



Are Your Heating Ducts Robbing You Blind?

In the last column of Going Green readers were treated to a “fun fact to know and tell”: that the average home wastes about half the energy it uses considering cost-effective alternatives. Today’s column will cover a common example. The answer to the title “Are your heating ducts robbing you blind?” is, “More than likely – Yes!” Let’s take a look at what’s going on and what you can do about it.

As building performance contractors we’ve found that most duct systems associated with forced air heating and cooling systems suffer from two common problems – air leakage and a lack of insulation. Thousands of pressure tests on duct systems in California have found the average system leaks about 30% of its air flow. And it’s not just an energy and money loss, it can be a health issue as well because the return air ducts suck foul air in from attics or crawlspaces and blow it into your home. And on the supply side of your duct system, heated (or cooled) air leaking out is lost into attic or crawlspace areas. In terms of insulation, ducts in our climate should be insulated to between R-6 and R-8. Most ducts we see have, at best, about R-2 fiberglass insulation, about 1/3 to 1/4 what’s needed.

This combination of leakage and poor insulation leads to a significant drop in the efficiency of your system. The overall efficiency of your heating system can be calculated by multiplying your furnace efficiency by your duct system efficiency. Let’s say you have a high efficiency furnace rated at 90% efficiency but your duct system is just 60% efficient. Your overall system efficiency in this case is just 54%!

What’s interesting and unknown to most people is that the losses from leaky ducts don’t stop at the ducts. Let’s look at a simple example to understand why leaky ducts make leaks in your homes walls, floors and ceilings even worse too. About 15 years ago I had this conversation about leaky ducts with Mark Modera, a building scientist at Lawrence Berkeley National Labs who’s been studying this issue for decades now. He gave a simple example of what happens that’s fairly easy to understand.

Imagine this. It’s an average winter day and your furnace is off at the moment. The natural air leakage rate of your home is measured and found to be about one half air change per hour. That means the entire volume of air in your home is replaced with outside air every two hours and, with it, the air you just spent money heating is lost. Then the temperature in your drops and your thermostat tells your heating system to come on. Now that air is being forced through your ducts the leakage rate of your home just doubled to about one air change per hour. Why? Because your ducts are sucking in cold air from return duct leaks and blowing hot air out of supply duct leaks. But wait, there’s more! Let’s say you have a number of registers closed off or you have all your interior doors closed. Now the leakage rate of your entire home has tripled to about one and a half air changes per hour! This happens because the air trying to get out of the supply registers doesn’t have a clear, unobstructed path back to the return air grilles. So it ends up going out the path of least resistance – the leaks in the ducts as well as the leaks in your home!

That last example explains why I recommend people shouldn't shut registers off to "save energy". It also explains why more return air grilles are used in properly designed systems. Most homes have only one or two return air grilles. A homeowner or building performance contractors can deal with these problems in a variety of ways but, until they do, the simplest thing to do is leave registers and interior doors open.

As far as fixing ducts yourself there's a great resource from Energy Star here – http://www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts

You can avoid typing in all these characters by just typing "energy star duct" into most any internet search engine. When you get there you'll also find guidelines for sealing leaks in your building, tips on how to properly insulate your home and ducts, and all sorts of other helpful information.

If you decide to hire a professional to help with some or all of this work I recommend you spend a little extra and ask for measurements of your air leakage before and after the work is done. This can be done for the duct system as well as the home itself and will tell you how much was accomplished. Care must also be taken not to make the building so tight that back-drafting of wood stoves or gas appliances becomes a problem.

With the winter heating season approaching, now is the best time to get this work done. And you won't just prevent your heating ducts from robbing you blind - you'll avoid filling your home with foul attic and crawlspace air too!

Ray Darby is President of Sustainable Energy Group Inc., a Grass Valley company offering energy efficiency and solar services for residential and commercial buildings, from comparing the alternatives through installation and servicing of energy systems of all types. You can reach him at 530-273-4422, via email RayDarby@SustainableEnergyGroup.com, or visit their web site at www.SustainableEnergyGroup.com.