



Standard Test Method for Determination of Operating Force of Sliding Windows and Doors¹

This standard is issued under the fixed designation E 2068; 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 test method determines the operating forces for opening and closing horizontal and vertical sliding windows and horizontal sliding door systems. It does not address the forces required for opening pivoting, projecting, or other fenestration systems. This test method does not address the use or performance of add-on devices or mechanical operators that might be installed to reduce operating forces of sliding windows or doors. It deals only with the forces necessary to open and close a sash or panel through the direct application of force to the operable sash or panel.

1.2 This test method is suitable for laboratory product comparisons or for qualifying products, or both, as meeting window or door operating force specifications. This test method is also suitable for use in the field to determine the operating forces required to open and close installed sliding windows and doors.

1.3 The values stated in inch-pound 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.* For specific precautionary statements, see Section 7.

2. Referenced Documents

2.1 ASTM Standards:

E 631 Terminology of Building Constructions²

3. Terminology

3.1 Definitions are in accordance with Terminology E 631 unless otherwise specified.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *breakaway force*—the force required to start a sash (panel) in motion from a fully closed or fully open position.

3.2.2 *fully open position*—the point at the limits of the operating hardware (if applicable) or the point at which the sash or panel contacts a limiting device.

3.2.3 *fully closed position*—the position of the sash or panel after being closed, latched, and unlatched, or where the sash or panel is closed to its maximum engagement within a frame or pocket if no latching mechanism is provided.

3.2.4 *in-motion operating force*—the force required to maintain a sash or panel in motion while moving the sash or panel between 1 in. from fully open to 1 in. from fully closed positions, or 1 in. from fully closed to 1 in. from fully open position.

4. Summary of Test Method

4.1 Two equivalent test methods for determining operating force are described. Test Method A uses dead weights and a cable and pulley system to apply force to operate a sash or panel. Test Method B uses a force gage and hand-applied pressure to operate a sash or panel. The test specimen is mounted in a rigid support frame. After attaching the loading system to the operating sash or panel, the weight or force is applied and increased until the sash or panel is put into motion. This determines breakaway force. Starting from one inch (25 mm) from a closed or open position the minimum amount of weight or force required to keep a sash in motion, once it is started moving, is measured. This determines the in-motion operating force. Forces required to operate a sliding window or patio door in both opening and closing directions are determined by this test method.

5. Significance and Use

5.1 This test method determines the operational forces of sliding windows and doors by simulating force applied by hand directly to movable sash or panels. Breakaway and in-motion operating forces are measures of the ease of operation of fenestration products. Product specifications, building codes, and building specifications establish operating force limits as measures of product performance or limits for handicapped accessibility, or both.

5.2 Window and door performance standards for air infiltration and water penetration in some cases require operating force measurements to be made and reported as an indication of the operability of the test specimen.

¹ This test method is under the jurisdiction of ASTM Committee E-6 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Component Performance of Windows, Curtain Walls, and Doors.

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² *Annual Book of ASTM Standards*, Vol 04.11.