

Procedure for Field Checking the Model 3 Minneapolis Blower Door™ Fans

Introduction

Model 3 Minneapolis Blower Door™ fans maintain their calibration unless physical damage occurs to the fan. Conditions which could cause the fan calibration to change are primarily damaged flow sensors, leaks in the flow sensor or tubing running from the flow sensor to the fan pressure tap, or improper positioning of the flow sensor relative to the fan housing. These conditions are easily detected and should be tested for on a regular basis.

You will Need

1. A 30 foot piece of tubing (this is the longer, clear tubing supplied with all Model 3 fans. The red and green tubes are too short for this test). You can use 2 or 3 pieces of tubing with connectors as long as they add up to 30 feet.
2. A 1 ml syringe (usually 1.2 to 1.3 ml). These are available from TEC.
3. Two tubing T's for standard ¼" OD tubing
4. A DG-1000 or DG-700 manometer
5. A straightedge such as a carpenter's level or a heavy yardstick or long ruler on edge
6. A ruler that measures 16ths of an inch or millimeters
7. A workbench or table (optional). All checks can be done on the floor, but they are easier on a workbench or table.

Checking for a Leaky or Damaged Flow Sensor

Model 3 Blower Door fans use a round white plastic flow sensor that is mounted on the end of the fan motor opposite the fan blades.

First visually confirm that the flow sensor is not broken or deformed due to impact. Check that the flow sensor is firmly attached to the motor using the 3 metal attachment clips.

Setup – Each Time you Test Fans

1. Make sure everything is at room temperature for at least 30 minutes. If the tubing, gauge, or fan are warming up or cooling down during this test it may not be accurate.
2. Test to be sure the syringe, tubing, and manometer aren't leaking: Attach a loop of tubing and a "T" to the end of the 30 ft tube as shown in the photo. Then depress the plunger most of the way down until it reads about 1000 Pa. After 15 seconds, it should still read at least 900 Pa. If it reads lower than 900 Pa, the syringe or the tubing has a leak and should be replaced.

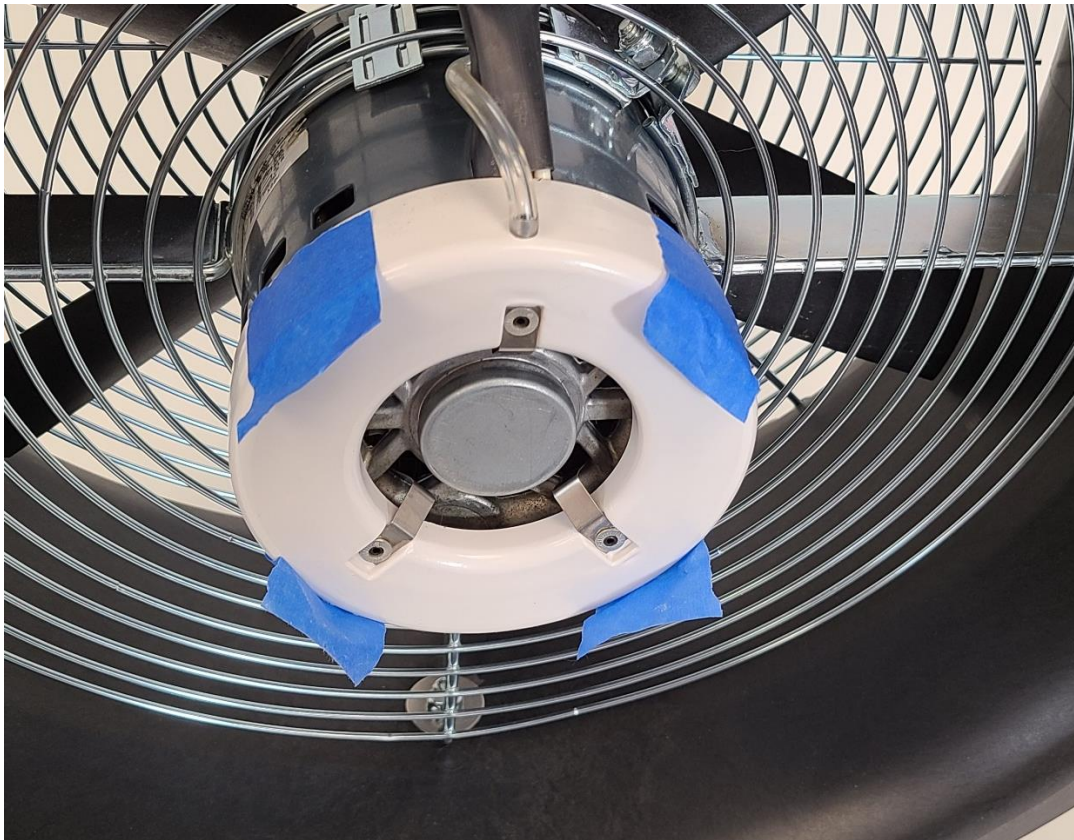


Setup for testing the syringe, tubing, and manometer for leaks.

Leak Test for Each Fan

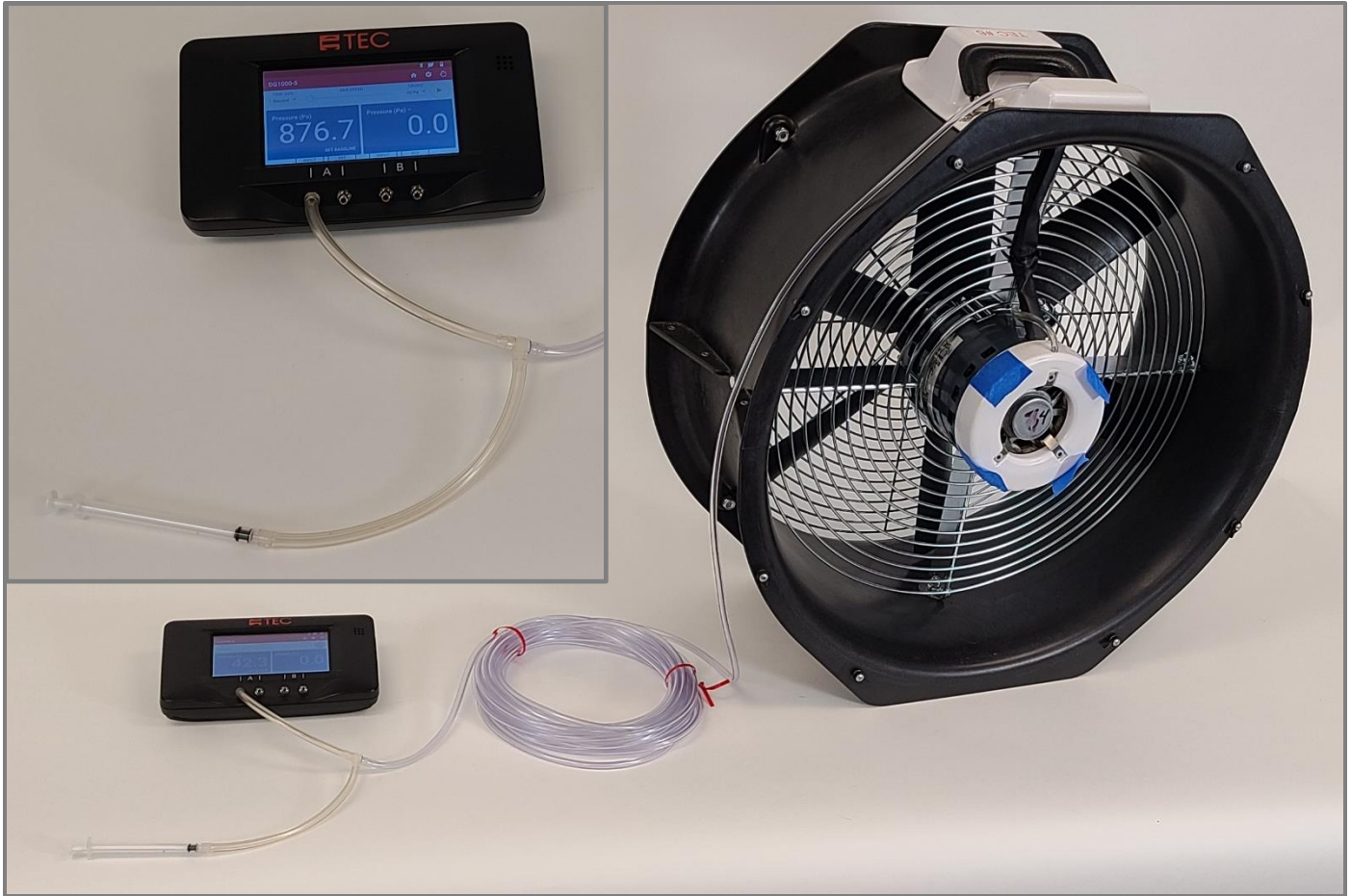
3. Find the 4 intentional sensing holes in the outside rim of the flow sensor (the sensing holes are located at 2, 4, 8, and 10 o'clock). Temporarily seal the 4 sensing holes by carefully covering them with tape.

Tip: use a dark colored painter's tape to be sure it is obvious that the sensor has been taped temporarily. Using clear or white tape makes it easier to forget the tape is there, which makes it impossible for the fan to measure flow.



Painter's masking tape covering each of the 4 sensing holes in the flow sensor.

- Attach one end of the 30' tube to the pressure tap on the blower door. Attach the other end of the tube to a tubing "T". Attach two short lengths of tubing to the "T". Connect one to Channel A of the manometer, and the other one to the 1 ml syringe as shown.



Overall setup for testing the Model 3 flow sensor.

- Remove the plunger from the syringe and be sure the manometer reads 0 Pa.
- Depress the plunger all the way in and start a stopwatch immediately. Do not hold the syringe because the warmth from your hand will raise the pressure.

7. The manometer pressure should spike up to 800 Pa or higher and then begin to drop slowly
8. Record the pressure reading when the stopwatch reads 15 seconds



This sensor measures 971 Pa after 15 seconds. It passes the leak test.

9. Results

Peak Pressure	Pressure after 15 seconds	Result
Less than 800 Pa	or Less than 400 Pa	Fail. The sensor has a leak and should be replaced
More than 800 Pa	and More than 400 Pa	Pass. The sensor is good
Less than 800 Pa	More than 400 Pa	Your Tube may be too long. Measure it.
More than 1200 Pa		Your Tube may be too short. Measure it.

10. Remove the masking tape from the sensor holes.

Checking the Flow Sensor Position

The position of the flow sensor relative to the inlet of the fan housing is an important component of the fan's air flow sensing system. Because the fan flow sensor is attached to end of the fan motor, the position of the flow sensor can change if the position of the motor changes. If a fan has been dropped, the motor may have shifted from its proper position in the motor mount, or the motor mount itself can sometimes bend. This movement of the motor and flow sensor can degrade the fan calibration.

Sensor Position Test for Each Fan

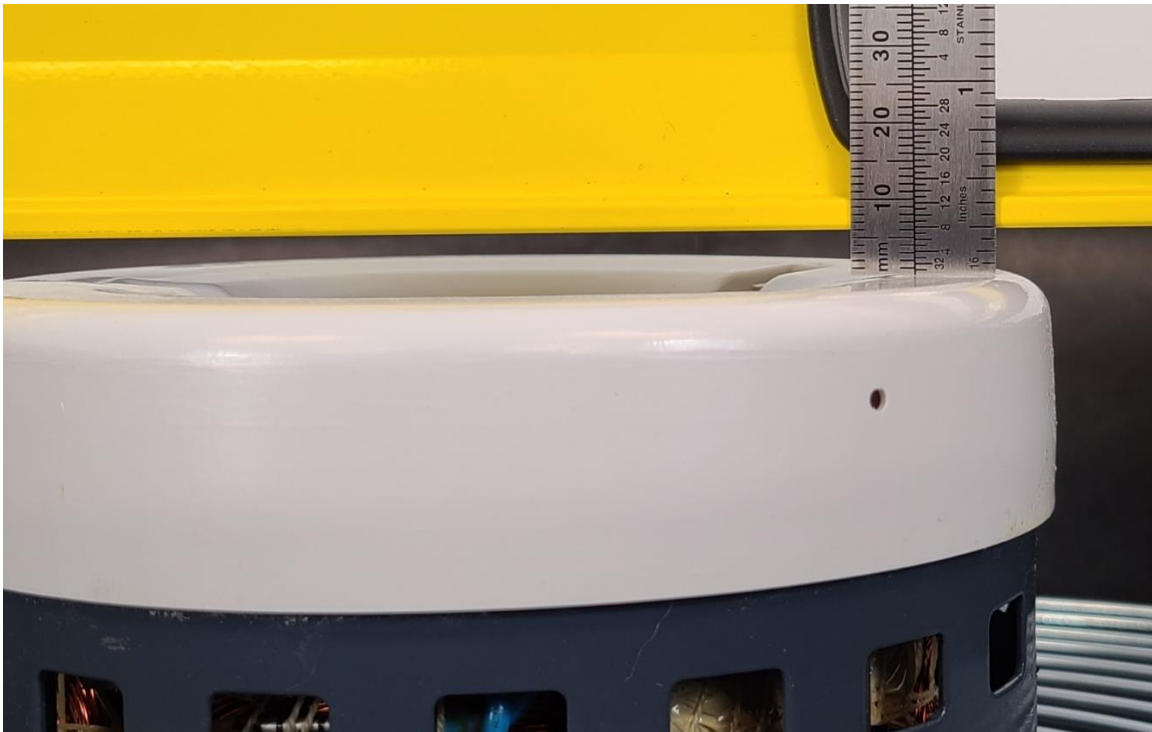
1. Lay the fan on its side with the flow sensor facing up and all flow rings removed. Place a straightedge (such as a heavy yardstick on edge) across the inlet of the fan as shown in the photo.



A straightedge across the fan housing with a ruler to measure the gap.

2. Use a ruler to measure the distance from the bottom of the straightedge to the face of the flow sensor (see photo below). This distance should be in the range of $3/16^{\text{ths}}$ to $5/16^{\text{ths}}$ of an inch (or about 5 – 8 mm). If the flow sensor is within this range, the fan passes this part of the field check

procedure. If the flow sensor is not in the proper position, contact The Energy Conservatory for information about how to repair the fan.



This fan measures just under ¼" or about 6mm from the flow sensor to the straightedge; it's in the middle of the allowable range.

Visual Inspection

- Inspect the motor mount for cracked or broken parts. These are usually the result of the fan being dropped.
 - Broken Welds between the band clamp and the radial struts.



- Broken Between the motor vent tabs and the band clamp



- The same broken weld as seen from inside the housing



- Inspect housing, blades, and guards for broken or damaged parts.
- Inspect the clearance of blade tips relative to the fan housing. There should be about 1/4 inch of clearance.
- Inspect electrical wiring and electrical connections on the fan and the fan speed controller.
- If the fan housing, fan guards, blade, controller, or cords become damaged, do not operate the fan until repairs have been made.
- Examine the motor cooling holes for excessive dust build-up. Use a vacuum with a brush attachment to remove dust or blow out the dust with compressed air.