Are Conventional Wood Fireplaces Efficient?

Conventional wood fireplaces are extremely inefficient, averaging between -10% and +10% energy efficiency (by comparison, the gas and oil furnaces sold today operate at better than 80% efficiency). In the best case scenario, only a small amount of heat is provided to the house. Unfortunately, most fireplaces fall into the worst case side of the equation, causing an overall heat loss. Tests have demonstrated that, in most instances, on cold winter days the use of conventional fireplaces will actually result in an increase in fuel consumption for heating.

One of the primary reasons for this inefficiency is that a large amount of heated household air flows through the fireplace and up the chimney when a fire is blazing. A conventional wood fireplace will use up to 10 times the amount of air required by a typical oil or gas furnace. And only a small amount of the air drawn into a fireplace is actually used for combustion; the rest, known as excess or “tramp” air, escapes to the outdoors.

This flow of tramp air has two consequences. First of all, it draws heat that is generated by the fire up the chimney, rather than transferring it to the house. Second, it results in a high rate of air exchange in the house, which among other things causes the furnace or other primary heat source to work overtime to heat more air. A roaring fireplace can result in all the air in a house being exhausted up the chimney as much as 1.4 times each hour the fireplace is in use. As discussed below, this can disrupt the operation of a new or energy-efficient home, which would typically have an air exchange rate of about 0.3-0.4 air changes per hour, and can lead to potentially catastrophic situations.

Environmental issues

Many homeowners use their conventional fireplaces because they think this is less environmentally harmful than heating with oil, gas or electricity. Not so! Wood combustion in these fireplaces results in high levels of emissions, contributing to air pollution problems outside the home, as well as to indoor air quality problems.

Again, there are a number of reasons for this. First, the design of a conventional fireplace does not promote complete combustion of the wood. As the fire burns, complex and volatile combustion products are being boiled or distilled out of the wood. These products, in the form of smoke, often enter the chimney before they can be ignited and burned. Some may condense in the chimney, forming creosote, which in turn can cause chimney fires. However, most escape to the outdoors where they are a significant cause of air pollution. The incomplete combustion products can even spill into the home, causing serious indoor air quality problems.

What to do?

Until recently, there were no simple solutions that could make a conventional wood fireplace work truly efficiently, safely and with low pollutant emissions. Most remedial actions address only minor or isolated aspects of the problem. At best, measures such as providing an outside air supply or installing glass doors or heat exchangers will increase efficiency to the 10 to 20% level. They can also lead to their own set of problems. For example, depending on outdoor conditions, conventional fireplaces can sometimes attempt to use a large outside-air supply duct as if it were a chimney, which can cause a fire.

One partial solution is to burn artificial fire logs, which can minimize air demand and reduce pollutant emissions and the chances of combustion gases being spilled into the house. On the down side, artificial logs burn longer, but at a lower heat rate and can be costly.

By far the best solution is to convert your existing conventional fireplace into an efficient, clean-burning advanced combustion unit. These new wood fireplaces operate safely, efficiently, produce a minimal amount of emissions and can reduce energy bills.