

Guarded blower door testing for multifamily or large non-residential buildings

This document is intended for testers that are using TECLOG3 to control multiple blower door fans during a guarded test. Often buildings have adjacent zones that are conditioned and have no intentional openings between those spaces and the main section of the building. An example of this type of space could be a mechanical room. Other buildings might be a series of very large attached spaces with no intentional openings between these spaces. In order to test the leakage of the enclosure, you may need to set up blower doors in each separate space and maintain an equal pressure within the entire building enclosure. Occasionally, adjacent spaces like this are well connected to each other and act more like one large open space. This presents a special condition that may require some different testing techniques.

Choose a Primary Zone

The recommended protocol is to choose one space as your primary zone. This will likely be the largest or most central space. Your envelope pressures all need to have their **inputs** in the Primary Zone if you expect your envelope pressure to be meaningful at all times. Otherwise you will not know what your envelope pressure really is until ALL of the fans are stabilized and all of your other zones have reached their targets (near zero). The blower doors in the other spaces will be configured to 'follow' the pressure of the primary zone. As always, you will try place your DG-700 gauges to minimize tubing length. Figure 1 shows an example of gauge placement and tubing connections.

Set other spaces to 'follow' the Primary Zone

We want the pressures in each space to change by the same amount of pressure during the test. So if the Primary Zone changes by 75 Pa, we want all of the other spaces to change by 75 Pa. We can accomplish this by first recording the baseline pressures, as you usually do, between the other spaces With Respect To (WRT) the Primary Zone with the building in test conditions. You can retrieve the zone WRT primary baseline value by clicking on the POR and then viewing the value on the appropriate channel. The baseline readings will then be entered into the TECLOG3 cruise targets for each fan in the other spaces. As the pressures change in the primary zone all other spaces will try to get back to the pre-existing baseline pressure they had WRT the Primary Zone.

Occasionally adjacent spaces are well enough connected to the Primary Zone that the spaces will be at the same pressure without the blower doors turning on in the adjacent spaces. If this occurs you should link the fans in those adjacent spaces to the master control.

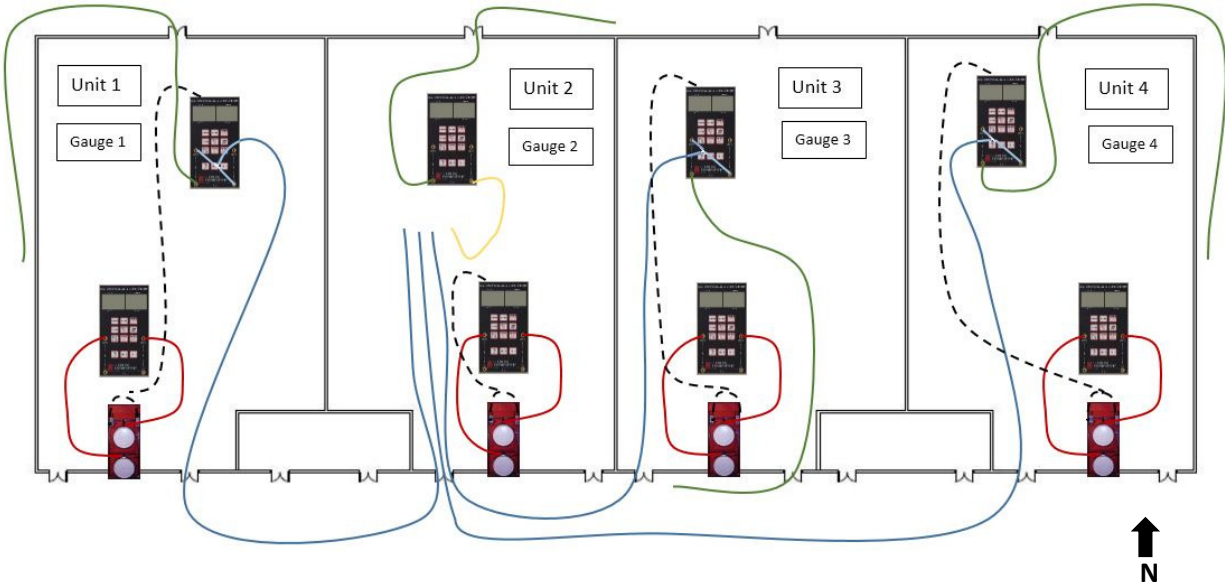


Figure 1

Tubing connections

In Figure 1 above, Unit 2 is set up as the Primary unit. The Primary unit will use the average of four envelope pressures, one on each side of the building, to determine the induced pressure caused by the operation of the blower doors. It is recommended to have all four of the envelope pressures measuring Unit 2 With Respect To (WRT) outside. Units 1, 3, and 4 will be set up to 'follow' the pressures in Unit 2.

You will notice that Gauge 1 in Unit 1 has a green tube running from the west side of the building to the reference of Channel A. The input of Channel A and the Reference of Channel B are connected with a Tee to a blue tube running to Unit 2. In other words, Channel A is reading the West side of the building WRT Unit 2 and Channel B is reading Unit 1 WRT Unit 2. Gauges 3 and 4 are set up in a similar fashion so Channel A reads Unit 2 WRT a side of the building and Channel B reads the unit the gauge is in WRT Unit 2.

The other four gauges are for reading fan flow of the lower blower door fan on Channel A and the upper blower door fan flow on Channel B.

Controlling the blower door fans in TECLOG3

Blower door fans are controlled in TECLOG 3 by using slide controls and/or cruise control. Each blower door speed controller must be connected to a DG-700 using a 3.5 mm cable. Each DG-700 can control as many as 6 blower door fans by using cable splitters. The default setting in TECLOG3 is to link each gauge to the master control. The Master Control will use the average of all envelope pressures. If you do not want a DG-700 linked to the Master Control, you will need to go to the Configuration pull down menu and choose Settings. Uncheck any link box in the Configuration Settings page (see figure 3) that you do not want linked to the Master Control. If you have chosen not to link a DG-700 to the Master Control, you will need to choose whether you want to use Channel A or Channel B of the gauge as your control / cruise pressure. You will choose Channel A or Channel B by going to the Channel Setting page and clicking on Cruise Settings (see figure 3).

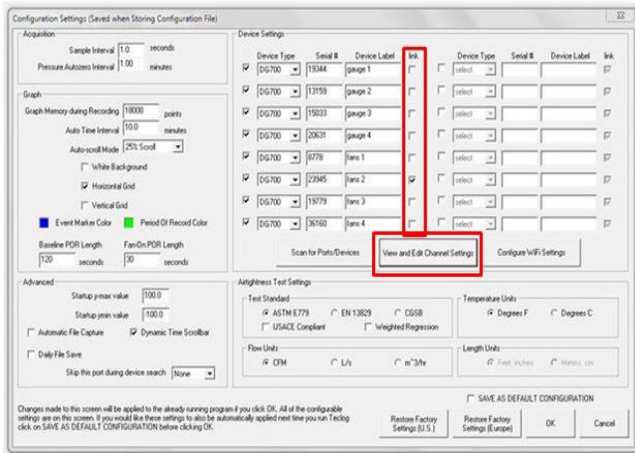


Figure 2

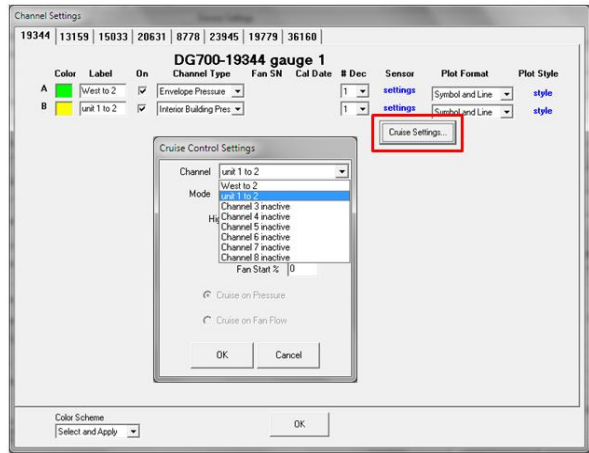


Figure 3

For this example, you will want to link the DG-700 that is measuring fan flows in Unit 2 to the Master Speed Control so it will be targeting the average envelope pressure based on the four Envelope Pressure channels. All other DG-700s can be unlinked. The Cruise Setting for Gauge 1 in Unit 1 should be set to channel B, which is reading Unit 1 WRT Unit 2. The Cruise Settings of Gauge 3 and Gauge 4 will also be channel B. Fan control cables and splitters must be used to connect the DG-700s to the respective fans in each unit. After configuring the gauges and channels in TECLOG3 you will create a Baseline Period of Record. It is good practice to add the Baseline Envelope Pressure reading to your target pressure (ie. 75 Pa) so the blower door will be inducing a pressure of 75 Pa on Unit 2. Figure 4 shows Unit 1, 3, and 4 WRT Unit 2 baseline numbers entered in for the Gauge 1, 3, and 4 Cruise targets. The gauge for the Unit 2 fans has a target of -74.9 entered for a cruise number (the baseline average of the four envelope pressures (0.1) added to the -75 Pa induced pressure). You will control the blower door fans in Unit 1 by using the baseline of Unit 1 WRT Unit 2 as the cruise setting. The same is true for Units 3 and 4, the cruise setting for the two fans in each unit will be that Unit WRT Unit 2

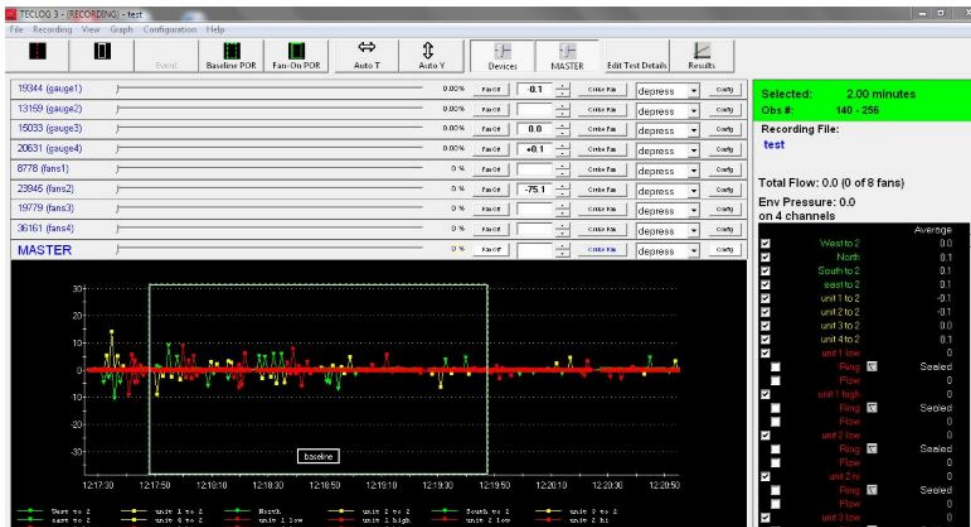


Figure 2

Well-connected units

Occasionally, you will come across sections of a building without intentional openings between them that are well connected by unintentional openings or possibly connected through ductwork. Let us use an example where Units 1 and 2 are well connected, Units 3 and 4 are well connected, but there is no connection between units 2 and 3. If we turn on the blower door fans in Unit 2, the Unit 1 WRT Unit 2 pressure changes very little. The two units are acting like one unit as though there is not a wall between them. If the blower door fans in Unit 1 are set to cruise zero induced pressure between the units, the blower door fans will not turn on. In this case, you can use the slide bars for the two fans in Unit 1 to increase the fan speed until the desired induced envelope pressure is achieved or the fans in units 1 and 2 could be linked to the master control so they would all come on. In this example, the fans in Unit 3 and 4 would come on as pressures change in Unit 2.

It may be worth it to diagnose these interconnections before you set up all of the blower door fans. You could start by setting up blower door fans in the Primary unit and turn them on and note how pressures are changing in adjacent spaces as you adjust the fan speeds. If the adjacent spaces WRT the Primary Zone pressure is less than 10% of the target test pressures and you are able to reach all of your target test pressures, you can simply monitor the adjacent space pressures and not set up the blower door fans in those spaces.