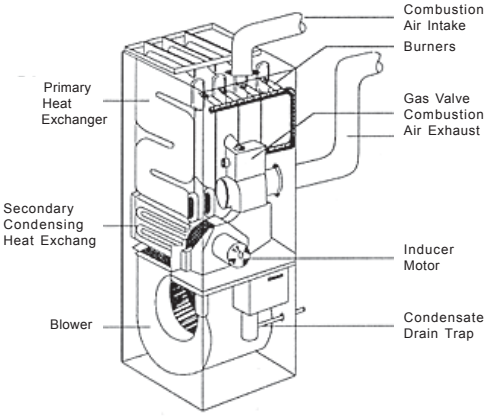
High-Efficiency Gas Furnaces

By Sherif W. Youssef, P.E., CEM
PGW Senior Staff Engineer

High-efficiency gas furnaces save energy costs while improving customer comfort. Though this new technology is more expensive than the standard, the additional first cost for a high-efficiency gas heater is offset by reduced operating costs. Most new high-efficiency furnaces have an Annual Fuel Utilization Efficiency (AFUE) of 90% or higher. AFUE is the usual measure of furnace efficiency, while seasonal efficiency measures how efficiently the furnace uses fuel over the entire heating season. The minimum efficiency standard for furnaces is 78%. The U.S. Department of Energy (DOE) is considering raising the AFUE to a higher standard by the year 2006.



High-Efficiency Condensing Furnace

Courtesy of BC Hydro, Vancouver, B.C.

Condensing and Pulse Furnaces

Condensing furnaces with AFUE ratings over 90%, offer the most energy savings. These furnaces achieve a 90% AFUE rating by sending flue gases through a secondary heat exchanger. This device extracts additional heat for the home. Pulse furnaces burn natural gas in small bursts, much like a car engine burns gasoline, allowing the maximum heat to be extracted from the burning fuel. These furnaces can achieve AFUE ratings as high as 95%. Flue gases are exhausted through a special, plastic-type vent pipe inserted through the wall of the home. This "direct-vent" piping configuration also draws in outside air for combustion. Since indoor air is not used for combustion, cold air leakage (infiltration) is reduced for possible energy savings. By using PVC pipe for side venting the expense of installing a stack or chimney could be eliminated.

High-Efficiency Gas Furnaces vs. Standard Gas Furnaces

High-efficiency residential gas furnaces have difficulty competing against standard furnaces. This is due to the lack of consumer awareness, the constant changes in technology, and the hesitation of contractors to market higher-priced equipment due to economizing. The decision to purchase a new furnace is typically driven by the needed replacement of an old inefficient furnace. If the furnace is more than 10 years old, it is likely to be 60% to 70% efficient. Thus, the furnace wastes as much as 40% of the available heat and the customer will lose 40¢ of every heating dollar. As customers become aware of the new ways to reduce energy costs, the demand for new technology and contractors who can install the high-efficiency gas furnace will increase. High-efficiency furnaces are the future and represent a great opportunity for contractors wishing to expand their business.

High-tech features

Some features that improve furnace efficiency are ***electronic spark ignitions*** and ***automatic vent dampers***. ***Electronic spark ignitions*** and ***hot surface ignitions*** eliminate the need for continuously burning pilot lights that waste fuel and increase operating costs. ***Automatic vent dampers*** close the flue pipe when the burners are off, reducing the amount of warm inside air exhausted, thereby reducing heat loss. ***Variable speed blowers*** and ***draft induced motors*** use less electricity, thus decreasing energy costs. The hot air delivered at low speed matches the house's heat loss, reducing cycling and improving customers' comfort. High speed is only used to meet peak heating requirements.

Conclusions

The latest high-efficiency natural gas furnace is up to 95% efficient. Because a high-efficiency gas furnace is more efficient, it can pay for itself in three to five years. In addition to the energy cost savings, customers enjoy the gentle flow of heat that eliminates overheating and enhances their comfort.