WISCONSIN ENERGY STAR HOMES

TECHNICAL BULLETIN – No. 2

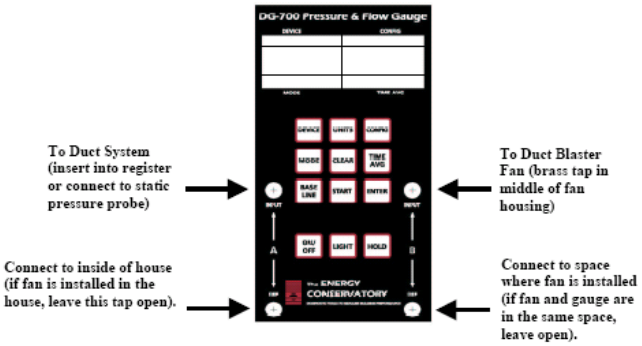
Quick Guide to Measuring Duct Leakage to Outside

Below is a simplified outline for conducting a one-point, 25 Pascal, Duct Leakage to Outside Pressurization Test. The test procedure requires blowing air into the house and duct system using the Minneapolis Blower Door™, DG-700 Digital Gauge, and Minneapolis Duct Blaster®.

1. **Setting up the Blower Door: Prepare House for P*ressurizing* to + 25 pascals**
    a. Change the direction of Blower Door fan flow from the normal depressurization mode to pressurization mode by flipping the flow switch on the fan.
    b. Make sure all windows and doors are LOCKED and the house is ready for a Blower Door test.
    c. Turn all mechanical equipment OFF. Check status of all combustion devices for safety purposes.
    d. Seal off all supply and return registers with *duct mask*™ (do not forget those in the trunk line).
    e. Seal off any outside make-up air intake ducts.
    f. Seal off any HRV/ERV outside ports IF the unit does NOT have internal dampers.
    g. Set DG 700 (Blower Door) to measure PR/FL (pressure/flow). Do not use pressure/flow@25. For this test the house pressure (with respect to outside) is important to measure, maintain, and record.

2. **Connecting the Duct Blaster Fan to the Duct System**
    a. In most Wisconsin homes attach Duct Blaster to the bottom of the air handler cabinet where the air handler fan is located. Another good choice is largest and closest return to the air handler. IF the air handler is in the attic or garage attach the Duct Blaster to a central return or a return close to the air handler location.
    b. Remove the filter from the duct system and tape closed any holes in the filter slot.
    c. Connect the Duct Blaster fan to either a piece of cardboard cut to fit the Duct Blaster fan or cover the air handler opening or the prefabricated transition piece. Make sure the exhaust side of the Duct Blaster fan (the side with the metal guard) is facing the transition piece. This can be done with either tape in the case of cardboard or the clips on the prefabricated transition piece.
    d. Connect the transition piece to the air handler cabinet or return with masking tape (duct mask tape from the Energy Conservatory will do in most cases).
    e. Attach the appropriate fan flow ring to the open side of the Duct Blaster with the 3-2" neoprene connectors. Suggest you start with the smallest ring first.
    f. Pull the 'shower cap' over the opening.
    g. Connect the fan speed controller to the fan and plug into a 110V outlet.

3. **Connecting the DG 700 (Duct Blaster)**
   a. Connect hoses per diagram. Drill small hole in top of supply plenum (prior to any branch) to insert static pressure probe. Make sure probe is facing into the direction of air flow. This is Channel A input and measures pressure in the duct system.



   b. Set DG 700 parameters (Duct Blaster).
      i. Mode – Select PR/FL (pressure/flow): Channel A measures duct system pressure with respect to house and Channel B measures air flow through the Duct Blaster fan opening.
      ii. Device – Select DB B: (dependent on type of Duct Blaster being used but most are Duct Blaster series B).
      iii. Config – (refers to fan configuration) Select configuration for DG700 according to diagram below and flow ring installed in Duct Blaster fan (typical ring 3 or 2).

Fan Configuration	Flow Range (cfm) For Series B Duct Blaster
Open (no Flow Ring)	1,500 - 600
Ring 1	800 – 225
Ring 2	300 – 90
Ring 3	125 – 20

4. **Conducting the Test**
   a. Turn on the Blower Door and *pressurize* the house to +25 pascals.
   b. Return to the Duct Blaster and note the duct system pressure on DG 700 – Channel A.
   c. Take the 'shower cap' off the Duct Blaster fan to open the duct work to the building pressure.
   d. Double check Blower Door to maintain +25 pa building pressure and adjust as necessary.
   e. Return to the Duct Blaster and RECORD the new duct system pressure on DG 700 – Channel A (all numbers including zero are significant). If the number is fluctuating use time averaging. If duct pressure reading is zero, the exterior duct leakage is to small to measure and the test is complete (default to 10cfm ext leakage for the purpose of modeling).
   f. If the recorded duct pressure is non zero, with the Blower Door still running, turn on the Duct Blaster fan by slowly turning the fan controller clockwise. **We're now trying to "cancel out" the duct pressure reading.** Continue to increase the fan speed until the pressure on Channel 'A' reads zero.
   g. Re-check the Blower Door building pressure and, if necessary, readjust its speed to maintain +25 pascals.

h. Re-check the Duct Blaster duct pressure on the DG 700 and, if necessary, re-adjust the fan until it again Channel A reads zero. **Record the cfm number on Channel B.**
i. If "LO" appears on Channel B.
    i. Insert next smallest flow ring.
    ii. If you still read "LO" there is no reliable flow to accurately measure. Default to 10cfm ext leakage for the purpose of modeling.

5. **Necessary Information to Record**
    a. Building pressure – at time of test (from Blower Door DG 700).
    b. Duct system pressure with house at +25, shower cap off, and Duct Blaster fan NOT operating - (Channel A of Duct Blaster DG 700).
    c. Flow ring - (your choices are A1, B2, C3 as indicted on the DG 700).
    d. Flow – (cfm number on Channel B of Duct Blaster DG 700 with house at +25 and duct pressure zeroed out by operation of Duct Blaster fan (channel A reading zero).

6. Return house and duct system to normal operating conditions.