

## Carefully controlled air-duct system critical to energy efficiency

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In this age of high-tech and instant everything, heated and cooled homes are something we often take for granted.

I, for one, expect to return to a comfortable home after a hard day's work, and I give little thought to the luxury of having a heating and cooling system that constantly adjusts to the outside weather without any effort on my part.

In fact, the HVAC equipment in a home is a complex design of mechanical equipment that keeps us comfortable no matter what the temperature is outside, and it is the ductwork of this system that transfers the conditioned air into our living space. The more efficiently ducts transfer air, the more effectively your home gets conditioned. Because ducts have such a significant role in HVAC efficiency, and because they represent a small fraction of the cost of the entire system, it is a good place to examine for repairs and upgrades.

Unconditioned places, such as the attics and crawlspaces where ducts are often located, create challenges for the effective transfer of conditioned air. According to information on a U.S. Department of Energy site ([ducts.lbl.gov](http://ducts.lbl.gov)), about 25 percent of the energy (and therefore money for utilities) used for heating and cooling is typically wasted through duct system energy losses.

How do we lose efficiency through our ductwork, and how can we fix it? There are two main causes of this problem.

One is by conduction losses. This happens when ducts are not insulated or are poorly insulated. A well-insulated duct allows the conditioned air to travel to its intended destination without being affected by the temperature that surrounds it. Without this important insulation, transfer of heat and cold to and from the air inside the duct with unconditioned space is inevitable.

The second way efficiency is lost is through duct leakage. "Air leaks in and out of ducts at all connections within a system," according to information on [ducts.lbl.gov](http://ducts.lbl.gov). "This leakage means that air that occupants have paid to have heated or cooled escapes from the heating or cooling system and does not heat or cool the house. Also, air that leaks into the heating and/ or cooling system increases the amount of outside air that must be heated or cooled."

So the better we can seal our duct work, the more efficient our systems will be. A "flexible duct" is seamless and generally will leak only where it connects at each end. Sheet metal duct has many seams and in turn much more potential for leakage. The best way to seal a duct seam is with duct mastic. It has a paste-like consistency upon application and when dry will still maintain some flexibility. This is important because of the expansion and contraction that occurs with temperature changes in ducts. There also are various places on an air handler that can leak conditioned air. The sealing of these locations will affect the optimal performance of your HVAC equipment.

Qualified professionals are best equipped to do this work. A “duct blaster” test calculating duct leakage also can be performed to check before and after duct sealing has been done. The final results will indicate the amount of improvement that has been achieved. An opportune time to evaluate potential leakage of escaping air is while the ducts are pressurized during the test. It should also go without saying that furniture or other obstructions of duct registers should be moved and filters should be cleaned or replaced regularly.

While I have only scratched the surface on the riveting subject of duct leakage, I hope that this will motivate some readers to take steps toward making their heating and air systems more energy efficient. There are numerous benefits, including lower utility bills, longer-lasting HVAC equipment, a more comfortable home and improved indoor air quality.