

Wood Burning Inserts for Fireplaces

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The idea of inserts came about for three reasons. First, research showed that conventional fireplaces were very inefficient and, therefore, not an effective heat source. Second, since the OPEC oil embargo of 1973, Americans have become more aware of energy. Third, because a high percentage of American homes already have these inefficient fireplaces, people began searching for a solution.

Generally, inserts greatly improve heat generation efficiency in comparison to the conventional brick or stone fireplace. Fireplaces are 10 percent efficient at best, and as the outside temperature drops, their efficiency declines. On the other hand, a good insert can operate at 40 percent efficiency if it is fired properly.

Because the cost of inserts ranges from \$800 to \$1500, consumers wonder whether putting an insert into their fireplace is a wise economic choice. Of course, this depends on how often the fireplace (insert) is used. If you only use your fireplace occasionally and not necessarily as a heat source, then the purchase of an insert is not a good choice. On the other hand, if you plan to burn one or more cords of wood per year for the heat, then buying the insert may be wise. The more wood you plan on burning each year for heat, the shorter the payback period will be.

Types of inserts

There are three types of inserts. They are single wall, double wall and triple wall.

The most common type is the double-wall insert. This insert consists of two metal boxes, one inside the other, separated by an air-passageway. The inside box, the firebox, is where the fire is built. The open area between the inside box and the outside box serves as the heat exchanger. Air is circulated (usually with a fan) in the heat exchanger. The air intake is usually placed low (near the floor) in the front of the insert. The fan blows the air around the firebox and out a vent near the top front of the insert.

Single-wall inserts are less expensive than double-wall inserts and probably less efficient. A single-wall inset must be connected directly to the chimney. If smoke from a single-wall unit gets in the fireplace, it will be blown into the house.

Triple-wall inserts are probably slightly more efficient than double wall. Because of the third wall, these inserts are also cooler on their exterior surface. Thus, they permit a lower clearance to combustible materials such as wood moldings or trim.

Other features

When you shop for an insert, be aware of its features.

- Most better inserts have been tested by an independent testing laboratory and will be so labeled. Two of the more common labs are U.L. and I.C.B.O.
- Most inserts vent the insert firebox directly into the firebox of the fireplace. The designers are counting on the heat of the smoke and exhaust gases to carry these materials out of the fireplace firebox and up the chimney. In this case, it is best to have the insert vent near the top in a position as close to the chimney as possible. Be sure to remove the fireplace damper or wire it open before putting the insert in the fireplace.
- In the case of single-wall inserts, the vent must be connected directly to the chimney to keep smoke from spilling into the room. This is done by connecting a piece of stovepipe to the inset vent that projects beyond the chimney damper a minimum of 6 to 10 inches. The stovepipe passes through a sheetmetal flue shield that is attached to the bottom of the chimney damper. This is the best way to vent an insert; however, it is not frequently implemented in double-wall and triple-wall inserts because of the added expense.
- Research shows that outside combustion air systems do not increase the efficiency of a wood burning stove or fireplace insert. You will probably do as well or better without an outside combustion air system.
- Good inserts should have a heat exchanger system in which a fan blows air around the insert firebox and into the room. For safety's sake, it is good to know that the air blown into the room can reach temperatures as high as 400 degrees F.

When shopping for an insert, note how noisy the fans are. Also, note that some blowers have three fan speeds, while others operate at single speed. Inserts without power blowers operate at diminished efficiency. Ask about the warranty (if any) of the blower system, the availability of new blower parts (fan assemblies for example), costs and installation.

Some inserts use three walls of the firebox to remove heat (bottom, backside and top). Others, said to be more efficient, remove heat from five sides of the firebox (besides the bottom, backside and top, two end walls are added).

- The firebox of better inserts is made of 3/16- to 1/4-inch sheet steel. The firebox should be partially lined with firebrick and the insert, like modern wood stoves, should be tightly constructed. The overall weight of an insert (as well as a wood stove) is often taken as one indicator of quality. Heavier inserts with similarly sized (volume) fireboxes should be considered a positive feature.
- Doors on inserts vary greatly. Solid, cast iron doors are standard. Most importantly, they should seal tightly. This is often accomplished with a replaceable asbestos rope that fits into a slot around the door and acts as a gasket. Some manufacturers offer doors made of alloy aluminum, or brass at added cost. For aesthetic purposes, doors with glass inserts are available as an added cost option. The glass is a special type to withstand the heat.

When shopping, you might ask about the possibility of the glass smoking up and how to handle the problem if the glass in the doors breaks.

- Before going out to shop for an insert, measure your fireplace firebox size in inches. Measure the height and width of the firebox at the front face as well as at the rear wall. Also measure the depth of the firebox.
- Many manufacturers offer three sizes of inserts, while others offer only one, designed to fit most fireplaces. The cubic volume of the insert firebox is important, and more specifically, the bottom area of the firebox. For most homes where fireplace inserts will be used as a primary or secondary source of heat, one of the smaller models should be adequate. Don't let the idea that bigger is better play a part in your decision. A smaller firebox will operate at a higher level of efficiency, even though it may require a little more attention.
- Many retailers will deliver and install a new insert for less than \$100 if there is no special venting required (venting to the chimney through a flue shield). If venting is required, costs may be as high as \$200.
- The heating capacity of inserts is usually specified in terms of hourly British thermal units (Btu) output or in the number of square feet of living space the insert will heat. Neither of these measures is accurate. The Btu output is a function of the number of pounds of wood burned per hour, the moisture content of the wood, the efficiency of the insert, and the efficiency of operation. Regardless of the heat output, an insert cannot be counted on to uniformly heat a home because of the problem of heat distribution to rooms remote from the heat source (insert). An insert will no doubt heat the room in which it is located, and some heat will diffuse into immediately adjacent rooms. But even in adjacent rooms there will be a considerable heat gradient. For example, the temperature 1 foot from the insert may well be too hot, while 10 to 12 feet from the insert air would be comfortable, and in the adjacent rooms, air could be cooler than desirable.

With all these complexities, the best advice is to "think small rather than large."

- Manufacturers now sell inserts with a new device called a catalytic combustor. For further information on the catalytic combustor, see MU publication [G1733](#).

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