



Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door¹

This standard is issued under the fixed designation E 1827; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods describe two techniques for measuring air leakage rates through a building envelope in buildings that may be configured to a single zone. Both techniques use an orifice blower door to induce pressure differences across the building envelope and to measure those pressure differences and the resulting airflows. The measurements of pressure differences and airflows are used to determine airtightness and other leakage characteristics of the envelope.

1.2 These test methods allow testing under depressurization and pressurization.

1.3 These test methods are applicable to small indoor-outdoor temperature differentials and low wind pressure conditions; the uncertainty in the measured results increases with increasing wind speeds and temperature differentials.

1.4 These test methods do not measure air change rate under normal conditions of weather and building operation. To measure air change rate directly, use Test Methods E 741.

1.5 The text of these test methods reference notes and footnotes that provide explanatory material. These notes and footnotes, excluding those in tables and figures, shall not be considered as requirements of the standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements see Section 7.

2. Referenced Documents

2.1 ASTM Standards:

E 456 Terminology Relating to Quality and Statistics²

E 631 Terminology of Building Constructions³

E 741 Test Methods for Determining Air Change in a Single Zone by Means of Tracer Gas Dilution³

E 779 Test Method for Determining Air Leakage Rate by Fan Pressurization³

E 1186 Practice for Air Leakage Site Detection in Building Envelopes³

E 1258 Test Method for Airflow Calibration of Fan Pressurization Devices³

2.2 ISO International Standard:

ISO 9972 Thermal Insulation—Determination of Building Airtightness—Fan Pressurization Method⁴

2.3 Other Standard:

ANSI/ASME PTC 19.1—Part 1, Measurement Uncertainty, Instruments, and Apparatus⁴

3. Terminology

3.1 *Definitions*—Refer to Terminology E 456 for definitions of accuracy, bias, precision, and uncertainty.

3.1.1 ACH_{50} , n —the ratio of the air leakage rate at 50 Pa (0.2 in. H_2O), corrected for a standard air density, to the volume of the test zone (1/h).

3.1.2 *air leakage rate*, Q_{env} , n —the total volume of air passing through the test zone envelope per unit of time (m^3/s , ft^3/min).

3.1.3 *airtightness*, n —the degree to which a test zone envelope resists the flow of air.

NOTE 1— ACH_{50} , air leakage rate, and effective leakage area are examples of measures of building airtightness.

3.1.4 *blower door*, n —a fan pressurization device incorporating a controllable fan and instruments for airflow measurement and building pressure difference measurement that mounts securely in a door or other opening.

3.1.5 *building pressure difference*, P , n —the pressure difference across the test zone envelope (Pa, in. H_2O).

3.1.6 *fan airflow rate*, Q_{fan} , n —the volume of airflow through the blower door per unit of time (m^3/s , ft^3/min).

3.1.7 *nominal airflow rate*, Q_{nom} , n —the flow rate indicated by the blower door using the manufacturer's calibration coefficients (m^3/s , ft^3/min).

¹ These test methods are under the jurisdiction of ASTM Committee E06 on Performance of Buildings and are the direct responsibility of Subcommittee E06.41 on Air Leakage and Ventilation.

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² *Annual Book of ASTM Standards*, Vol 14.02.

³ *Annual Book of ASTM Standards*, Vol 04.11.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

