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AMERICAN NATIONAL STANDARD
FOR
AUXILIARY HARDWARE



SPONSOR
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AMERICAN NATIONAL STANDARD

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FOREWORD (This Foreword is not a part of ANSI A156.16)

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. Auxiliary Hardware is one such section and this Standard is the result of the collective efforts of members of the Builders Hardware Manufacturers Association 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, material and 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 will 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 product category. Choice of grade and specific product are made on the basis of utility, aesthetics, security objectives and end use desired.

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

Use of some products described in this Standard on doors within a means of egress or fire door assemblies are regulated by authorities having jurisdiction. Applicable codes, ordinances and standards are to be consulted.

TABLE OF CONTENTS

1. SCOPE.....	5
2. DEFINITIONS.....	5
3. GENERAL	6
4. TESTS.....	6
4.1 TESTS FOR DOOR HOLDERS.....	6
4.2 TESTS FOR DOOR STOPS	7
4.3 TEST FOR COMBINATION DOOR STOP AND HOLDER.....	8
4.4 TEST FOR GARMENT HOOKS	8
4.5 TESTS FOR GARMENT ROD ASSEMBLIES, SHELF BRACKETS AND COMBINATION GARMENT ROD AND SHELF SUPPORT BRACKETS	8
4.6 TESTS FOR HANDRAIL BRACKETS.....	9
4.7 TESTS FOR DOOR BOLTS OR FASTENERS	10
4.8 TESTS FOR WINDOW LIFTS	10
4.10 TESTS FOR DOOR SILENCERS.....	10
4.11 TESTS FOR IDENTIFICATION SIGNS	11
4.12 TESTS FOR DOOR VIEWERS	11
4.13 TESTS FOR DOOR GUARDS.....	11
4.14 TESTS FOR REPLACEMENT CASEMENT WINDOW CONTROLS	11
4.15 TEST FOR ROLLER LATCHES.....	12
4.16 TESTS FOR WINDOW BOLTS, SASH LOCKS, OR CATCHES	13
4.17 TESTS FOR TOWEL BARS AND RINGS.....	13
4.18 TEST FOR GRAB BAR AND SOAP DISH AND GRAB BAR FIXTURE	14
4.19 TEST FOR SHOWER CURTAIN RODS.....	14
4.20 TEST FOR SHELF AND BRACKET OR SHELF AND GARMENT ROD SYSTEM	15
4.21 TESTS FOR SELF LATCHING FLUSH BOLTS.....	15
5. PERFORMANCE REQUIREMENTS FOR FINISHES.....	17
6. AUXILIARY HARDWARE FUNCTIONS AND IDENTIFYING NUMBERS	18
7. EXPLANATION OF NUMBERING SYSTEM	34
APPENDIX A (NOT A PART OF ANSI/BHMA A156.16)	35

1. SCOPE

1.1 This Standard establishes requirements for auxiliary hardware and includes performance tests covering operational, cyclical, strength or finish criteria.

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

2. DEFINITIONS

2.1 **Casement and Awning Window Control** A mechanism to control and limit the swing of an unlatched casement or awning.

2.2 **Combination Door Stop and Holder** A device which combines the features of a door stop and a door holder by stopping and holding a door at predetermined points.

2.3 **Door Bolt or Fastener** A mechanical device operable from one side of a door and used to fasten the door in a closed position.

2.4 **Door Guard** A connectable device used to limit the extent to which a door is opened.

2.5 **Door Holder** A device for holding a door in a predetermined open position until released by manual or automatic means.

2.6 **Door Knocker** A sounding mechanism used to announce one's presence at a door.

2.7 **Door Silencer** A device used to cushion the sound of a door closing into a frame.

2.8 **Door Stop** A device used for stopping the opening swing of a door at some predetermined position.

2.9 **Door Viewer** An optical device which permits an inside observer an undetected view of the outside area.

2.10 **Garment Hook** A device with one or more arms projecting from an attachment base on which to hang garments.

2.11 **Garment Rod Assembly** A pole device, usually anchored at each end and sometimes supported between, for hanging garments.

2.12 **Handrail Bracket** A device used to anchor and support a handrail.

2.13 **Identification Sign** An ornamental device fastened on or near an entrance which identifies an address, occupant, or contents of room or area beyond.

2.14 **Combination Garment Rod and Support Bracket** A device used for supporting a garment rod (2.11) and a shelf.

2.15 **Roller Latch** A mechanical device used to fasten or hold a door by means of a rolling plunger which engages a socket or catch.

2.16 **Shelf Bracket** A fixture used to support a shelf.

2.17 **Self-latching Flush Bolt** A flush mounted locking device for the inactive leaf of a pair of doors that latches automatically and unlatches manually.

2.18 **Shower Curtain and Rod Assembly** A fixture enclosing a bathtub or shower stall on which a shower curtain is hung.

2.19 **Soap and Grab Bar Assembly** A fixture used within a bathtub or shower enclosure which provides a receptacle for soap and an assisting hand grip.

2.20 **Towel Bar or Ring** A bar or ring shaped fixture on which towels or similar items are hung.

2.21 Window Bolt or Catch A mechanical device operable from inside a window and used to fasten the window in a closed position.

2.22 Window Lift A device fastened to the lower sash of a double hung window to facilitate opening and closing of the sash.

3. GENERAL

3.1 Values Required values in this Standard are given in US units. SI (metric) equivalents are approximate.

3.2 Reference to ANSI Standards ANSI Standards are available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036 or www.buildershardware.com.

3.3 Products Available Products have been divided functionally for performance testing. Products illustrated in Section 6 are available in the marketplace. Similar products not illustrated which meet the required finish and performance tests shall be acceptable.

3.4 Lubrication No lubricants shall be added before or during tests unless specified in the manufacturer's printed instructions.

3.5 Mounting Screws In tests where the tested product is mounted on steel fixtures, the screws used in mounting shall be the same head and body size as those specified by the manufacturer.

3.6 Tolerances All values not having specific tolerances or not marked maximum or minimum shall have the following tolerances. Linear dimensions shall be $\pm 1/16$ in (1.6 mm). Force and impact shall be $\pm 2\%$. Degrees shall be ± 2 degrees.

3.7 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. TESTS

4.1 Tests for Door Holders

4.1.1 Test Fixture Use the test door fixture described as "Lockset Component Test Fixture" alternative door assembly in ASTM F476-84 (2002) for this test.

4.1.2 Holding Test Apply a static force perpendicular to the door and parallel with the floor on a horizontal centerline and 20 in (508 mm) from the hinge edge of the door for a period of five minutes. Test friction type floor door holders against an unwaxed vinyl composition tile floor 1/8 in (3.2 mm) thick with 1 in (25.4 mm) movement constituting failure.

Grade 1: withstands 50 lbf (222 N) minimum

Grade 2: withstands 30 lbf (133 N) minimum

Grade 3: withstands 10 lbf (45 N) minimum

Tests for magnetic devices are listed under function descriptions.

4.1.3 Cycle Test Mount the holder on the test door in accordance with the manufacturer's instructions. Cycle the holder at a rate of six to ten cycles per minute with an impact of 7 lbf-ft (9.5 J) at a point 4 in (102 mm) from the bottom of the door and 8 in (203 mm) inward from the free swinging edge of the door. Manual hook and eye types are exempt from the operation of the hook in the eye. Cycle lever and lever types without impact. At the end of the test, all functions shall be operable.

Grade 1:	50,000 cycles
Grade 2:	25,000 cycles
Grade 3:	10,000 cycles

Each cycle equals one opening and one closing, or one holding and one release or one impact and removal of load.

4.1.4 Repeat holding test at conclusion of the cycle test.

4.1.5 Resilient Material Retention Test Both before and after aging (4.2.2), the force applied in any direction required to remove the resilient bumper (if used) from the door holder shall not be less than:

Grade 1:	50 lbf	(222 N)
Grade 2:	9 lbf	(40 N)
Grade 3:	5 lbf	(22 N)

4.2 Tests for Door Stops [Test for chain door stop is listed under function description (6.4)]

4.2.1 Test Fixtures

4.2.1.1 Cycle Test Perform the cycle test using the test fixture listed in 4.1.1 and Door Ram Pendulum System specified in ASTM F476-84 (2002). Mount and impact door stops in accordance with 4.2.1.2 to the values given in 4.2.3.

4.2.1.2 Impact Test Perform the impact test using the test fixture listed in 4.1.1, the Door Ram Pendulum System, and Body Impact Test Method as specified in ASTM F476-84 (2002) and modified herein. Instead of the impact buffer specified in ASTM F476-84 (2002) use a 1/4 in (6.4 mm) steel plate 8 in (203 mm) square centered at the specified impact point and affixed to the face of the test door with four screws minimum. Attach the door stop to the Mounting Test Fixture A (Figure 7) and normal to the inside face of the test door located as specified. Stops shall be mounted with the resilient face of the stop resting against the closed test door and centered 8 in (203 mm) inward from the free swinging edge of the door. Using the Door Ram, impact the closed door at a point 4 in (102 mm) up from the bottom and 8 in (203 mm) inward from the free swinging edge of the door. Mount wall stops at the level of the center hinge and floor stops on the base plate. Adjustable hinge pin type stops shall be mounted on top hinge of the test door and adjusted to restrain the door at 75 ± 3 degrees when the resilient tip is resting against Bracket B (See Figure 7). Using the Door Ram, impact the closed door at a point 12 in (305 mm) from the bottom and 8 in (203 mm) inward from the free swinging edge of the door.

4.2.2 Aging Test A door stop containing resilient material parts shall be subjected to an aging test in an air circulation oven at 158 ± 5 degrees F (70 ± 3 C) for a period of 168 hours followed by testing under 4.2.3 and 4.2.4.

4.2.3 Cycle Test The door stop shall be mounted and the door impacted in accordance with 4.2.1.2 with the force specified for 10,000 cycles at a rate of six to ten cycles per minute. Failure is breakage of the test product.

Grade 1	Grade 2	Grade 3
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Impact at 7 lbf-ft (9.5 J)	Impact at 3 lbf-ft (4 J)	Impact at 7 lbf-in (.8 J)
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4.2.4 Impact Test A dynamic force shall be applied as specified in 4.2.1.2. Failure is breakage of the test product.

Grade 1	Grade 2	Grade 3
Grade 2 test plus 2 impacts 44 lbf-ft (60 J) each	Grade 3 test plus 2 impacts 30 lbf-ft (40 J) each	2 impacts 15 lbf-ft (20 J) each

4.2.5 Bumper Retention Test Both before and after aging (4.2.2), the force applied in any direction required to remove the resilient bumper from the door stop shall not be less than:

Grade 1	Grade 2	Grade 3
50 lbf (222 N)	9 lbf (40 N)	3 lbf (13 N)

4.3 Test for Combination Door Stop and Holder

4.3.1 Testing The test product shall be subjected to both 4.1 and 4.2 Tests with the Holding Test first.

4.4 Test for Garment Hooks

4.4.1 Load Test Apply a static load on the arm of the test product which has been mounted to a rigid test fixture using fasteners recommended by the manufacturer. The load shall be parallel to the mounting surface and shall be applied for 1/2 minute by a 2 in (50.8 mm) wide leather or canvas strap centered on the end of the arm being tested. Test each arm of a multiple arm product separately. Failure is breakage, disassembly or a 1/2 in (12.7 mm) vertical deflection of the product's arm.

Grade 1	Grade 2	Grade 3
125 lbf (556 N)	75 lbf (334 N)	35 lbf (156 N)

4.5 Tests for Garment Rod Assemblies, Shelf Brackets and Combination Garment Rod and Shelf Support Brackets (see Figure 5)

4.5.1 Test Fixture The test apparatus shall consist of a wall, reflecting typical building construction for this product.

4.5.2 Garment Rod Assembly Load Test

When extended and mounted according to the manufacturer's maximum recommended length, apply a 3 lbf (13 N) and then gradually apply a 20 lbf (90 N) per foot along the length of the rod. (See figures 5 and 6 to determine total load per point.) Maintain load for two (2) minutes, then measure sag in rod at center of each span with loads still applied. Deflection of test fixture shall not be part of the measurements.

Grade 1	Grade 2
3/4 in (19.1 mm) for any span	1 1/4 in (31.7 mm) for any span

4.5.3 Garment Rod Assembly Overload Test Double the load in 4.5.2 to 40 lbf (180 N). Maintain load for five (5) minutes.

Any Grade: The rod shall be capable of withstanding the load without separating at any mounting point.
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becoming detached from mounting.

4.5.4 Shelf Bracket Load Test When a 100 lbf (445 N) static load is applied directly over the mounted bracket complete with shelf described in 4.5.4.1 and back from the front edge 1/3 the width of the shelf, the angular deflection of the shelf measured directly over the bracket shall not be greater than:

Grade 1	Grade 2
1/2 degree	3 degrees

4.5.4.1 The wood shelf shall be 3/4 in $\pm$ 1/8 in (19.1 mm $\pm$ 3.2 mm) by 24 in $\pm$ 1/4 in (610 mm $\pm$ 6.35 mm) long by a width equal to the length of the shorter leg of the shelf bracket. It shall be fastened to the short leg of the bracket so as to extend 4 in (102 mm) past the bracket. The other end of the shelf shall be supported to maintain the shelf approximately horizontal and also allow the shelf to tilt transversely.

4.5.5 Combination Garment Rod and Shelf Support Bracket Load Test Subject the mounted test product complete with shelf and rod described in 4.5.5.1 to a combined static load of 125 lbf (556 N) applied to the rod support section of the bracket and 150 lbf (667 N) applied to the shelf support section of the bracket 8 in (203 mm) from the "wall" end and directly over the bracket. Measure the vertical deflection under load and the vertical set after removal of the load with the top of the rod being the benchmark.

Grade 1	Grade 3
.375 in (9.5 mm) maximum deflection, .063 in (1.6 mm) maximum set	.500 in (12.7 mm) maximum deflection, .125 in (3.2 mm) maximum set

4.5.5.1 Secure an 11 1/2 in (292 mm) square by 3/4 in (19 mm) thick plywood shelf to the horizontal leg of the bracket and rest a 1 3/8 in (35 mm) diameter by 4 in (102 mm) long rod on the hook portion of the bracket.

4.6 Tests for Handrail Brackets

4.6.1 Test Procedure Attach the test product with a 6 in (152 mm) section of handrail to a rigid metal support.

4.6.2 Load Test Apply the specified static force to the rail where it is attached to the bracket in each of the directions noted. No breakage or disassembly of the handrail bracket members shall occur. Apply one half the specified load with the rail maintained in a position parallel to the mounting surface and normal to the axis of the handrail bracket in each of the directions of the axis of the rail, then apply the full load in each of the four directions 90 degrees from the one another around the axis of the rail starting parallel to the mounting surface. Apply each of the six loads independently of one another to the same bracket and each maintained for 1/2 minute. (see Figure 4)

Grade 1	Grade 2
250 lbf (1112 N)	200 lbf (890N)

4.7 Tests for Door Bolts or Fasteners

4.7.1 Test Fixture The test fixture described in 4.2.1.2 shall be the standard fixture for this test with the following modification. Install the test product on a material which is compatible with the fasteners furnished by the manufacturer and to any written instructions. For wood screws, use a standard 2 x 4 piece of fir 20 in (508 mm) in length. For sheet metal screws, use a section of US 16 gauge (.060 in. nominal) (1.52 mm) sheet metal door frame material. For machine screws, use 1/8 in (3.2 mm) thick angle iron.

4.7.2 Bolt Impact Test Apply a dynamic force in the opening direction of the door with the Ram Pendulum described in 4.2.1.2 striking perpendicular to the closed door at a point on the horizontal centerline and 8 in (203 mm) from the bolt edge of the door. Failure shall occur if entry through the locked side of the test door is possible.

Grade 1	Grade 2	Grade 3
Grade 2 test plus 2 impacts 118 lbf-ft (160 J) each	Grade 3 test plus 2 impacts 89 lbf-ft (120 J) each	2 impacts 44 lbf-ft (60 J) each

4.7.3 Bolt Friction Test Apply a 50 lb (23 kg) weight to load the bolt against the strike in the opening direction of the door. Measure the effort to retract the bolt. The maximum effort for all Grades is 30 lbf-in (3.4 Nm) or a 50 lbf (222 N) for "straight line" pull design.

4.7.4 Bolt Cycle Test Rotary actuated door bolts or fasteners shall be cycle tested. Slide type actuated door bolts or fasteners are exempt from this test. One cycle consists of completely extending the bolt into the strike and extracting it. Failure shall occur if the force to extend or retract the bolt exceeds initial forces by 30% or the bolt cannot be extended or retracted. Cycle speed shall be at the rate of six to ten cycles per minute.

Grade 1	Grade 2	Grade 3
50,000 cycles	25,000 cycles	10,000 cycles

4.7.5 Repeat Test Repeat the Bolt Friction Test 4.7.3 at conclusion of Cycle Test 4.7.4.

4.8 Tests for Window Lifts

4.8.1 Test Fixture Attach the test product to a standard 2 x 4 piece of fir wood support. Distribute the load over the pull area.

4.8.2 Load Test (lifts that are mortised are exempt from this test). Apply a static load parallel to the direction of window travel along the vertical centerline of the test product for a period of 15 seconds. No breakage or disassembly shall occur.

Grade 1	Grade 2	Grade 3
120 lbf (534 N)	80 lbf (356 N)	40 lbf (178 N)

4.9 Tests for Door Knockers

4.9.1 Testing None except Finish Performance.

4.10 Tests for Door Silencers

4.10.1 Aging Test Subject resilient material parts of the test product to Aging Test 4.2

4.11 Tests for Identification Signs

4.11.1 **Testing** None except Finish performance.

4.12 Tests for Door Viewers

4.12.1 **Angle of Observation** The minimum angle of observation for door viewers shall be as follows:

Grade 1	Grade 2	Grade 3
185 Degrees	145 Degrees	115 Degrees

4.12.2 Test Conditions

4.12.2.1 Mount a 17 in x 22 in (432 mm x 559 mm) 210 degree protractor, with 10 in (254 mm) long graduation lines at each 5 degree interval, on a flat surface at eye level. (See Figure 1) The 90 graduation lines of the protractor shall be in line with the flat surface of the protractor mounting.

4.12.2.2 Mount viewer holder (any flat material with a hole in it large enough to receive viewer) on the edge of the flat surface at a right angle to the surface of the protractor. One centerline of the viewer hole in holder shall be on the zero graduation line of protractor and the other centerline shall be 0.72 in to 0.75 in (18.3 mm to 19.1 mm) from the protractor surface. (See Figures 1 and 2)

4.12.2.3 Install viewer as shown in Figure 2 and according to manufacturer's instructions.

4.12.2.4 Look through the viewer and mark the protractor at the upper and lower limits of vision. Move eye as necessary for the greatest angle of observation. Add the two angles for the total viewer angle of observation. Use the point of a red pen as the object being viewed for ease of sighting.

4.13 Tests for Door Guards

4.13.1 **Test Fixture** The fixture described in 4.1.1 shall be the standard fixture for this test with the following modification. Mount the jamb mounted member of the door guard on a fir 2 in x 6 in (50.8 mm x 152.4 mm) wood member rigidly secured to the test fixture. Mount the door guard according to the manufacturer's instructions using the screws supplied with the assembly.

4.13.2 **Impact Test** Apply a dynamic force in the opening direction of the door with the Ram Pendulum described in 4.2.1.2 impacting perpendicular to the open door secured by the test product at the maximum chain or rod length. The impact point shall be 12 in (305 mm) from the bottom of the door and 8 in (203 mm) inward from the open edge of the door.

Grade 1	Grade 2	Grade 3
Grade 2 test plus 2 impacts 118lbf-ft (160 J) each	Grade 3 test plus 2 impacts 89 lbf-ft (120 J) each	2 impacts 44 lbf-ft (60 J) each

4.13.3 Manipulation Test. It shall not be possible to disconnect the device without hand tools without first fully closing the door. Make the test attempt through the door opening with chain or rod first partly and then fully extended.

4.14 Tests for Replacement Casement Window Controls

4.14.1 Test Conditions

4.14.1.1 The test sash size shall be 50 lbs $\pm$ 1/2 lb (22.7 kg $\pm$ 0.23 kg) not including hinges or the operator. Sash shall be made from 1/2 in (13 mm) thick aluminum plate and the height adjusted to achieve the specified test weight. The width of the sash shall be 24 in (610 mm). Add necessary components to mount the operator to be tested (see Figure 3).

4.14.1.2 Mount the test sash with hinges recommended by the manufacturer to be used with the operator under test to a solid metal member which simulates the window frame..

4.14.2 **Operator Input Force Test** The input force of the operator when using the crank furnished with the operator shall not be greater than the following values and when tested in accordance with 4.14.2.1.

Grade 1	Grade 2	Grade 3
5 lbf (2.27 N)	10 lbf (4.54 N)	15 lbf (6.82 N)

Where operators are to be used by people with physical disabilities, only Grade 1 is suitable.

4.14.2.1 With the test sash mounted in accordance with 4.14.1, operate the sash through its full opening and closing range using a torque meter with a highest reading indicator. Perform the test ten times and record the highest torque measurements every revolution. Avoid contact with any type of stop that gives false measurements. Divide the highest torque reading by the measured distance from input shaft centerline to finger placement or knob centerline.

4.14.3 **Simulated Wind Speed Test** The operator shall work smoothly throughout the full range after the load has been applied in accordance with 4.13.3.1 using the following values.

Opening Wind Speed Equivalent Load

Grade 1	Grade 2	Grade 3
65 m/h (105 km/h) 10.6 psf (0.51 kPa)	60 m/h (97 km/h) 9.03 psi (0.43 kPa)	50 m/h (80 km/h) 6.27 psf (0.3 kPa)

Closing Wind Speed Equivalent Load

Grade 1	Grade 2	Grade 3
60 m/h (97 km/hr) 9.03 psf (0.43 kPa)	55 m/h (89 km/h) 7.59 psf (0.36 kPa)	45 m/h (72 km/h) 5.08 psf (0.24 kPa)

4.14.3.1 Apply a test load to the test sash at the center. The test load shall be calculated based upon the sash area times the wind speed equivalent load. Perform the test in the opening and closing direction at 45 degrees and the maximum operable sash opening. A different operator shall be used for each position and direction.

4.15 Test for Roller Latches

4.15.1 **Test Fixture** The test fixture described in 4.1.1 is the standard fixture for this test.

4.15.2 **Cycle Test** Speed shall be at the rate of six to ten cycles per minute. All Grades shall operate through 100,000 cycles minimum.

4.15.3 **Release Test** When the specified static force is applied in the opening direction of the door and perpendicular to a point on its horizontal centerline 3 in (76 mm) from the latch edge of the door, it shall