

Air leakage a major contributor to energy loss

By Jeff Knutson

The largest energy loss in most buildings is the air moving in and out of a building. There are four barriers (insulation, water, vapor and air leakage) to a heated or cooled building that make it comfortable and energy efficient. Air leakage is defined as the uncontrolled migration of conditioned air through the building envelope. It is caused by pressure differences due to wind, stack, (hot air rising) and mechanical systems. It has been shown to represent the single largest source of heat loss and gain through the building envelopes of nearly all types of buildings.

Tests carried out by the National Research Council of Canada on high-rise commercial and residential buildings, schools, supermarkets and houses have shown levels of 30 to 50 percent of heat loss could be attributed to air leakage. The first step is to do a blower door test (also called an air infiltration test) to determine the amount of air that is leaking in and out of a building. A blower door is a calibrated fan that is installed into a doorway to measure air leakage. There are small fans for homes and small buildings and very large gas powered fans for commercial buildings. Energy star homes can not have more than .25 cfm (cubic foot of air moving in one minute) per square foot of outside shell. Ninety eight percent of all buildings in Wisconsin have too much air infiltration.

Air leakage testing helps to determine where the air leakage is occurring. A smoke stick (a device that creates smoke) or other device is used to find these holes while the blower door is running to put pressure on the holes. An infrared camera can also be used to locate air leakage. This camera is like an X-ray machine in that it allows the operator to see inside the walls and ceiling of a building. Another way to find leaks is to look for: cob webs, which can only grow where air is moving; dirty fiberglass insulation, which gets dirty from air moving through it; and dark streaks, or streaks caused by air moving into or out of a hole and it leaves dirt behind.

So where exactly are these holes? Most of the holes are found in the attic under the insulation and in the basement, wherever there is a wire, pipe, chimney or vent going into the building. Some other major leakage is under tubs, around stairs and recessed light fixtures.

The next step is to plug these holes. The holes are plugged with many different products depending on the size of the hole, what the hole is made of and what is going through the hole. Some products used to plug holes include drywall, insulation board, cardboard, plastic, metal, two-part foam, one-part foam, caulk and many other items too numerous to mention.

The final step is to do a post blower door test to see how much air infiltration has been reduced. The rule of thumb is for every cfm reduced it will save you \$.60 per year. If you have a professional do the job they should be able to get you a 20 percent return on your investment by air sealing your building.

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