Improving the Accuracy of Duct Leakage Measurements for Quantifying Energy Savings from Duct Sealing and Repairing

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Various studies of duct leakage in houses have shown that leakage can be considerable in many houses and that reducing duct leakage can reduce energy use for heating and cooling. Accordingly, utilities provide incentives for sealing ducts in existing houses to reduce leakages. Conventional practice in measuring the resulting reduction in duct leakage is to use a duct pressurization test. A standard reference positive air pressure (typically 25 Pascals) is used for this testing. However, measurements of duct leakages made at the reference pressure may not accurately represent the reduction in leakage that is occurring.

Inaccuracies in measuring reductions in duct leakage and hence in energy use that result from duct sealing can cause estimates of the savings attributable to program measures for duct sealing and reparing to be inaccurate. Some studies have suggested that duct leakage measured at 25 Pascals may be overstating actual leakage, thereby overstating the savings that result from duct sealing.

A utility in the western U.S. was interested in improving the accuracy with which savings from duct sealing and repairing are estimated, and sponsored a field study in which several different methods for making duct leakage measurements were applied and compared for a sample of existing homes.

Measurements of duct leakage were made at a sample of 21 existing houses using three methods of measurement. Measurement Method 1 used tracer gas infiltration testing to measure the natural duct leakage; carbon dioxide (CO_2) was used as the tracer gas for this testing. CO_2 infiltration testing is regarded as one of the more accurate methods for measuring infiltration rates. It can thus provide benchmark values for duct leakage against which measurement results from the other methods could be compared and assessed.

The other two methods for making the duct leakage measurements were variants of the usual duct pressurization method. Measurement Method 2 was to measure duct leakage using the standard fixed 25 pascals (Pa) pressurization; Measurement Method 3 was to make measurements at ½ system static pressure (SSP) for central air conditioning systems. SSP is a measurement of static pressure at the supply-side plenum of the duct system when the supply fan is on and operating with registers in their normal position. It was hypothesized that testing at ½ SSP would provide a more accurate measurement relative to testing at 25 Pa when both were compared to the results of CO2 testing.

When the duct leakage values as measured using the two duct pressurization methods were compared to the benchmark duct leakage values measured through the tracer gas testing, the results showed that the measurements made at ½ SSP were more accurate than those made at 25 Pascal. Energy savings estimates therefore should be more accurate if duct pressurization testing is done using the ½ SSP approach.