

Building Air Leakage Testing

2012 Washington State Energy Code (WSEC) section R402.4.1.2 requires air leakage testing for all new houses and additions. The requirement is met if the structure has a leakage rate of 5 air changes per hour when depressurized with a blower door to 50 Pascals or less ($5ACH_{50}$). A Pascal is a measurement of pressure. 249 Pascals are equal to 1" of water column. The test must be performed using a Blower Door device which consists of a large fan, a frame and panel. A manometer (pressure gauge) is used to read house and fan pressures.

WSEC states that the test may be performed at any time after rough in. All penetrations in the building envelope must be sealed including those for utilities, plumbing, electrical, ventilation and combustion appliances. The code also states that when required by the building official, the test shall be conducted by an approved third party.



To conduct the test:

1. Close all windows, doors and fireplace and stove doors.
2. Close all dampers including exhaust, intake, make-up air, backdraft and flue dampers. Since you will be depressurizing the house, dampers in bath fans, etc. will be sucked closed during the test and will therefore not negatively affect the results.
3. Make sure plumbing traps are filled with water.
4. Leave doors between heated areas open.
5. Open access hatches to conditioned attics and/or conditioned crawl spaces. Leave hatches closed if these are unconditioned areas.
6. Seal exterior openings for continuously operating ventilation systems and heat recovery ventilators.
7. Turn off heating and cooling systems but do not seal supply or return registers.
8. Adjust all combustion appliances so that they do not turn on during the test.
9. Install the blower door in an exterior door opening and connect hoses from the manometer to the blower door fan and the exterior pressure tap. See manufacturer's instructions for correct set-up.
10. Depressurize the house to -50 Pascals.

11. Record the flow rate (with simple manometers, the fan pressure (Pa) is converted to CFM₅₀ using a flow table. Many digital manometers sold with blower doors can automatically perform this conversion, and display CFM₅₀ directly.) Consult your blower door and manometer manuals.

You now must convert the flow rate (CFM₅₀) to ACH₅₀. Use the following formula:

$$\text{ACH}_{50} = (\text{CFM}_{50} \times 60) / \text{Volume}$$

Where: ACH₅₀ = Air Changes per Hour at -50 Pascals
 CFM₅₀ X 60 = Converts Cubic Feet per Minute to Cubic Feet per Hour
 Volume = Conditioned floor area of the housing unit multiplied by the ceiling height

Example: A blower door test has been done on a 2,000 square foot house and the fan flow (CFM₅₀) rate is 1100 CFM.

$$\text{ACH}_{50} = (\text{CFM}_{50} \times 60) / \text{Volume}$$

$$\text{ACH}_{50} = (1100 \times 60) / (2000 \times 8)$$

$$\text{ACH}_{50} = 66,000/16,000$$

$$\text{ACH}_{50} = 4.1$$

Since the code requires the ACH₅₀ to be less than 5, this house complies with an ACH₅₀ of 4.1. Record the ACH₅₀ on the energy certificate on or near the electrical panel.