



# Residential Air Leakage (Blower Door) Testing for Florida Code Compliance

## FACT SHEET



Infiltration is the uncontrolled inward air leakage through cracks and crevices in any building element and around windows and doors of a building caused by pressure differences across these elements due to factors such as wind, inside and outside temperature differences (stack effect), and imbalance between supply and exhaust air systems.

### WARNING

Due to the potential for combustion and other health and safety issues, blower door testing should only be conducted by trained, qualified individuals.

To address the energy and indoor air quality impacts of air leakage in homes, the current Florida Building Code includes building air leakage testing requirements. Section R402.4.1.2 of the Energy Conservation volume of the Code stipulates maximum leakage rates, how the test is to be conducted, who can conduct the testing, reporting requirements, and at what point in construction the test can be performed.

The maximum air leakage rate allowed in Florida (Climate Zones 1 and 2) is no greater than 7 air changes per hour at a pressure of 0.2 inch w.g., or 50 Pascals (also written as "7 ACH50").

Per the Florida Statutes referenced in Section R402.4.1.2, individuals qualified to provide air leakage testing include energy auditors, energy raters, Class A or B air-conditioning contractors and mechanical contractors, plus approved third parties. For the purposes of this code section, an approved third party is an individual approved by a code official to perform air leakage testing.

As illustrated below, air leakage tests are performed using a blower door, which includes the following components:

- Digital gauge
- Calibrated variable speed fan
- Adjustable frame and curtain
- Fan speed controller with cable
- Tubing

A blower door test can be performed at any time, but for Florida Code compliance, it is conducted before the Certificate of Occupancy (CO) is issued, after all piping, wiring and other penetrations of the building thermal envelope have been sealed.

Either a single- or multi-point blower door test can be conducted. A single point test only measures leakage at one house pressure (house with reference to outside) of approximately 50 Pascals, while a multi-point test measures leakage over a range of house pressures (from approximately 15 Pascals to 55 Pascals).

The tester conducts the blower door test and records the house pressure, fan ring used for the test and fan pressure. This data is then used to calculate an airflow rate in cubic feet per minute (CFM50).



Photo: Retrotec

Test results are reported on a form that includes space to record the house's CFM50 measurement, conditioned volume, ACH50 leakage rate (calculated from the CFM50 measurement) and Pass/Fail status, and an area for the tester to provide their name, company, qualification and signature. Blank Envelope Leakage Test Report forms are available through Florida Building Commission approved Energy Code calculation software products. Some Florida

building departments require their own version of the form.

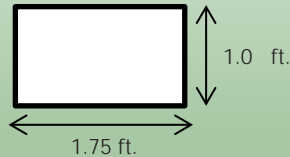
You may notice that the test form shown provides a place to indicate whether the house is complying with the Florida Energy Code via the Prescriptive, Performance or Energy Rating Index (ERI) method, and also includes a field to enter the ACH50 from the Performance or ERI compliance form.

For the Performance and ERI compliance methods,

using an ACH50 value lower than the code maximum of 7 for the code compliance calculation will help a house pass the code. But since code credit is received for ACH50 values less than 7, if a lower value is entered for compliance, the blower door test must show that the house's leakage is at or below that lower value (rather than 7). By providing fields to indicate the ACH50 used for compliance, test forms provide project-specific air leakage verification guidance.

For example, if the proposed air leakage was entered on the compliance form as

The CFM50 leakage value is proportional to the number and size of cracks and gaps in the building's thermal envelope and can provide an estimate of the combined area of the holes in the envelope. This equivalent hole size is approximated, in square inches, by multiplying the CFM50 result by a 0.13 conversion factor. For example, a home with a measured CFM50 of 1,940 has an equivalent hole size of  $1,940 \times 0.13 = 252.2$  square inches, or 1.75 square feet.



5 ACH50 but was tested as 6.26, it would fail because 6.26 ACH50 exceeds 5 ACH50. If instead the proposed air leakage on the compliance form was 7 ACH50, then 6.26 ACH50 would pass.

If a house's ACH50 is less than 3, Florida Code requires whole-house mechanical ventilation to be provided.

For more information on whole-house mechanical ventilation see the U.S. Department of Energy article: <https://bascc.pnnl.gov/resource-guides/whole-building-delivered-ventilation#quicktabs-guides=0>.

<b>Envelope Leakage Test Report (Blower Door Test)</b> Residential Prescriptive, Performance or ERI Method Compliance 2017 Florida Building Code, Energy Conservation, 6 <sup>th</sup> Edition	
Jurisdiction:	Permit #:
<b>Job Information</b>	
Builder:	Community: Lot:
Address:	Unit:
City:	State: Zip:
<b>Air Leakage Test Results</b> <i>Passing results must meet either the Performance, Prescriptive, or ERI Method</i>	
<input type="radio"/> <b>PRESCRIPTIVE METHOD</b> - The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 7 air changes per hour at a pressure of 0.2 inch w.g. (50 Pascals) in Climate Zones 1 and 2.	
<input type="radio"/> <b>PERFORMANCE OR ERI METHOD</b> - The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding the selected ACH(50) value, as shown on FORM R405-2017 (Performance) or R406-2017 (ERI), section labeled as Infiltration, sub-section ACH50. ACH(50) specified on Form R405-2017-Energy Calc (Performance) or R406-2017 (ERI): <input type="text"/>	
$\frac{\text{CFM}(50)}{60} \div \frac{\text{Building Volume}}{\text{ACH}(50)} = \text{ACH}(50)$	
<input type="checkbox"/> <b>PASS</b> <input type="checkbox"/> <b>FAIL</b>	
<input type="checkbox"/> When ACH(50) is less than 3, Mechanical Ventilation Installation must be verified by building department.	
<b>Method for calculating building volume:</b> <input type="radio"/> Retrieved from architectural plans <input type="radio"/> Code software calculated <input type="radio"/> Field measured and calculated	
<b>Testing.</b> Testing shall be conducted in accordance with ANSI/RESNET/ICC 380 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Testing shall be conducted by either individuals as defined in Section 553.993(5) or (7), <i>Florida Statutes</i> , or individuals licensed as set forth in Section 489.105(3)(f), (g), or (i) or an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the <i>building thermal envelope</i> .	
<b>During testing:</b> 1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures. 2. Dampers including exhaust, intake, makeup air, back draft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures. 3. Interior doors, if installed at the time of the test, shall be open. 4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed. 5. Heating and cooling systems, if installed at the time of the test, shall be turned off. 6. Supply and return registers, if installed at the time of the test, shall be fully open.	
<b>Testing Company</b>	
Company Name:	Phone:
I hereby verify that the above Air Leakage results are in accordance with the 2017 6 <sup>th</sup> Edition Florida Building Code Energy Conservation requirements according to the compliance method selected above.	
Signature of Tester:	Date of Test:
Printed Name of Tester:	
License/Certification #:	Issuing Authority:

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