



Designation: E1425 – 07

# Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems<sup>1</sup>

This standard is issued under the fixed designation E1425; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice establishes requirements for testing and rating acoustical performance of window, door, skylight, and glazed wall systems, regardless of their method or materials of manufacture.

1.1.1 Operating force, latching force, and air leakage are integral elements of the acoustical performance of window, door, skylight, and glazed wall systems. This practice requires (when applicable) the concurrent testing of operating force, latching force, and air leakage, in addition to the sound transmission loss test.

1.2 This practice establishes the test methodology, specimen criteria, and classification rating system for purposes of determining the acoustical performance levels of window, door, skylight, and glazed wall systems only, and not through openings between such assemblies and adjacent construction.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**C634 Terminology Relating to Building and Environmental Acoustics**

**E90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements**

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Performance of Windows, Doors, Skylights and Curtain Walls.

Current edition approved Oct. 1, 2007. Published November 2007. Originally approved in 1991. Last previous edition approved in 1999 as E1827 – 91 (1999). DOI: 10.1520/E1425-07.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

**E283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen**

**E413 Classification for Rating Sound Insulation**

**E631 Terminology of Building Constructions**

**E1332 Classification for Rating Outdoor-Indoor Sound Attenuation**

**E2068 Test Method for Determination of Operating Force of Sliding Windows and Doors**

2.2 *Other Standards:*

**28 CFR Part 36 ADA Standards for Accessible Design**<sup>3</sup>

**AAMA/WDMA/CSA 101/I.S.2/A440 Standard Specification for Windows, Doors, and Unit Skylights**<sup>4,5</sup>

**AAMA 501 Methods of Tests for Exterior Walls**<sup>4</sup>

**NFRC 100 Procedure for Determining Fenestration Product U Factors**<sup>6</sup>

**ISO 140 Acoustics—Measurement of sound insulation in buildings and of building elements**<sup>7</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, refer to Terminologies C634 and E631, unless otherwise indicated.

## 4. Significance and Use

4.1 *Air Leakage Relative to Sound Transmission*—Certain frequencies are more susceptible to sound transmission through cavities or discontinuities in the test specimen; therefore, the air leakage of the test specimen is reported to allow the approving authority information relative to air tightness.

<sup>3</sup> Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://www.dodssp.daps.mil>.

<sup>4</sup> Available from the American Architectural Manufacturers Association (AAMA), 1827 Walden Office Square, Suite 550, Schaumburg, Illinois 60173-4268.

<sup>5</sup> Available from Canadian Standards Association (CSA), 5060 Spectrum Way, Mississauga, ON L4W 5N6, Canada, <http://www.csa.ca>.

<sup>6</sup> Available from the National Fenestration Rating Council (NFRC), 6305 Ivy Lane, Suite 140 Greenbelt, MD 20770.

<sup>7</sup> Available from International Organization for Standardization (ISO), 1 rue de Varembe, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.

NOTE 1—The AAMA/WDMA/CSA 101/I.S.2/A440 document provides air leakage acceptance criteria for these products based on their performance class. Acoustical products could require a lower air leakage rate than what is required in this standard in order to achieve the desired acoustical performance.

4.2 *Operating Force Relative to Sound Transmission*—The use of specific sealing components to achieve a given sound rating could affect operating force of the vertical or horizontal sliding sash or panels of the assembly; therefore, operating force is reported to allow the approving authority information relative to sash or panel operating forces.

NOTE 2—The opening force in 28 CFR Part 36 ADA for interior hinged doors and sliding doors is limited to 22.2 N (5 lbf). The AAMA/WDMA/CSA 101/I.S.2/A440 document provides operating force acceptance criteria for products based on their performance class.

4.3 *Latching force Relative to Sound Transmission*—Latching force can affect the compression of seals and the amount of damping applied to the system that in turn affects the air leakage and the acoustical performance. The use of specific sealing components and latching/locking hardware can affect the force required to close and latch the door under test. The latching force is reported to allow the approving authority information relative to sash or panel latching conditions.

NOTE 3—The AAMA/WDMA/CSA 101/I.S.2/A440 document states that the latching force shall not exceed 65 N (15 lbf).

## 5. Test Specimen

5.1 Assemblies to be tested in accordance with this practice shall be representative of those produced by the manufacturer or fabricator. Test specimens shall be sealed, painted or otherwise finished or prepared only as they would normally be prepared for actual installation and use. Test specimens shall be mounted for testing as specified by each applicable test method.

5.1.1 Test specimens shall not be modified with supplementary adhesives, sealants, tapes, or clamping devices not normally a part of the product.

5.2 The test specimen size for window, door, skylight, and glazed wall systems are listed below in **Table 1**. The window, sliding door, glazed wall system, sloped glazing system, skylight, and roof window test specimen size shall not vary by more than 25 mm (1 in.) for either dimension. The single and double hinged door test specimen width shall not vary by more than 50 mm (2 in.) and the height shall not vary by more than 75 mm (3 in.).

## 6. Test Methods

6.1 The sequence of testing shall be: operating force (if applicable); followed by latching force (if applicable); followed by air leakage; and ending with sound transmission loss. If additional sash or panels are tested in the same specimen

**TABLE 1 Test Specimen Size**

Window Descriptions	Width (mm) × Height (mm)	Width (in.) × Height (in.)
basement window	900 × 600	35.4 × 23.6
casement window	600 × 1500	23.6 × 59.1
composite—fixed beside operable	1500 × 1200	59.1 × 47.2
composite—fixed over/under operable	1200 × 1500	47.2 × 59.1
dual action window (tilt/turn window)	1200 × 1500	47.2 × 59.1
fixed window (picture window)	1200 × 1500	47.2 × 59.1
greenhouse/garden window	900 × 900 × 300	35.4 × 35.4 × 11.8
horizontal sliding window	1500 × 1200	59.1 × 47.2
jal—awning window	1200 × 1500	47.2 × 59.1
jalousie window	1200 × 1500	47.2 × 59.1
pivoted window (vertical or horizontal)	1200 × 1500	47.2 × 59.1
projected window (awning or hopper)	1500 × 600	59.1 × 23.6
side-hinged window	1200 × 1500	47.2 × 59.1
top-hinged window	1200 × 1500	47.2 × 59.1
vertical sliding (single, double, and triple hung) window	1200 × 1500	47.2 × 59.1
<b>Door Descriptions and Required Elements</b>		
single swinging (hinged) door	1000 × 2125	39.4 × 83.7
double swinging (hinged) door	1900 × 2125	74.8 × 83.7
sliding door	1825 × 2025	71.9 × 79.7
sidelites	600 × 2000	23.6 × 78.7
transoms	2000 × 600	78.7 × 23.6
<b>Glazed Wall System Descriptions</b>		
curtain walls, storefront, and so forth.	2000 × 2000	78.7 × 78.7
sloped glazing system	2000 × 2000	78.7 × 78.7
<b>Skylight Descriptions</b>		
unit skylights	1200 × 1200	47.2 × 47.2
roof windows	1200 × 1200	47.2 × 47.2

NOTE 1—The area used to calculate the sound transmission loss of the window, door, skylight, or glazed wall assembly shall include the test specimen frame.

NOTE 2—For a more thorough description of the window and door types, refer to The AAMA/WDMA/CSA 101/I.S.2/A440 document.

NOTE 3—The window sizes listed above were taken primarily from NFRC 100 and AAMA/WDMA/CSA 101/I.S.2/A440 standards with some modifications due to the inconsistencies between the two documents. Some consideration was also given to the size (1250 mm × 1500 mm ± 50 mm) recommended in the ISO 140 standard.

NOTE 4—Fir high STC rated products, two units in the size specified above might need to be tested in the filler wall in order to obtain sound transmission coefficient differences that are greater than 6 dB at all frequencies.