

ZERO CLEARANCE FIREPLACES

With masons becoming harder to find, many builders are turning to factory-built, or prefabricated, fireplaces and chimneys. These new technologies have made the installation of fireplaces easy enough for even a novice builder.

Factory-built fireplaces have been in use for over 25 years now, and most have stood the test of time. They have been modified in recent years to improve some of their basic components, but in general their basic design has stayed the same. Each factory-built fireplace consists of a fireplace unit and a chimney system.

It comes Preassembled

The fireplace unit comes complete with a firebox, damper and smoke chamber, all preassembled. The units come in various sizes, and some manufacturers have recently enlarged the front opening to a full 49 inches. This trend is in response to the public's desire for larger fireplaces. There are new models on the market that are open on two sides, so they can have openings in back-to-back rooms.

There are two different designs used to ensure safe operation. In the air-cooled type, a channel of air surrounds the firebox, and circulates by natural convection. This keeps the outside temperature of the unit at safe levels. The alternate method is to use an insulating material. The insulation material will vary depending upon where it is being used. One manufacturer (Heatiator, Mt. Pleasant, Iowa) uses fiberglass insulation in some of the side areas, mineral wool in the rear, and rock wool in the top, or hottest area.

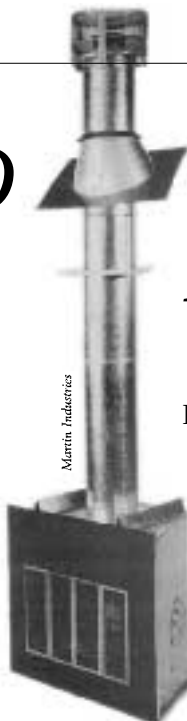
In both of these methods, the end result is a firebox that can be placed directly on combustible material, and is guaranteed not to ignite it. The units are called "zero-clearance" because no clearance is needed between the fireplace unit and the surrounding structure. When the design of the unit requires an airspace (and often it does) the manufacturer builds it into the shell of the unit itself.

Whether installing the air-cooled or insulated type, it's important to select fireplaces with a UL listing. There are a lot of testing agencies, but only UL is nationally recognized. If there is a failure in the fireplace, and the unit is tested by an agency not recognized by the local municipality, you will be personally liable. UL standards are rigorous. In the case of the fireplace unit, the outside temperature can't exceed 90° Fahrenheit over the ambient temperature of the room.

One of the weakest parts of early factory-built fireplace systems was the damper. In fact, in over 80 percent of the five- to six-hundred systems I've inspected for problems, the damper was at fault. But most of the better models have replaced the old-style dampers, which operated on a pull-chain and weighted damper, with a spring-loaded damper mechanism. With the old damper, a homeowner could think they had closed the damper, but really had not. With the new damper, this can't happen. The average masonry damper will allow 28 cfm of air infiltration, while the factory-built units only allow about half of that.

Another big difference in the factory-built fireplace is that it has a modified smoke chamber designed for maximum efficiency. The smoke shelf is eliminated, and this makes the flow of gases much smoother. This, coupled with the perfect shape of the smoke chamber, and very smooth surfaces in this area, allows these units to function better than even the best masonry fireplaces. It is very rare that a complaint comes into our office about a factory-built fireplace sending smoke into the house.

Another advantage to using prefab fireplaces is that they open the door to different aesthetic treatments of the fireplace finish. Since this facing doesn't serve any real protective function, there are lots of aesthetic options to choose from, including a multitude of ceramic tile designs. Inside the firebox, the traditional look of brickwork still appeals to consumers, so several units made today are available with firebrick lining. These vary in thickness. In the field we have noticed cracked firebrick panels in many units. This is usually the result of the user throwing a large log against the rear wall. These brick liners can be replaced easily, so I don't feel it is a major problem.

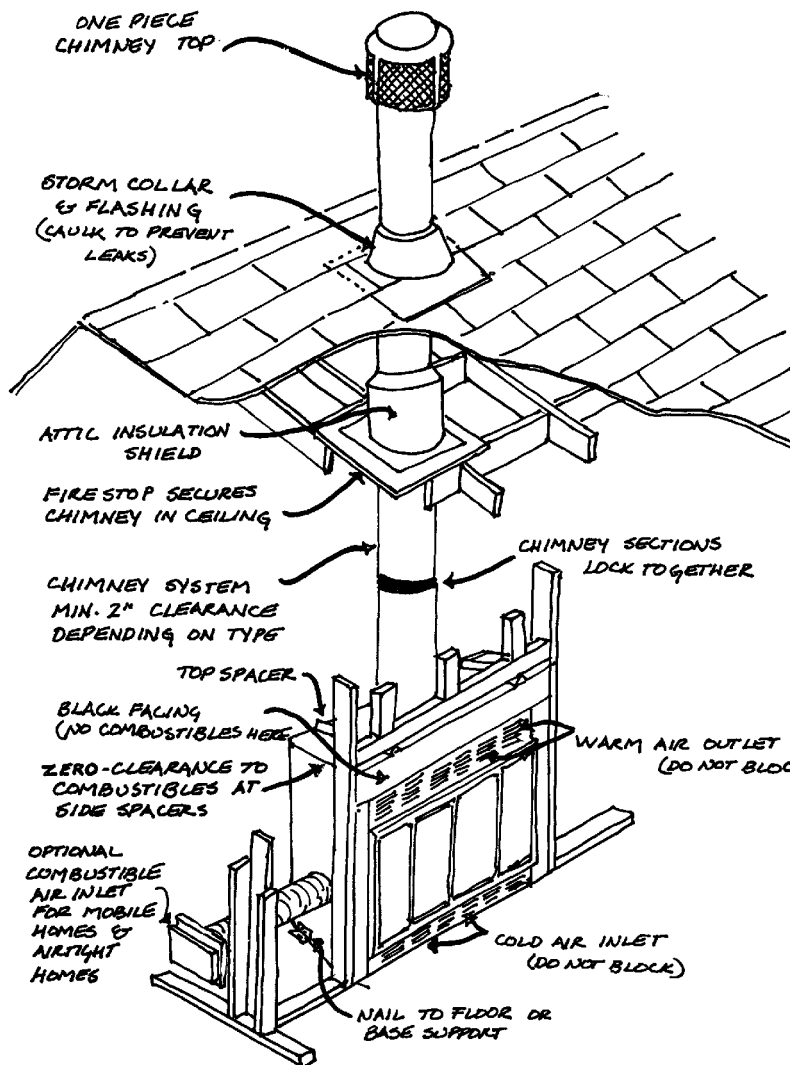


In many ways prefab units outperform the real thing, and they're a lot cheaper. But for safety and durability—follow the instructions!

by Gary Menia

Install manufactured fireplaces as directed—from firebox to chimney top—since they are designed and tested as engineered units. Prefabs have established a good track record for safety and durability if installed to specs and not overfired by the homeowner.

TYPICAL ZERO-CLEARANCE INSTALLATION



This is a schematic of a typical prefab fireplace. Each should be installed in strict accordance with the instructions that accompany the unit. For a safe installation, note: chimney is not zero-clearance (see specs for particular unit); insulation should not be installed directly to chimney (use insulation shield), air inlets and outlets should not be blocked. Also instruct homeowner not to burn coal or light bonfires in fireplace.

Another major benefit of factory-built fireplaces is that the cost of installing them is usually about one-half the cost of installing a masonry fireplace. This includes labor and materials. The factory-built unit can be installed in from two to four hours for the wood-burning system, and the housing can be erected in a day by one person. Compare this with four days for a mason and a helper, and you can see the obvious cost advantage of the prefab fireplace.

Other advantages are that the units take up less space than the same size masonry unit, and weigh considerably less. There is generally no need to increase the floor supports (an additional reason for low installation costs).

The Chimney

The second part of the system is the chimney. Because it vents the wood-burning smoke, it is the most critical—and can be the most hazardous—part of the factory-built fireplace. There are three types of chimney systems available.

Packed insulation. This type usually consists of a stainless-steel inner liner, an insulation material—either rock wool or ceramic material—and an outer steel or stainless-steel covering. This is a good system, although there have been many reported cases of the inner stainless-steel warping due to overfiring or a chimney fire. This warpage is a problem because the inner layer is a structural component of the chimney system and can lead to eventual failure.

Thermal-syphoning. This type of chimney brings air into the chimney system either from the top, or from the air intakes, and circulates this air through the chimney. This cools the outside of the chimney and allows safe exhausting of the smoke. The problem with this type is that you are intentionally cooling the inner surface of the chimney stack, and this will increase soot and creosote build-up. In my opinion, this is the least desirable of all the chimney systems.

Packed insulation and thermal-syphoning. A combination of the first two, this type of chimney uses a blanket of ceramic insulation, and an air space around it. This is then enclosed in a metal housing that is stainless steel on the inside, and galvanized steel on the outside. The advantage of this type of chimney is that the insulation is not packed firmly in place and will allow the inner liner to expand as it gets hotter.

The problem of expansion of the inner liner is something that needs more attention. Currently the most common grade of stainless steel used is the 430 grade. The growing trend, however, is to use a more expensive grade of stainless steel, types 304 or 316. This will, of course, increase the costs of the chimney, but will prevent much of the distortion of the inner liner. An added benefit is that the higher grade is more resistant to corrosive attacks by the acids in the soot deposited in the chimney.

Whichever type of chimney system you install, it is essential to follow the instructions. I referred earlier to the strict testing of each fireplace unit, and this is also true with the chimney system. UL-listed chimneys must comply with the UL-103 standard. In fact, the standards that the factory-built chimneys must meet are too severe for most masonry chimneys in use. The test standard includes a chimney-fire test, an acid test, and a rapid increase in



Manufactured fireplaces can get dressed up with traditional masonry faces. This unit from Martin Industries has a decorative brick lining in the firebox and marble trimmings on the face.

temperature. The insides of the chimneys are brushed two hundred times with a metal brush, and then inspected to make sure there is no evidence of scratching or disjoining of the chimney.

Although the fireplace units are designed for zero-clearance, none of these chimneys are intended to be installed with no clearance. They require a 2-inch air space between the outside of the chimney and any combustible materials. There are also fire-stopping and support requirements. This may sound complicated, but the average craftsman can install his first fireplace and chimney in less than a day. The most important thing to remember is to follow the instructions that come with the unit. In general, these are easy to read and follow. UL tests the units fully-assembled, and although the chimney has to meet different standards than the fireplace insert, the UL-listing assures the installer that both have met the test. If installed as designed they will perform as tested.

Safety

As a mason, I have long felt that the safest type of fireplace had to be an all-brick unit. In fact, several studies point to the opposite conclusion. A Consumer Product Safety Commission report indicates that when there is a chimney fire, there is two-and-one-half times as great a danger in a masonry chimney. The masonry chimney was more likely to lead to a structural fire, due to heat being transferred through the uninsulated brickwork.

One safety-related advantage of factory-built fireplaces is that they can be inspected much more easily than masonry systems. The chimney is usually installed in a wooden chase, and then covered at the top. I have inspected chimneys for proper clearances, and all I had to do was remove the top flashing and lower a trouble light. This makes periodic inspections much more reliable than trying to look down a masonry chimney.

The only safety problems I have found with factory-built fireplaces are those due to poor installation or misuse by the homeowner.

Poor installation. The instructions tell you how to install the basic unit. Despite this, installers frequently fail to leave enough of an airspace between the chimney and the structure.

Another common, and serious, error

is to insulate right up to the chimney. Most of the chimney systems are tested with some type of attic shield that is intended to keep the insulation from coming in contact with the chimney. The air space is needed to ensure the chimney can cool. This is also true with a masonry chimney, but because of the extra mass, the masonry chimney will absorb much of this excess heat.

An additional problem area is the flashing and storm collar. The chimney is generally centered at the top using a spacer and flashing. This is then covered with a thin metal strip that wraps around the chimney pipe. Once tightened down, this is supposed to be watertight, but often it's not. I suggest clear caulk at this point as insurance.

A question that often arises is "Can one combine various types of systems?" I always respond that in order to maintain the UL-listing, the system must be installed exactly as tested. This means that if you buy one type of prefab, you must use the chimney made by the same manufacturer. If you don't you are liable. You must consider this when doing a renovation or retrofit of an older home. The factory-built fireplace can't be installed using an existing masonry chimney as a venting system. I know of no factory-built fireplace listed for use with a masonry chimney.

Misuse. Homeowners will often install fireplace inserts in an air-circulating type of firebox. This blocks the air intakes, making the chance of a fire very high. The firebox can't dissipate the heat generated by the insert. The homeowner has modified the fireplace beyond its intended use.

Another violation of the intended use is to build too large a fire. I wouldn't advise installing a prefab unit for the homeowner who will build large fires on a daily basis. The limits of the prefabs stem from the limits of the materials used to make them. It is conceivable that you could build too hot a fire and actually exceed the temperature limits that were tested. This would take a big fire, but some people build them like that.

Durability

I have always been concerned about the durability of factory-built fireplaces. But experience in the field has shown me that these units will last a very long time if maintained properly. The firebox unit itself will retain its

insulation almost indefinitely, and shouldn't deteriorate from rusting. The chimney system will last at least 25 years, and this can easily be extended to twice that with proper chimney-sweeping. I have seen over a thousand of these in the field (and fully inspected over half of them), and haven't found any that were so deteriorated that they had to be replaced.

There are potential problems if coal is burned in the fireplace, or if you live near the ocean. The salt and resulting chlorides in the air will deteriorate any metal, even the metal chimney liners. These cases are rare, but they do present some limits on where and when to use the prefabs.

The Mason in Me...

The mason in me has believed for a long time that masonry fireplaces are "better" than the prefabricated variety. But as a chimney sweep, I've seen quite a few of the factory-built type in operation. I've been surprised at how well they work, and how well they stand up to time. ■

Gary Menia has been a mason contractor for nineteen years. He has been in the solid fuel business for 14 years—sweeping chimneys, and installing woodstoves and prefabricated fireplaces. His business is located in Slingerlands, N.Y.