

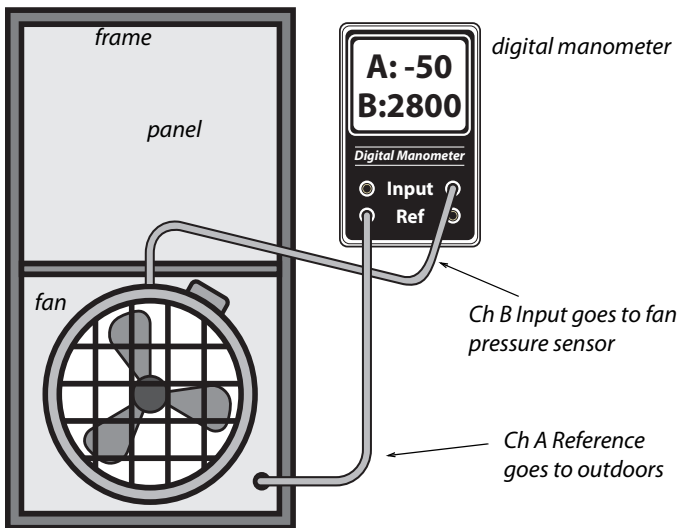
## 12.2 SINGLE-FAMILY AIRTIGHTNESS TESTING

House airtightness testing was made possible by the development of the blower door. The blower door measures a home's leakage rate at a standard pressure of 50 pascals. Energy auditors use this leakage measurement to compare homes with one another and to established air-leakage standards.

The blower door also allows the auditor to test parts of the home's air barrier to locate air leaks. Sometimes air leaks are obvious. More often, the leaks are hidden, and you need a blower door to find their location.

This section outlines the basics of blower-door measurement along with some techniques for gathering clues about the location of air leaks.

### Blower-Door Components

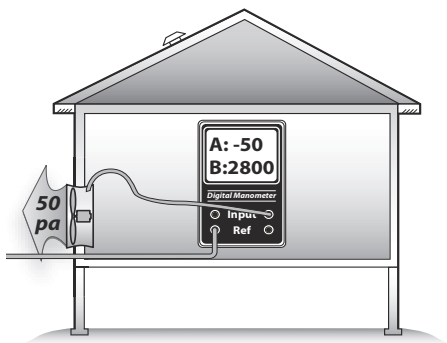


### 12.2.1 Blower-Door Principles

The blower door creates a 50-pascal pressure difference across the building envelope and measures fan pressure in order to cal-

culate airflow in cubic feet per minute ( $CFM_{50}$ ) to estimate the leakiness of homes. The blower door also creates pressure differences between rooms in the house and intermediate zones like attics and crawl spaces. These pressure differences can give clues about the location and combined size of a home's hidden air leaks.

**Blower-door test:** Air barriers are tested during a blower-door test, with the house at a pressure of 50 pascals negative with reference to outdoors. This house has 2800  $CFM_{50}$  of air leakage. Further diagnostic tests can help determine where that leakage is coming from.



## Blower-Door Terminology

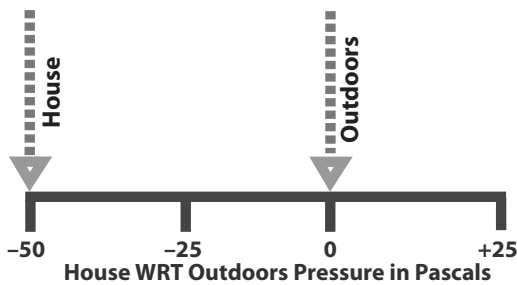
Connecting the digital manometer's hoses correctly is essential for accurate testing.

This method uses the phrase *with-reference-to (WRT)*, to distinguish between the input zone and reference zone for a particular measurement. The outdoors is the most commonly used reference zone for blower-door testing. The reference zone is considered to be the zero point on the pressure scale.

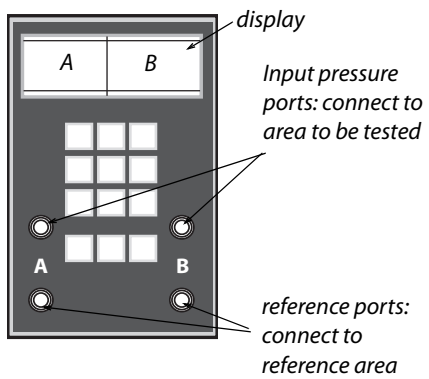
For example, *house WRT outdoors = -50 pascals* means that the house (input) is 50 pascals negative compared to the outdoors (reference or zero-point). This pressure reading is called the house pressure.



**Video: Setting up the DG700**— How to set up the DG700 manometer for diagnostic testing.



**Digital manometers:** Used to diagnose house and duct pressures quickly and accurately.



## Low-Flow Rings

During the blower-door test, the manometer measures airflow through the fan. This airflow (CFM<sub>50</sub>) is the primary measurement of a home's airtightness and is directly proportional to the surface area of the home's air leaks. For the blower door to measure airflow accurately, the air must be flowing at an adequate speed. Tighter buildings and smaller buildings don't have enough air leakage to create an adequate airspeed to create the minimum fan pressure. This low-flow condition requires using one or two low-flow rings, to reduce the blower-door fan's opening and to increase air speed, fan pressure, and measurement accuracy.

When the air speed is too low, the DG-700 displays "LO" in the Channel B display. After installing one of the low-flow rings, follow the manufacturer's instructions for selecting the proper range or configuration on the digital manometer.

## 12.2.2 Preparing for a Blower-Door Test

Preparing the house for a blower-door test involves putting the house in its normal heating-season operation with all conditioned zones open to the blower door. Try to anticipate safety problems that the blower-door test could cause, particularly with combustion appliances.

- Identify the location of the thermal boundary and determine which house zones are conditioned.
- Identify large air leaks that could prevent the blower door from achieving adequate pressure, such as a pet-door.
- Put the house into its heating-season operation with windows, doors, and vents closed and air registers open.
- Turn off combustion appliances temporarily.
- Open interior doors so that all indoor areas inside the thermal boundary are connected to the blower door. This could include the basement, conditioned kneewall areas, and closets.

### Avoiding Risky Situations

Don't perform a blower-door test in risky situations like the following until you remove the risk or perform an acceptable building repair.

- A wood stove is burning or contains ashes that may be pulled into the home.
- Holes in the ceiling that could lead to dust pollution during a blower-door test.
- Extremely weak building components, like a poorly installed suspended ceiling or loose wood wall paneling.
- Lead or asbestos dust is present.