2024 IECC Residential Energy Code Duct Leakage Requirements

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What is a duct leakage test?



Figure 1: Minneapolis Duct Blaster™

The duct system is sealed (registers are taped) and a small fan is placed in an opening in the air handler or on the return side of the system (Figure 1). This fan pressurizes the duct system and a gauge records the pressure and CFM flow rate of the fan to maintain a pressure difference of 25 Pascals (0.1 inch w.g.). The CFM is then converted to CFM25 per 100 SF of floor area using the conditioned square feet of the house. The calculation is as follows:
CFM25 per 100 SF = (CFM25/SF of the conditioned space) x 100 SF
Results must meet requirements listed in Figure 2.

Why is duct leakage testing important?

We don't need to heat or cool non-living spaces like attics and crawl spaces, yet leaky ductwork is doing just that, leading to unnecessarily high energy bills. Leaky ducts can also cause a variety of other problems in our homes. For example, they can introduce water vapor into a cold attic, which may result in condensation and mold growth. Similarly, ducts can pull in harmful pollutants like radon from crawl spaces and bring them into the living areas of our home. Even when the ductwork is installed entirely within the conditioned space, leakage can still create issues. For instance, a back bedroom may feel uncomfortable if too much conditioned air leaks out before it reaches the room. Furthermore, duct leaks force the system to work harder to maintain the proper airflow, which increases overall energy consumption and drives up your energy bills.

What happens if the duct system fails?

The system must be brought into compliance. This can be difficult to do at the time of Certificate of Occupancy, therefore it is recommended that this test be performed at the rough mechanical inspection, when all of the ducts are accessible. HVAC installers should follow the guidance of Table N1102.5.1.1 (402.5.1.1) and seal all HVAC register boots to the subfloor, wall covering, or ceiling penetrated by the boot.

Figure 2: TABLE N1103.3.8 (R403.3.8) MAXIMUM TOTAL DUCT SYSTEM LEAKAGE

EQUIPMENT AND DUCT CONFIGURATION	DUCT SYSTEMS SERVING MORE THAN 1,000 FT² OF CONDITIONED FLOOR AREA		DUCT SYSTEMS SERVING 1,000 FT² OR LESS OF CONDITIONED FLOOR AREA
	cfm/100 ft²		cfm (LPM)
	Number of ducted returns [a]		
	< 3	≥ 3	Any
Space conditioning equipment is not installed [b, c]	3	4	30
All components of the duct system are installed [c]	4	6	40
Space conditioning equipment is not installed, but the ductwork is located entirely in conditioned space [c, d]	6	8	60
All components of the duct system are installed and entirely located in conditioned space [c]	8	12	80

For SI: 1 cubic foot per minute per square foot = 0.0033 LPM/m², 1 cfm = 28.3 LPM

a. A ducted return is a duct made of sheet metal or flexible duct that connects one or more return grilles to the return-side inlet of the air-handling unit. Any other method to convey air from return or transfer grilles to the air-handling unit does not constitute a ducted return for the purpose of determining maximum total duct leakage allowance.
b. Duct system testing is permitted where space conditioning equipment is not installed, provided that the return ductwork is installed and the measured leakage from the supply and return ductwork is included.
c. For duct systems to be considered inside a conditioned space, where the ductwork is located in ventilated attic spaces or unvented attics with vapor diffusion ports, duct system leakage to the outside must comply with Item 2.1 of Section N1103.3.4 (R403.3.4).
d. Prior to the issuance of a certificate of occupancy, where the air-handling unit is not verified as being located in conditioned space, the total duct system leakage must be retested.

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What are the current RI Energy Code requirements for residential new construction?

Rhode Island has adopted the 2024 International Energy Conservation Code which requires all new residential heating and cooling systems with ducts to pass a duct leakage testing verification. While duct leakage testing is not new to the Rhode Island energy code, the 2024 IECC introduces a more dynamic approach, setting maximum limits based on specific criteria. The test results must be reported to the building official and recorded as cubic feet of air per minute (CFM) leakage per 100 ft^2 of conditioned space at 25 Pascals (Pa) of pressure.

Reference: 2024 IRC Chapter 11 - N1103.3.7 (R403.3.7) Duct system testing

What are the new duct leakage requirements?

Previously, only duct systems located in unconditioned space were required to be tested. The 2024 IECC requires that *all* space conditioning ductwork be tested, including ducts installed on the conditioned side of the building thermal envelope. The new requirements are divided into three categories:

1. **Systems servicing less than 1,000 ft^2:**
   - Space conditioning equipment is not installed = *30 cfm*
   - All components of the duct system are installed = *40 cfm*
   - Space conditioning equipment is not installed, but the ductwork is located entirely in conditioned space = *60 cfm*
   - All components of the duct system are installed and entirely located in conditioned space = *80 cfm*

2. **Systems servicing more than 1,000 ft^2 with <3 returns:**
   - Space conditioning equipment is not installed = *3%*
   - All components of the duct system are installed = *4%*
   - Space conditioning equipment is not installed, but the ductwork is located entirely in conditioned space = *6%*
   - All components of the duct system are installed and entirely located in conditioned space = *8%*

3. **Systems servicing more than 1,000 ft^2 with >3 returns:**
   - Space conditioning equipment is not installed = *4%*
   - All components of the duct system are installed = *6%*
   - Space conditioning equipment is not installed, but the ductwork is located entirely in conditioned space = *8%*
   - All components of the duct system are installed and entirely located in conditioned space = *12%*

Reference: 2024 IRC Chapter 11 - TABLE N1103.3.8 (R403.3.8) Maximum Total Duct System Leakage

Duct testing is commonly performed by HERS raters or individuals with BPI certification. For more information, visit:

www.nehers.org
www.bpi.org