar. Do not grout solidly behind firebox wall. Slush mortar or grout loosely behind firebox wall to allow for expansion of firebox.

The horizontal steel may be placed either in the mortar bed joint or in the grouted area.

Some fireboxes are constructed without the face, leaving ties so the face may be added at a later date, while other fireboxes are constructed simultaneously with the face. Either way is an approved method of construction.

Tempered mortar grout shall fill the void between the flue lining and the masonry wall.

MASONRY CHIMNEY SECTIONS



GENERAL CODE REQUIREMENTS

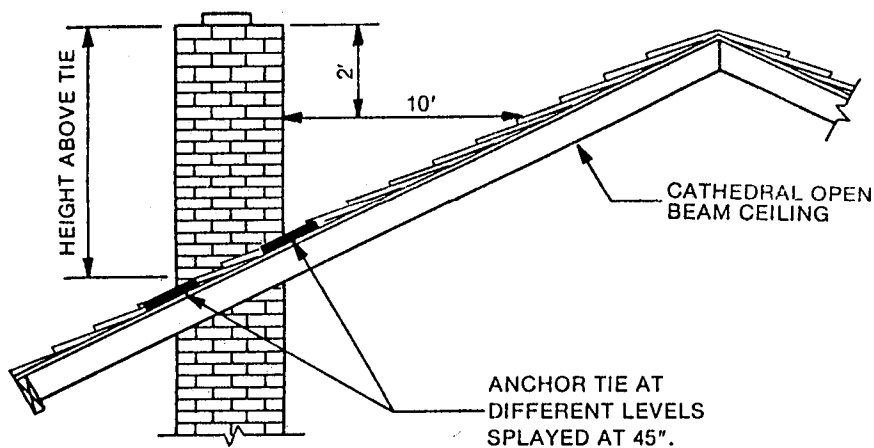
ITEM	LETTER	Uniform Building Code 1985 & 1988 Editions
Hearth Slab Thickness	A	* 4"
Hearth Slab Width (Each side of opening)	B	8" Fireplace opg. < 6 sq. ft. 12" Fireplace opg. ≥ 6 sq. ft.
Hearth Slab Length (Front of opening)	C	16" Firepl. opg. < 6 sq. ft. 20" Firepl. opg. ≥ 6 sq. ft.
Hearth Slab Reinforcing	D	Reinforced to carry its own weight and all imposed loads.
Thickness of Wall of Firebox	E	* 10" common brick or 8" where a fireback lining is used. Jts. in fireback ¼" max.
Distance from Top of Opening to Throat	F	6"
Smoke Chamber Edge of Shelf		6"
Rear Wall—Thickness	G	8"
Front & Side wall—Thickness		
Chimney Vertical Reinforcing	**H	Four #4 full length bars for chimney up to 40" wide. Add two #4 bars for each additional 40" or fraction of width or each additional flue.
Horizontal Reinforcing	J	¼" ties at 18" and two ties at each bend in vertical steel.
Bond Beams	K	No specified requirements. L.A. City requirements are good practice
Fireplace Lintel	L	Incombustible material

ITEM	LETTER	Uniform Building Code 1985 & 1988 Editions
Walls with Flue Lining	M	Brick with grout around lining. 4" min. from flue lining to outside face of chimney.
Walls with Unlined Flue	N	8" Solid masonry
Distance Between Adjacent Flues	O	4" including flue liner
Effective Flue Area (Based on Area of Fireplace Opening)	P	Round lining—1/12 or 50 sq.in.min. * Rectangular lining 1/10 or 64 sq. in min. Unlined or lined with firebrick—1/8 or 100 sq. in. min.
Clearances Wood Frame		2" when outside of wall or ½" gypsum board 2" when entirely within structure
Combustible Material Above Roof	R	6" min. to fireplace opening. 12" from opening when material projecting more than 1/8 for ea. 1" 2' at 10'
Anchorage Strap Number Embedment into chimney Fasten to Bolts	S	* 3/16" x 1" 2 12" hooked around outer bar w/6" ext. 4 Joists Two ½" Dia.
Footing Thickness	T	* 12" min.
Width		6" each side of fireplace wall
Outside Air Intake	U	+ Optional
Glass Screen Door		Optional

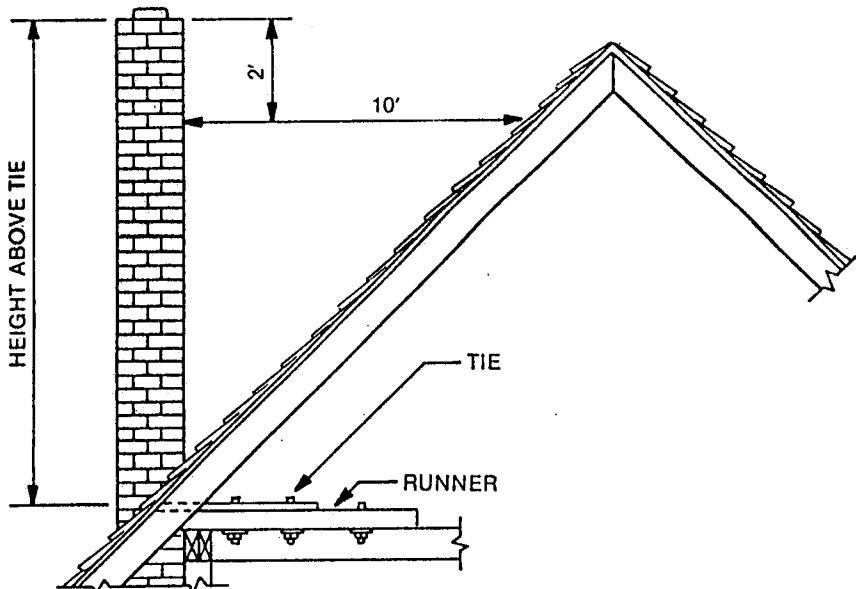
*Applies to Los Angeles County and Los Angeles City requirements.

**H EXCEPTION. Chimneys constructed of hollow masonry units may have vertical reinforcing bars spliced to footing dowels, provided that the splice is inspected prior to grouting of the wall.

+ When outside air intake vents are required, provide either one in rear of firebox or one on each side of firebox.

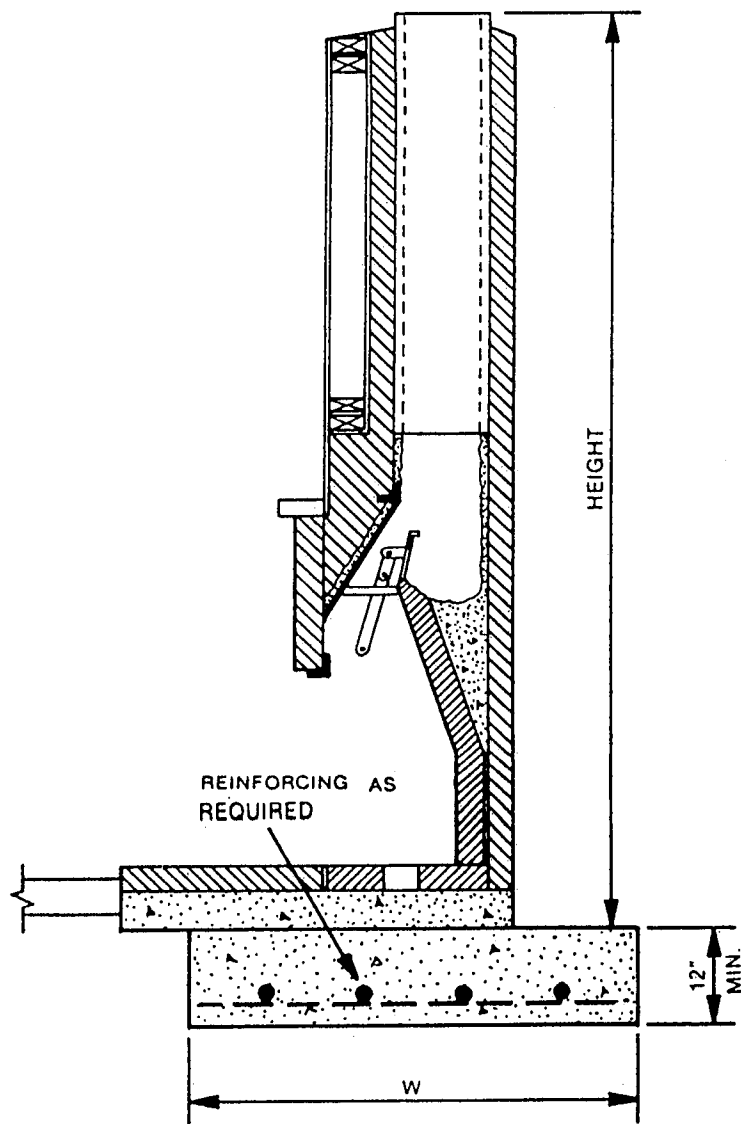


GABLE END OPEN BEAM



ANCHOR TIE CONNECTION REQUIREMENTS FOR TALL CHIMNEYS

HEIGHT OF CHIMNEY ABOVE TIE	SMALL CHIMNEY APPROX. 22" x 30"		WIDE STRAIGHT UP CHIMNEY APPROX. 22" x 55"	
	BOLT TIE TO 2" x 4" RUNNER	NAIL 2" x 4" RUNNER TO RAFTERS OR JOISTS	BOLT TIE TO 2" x 4" RUNNER	NAIL 2" x 4" RUNNER TO RAFTERS OR JOISTS
8'	2-½" bolts	8-16d nails	2-½" bolts	12-16d nails
10'	2-½" bolts	10-16d nails	2-5/8" bolts or 3-½" bolts	14-16d nails



ALTERNATE FOUNDATION SCHEDULE FOR A ONE STOREY FREE STANDING FIREPLACE (Soil Bearing 1000 psf max.)

FREE STANDING HEIGHT—FT.	SQUARE FOOTING "W"(min.)	BOTTOM REINF. EACH WAY
10' and 11'	4'-0"	4-#4
12' and 13'	4'-6"	4-#4
14' and 15'	5'-0"	5-#4
16' and 17'	5'-6"	5-#4

Fireplace and chimney reinforcing and details same as "minimum requirements" this sheet except no anchor tie connections at roof or ceiling are required, but are recommended in seismic areas.

FLUE SIZES AND EFFECTIVE AREA

Effective Area of Flue Lining Square Inches	Nominal Flue Size Inches	Actual Outside Dimension Inches	Inside Dimension Inches
70 to 72	*8 x 13 SQ *8 x 13 OV	9-1/8 x 13-1/2 9 x 13-1/2	7-1/8 x 11-1/2 7 x 11-1/4
80 - 87	*11-1/2 x 11-1/2 SQ *8 x 12 SQ + 8-1/2 x 17 RC	11-5/8 x 11-5/8 12-3/8 x 12-3/8 8-1/2 x 17	10 x 10 10-1/2 x 10-1/2 6-1/4 x 14-7/8
93 - 96	*8 x 17 SQ *8 x 17 OV + 8 x 19-1/2 OV + 10 x 14 RC *12-3/4 Rd	8-3/4 x 17-5/8 8-3/4 x 17-1/4 8 x 19-1/2 10-1/2 x 14-3/4 13	6-1/2 x 15-1/2 6-3/4 x 15-1/2 5-3/4 x 17-1/4 8 x 12-3/8 11
104 - 108	*8 x 19 OV *8 x 20 SQ *10 x 17 OV + 10 x 17-1/2 RC + 13 x 13 RC *13 x 13 SQ	8-1/2 x 19-1/2 8 x 20-1/4 10-1/4 x 18 9-5/8 x 17-3/4 13 x 13 13-1/4 x 13-1/4	6-1/2 x 17-3/8 6-1/4 x 18-1/4 8 x 16-3/8 7 x 15-1/8 10-1/2 x 10-1/2 11-1/4 x 11-1/4
133 - 140	+ 10 x 21 RC + 12 x 16 SQ *12 x 16 SQ *13 x 17 SQ *13 x 17 OV + 13 x 17 RC	9-5/8 x 21 12 x 16 12 x 16 12-7/8 x 17-1/2 13 x 17 13 x 17	7-3/8 x 18-3/4 9-3/4 x 13-3/4 10 x 14 10-1/2 x 15-1/4 10-1/2 x 14-3/4 10-1/2 x 14-1/4
170 - 180	+ 13 x 20 RC *13 x 21 OV	13 x 20 13-1/4 x 22-1/4	10-1/4 x 17-1/4 10-1/2 x 19-3/4
195 - 200	*17 x 17 OV + 17 x 17 RC	17-1/4 x 17-1/4 17 x 17	14-3/4 x 14-3/4 14-1/4 x 14-1/4
240 - 250	+ 17 x 20 RC *17 x 21 OV	17 x 19-3/4 17-5/8 x 22	14-1/2 x 17 15 x 19-5/8
290 - 310	+ 21 x 20 RC *21 x 21 OV	21 x 20 22 x 22	18-1/2 x 17-1/8 19 x 19

OV = Oval; SQ = Square; RC = Round Corner; Rd = Round

*This style type is for CLAY FLUE LININGS. These meet or exceed requirements of ASTM C315. Approximate wall thickness 1" ±.

+ This style type is for CONCRETE FLUE LININGS. These meet or exceed requirements of FHA-MPS 4900.1, Sec. 604-6.7; ICBO Research Recommendation No. 2602; City of Los Angeles Research Report No. 23878. Approximate wall thickness 1-1/8" ±.

FLUE SIZES

The area of the fireplace opening is multiplied by the flue area ratio to obtain the minimum required effective flue area.

The size of the flue lining selected should be equal to or larger than the required computed area.

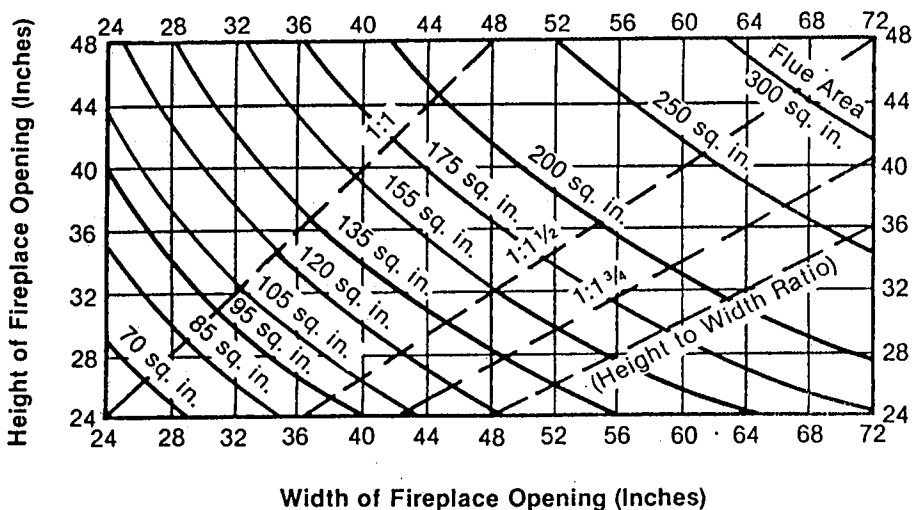
EXAMPLE:

Find proper flue size at 1/10 fireplace area for a fireplace 48" wide by 28" high.

SOLUTION:

1. Find 48" fireplace width at bottom of chart.
2. Find 30" fireplace height at left side of chart.
3. Follow height line across and width line up until they intersect.
4. Proper flue area will be nearest curve above intersection.
5. Read 135 sq. in. Flue area required. Select a flue from the 133 - 140 sq. in. category.

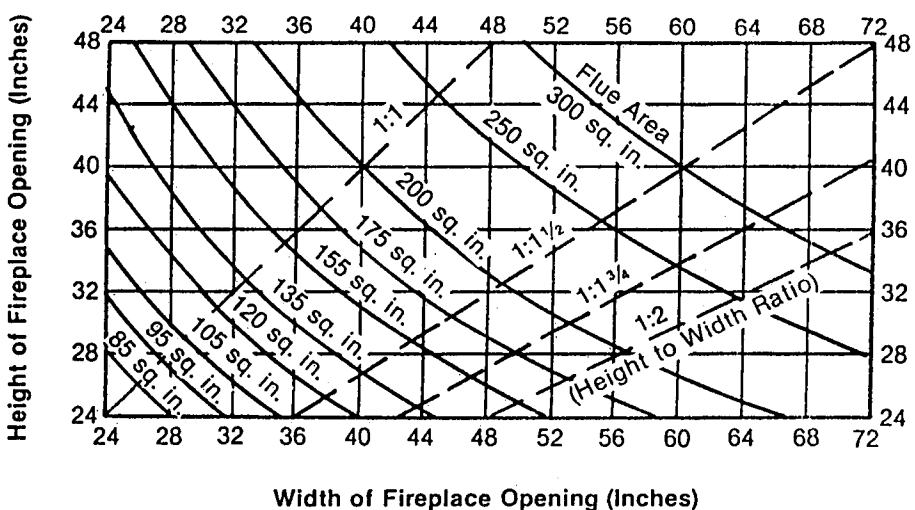
Area of Flue for 1/10 Fireplace Opening



Graph to determine proper flue size for single face fireplace which requires 1/10 of fireplace opening or when the chimney is 15 feet high* or more.

*Chimney height is measured from the smoke shelf to the top of the chimney.

Area of Flue for 1/8 Fireplace Opening



Graph to determine proper flue size for single face fireplace which requires 1/8 of fireplace opening or when the chimney is 15 feet high*.

*Chimney height is measured from the smoke shelf to the top of the chimney.

CHIMNEY REINFORCEMENT

Every chimney shall be reinforced with at least four 1/2" diameter vertical reinforcing bars. The bars shall extend the full height of the chimney. The bars shall be tied horizontally at 18" intervals with not less than 1/4" diameter steel tie at each interval. Two ties shall also be provided at the bend in a bar where it changes from a sloped position to a vertical position. Maximum slope of vertical steel should be 6" horizontal to 12" vertical.

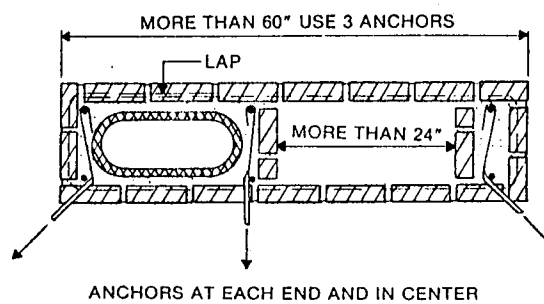
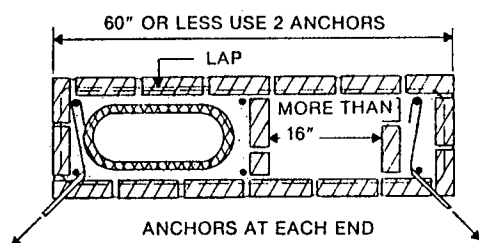
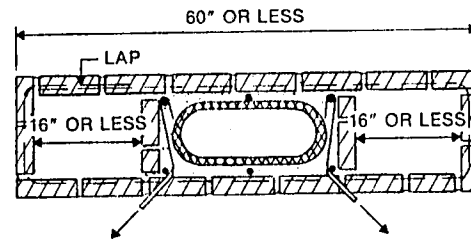
It is suggested that ties be also placed approximately 6" above and below anchor strap.

Where the width of the chimney exceeds 40", two additional 1/2" diameter vertical bars shall be provided for each additional flue incorporated into the chimney; or for each additional 40" in width or fraction thereof.

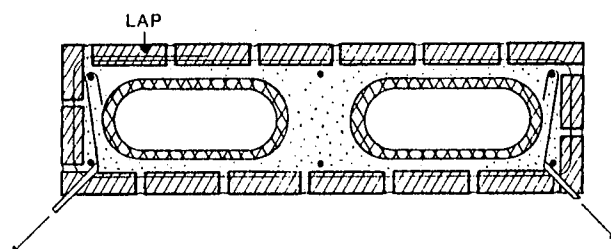
The above reinforcement requirement will be adequate for chimneys to 12 ft. above the anchor line.

ANCHORAGE OF CHIMNEY TO BUILDING

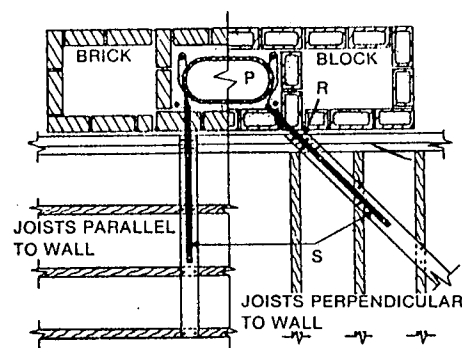
It is required by all codes to provide anchor straps from the chimney to the building when the chimney is outside the building and against the exterior wall. For a standard size chimney with one flue, steel straps approximately 3/16" x 1", or standard FHA anchors, are embedded in the grout and around the reinforcing steel. They are attached with two 1/2" dia. bolts or four 3/8" dia. x 3" lag screws to framing members. Bolts or lag screws used in all anchors must each be in separate holes.



WIDE CHIMNEY — 2 FLUES



SMALL CHIMNEY ONE FLUE



ENERGY CONSERVATION REQUIREMENTS

as per Title 24 (State Building Standards Code); Part 2 (State Building Code); Chapter 2-53 (Energy Conservation in New Building Construction); Section 2-5304 (d)(5) (Masonry and factory-built fireplaces).

Masonry and factory-built fireplaces shall meet the following requirements.

1. The entire opening of the firebox must be covered with a tight-fitting, closeable, metal or glass door. This requirement may be omitted if such doors would interfere with devices permanently installed in the fireplace which are designed to increase the circulation of heat.
2. For fireplaces located on an outside wall the firebox must have an outside air intake which has a minimum area of six square inches. This air intake must have a tight-fitting damper (not the same as the flue damper) which is operable and readily accessible.
3. The flue damper must be tight-fitting with an accessible control.
4. Continuous burning gas pilot lights are prohibited.
5. The use of indoor air to cool the firebox when that indoor air is vented to the outside of the building is prohibited.

GAS LOG LIGHTER

Installation of a gas log lighter should comply with local regulations for gas appliances.

The gas shut off valve should be an approved A.G.A. appliance and must be outside the masonry fireplace and not embedded in the outside hearth. A swing joint consisting of at least three elbows should be installed between the gas shut off valve and the log lighter pipe. This is to prevent breaks in the joints in the event of movement or settlement of the fireplace.

It is recommended that the gas log lighter be 1" above the ash bed and definitely not buried in the ashes or in sand.