

DUCT AIRTIGHTNESS TESTING WITH TEC'S DUCT BLASTER®

Product uses, fan styles and the latest specifications

Executive Summary:

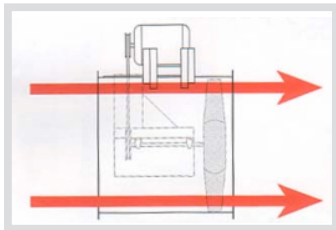
This paper explains important considerations that help weatherization professionals and HVAC contractors identify the best product for their duct airtightness testing needs. It also describes differences between various styles of fans that are used for performance testing of forced air distribution systems in both houses and light commercial buildings. Airtightness measurements of ducts are used to diagnose and demonstrate leakage problems, estimate efficiency losses from duct leakage, and certify code compliance with duct leakage standards such as IECC 2012 and 2015 and California's Title 24 Building Energy Efficiency Standards.

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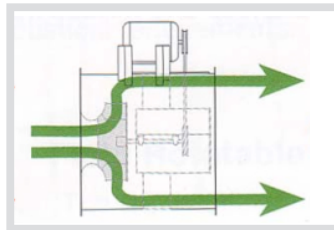
TWO DIFFERENT FAN STYLES

First, it is important to understand the difference between two general styles of fans used for duct airtightness testing: axial and centrifugal fans. These two fans behave differently and is best used for certain types of testing.



Axial Fans

Axial fans look like a common household floor or box fan; the main air flow direction is straight through the fan, parallel to the shaft. Generally, axial fans are designed to create a higher flow at lower back pressures and they are more sensitive to back pressure.



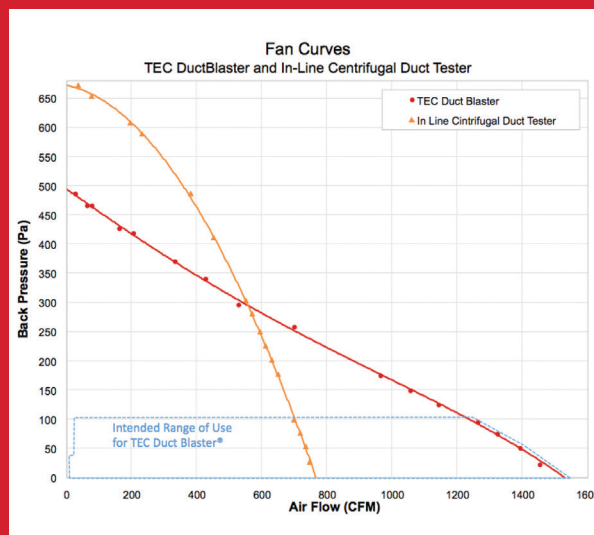
Centrifugal Fans

Centrifugal fans look like the industrial floor fans or the blower inside a furnace air handler. Most often, the air enters on one side and exits the fan at a right angle to the shaft and the inlet, but centrifugal fans can also be ducted "in-line," such that the inlet and outlet are oriented in a straight line. Compared to axial fans, centrifugal fans will create a somewhat lower flow rate at low pressures given the same motor, but will create higher flows at higher back pressures and be less sensitive to changes in back pressure.

WHY DO FAN STYLES MATTER?

They matter because TEC's fan is an axial fan, so just as one would expect, air moves differently through TEC's axial fan when compared to other types of fans. TEC's Duct Blaster moves more air and is more sensitive to back pressure. Centrifugal fans move less air, and are impacted less by higher back pressures. This difference in fan style explains most of the differences shown in product comparisons.

The easiest way to show the performance difference is with a fan curve showing air flow vs. back pressure. As you can see in Figure 1 below, an axial fan produces higher flow at lower pressures, whereas the centrifugal fan produces higher flow at higher pressures.



DIFFERENT FANS ARE DESIGNED FOR DIFFERENT PURPOSES

The Minneapolis Duct Blaster was designed as the first commercially available duct tester for residential applications, and was dual purposed as a mini blower door for markets with smaller, tighter housing units. Both of these purposes require pressurization of under 75 pascals (Pa), usually 25 or 50 Pa, for which an axial fan is well-suited.

The higher maximum flow of the Duct Blaster axial fan is what makes it ideal for use as a mini blower door. At a pressurization of 50 Pa with an open fan, the Duct Blaster will produce 1350 CFM, while competing products are specified at only 760 CFM, a difference of more than 75 percent. Is this important? It certainly is when technicians need to return to their vehicle or workshop to get a larger fan.

When using an axial fan, contractors are able to test more housing units because the fan is capable of meeting the flow requirements for larger or leakier houses. Whereas, a centrifugal fan of the same weight likely will test fewer housing units because of its flow limitations.

When testing at a pressurization between 25 and 50 Pa, TEC's Duct Blaster allows contractors more flexibility with its test range, meaning they can get more done with a single product. For duct testing at higher pressures review the Duct Blaster manual Appendix A, section A.2.c "Operating Under High Backpressure Conditions:" which explains the back pressure limitations of the Duct Blaster Fan.

Duct Blaster Use and Misuse

TEC's Duct Blaster is used for performance testing of forced air distribution systems. Since the Duct Blaster is designed for that specific use, it will produce inaccurate readings when used improperly, for example, if it is taped with the outlet onto the floor. As with all tools, the Duct Blaster needs to be used in the application for which it was designed, and not purposefully misused. Inaccuracies upward of 20 percent are simply a result of improper testing and have no basis in practical testing of ducts.

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WHEN ACCURACY MATTERS, TRUST TEC

Over the years TEC has continuously improved the design of its products to ease customer use and keep up with the demands of new technology. TEC's Duct Blaster has been tested on duct systems in many independent and national laboratories and found to be within specification of +/- 3 percent. These calibration specifications include variation because of production tolerances of the fan and calibration error of the gauge.

The Duct Blaster fan meets the flow calibration specifications of the following standards: CGSB 149.10-M86, ASTM E779, ASTM E1827, ASHRAE 152, EN 13829, ATTMA TS1, NFPA 2001, RESNET and USACE. TEC is always interested in partners who share our commitment to credible testing and following protocol with the intention of improving the industry.

For assistance with testing, refer to the Minneapolis Duct Blaster Operation Manual or give us a call at (612) 827-1117. TEC's customer support is here to help you answer questions and guide you through intended uses for the Duct Blaster so you get the most accurate readings.

For more information about the Duct Blaster visit DuctBlaster.com

CONCLUSION

It's important for industry professionals to know the difference between axial and centrifugal fans because each fan style has specific uses and limitations. TEC's Duct Blaster is an axial fan, so it is designed to create a higher flow at lower back pressure. The Duct Blaster is best used for quick and accurate airtightness measurements from 10 – 1,500 CFM, for tests under 100 Pa of pressurization. Every product of ours has specific uses for which it is intended. When following protocol for product use, TEC's Duct Blaster gives professionals the most flexibility in testing with the accuracy TEC is known for.

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