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Duct Leakage Testing

Is There a Thief in Your Ductwork?

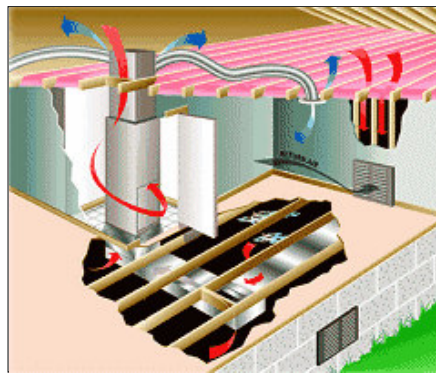
There are more than a million miles of duct work in U.S. homes. And industry experts estimate that more than two-thirds of them are leaky enough to justify sealing or repair. Leaky ducts can significantly increase air conditioning and heating bills, dramatically reduce equipment capacity and performance, as well as result in potentially dangerous indoor air quality problems. In fact, duct leakage is responsible for many of the comfort complaints experienced by homeowners today.



Why Is Duct Leakage Important?

Leaks in forced air duct systems are now recognized as a major source of energy waste in both new and existing houses. Studies indicate that duct leakage can account for as much as 25% of total house energy loss, and in many cases has a greater impact on energy use than air infiltration through the building shell. Just as important, duct leakage can prevent heating and cooling systems from doing their job properly, resulting in hot or cold rooms, and humidity problems. Worse yet, duct leaks can create air quality problems by pulling pollutants and irritants directly into the house.

Here are just a few of the problems resulting from duct leakage:



- Leaks in the supply ductwork cause expensive conditioned air to be dumped into the attic, crawlspace or garage instead of into the house.
- Return leaks pull outside air (hot in summer, cold in winter) into the duct system reducing both efficiency and capacity. In humid climates, moist air being drawn into return leaks can overwhelm the dehumidification capacity of air conditioning systems causing homes to feel clammy even when the air conditioner is running.
- Heat pumps are particularly susceptible to comfort complaints from duct leakage, especially during the heating season. Duct leaks can cause the air coming from heat pumps to feel luke-warm or even cold during the winter. In addition, leaky ductwork has been found to greatly increase the use of electric strip heaters in heat pumps during the heating season.
- Leaks in return ductwork draw air into the house from crawlspaces, garages and attics bringing with it dust, mold spores, insulation fibers and other contaminants.
- Household depressurization from duct leaks and imbalanced duct systems can cause spillage of combustion products (from furnaces, water heaters and fireplaces) into the house.

Measuring Duct Leakage

A duct leakage performance test involves pressurizing the duct system with a calibrated fan and simultaneously measuring the air flow through the fan and its effect on the pressure within the duct system. The tighter the duct system, the less air you need from the fan to create a change in duct system pressure. Testing procedures can be set up to measure only duct leaks which are connected to the outside, or to measure total duct leakage (i.e. leaks connected to the outside and inside of the house). Duct leakage measurements are used to diagnose and demonstrate leakage problems, estimate efficiency losses from duct leakage, and certify the quality of duct system installation.

Two different types of performance testing systems are used to measure duct leakage; a Duct Blaster® and a Blower Door.

Duct Blaster®

- A Duct Blaster is used to directly pressure test the duct system for air leaks, much the same way a plumber pressure tests water pipes for leaks.
- The Duct Blaster fan is first connected to the duct system at the air handler cabinet, or a return grille. After temporarily sealing all remaining registers and grilles, the Duct Blaster fan is turned on to force air through all holes and cracks in the ductwork.
- The fan speed is increased until a standard test pressure is achieved in the duct system. A precise leakage measurement is then made using an airflow and pressure gauge connected to the Duct Blaster system.
- Estimates of efficiency losses from duct leakage can then be made from the leakage measurements.
- A theatrical fog machine can be used along with the Duct Blaster to inject a non-toxic fog into the duct system to visually demonstrate the location and extent of leakage in the ductwork.



Blower Door

- The Blower Door is a whole house testing system which indirectly measures duct leakage by pressurizing the entire house to a standard testing pressure.
- By comparing the whole house test before and after all registers are temporarily sealed, the Blower Door provides you with an estimate of duct leakage to the outside.
- With the Blower Door running, duct leaks can be pinpointed using a hand-held smoke puffer, or a leak detection tool called a pressure pan.
- In addition to diagnosing duct leakage problems, the Blower Door can identify building envelope improvements that will reduce energy use and increase comfort.
- Blower Door airtightness measurements can also be used in HVAC equipment design and sizing decisions, and to help estimate the need for mechanical ventilation.

