17 Fireplaces, Chimneys, and Stoves

Objectives

After studying this chapter, you will be able to:

- Compare various types of fireplaces that are appropriate for a residence.
- Identify the parts of a standard masonry fireplace and chimney.
- Apply the appropriate principles to design a typical fireplace.
- Use a fireplace design data chart.
- Explain the difference between a radiant and circulating stove.

Key Terms

Ash Dump
Circulating Stove
Cleanout
Cricket
Damper
Fire Chamber
Fireclay
Flue
Hearth
Inner Hearth
Prefabricated Metal Fireplace
Projecting Corner Fireplace
Radiant Heat
Radiant Stove
Saddle
Single-Face Fireplace
Smoke Chamber
Smoke Shelf
Three-Face Fireplace
Three-Way Fireplace
Two-Face Adjacent Fireplace
Two-Face Opposite Fireplace

Most everyone enjoys the sound and warmth of a blazing fire. The fireplace is often a focal point in the living room or family room. Including a fireplace in a home plan is an important design consideration, Figure 17-1. However, many homes have fireplaces that are pleasing to the eye, yet fail to operate properly. Care must be taken in the design and construction of a fireplace and chimney to make sure the fireplace will safely perform as desired.

Fireplace Design Considerations

Several types of fireplaces are being constructed in modern residences. Some are traditional in design while others are contemporary, Figure 17-2. Increasingly, metal fireplaces are finding their way into the home. Some of these are wood burning, but many are

Figure 17-1. An attractive fireplace may be the focal point of a living room. (Superior Fireplace Company)

A

B

Figure 17-2. Fireplaces come in many styles. A—Traditional. (Stone Products Corporation) B—Contemporary. (Heatilater, Inc.)

gas-fired and designed to look like a wood fire. Often, the design of the fireplace draws on the building materials for its charm, Figure 17-3.

Generally, fireplaces may be identified as single face, two-face opposite, two-face adjacent, three face, or prefabricated metal, Figure 17-4. Each type has specific design requirements that must be met if the fireplace is to perform safely and properly. These design specifications are discussed later in this chapter.

Figure 17-3. The colors in the stones used in the design of this fireplace accent the wallcovering materials in the room.

Fireplace/Chimney Terms

Several terms are associated with fireplaces and chimneys. The following list defines some of the terms that should be understood before designing a fireplace.

- ***Ash dump:*** The cavity below the fireplace where ashes can collect and be removed.
- ***Cleanout:*** A door to allow access for removal of ashes from the ash dump.
- ***Damper:*** Regulates airflow and prevents downdraft.
- ***Fireclay:*** A fire-resistant, mortar-like refractory material used as a bonding agent between the firebrick.
- ***Flue:*** The path for smoke to pass up the chimney.
- ***Hearth:*** Protects the floor from sparks.
- ***Inner hearth:*** The floor of the fireplace.
- ***Smoke chamber:*** The area just above the smoke shelf and damper.
- ***Smoke shelf:*** Causes downdrafts to be deflected upward.

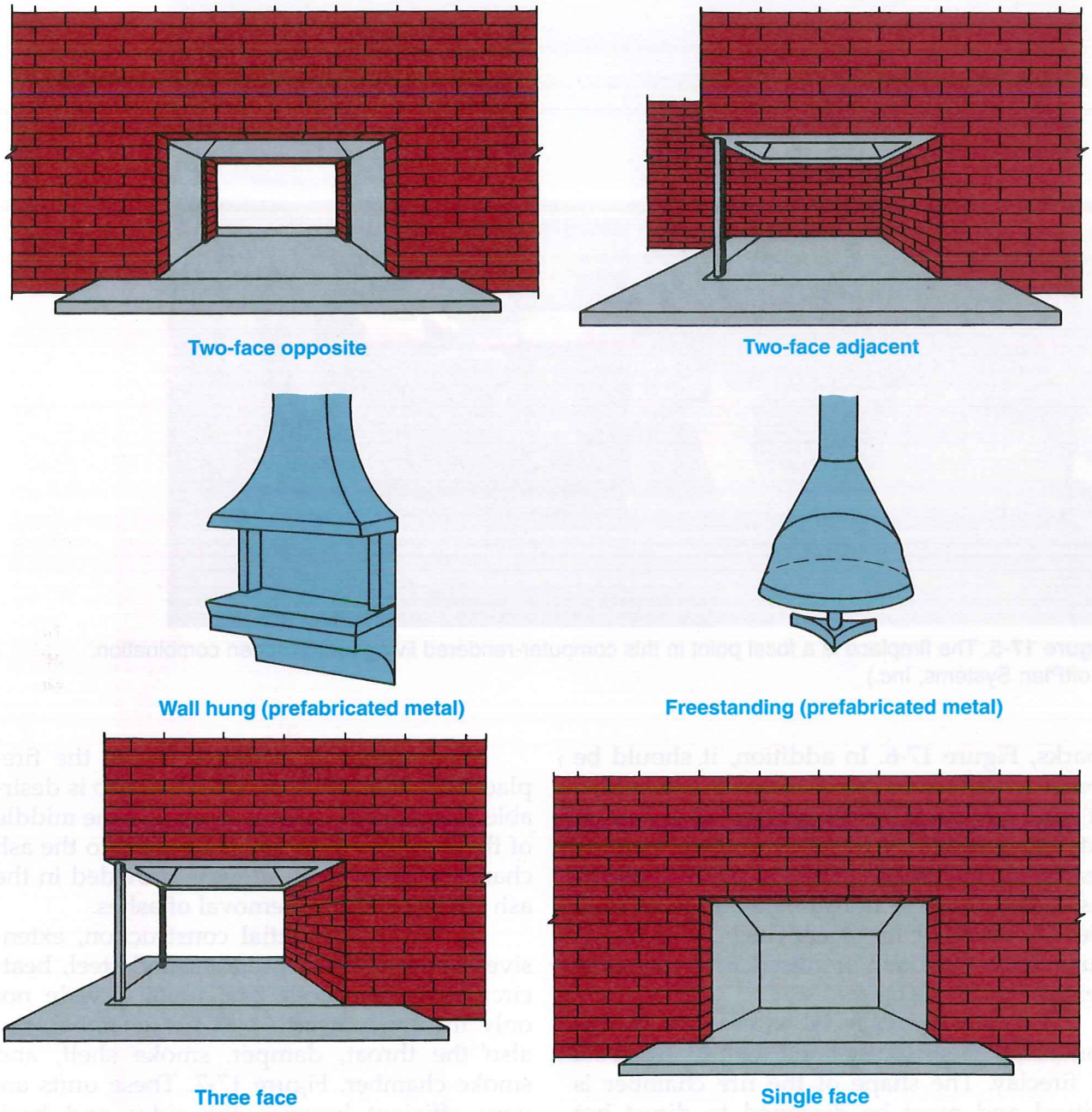


Figure 17-4. There are several general types of fireplaces.

Designing with CADD

Some CADD packages include an option or function for automating the design process of fireplaces. Generally, all the drafter has to specify is the width of the opening and the desired style of fireplace. The plan view, elevations, and details are automatically generated. Figure 17-5 shows a computer-generated rendering of a room with a fireplace.

Hearth and Fire Chamber

The hearth should extend at least 16″ in front of the fireplace to protect the floor from

Figure 17-5. The fireplace is a focal point in this computer-rendered living room/kitchen combination. (SoftPlan Systems, Inc.)

sparks, Figure 17-6. In addition, it should be constructed from a noncombustible material. In conventional construction, the hearth extends beneath the fireplace to form an inner hearth. It is usually covered with firebrick inside the fireplace and stone, slate, or ceramic tile in front of the fireplace. The hearth may be flush with the floor or raised to a desirable height.

The *fire chamber* is where the fire is contained. It is usually lined with firebrick set in fireclay. The shape of the fire chamber is critical and must be designed to direct hot gases and smoke into the throat for passage up the chimney. In addition, if the chamber is too deep, little heat will be reflected out into the room. On the other hand, if it is too shallow, the fireplace is likely to smoke into the room. The wall thickness on the back and sides of the fire chamber should be a minimum of 8", as noted in Figure 17-6.

When space is available below the fireplace and finished floor, an ash dump is desirable. A metal trap door is located in the middle of the fireplace floor and connected to the ash chamber below. A cleanout is provided in the ash chamber for the removal of ashes.

In newer residential construction, extensive use is made of prefabricated steel, heat-circulating fireplaces. The units include not only the inner hearth and fire chamber, but also the throat, damper, smoke shelf, and smoke chamber, Figure 17-7. These units are very efficient because the sides and back consist of a double-wall passageway where the air is heated. Cool air is drawn into the passageway, heated, and returned to the room through registers located at a higher level. Installation is generally easy. Figure 17-8 shows the step-by-step procedure for installing a prefabricated, heat-circulating fireplace in frame construction.

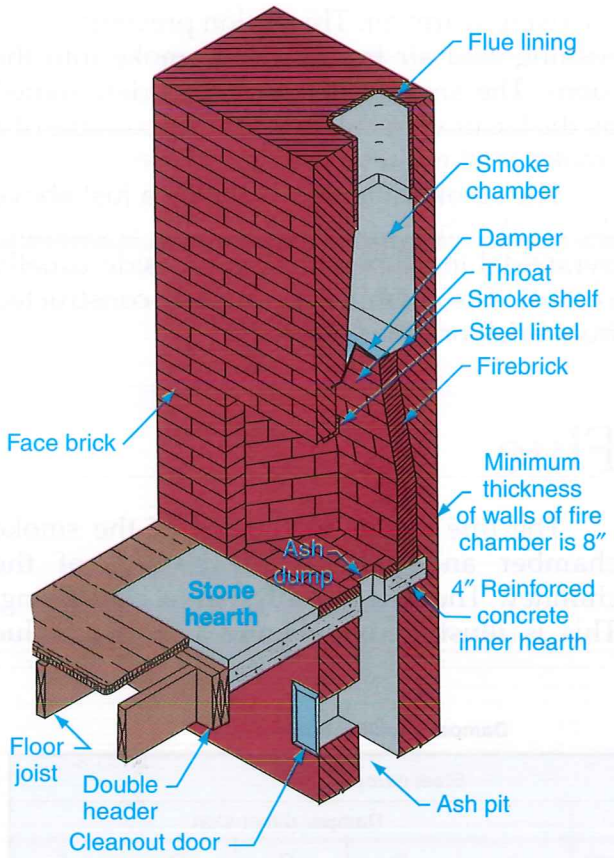


Figure 17-6. This three-dimensional section drawing of a fireplace shows various details of the construction.

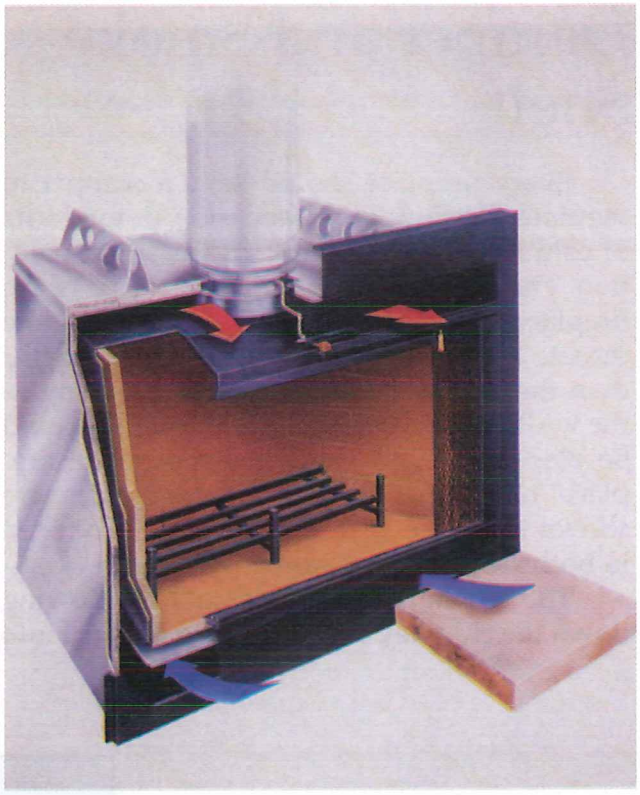


Figure 17-7. This is a cutaway view of a prefabricated steel, heat-circulating fireplace. (Heatilator, Inc.)

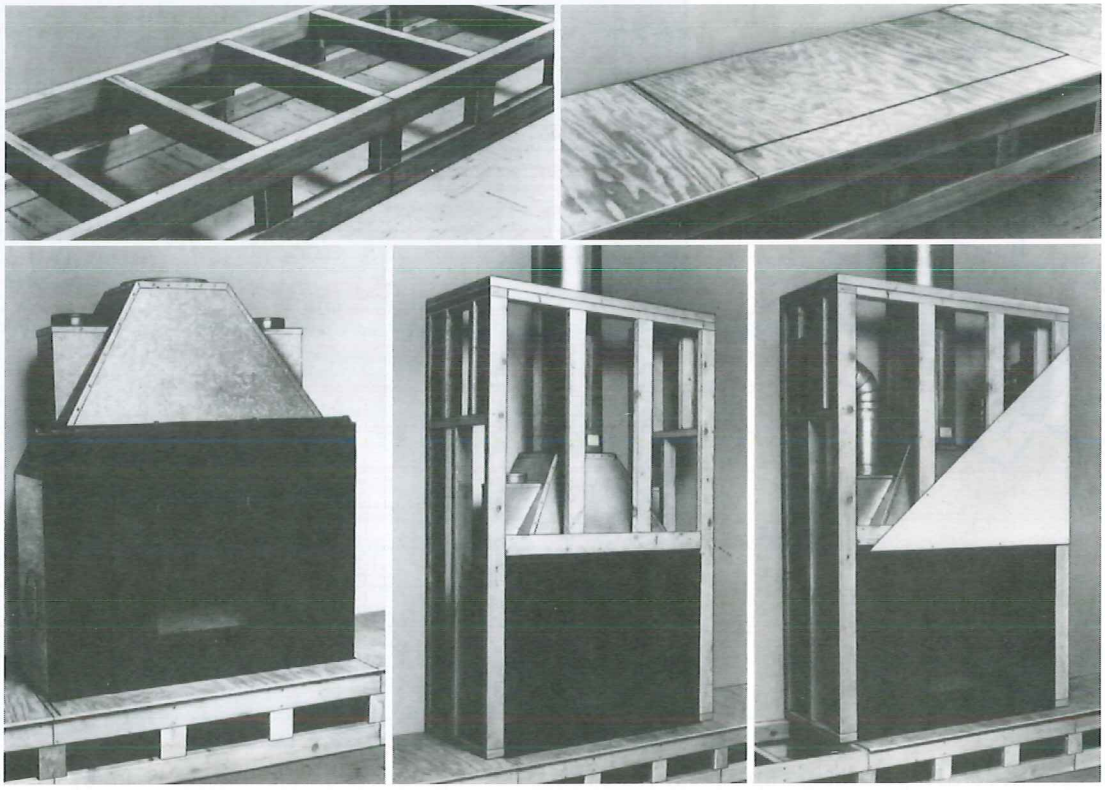


Figure 17-8. Installation of a prefabricated steel, heat-circulating fireplace in frame construction. (Heatilator, Inc.)

Damper and Smoke Shelf

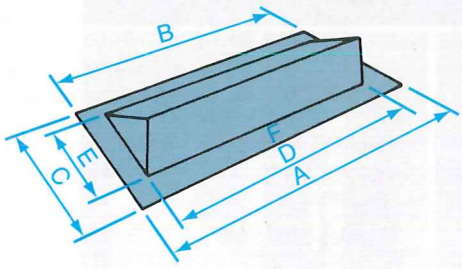
Every fireplace should have a damper to regulate the flow of air and stop downdrafts of cold air when the fireplace is not in operation. The damper is located in the throat of the fireplace and opens toward the back of the throat. The damper opening should be larger than the area of the flue lining and as long as the width dimension of the fireplace. It should be placed 6″ or 8″ above the top of the fireplace opening. Standard damper sizes are shown in Figure 17-9. Dampers are produced in both steel and cast iron.

The smoke shelf causes cold air flowing down the chimney to be deflected upward into the rising warm air. This action prevents down rushing cold air from forcing smoke into the room. The smoke shelf height is determined by the location of the damper. An example of a smoke shelf is shown in Figure 17-6.

The smoke chamber is the area just above the smoke shelf and damper. This is basically pyramidal in shape with the backside usually vertical. The chamber is normally constructed from brick or other masonry.

Flue

The flue begins at the top of the smoke chamber and extends to the top of the chimney. The flue usually has a clay lining. This is illustrated in Figure 17-6. Each flue



Damper specifications

Steel dampers					
	Damper dimension				
Width of fireplace	A	B	C	D	E
24″ to 26″	28-1/4″	26-3/4″	13″	24″	9-1/2″
27″ to 30″	32-1/4″	30-3/4″	13″	28″	9-1/2″
31″ to 34″	36-1/4″	34-3/4″	13″	32″	9-1/2″
35″ to 38″	40-1/4″	38-3/4″	13″	36″	9-1/2″
39″ to 42″	44-1/4″	42-3/4″	13″	40″	9-1/2″
43″ to 46″	48-1/4″	46-3/4″	13″	44″	9-1/2″
47″ to 50″	52-1/4″	50-3/4″	13″	48″	9-1/2″
51″ to 54″	56-1/4″	54-3/4″	13″	52″	9-1/2″
57″ to 60″	62-1/2″	60-3/4″	13″	58″	9-1/2″
Cast iron dampers					
	Damper dimension				
Width of fireplace	A	B	C	D	E
24″ to 26″	28″	21″	13-1/2″	24″	10″
27″ to 31″	34″	26-3/4″	13-1/2″	30″	10″
31″ to 34″	37″	29-3/4″	13-1/2″	33″	10″
35″ to 38″	40″	32-3/4″	13-1/2″	36″	10″
39″ to 42″	46″	38-3/4″	13-1/2″	48″	10″
43″ to 46″	52″	44-3/4″	13-1/2″	48″	10″
47″ to 50″	57-1/2″	50-1/2″	13-1/2″	54″	10″
51″ to 54″	64″	56-1/2″	14-1/2″	60″	11-1/2″
57″ to 60″	76″	58″	14-1/2″	72″	11-1/2″

Figure 17-9. These damper design specifications are typical of products on the market. (Donley Brothers Company)

requires at least 4″ of masonry on all sides. If a liner is not used, the wall thickness must be a minimum of 8″. Each fireplace in a structure must have its own flue. Ideally, the flue will be centered directly above the fireplace and installed in a straight vertical line. A small amount of offset is permissible; however, efficiency is reduced when the flue is not straight.

The flue must be large enough to provide the necessary updraft. A rule of thumb to follow in selecting the proper flue size is the cross-sectional area of the flue should be at least 1/10th of the fireplace opening. For example, if the fireplace opening is 32″ × 48″, the area is 1536 square inches. One-tenth of 1536 square inches is 153.6 square inches. A standard flue size that has at least this area is a 12″ × 16″ flue, which has 192 square inches. Standard flue sizes are shown in Figure 17-10. It is better to have a flue that is slightly too large than one that is too small; however, a flue that is significantly oversize will not function properly.

Proper flue size is also related to several other factors. If the height of the flue is less than 14′, the size should be increased to provide the necessary updraft. The updraft is increased by making the flue higher. Prevailing winds and surrounding trees and buildings also affect the draft. If the flue is sheltered, the size should be increased. Most codes require that the flue extend at least 2′ above the highest point of the roof, Figure 17-11.

Clay flue liner sizes		
New sizes	**Round (dia.)**	**Old sizes**
8″ × 12″	8″	8-1/2″ × 8-1/2″
12″ × 12″	10″	8-1/2″ × 13″
12″ × 16″	12″	13″ × 13″
16″ × 16″	15″	13″ × 18″
16″ × 20″	18″	18″ × 18″
20″ × 20″	20″	20″ × 20″
20″ × 24″	22″	24″ × 24″

New flue sizes conform to the new modular dimension system. Sizes shown are nominal. Actual size is 1/2″ less each dimension. All flue liners listed above are 2′-0″ long.

Figure 17-10. Flue liners are available in round and rectangular shapes. Most are made of clay.

This is a safety factor, since sparks may fly out of the top and cause a roof fire.

A single chimney may have several flues. A flue is required for a gas furnace, a gas water heater, an incinerator, and each fireplace. The efficiency of a chimney may be increased if it is placed within the house, rather than on an outside wall. The warmer the chimney, the better the performance.

Framing around Fireplace and Chimney

The chimney is a free-standing structure. It does not support any part of the house. In fact, fire codes prohibit direct contact of framing with surfaces of the fireplace or chimney. A minimum of 2″ of clearance is required between the chimney and framing. This space should be filled with a noncombustible material. The openings in the floor, ceiling, and roof through which the chimney passes must have double headers and trimmers to give the necessary support, Figure 17-12.

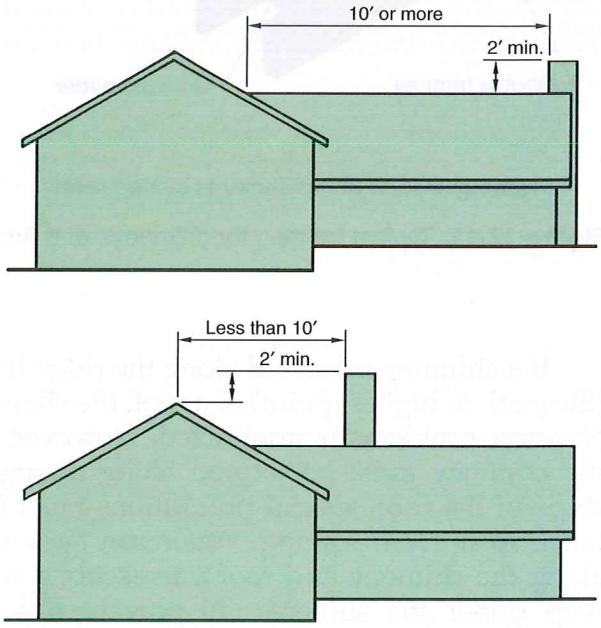


Figure 17-11. Recommended chimney heights above the roof.

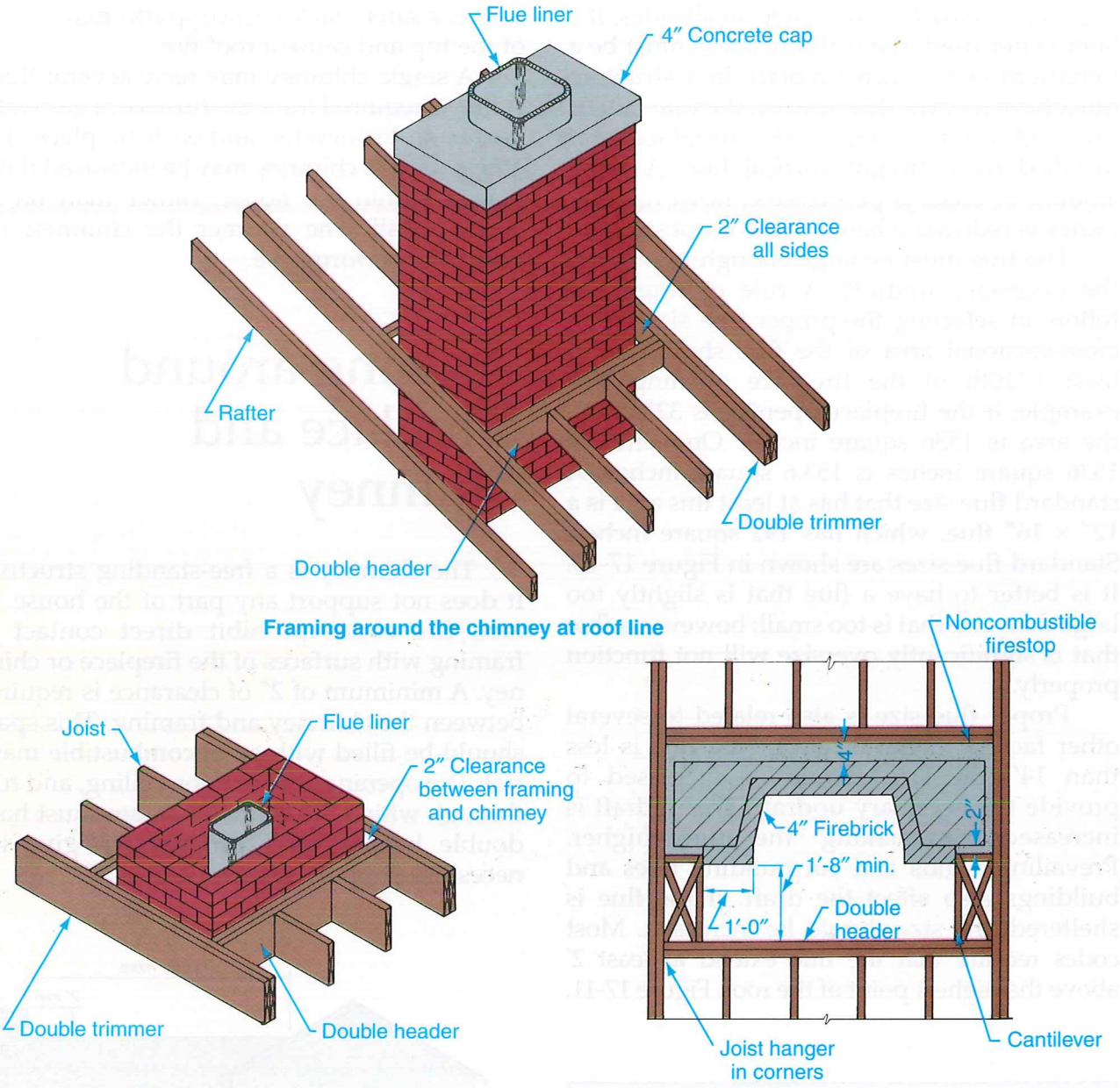


Figure 17-12. Typical framing for chimneys and fireplaces.

If a chimney is located along the ridge line (the peak or highest point) of a roof, the chance of water problems is minimized. However, if the chimney must be located along a single slope of the roof, special precautions must be taken to prevent leaking. Water can back up along the chimney and roof intersections and seep under the shingles. To prevent this, a ***saddle*** or ***cricket*** is built on the high side of the chimney to shed water. A saddle is especially necessary if the roof slope is low or the chimney is wide. Figure 17-13 shows the framing for a saddle.

The masonry above the fireplace opening must be supported by a lintel, just as over a door or window. An angle steel lintel is the most common type. This is shown in Figure 17-6. The required size of angle will vary with the width of the fireplace opening. A 3″ × 3″ × 1/4″ angle will be sufficient for an opening of 60″ wide.

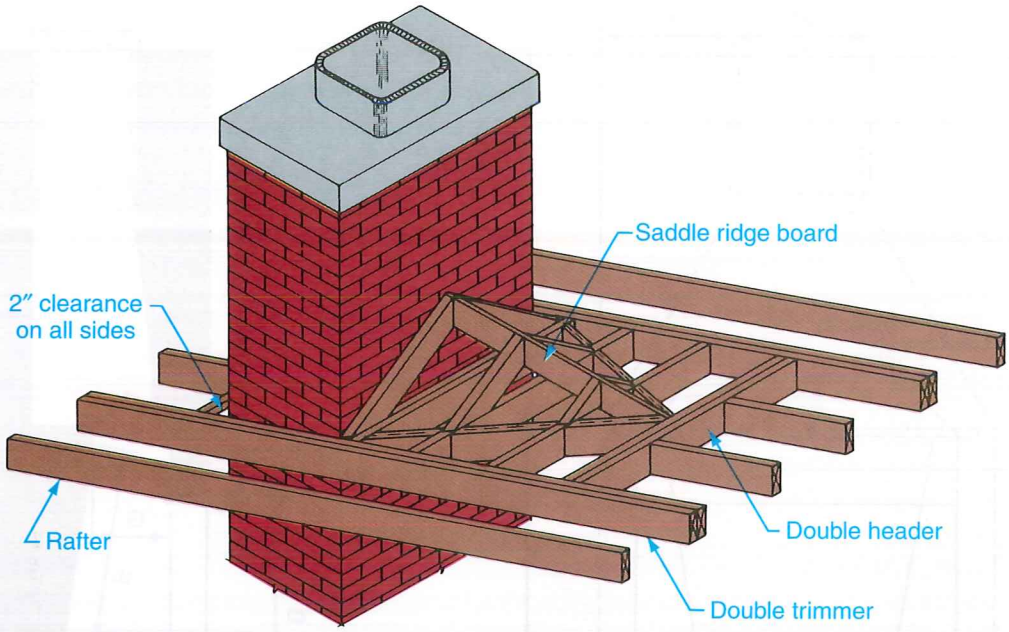


Figure 17-13. The framing for a saddle to shed water away from the chimney.

Fireplace Specifications

Generally, fireplaces may be identified as single face, two-face opposite, two-face adjacent, three face, or prefabricated metal. The type of fireplace and size of opening is the beginning point in designing a fireplace. Each type has specific design requirements that must be met if the fireplace is to be safe and perform properly. The specifications for each type are covered in the next sections.

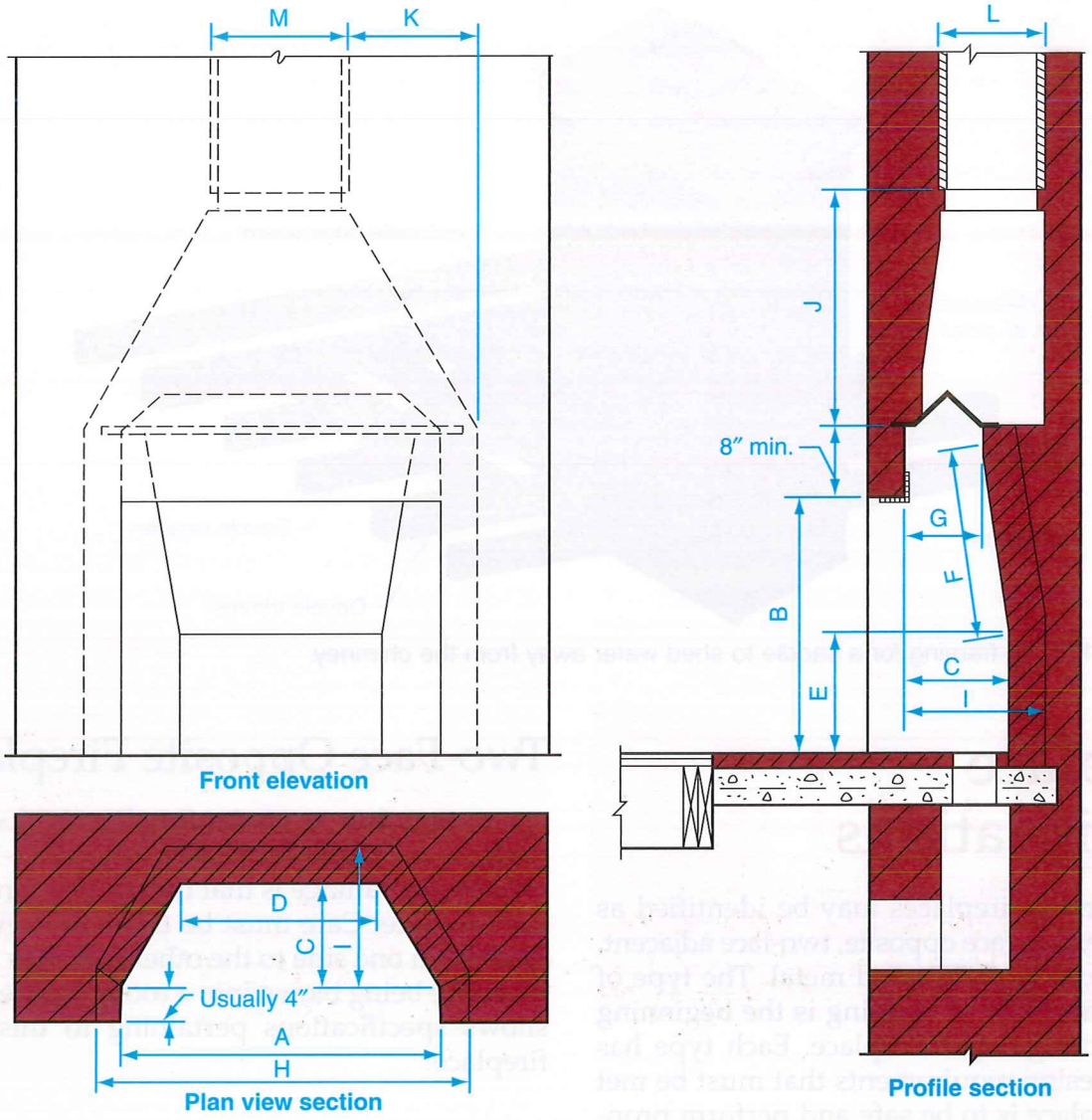
Single-Face Fireplace

The ***single-face fireplace*** has a single opening on one face and is the most popular type, Figure 17-14. It is the least complicated to construct and usually functions better than the other types. Figure 17-15 provides specifications for several single-face fireplaces. The proper damper size can be determined from the chart in Figure 17-9.

Two-Face Opposite Fireplace

A ***two-face opposite*** fireplace is open on both the front and back sides, Figure 17-16. Its primary advantage is that two rooms can view the fireplace. Care must be taken to prevent a draft from one side to the other that may result in smoke being blown into a room. Figure 17-16 shows specifications pertaining to this type fireplace.

Figure 17-14. This is a single-face fireplace that adds to the basic architectural style of the room. (Heatilator, Inc.)

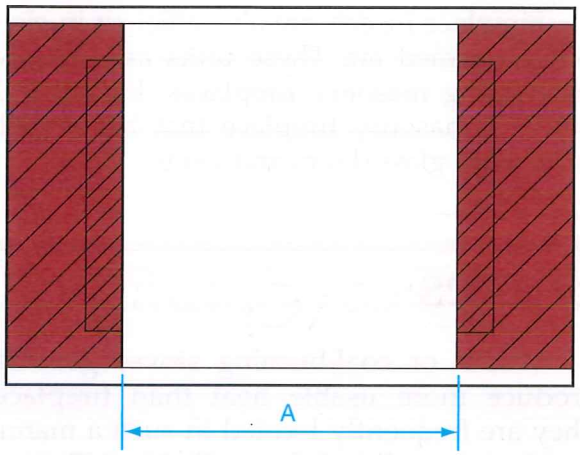


Design data for single-face fireplaces

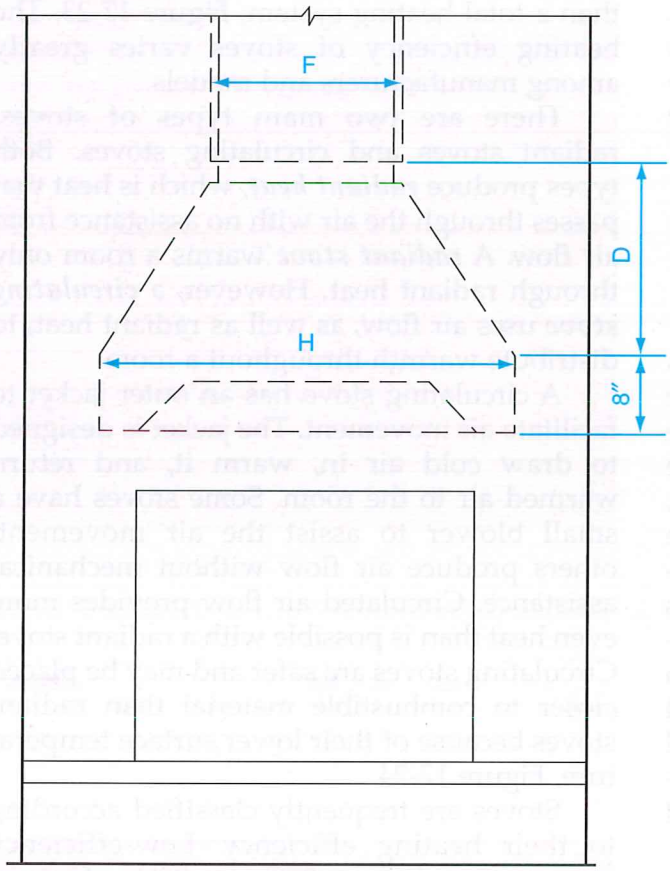
Width	Height	Depth	Back	Verti-back	Slope back	Throat	Width	Depth	Smoke chamb	Flue lining sizes				
										Rectangular		Round	Modular	
A	B	C	D	E	F	G	H	I	J	K	L × M		K	L × M
24	24	16	11	14	15	8-3/4	32	20	19	11-3/4	8-1/2 × 8-1/2	8	10	8 × 12
26	24	16	13	14	15	8-3/4	34	20	21	12-3/4	8-1/2 × 8-1/2	8	11	8 × 12
28	24	16	15	14	15	8-3/4	36	20	21	11-1/2	8-1/2 × 13	10	12	8 × 12
30	29	16	17	14	18	8-3/4	38	20	24	12-1/2	8-1/2 × 13	10	13	12 × 12
32	29	16	19	14	21	8-3/4	40	20	24	13-1/2	8-1/2 × 13	10	14	12 × 12
36	29	16	23	14	21	8-3/4	44	20	27	15-1/2	13 × 13	12	16	12 × 12
40	29	16	27	14	21	8-3/4	48	20	29	17-1/2	13 × 13	12	16	12 × 12
42	32	16	29	14	23	8-3/4	50	20	32	18-1/2	13 × 13	12	17	16 × 16
48	32	18	33	14	23	8-3/4	56	22	37	21-1/2	13 × 13	15	20	16 × 16
54	37	20	37	16	27	13	68	24	45	25	13 × 18	15	26	16 × 20
60	37	22	42	16	27	13	72	27	45	27	13 × 18	15	26	16 × 20
60	40	22	42	16	29	13	72	27	45	27	18 × 18	18	26	16 × 20
72	40	22	54	16	29	13	84	27	56	33	18 × 18	18	32	20 × 20
84	40	24	64	20	26	13	96	29	67	36	20 × 20	20	36	20 × 20
96	40	24	76	20	26	13	108	29	75	42	24 × 24	22	42	20 × 20

Dimensions are in inches. Flue sizes are for a chimney height of at least 14′–0″.

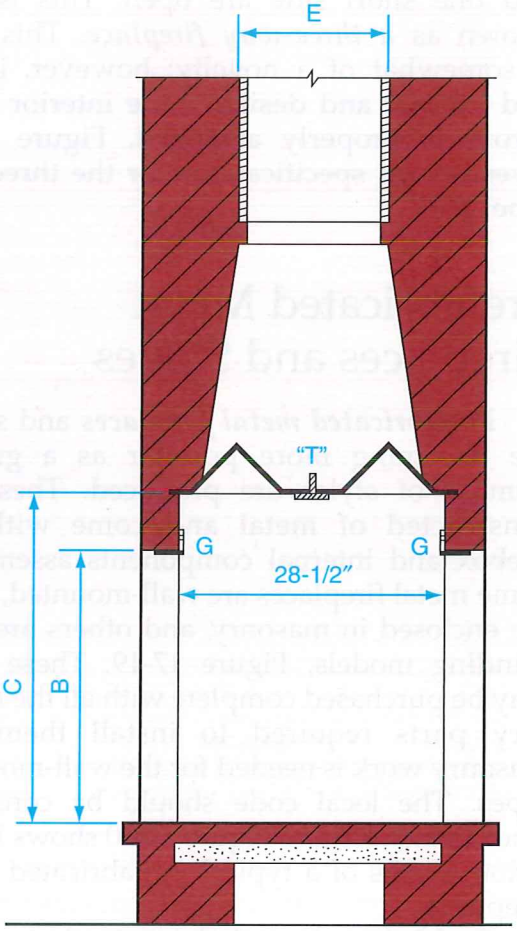
Figure 17-15. Design specifications for single-face fireplaces.



Plan view section



Front elevation



Profile section

Design data for two-face opposite fireplaces

A	B	C	D	Old flue size		Round	New mod. size		Angle G 2 req'd.	H	Tee length
				E	F		E	F			
28	24	35	19	13	13	12	12	16	36	36	35
32	29	35	21	13	18	15	16	16	40	40	39
36	29	35	21	13	18	15	16	20	42	44	43
40	29	35	27	18	18	18	16	20	48	48	47
48	32	37	32	18	18	18	20	20	54	56	55

Dimensions are in inches.
Flue sizes are for a chimney height of at least 14′–0″.
Angle G is 3″ × 3″ × 1/4″

Figure 17-16. Design specifications for two-face opposite fireplaces. Two rooms may benefit from a two-face opposite fireplace, as shown in the photo. (Superior Fireplace Company)

Two-Face Adjacent Fireplace

A *two-face adjacent* fireplace is open on the front and one side, Figure 17-17. It may be open on the right or left side. This type is also known as a *projecting corner fireplace.* Design specifications are shown in Figure 17-17.

Three-Face Fireplace

A *three-face fireplace* is open on three sides, Figure 17-18. Ordinarily, two long sides and one short side are open. This is also known as a *three-way fireplace.* This type is somewhat of a novelty; however, it can add interest and design if the interior room layout is properly arranged. Figure 17-18 gives design specifications for the three-face type.

Prefabricated Metal Fireplaces and Stoves

Prefabricated metal fireplaces and stoves are becoming more popular as a greater number of styles are produced. These are constructed of metal and come with the firebox and internal components assembled. Some metal fireplaces are wall-mounted, some are enclosed in masonry, and others are free-standing models, Figure 17-19. These units may be purchased complete with all the necessary parts required to install them. No masonry work is needed for the wall-mounted types. The local code should be consulted prior to installation. Figure 17-20 shows installation details of a typical prefabricated metal fireplace.

Prefabricated steel, heat-circulating fireplaces are designed to draw air in from the room, heat it, and return warmed air to the room. They are manufactured in several designs, Figure 17-21. These units require framing or masonry enclosures. See Figure 17-19A. Vents are visible at the top and bottom of the unit.

Fireplace inserts are also efficient in circulating warmed air. These units are designed for existing masonry fireplaces. Figure 17-22 shows a masonry fireplace that has a metal insert with glass doors and vents.

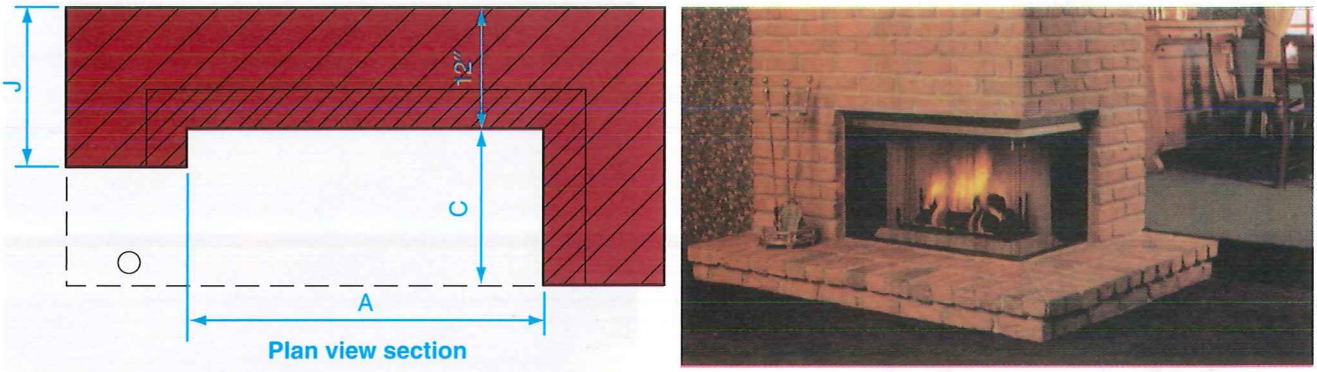
Stoves

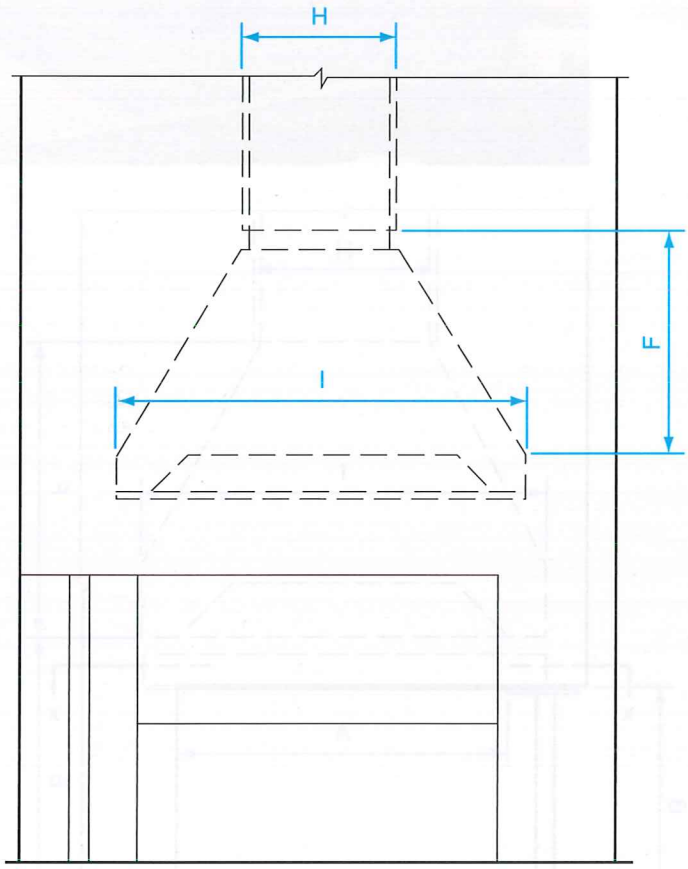
Wood- or coal-burning stoves generally produce more usable heat than fireplaces. They are frequently located in such a manner that heat is radiated from all sides. They are typically used as local sources of heat, rather than a total heating system, Figure 17-23. The heating efficiency of stoves varies greatly among manufacturers and models.

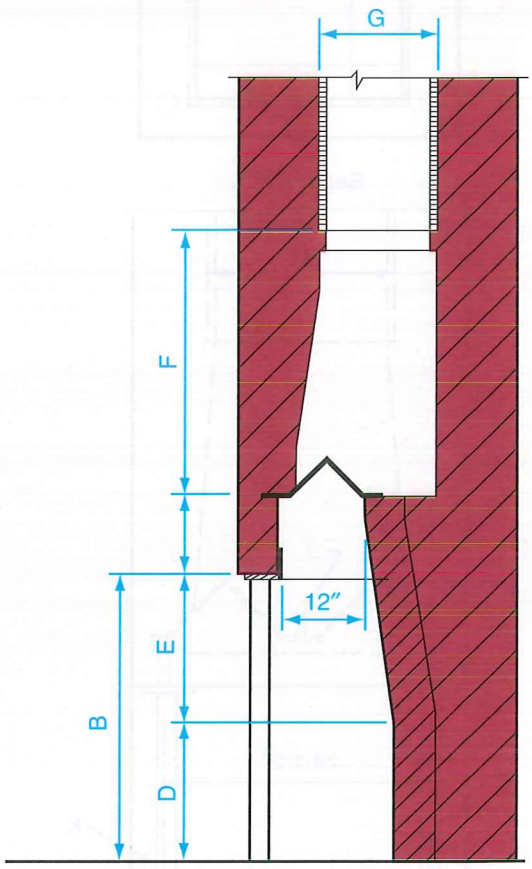
There are two main types of stoves: radiant stoves and circulating stoves. Both types produce ***radiant heat,*** which is heat that passes through the air with no assistance from air flow. A ***radiant stove*** warms a room only through radiant heat. However, a ***circulating stove*** uses air flow, as well as radiant heat, to distribute warmth throughout a room.

A circulating stove has an outer jacket to facilitate air movement. The jacket is designed to draw cold air in, warm it, and return warmed air to the room. Some stoves have a small blower to assist the air movement, others produce air flow without mechanical assistance. Circulated air flow provides more even heat than is possible with a radiant stove. Circulating stoves are safer and may be placed closer to combustible material than radiant stoves because of their lower surface temperature, Figure 17-24.

Stoves are frequently classified according to their heating efficiency. Low-efficiency stoves range from 20% to 30% efficient. Examples of low-efficiency stoves include simple box stoves, Franklin stoves, pot belly stoves, and some parlor stoves. Medium-efficiency stoves range from 35% to 50% efficient. They provide better combustion and have less air leakage into the stove. Most





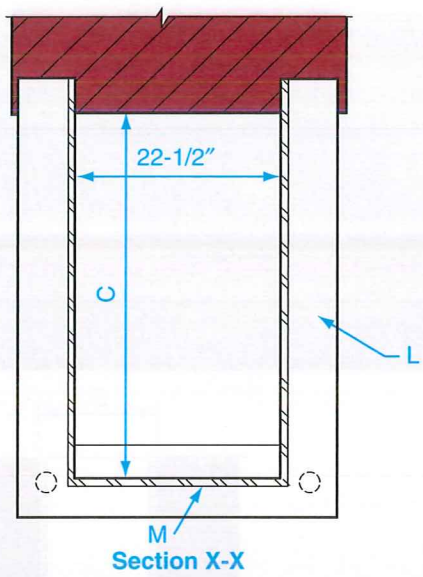


Design data for two-face adjacent fireplaces

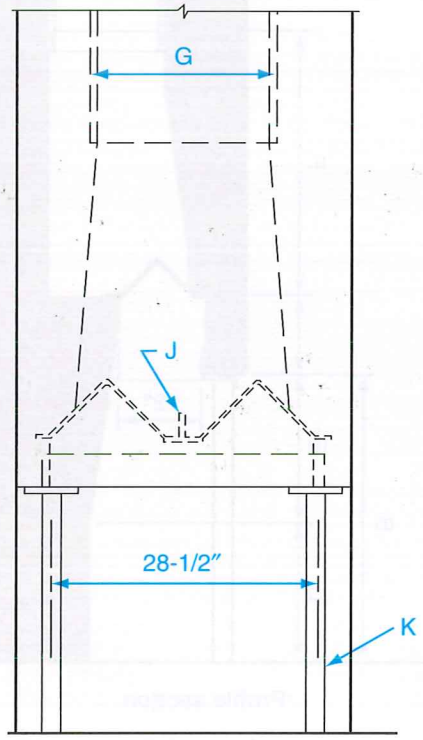
A	B	C	D	E	F	Old flue		Round	Mod. flue		I	J	Corner post height
						G	H		G	H			
28	26-1/2	16	14	20	29-1/4	13	13	12	12	12	36	16	26-1/2
32	26-1/2	16	14	20	32	13	13	12	12	16	40	16	26-1/2
36	26-1/2	16	14	20	35	13	13	12	12	16	44	16	26-1/2
40	29	16	14	20	35	13	18	15	16	16	48	16	29
48	29	20	14	24	43	13	18	15	16	16	56	20	29
54	29	20	14	23	45	13	18	15	16	16	62	20	29
60	29	20	14	23	51	13	18	15	16	20	68	20	29

Dimensions are in inches.
Flue sizes are for a chimney height of at least 14′–0″.

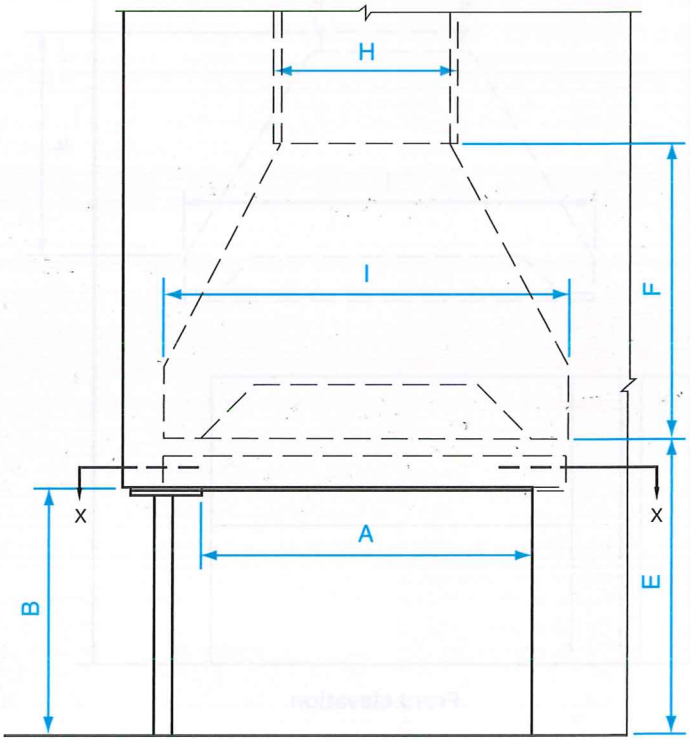
Figure 17-17. Design specifications for two-face adjacent fireplaces. (Superior Fireplace Company)



Section X-X



Front elevation



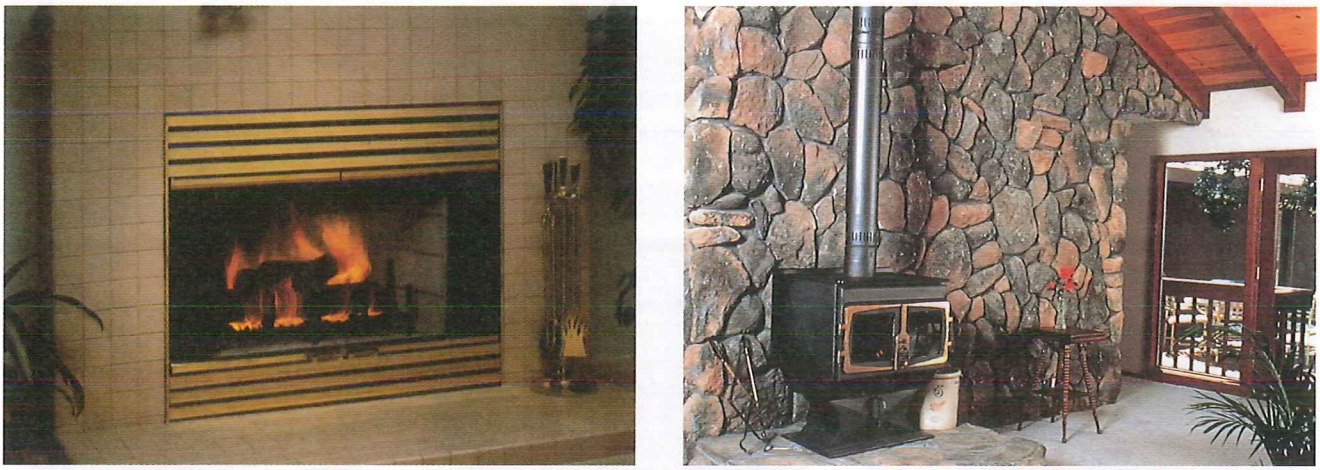
Profile elevation

Design data for three-face fireplaces

A	B	C	E	F	Old flue size		Round	New modular flue size		I	Steel tee	Post height	Angle 2 req'd.	Special welding tee
					G	H		G	H		J	K	L	M
28	26-1/2	32	32	24	18	18	18	16	20	36	35	26-1/2	36	34
32	26-1/2	36	32	27	18	18	18	20	20	40	39	26-1/2	40	34
36	26-1/2	40	32	32	18	18	18	20	20	44	43	26-1/2	44	34
40	26-1/2	44	32	35	18	18	18	20	20	48	47	26-1/2	48	34
48	26-1/2	52	32	35	20	20	20	20	24	56	55	26-1/2	56	34

Dimensions are in inches.
Flue sizes are for a chimney height of at least 14′–0″.

Figure 17-18. Design specifications for three-face fireplaces. (Superior Fireplace Company)



A B

Figure 17-19. Prefabricated metal fireplaces can be wall mounted, enclosed in masonry, or freestanding. A—Enclosed in masonry. (Superior Fireplace Company) B—Freestanding. (Stone Products Corporation)

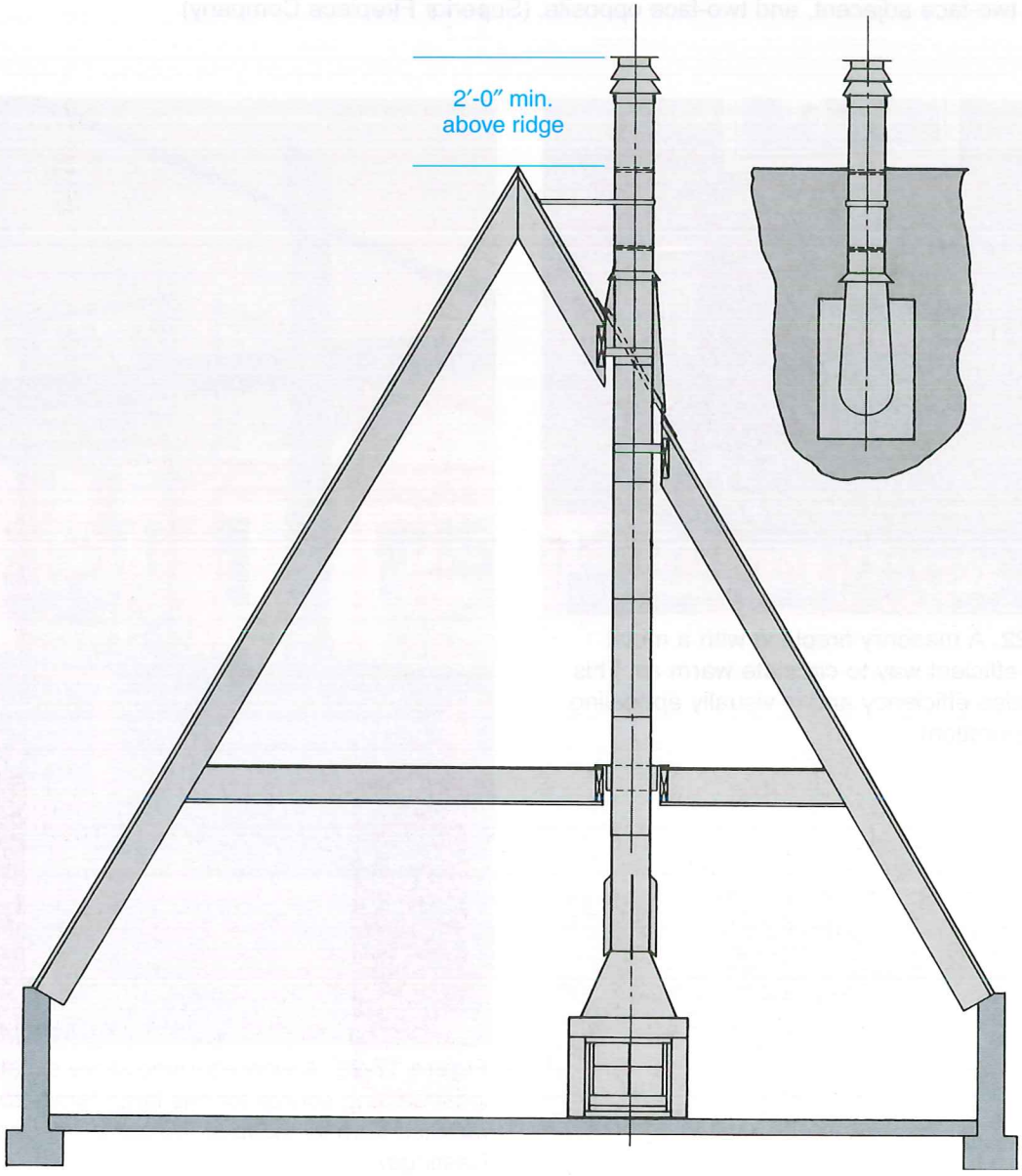


Figure 17-20. A typical installation of a prefabricated metal fireplace in a cottage.

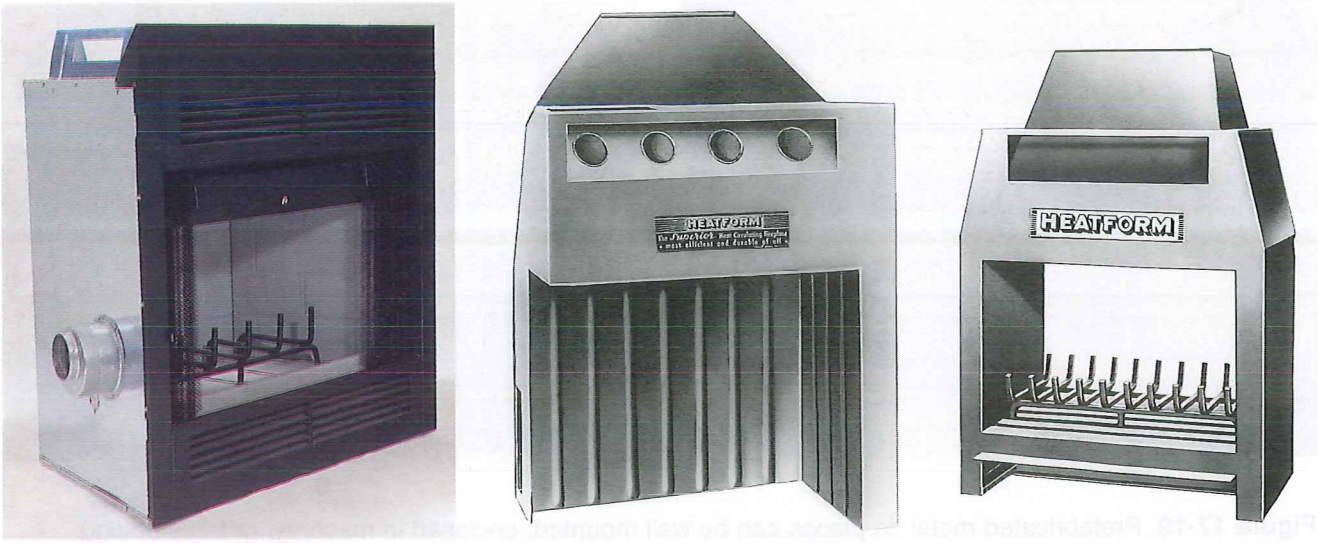


Figure 17-21. Three common designs of prefabricated steel, heat-circulating fireplaces. From left to right: single-face, two-face adjacent, and two-face opposite. (Superior Fireplace Company)

Figure 17-22. A masonry fireplace with a metal insert is an efficient way to circulate warm air. This model provides efficiency and is visually appealing. (Eneco Corporation)

Figure 17-23. A wood-burning stove suitable as a local heating source for this large family room. Heat radiates from all sides of the stove. (Vermont Castings)

Figure 17-24. Circulating stoves may be placed closer to combustible materials than radiant stoves. This wood-burning stove combines function with beauty. (Heatilator, Inc.)

include a device to ensure a constant burning rate. High-efficiency stoves are over 50% efficient. They include all of the features of the medium-efficiency stoves, but also use baffles, long smoke paths, and heat exchange devices to increase heat output, Figure 17-25.

A stove may be located in front or inside of an existing fireplace, Figure 17-26. When the stove is positioned in front of the fireplace, the opening should be covered with sheet metal to reflect the heat back into the room. It is very important to follow the manufacturer's installation instructions as well as the local code requirements when installing a stove.

Figure 17-25. This is a high-efficiency stove that is made of cast iron and has large glass doors to view the fire. Note the fire-resistant materials behind and beneath the stove. (Vermont Castings)

Figure 17-26. This stove, which sits inside an existing masonry fireplace, is classically styled and blends nicely with the atmosphere of the room. (Vermont Castings)

Internet Resources

www.ansi.org
American National Standards Institute

www.architectural-ornament.com
Architectural Ornament, Inc., manufacturer of polyurethane architectural molding

www.boralbricks.com
Boral Bricks

www.concretehomes.com
Portland Cement Association

www.epa.gov
US Environmental Protection Agency

www.ibhs.org
Institute for Business and Home Safety

www.martinindustries.com
Martin Industries, Inc., manufacturer of Martin fireplaces

www.meltonclassics.com
Melton Classics, Inc., a producer of millwork

www.napoleon.on.ca
Napoleon, a manufacturer of fireplaces, stoves, and inserts

www.sweets.com
Sweets Catalog File

Review Questions – Chapter 17

Write your answers on a separate sheet of paper. Do not write in this book.

1. List the five general types of fireplaces.
2. The part of the fireplace designed to protect the floor from sparks is the _____.
3. If the fire chamber is too shallow, what may happen?
4. The _____ deflects cold air flowing down the chimney into the rising warm air.
5. The area in the fireplace just above the smoke shelf and damper is called the _____.
6. A rule of thumb to follow in selecting the proper flue size is to choose a flue that has at least _____ the sectional area of the fireplace opening.
7. Increasing the flue height will _____ the draft.
8. Most codes require that the flue extend at least _____ above the highest point of the roof.
9. Why will a chimney placed within the house function better than one on an outside wall?
10. Allow a minimum clearance of _____ between the chimney and framing.
11. The purpose of a saddle or cricket is to _____.
12. The most common type of lintel used above the openings of fireplaces is _____.
13. A fireplace that has only one front opening is known as a _____.
14. A fireplace that is open on the front and one side (not the back) is a _____.
15. A type of fireplace (not stove) that requires no masonry is the _____.
16. Wood- or coal-burning stoves are ordinarily used as _____ sources of heat.
17. Name the two main types of stoves.
18. Name three features that are unique to a high efficiency stove.

Suggested Activities

1. Select a residential plan that has a fireplace. Draw the fireplace details and dimension the drawings.
2. Using CADD, design a fireplace following the principles outlined in this chapter. Draw the plan view and front elevation of the fireplace. Build a scale model of a fireplace. Describe the materials to be used in the actual fireplace.
3. Collect literature and materials commonly used in fireplaces and bring to class. Display the literature and materials and describe them in class.
4. Locate a residence under construction that has a fireplace. Obtain permission to enter the construction site. Measure the opening and depth of the fireplace. Sketch the fireplace. Bring the sketch to class and be prepared to discuss the construction techniques used.
5. Visit your local building department and secure local code restrictions about the installation of wood burning stoves. Summarize the main points in class.
6. Using CADD, draw the plan view and profile in section of a single-face fireplace that has a opening width of 28".