Airflow Test (Detailed Instructions)

The PTCS specifications call out a recommended airflow across the indoor coil of 375-425 CFM/ton of outdoor unit capacity. The minimum allowed airflow is 350 CFM/ton. At this point, the program has not mandated a higher flow for systems installed at elevation. Systems installed above sea level should really be required to provide more volumetric flow since the air is thinner; at 5000 feet above sea level, approximately a 10% bump in volumetric flow is needed to provide the same mass flow as at sea level.

The intention is that the technician will test the system at full capacity in heating mode. In newer systems, attaining full capacity flow may be complicated and can require detailed review of system controls and sensors. Temporary settings and/or sensor jumpering may be required. Also, it may be possible to get to full capacity and flow by using the test mode of the indoor thermostat. The TrueFlow calibrated plate is the preferred means of measuring system airflow. The plate can be used in most heat pump systems, where it is installed temporarily in place of the system filter.

If the TrueFlow cannot be used because of physical obstacles or other problems, use the Duct Blaster matching method worksheet with full procedure found on page three of this document .

Important things to remember when using the plate: Obstructions within 6 inches upstream or 2 inches downstream of the plate that are blocking airflow through any of the metering holes may reduce the accuracy. If there is an obstruction and there is a spacer attached to the plate, try to install the plate so that the spacer is directly in front of the obstruction (this will minimize the effect of the obstruction on the measurement). If the metering plate is installed directly downstream of a 90° bend in the duct system and the re is a spacer attached to the plate, install the plate so that the spacer is on the inside corner of the bend.

Air Flow Test Instructions:

1. **Turn on air handler (by using fan-only switch or by turning on heat/AC).**
   It is best to call for the flow that will be used during most of the year (probably heating). Make sure you know which stage is operating so you will divide the measured flow by the right number of tons.

2. **Place static pressure tap in supply plenum--drill hole if needed.**
   The hooked end of the tap should face into the air stream.
   Note: it is generally better to place tap at least 6” away from any take-off or turning vane.
   If this position was used to measure static pressure as part of the external static pressure measurement, the tap does not need to be moved.
   If the system tested is a manufactured home, access the supply system through the nearest supply register. Temporarily remove the magnet from the static pressure tap, reach down into the supply boot (look out for sharp edges) and toss the tap back toward the furnace

3. **Connect other end of hose (that leads to the pressure tap) to the pressure gauge (usually the Input tap of Channel A).**

Turn on gauge (if using DG-700 or similar). If using DG-700, switch to inches of water mode by using Units switch. Keep gauge in pressure/pressure mode for all tests.

4. **Record normal supply operating pressure (NSOP) on form in Box 1[A].**
   If the reading is very "jumpy," press the Average key on the manometer and wait at least 5 seconds for the average value to display.

5. **Now remove system filter and replace with TrueFlow, with any needed spacers.**

   Note plate size on form. Plate should be positioned so side with labels faces oncoming air flow. Connect plate hoses to "B" side of pressure gauge (if using DG-700); otherwise, connect plate hoses so they will read pressure drop across plate. Note where the TrueFlow is installed. If it is installed on a non-ducted return (on the top/front of the furnace cabinet or on a return grille), you will need to apply a 1.04 multiplier to the raw flow before the Correction Factor is applied.

6. **Read pressure across plate--record in the Plate Pressure box on the form.**

7. **Look at the pressure in supply system with TrueFlow installed**
   (Usually still the input of Channel A on DG-700);
   Record on form in the True Flow section of the form under **Plate Pressure**.

8. **Look at NSOP and TFSOP.** If they differ by more than 3 Pa or 0.02" water, look up a Correction Factor. Use the TrueFlow look-up table to figure any needed correction.
   Record Correction Factor in **Box 5 [C].**

9. **Using plate pressure, look up Raw Flow on laminated card.**
   Record Raw Flow in **Box 6 [D].**

10. **Multiply Raw Flow by Correction Factor; this is Corrected Flow.**
    Record in **Box 7**.

11. **Divide Corrected Flow [7] by system tons (capacity) to get CFM/ton.**
    If it is more than 350/ton it meets program specs.

12. **If flow is not at least 350 CFM/ton, adjust upward by changing fan taps, board settings, etc.** You may have to get creative.

Please note: The literature supplied with the TrueFlow shows how to do the test with the DG-700 pressure gauge in a semi-automated mode (where the gauge takes the baseline system operating pressure, stores it, and then uses it to adjust the raw flow when the gauge operates in the pressure/flow mode).

This is not the preferred way to do the test in the PTCS program. The data form requires entry of all intermediate pressures (both in the supply plenum and across the TrueFlow) and the test plate number (since there are two plates, each with a different calibration). This is done to protect the technician, since it is easier to make mistakes in semi-automated mode. **Even if you do the test this way, you must record the intermediate readings on the form.**

If you get confused at any point in the test, just turn the gauge off and on, check hose positions, and start over. You can always test the NSOP at the end, too, if you decide to change fan speeds in the middle of the test.

Duct Blaster Matching Method Worksheet

1. Turn on air handler (by using fan-only switch or by turning on heat/AC). It is best to call for the flow that will be used during heating.

2. Drill access hole as needed and point hooked end of static tap into airflow**. Do not drill into the duct at any point where you are concerned with hitting something.** Note if fan is variable speed and note expected flow given size of unit and DIP or other settings on system control board.

3. Record normal system operating pressure (NSOP) as described in flow plate test.

4. Next, install split between supply and return so that all air flowing through Duct Blaster will go into supply side.

5. Install Duct Blaster on furnace. Ingenuity with cardboard and duct tape is often needed.

6. ***Turn on air handler to heating speed.***

7. Turn Duct Blaster on and slowly increase flow until the supply plenum pressure is the same as NSOP.

8. Check to make sure the pressure in the return system is 0 or very close to 0 (to confirm system split is good).

9. Record Duct Blaster flow pressure, ring#, and CFM.
NSOP _____Pa
Ring # _____
Flow pressure _____Pa
Air Handler flow _____CFM
Note: if highest pressure reached is not NSOP, a correction is needed.
Record highest pressure reached (HPR)_____
Correction: take square root of (NSOP/HPR) _____
And multiply by Air Handler flow (from above) _____
This is the corrected flow: _____