

Heating Efficiency

High efficiency heating systems have become popular because they save fuel and, one would suppose, save money. But what do they mean when they talk about efficiency? What is furnace efficiency? Actually, there are two ways to measure it - steady state and seasonal.

Steady State Efficiency

Steady state efficiency refers to how much usable heat is created when a furnace is running. Conventional gas and oil furnaces have steady state efficiencies of roughly eighty percent. When the furnace is on, twenty percent of the heat that is generated goes up the chimney while the remaining eighty percent is transferred through a component called a heat exchanger and stays in the house. This is the heat that travels through the ductwork and ends up coming out of the registers in each room.

But even in the dead of winter, furnaces are not on all of the time. They cycle on as the thermostat calls for heat, and off when the thermostat is satisfied. During start-up and cool down, the furnace is not operating as efficiently.

Also, when the furnace is not on, heat from inside the house escapes up the chimney flue the same way that heat would escape from an unused fireplace, if the damper was left open.

Seasonal Efficiency

If you add these off-cycle losses to the steady state losses you end up with the seasonal efficiency. Seasonal efficiencies for conventional gas and oil furnaces are about sixty to sixty-five percent.

Therefore, if you buy a thousand dollars worth of gas or oil over the course of a winter and you have a conventional furnace, only about \$600 to \$650 worth of the fuel will be used to heat your house and rest will be wasted.

But what about mid and high efficiency furnaces? How efficient are they, and what makes them so efficient?

Mid-efficiency Furnaces

Mid-efficiency furnaces have a seasonal efficiency of about eighty percent. They achieve this by cutting off-cycle losses. Mid-efficiency gas furnaces do not have a continuously running pilot. It is shut off when the furnace is idle. Also, to prevent heat from escaping up the chimney when the furnace is not on, some manufacturers install a motorized damper in the exhaust flue to close it during idle periods. (Other manufacturers use other approaches to accomplish the same thing.)

High Efficiency Furnaces

High efficiency furnaces employ similar techniques to reduce off-cycle loss, but go further to improve the steady state efficiency. Instead of having one heat exchanger, most have two or even three heat exchangers to extract more heat from the burning fuel. High efficiency systems can be 95 percent efficient.

Because high efficiency systems are more complex, they cost more - typically \$1,000 to \$1,500 more than a conventional furnace. If you look at fuel costs only, the house that cost \$1,000 to heat with a conventional furnace should cost only \$650 or so to heat with a high efficiency system, yielding a savings of \$350 or so a year. In a few years, the system would pay for itself.

Some models of high efficiency furnaces, however, have had reliability problems and virtually all high efficiency systems require more costly maintenance which eats into the savings.

Therefore, if you are considering a high efficiency system, on a retrofit basis, or as an option on a new home, it is best to speak to a reliable heating contractor to discuss the pros and cons of various models and the estimated

increase in maintenance costs.

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