Is Your Forced-Air Gas Heating System Blowing Away Money?

Introduction

The largest expense for homeowners is heating their home. It is 30% of their annual energy bill. This fact provided by EnergyStar, a government program created by the Environmental Protection Agency and the Department of Energy, nudges homeowners to examine their home heating system's efficiency. The forced-air gas heating system is the most common furnace type in American homes. The three major parts of this system attributing to its possible inefficiency and are the furnace size, ducting, and thermostat.

Why an oversized forced-air gas furnace is costing homeowners more

A very common error costing homeowners on their energy bill is having a too large of a forced-air gas furnace installed. This is due to two improper heat load calculations. The two calculations are the *design heat load* and *annual heat load*. Design heat load has already been calculated and is determined by a home's location's coldest day of the year and is provided by the International Code Council. Annual heat load is a calculation of all aspects of a house. It takes into account building materials and floors, walls, windows, doors, and ceilings square footage. These calculations are given an U-Factor (the rate of transfer of heat through one square foot of a house divided by difference in temperature) and the lower the U-Factor, the less heat is lost out of a house. This worksheet elaborates on U-Factors and how to calculate them. With these calculations an appropriate furnace size (sizes are given in BTU, British thermal units, which is the amount of energy required to raise the temperature of one pound of water by one degree Fahrenheit) can be known.

To understand the workings of a forced-air gas furnace reveals why an over-sized furnace is costing extra. The forced air gas furnace ignites natural gas to heat air supplied by the home via an air return duct. The heated air is forced by a blower motor into ducting delivering heat throughout the house. The furnace operates in two stages. The first stage is when the furnace initially kicks on to quickly heat the cool air. It is liken to when a car accelerates from a dead stop. The gas consumed for both these actions are at its greatest. The second stage of the furnace is to maintain the heated air at a set temperature, like a car cruising on a highway at 65 MPH, consuming the least amount of fuel.

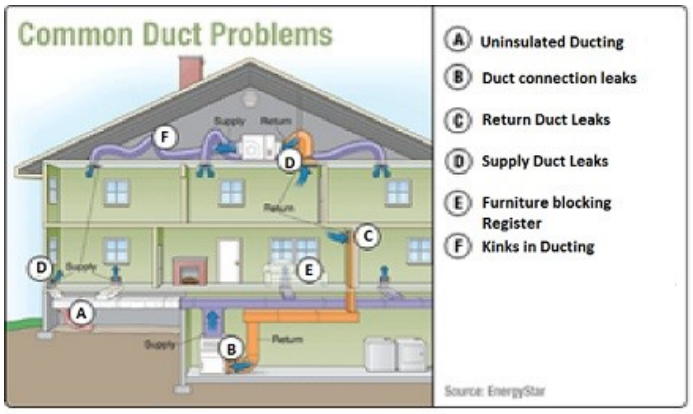
The common problem leading to their inefficiency is the majority of homes in the U.S. own over-sized furnaces. Those furnaces are shifting through the stages more often, this is known as Short-Cycling. The over-sized furnace often does not shift from the first stage to the second but reaches the thermostat set temperature and shuts off. This is done repeatedly during the day. It is like the furnace is driving through heavy downtown Chicago traffic, many stops and quick goes, never achieving a cruising rate of combustion.

The ideal fix for an over-sized furnace is to replace it with the correct sized furnace. However, a cheaper route is to de-rate the furnace. De-rating is to cap off one of the 2-4 gas valves and adjusting the gas flow regulator. This would have the forced-air gas furnace taking in less and burning less natural gas. This makes the furnace more efficient but not to a its most efficient.

Common Causes for Duct Heat Loss

Ducts used in forced-air heating systems are another vital component in home energy efficiency. Their common problems of causing unwanted energy loss:

- The typical system has (A) uninsulated ducts in attics and crawl spaces. Heating unnecessary spaces thus increasing heating cost.
- Through air leakage in (B) duct connections, (C) return and (D) supply ducts with small cracks or improperly sealed seams.
- Furniture (E) covering registers and (F) kinks in ducts restricting air flow forcing the furnace to work harder.



Ideal Thermostat Setting

The simplest means to cut home heating cost is setting a programmable thermostat 10 degrees lower during the night when all in the household is asleep and during times when no one will be home. For it to operate properly, the thermostat must be placed on an interior wall where natural room air currents, the warm air rising and cool air sinking, occur.

Summary

No system is 100% efficient but the majority of forced-air gas heating systems are operating between 45%-78% efficiency. Knowing where possible home heating systems inefficiency lay, inspecting the furnace size, ducting and thermostat, adjustments can be made to increase the its efficiency to 85%-90%.