



**AMERICAN NATIONAL STANDARD**  
**FOR**  
**CABINET HARDWARE**



**AMERICAN NATIONAL STANDARDS INSTITUTE**  
**Approved October 14, 2015**

**Sponsor**

**BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.**

## AMERICAN NATIONAL STANDARD

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## FOREWORD (This Foreword is not a part of A156.9)

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. Cabinet 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, material requirements, have been established to insure safety and stability to which the public is entitled. There are no restrictions on design. Cabinet hardware described in this Section represents a cross-section of that which is available today. However, since cabinet hardware styling and functional application is constantly changing, new items are not to be excluded. Each manufacturer of this type of hardware shall determine which of its products will meet these requirements. On all items, styling is optional.

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.

Cabinet hardware products generally have been described in three levels of performance. Choice of product is made on the basis of utility, aesthetics, security objectives and end use desired. As a general guide, Grade 1 is the highest and is suitable for most institutional applications, Grade 3 is suitable for most residential uses, and Grade 2 is often used in all applications.

The BHMA numbers which indicate types of hardware do not identify size, finish or design and are not intended to be used without necessary supplementary information.

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## 1. SCOPE

1.1 This Standard contains requirements for cabinet hardware and includes hinges, knobs, pulls, catches, shelf rests, standards and brackets, drawer slides, rotating shelves and track with guides for sliding panels. Included are performance tests covering operational, cyclical, strength, and 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. Tests required are applicable to hardware products only and are not intended to evaluate systems incorporating cabinet components. Fixtures described are designed to withstand the test forces required and only hardware items are measured.

1.3 **Grade qualifications** Manufacturers shall indicate the grade level of their products. Cabinet hardware shall meet all tests for the grade listing. Three grades are offered for most products; for drawer slides, additional grades 1HD are available.

## 2. DEFINITIONS

2.1 **Catch** A product with a holding capacity that keeps a cabinet door closed.

2.2 **Drawer Slide** Elements suspending a drawer and in which the drawer moves.

2.2.1 **Standard Duty Drawer Slide** Intended for use in residential or light commercial applications.

2.2.2 **Heavy Duty Drawer Slide** Intended for use in commercial and institutional casework.

2.2.3 **Pocket Cabinet Door Slide** A device which allows for a door to be rotated and linearly retracted into a horizontal or vertical position. Also called a flipper door. See paragraphs 4.11.6 and 4.11.7.

### 2.3 Hinges

2.3.1 **Butt Hinge** In this Standard, a hinge attached to the edge of a cabinet door and the edge of a cabinet face frame.

2.3.2 **Concealed Hinge** A hinge installed in such a way that it cannot be seen from the outside when the cabinet door is in a closed position.

2.3.3 **Continuous Hinge** A butt type hinge that is as long or nearly as long as the height of a cabinet door.

2.3.4 **Full Surface Hinge** A hinge having one leaf attached to the face of a door and the other leaf attached to the face of a door frame.

2.3.5 **Olive Knuckle Hinge** A pivot hinge with a joint shaped like an olive.

2.3.6 **Pivot Hinge** A hinge with a fixed pin and a single joint having a height less than the adjacent hinge leaves.

2.3.7 **Self Closing Hinge** A hinge incorporating energy, usually a spring, causing a door to close from an open position.

2.3.8 **Self Closing Integrated Damper Hinge** A self closing hinge with an integrated damper mechanism located in the hinge cup or hinge arm assembly. Some damper mechanisms can be turned off-on or include dampening adjustment.

**2.3.9 Semiconcealed Hinge** A hinge mounted to the face or edge of a door frame and to the back of a cabinet door. When the door is closed, only the pin or the frame mounted portion of the hinge is seen from the outside.

**2.4 Hinge Catch** A semiconcealed hinge incorporating a cabinet catch.

**2.5 Knob** A projecting part, surface or back mounted, used to operate a door or drawer.

**2.6 Latch** A device used to hold a door and requiring movement of an element before the door is released for opening.

**2.7 Pull** A surface or flush mounted part used to operate a door or drawer.

**2.8 Rotating Shelf** A shelf unit rotating on a center member.

**2.9 Shelf Bracket or Rest** A member installed into a shelf standard, wall or cabinet for supporting a shelf.

**2.10 Shelf Standard** A slotted unit into which a bracket or rest is installed for supporting a shelf.

**2.11 Track and Guides** Elements retaining a sliding panel and in which the panel moves.

### **3. GENERAL**

**3.1 Values** Required values in this Standard are given in US units. SI (metric) units are shown in parentheses and are approximate.

**3.2 Finishes** All products shall meet the applicable performance requirements for finishes. A product with a finish not specifically described shall be acceptable if such finish meets or exceeds the lowest finish resistance requirements for that product class.

**3.3 Lubrication** No lubricants shall be added before or during tests unless called for in the manufacturers' printed instructions supplied with the product. It is permitted to add lubricants during the manufacturing process.

**3.4 Equipment** It is important to ensure that test units are adequately secured to prevent tipping under all test loads.

**3.5 Reference to other Standards** American National Standards referred to in this Standard are available from American National Standards Institute, Inc., 11 West 42nd Street New York, NY 10036 or [www.buildershardware.com](http://www.buildershardware.com).

**3.6** Several requirements in this Standard were extracted in whole or part, with permission, from the BIFMA X5.5 1998, Desk Product Standard.

### **4. PERFORMANCE TEST REQUIREMENTS**

#### **4.1 Test Conditions for Test 1, Test 2 and Test 3 (see Figures 1 and 2)**

**4.1.1** The test door size shall be 29½ in. (750 mm) high, 14½ in. (368 mm) wide and ¾ in. (19 mm) or 1⅜ in. (35 mm) thick depending upon the requirement of the hinge, all ± ⅛ in. (3.2 mm), and shall be a rigid non-flexing member.

**4.1.2** For Grade 1 hinges, the test door shall weigh 40 ± ½ lbs (18 ± 0.23 kg), for Grade 2 hinges, 12 ± ½ lbs (5.4 ± 0.23 Kg), and for Grade 3 hinges, 6 ± ½ lbs (2.7 ± 0.23 kg). Holes or weights are permitted to be added at the center of gravity of the test door to adjust its weight to the above requirement.

**4.1.3** Two hinges shall be mounted on the test door on 24 in. (610 mm) centers except that top and

bottom pivot type hinges shall be mounted 29 ½ in. (750 mm) centers, all ± ⅛ in. (3.2 mm). For the Hinge Over Opening Test for concealed hinges, tab distance shall be set in accordance with the manufacturer's instructions.

4.1.4 The test door with the hinges shall be mounted to a solid metal member that simulates the hinge side of the cabinet face frame and the test door shall be able to operate freely through at least 90 degrees. The hinge shall be aligned and spaced to eliminate hinge bind.

4.1.5 A separate set of hinges shall be used for the Hinge Permanent Set Test, the Hinge Operating Life Test and the Concealed Hinge Over Opening Test.

4.1.6 A dial indicator shall be used to measure vertical permanent set and vertical sag. This indicator shall be located as shown in Figures 1 and 2 and is identified as Indicator 1 on Figure 2.

4.1.7 When testing Grade 1 hinges, a second dial indicator shall be used to measure horizontal permanent set and horizontal sag. The indicator shall be located opposite the upper hinge as shown in Figures 1 and 2 and is identified as Indicator 2 on Figure 2. Exception: With top and bottom pivot type hinges, Indicator 2 shall be centered ½ in. (12.7 mm) from the top of the door.

4.1.8 When the hinges to be tested are designed for mounting on a glass door, glass thickness for the hinge shall be in accordance with the manufacturer's specification. The height and weight of the test door shall be in accordance with 4.1.1 and 4.1.2.

4.1.9 Self closing damper hinges shall be tested to the requirements of this section amending the test method as shown in paragraphs 4.4.2 and 4.4.3.

#### 4.2 Test 1 Hinge Permanent Set Test

4.2.1 Open the door 5 ± 3 degrees and with no weight applied measure the position of the door with the indicators located as shown in Figures 1 and 2.

4.2.2 The specified load (4.2.6) shall be applied to the door as shown in Figures 1 and 3.

4.2.3 Slowly operate the door to a 90 ± 3 degree open position and then return it to the 5 ± 3 degree open position.

4.2.4 Remove the test load and then measure the position of the door as shown in Figure 2.

4.2.5 The difference in measurements made in 4.2.1 and 4.2.4 is permanent set.

##### 4.2.6 Maximum Permanent Set:

| Hinge Grade | Load - lbf(N)  | Vertical set in.(mm) | Horizontal set in.(mm) |
|-------------|----------------|----------------------|------------------------|
| 1           | 160 lbf. (712) | .030 in. (0.76)      | .030 in. (0.76)        |
| 2           | 75 lbf. (334)  | .060 in. (1.52)      | -                      |
| 3           | 75 lbf. (334)  | .090 in. (2.29)      | -                      |

#### 4.3 Test 2 Hinge Operating Life Test

4.3.1 Open the door 5 ± 3 degrees and measure the position of the door with the indicators located as shown in Figure 2

4.3.2 Open and close the door at a rate not to exceed 15 cycles per minute with each cycle consisting of opening 90 degrees from the 5 degree open position or completely closed position (all ± 3 degrees). For Self Closing Damper Hinges, allow the hinges to completely close the door in each cycle.

4.3.3 Upon completion of cycling, return the door to 5 ± 3 degree position and measure the position of

the door.

4.3.4 The difference in measurements in 4.3.1 and 4.3.3 is sag.

**4.3.5 Maximum Sag After Cycling:**

| Hinge Grade | Cycles  | Vertical - sag in.(mm) | Horizontal sag in.(mm) |
|-------------|---------|------------------------|------------------------|
| 1           | 100,000 | .030 (0.76)            | .020(0.51)             |
| 2           | 50,000  | .030 (0.76)            | -                      |
| 3           | 25,000  | .030 (0.76)            | -                      |

**4.4 Test 3 Self Closing Hinge Closing Force Test and Over-Opening Test**

4.4.1 In addition to the Hinge Permanent Set Test 1 and the Hinge Operating Life Test 2, self closing hinges shall meet the Closing Force Test 3. Frame and frameless concealed hinges shall also meet the Over-Opening Test described in 4.4.4.

4.4.2 At the start of the Hinge Operating Life Test 2, two self closing hinges when mounted on the test door shall produce a minimum closing force (not the force to open) when the door is in the closed position of 4 ounces (1.1 N) 14 inches (356 mm) from the test fixture as specified in Figure 1. For Self Closing Damper Hinges take the closing force measurement before installing the damper mechanism.

4.4.3 After the Operating Life Test 2, the hinges shall hold the door in the closed position and the hinges shall cause the door to automatically close from not less than 10 degrees open position while the door is being moved slowly toward the closed position. For Self Closing Damper Hinges the hinges shall hold the door in the closed position with the damper fully engaged, and with the damper removed shall cause the door to automatically close from not less than 10 degrees open position while the door is being moved slowly toward the closed position.

4.4.4 Using a test fixture as described in 4.1 and shown in Figure 3, open the door to the fully open position. Apply a force in the opening direction at a point 12 in. (305mm) out from the inside edge and halfway down the length of the door. Apply the force increasingly at a constant rate up to the required value and then release. The hinges shall then be fully functional and hold the door in a closed position. The hinges shall cause the door to automatically close from a minimum of a 10 degree open position while the door is being moved slowly toward the closed position.

**4.4.6 Over-Opening Test Values**

| Hinge Grade | Force lbf (N) Frame | Force lbf (N) Frameless |
|-------------|---------------------|-------------------------|
| 1           | NA                  | NA                      |
| 2           | 34 (150)            | 17 (74)                 |
| 3           | 17 (74)             | 10 (32)                 |

**4.5 Test 4 Catch Test**

4.5.1 Unless otherwise specified, the following shall be the minimum performance requirements for cabinet catches:

4.5.2 The holding force of the catch shall be not less than the rated test pull minimum before cycle testing. (see 5.4 for type descriptions and test pull values)

4.5.3 The catch shall be operable for the rated minimum of operations and it shall retain at least 50% of its rated minimum pull at the completion of the test.

4.5.4 The catch shall be installed in accordance with the manufacturer's printed instructions in a simulated cabinet having a hinged door as in 4.1.1.

4.5.5 Each operation of the catch shall consist of full engagement and disengagement of the catch to strike.

4.5.6 Cycle test at a speed where excessive heat through friction is not developed and in a manner simulating actual usage.

4.5.7 Catch "pull" force is defined as the force necessary to pull the strike free of the catch.

#### 4.6 Test 5 Latch Tests

4.6.1 **Test Fixture** The fixture shall consist of a plywood test door 14 ½ in. (368 mm) wide x 29 ½ in. (750 mm) high x ¾ in. (19 mm) thick hinged with two 4 ½ x 4 ½ in. (114 x 114 mm) hinges all ± 1/8 in. (3.2 mm). The frame shall be of channel and angle iron to minimize deflection during impacting.

##### 4.6.2 Operational Tests

4.6.2.1 **Force to latch test** The force required to close the door to engage the latch shall be measured at a point on the door 1 in. (25.4 mm) from the latch edge of the door and on the centerline of the latch. This force shall not exceed a 4.5 lbf (20 N) maximum.

4.6.2.2 **Force to unlatch test** The force required to operate the latch to release the strike shall not exceed an 8 lbf (35.6 N) maximum or 12 lbf-in. (1.4 Nm) maximum. This force shall be measured at the release actuator or in the case of touch latches at a point 1 in. (25.4 mm) from the edge of the door and on the centerline of the latch.

4.6.2.3 **Holding Force Test** The latch shall hold the door in the closed position when a 10 lbf (44.5 N) is applied against the door. This force shall be applied 1 in. (25.4 mm) from the free swinging edge of the door and on the centerline of the latch.

4.6.2.4 Child resistant latches, when mounted according to the manufacturers' instructions, shall require two or more separate actions before the door is opened more than 1 ¼ in. (31.8 mm); or simultaneous actuation of two or more latch elements separated by a distance of at least 3 in. (76.2 mm) before the door is opened more than 1 ¼ in. (31.8 mm).

4.6.2.5 Child resistant latches, when mounted according to the manufacturers' instructions, shall require more than 15 lbf (66.7 N) pull or 25 lbf (111.2 N) push at the free edge of the door to open the door over 1 ¼ in. (31.8 mm) from its latched position.

##### 4.6.3 Cycle Tests

4.6.3.1 The latch shall be tested for the specified cycles. One cycle shall consist of closing the door to obtain complete engagement of the strike and opening the door after obtaining complete disengagement of the strike. Cycle at a rate not exceeding 10 cycles per minute.

4.6.3.2 The latch shall be subjected to operational tests 4.6.2 before starting the cycle test.

4.6.3.3 After 50% of the cycles are completed, repeat the operational test 4.6.2. The values obtained shall not decrease from the maximum values specified by more than 20%.

4.6.3.4 At the completion of the cycle test, repeat the operational test 4.6.2. The values obtained shall not decrease from the maximum values specified by more than 50%.

4.6.4 **Impact Strength Test:** ( For Positive Latches only.) When the latched door is impacted with a single 40 in.-lbf (4.5 J), normal to the door and in a direction tending to open the door, the door shall remain latched. The point of impact shall be the intersection of a vertical line 5.8 in. (147 mm) from the

latch side of the door and a horizontal line from the center of the latches and the midpoint between the hinges. The impactor shall be a 2 ½ in. diameter (63.5 mm) steel ball and the impacted surface on the door shall be a 1 x 4 x 4 in. (25.4 x 102 x 102 mm) hardwood pad secured on the door. This is a destructive test and the tested latch shall not be further tested.

#### 4.7 Test 6 Knob and Pull Load Test

4.7.1 Knobs, swinging bails and fixed bails shall support a 40 lbf (177 N) test load and pulls shall support a 75 lbf (333 N) test load without chipping, disassembly, breakage of the part or screws. Knobs and pulls shall withstand installation torques of 16 lbf-in. (1.8 Nm) without chipping and 21 lbf-in. (2.4 Nm) without breakage of the part or rotation of the threaded insert.

4.7.1.1 All loads shall be applied to a single test part.

4.7.1.2 The part shall be mounted on a ¾ in.  $\pm \frac{1}{16}$  in. (19 mm  $\pm$  1.6 mm ) thick hard wood simulating actual usage, using the attaching hardware supplied or recommended by the manufacturer.

4.7.1.3 The first test load shall then be applied normal to the axis of the screws as though a child were to stand on the part under test when it is applied on a cabinet.

4.7.1.4 The second test load shall then be applied to cause the screws to be in tension.

4.7.1.5 The torque loads in 4.7.1 shall then be applied.

4.7.1.6 Each test load shall be applied for ten seconds.

4.7.1.7 With pulls and bails, the loads shall be distributed over the pull grip area by use of a leather or canvas strap. With knobs, the load shall be equally distributed on opposite sides of the knob.

#### 4.8 Test 7 Shelf Rests and Standards and Shelf Rests Test

4.8.1 Four shelf rests shall support the specified static load (4.8.5) and a 20 in.-lbf (2.3 J) impact without a sudden collapse of any rest under the following test conditions:

##### 4.8.2 Grade 1 Test Conditions

4.8.2.1 The standards shall be cut to a length equal to the space between 2 screw holes plus  $1 \pm \frac{1}{16}$  in. (25.4  $\pm$  1.6 mm) below the bottom hole and  $1 \pm \frac{1}{16}$  in. (25.4  $\pm$  1.6 mm) above top hole.

4.8.2.2 Two standards shall be mounted on each of two parallel vertical walls, or simulated walls, which are 24 in.  $\pm \frac{1}{16}$  in. (610  $\pm$  1.6 mm) apart, shall be placed on 6 in.  $\pm \frac{1}{16}$  in. (152  $\pm$  1.6 mm) centers on each wall, shall be symmetrically opposite the other pair on the opposite wall, shall be mounted using the fasteners recommended by the manufacturer, shall not rest on any base at their lower ends, and shall be surface mounted whether designed for rabbeted or surface application.

4.8.2.3 Four rests shall be attached approximately midway between the standards attaching screws.

##### 4.8.3 Grade 3 Test Conditions

4.8.3.1 Two parallel vertical walls, or simulated walls, with approximately ¾ in. (19 mm) thick soft wood (pine) facing, shall be spaced approximately 24 in. (610 mm) apart.

4.8.3.2 Two holes shall be symmetrically and horizontally spaced 6 in.  $\pm \frac{1}{16}$  in. (152 mm  $\pm$  1.6 mm) apart on each wall. The hole size shall be that recommended by the manufacturer in the printed instructions or lacking this instruction it shall be the nearest  $\frac{1}{64}$  in. diameter (standard metric drill size) larger than the minor or basic diameter of the post.

4.8.3.3 A shelf rest shall be inserted in each of the four holes.

#### 4.8.4 Common Test Conditions

4.8.4.1 A  $\frac{3}{4}$  in. x 8 in. (19 x 203 mm) all  $\pm \frac{1}{16}$  in. (1.6 mm) wide by approximately 24 in. (610 mm) long plywood shelf shall be placed on the rests and the length of the shelf shall be adjusted so that there is not more than  $\frac{3}{32}$  in. (2.4 mm), or less than  $\frac{1}{32}$  in. (0.8 mm) clearance between the ends of the shelf and the standards and clearance shall be equal at both ends.

4.8.4.2 A  $1\frac{1}{2}$  in. x  $5\frac{1}{2}$  in. x  $11\frac{1}{2}$  in. (38 x 140 x 292 mm) all  $\pm \frac{1}{8}$  in. (3 mm) wood plate shall be centrally placed on the shelf to minimize its deflection.

4.8.4.3 The specified static load shall be gradually applied at the center of the shelf.

4.8.4.4 After the static load has been on the shelf five minutes, and without removing this load, a 20 in.-lbf (2.3 J) impact load shall be applied at the center of the shelf by dropping a 4 lb (1.8 kg) weight 5 in. (127 mm).

#### 4.8.5 Specified Static Load

| Product Grade | Static Load      |
|---------------|------------------|
| 1             | 500 lbf (2220 N) |
| 3             | 100 lbf ( 444 N) |

#### 4.9 Test 8 Shelf Brackets and Standards and Ornamental Shelf Supports Test

4.9.1 A pair of shelf supports shall support a static load (4.9.9) and a 20 in.-lbf (2.3 J) impact load without a sudden collapse of a support and without deflecting more than 3 degrees under the specified test conditions. If a shelf support is readily mounted in a second manner it shall also be tested in that manner using a second set of shelf supports.

4.9.2 A pair of shelf supports shall be mounted on 16 in centers, or the centers dictated by the design or manufacturer's instructions, against a vertical wall or simulated wall using fasteners as recommended by the manufacturer.

4.9.3 A  $\frac{3}{4}$  in  $\pm \frac{1}{16}$  in ( $19 \pm 1.6$  mm) thick plywood shelf approximately 24 in (610 mm) (or shorter if the support is designed to receive the shelf between the supports) by a width equal to the length of the shelf support leg plus  $\frac{1}{2}$  in  $\pm \frac{1}{16}$  in ( $13.6 \pm 1.6$  mm) shall be centered on the brackets.

4.9.4 If the shelf fits between the supports, the length of the shelf shall allow not more than  $\frac{3}{32}$  in (2.4 mm) or less than  $\frac{1}{32}$  in (0.8 mm) clearance between the ends of the shelf and the brackets and the clearance shall be equal at both ends.

4.9.5 A  $1\frac{1}{2}$  in x  $3\frac{1}{2}$  in x 12 in (38 x 89 x 305 mm) all  $\pm \frac{1}{16}$  (1.6 mm) wood plate shall be centrally placed on the shelf to minimize its deflection.

4.9.6 The static load shall be gradually applied at the center of the shelf.

4.9.7 After the static load has been on the shelf five minutes, and without removing this load, a 20 in.-lbf (2.3 J) impact load shall be applied at the center of the shelf by dropping a 4 lb (1.8 kg) weight 5 in. (127 mm).

4.9.8 After the impact load has been applied and without removing the static load the deflection of the shelf shall be measured over each of the supports. The average of these measurements shall not exceed 3 degrees.

#### 4.9.9 Static Test Loads

| Shelf Support Size - in (mm) | Static Test Load   |                    |
|------------------------------|--------------------|--------------------|
|                              | Grade 2 – lbf. (N) | Grade 3 – lbf. (N) |
| 4 up to 6 (101 up to 152)    | 100 (445)          | 40 (178)           |
| 6 up to 9 (152 up to 229)    | 125 (556)          | 40 (178)           |
| 9 up to 12 (229 up to 305)   | 150 (667)          | 40 (178)           |
| 12 up to 16 (305 up to 406)  | 180 (801)          | 40 (178)           |
| 16 up to 20 (406 up to 509)  | 210 (934)          | 40 (178)           |

#### 4.10 Test 9 Shelf Standard and Shelf Load Test

4.10.1 Two supports and a shelf shall support a load of 15 lbs per square foot (73 kg/m squared) of usable shelf area, a static 50 lbf (222 N) load at the center front edge of the shelf, and a 20 in-lbf (2.3 J) impact load applied at the center of the shelf, and without a sudden collapse of the shelf under the following specified test conditions.

4.10.2 The standard shall be cut to a length equal to the space between 2 screw holes plus  $1 \pm \frac{1}{16}$  in ( $25.4 \pm 1.6$  mm) below the bottom hole and  $1 \pm \frac{1}{16}$  in ( $25.4 \pm 1.6$  mm) above the top hole.

4.10.3 Two standards shall be mounted on a vertical wall, or simulated wall, using the fasteners recommended by the manufacturer and they shall not rest on any base at their lower end. They shall be mounted on centers dictated by the shelf span.

4.10.4 The shelf shall be positioned on the standard approximately midway between the attaching screws.

4.10.5 A load of 15 lbs per square foot (73 kg/m squared) of usable shelf area shall be gradually applied to the shelf. The load shall be equally distributed over the surface of the shelf.

4.10.6 Without removing the load of 4.10.5, a static load of 50 lbf (222 N) shall be applied at the center of the front edge of the shelf by use of a  $3 \pm \frac{1}{8}$  in ( $76 \pm 3.2$  mm) wide strap.

4.10.7 After the static loads have been on the shelf five minutes, and without removing these loads, a 20 in-lbf (2.3 J) impact load shall be applied at the center of the shelf by dropping a 4 lb (1.8 kg) load 5 in (127 mm).

#### 4.11 Test 10 Drawer Slides Tests (All Grades)

4.11.1 The test drawer is defined as 24 in.  $\pm \frac{1}{4}$  in. (610mm  $\pm$  6mm) wide and mounted with 18in. (457mm) nominal standard drawer slides. Exception: for center mounted drawer slides, the test drawer shall be 12 in.  $\pm \frac{1}{4}$  in. (304 mm  $\pm$  6mm) in width. A simulated or actual drawer shall be used for the test drawer, and the hardware shall be installed according to the manufacturers' instructions. If staples are used, a hardwood face frame and rear support shall be used. Unless otherwise specified by the manufacturer, where a separate rear bracket is used to receive the slide, the slide shall be installed midway into the bracket. The test drawer is not meant to represent any specific drawer type. Test drawers shall be equipped with attachment devices to perform the tests as specified.

4.11.2 All drawer slides shall permit complete drawer removal. Normal or abnormal placement of loads in a drawer shall not cause the drawer to be removed or partially removed from its suspended position when the drawer is operated through its opening and closing cycle. Heavy duty drawer slides shall have a positive disconnect, requiring the release of a mechanism, or removal of fastener prior to disconnecting the drawer.