



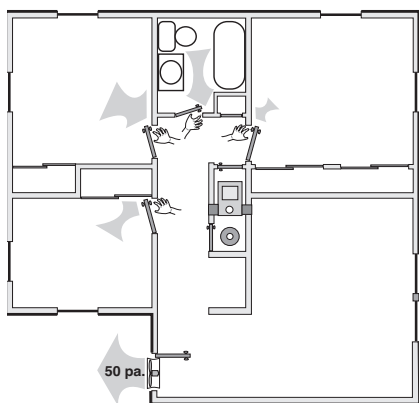
12.4.2 Simple Pressure Tests

Blower-door tests give us valuable information about the relative leakiness of rooms or sections of the home. Listed below are five simple methods.

1. *Feeling zone air leakage:* Close an interior door partially so that there is a one-inch gap between the door and door jamb. Feel the airflow along the length of that crack, and compare that airflow intensity with airflow from other rooms, using this same technique.
2. *Observing the ceiling/attic floor:* Pressurize the home and observe the top-floor ceiling from the attic with a good flashlight. Air leaks show in the movement of loose-fill insulation, blowing dust, fluttering cobwebs, etc. You can also use a small piece of tissue paper or smoke generator to discover air movement. An infrared camera also works well for identifying leakage areas during heating and cooling seasons.
3. *Observing smoke movement:* Pressurize the home and observe the movement of smoke through the house and out of its air leaks.
4. *Room pressure difference:* Check the pressure difference between a closed room or zone and the main body of a home. Larger pressure differences indicate larger potential air leakage within the closed room or else a

tight air barrier between the room and main body. A small pressure difference means little leakage to the outdoors through the room or a leaky air barrier between the house and room.

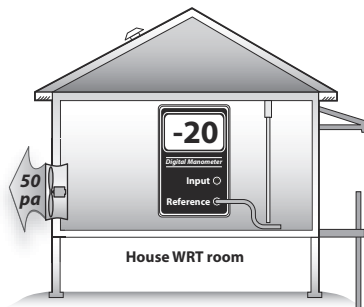
5. *Room airflow difference:* Measure the house CFM_{50} with all interior doors open. Close the door to a single room, and note the difference in the CFM_{50} reading. The difference is the approximate leakage through that room's air barrier.



Interior door test: Feeling airflow with your hand at the crack of an interior door gives a rough indication of the air leakage coming from the outdoors through that room.

Tests 1, 2, and 3 present good client education opportunities. Feeling airflow or observing smoke are simple observations, but have helped identify many air leaks that could otherwise have remained hidden.

When airflow within the home is restricted by closing a door, as in tests 4 and 5, it may take alternative indoor paths that render these tests somewhat misleading. Only practice and experience can guide your decisions about the applicability and usefulness of these general indicators.



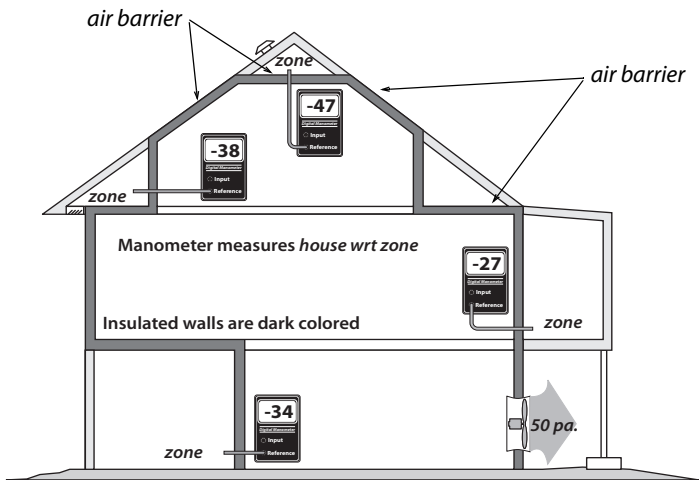
Bedroom test: This bedroom pressure difference may be caused by its leaky exterior walls or tight interior walls, separating it from the main body of the home. This test can determine whether or not a confined combustion zone is connected to other rooms.

12.4.3 Simple Zone Pressure Testing

Manometers aren't limited to finding indoor WRT outdoor differences. They can also measure pressure differences between the house and its intermediate zones during blower-door tests. The purpose of these tests is to evaluate the air-tightness of the home's interior air barriers.

The blower door, when used to create a house-to-outdoors pressure of -50 pascals, also creates house-to-zone pressures of between 0 and -50 pascals in the home's intermediate zones. The amount of depressurization depends on the relative leakiness of the zone's two air barriers.

For example, an attic with a fairly airtight ceiling and a well-ventilated roof indicates that it is mostly outdoors by showing a house-to-zone pressure of -45 to -50 pascals. The leakier the ceiling and the tighter the roof, the smaller that the negative house-to-zone pressure will be. This holds true for other intermediate zones like crawl spaces, attached garages, and unheated basements.



Pressure-testing building zones: Measuring the pressure difference across the assumed thermal boundary (*house wrt zone*) tells you whether the air barrier and insulation are aligned. If the manometer reads close to -50 pascals, the air barrier and insulation are aligned and the tested zones are well-connected to outdoors.

Zone Leak-Testing Methodology and Diagnostics

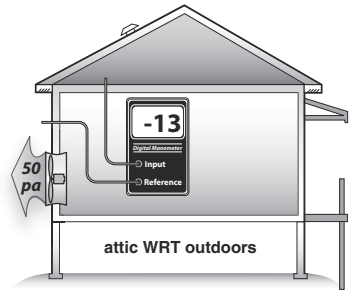
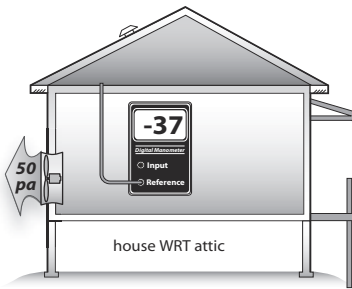
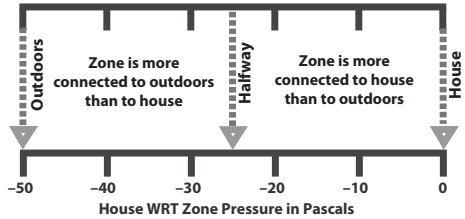
Depressurize house to -50 pascals with a blower door.

1. Find an existing hole, or drill a hole through the floor, wall, or ceiling between the conditioned space and the intermediate zone.
2. Connect the reference port of a digital manometer to a hose reaching into the zone.
3. Leave the input port of the digital manometer open to the indoors.
4. Read the negative pressure given by the manometer. This reading is the house-to-zone pressure, which will be -50 pascals, if the air barrier between house and zone is airtight and the zone itself is well-connected to outdoors.

- If the reading is significantly less negative than -45 pascals, find the air barrier's largest leaks and seal them.
- Repeat steps 1 through 5, performing more air-sealing as necessary, until the pressure is as close to -50 pascals as possible.

Interpreting house-to-zone pressure:

The greater the negative number the better the air barrier is performing.



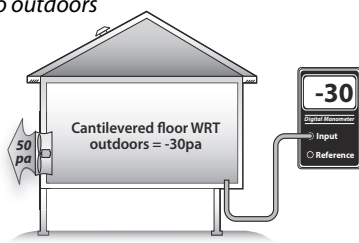
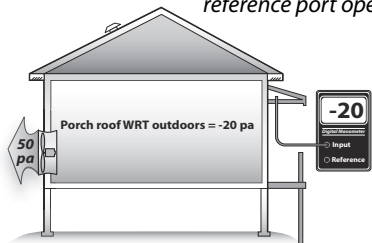
House-to-attic pressure: This commonly used measurement is convenient because it requires only one hose.

Attic-to-outdoors pressure: This measurement confirms the first because the two add up to -50 pascals.

Leak-Testing Building Cavities

Building cavities such as wall cavities, floor cavities between stories, and dropped soffits in kitchens and bathrooms can also be tested as described above to determine their connection to the outdoors as shown here.

These examples assume that the manometer is outdoors with the reference port open to outdoors



Porch roof test: If the porch roof were outdoors, the manometer would read near 0 pascals. We hope that the porch roof is outdoors because it is outside the insulation. We find, however, that it is partially indoors, indicating that it may harbor significant air leaks through the thermal boundary.

Cantilevered floor test: We hope to find the cantilevered floor to be indoors. A reading of -50 pascals would indicate that it is completely indoors. A reading less negative than -50 pascals is measured here, indicating that the floor cavity is partially connected to outdoors.

Testing Zone Connectedness

Sometimes it's useful to determine whether two zones are connected by a large air leak. Measuring the house-to-zone pressure during a blower-door test, before and then after opening the other zone to the outdoors, can establish whether the two zones are connected by a large air leak. You can also open an interior door to one of the zones and check for pressure changes in the other zone.