



Designation: E1425 – 14 (Reapproved 2023)

Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems¹

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 (ϵ) 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 inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

C634 Terminology Relating to Building and Environmental Acoustics

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

E283/E283M Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, 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 Design³

AAMA/WDMA/CSA 101/1.S.2/A440 Standard Specification for Windows, Doors, and Unit Skylights^{4,5}

AAMA 501 Methods of Test for Exterior Walls⁴

NFRC 100 Procedure for Determining Fenestration Product U-factors⁶

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

⁴ Available from Fenestration & Glazing Industry Alliance (FGIA) (formerly American Architectural Manufacturers Association (AAMA)), 1900 E. Golf Rd., Suite 1250, Schaumburg, IL 60173, <https://fgiaonline.org/>.

⁵ Available from CSA Group, 178 Rexdale Blvd., Toronto, ON, Canada M9W 1R3, <http://www.csagroup.org>.

⁶ Available from National Fenestration Rating Council (NFRC), 6305 Ivy Lane, Suite 410, Greenbelt, MD 20770, <http://www.nfrccommunity.org/store>.

¹ 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.

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ISO 140 Acoustics—Measurement of sound insulation in buildings and of building elements⁷

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.

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 5 lbf (22.2 N). 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 maximum force to latch shall be measured and reported.

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 1 in. (25 mm) for either dimension. The single and double hinged door test specimen width shall not vary by more than 2 in. (50 mm) and the height shall not vary by more than 3 in. (75 mm).

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 frame, the complete sequence of tests shall be repeated for each set of sash or panels. The specimen shall be opened and closed (where applicable) at least five times prior to conducting the operating, latching force and air leakage tests.

6.2 *Operating Force*—The operating force test shall be conducted on horizontal or vertical operating windows and sliding doors in accordance with ASTM Test Method **E2068**. For dual windows or doors, the operating force shall be measured on both sets of sash or panels. The operating force of rotary operators shall be determined in accordance with the procedures contained in the AAMA/WDMA/CSA 101/I.S.2/A440 standard.

6.2.1 The operating force shall not exceed the maximum force to initiate motion and the maximum force to maintain motion criteria contained in the AAMA/WDMA/CSA 101/I.S.2/A440 standard. If adjustments need to be made, the operating force shall be remeasured.

6.3 *Latching Force*—Latching force tests shall be conducted on swinging (side-hinged) doors with latches. The latching force test shall be conducted in accordance with procedures contained in the AAMA/WDMA/CSA 101/I.S.2/A440 standard. For multiple doors, such as dual doors (back to back) or double doors (side by side) the latching force shall be conducted on all panels containing latching hardware.

6.3.1 The maximum latching force shall be reported as required in the AAMA/WDMA/CSA 101/I.S.2/A440 standard. If adjustments need to be made, the operating force and latching force must be remeasured.

NOTE 4—A swinging door is defined as closed when the latch is fully secured in the strike plate and the door remains in the closed position.

6.4 *Air Leakage Test*—The air leakage test shall be performed in accordance with Test Method **E283/E283M**. The air leakage test pressure for windows, doors, and skylights shall be as specified in the AAMA/WDMA/CSA 101/I.S.2/A440 standard. The air leakage test for glazed wall and sloped glazing systems shall be initially conducted at a test pressure of 1.57 psf (75 Pa) and then at a test pressure 6.24 psf (300 Pa).

6.4.1 For windows, doors, and skylights, the air leakage shall be recorded as pass or fail in accordance with the criteria contained in the AAMA/WDMA/CSA 101/I.S.2/A440 standard. For glazed wall and sloped glazing systems, report the air leakage at both test pressures. If any adjustments need to be made, the operating force, latching force and air leakage measurements (where applicable) shall be repeated.

NOTE 5—For glazed wall and sloped glazing systems, the air leakage shall not exceed 0.06 cfm/ft² (0.3 L/s • m²) at both test pressures, which is an industry standard and recommended in AAMA 501.

⁷ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandinnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.