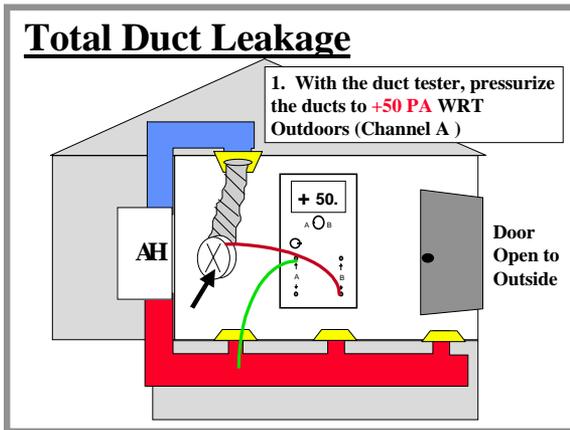


Total Duct Leakage Test

Testing Procedure

Application: For the PTCS Program perform this test **only on new homes**. This test is most appropriate in new construction when ducts are to be tested at the rough-in stage before the house envelope is intact. The test measures the CFM50 value of the duct system. It is a simpler test, but a more stringent standard than the leakage to exterior test that may be used as an alternative.

Standard: For certification, the measured CFM50 must not exceed $0.06 \text{ CFM50} \times \text{floor area served by the system (in square feet)}$ or 75 CFM50 whichever is greater.



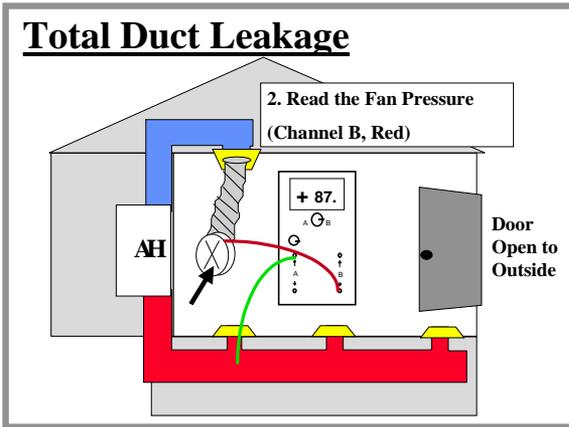
Tools and Equipment:

- Duct tester
- Manometer
- Tape and paper or duct mask to seal registers

Setup:

- Remove air filters from the air handler.
- Open all duct dampers (Note setting and return after testing).
- Attach the duct tester to the return register closest to the air handler. **or**
- Attach the duct tester to the air handler cabinet (Preferred location).
- Place the duct pressure tube in the supply register closest to the air handler. **or**
- Place the duct pressure tube in the supply plenum.

- Seal all the duct system supply and return registers with tape, paper, or mask.
- Open an exterior door or window so that all spaces exterior to the ducts are at outside pressure.



Test:

1. With the Duct Tester **pressurize** the ducts to **+50 Pa WRT to outside**.
2. Read the fan pressure and follow your Duct Tester instructions to determine the **CFM50** leakage

of the system. If you can't reach +50 Pa, perform the test at the highest attainable pressure (rounded to the nearest 5 Pa) and correct the results (see interpreting results below).

Interpreting Results:

The **CFM50** is a measure of the total collected hole size in the system. As an approximation the CFM50 divided by 10 gives the total effective leakage area in square inches.

Example: $400 \text{ CFM50} / 10 = 40$ square inches of total leakage area.

Using this approximation during sealing can help estimate how many and how big the holes are that you are looking to seal.

If you could not perform the test at +50 Pa adjust your results using Table 1 (see page 33).

Example: The results of the test show a leakage area of 275 CFM at a duct pressure of 35 Pa. The correction factor from Table 1 for a pressure of 35 Pa is 1.26.

$$275 \text{ CFM}_{35} \times 1.26 = 346.5 \text{ CFM}_{50}$$

The test doesn't give any indication of where to find the holes, just an estimate of the collected hole size. As CFM50 values get larger, they will tend to be less accurate. In the range of values required for certification, the test should be most accurate.

Limitations: Inaccuracies are introduced because the test assumes a constant pressure difference from inside to outside the ducts throughout the system during testing. This is not always true because of pressure drops caused by large holes and possible induced pressures in buffer zones. Because the assumed constant pressure difference doesn't accurately model the dynamic pressure gradient present during normal system operation, the test measured hole size does not always correlate well with heat loss and potential savings. The assumption, however, is that in new construction, the tighter, the better.

Duct Leakage to the Exterior

Testing Procedure

Application: This test may be used on either **new or existing homes**. In new construction, doors and windows must be installed and the building envelope capable of maintaining +50 Pa WRT outside pressure with the operation of a blower door. By pressurizing the interior of the home with a blower door while using a duct tester, duct leakage to the interior is eliminated from the measurement. The test attempts to measure the CFM50 value for holes in the duct system outside of conditioned space. In **existing homes**, by performing a pre and post test documenting a 50% reduction in leakage area, it is sometimes possible to certify homes that otherwise would not qualify.

Standard:

New Construction: For certification, the measured CFM50 must not exceed $0.06 \text{ CFM50} \times \text{floor area served by the system (in square feet)}$ or 75 CFM50 whichever is greater.

Existing Homes: For certification, the measured CFM50 must not exceed $0.10 \text{ CFM50} \times \text{floor area (in square feet) served by the system}$;

Or

Document a **50% reduction*** in leakage to the outside by comparing duct leakage to the outside before and after sealing.

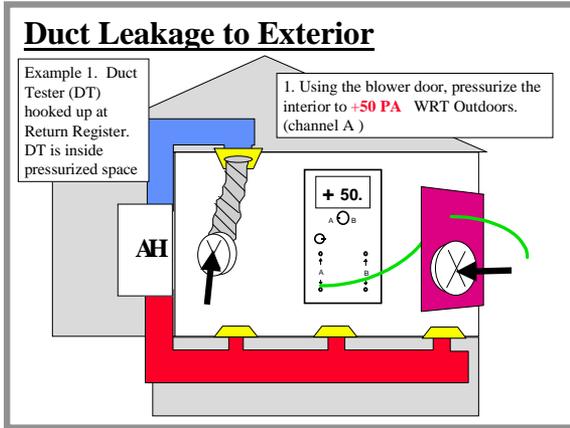
*The leakage rate specified above or a minimum 50% reduction in duct leakage is required for an existing system to be **certified** as meeting the PTCS standard. Some utilities may pay an incentive for “test only” or less than a 50% reduction. Contact Climate Crafters or the sponsoring utilities for specific program details.

Tools and Equipment:

- Blower Door
- Duct Tester
- Manometer
- Tape and paper or duct mask to seal registers

Setup:

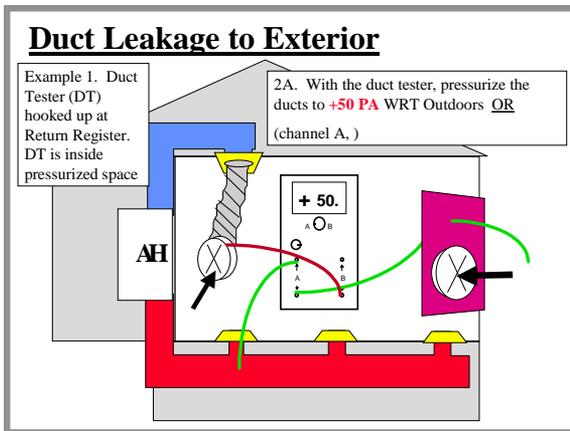
Example 1. Duct Tester is hooked up at largest return register. The duct



tester is inside the pressurized zone of the house when the blower door is turned on.

- Prepare house for a standard blower door test.
- Set up **blower door** and set to pressurize the house.

- Set up the **Duct Tester** as in a total leakage test except all exterior doors and windows must be closed.

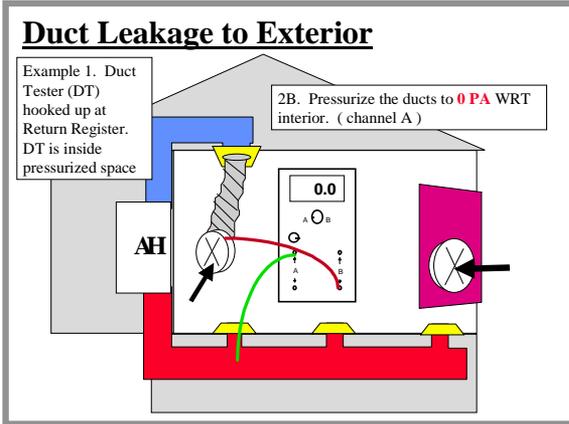


Test:

1. Using the **blower door** pressurize the interior to **+50 PA WRT outdoors**.

2A. With the **Duct Tester**, pressurize the ducts to + **50PA WRT outdoors**.

Or



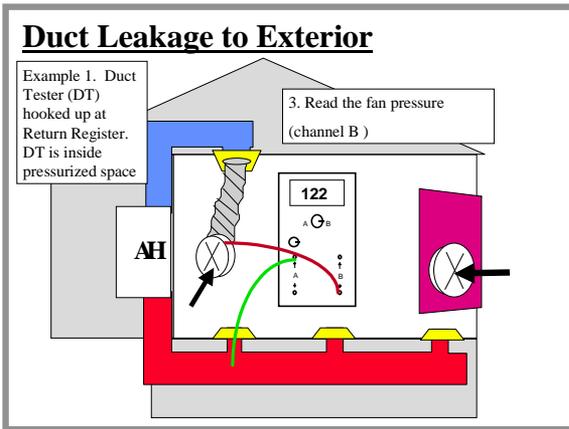
2B. With the **Duct Tester**, pressurize the ducts to **0 PA WRT interior**

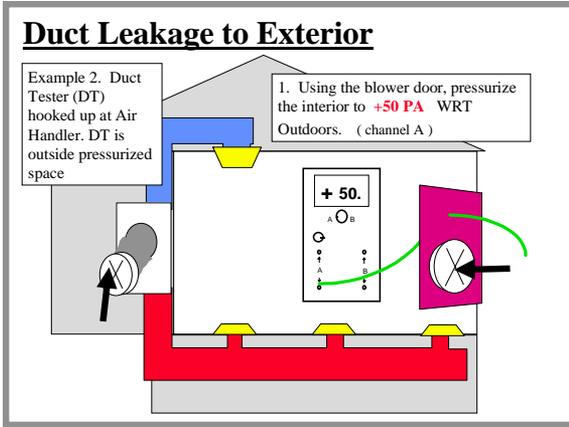
Check the blower door reading to assure it is still at +50PA.

3. Measure Fan Pressure of the Duct Tester.

Note: You may need to adjust the ring size of the duct tester (see duct tester manual).

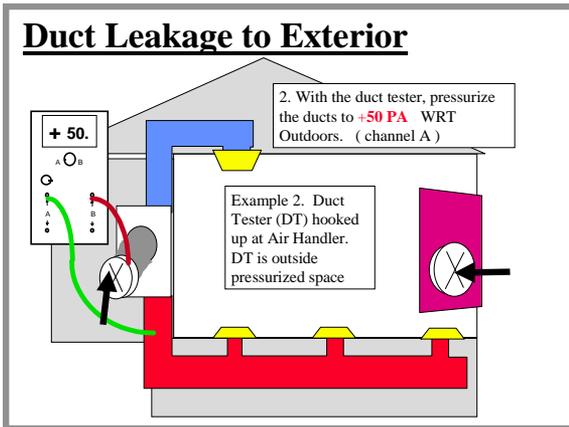
4. Convert Fan Pressure to CFM50 measurement by consulting the duct tester manual.





Example 2. Duct Tester is hooked up at Air Handler. Depending on the location of the Air Handler, the Duct Tester may be either inside or outside the pressurized zone of the house. (Outside in pictured example)

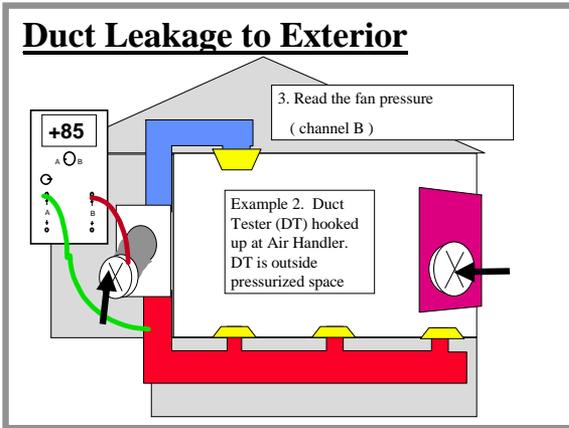
Follow the same steps as in Example 1.



Note:
In this example because the Duct Tester is outside of the pressurized zone of the house, it is no longer necessary to run a pressure hose from the reference pressure tap on channel A to the outside when

determining the duct pressure WRT to outside as it was in Example 1.

In any case, if either the house or the ducts can't be pressurized to 50 Pa WRT to outside, pressurize them both to highest same value possible (rounded to the nearest 5 Pa) and then convert to CFM50 using Table 1 (see page 33).



Interpreting Results:

By pressurizing the house to the same pressure as the ducts, holes between the ducts and the house are assumed to have no pressure difference and therefore make no contribution to the

measured CFM50. All the measured leakage is to the exterior. Generally this will be a more reliable indicator of potential energy savings than a *Total Leakage* test.

The test doesn't give any indication of where to find the holes, just an estimate of the collected hole size to the outside. As CFM50 values get larger, they will tend to be less accurate. In the range of values required for certification, the test should be most accurate.

Documenting a 50% reduction of a very leaky system for certification may not provide the desired benefits. Always try to get the systems as tight as possible.

Limitations: The test assumes that the pressures inside the ducts and outside the ducts within the house are always equal during the test. This is not always true and may skew the results. Two story houses with ducts in the second story floor cavity and houses with ducts in other buffer zones that are partially pressurized by the blower door may produce unreliable results.