Fireplaces

By Dan Phillips

In East Texas, essentially, we have a few weeks of winter, and then we have summer. Evidently we like this arrangement, because we are still here, and many of us wouldn't even think of leaving for a more temperate climate. But living through the eleven and a half months of summer makes most East Texans a bit surly, and by the time our coveted winter arrives, we are poised with an ax, fireplace tongs, and toddies. We are ready for some serious after-dinner atmosphere. After all, we don't get to stoke up our fireplaces for four months straight like our northern neighbors.

But since we don't use our fireplaces for extended periods, we East Texans can be just a bit naïve about just how wasteful they are. (Of course we will never admit that Yankees have pre-empted us in fireplace savvy.) The simple fact is that the heating efficiency of fireplaces is dismal. The efficiency of the average fireplace ranges from –10% to +10%--meaning that if you want heat, a fireplace is not your answer. A sweater is vastly more efficient, albeit not quite as romantic on a cold winter night.

If you're a seasoned old dog, you know that a chimney must "draw." Otherwise, you get smoke in your living room. When a chimney draws properly it pulls air from your living room, across the fireplace and provides air for combustion. Once there is combustion, then the hot air from the fire goes pell-mell up the chimney and into the atmosphere. The amount of air required for satisfactory performance is called "excess" air, which comes from your living room.

According to Skip Hayden, head of Energy Conservation Technology at the Combustion and Carbonization Research Laboratory in Canada, a typical gas furnace requires approximately 50% excess air for efficient performance. A typical masonry fireplace requires 1500% excess air, 16 times the theoretical requirement and more than 10 times what a fossil fuel furnace needs. So when you fire up your fireplace, and have the furnace running at the same time, your fireplace essentially sucks all the heated air from your house and sends it whisking up your chimney, resulting in a cooler house and more frequent cycling of your furnace.

Take the time to observe a burning log in your fireplace sometime. You will notice that there is flame coming from only a small portion of the log, but the other parts of the log are nevertheless "smoking." This smoke consists of gasses that have not completely combusted, and other vapors that are simply being boiled out of the wood. Much of this gas stew is carbon monoxide and volatile organic compounds, and is gleefully flying up the chimney and into the atmosphere. It could be burnt, but never has the chance because the draw on the chimney is strong indeed. So, along with these nasty gasses goes the ambient warm air in your house.

Now, let's say that you let the fire die down to a glow before going to bed, and your furnace cycles on. With the reduced activity of your fireplace and chimney, your furnace

can actually create a negative pressure, drawing in the nasty gasses to your living space—things that we normally don't like to breathe, like carbon monoxide. A nice precaution would be to close adjoining doors to the fireplace room before hitting the sack.

Fireplaces are typically located on the outside wall—a maintenance and architectural expedient—so that half of whatever heat the house might otherwise absorb from the thermal mass of the chimney is radiated to the outside. (Now would be a good time to dig out our notes from high school physics.)

But it is unlikely any of us will be replacing our fireplaces—especially since we only use them a small percentage of the year. But it remains that a chimney represents a one-square-foot hole in your roof. Even with the damper closed, your chimney will leak air all year long.

One solution is to install glass doors in front of your fireplace, and seal them to prevent air leakage, and then provide combustion air to the fireplace from the outside of your house. Such glass doors are tempered glass, and so will not radiate heat like normal glass, but you will still have the visual romance, and the occasional heat radiated when you open the doors for stoking.

Another solution is to use artificial fire logs instead of cordwood. "Manufactured fire logs," according to Hayden, "particularly those with a paraffin base, can minimize problems by lowering the high air demand, reducing pollutant emissions by up to 80%, and lessening the chances of combustion gas spillage into the house." The entire surface of the log burns, including the volatiles that on a normal log would simply not be ignited and burned. However, artificial logs provide almost no heat, can be costly, and reduce romance to intellectual dimensions only—that is, no crackling.

If you are building a new house, take the time to research this issue. Technology has developed some amazing systems, including fireplaces with "catalytic" converters, which burn all the volatile organic compounds before going up the chimney—good for us, good for the atmosphere, and efficient to the extreme. In the north, whole houses are heated by one energy efficient fire box.

If you would like a good dose of the technical information on fireplaces, go to http://www.hearth.com/what/more/skip.html, and read Mr. Hayden's article. You may or may not understand all of what he has to say, but the subtext will be jarring.

Another way to manage all this is simply skip the fire altogether, and go outside and split some firewood. Splitting oak firewood with an ax for an hour is romantic and will heat you up better than any fire possibly could. And you can still have a toddie afterward.