



# DUCT BLASTER TEST

## Duct Pressure Testing History

The earliest duct leakage testing was set in the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) standards for duct construction and involved an audible leakage test for high-velocity ductwork in 1969. <sup>1</sup> However, until residential codes required duct leakage testing in 2009, no pressure testing of ductwork was required except for high-velocity/high-pressure duct systems per the SMACNA standards.

Research during the early 80's by SMACNA and others showed the duct leakage was dependent on:

- The **openings** in the duct system (tightness level)
- The **pressure** in the duct system

Velocity had little impact on leakage rates, and thus most duct leakage standards are based on the design operating pressure of the duct system.



## Total Duct Leakage Testing

Duct leakage testing helps to make sure that ducts are properly sealed to create an energy efficient, comfortable, and healthy indoor environment. Duct leakage testing is a requirement of the 2018 IECC for new construction residential buildings with any ductwork located outside conditioned space. For renovations or additions to existing buildings, duct testing is not required (see Illinois amendments), but duct work must be sealed (R403.3.2).

To test duct leakage, any intentional openings in the ductwork must be sealed with tape or other temporary means to isolate the ducts from the rest of the building. A fan is then connected to the ducts, as well as pressure and flow sensors. The ductwork is pressurized to a standard pressure of 25 Pascals, or about 0.1" of water and the flow through the fan indicates the amount of leakage in the duct system. <sup>2</sup>



## Duct Leakage to Outside

Measuring duct leakage to the outside requires the simultaneous use of a blower door to pressurize the building. Since the building interior and ducts will be at the same pressure, there will be little to no leakage to the interior. Any leakage from the ductwork to outdoors will cause the ducts to depressurize slightly. The duct leakage fan is used to balance this pressure difference back to zero, and the resulting airflow through the fan is how much air is being lost to the outdoors.

<sup>1</sup> [https://www.smacna.org/docs/default-source/technical-resources/hvac-duct-air-leakage-9-12-19.pdf?sfvrsn=cba0c8a5\\_0](https://www.smacna.org/docs/default-source/technical-resources/hvac-duct-air-leakage-9-12-19.pdf?sfvrsn=cba0c8a5_0)

<sup>2</sup> <https://energyconservatory.com/support/minneapolis-duct-blaster-user-guide/>

# Why is Duct Leakage Testing Important?

Leaks in ducts have differing impacts depending on where they are located<sup>3</sup>



**In supply ductwork**, conditioned air is lost before it reaches its intended space, often compensated for by increasing static pressure settings and fan speed at increased energy costs.



**In return ducts**, leakage allows pollutants such as mold spores, pollen, insulation fibers, and other materials to be drawn into HVAC systems. The increased load leads to shorter filter lifespan and increased maintenance and energy costs. Furthermore, pollutants making it past the filter will contaminate the heat exchanger and be distributed around the building with the supply air.



**In combination with envelope leakage**, duct leakage can lead to moisture damage in building assemblies, and/or increased loads on the HVAC system.



**Exhaust in combination with return losses** can cause depressurization that leads to back-drafting, drawing in exhaust fumes rather than allowing them to vent outside, which can be a serious issue.

<sup>3</sup> <https://yellowbluetech.com/2019/04/01/how-duct-leakage-causes-money-and-energy-loss/>

<sup>4</sup> <https://www.dropbox.com/s/70qd6b7xokhsbqp/HVAC-Distribution-Research-2002-lbnl-47214.pdf?dl=0>

<sup>5</sup> [https://www.mncee.org/MNCEE/media/Applications/Research%20PDF/Executive-Summary-formatted-v3\\_1.pdf](https://www.mncee.org/MNCEE/media/Applications/Research%20PDF/Executive-Summary-formatted-v3_1.pdf)



Figure 2: Air leakage at duct collar

## Common estimates of duct leakage

**20%-30%** of conditioned air leaks in typical home<sup>4</sup>

**5%-7%** of conditioned air leaks in typical commercial buildings, though there is a much wider range<sup>5</sup>

## Identifying and fixing leaks

Duct pressure testing reveals leakage rates, and when combined with infrared imaging (see Figure 2), duct testing can reveal problem spots that need to be sealed.

There are various ways to seal duct systems. Ducts that are easily accessible can be sealed with liquids or mastics that are spread over connections or with special duct sealing tapes. Ducts located within inaccessible building cavities can be sealed using more sophisticated and costly aerosol duct sealing techniques.

## WHO WE ARE

The Smart Energy Design Assistance Center assists buildings and communities in achieving energy efficiency, saving money, and becoming more sustainable. SEDAC is an applied research program at the University of Illinois at Urbana-Champaign. In addition to Energy Code training and support, SEDAC services to save energy and money include:

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