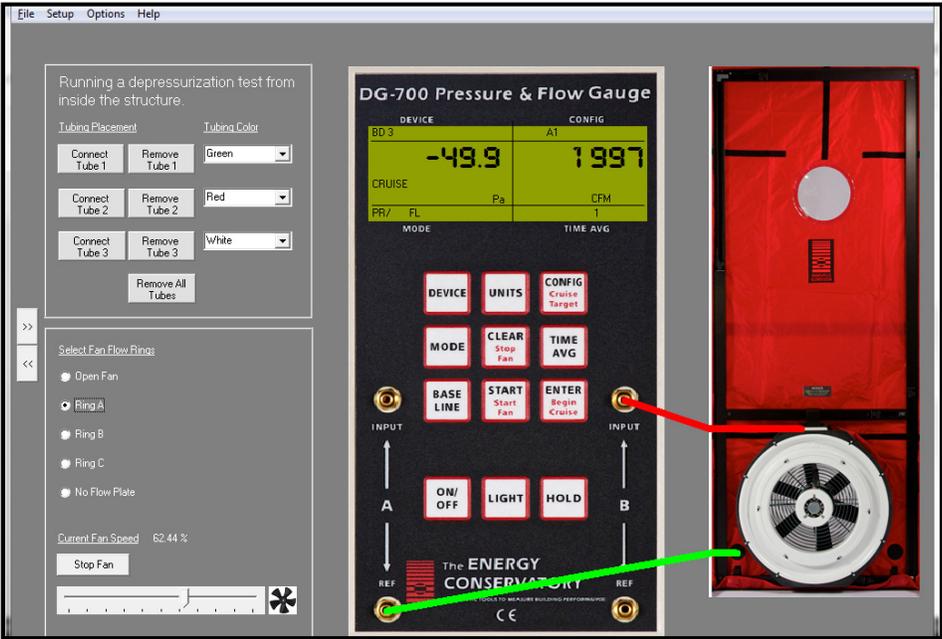


TEC Blower Door Simulator

Software User's Guide



Performance Testing Tools

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Chapter 1 Introduction to the TEC Blower Door Simulator

The TEC Blower Door Simulator is a software training aid that helps trainers demonstrate how to perform a blower door test without having to physically set up a blower door system. The Blower Door Simulator includes a virtual Model 3 Minneapolis Blower Door and DG-700 Pressure and Flow Gauge that can be used to perform a blower door test on a virtual house. Test conditions such as building airtightness, indoor/outdoor temperatures, building style and wind levels can be set to simulate a variety of testing scenarios. The program also includes a RESNET One-Point Test Calculator so that the user can see the effects of temperature and baseline pressure corrections on overall test results using the RESNET test procedure.

Installing the Blower Door Simulator

The TEC Blower Door Simulator is available from The Energy Conservatory website at <http://www.energyconservatory.com/software>. To install the program, first download the program file to any folder on your computer. Double click on the downloaded file to begin installation. The program will self-extract and prompt you through the installation process.

Starting the Blower Door Simulator

To start the program, click on **Start...All Programs...Energy Conservatory...TEC Blower Door Simulator**.

Chapter 2 Overview of the Main Screen

The main program screen includes a virtual DG-700 gauge and Model 3 Blower Door system, along with a simple operator control panel on the left side of the screen.



Operator Controls

The operator controls allows the user to connect and remove tubing between the virtual gauge and blower door system. In addition, the operator can select the flow ring for the blower door fan, and can manually control the speed of the fan using the speed control slider.

Virtual DG-700 Gauge

The buttons on the virtual DG-700 gauge are fully operational and work the same way as a real gauge (including Cruise Control).

Main Menu

At the top of the screen is the Main Menu with the *File*, *Setup*, *Options* and *Help* menus.

- File:* Used to exit the program.
- Setup:* Used to set the test conditions.
- Options:* Used to check tubing and gauge setup, and set other options.
- Help:* Used to access the operation manual and RESNET Quick Guide.

Chapter 3 Setting the Test Conditions

From the **Setup...Set Conditions** menu, a number of variables such as building airtightness (CFM@50), indoor/outdoor temperatures, building style and wind levels can be set to simulate a variety of testing scenarios. Based on the settings, the program will simulate stack and wind effects that you would see during a real blower door test.

Gauge Location and Test Type

You can choose between performing the test with the DG-700 gauge inside or outside the building, and between depressurization and pressurization testing. An example application for choosing “Outside” for the gauge location would be testing individual apartment units by setting up the blower door system from the hallway with the gauge located in the hallway (this can speed up setup when testing many individual apartments).

Building CFM@50

The Building CFM@50 field is the actual airtightness level of the virtual building that you are testing. When you are conducting a blower door test, this CFM@50 value is the final test result you are attempting to measure.

Inputs that Affect Baseline Readings and Air Density

An important aspect of the Blower Door Simulator is the ability to see and learn how both baseline pressures and differences in air density affect blower door test results. Failure to adjust your test results for these effects will reduce the accuracy of your test.

Baseline envelope pressures are impacted by both stack and wind effects. Stack effect is a function of inside/outside temperatures and the height of the building. Air density effects are a function of both inside/outside temperatures and building elevation above sea level. Wind can also create baseline pressures, and can introduce variability into the test readings.

Although the DG-700 gauge can make adjustments for measured baseline pressures by using the BASELINE function, it cannot make adjustments for changes in air density (these adjustments are normally made in software programs like TECTITE). However, the Blower Door Simulator includes a RESNET Test Calculator (available in the **Options** menu) which allows you to make adjustments to your test results for both baseline pressures and air density differences.

The screenshot shows the 'Set Test Conditions' dialog box with the following settings:

- Gauge Location:** Inside, Outside
- Building CFM@50:** 4000
- Indoor Temp (Fahrenheit):** 68
- Test Type:** Depressurization, Pressurization
- Outdoor Temp (Fahrenheit):** 20
- Elevation Above Sea Level (ft):** 450
- Fan Type:** Model 3 110 V
- Building Style:** 1 Story, 2 Story, 3 Story, Warehouse
- Wind Conditions:** No Wind, Light, Moderate, Strong, Gusty

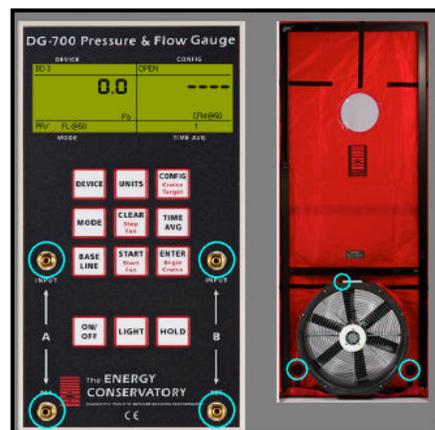
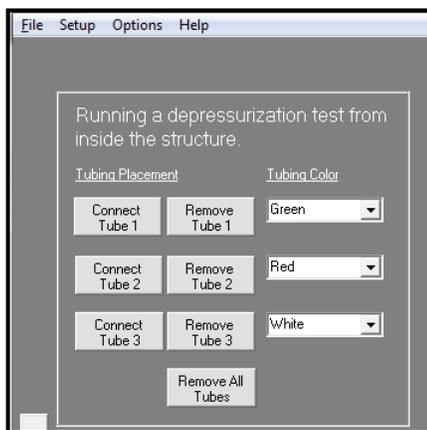
An 'OK' button is located at the bottom center of the dialog box.

Chapter 4 Checking Tubing Connections and Gauge Settings

Connecting Tubing Between the Gauge and the Blower Door

When you click on **Connect Tube 1** in the operator control panel, circles will appear around the seven possible connection points on the gauge and blower door system (including the four pressure taps on the DG-700 gauge, the pressure tap on the blower door fan, and the two holes at the bottom of the red nylon blower door panel). To connect the tubing, first click on one of the four DG-700 pressure taps and then click again on one of the other three locations. The tubing can be removed by clicking on **Remove Tube 1**. Repeat the process for Tube 2 (and Tube 3 if needed).

We typically recommend that Tube 1 be used to measure building pressure, and Tube 2 (and Tube 3 if needed) be used to measure fan pressure/flow.



Checking the Tubing and DG-700 Setup

After completing the tubing connections necessary to perform the blower door test, you can have the Simulator program analyze your tubing setup by using the **Options...Check Tubing Setup** menu item. The program will provide a message(s) indicating whether or not the current tubing setup is consistent with the gauge location and test type indicated in the **Set Test Conditions** window.

You can also have the Simulator program analyze the DG-700 gauge settings by using the **Options...Check DG-700 Gauge Settings** menu item.

Chapter 5 Using the RESNET One-Point Test Calculator

The Blower Door Simulator program includes a simple calculation utility that allows the user to enter blower door test data collected from the virtual DG-700 gauge (baseline pressures, nominal building pressure and fan flow values), and along with the temperature and elevation settings from the **Set Test Conditions** screen, calculates a corrected **CFM@50** flow value. The calculator utility is based on the RESNET One-Point Airtightness Test, in accordance with Chapter 8 of the RESNET Standards (adopted in 2012). The corrected **CFM@50** value includes corrections for baseline pressures and air density, and can be compared directly to the **Building CFM@50** value in the **Set Test Conditions** window to see if your test results closely match the real airtightness value for the virtual house.

Displaying the RESNET Test Calculator

To display the RESNET Test Calculator on the left side of the screen, use the **Options...Display RESNET Test Calculator** menu, or simply click on the right facing arrow (>>) on the left side of the screen. You can hide the RESNET Test Calculator by clicking on the left facing arrow (<<) on the left side of the screen.

In the Test Calculator, you can input 5 baseline readings and a nominal (unadjusted) building pressure and fan flow reading (in accordance with the RESNET One-Point Test procedure). Using these values, as well as the temperature and elevation settings, the utility will calculate a corrected **CFM@50** flow value. In the case shown below, the corrected flow of 4,002 CFM@50 matches closely with the real airtightness value of 4,000 CFM@50 for the virtual house. The **Help** menu contains a copy of our RESNET One-Point Test Quick Guide document which can be used to better understand the RESNET testing procedure.

