Residential duct leakage tester comparison

Includes specifications and information commonly available from public sources.
Actual performance will vary.

The Energy Conservatory (TEC)

Duct Blaster® Series B

System includes:
- Manual Fan Speed Controller on powercord
- DG 700 gauge (replaced by DG-1000), add on WiFi optional.
- 3 Flow Rings ranging from 10 CFM to 650 CFM*
- Black Flange that is taped to the return grill
- Color tubing with brass connections
- Twelve feet of 10 in. diameter flex duct
- Sports Bag style Carrying Case
- Roll of 8" DuctMask™
- Manual in Black and White

* Flow rates are limited to 650CFM due to resistance of flex, register and blower. Axial fan is affected by backpressure.

Retrotec (Rt)

Model 341 DucTester

System includes:
- Built in Fan Speed Controller.
- DM32 iPhone style smart gauge, built-in WiFi optional.
- 3 Flow Rings ranging from 10 CFM to 675 CFM **
- Clear Flange with hooks that attach to the return grill
- Color coded tubing with matching color connections
- Twelve feet of 10 in. diameter flex duct.
- Custom Carrying Case.
- Roll of 12" Grill Mask™
- QuickGuides with color pictures

** Flow rates are limited to 675 CFM due to resistance of flex, register and blower. Centrifugal blower not affected by backpressure.

Sports style bag holds all the equipment needed for testing.

The custom case has a stiff lid for use as a gauge stand. Exterior vented pocket keeps corrosive smoke puffer from destroying electronics.

® Duct Blaster is a Registered Trademark of The Energy Conservatory

Duct tester performance and application

Duct leakage testing for <u>new</u> construction is typically between 40 to 180 CFM depending on floor area and Code requirements. <u>Old</u> houses can be above 500 CFM. Both systems will measure duct leakage in any old or new house.

Test Equipment and Calibration complies with	
• ASTM E 1554 - 03 • ASHRAE 152 • RESNET • All State Codes	• Internationally recognized ILAC ISO-17025* accredited calibration lab. • ASTM E 1554 - 03 • ASHRAE 152 • RESNET • All State Codes

TEC Pros

- Slightly smaller and lighter
- When mounted to air handler cabinet, it can create over 1000 CFM of flow.
- Gauge can be upgraded to tablet style for $450.
- Calibration cost $100 every two years.
- Many people have been trained on how to use them.
- Military style connectors.

Retrotec Pros

- FREE online training course included.
- Most just use the illustrated Quick Guides.
- Calibrated in an ISO 17025 Accredited Lab.
- Remembers all your set up for next test when turned off.
- Optional flow ranges go down to 0.02 CFM allowing it to be used for a variety of new applications, such as testing windows.
- Universal gauge will operate all systems from Retrotec and TEC
- Follow easy to use color icons on gauge to eliminate set up time and errors.

TEC Cons

- Flow ranges can be installed backwards and on the wrong side of the fan.
- When performing depressurization tests, the flow conditioner and reference tube must be installed.
- Large errors will occur when using Open range on a flex because the maximum backpressure of 100 Pa is so easily exceeded.
- Gauge returns to factory defaults when turned off which forces Device, Mode and Range to be reset for each test.
- Letter codes for Devices, Ranges and results can be misinterpreted.

Retrotec Cons

- The End Plate may come loose inside the flex while depressurizing but that can be corrected with the polyurethane tape supplied. Later versions have a tighter fitting End Plate.
- Mounting bolts that run through the fan shell can cause it to crack but there is 10-year warranty on the shell. Later models have a metal backing plate that has corrected this weakness.
- Gauge calibration is $165 but only has to be done every 5 years.

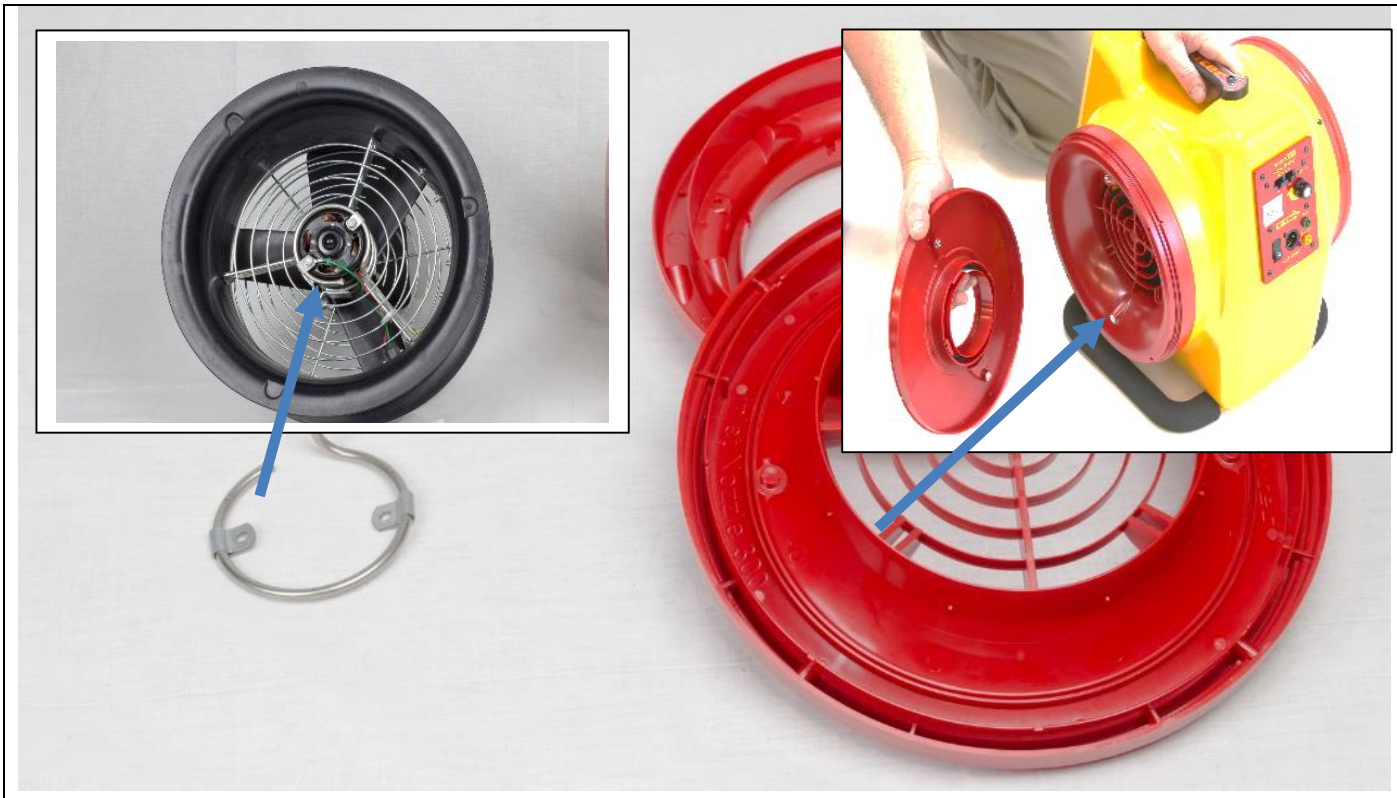
Four flow ranges are included for flows from 10 to 650 CFM through flex duct and register. Optional Ring 4 measures down to 2.4 CFM.*

Four flow ranges are included for flows from 10 to 675 CFM. Optional ranges go down to 0.02 CFM

* More flow can be achieved where flex duct is not used and fan is taped onto air handler cabinet.

Connect range plates using the U-shaped molding.

Snap range plate and/or plugs into place with super magnets.



Flow Sensor is a metal tube that is screwed onto the motor. It has holes on the downstream side used to measure flow.

Flow Sensor is a venturi nozzle with two annular pressure damping chambers for flow and reference pressure. It is built into the fan housing.

Speed control knob (blue arrow) or controlled by gauge. Power and tubing connections shown. Luggage style swiveling handle (blue arrow).

Built in speed control knob (blue arrow) with indicator lights or controlled by gauge. Color-coded tube connections. Built in handle (blue arrow).

Duct Blaster® Series B

Depressurization requires the attachment of the Flow Conditioner with U molding and an additional tube from Channel B to the flange.

Model 341 DucTester

Depressurization requires no tubing changes. Optional quick collar makes this connection fast.

Set the fan on the foam base to prevent it from rolling. Fan can be used as an optional powered flow hood.

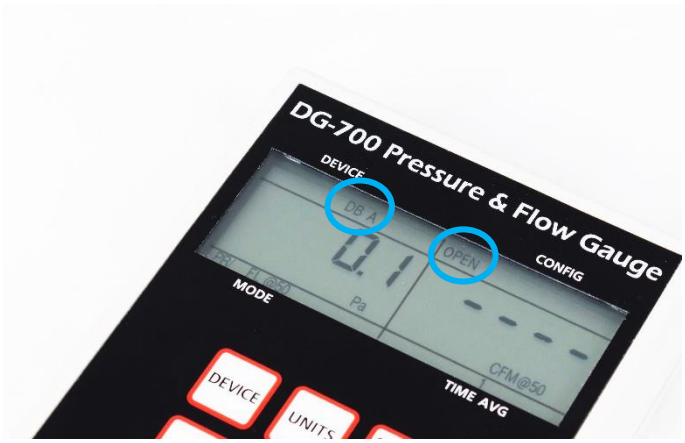
Padded aluminum base provides stability and is used for handheld powered flow hood operation.

DG-700 Gauge

A pouch-style case protects the DG700. Gauge stand is a plate with Velcro to hold the gauge and a clamp to secure it to a door.

DM32 Gauge

Padded 'lunch box' style case for carrying the gauge and all the accessories also acts as a gauge stand.



To start the test, press ON, then 10 clicks on 5 keys. Device and Range are shown as character codes. Settings are not saved.

To start the test, tap the Power Button. Device and Range are shown as color image. Settings are saved.

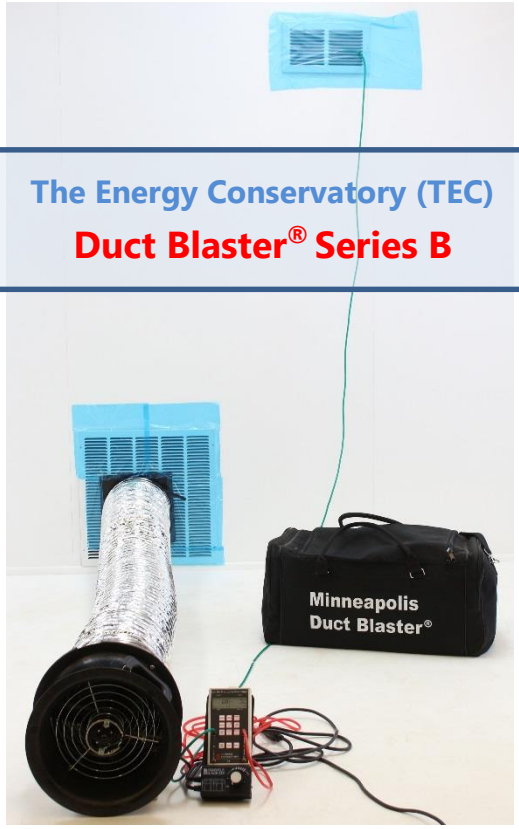
Velcro loops mount to a speed control plate that will clamp to a door.

Rubber non-skid pads, a belt clip and super magnets are the attachment choices.

Duct Blaster® Series B	Model 341 DucTester
	
Uses six AA batteries.	*Built-in Lithium-ion battery recharged from a USB charger in the office or vehicle like a cell phone.*
Gauge specs	
Accuracy: **1% of reading** Cruise Control: **0, 25, 50 and 75 Pa unless WiFi Link is used** Duct testing results: **Flow in CFM. Other units available by connecting to WiFi add-on** Compatible duct testing Devices: **TEC Duct Blaster B or Tru-Flow Grid**	Accuracy: **1% of reading** Cruise Control: **any pressure** Duct testing results: **Flow in CFM, CFM/sq ft, CFM/100 sq ft & CFM/1000 sq ft** Compatible duct testing Devices: **Retrotec Model 240, 340, 350 DucTesters** **TEC Duct Blaster B or Tru-Flow Grid**
Fan specs	
Dimensions and weight: **10 in. diameter, 7 in. length, 8.5 lbs. with 3 flow rings. System 27 pounds.** Motor **Can be operated for up to 2 hours at one time.** Test direction: **Test in both directions. Only when depressurizing, the clear reference hose and flow conditioner must be used.** Maximum pressure in flex: **100 Pa** Accuracy claimed: **± 3%** Warranty: **2 years** Price: **$2075**	Dimensions and weight: **13 x 11 x 13.25 in., 9 lbs. with 2 flow rings System 26 pounds.** Motor **Continuous duty impeller designed for over 100,000 hours of operation.** Test direction: **Works in both directions without changes to set up.** Maximum pressure in flex: **500 Pa** Accuracy claimed: **± 3% ISO 17025 Accredited** Warranty: **2 years, 10 years on shell.** Price: **$2175**

Myths & Facts

Perform these tests yourself to learn how to use your equipment accurately



The Energy Conservatory (TEC)
Duct Blaster® Series B

Retrotec (Rt)
Model 341 DucTester

Myth #1 : The Duct Blaster will measure duct leakage over 1,000 CFM.

Fact When the Duct Blaster is on a flex duct which is attached to a return register, it typically cannot achieve the rated flow of 1000 CFM on Open Range. Because of the backpressure, it will read much higher than the actual flow.

Proof

1. Install your Duct Blaster on a return using the flex in pressurize mode on Open Range.
2. Seal one supply register closest to the plenum and measure duct pressure there.
3. Run the Duct Blaster at full speed, then seal off registers until 25 Pa is achieved.
4. Measure the Duct Blaster Flow rate. Do NOT use the @ pressure feature.
5. Now run the the Duct Blaster at full speed on Ring 1 and again measure the Duct Blaster Flow rate using the @ 25 Pa feature to establish the actual flow required to get 25 Pa.

What was learned about the Duct Blaster

Ring 1 should give the same reading as Open Range. Open Range errors start to increase when back pressures are well in excess of the 100 Pa stated in the Manual. At extremely high back pressures, Open Range will still read high flow rates even though it should read zero (see Myth #2).

What was learned about the Retrotec DucTester

The Model 341 uses a centrigual blower which is not affected by back pressure and will usually get more flow than the Duct Blaster on a flex duct.

TEC Duct Blaster when completely sealed at the outlet creates 414 Pa and flow reads 706 CFM even though it's actually zero.

Retrotec DucTester completely sealed creates 656 Pa and flow reads correctly at 0 CFM.

Myth #2 : The Duct Blaster will measure 800 CFM at 500 Pa (two inches of water).

Fact In this example, the flow is zero but the Duct Blaster incorrectly displays 706 CFM at 414 Pa pressure even though the flow must be zero since the outlet is taped off.

Proof

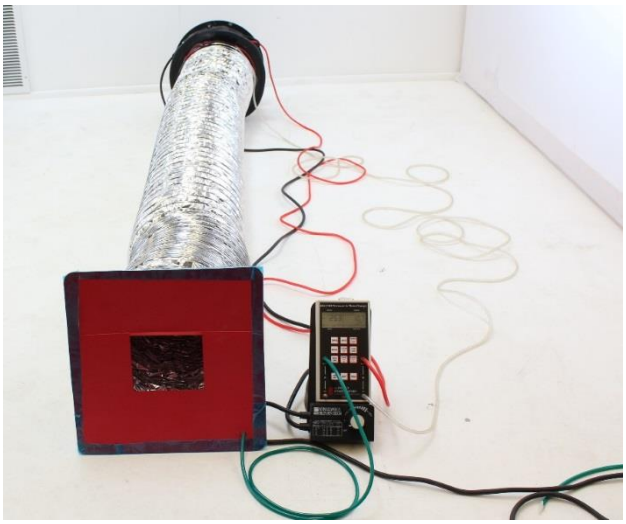
1. On Open range, tape the back of your Duct Blaster to the floor with a static pressure probe underneath.
2. Tape it to the floor
3. At full speed and read the flow rate.

What was learned about the TEC Duct Blaster

The flow rate should read zero because the outlet is completely blocked. The axial fan blade is causing flow to pass the sensor in a circular fashion which gives a flow reading where no net flow through the Duct Blaster actually exists. The 414 Pa back pressure exceeds the maximum 100 Pa the Duct Blaster is rated for so you need to keep this in mind.

What was learned about the Retrotec DucTester

The Model 341 DucTester is not affected by back pressure. In a similar situation you will read a pressure of about 650 Pa but the flow will correctly register 0. The Model 341 uses a centrigual blower and sophisticated fault analysis to prevent erroneous readings.



Myth #3 : I know my Duct Blaster is accurate because I checked it out on the Field Calibration Plate.

Fact The Duct Blaster Field Calibration Plate is only designed to work while depressurizing but chances are you've been trained to test in the pressurization direction so you have not tested your system in the way you're using it.

Proof

1. Install your Field Calibration Plate or cardboard with a 4x5" hole on the end of your flex.
2. Measure the CFM on Ring 2 and 3 while depressurizing the flex with the Flow Conditioner.
3. Now perform the same test on Ring 2 and 3 while pressurizing the flex without the Flow Conditioner.
4. Perform additional tests on ducts by using Ring 2 and 3 or Ring 1 and 2 in both directions and compare the results.

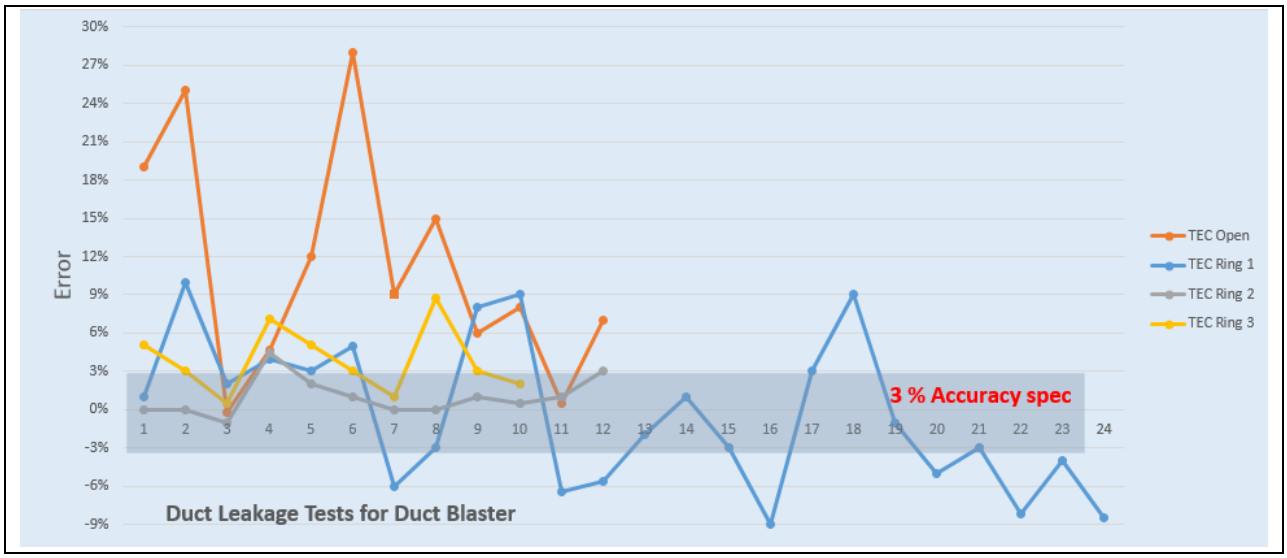
What we learned about the Duct Blaster

You should read 107.5 CFM at 25 Pa on the 4x5" hole, 106 CFM in the TEC field Cal plate, 99 CFM on the Retrotec DU159 plate and 98 CFM on the new Red Cal Plate that fits the new Retrotec Clear Flange. You should find depressurization readings are fairly close to these values.

In pressurization, you will typically see Ring 3 reading 20% low, with 5 to 10% errors on Ring 2 being commonplace. This does not necessarily mean these Ranges are in error but it is sure hard to verify that they're ok. For this reason, we recommend only testing in the depressurization direction which has the added advantage that the register seals won't get blown off. In WA and CA you require a pressurization result, so pass the test in depressurization first, then if all is ok, flip the duct tester around to get a pressurization result.

What was learned about the Retrotec DucTester

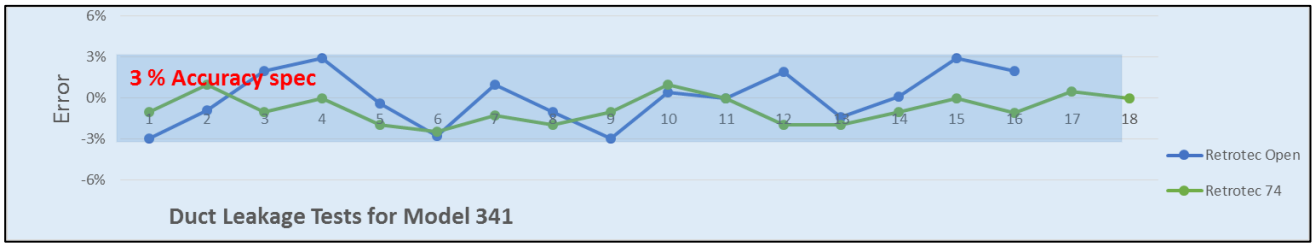
The Model 341 DucTester's Field Calibration Plate works in both directions. You can verify your DucTester is reading correctly no matter what direction you test in.



Field Tests of TEC Duct Blaster® on all Ranges showing accuracy on 10 second averaging.

What was learned about the Duct Blaster®

1. Results were irregular on actual duct systems when 10 second averaging was used but were close to ±5% for 60 second averaging.
2. High backpressures caused by the flex duct while on Open Range created such large errors as to make in unusable.
3. Ring 1 is much more accurate and has about the same flow rate eliminating the need to use Open Range.
4. Perform only depressurization tests because they're faster and can be confirmed with the Field Calibration Plate.

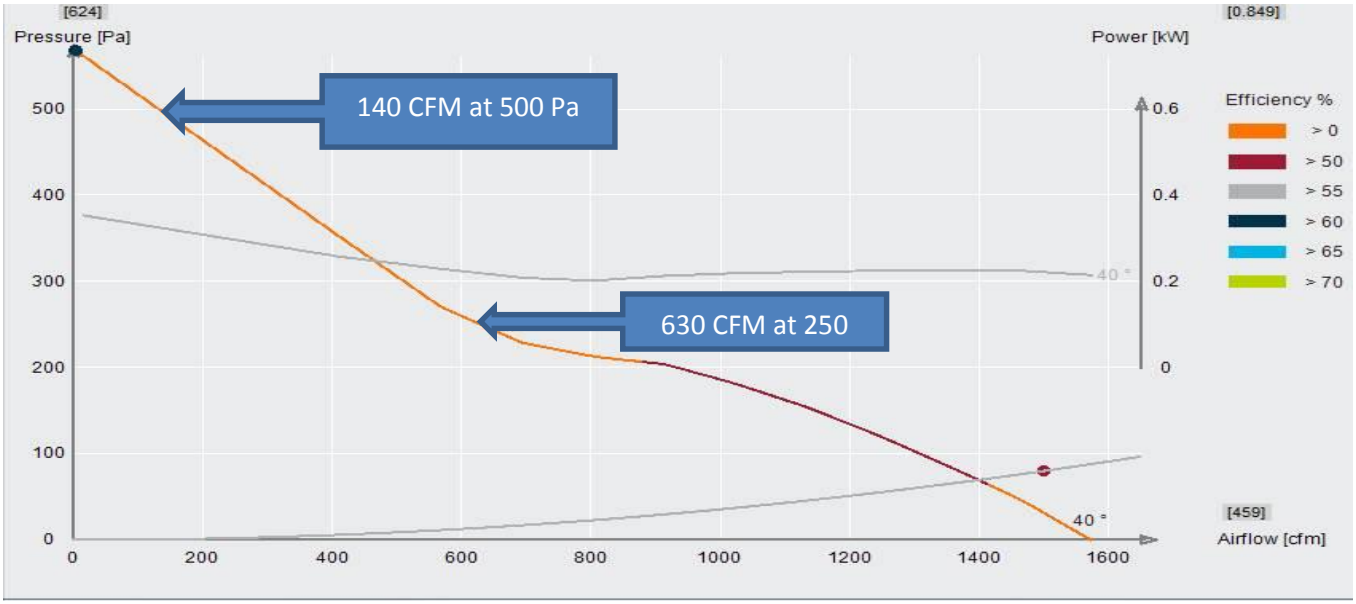


Field Tests of Retrotec DucTester on Open and 74 showing accuracy on 10 second averaging.

What was learned about the Retrotec DucTester

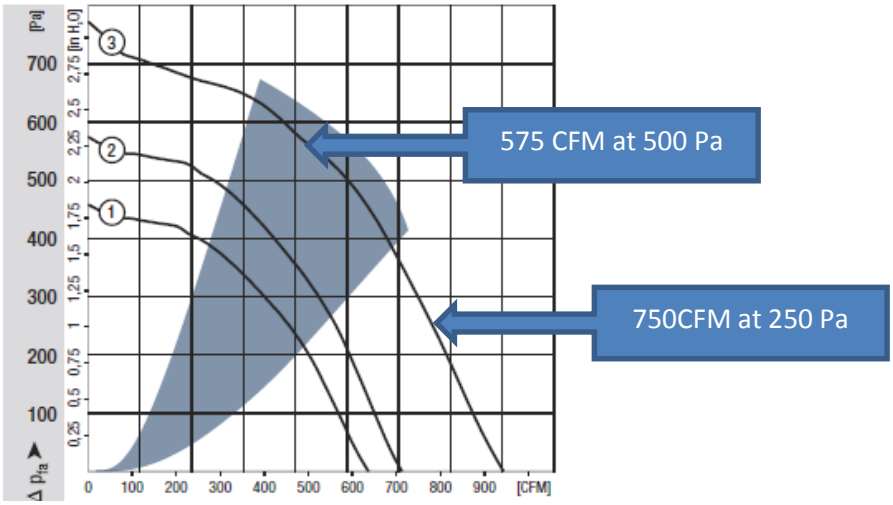
1. Accuracy of ±3% easily obtained for 10 to 20 second averaging.
2. Perform depressurization tests because they're faster.
3. Confirm accuracy by using a Field Calibration Plate in any test direction.
4. Range 47, 29 and 18 are for very low flows and appear to be very accurate.

How does the TEC axial fan compare to the Retrotec centrifugal blower?



TEC Fan Curve shows 650 CFM at 250 Pa

The TEC axial fan performs well against small back pressures and is well suited to tests that do not require a flexduct. At 250 Pa the TEC fan flow drops to 630 CFM and at 500 Pa has dropped to 140 CFM.



Retrotec Fan is Curve "3" which shows 760 CFM at 250 Pa

Retrotec blower creates 750 CFM at 250 Pa and still delivers 575 CFM at 500 Pa making it well suited to testing ducts.