

OVERVIEW

A typical duct system loses 12% or more of conditioned air due to leaks and poorly connected ducts. Properly sealed ducts reduce energy loss and utility bills, and can improve a home's comfort, indoor air quality, safety, and humidity balance.

Ducts distribute conditioned air throughout your house. Ductwork that is well sealed and insulated can help maintain a more even distribution of heated and cooled air in the home and improve indoor air quality by reducing the intake of pollutants such as dirt, dust, and mold into the duct system. Properly sealed return ducts help prevent “back drafting” of products of combustion (which can include deadly carbon monoxide) from gas furnaces and water heaters into living spaces. In addition, duct sealing and insulation helps improve the efficiency of the air conditioning system by lowering return and supply air temperatures in the summer—while improving heating system efficiency by raising both return and supply duct temperatures.

IS YOUR DUCT SYSTEM WORKING PROPERLY?

Energy auditor tests usually reveal duct leaks to or from the outside of the conditioned envelope. Often specific sites are located during the audit.

Visual inspections of ducts can also reveal cracks and openings, and the back of the hand can show leaks on the supply side when the air handler in the furnace is on. Be sure no return or supply ducts are covered, and check that the return air filter is clean and that there are no leaks around its access door.

Noting rooms that are particularly uncomfortable in summer or winter suggests duct problems. This could be due to poor settings of dampers in supply ducts near the supply plenum, poor control settings at the register, leakage anywhere between the furnace and the register, lack of duct insulation where the duct passes through semi-conditioned areas like basements or crawl spaces—or un-conditioned areas like attics—or lack of return ducts (or pressure relief to allow flow to the main return) in spaces that are closed from the main portion of the home.

FIND LEAKS IN YOUR DUCT SYSTEM

Most air leaks occur at duct joints and connections, including at the initial connection to the furnace or air conditioner, at branches in the duct system, and at the vents where a duct meets the floor, wall, or ceiling. Because many ducts are hidden in walls and floors, you may need a professional contractor to perform whole-house repairs of duct system leaks.

A professional can repair hidden leaks without major renovation using an aerosol sealant, which seals air leaks from the inside of ducts in inaccessible areas. The sealant is blown into the ducts where it remains suspended until it finds a leak. The particles attach to the edges of leaks and build up until it is sealed. While this requires a trained technician to properly apply, aerosol sealants typically come with a minimum ten-year warranty and excellent results.

However, exposed ductwork can be easily sealed by a handy homeowner. Look for streaks of dirt around registers or duct connections and holes and duct joints that are connected mechanically and not sealed, paying special attention to joints near the furnace and air conditioner unit and duct penetrations

in walls and floors. Next, check the connections at the boots which connect to vents and registers to make sure ducts are well-sealed where they meet the floors, walls, and ceiling.

MASTIC

UL-Listed duct mastics have been developed that work well, install quickly, clean up easily, are environmentally benign, and have very long lifetimes. Mastic can be put on by hand, brush, or trowel. If openings are larger than ¼-in., fiberglass mesh should be laid down on a bed of freshly-applied mastic followed by an outer coating of mastic.

The process goes quickly, so to enhance production, most practitioners work by the rule, “if it looks like a crack, seal it.” This is particularly applicable when dealing with returns that “pan” across joists, creating a virtual, albeit leaky duct. This is a notoriously bad duct design feature that nonetheless is found all too frequently in older homes and is still employed in some new ones. The best tactic is to detach the panning, seal all sides of the “return” completely (imbedding fiberglass in the mastic as appropriate), lay down a bead of mastic over the edges of the joists, reinstall the panning over the mastic, then touch up any remaining holes on the outside.

CONSIDER DUCT INSULATION

Ducts in semi-conditioned or unconditioned spaces, such as the basement, crawlspace, attic or garage, are major sources of conductive heat loss and should be properly insulated. Be certain to seal all holes and connections first. You can buy an insulating jacket or wrap at most home improvement stores—be sure to get insulation material rated at R-8, preferably more. Either purchase insulation with a self adhesive surface or use zip ties to secure the insulation tightly around ductwork. Cut the insulation to fit and seal seams with foil tape or staples. If the duct is used for cooling, buy insulation with a vapor barrier layer or apply a vapor barrier to the outside of the insulation to prevent condensation when warm moist air hits the cold surface.

DUCT SEALING FOR DO-IT-YOURSELFERS

Here are some useful materials to seal and insulate ductwork yourself. Most of these materials may be found at home improvement stores, HVAC supply companies and on-line.

- ☀ **UL listed foil tape:** make sure it's U.L 181 approved. Apply to a clean surface with a plastic squeegee. Cost: about \$16 for a 60 yard roll.
- ☀ **Duct Mastic:** available in a 1 or 2 gallon pails or 10 oz tube (apply like caulk and seal with a glove. Cost: about \$16 to \$25 for a 1 gallon pail, or \$3 to \$5 for an 11 oz. tube.
- ☀ **Foam caulk:** use to fill cracks and gaps around wall or floor penetrations. Cost: \$2 to \$5 for a 10 oz tube

LEARN MORE

Department of Energy-Energy
Efficiency and Renewable Energy

<http://www1.eere.energy.gov/buildings/residential/hvac.html>

Integrating Ducts into the
Conditioned Space: Successes and
Challenges

<http://www.osti.gov/bridge/servlets/purl/835360-JOPOCK/native/835360.pdf>