

How Three Airtightness Testing Methods Differ

Whole-building airtightness testing can be performed under several different standards, but the requirements are not interchangeable. Building preparation, pressure ranges, test points, and test direction can all change depending on the method used.

Intertek Academy's **The American Institute of Architects (AIA)**-approved course, Airtightness Testing Goes Extreme: Lessons Learned in Unusual Building Environments, provides context for selecting and applying these test methods. Presented by **Pam Jergenson**, FCSI, CDT, CCS, CCCA, BECxP, CxA+BE, CABS Technical Director, the course covers the testing parameters behind each method and draws on project experience to address conditions that can complicate testing on-site.

Common Airtightness Testing Standards

ASTM E3158, ASTM E1827, and ASTM E779 are among the standards used for building airtightness testing in the United States. The U.S. Army Corps of Engineers also has its own requirements, drawing from ASTM methods while adding specific testing parameters.

"Airtightness testing methods can differ in building preparation, pressure ranges, test points, and test direction, affecting how results are collected and evaluated."

- **ASTM E3158** is generally used for larger, multizone buildings and is referenced in the 2021 and 2024 International Energy Conservation Code.
- **ASTM E1827** provides a simpler testing approach. Under the 2024 IECC, it is referenced for buildings less than 10,000 square feet.
- **ASTM E779** is a multipoint test method that has long been used for whole-building airtightness testing. It is referenced in the 2018, 2021, and 2024 IECC and in ASHRAE 90.1.

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How the Three Methods Differ

The three methods vary in several areas that can affect how whole-building airtightness testing is prepared and performed.

Testing Parameter	ASTM E1827	ASTM E779	U.S. Army Corps of Engineers
Building Preparation	Operational or closed	Operational	Closed envelope
Baseline Measurements	Before and after	Before and after, 10 seconds each	Before and after, 10 seconds each
Test Points	Single- or two-point test, with at least five measurements at each point	Multipoint test, with at least five measurements	10 to 12 points
Pressure Range	Primary at 50 Pa, with optional secondary at 12.5 Pa	Generally 10 to 60 Pa	Generally 40 to 85 Pa
Test Direction	Pressurization, depressurization, or both	Pressurization and depressurization	Pressurization and depressurization

These differences affect how the building is prepared, how much data is collected, and how the resulting air leakage measurements are evaluated. An air leakage result should be considered along with the test method, pressure, test direction, and performance criteria specified for the project.

Code Requirements Also Differ

Airtightness requirements have changed through recent editions of the IECC.

Under the 2021 IECC provisions measured air leakage for commercial buildings should not exceed 0.40 cfm per square foot at 75 pascals. Dwelling and sleeping units use different pressure and leakage criteria.

The U.S. Army Corps of Engineers requirement covered in the course is 0.25 cfm per square foot at 75 pascals.

If project documents, code criteria, and testing requirements don't point to the same target, questions can arise about which procedure and performance limit should govern the test.

What Happens in the Field

Once testing begins, the standard is only part of the equation. Weather, building preparation, penetrations, enclosure details, construction progress, and changes made between tests can all affect how the work is carried out.

Those conditions can influence the ability to establish pressure, complete the required test points, and evaluate results against the specified project criteria.

Questions to Address Before Testing

Before whole-building airtightness testing begins, project teams should confirm:

- The applicable test standard and leakage requirement
- How the building should be prepared
- The required pressure range, test points, and test direction
- The location of the intended pressure boundary
- Enclosure details or penetrations that could affect testing
- Whether construction has progressed far enough for the planned test

Addressing these items before test day can reduce questions about test setup and how to evaluate the results.

Take the Course

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