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STANDARD
FOR
SLIDING AND FOLDING DOOR HARDWARE



SPONSOR
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

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AMERICAN NATIONAL STANDARD

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FOREWORD (This Foreword is not a part of ANSI/BHMA A156.14)

The general classification of builders hardware includes a wide variety of items which are divided into several categories. To recognize this diversity, a sectional classification system has been established. Sliding and Folding Door Hardware is one such section and this Standard is the result of the collective efforts of members of the Builders Hardware Manufacturers Association, Inc., who manufacture this product. The total Product Standards effort is, therefore, a collection of sections, each covering a specific category of items.

Performance tests and, where it has been necessary, dimensional requirements have been established to insure safety, security and stability to which the public is entitled. There are no restrictions on design, except for those dimensional requirements imposed for the reasons given above. It is also required that some hardware items fit certain specified cutout dimensions.

The BHMA recognizes that errors will be found, items will become obsolete, and new products, methods and materials will be developed. With this in mind, the Association plans to update, correct and revise these Standards on a regular basis.

In most cases, products have been described in grade levels related to performance. Grade classifications indicate levels only within their own category. Choice of grades and specific products are made on the basis of utility, aesthetics, security objectives and end use desired.

The BHMA numbers and pictorials which indicate types of hardware do not necessarily identify size, finish, or material and are not intended to be used without necessary supplementary information. Individual manufacturer's catalogs are consulted.

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1. SCOPE

1.1 This Standard establishes requirements for Sliding and Folding Door Hardware. Cycle tests, abuse, durability static load, smoothness, static friction, kinetic friction and finish tests are included. Hardware for light to very heavy doors is covered including both residential and industrial applications.

1.2 Fire doors equipped with sliding door hardware shall successfully pass the requirements of ANSI/UL 10B or 10C. ANSI/UL 14B specifies requirements for sliding door hardware used on sliding type fire doors.

1.3 Tests described in this Standard are performed under laboratory conditions. In actual usage, results vary because of installation, maintenance and environmental conditions.

1.4 All dimensions which do not carry specific tolerances or are not marked maximum or minimum are permitted to have nominal deviations. Dimensions are given in US units. SI unit (metric) equivalents given in parentheses are approximate.

1.5 ANSI Standards referenced in this Standard are available from the BHMA website www.buildershardware.com or the American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

2. DEFINITIONS

2.1 **Activator** A device which interacts with the damper to catch the door and slowly bring the door to its final position (open or closed).

2.2 **Aligner** A component added to a 4 door bifold set to keep the leading edge of doors flush when closed.

2.3 **Actuator** Part of the test set up in a laboratory which externally acts on the door to provide motion.

2.4 **Bow Handle** A pull for use on heavy doors.

2.5 **Bumper Shoe** A protection plate for the bottom edge of a door where it hits a stop.

2.6 **Cane Bolt** An L shaped rod held by guides which fixes a door in a closed or open position.

2.7 **Chain Bolt** See Spring Bolt.

2.8 **Cremone Bolt** Rods held by guides and controlled by a knob or lever. The rods project into members above and below a door.

2.9 **Damper** A mechanical device that provides assistance with door closure utilizing a pneumatic function, spring, or other dampening type mechanism and interacts with a system's activator to catch the door and slowly bring the door to its final position (open or closed).

2.10 **Edge Pull** A pull inserted into the edge of a sliding door.

2.11 **Flush Pull** A pull mortised into the face of a door.

2.12 **Foot Bolt** A bolt projected with one's foot and released against a spring loaded trigger mechanism. Fixes a door in a closed or open position.

2.13 **Guide** A device used to control lateral movement of a sliding door.

2.14 **Hanger** Rollers with a connection to a door which suspend the door and allow it to travel in a track.

2.15 **Oversize Sliding Doors** – sliding doors that weight 240 lbs (109 kg) or greater or are greater than 8ft in width; doors to be tested to requirements in Section 4.

2.16 **Point of engagement** The point in travel where the damper and activator engage to begin the function of soft close.

2.17 **Sliding Door Lock or Latch** A lock or latch inserted into the edge of a sliding door to lock or latch into the adjacent frame.

2.18 **Snugger** A device installed in a track to keep doors in a closed position.

2.19 **Soft-close Device** The pairing of a damper and activator intended to catch the door and slowly bring the door to its final position (open or closed).

- 2.20 **Spring Bolt** A self latching bolt retracted by a chain and used on swinging doors (also called Chain Bolt).
- 2.21 **Stay Roller** A roller used to control lateral movement of a sliding door.
- 2.22 **Stop** A device used to limit the travel of a sliding door.
- 2.23 **Surface Pull** A pull applied to the face of the door.
- 2.24 **Track** A member containing the hangers and supporting the weight of the door (also called rail).
- 2.25 **Track Support** Brackets used to hold and fasten the track to the structure above or below the door (also called rail support).

3. TEST PROCEDURES

3.1 **Purpose** Tests are established to determine the smoothness of operation, force required to overcome static friction, durability of the hardware and the ability to maintain adjustments.

3.2 **Necessary Equipment for Performance Testing** Provide appropriate height doors for a standard 6 ft 8 in (2032 mm) high opening a maximum width for which the hardware is recommended in a prepared opening (see 3.3), the hardware to be tested, an accurate scale, hand tools as required, door weights, actuators for operating doors, force gages, and a cycle counter.

3.3 Preparing the Opening

3.3.1 Provide a structurally sound finished opening to the sizes specified by the manufacturer of the hardware to be tested. Brace opening to prevent any movement.

3.3.2 The jambs of this opening shall be plumb and parallel and at right angles to the header. Where applicable, the threshold or bottom track shall be level so as not to interfere with the operation of the doors.

3.3.3 The header shall be suitable for the door widths.

3.3.4 The header shall be straight and level within 3/32 in (2.4 mm).

3.4 **Preparing the Doors** Place the doors on the scale one at a time and add enough weight to each door to make its total weight equal to the rating of the hardware. The weights shall be added to locate the center of gravity at the geometrical center of the rectangular door. The weights shall be firmly attached to the doors to prevent their movement as doors open and close. It is permitted to seal and finish doors and frames to minimize warping.

3.5 Mounting the Hardware (Bifold)

3.5.1 At random, select hardware from stock. Perform all tests on the same sample.

3.5.2 Install the bifold set in the opening, according to the manufacturer's instruction sheet, using the fasteners furnished with the hardware.

3.5.3 Mount the hinges, pivots and guides to the doors, as per the instruction sheet, with the fasteners supplied.

3.5.4 Hardware and doors shall be adjusted so that all adjustable or spring loaded top and bottom pivot hardware is at the manufacturer's fully extended position(s). Mark or measure track pivot locations.

3.5.5 Remove the doors and accurately measure the lower pivot extension (if adjustable) and mark the pin in such a way that any vertical movement is apparent.

3.5.6 Install the aligner(s) or snugger(s) in the position specified by the manufacturer, if supplied.

3.5.7 Do not add any lubricants to the hardware unless specified by the manufacturer. Lubricants that have been applied during manufacturing as standard procedure are permissible. Lubricants shall not be added during the test.

3.6 Mounting the Hardware Multiple Folding Types, Bypassing Types and Pocket Types

- 3.6.1 At random, select hardware from stock. Perform all tests on the same sample.
- 3.6.2 Install the track(s) in the opening, according to the manufacturer's instruction sheet, using the fasteners furnished with the hardware.
- 3.6.3 Mount the hangers with the fasteners supplied according to the manufacturer's instruction sheet.
- 3.6.4 Install door(s) and door guide in the opening with the faces and edges of doors plumb.
- 3.6.5 Install the bumper(s), aligner(s), or snugger(s) or a combination thereof, according to the manufacturer's instruction sheet.
- 3.6.6 Mark a point 34 1/2 in (876 mm) from bottom of door(s) on both vertical edges of each folding door to be tested. Mark a point on each side of the frame horizontal to the marks on the doors.
- 3.6.7 Do not add any lubricants to the hardware, including guides, unless specified by the manufacturer. Lubricants that have been applied during manufacture as standard procedure are permissible. Lubricants shall not be added during the test.
- 3.6.8 **Tolerances** All values which do not carry specific tolerances or are not marked maximum or minimum shall have the following tolerances: Linear dimensions shall be $\pm 1/16$ in (1.6 mm). Pounds or pound force shall be $\pm 2\%$. Degrees shall be ± 2 degrees.
- 3.6.9 **Measuring Equipment** All instruments and equipment used in the conduct of tests for recording data need to be calibrated and maintained for effectiveness and continued accuracy. Calibration of equipment shall be traceable to National Institute of Standards and Technology (NIST). The frequency of calibration depends on the recommendation of the particular test equipment manufacturer with a minimum being once per year. Measuring equipment used shall have a known measurement error and be capable of qualifying the value being measured.

4. OVERSIZE SLIDING DOORS; BY-PASS, TELESCOPIC AND POCKET TYPES

4.1 **Static Load Test** The track shall be installed with the supports spaced along the track at the manufacturer's recommended spacing. The Static Load Test shall consist of two tests, one with a hanger located midway between two supports and the other with a hanger located directly under a support. Subject the hangers, track, and supports to a static load equal to two times their maximum rated capacity.

Requirements

Permanent deformation shall not exceed 0.062 in (1.6 mm)
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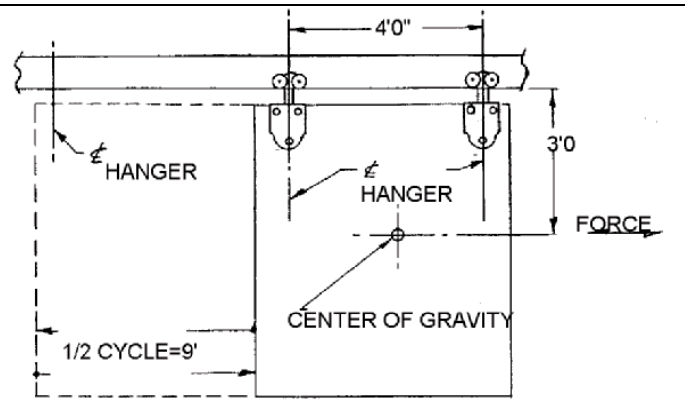
4.2 **Static Friction Test** At random, select hardware from stock. The track shall be installed in accordance with the manufacturer's instruction sheet. Hanger spacing, point of force application, center of gravity, and cycle distance shall be in accordance with 4.3.1. Using a force gauge placed at 34 1/2 in. (876 mm) from the bottom of the door, push or pull the door on its track and record the maximum force to start the door moving when hangers are located midway between the track supports. The average of three trials in each direction shall be the static friction.

Requirements

Maximum force shall be 5% of the door panel weight being tested.
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4.3 Durability Test

4.3.1 At random, select hardware from stock and apply it to test setup as shown. Door shall automatically traverse the test track at a speed not to exceed 50 feet (15 m) per minute. One cycle consists of operating the door(s) from the fully closed position to the fully open position to the fully closed position covering a distance of 18 feet. Track, hangers and supports shall be installed in accordance with the manufacturer's instruction sheet. Throughout the durability test, all parts shall remain operational and not require any adjustment. Hardware shall satisfy the requirements in 4.2 at completion of required number of cycles.



4.3.2 **Soft Close Device System Tests – Preparation and Requirements** When soft-close device is to be provided with a system, it shall be included in the durability test for the system as described in 4.3.1. With the soft-close device installed, the actuator must stop acting on the door prior to the point of engagement and allow the damper to bring the door to a fully open or fully closed position as the only acting force on the door. If the soft-close device is included in the test, the door shall cycle two times and not more than four times per minute with a maximum dwell of five seconds to ensure door is in the fully open and fully closed position with no additional movement. Only one device shall be installed in the test set up.

4.3.2.1 **Engagement** Soft close device must be installed in position per manufacturer's installation instructions. Set door in opening at the point where the two hardware components for soft close device are at the point of engagement. Visibly mark on the track or header and on the door where the point of engagement between damper and its activator occurs. When the damper is activated, it must act independently of the actuator and visibly slow the velocity of the door as it brings the door to its end condition. The soft close device must visibly slow the door through the entire duration of the test.

4.3.2.2 **Disengagement** When using a soft close device, the disengage force shall be measured. Using a force gauge placed at 34 1/2 in. (876 mm) from the bottom of the door, push or pull the door on its track. Starting when the soft close is fully engaged and the door is stationary, record the maximum force to fully disengage and reset device for next engagement. The average of three trials shall be the disengage force.

4.3.2.3 **After Completion of Required Cycles** The device shall be tested at the conclusion of cycles required for each grade. Following the required cycles for each grade, the soft close device shall continue to disengage with a maximum force of 20% of door panel weight. The soft close device shall also continue to visibly slow the door at the end of each cycle. Activator must reset the damper when actuator pulls door away from point of engagement. Damper must stay reset until next engagement.

Cycle Requirements for All Types

Grade 1	Grade 2	Grade 3
35,000 cycles	20,000 cycles	10,000 cycles

5. SLIDING DOORS BY-PASS, TELESCOPIC AND POCKET TYPES

5.1 **Operation Test for Smoothness** Open the doors. Using the force gauge at 34 1/2 in. (876 mm) from the bottom of the door, push or pull the door as slowly as possible until the forward edge of the lead door is within two inches of the fully closed position. Note the maximum force required. Still using the force gauge, slowly urge the door to the open position. Note the maximum force required.

Requirements

The doors shall glide smoothly with no discernible "Stop- Go" action or chatter. The force gauge reading shall not vary more than 2% of the door weight while the door is in motion in either direction.

5.2 Static Load Test The track shall be installed with the supports spaced along the track at the manufacturer's recommended spacing. The Static Load Test shall consist of two tests, one with a hanger located midway between two supports and the other with a hanger located directly under a support. Subject the hangers, track, and supports to a static load equal to two times their maximum rated capacity.

Requirements

Permanent deformation shall not exceed 0.062 in (1.6 mm)

5.3 Static Friction Test

5.3.1 Using a force gauge placed at 34 1/2 in. (876 mm) from the bottom of the door, push or pull the door on its track and record the maximum force to start the door moving when hangers are located midway between the track supports. The average of three trials in each direction shall be the static friction.

Requirements

Maximum force shall be 5% of the door panel weight being tested.

5.4 Kinetic Friction Test

5.4.1 Gently nudge one door to start it rolling. Using force gauge at the 34 1/2 in. (876 mm) marking, determine the minimum number of pounds required to keep it rolling.

5.4.2 Repeat on the same door in the opposite direction.

5.4.3 Repeat on the second door (if applicable).

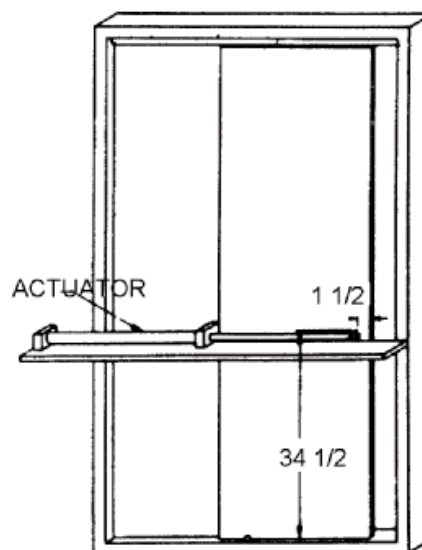
Requirements

Maximum force shall be 5% of the door panel weight being tested.

5.5 Durability Test

5.5.1 Attach door actuator in such a manner that it will completely open and close the door at least 5, but not more than 7, times per minute, with a maximum dwell of two seconds at the open and closed positions. The actuator without applying additional loads, shall engage the door at a point 34 1/2 in (876 mm) from the bottom of the door and 1 1/2 in (38 mm) from the edge.

5.5.2 One cycle consists of from closed to open to closed positions. Doors shall be no more than 1/8 in (3 mm) out of alignment with their respective jambs. Any deformation of track or hangers shall be slight enough so as not to allow unintentional disengagement between the hangers and track. There shall be no hardware contact other than wheel to track and door to guide contact. Repeat Friction Tests 5.3 and 5.4 after the Durability Test has been run.



5.5.3 Soft Close Device System Tests – Preparation and Requirements When soft-close device is to be provided with a system, it shall be included in the durability test for the system as described in 5.5.1. With the soft-close device installed, the actuator must stop acting on the door prior to the point of engagement and allow the damper to bring the door to a fully open or fully closed position as the only acting force on the door. If the soft-close device is included in the test, the door shall cycle two times and not more than four times per minute with a maximum dwell of five seconds to ensure door is in the fully open and fully closed position with no additional movement. Only one device shall be installed in the test set up.

5.5.3.1 Engagement Soft close device must be installed in position per manufacturer’s installation instructions. Set door in opening at the point where the two hardware components for soft close device are at the point of engagement. Visibly mark on the track or header and on the door where the point of engagement between damper and its activator occurs. When the damper is activated, it must act independently of the actuator and visibly slow the velocity of the door as it brings the door to its end condition. The soft close device must visibly slow the door through the entire duration of the test.

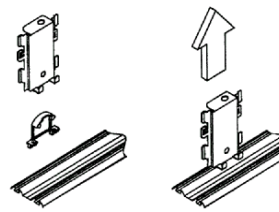
5.5.3.2 Disengagement When using a soft close device, the disengage force shall be measured. Using a force gauge placed at 34 ½ in. (876 mm) from the bottom of the door, push or pull the door on its track. Starting when the soft close is fully engaged and the door is stationary, record the maximum force to fully disengage and reset device for next engagement. The average of three trials shall be the disengage force.

5.5.3.3 After Completion of Required Cycles The device shall be tested at the conclusion of cycles required for each grade. Following the required cycles for each grade, the soft close device shall continue to disengage with a maximum force of 20% of door panel weight. The soft close device shall also continue to visibly slow the door at the end of each cycle. Activator must reset the damper when actuator pulls door away from point of engagement. Damper must stay reset until next engagement.

Cycle Requirements for All Types

Grade 1	Grade 2	Grade 3
100,000 cycles	50,000 cycles	25,000 cycles

5.6 Abuse Tests

5.6.1 Jump Resistant Test Sliding doors equipped with snap-in type hardware shall be tested in tracks. Perform test by applying the load to the center of the test specimen.	
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Requirements

Shall withstand direct pullout force greater than a 25 lbf (112 N) per roller or guide.
