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AMERICAN NATIONAL STANDARD

FOR

DOOR CONTROLS - CLOSERS

SPONSOR

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

AMERICAN NATIONAL STANDARDS INSTITUTE

Approved by ANSI October 1, 2008

AMERICAN NATIONAL STANDARD

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FORWARD

(This Forward is not a part of ANSI/BHMA A156.4-2007)

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 systems has been established. Door Controls 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 with their own category. Choice of grade and specific product 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 identify size, finish, material or options and are not intended to be used without necessary supplementary information. Consult individual manufacturer’s catalog.

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1. SCOPE

1.1 This Standard contains requirements for door closers surface mounted, concealed in the door, overhead concealed and concealed in the floor. Also included are pivots for floor closers. Criteria for conformance include cycle, operational, closing force and finish tests. Optional tests which shall be specified separately are also included.

1.2 Tests in this Standard are performed under neutral air pressure laboratory conditions and between 60 and 85 degrees F. In actual usage results vary because of installation, maintenance, and environmental conditions. Actual closer performance is affected by fluctuating ambient conditions such as wind and pressure differentials, consult factory for recommendations.

1.3 **Use on Fire Doors** A door closer used on labeled fire door assemblies shall be listed or labeled by a nationally recognized independent testing laboratory, and be subject to a periodic in-plant follow-up service. Consult the authority having jurisdiction for the appropriate fire test requirements.

2. GENERAL

2.1 **Reference to other Standards**. ANSI Standards referenced in this Standard are available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036 and www.buildershardware.com.

2.2 **Type Numbers** This Standard has been prepared to standardize door closers and controls by type requirements and performance levels. Only those type numbers shown in this Standard shall be used. For explanation of identifying numbers, see 11.14.

2.3 **Manufacturer's Catalogs** Consult manufacturer's catalogs for construction details and special conditions relating to accessories.

2.4 **Tolerances** All values which do not carry specific tolerances or are not marked maximum or minimum shall have the following tolerances: Number of cycles shall be minimum. Linear dimensions shall be $\pm$ 1/16 in. (1.6 mm). Pounds or pound force shall be $\pm$ 2%. The scribed lines for degree of opening shall be. A tolerance of $\pm$ 2 degrees F shall be applied to temperature call outs.

2.5 **SI Units** All dimensions are expressed first in US units with SI unit (metric) equivalents given in parentheses. SI units are approximate.

2.6 **All Closers** Door closers shall be categorized as listed in the following groupings by their performance requirements.

Closer Description	**PT Number**
Surface or Concealed in Door closers, Grade 1	PT 1
Surface or Concealed in Door closers, Grade 2	PT 2
Surface or Concealed in Door closers, Grade 3	PT 3
Surface or Concealed in Door closers, Options	PT 4-A,C,D,E,F,G,H,J
Concealed Overhead and Floor Closers, Grade 1	PT 5
Concealed Overhead and Floor Closers, Grade 2	PT 6
Concealed Overhead and Floor Closers, Grade 3	PT 7
Concealed Overhead and Floor Closers, Options	PT 8-A,B,C,D,E,F,G,J,K,L,M

2.7 **Field Application Guidelines** for closer sizing and door sizes are provided in the Appendix in Table A1.

2.8 **Fluid** To ensure better performance over a range of outdoor temperatures fluid used in door closers intended for exterior or vestibule door application shall have a pour point of minus 38 degrees F (-39 degrees C) or lower when tested in accordance with ASTM D-97.

2.9 **Types to Test** Non-hold open type closers shall be used for all testing.

2.10 **Samples** A single door closer shall be used for all tests except finish tests, and shall be run consecutively.

3. PREPARATION FOR PERFORMANCE TEST

3.1 The Test Door Weight, Mounting, and Actuating

3.1.1 **Weight** The test door weight shall be as specified in **Table 1** below. Center of gravity of the weighted door shall be 18 in (457 mm) from the pivot center of the door for size 2 or larger closers and 15 in. (381 mm) for size 1 closers. For light screen or combination storm door closers test door weight shall be 30 lbs (13.6 kg). Door weight is for test purposes only.

Table 1

Closer Size	Closing Force between the ½ in. (12.77 mm) and 3 in. (76 mm) mark (F1)		Test Door Weight
	lbf	N	
I	From 2 up to 3	From 9 up to 13	50 lbs/23 kg
II	From 3 up to 5	From 13 up to 22	80 lbs/36 kg
III	From 5 up to 8	From 22 up to 36	100 lbs/45 kg
IV	From 8 up to 11	From 36 up to 49	125 lbs/57 kg
V	From 11 up to 14	From 49 up to 62	155 lbs/70 kg
VI	14 and above	Above 62	180 lbs/82 kg

3.1.2 **Mounting** Doors shall be hung on hinges, accurately aligned with vertical pins or on offset or center pivots, if required by the door closer. Force required to overcome friction or out of balance condition shall be a 1/4 lbf. (1.1 N) or less throughout the test measured perpendicular to the face of the door at a point 30 in (762 mm) from pivot center. Forces required to overcome friction or out of balance conditions are permitted to be greater than a 1/4 lbf. (1.1 N) if acceptable to closer manufacturer. Top jamb mounting shall be 2 in $\pm$ 1/8 in (5l $\pm$ 3 mm) reveal. Any force due to hinge friction shall not be used to adjust test data.

3.1.3 **Actuating** Means for mechanically opening the door to the 90 degree position ($\pm$ 5 degrees) and releasing shall be provided for the cycling test.

3.2 The Door Closer to be Tested

3.2.1 If door closer bodies of the same type are of substantially the same construction, the cycle test shall be required only for one arm application (i.e. regular arm, parallel arm, track arm, bracket mounting or top jamb mounting) under tests PT 1, PT 2, and PT 3. All other tests as applicable, shall be required for all arm applications.

3.3 **Marking**

3.3 **Door Opening Templates and Floor Marking** In preparation for the testing, attach a pointer to bottom the leading edge of door 30" from pivot center, and provide a template (Figure 4) or floor markings along the swing of the pointer mounted on the test door at the following intervals: 135, 115, 90, 70, and 45 degrees. For the applicable tests, the door will be opened to the line being parallel to the leading edge of the door degree where the pointer intersects the required location. In addition, for tests which require an opening to a specified distance, mark lines (Figure 5) at ½, 2, 3, 4 and 12 inches perpendicular to the door in the closed position, and 30 in. (762 mm) from the pivot center of the door.

3.4 **Installation** The door closer shall be installed in accordance with the manufacturer's written installation instructions.

3.5 **Applied Forces and Force Readings** All applied forces or force readings shall be made perpendicular to the face of the door at a point 30 in (762 mm) from the pivot center of the door. Force applications and readings shall be applied by a force gauge with a combined calibration and reading accuracy within 5%.

3.6 **Overload Abuse Test Weights** In closers with adjustable spring power, set the closing force to the closest increment within the values specified for the closer size in **Table 1**.

Table 2

Door Closer Size	I	II	III	IV	V	VI
Overload Test Weight	35 lbs (16 kg)	40 lbs (18 kg)	45 lbs (21 kg)	55 lbs (25 kg)	60 lbs (27 kg)	65 lbs (30 kg)

4. TEST PROCEDURES PART 1: INITIAL STATIC TESTS

4.1 **BREAK-IN CYCLES Grades 1, 2, 3 (PT1, PT2, PT3, PT5, PT6, PT7, & Other PT Options).** . Prior to performing the static tests, the following break-in cycles shall be completed:

Setup Mount door closer on test apparatus, Figure 6, regulate door closing time from 90 degrees to between 3 and 6 seconds. Maintain this time during cycling by re-regulating if necessary. Fully open backcheck valve, where applicable.

Test Cycle door closer to 4,000 cycles.

4.2 **STATIC TEST 1** **Range of Checking Control**

4.2.1 **Surface or Concealed-in-Door Closers, Grade 1 (PT1) and Concealed-in-Floor or Overhead Concealed Closers, Grade 1 (PT5)**

Setup Mount door closer per manufacturer's instructions. Completely close the general speed regulating valve on the closer.

Test Open the door to 135° or maximum designed opening if less than 135 degrees and release. The point at which the closing motion of the door is essentially stopped (a slow creeping motion after deceleration shall be disregarded) shall be not more than 20° from release point.

4.2.2 **Surface or Concealed-in-Door Closers, Grade 2 (PT2) and Concealed-in-Floor or Overhead Concealed Closers, Grade 2 (PT6)**

Setup Mount door closer per manufacturer's instructions. Completely close the general speed regulating valve on the closer.

Test Open the door to 135° or maximum designed opening if less than 135 degrees and release. The point at which the closing motion of the door is essentially stopped (a slow creeping motion after deceleration shall be disregarded) shall be not more than 25° from release point.

4.2.3 **Concealed-in-Floor or Overhead Concealed Closers, Grade 3 (PT7) and Surface or Concealed-in-Door Closers, Grade 3 (PT3)**

Setup Mount door closer per manufacturer's instructions. Completely close the general speed regulating valve on the closer.

Test Open the door to 135° or maximum designed opening if less than 135 degrees and release. The point at which the closing motion of the door is essentially stopped (a slow creeping motion after deceleration shall be disregarded) shall be not more than 30° from release point.

4.2.4 **Concealed-in-Floor or Overhead Concealed Closers, Optional (PT8A)**

Setup Mount door closer per manufacturer's instructions. Completely close the general speed regulating valve on the closer.

Test Open the door to maximum opening and release. The point at which the closing motion of the door is essentially stopped (a slow creeping motion after deceleration shall be disregarded) shall be not more than 7° from release point to the closed position.

4.3 **STATIC TEST 2** **Two Speeds of Closing Control**

4.3.1 **Surface or Concealed-in-Door closers, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup Adjust the general speed regulating valve for a normal closing motion and fully open the latch speed regulating valve.

Test Open the door to approximately 45 degrees and release. The point at which the door noticeably accelerates shall be between the 12 in. (305 mm) and 2 in. (51 mm) marks. When the valving does not allow a latch speed faster than the closing speed, adjust the general speed regulation for normal closing motion and close the latching speed regulating valve.. Open the door to about 45 degrees and release. The point at which the door noticeably decelerates shall be between the 12 in. (305 mm) and 2 in. (51 mm) marks.

4.3.2 **Concealed-in-Floor or Overhead Concealed closers, Grades 1 (PT5)**

Setup Mount the door closer per manufacturers instructions.

Test #1 Adjust the general speed regulation for a normal closing motion and fully open the latch speed regulation. Open the door to about 45 degrees and release. The point at which the door noticeably accelerates shall be between the 12 in. (305 mm) and 2 in. (51 mm) marks. When the valving does not allow a latch speed faster than the closing speed, adjust the general speed regulation for normal closing motion and close the latching speed regulating valve. Open the door to about 45 degrees and release. The point at which the door noticeably decelerates shall be between the 12 in. (305 mm) and 2 in. (51 mm) marks.

Test #2 In lieu of Test #1 at the option of the manufacturer, with the door closer mounted and adjusted to close from 90 degrees to closed between 3 and 6 seconds, open the door to 30 +/- 3 degrees and release. The closing force shall exceed by 30% the value specified by Table 1.

4.4 STATIC TEST 3 Adjustable Closing Speed

4.4.1 **Surface or Concealed-in-Door closers, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup#1 Fully close general and latch speed regulating valve(s).

Test #1 Open the door to 90 degrees and release. Door shall take 60 seconds or longer to fully close.

Setup #2 Fully open general and latch speed regulating valve(s).

Test #2 Open the door to 90 degrees and release. Door shall fully close in 3 seconds or less.

4.4.1 **Concealed-in-Floor or Overhead Concealed Closers, Grades 1, 2, 3 (PT5, PT6, PT7)**

Setup#1 Mount door closer. Fully close general and latch speed regulating valve(s).

Test #1 Open the door to 90 degrees and release. Door shall take 60 seconds or longer to fully close.

Setup #2 Fully open general and latch speed regulating valve(s).

Test #2 Open the door to 90 degrees and release. Door shall fully close in 3 seconds or less.

4.5 STATIC TEST 4 Closing Force for Fixed Size Closers with 15 to 50% Adjustment

4.5.1 **For Fixed and Adjustable Closers Surface or Concealed-in-Door closers, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup Open both general and latch speed regulating valves. Set the closing force as required for the size being tested.

Test Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between the 3 in. (76 mm) and ½ in. (12.7 mm) marks and record force (F1). The recorded force shall be within the values specified in Table 1 for the size closer being tested.

Note If a manufacturer's parallel arm or track arm application does not meet the closing force requirement for the size and force given in Table 1,the next larger size closer shall be used. This closer shall be tested for closing force requirements given in Table 1 for the size substituted to verify qualification.

4.5.2 **For Fixed and Adjustable Closers Concealed-in-Floor or Overhead Concealed closers, Grades 1, 2, 3 (PT5, PT6, PT7)**

Setup With the door closer mounted open both general and latch speed regulating valves. Set the closing force as required for the size being tested.

Test Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between the 3 in. (76 mm) and ½ in. (12.7 mm) marks and record force (F1). The recorded force shall be within the values specified in Table 1 for the size closer being tested.

Note If a manufacturer's track arm application does not meet the closing force requirement for the size and force given in Table 1, the next larger size closer shall be used. This closer shall be tested for closing force requirements given in Table 1 for the size substituted to verify qualification.

4.5.3 **For Adjustable Closers Surface or Concealed-in-Door closers, Optional (PT4A, PT4C)**

Setup Mount door closer and open both the general and latch speed regulating valves. Adjust the closing force to the maximum in accordance with the manufacturer's instructions.

Test Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between 3 in. (76 mm) and ½ in. (12.7 mm) and record force (F2). Calculate the percent of closing force adjustment by the following formula (F1 was recorded in 4.5.1): Percentage of closing force adjustment = ((F2 – F1) / F2) x 100.

The percentage of closing force adjustment shall be at least 15% for PT4A and 50% for PT4C over the minimum value for the size closer being tested.

4.5.4 **For Adjustable Closers Concealed-in-Floor or Overhead Concealed closers, Optional (PT8D, PT8L)**

Setup With the door closer mounted open both the general and latch speed regulating valves. Adjust the closing force to the maximum in accordance with the manufacturer's instructions.

Test Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between 3 in. (76 mm) and ½ in. (12.7 mm) and record force (F2). Calculate the percent of closing force adjustment by the following formula (F1 was recorded in 4.5.2.): Percentage of closing force adjustment = ((F2 – F1) / F1) x 100.

The percentage of closing force adjustment shall be at least 50% for PT8D or 35% for PT8L over the minimum value for the size closer being tested.

4.6 **STATIC TEST 5** **Closing Force for Closers with Adjustment Through Range of Sizes**

4.6.1 **Surface or Concealed-in-Door closers, Optional (PT4H)**

Setup #1 Mount door closer and fully open both the general and latch speed regulating valves. Adjust the closing force to the minimum available for the closer being tested.

Test #1 Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between the 3 in. (76 mm) and ½ in. (12.7 mm) marks and record force. The recorded force shall be less than the maximum value specified in Table 1 for the minimum size closer specified by the manufacturer.

Setup #2 Mount closer and fully open both the general and latch speed regulating valves. Adjust the closing force to the maximum available for the closer being tested.

Test #2 Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between the 3 in. (76 mm) and ½ in. (12.7 mm) marks and record force. The recorded force shall be equal to, or greater than the minimun value specified in Table 1 for the maximum size closer specified by the manufacturer. .

4.6.2 **Concealed-in-Floor or Overhead Concealed closers, Optional (PT8M)**

Setup #1 With the door closer mounted open both the general and latch speed regulating valves. Adjust the closing force to the minimum available for the closer being tested.

Test #1 Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between the 3 in. (76 mm) and ½ in. (12.7 mm) marks and record force. The recorded force shall be less than the maximum value specified in Table 1 for the minimum size closer specified by the manufacturer.

Setup #2 With the door closer mounted–open both the general and latch speed regulating valves. Adjust the closing force to the maximum available for the closer being tested.

Test #2 Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between the 3 in. (76 mm) and ½ in. (12.7 mm) marks and record force. The recorded force shall be equal to, or greater than the minimun value specified in Table 1 for the maximum size closer specified by the manufacturer.

4.7 **STATIC TEST 6** **Door Closer Efficiency**

4.7.1 **Surface or Concealed-in-Door closers, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup Mount door closer and fully open the general and latch speed regulating valves.

Test First, using a force meter open the door slowly and uniformly. Record the opening forces F3, F4, and F5 as the door edge passes the 2 in. (51 mm), 3 in. (76 mm), and 4 in. (102 mm) marks respectively. Second, starting beyond the 4 in. (102 mm) mark, let the door closer close the door in a slow and uniform manner resisted by the force meter. Record the force readings F6, F7, and F8 as the door edge passed the 4 in. (102 mm), 3 in. (76 mm), and 2 in. (51 mm) marks respectively. Calculate the door closer efficiency by the following formula: Percent Efficiency = ((F6 + F7 + F8) / (F3 + F4 + F5)) x 100

Door closer efficiency shall be a minimum of 50% for size I and II and 60% for sizes III through VI to be acceptable.

4.7.2 **Concealed-in-Floor or Overhead Concealed closers, Grades 1 and 2 (PT5 and PT6)**

Setup With the door closer mounted fully open the general and latch speed regulating valves.

Test First, using a force meter open the door slowly and uniformly. Record the opening forces F3, F4, and F5 as the door edge passes the 2 in. (51 mm), 3 in. (76 mm), and 4 in. (102 mm) marks respectively.

Second, starting beyond the 4 in. (102 mm) mark, let the door closer close the door in a slow and uniform manner resisted by the force meter. Record the force readings F6, F7, and F8 as the door edge passed the 4 in. (102 mm), 3 in. (76 mm), and 2 in. (51 mm) marks respectively. Calculate the door closer efficiency by the following formula: Percent Efficient = ((F6 + F7 + F8) / (F3 + F4 + F5)) x 100

Door closer efficiency shall be a minimum of 50% for size I and II and 60% for sizes III through VI to be acceptable.

4.8 STATIC TEST 7 Checking Cylinder Test

4.8.1 Surface,Concealed-in-Door Closers, Concealed in floor, Overhead Concealed Grades 1,2 (PT1, PT2, PT5, PT6)

Setup Mount door closer and open both the general and latch speed regulating valves. Adjust the closing force to the maximum in accordance with the manufacturer's instructions. Open the door beyond the 3 in. (76 mm) line drawn on the floor. Holding the door open with a force meter, allow the door to close slowly under the power of the door closer. Read the greatest force exerted by the power of the door closer as the door travels between the 3 in. (76 mm) and ½ in. (12.7 mm) marks and record force (F1). The recorded force shall equal or exceed the minimum values specified in 3.1.1 for the size closer being tested. Once closing force is set, fully close both the latch and speed regulating valves.

Test Open the door to 90 degrees. Release and push the door closed with a 20 lbf (89 N) force applied 30 in (762 mm) from the pivot center. The time required for the door to fully close shall not be less than 8 seconds.

4.9 STATIC TEST 8 Backcheck Tests

4.9.1 Adjustable Backcheck for Surface or Concealed-in-Door closers, Grades 1 and 2 only (PT1 and PT2 only), Optional (PT4D)

Setup Mount door closer and open both the general and latch speed regulating valves. Set the closing force. Fully open backcheck valve. The backcheck function is tested by the actuating means of the test apparatus pushing the door to 50 degrees maximum door opening. The actuating means must push with a velocity sufficient to propel the door to a minimum opening angle of 110 degrees with the backcheck valve fully open.

Test Adjust the backcheck valve to provide an observable reduction in the door opening speed between 60 degrees and 85 degrees of door opening and the door shall be completely stopped at a maximum of 90 degrees.

4.9.2 Adjustable Backcheck for Concealed-in-Floor or Overhead Concealed closers, Grades 1 and 2 only (PT5 and PT6 only), Optional (PT8F)

Setup With the door closer mounted both the general and latch speed regulating valves. Set the closing force. Open backcheck valve. The backcheck function is tested by the actuating means of the test apparatus pushing the door to 50 degrees maximum door opening. The actuating means must push with a velocity sufficient to propel the door to a minimum opening angle of 110 degrees with the backcheck valve fully open.

Test Adjust the backcheck valve to provide an observable reduction in the door opening speed between 60 degrees and 85 degrees of door opening and the door shall be completely stopped at a maximum of 90 degrees.

4.9.3 Advanced Backcheck for Surface or Concealed-in-Door closers, Optional (PT4J)

Setup Mount door closer and open both the general and latch speed regulating valves. Set the closing force. Disengage the backcheck function.

Test Manually open the door and adjust the backcheck valve to provide an observable reduction in the door opening speed prior to 70 degrees of door opening, at an angle specified by the manufacturer.

4.9.4 **Factory Pre-Set Backcheck for Concealed-in-Floor or Overhead Concealed closers, Grades 1 and 2 only (PT1 and PT2 only), Optional (PT4E)**

Setup Using a closer with adjustable backcheck as chosen by the manufacturer as representative of the model with construction which is the same or similar construction as the Factory Pre-Set Backcheck model under test, mount the door closer open both the general and latch speed regulating valves. Set the closing force. Fully open backcheck valve. The backcheck function is tested by the actuating means of the test apparatus pushing the door to 50 degrees maximum door opening. The actuating means must push with a velocity sufficient to propel the door to a minimum opening angle of 110 degrees with the backcheck valve fully open. Replace the closer with adjustable backcheck with a closer with Factory Pre-Set Backcheck. The closer is to be mounted in accordance with the manufacturer's instructions for 90 degrees of opening. Open both the general and latch speed regulating valves.

Test: The Factory Pre-Set Backcheck shall provide an observable reduction in the door opening speed between 60 degrees and 85 degrees and the door shall be completely stopped at a maximum of 90 degrees.

4.10 **STATIC TEST 9** Delayed Action Closer Test

4.10.1 **Surface or Concealed-in-Door closers, Optional (PT4F)**

Setup Mount door closer and fully open both the general and latch speed regulating valves and adjust the spring force. Fully close the delayed action regulating valve.

Test Open the door to 90 degrees and release. Closing time between 90 degrees and 70 degrees shall be a minimum of 20 seconds. The point at which the door noticeably accelerates shall be a minimum of 60 degrees.

4.10.2 **Concealed-in-Floor or Overhead Concealed closers, Optional (PT8J)**

Setup Mount door closer and fully open both the general and latch speed regulating valves and adjust the spring force. Fully close the delayed action regulating valve.

Test Open the door to 90 degrees and release. Closing time between 90 degrees and 70 degrees shall be a minimum of 20 seconds. The point at which the door noticeably accelerates shall be a minimum of 60 degrees.

4.11 **STATIC TEST 10** Dead Stop Tests

4.11.1 **Dead Stop Degree Test for Surface or Concealed-in-Door closers, (PT4G)**

Setup Mount closer in accordance with manufacturer's instructions for 90 degrees of opening.

Test Open the door to the maximum opening. Check the degree of opening. The degree shall be at the opening specified +/- 2 degrees..

4.11.2 **Dead Stop Degree Test for Concealed-in-Floor or Overhead Concealed closers, (PT8G)**

Setup Mount closer in accordance with manufacturer's instructions for degree of opening specified in manufacturer's instructions. The closer shall have a factory built-in dead stop at 85 to 105 degrees.

Test Open the door to the maximum opening. Check the degree of opening. The degree shall be at the opening specified +/- 2 degrees.

4.11.3 **Dead Stop Test for PT4G and PT8G**

Setup All forces shall be applied to the door and readings taken at a point 30 in (762 mm) from center line of hinge or pivot at a height of 40 in (1016 mm) from the bottom of the door.

Test Door closers shall be opened to the dead stop position and a static force exerted against the door in the opening direction. The door-closer shall withstand the force as listed with no impairment of function to the closer mechanism or mounting: Grade 1 – 150 lbf (890 N), Grade 2 – 100 lbf (445 N), Grade 3 – 50 lbf (225 N).

4.12 **STATIC TEST 11 Overload Abuse Test for Surface or Concealed-in-Door closers, 1 and 2 only (PT1 and PT2 only)**

Setup Mount door closer on test apparatus, Fig. 3. Adjust the closing time from 90 degrees to the closed position to 10 seconds. The test door weight shall be as described in Table 1. Attach weights to the cable in accordance with Table 2.

Test Open and Hold the door open to 90 degrees with the cable and weights attached and release the door allowing the weights to fall. The falling test weight is arrested when the door is 15 degrees from the closed position. The door continues to close under its own momentum until it is arrested by the energy absorbing stop at 5 degrees or the frame at 0 degrees, or in the case of double action closers, until it stops of its own accord. For Grade 1 (PT1), cycle 10 times. For Grade 2 (PT2), cycle 5 times.

4.13 **STATIC TEST 12 Automatic Hold-Open Test for Concealed-in-Floor or Overhead Concealed closers, Optional (PT8B)**

Setup Mount closer in accordance with manufacturer's instructions for degree of opening specified in manufacturer's instructions. The closer shall have automatic hold-open between 85 and 180 degrees.
Test Open the door until the closer engages hold-open. Check the degree of opening. The degree shall be at the opening specified +/- 2 degrees.

4.14 **STATIC TEST 13 Selector Hold-Open or Non-Hold-Open Test for Concealed-in-Floor or Overhead Concealed closers, Optional (PT8C)**

Setup Mount closer in accordance with manufacturer's instructions for degree of opening specified in manufacturer's instructions. The closer shall have a selector for hold-open or non-hold-open (manually engage or disengage hold-open adjuster) between 85 and 180 degrees.
Test #1 With the selector turned to hold-open, open the door until the closer engages hold-open. Check the degree of opening. Hold-open shall occur at the door opening specified +/- 2 degrees.
Test #2 With the selector turned to off or non-hold-open, open the door to the maximum opening. Closer shall not engage hold-open.

4.15 **STATIC TEST 14 165 Degree of Door Opening Test for Concealed-in-Floor or Overhead Concealed closers, Optional (PT8E)**

Setup Mount closer in accordance with manufacturer's instructions for 165 degrees of opening.
Test: Open the door to the maximum opening. For single acting closers, the door shall open to 165 +/- 2 degrees without harm to the closer, trim permitting. For double acting closers, the door shall open to 165 +/- 2 degrees in either direction, trim permitting.

4.16 **Successful completion of all applicable elements of Part 1 is required before continuing to Part 2.**

5. TEST PROCEDURES PART 2: INTERMEDIATE CYCLE TEST

Note on Spring Force Adjustment: Once spring force is set, adjust all speed regulating valves for a door closing time from a 90 degree opening to between 3 and 6 seconds. Maintain this time during the cycling by re-regulating if necessary.

5.1 **For Surface or Concealed-in-Door Closers *without* Backcheck, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup Mount door closer. (Reference Figure 6.) Open both the general and latch speed regulating valves and adjust the spring force. Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle.

Test Cycle door with the door closer maintaining control over the door for:
For Grade 1 (PT1), run 1,000,000 cycles for a total of 1,004,000 cycles
For Grade 2 (PT2), run 500,000 cycles for a total of 504,000 cycles
For Grade 3 (PT3), run 496,000 cycles for a total of 500,000 cycles

5.2 **For Concealed-in-Floor or Overhead Concealed Closers *without* Backcheck, Grades 1, 2, 3 (PT5, PT6, PT7)**

Setup Mount door closer. (Reference Figure 6.) Open both the general and latch speed regulating valves and adjust the spring force, where applicable.

Test Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle. Cycle door with the door closer maintaining control over the door for:
For Grade 1 (PT5), run 1,000,000 cycles for a total of 1,004,000 cycles
For Grade 2 (PT6), run 500,000 cycles for a total of 504,000 cycles
For Grade 3 (PT7), run 496,000 cycles for a total of 500,000 cycles

5.3 **For Surface or Concealed-in-Door Closers *with* Backcheck, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup 1 Mount door closer and open both the general and latch speed regulating valves. Set the closing force. Fully open backcheck valve. The backcheck function is tested by the actuating means of the test apparatus pushing the door to 50 degrees maximum door opening. The actuating means must push with a velocity sufficient to propel the door to a minimum opening angle of 110 degrees with the backcheck valve fully open.

Test 1 Adjust the backcheck valve to provide an observable reduction in the door opening speed between 60 degrees and 85 degrees of door opening and the door shall be completely stopped at a maximum of 90 degrees. Cycle the door closer as listed below:

For Grade 1 (PT1), run 100,000 cycles with the backcheck control functional.

For Grade 2 (PT2), run 50,000 cycles with the backcheck control functional.

Setup 2 Mount door closer. (Reference Figure 6.) Open both the general and latch speed regulating valves, turn off backcheck control, and adjust the spring force.

Test 2 Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle. Cycle door with the door closer maintaining control over the door for:
For Grade 1 (PT1), run 400,000 cycles with backcheck control disengaged for a total of 504,000 cycles.
For Grade 2 (PT2), run 200,000 cycles with backcheck control disengaged for a total of 254,000 cycles.
For Grade 3 (PT3), run 496,000 cycles with backcheck control disengaged for a total of 500,000 cycles.

5.4 **Concealed-in-Floor or Overhead Concealed Closers *with* Backcheck, Grades 1, 2, 3 (PT5, PT6, PT7)**

Setup 1 With the door closer mounted both the general and latch speed regulating valves. Set the closing force. Open backcheck valve. The backcheck function is tested by the actuating means of the test apparatus pushing the door to 50 degrees maximum door opening. The actuating means must push with a velocity sufficient to propel the door to a minimum opening angle of 110 degrees with the backcheck valve fully open.

Test 1 Adjust the backcheck valve to provide an observable reduction in the door opening speed between 60 degrees and 85 degrees of door opening and the door shall be completely stopped at a maximum of 90 degrees. Cycle the door closer as listed below:

For Grade 1 (PT5), run 100,000 cycles with the backcheck control functional.

For Grade 2 (PT6), run 50,000 cycles with the backcheck control functional.

Setup 2 Mount door closer. (Reference Figure 6.) Open both the general and latch speed regulating valves, turn off backcheck control, and adjust the spring force.

Test 2 Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle. Cycle door with the door closer maintaining control over the door for:

For Grade 1 (PT5), run 400,000 cycles with backcheck control disengaged for a total of 504,000 cycles.
For Grade 2 (PT6), run 200,000 cycles with backcheck control disengaged for a total of 254,000 cycles.
For Grade 3 (PT7), run 496,000 cycles with backcheck control disengaged for a total of 500,000 cycles.

6. TEST PROCEDURES PART 3: INTERIM STATIC TESTS

6.1 Repeat the following tests, as applicable to the closer type, from Part 1:

Range of Checking Control (4.2), Adjustment Through Range of Sizes (4.6), Door Closer Efficiency (4.7), Checking Cylinder Test (4.8), Backcheck Tests (4.9), and Delayed Action Closer Test (4.10).

6.2 Successful completion of applicable elements of Test Procedures Parts 1, 2, and 3 is required before continuing to Part 4.

7. TEST PROCEDURES PART 4: FINAL CYCLE TEST

7.1 **For Surface or Concealed-in-Door Closers *without* Backcheck, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup Mount door closer. Open both the general and latch speed regulating valves and adjust the spring force.

Test Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle. Cycle door with the door closer maintaining control over the door for:

For Grade 1 (PT1), run 996,000 cycles for a total of 2,000,000 cycles

For Grade 2 (PT2), run 496,000 cycles for a total of 1,000,000 cycles

For Grade 3 (PT3), total cycle requirement of 500,000 cycles

7.2 **Concealed-in-Floor or Overhead Concealed Closers *without* Backcheck, Grades 1, 2, 3 (PT5, PT6, PT7)**

Setup Mount the closer. Open both the general and latch speed regulating valves and adjust the spring force.

Test Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle. Cycle door with the door closer maintaining control over the door for:

For Grade 1 (PT5), run 996,000 cycles for a total of 2,000,000 cycles

For Grade 2 (PT6), run 496,000 cycles for a total of 1,000,000 cycles

For Grade 3 (PT7), total cycle requirements of 500,000 cycles

7.3 **For Surface or Concealed-in-Door Closers *with* Backcheck, Grades 1, 2, 3 (PT1, PT2, PT3)**

Setup Mount door closer. Open both the general and latch speed regulating valves, turn off backcheck control, and adjust the spring force.

Test Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle. Cycle door with the door closer maintaining control over the door for:

For Grade 1 (PT1), run 996,000 cycles for a total of 1,500,000 cycles

For Grade 2 (PT2), run 496,000 cycles for a total of 750,000 cycles

For Grade 3 (PT3), total cycle requirements of 500,000 cycles

7.4 **Concealed-in-Floor or Overhead Concealed Closers *with* Backcheck, Grades 1, 2, 3 (PT5, PT6, PT7)**

Setup Mount the closer Open both the general and latch speed regulating valves, turn off backcheck control, and adjust the spring force, where applicable.

Test Mechanically open the door to 90 degrees and release allowing the door closer to close the door. One opening and closing constitutes one cycle. Cycle door with the door closer maintaining control over the door for:

For Grade 1 (PT5), run 996,000 cycles for a total of 1,500,000 cycles

For Grade 2 (PT6), run 496,000 cycles for a total of 750,000 cycles

For Grade 3 (PT7), total cycle requirements of 500,000 cycles

7.5 **Additional Test Required for Double Acting Floor & Overhead Concealed Closers, Grades 1 & 2**

7.5.1 Cycle a grade 1 closer an additional 10,000 cycles and a grade 2 closer for 5,000 cycles from 20 degrees to 0 degrees to 20 degrees (opposite direction) for a total of 40 degrees of door travel (See Figure 7).

7.5.2. Adjust the latch speed to have hydraulic control by making closing speed from the 20 degree open position 1 second +/- 10% slower than that with the valves completely open

7.5.3. Cycle with an air actuator exerting 15 lbf (67 N) applied both ways at 30 in. (762 mm) from the pivot point.

7.5.4 At the conclusion of test, closer shall return to 0 degrees.

7.6 **Successful completion of applicable elements of Test Procedures Parts 1, 2, 3, and 4 is required before continuing to Part 5.**

8. TEST PROCEDURE PART 5: FINAL STATIC TESTS

8.1 Repeat all applicable Initial Static Tests for the closer type except the Dead Stop Tests.

8.2 Hydraulic closers shall not show visible indications of fluid dripping (more than a single drop, or simple wetting).

8.3 At the conclusion of the tests the closer shall be capable of being adjusted to return the door from 90 to zero degrees in 3 to 6 seconds.

9. PIVOT PERFORMANCE TESTS

9.1 The Test Door

Minimum Test Door Weights and Door Cycle Requirements

Minimum Test Door Weights & Cycles*			
Grade	Standard Duty lbs/kg	Extra Heavy Duty lbs/kg	Door Cycles
1	250/114	500/225	2.0 MM
2	150/68	300/135	1.0 MM

9.1.2 The balance of door information is the same as in 3.1.

9.2 The Pivots to be Tested

9.2.1 A manufacturer's standard pivot set (top and bottom) shall be used for testing.

9.2.2 Pivots shall be installed in accordance with the manufacturer's instructions.

9.2.3 Pivots shall not be lubricated for the duration of the test.

9.2.4 Pivots shall not be adjusted for the duration of the test.

9.3 Test Procedure

9.3.1 Cycle Test duration for Grade 1 pivot sets shall be 2,000,000 cycles.

9.3.2 Cycle Test duration for Grade 2 pivot sets shall be 1,000,000 cycles.

9.3.3 Install pivots and hang door.

9.3.4 Install gauge plates as indicated on sketch of Pivot Test Installation. (Figure 1)

9.3.5 Mechanically operate the door through 90 degrees of door opening. Door closed, to open, to closed constitutes one cycle. Maintain frequency of operation between 4 and 6 seconds per cycle.

9.3.6 After completing 1,000 cycles, stop and establish base data as follows and record .

A. **Requirements** for the allowable friction of door, maximum amount of change in the friction, vertical mismatch, clearance between the A and B plates:

Door Weight lbs./kg	After 1,000 Cycles	Maximum Amount of Change
	Maximum Friction of Door Swing	
150lbs/68 250 lbs/113 300 lbs/136 500 lbs/227	1/4 lbs/(1.1 N) 1/2 lbs/(2.2 N) 3/4 lbs/(3.3 N) 1 1/4 lbs/(5.5N)	2 lbs/(9 N) 2 lbs/(9 N) 3 lbs/ (13 N) 3 lbs/ (13 N)
Vertical Mismatch Set A	0	0.060 in. (1.5 mm) or less
Clearance between Set A plates		0.060 in. (1.5 mm) or less
Clearance between Set B plates		0.060 in. (1.5 mm) or less

B. Scribe a fine line in the layout dye across both plates of Set A and Set B. The scribed line shall be perpendicular to the vertical edge of the frame.

C. Measure the clearance between the plates of a pair in both Set A and Set B at the scribed line (in thousands of an inch) and record.

9.3.7 Continue cycling the pivots until the 1,000,000 (Grade 2) or 2,000,000 (Grade 1) cycles have been completed.

9.3.8 Record Final Test Data in 9.3.6.

A. Measure friction of door mounting as in 3.5 and record.

B. Measure the vertical mismatch between the scribe lines on the frame plate and door plate of Set A (in thousandths of an inch) and record.

C. Measure the clearance between the plates of a pair, Set A and Set B at the scribed line on the frame plate (in thousandths of an inch) and record.

9.3.9 Calculate change occurring during the test.

9.3.10 Compare with the standard.

9.3.11 Completion of the Pivot Test without changes exceeding those allowed by the Standard constitutes an acceptable test. Pivots shall be subject to Finish Tests.

10. FINISH TESTS

10.1 The tests shall be conducted in accordance with the American National Standard ANSI/BHMA A156.18-2006 for Materials and Finishes.

10.2 **Salt Spray Test**

10.2.1 **Requirements** Finish on all products: 25 hours

10.3 **Humidity Test** For clear coatings only:

10.3.1 **Requirements**

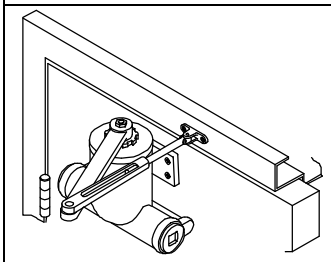
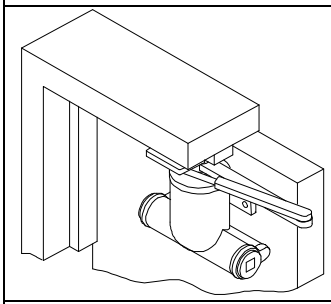
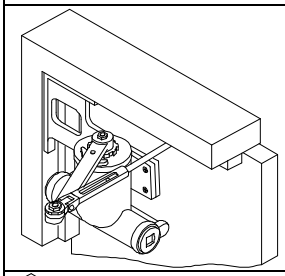
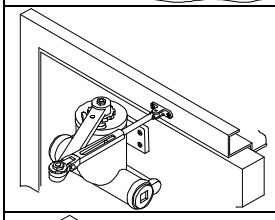
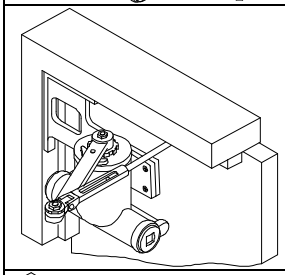
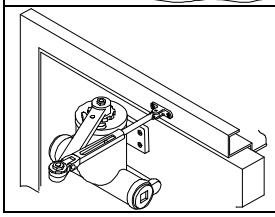
Grades 1 & 2: 48 Hours

Pencil Hardness 2H and Adhesion

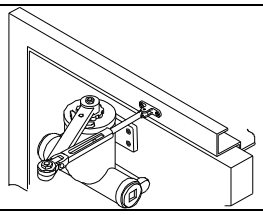
Classification 4 Method B

11. TYPICAL ILLUSTRATION AND IDENTIFYING TYPE NUMBERS[1]

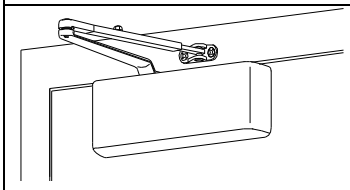
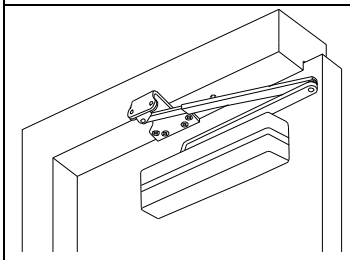
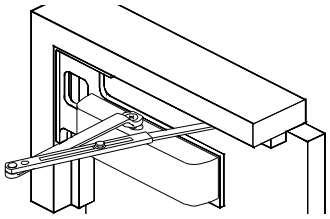
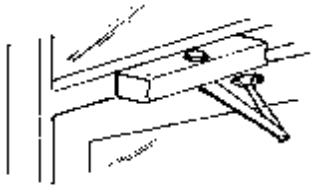
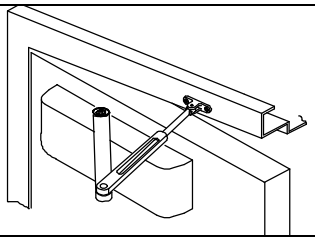
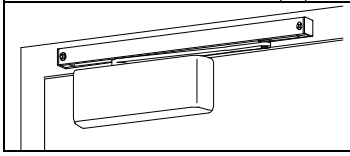
11.1 **Surface Closers - Traditional Type**. Tests required: 3.5 (PT 1) for Grade 1, 3.6 (PT 2) for Grade 2 and 3.7 (PT 3) for Grade 3. Certain options under 3.8 (PT 4) sometimes available. (see page 32) Consult manufacturer' catalog.

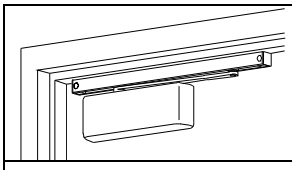
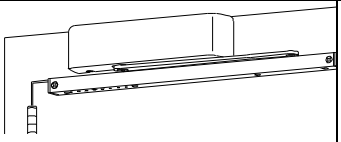
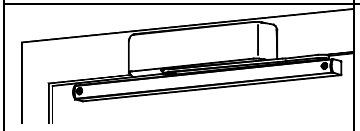
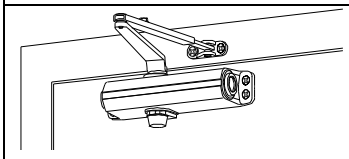
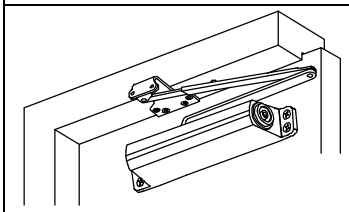
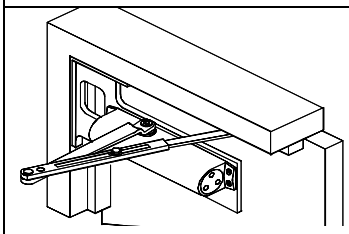
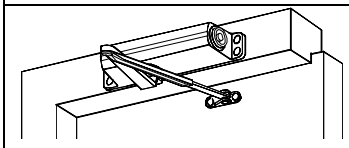
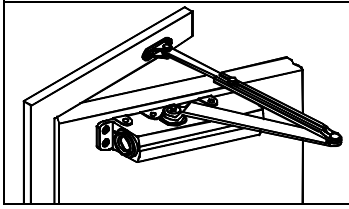
	C01011 C01012 C01013 Regular mounting C01051 C01052 C01053 Holder arm - regular mounting C01091 C01092 C01093 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Regular mounting.
	C01021 C01022 C01023 Parallel arm mounting C01061 C01062 C01063 Holder arm - parallel arm mounting C01101 C01102 C01103 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Parallel arm mounting.
	C01031 C01032 C01033 Bracket mounting C01071 C01072 C01073 Holder arm - bracket mounting C01111 C01112 C01113 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up service. Bracket mounting.
	C01131 C01132 C01133 Arm with two point hold-open function - Regular mounting.
	C01141 C01142 C01143 Arm with two point hold-open function - Bracket mounting.
	C01161 C01162 C01163 Delayed Action Closer holds door open for a minimum of 20 seconds between 110 and 70 degrees of door opening, then closes automatically. Regular mounting. Available in sizes III, IV, and V.

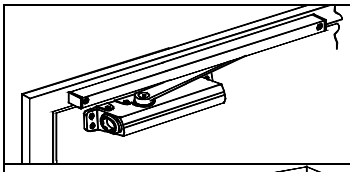
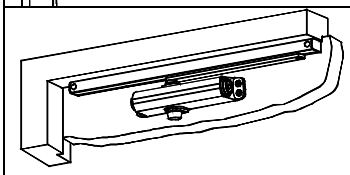
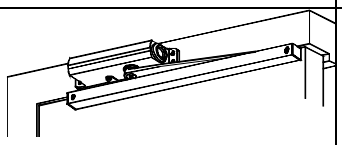
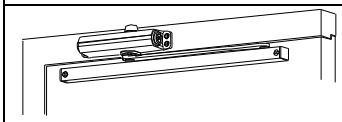
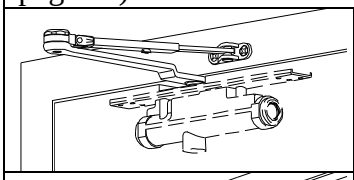
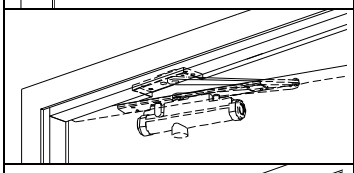
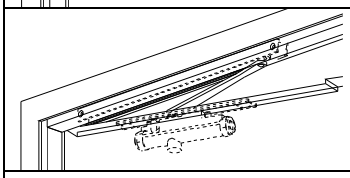
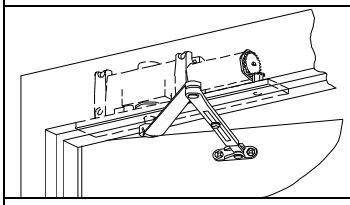
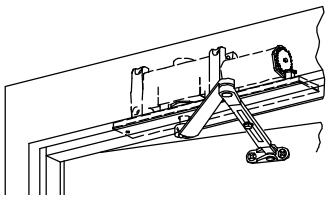
[1]All illustrations shown are typical. See individual manufacturers' catalogs for details.

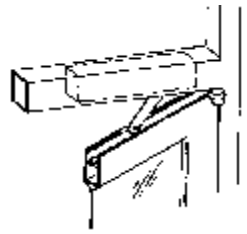
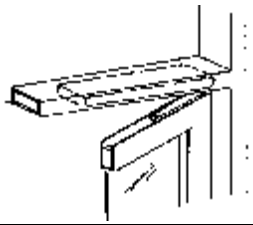
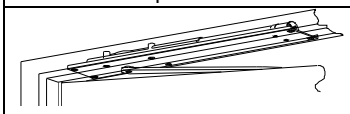
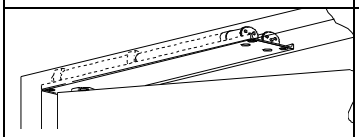
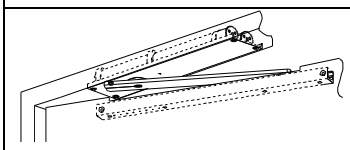
	C01171 C01172 CO1173 Telephone Booth Closer holds door ajar until patron enters booth and closes door. Regular mounting. Available in size II only.

11.2 **Surface Closers** - Modern Type with Cover. Tests required: 3.5 (PT 1) for grade 1 closers, 3.6 (PT 2) for grade 2 and 3.7 (PT 3) for grade 3. Certain options under 3.8 (PT 4) sometimes available. (see page 32) Covers shall be full or slim line as specified. Consult manufacturers' catalog.

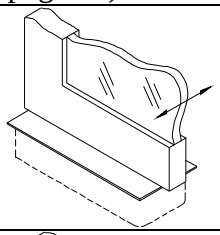
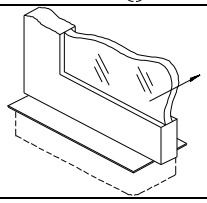
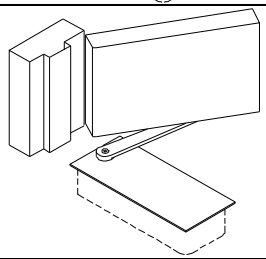
	C02011 C02012 C02013 Regular mounting C02051 C02052 C02053 Holder arm - regular mounting C02091 C02092 C02093 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Regular mounting.
	C02021 C02022 C02023 Parallel arm mounting C02061 C02062 C02063 Holder arm - parallel arm mounting C020101 C02102 C02103 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Parallel arm mounting.
	C02031 C02032 C02033 Bracket mounting C02071 C02072 C02073 Holder arm - bracket mounting C02111 C02112 C02113 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Bracket mounting.
	C02041 C02042 C02043 Top jamb mounting C02081 C02082 C02083 Holder arm - top jamb mounting C02121 C02122 C02123 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Top jamb mounting.
	C02171 C02172 C02173 Telephone Booth Closer holds door ajar until patron enters booth and closes door. Regular mounting. Available in size II only.
	C02211 C02212 C02213 Hinge side mounting - slide track arm C02221 C02222 C02223 Holder arm - regular mounting - slide track arm

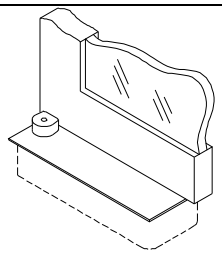
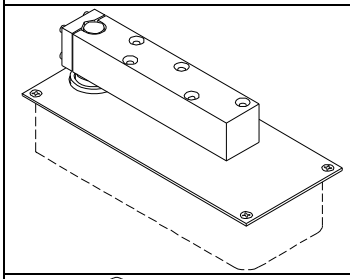
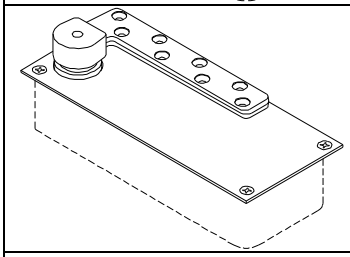
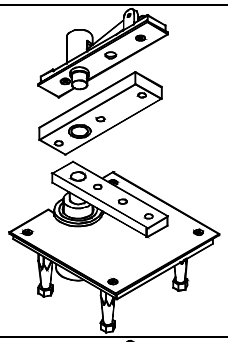
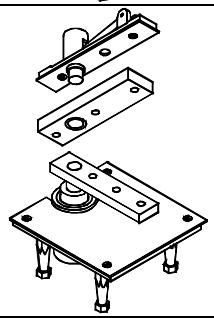
	C02231 C02232 C02233 Opposite hinge side mounting - slide track arm C02241 C02242 C02243 Holder arm - opposite hinge side mounting - slide track arm
	C02251 C02252 C02253 Hinge side - top jamb mounting - slide track arm C02261 C02262 C02263 Holder arm – hinge side - top jamb mounting - slide track arm
	C02271 C02272 C02273 Opposite hinge side - top jamb mounting - slide track arm C02281 C02282 C02283 Holder arm - opposite hinge side - top jamb mounting -slide track arm
11.3 **Surface Closers - Modern type No Cover**. Tests required: 3.5 (PT 1) for grade 1 closers, 3.6 (PT 2) for grade 2, and 3.7 (PT 3) for grade 3. Certain options under 3.8 (PT 4) are sometimes available. (see page 32) Consult manufacturers' catalogs.	
	C03011 C03012 C03013 Regular mounting C03051 C03052 C03053 Holder arm - regular mounting C03091 C03092 C03093 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Regular mounting.
	C03021 C03022 C03023 Parallel arm mounting C03061 C03062 C03103 Holder arm - parallel mounting C03101 C03102 C03103 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to follow-up inspection service. Parallel arm mounting.
	C03031 C03032 C03033 Bracket mounting C03071 C03072 C03073 Holder Arm - bracket mounting C03111 C03112 C03113 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Bracket mounting.
	C03041 C03042 C03043 Top jamb mounting C03081 C03082 C03083 Holder arm - top jamb mounting C03121 C03122 C03123 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Top jamb mounting.
	C03171 C03172 C03173 Telephone Booth Closer holds door ajar until patron enters booth and closes door. Regular mounting. Available in size II only. C03211 C03212 C03213 Regular mounting - slide track arm

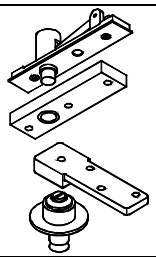
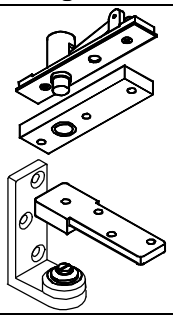
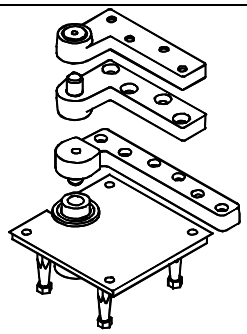
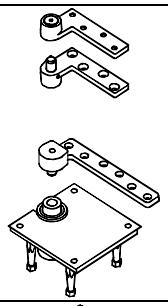
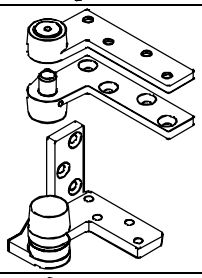
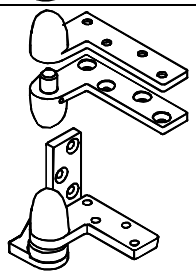
	C032221 C03222 C03223 Holder arm hinge side mounting - slide track arm
	C03231 C03232 C03233 Opposite hinge side mounting - slide track arm C03241 C03242 C03243 Holder arm - opposite regular mounting - slide track arm
	C03251 C03252 C03253 Hinge side - top jamb mounting C03261 C03262 C03263 Holder arm - regular - top jamb mounting - slide track arm
	C03271 C03272 C03273 Opposite hinge side - top jamb mounting - slide track arm C03281 C03282 C03283 Holder arm - opposite hinge side - top jamb mounting - slide track arm
11.4 **Concealed in Door Closers**. Tests required: 3.5 (PT 1) for grade 1 closers, 3.6 (PT 2) for grade 2 and 3.7 (PT 3) for grade 3. Certain options under 3.8 (PT 4) sometimes available. Consult manufacturers' catalogs. (see page 32)	
	C04011 C04012 C04013 Double lever arm - surface shoe. For interior doors only
	C04021 C04022 C04023 Double lever arm - mortised soffit plate. For interior doors only
	C04031 C04032 C04033 Concealed arm and track. For interior doors only
11.5 **Overhead Concealed Closers**. Tests required: 3.9 (PT 5) for grade 1 closers, 3.10 (PT 6) for grade 2 and 3.11 (PT 7) for grade 3. Certain options under 3.12 (PT 8) are sometimes available. Consult manufacturers' catalogs. (see page 32)	
	C05111 C05112 C05113 Concealed holder arm - single acting - butt hinge hung
	C05021 C05022 C05023 Exposed arm - surface shoe - single acting - pivot hung C05091 C05092 C05093 Holder arm - surface shoe - single acting. Butt hinge hung C05101 C05102 C05103 Fusible link holder arm listed by a nationally recognized independent testing laboratory and subject to a follow-up inspection service. Top jamb mounting.

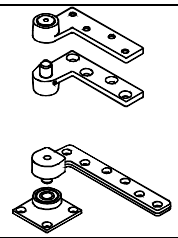
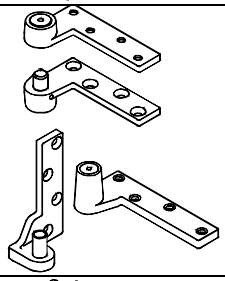
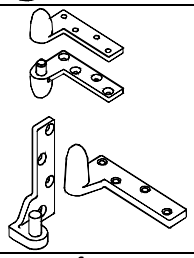
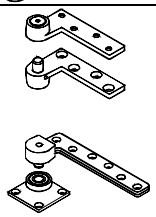
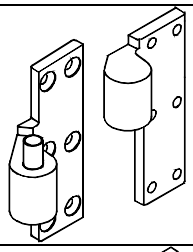
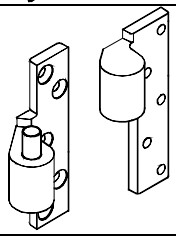
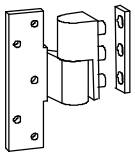
	C05031 C05032 C05033 Concealed arm and track - single acting - butt hinge hung C05041 C05042 C05043 Concealed arm and track - single acting - pivot hung C05111 C05112 C05113 Concealed holder arm - single acting - butt hinge hung
	C05051 C05052 C05053 Concealed arm - single acting - center pivoted C05061 C05062 C05063 Double acting - center pivoted
	C05121 C05122 C05123 Concealed holder arm - single acting - center pivoted
	C05071 C05072 C05073 Concealed arm and track - single acting - center pivoted
	C05081 C05082 C05083 Concealed arm and track - double acting - center pivoted

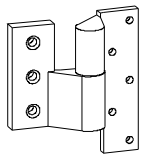
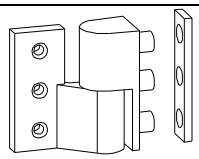
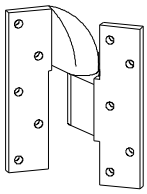
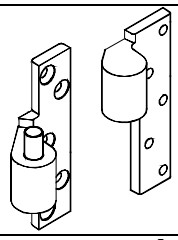
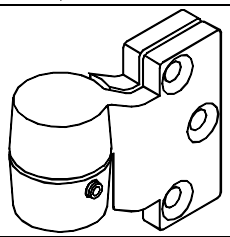
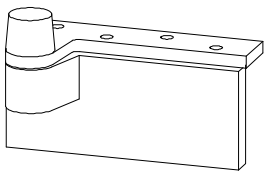
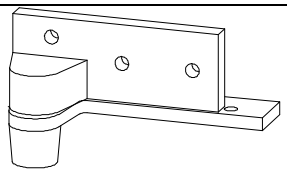
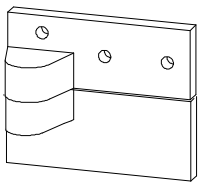
11.6 **Floor Concealed Closers**. Tests required: 3.9 (PT 5) for grade 1 closers, 3.10 (PT 6) for grade 2 and 3.11 (PT 7) for grade 3. Certain options under 3.12 (PT 8) sometimes available. Consult manufacturers' catalogs. (see page 32)

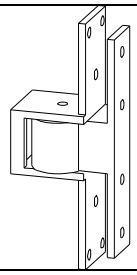
	C06011 C06012 C06013 Center pivoted. Grades 1 and 2 for exterior and interior doors. Grade 3 for interior doors only. Top pivot shall be the same as furnished for pivot set type C07021. Double acting.
	C06021 C06022 C06023 Center pivoted. Grades 1 and 2 for exterior and interior doors. Grade 3 for interior doors only. Top pivot shall be the same as furnished for pivot set type C07021. Single acting.
	C06031 C06032 C06033 Butt hinge hung or offset pivoted. Grades 1 and 2 for exterior and interior doors. Grade 3 for interior doors only. Single acting.

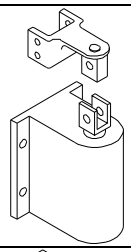
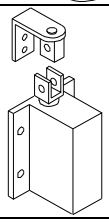
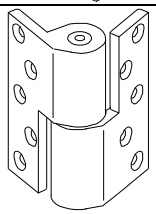
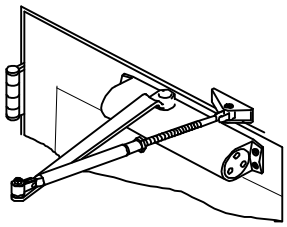
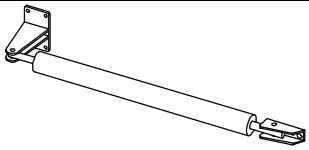
	C06041 C06042 C06043 Offset pivoted Grades 1 and 2 for exterior and interior doors. Grade 3 for interior doors only. Grades 1 and 2 shall have a 1/8 in (3.2 mm) minimum vertical adjustment without door removal. Top pivot shall be the same as furnished for pivot set type C07121. Single acting. C06051 C06052 C06053 Listed for use with labeled fire doors by a nationally recognized independent testing laboratory and be subject to a follow-up inspection service. Grades 1 and 2 for exterior and interior doors. Grade 3 for interior doors only. Top pivot shall be made of ferrous material. Grades 1 and 2 shall have a 1/8 in (3.2 mm) vertical adjustment without door removal. Offset pivoted. Single acting.
	C06061 C06062 Center pivoted. For extra heavy doors weighing up to 1,000 lbs. (454) kg). Top pivot shall be the same as furnished for pivot set type C07011. Single acting.
	C06071 C06072 Offset pivoted. For lead lined or extra heavy doors weighing up to 1,000 lbs (454 kg). Top pivot shall be the same as furnished for pivot set type C07111.
11.7 **Center Pivot Sets.** Consult Manufacturer's catalog for maximum door weight. Tests required: 8.1 through 8.11	
	C07011 For extra heavy doors. Top pivot: walking beam type with retractable pin, suitable bearings in door portion, concealed in frame and door. Bottom pivot: floor mounted in cement case, multiple sets of ball or roller bearings in floor portion, concealed in floor and door. Arms: top and bottom arm of sufficient width to permit attaching screws to straddle lead lining. Cover plate of non-ferrous material or series 300 stainless steel. Unexposed parts painted.
	C07021 Top pivot: walking beam type with retractable pin, suitable bearings in door portion, concealed in frame and door. Bottom pivot: floor mounted in cement case, multiple sets of ball or roller bearings in floor portion, concealed in floor and door. Arms: bottom arm of sufficient size to support weight of door. Cover plate of non-ferrous material or 300 series stainless steel. Unexposed parts painted.

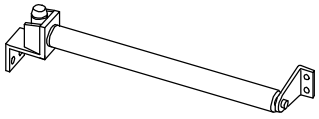
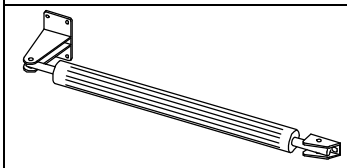
	C07032 Top pivot: walking beam type with retractable pin, concealed in door and frame. Bottom pivot: floor mounted, suitable bearings. Exposed parts of non-ferrous material or 300 series stainless steel. Unexposed parts painted.
	C07042 Top pivot: walking beam type with retractable pin, concealed in door and frame. Bottom pivot: jamb mounted, suitable bearings. Exposed parts of non-ferrous material or 300 series stainless steel. Unexposed parts painted.
11.8 **Offset Pivot Sets**. through 8.11	Consult Manufacturer's catalog for maximum door weight. Tests required: 8.1
	C07111 For lead lined or extra heavy doors. Top pivot: removable pin, suitable bearings, non-ferrous material, concealed in door and frame, shall be of sufficient width for attaching screws to straddle lead lining. Bottom pivot: floor mounted in cement case, suitable bearings, all exposed parts of non-ferrous material or stainless steel, concealed in floor and door, shall have 1/8 in (3.2 mm) vertical adjustment without door removal, arm shall be of sufficient width to permit attaching screws to straddle lead lining.
	C07121 Top pivot: removable pin, suitable bearings, non-ferrous material, concealed in door and frame. Bottom pivot: floor mounted, suitable bearings, all exposed parts of non-ferrous material or 300 stainless steel. Concealed in door and mounted in cement case in floor, shall have 1/8 in (3.2 mm) vertical adjustment without door removal.
	C07131 Same as C07121 only bottom pivot is jamb mounted and concealed in jamb and door.
	C07141 Same as C07121 only set has asylum type top pivot with round sloping upper surface on projecting knuckle of top pivot, jamb portion only. C07151 Same as C07131 only set has asylum type top pivot.

	C07162 Top pivot: removable pin, suitable bearings, non-ferrous material or 300 series stainless steel, concealed in door and frame. Bottom pivot: floor mounted, suitable bearings, non-ferrous material or 300 series stainless steel, concealed in door.
	C07172 Same as C07162 only bottom pivot is jamb mounted. Concealed in jamb and door.
	C07182 Same as C07162 only top pivot is asylum type. C07192 Same as C07172 only top pivot is asylum type.
	C07202 Same as C07162 only made from ferrous material and is permitted to be used on labeled fire doors. Exposed parts painted.
11.9 **Offset Intermediate Pivots**. Consult Manufacturer's catalog for maximum door weight. Test required: 8.1 through 8.11. Recommended for use with offset pivot sets and offset pivoted floor closers. When 3 intermediate pivots are used as a set to hang a door, the minimum tested door weight is as specified in 7.1.1.	
	C07311 For lead lined or extra heavy doors. Ball roller or combination of bearings for radial thrust loads. Vertical adjustment minimum 1/8 in (3.2 mm). Cast of forged bronze or forged aluminum material. Mortised in jamb and door. Leaves shall be of sufficient width to permit attaching screws to straddle lead lining.
	C07321 Ball, roller or combination of bearings for radial thrust loads. Vertical adjustment minimum 1/8 in (3.2 mm). Cast or forged bronze or forged aluminum material. Mortised in jamb and door. When three intermediate pivots are used as a set to hang a door, the maximum door weight is as specified in 7.1.1.
	C07331 Same as C07321 only half surface mounted. Door leaf surface mounted and jamb leaf mortised.

	C07341 Same as C07321 only half mortise mounted. Door leaf mortised and jamb leaf surface
	C07351 Same as C07321 only full surface mounted. Door and jamb leaf surface mounted.
	C07361 Same as C07321 only with asylum type knuckle.
	C07371 Same as C07321 only made from ferrous material and is permitted to be used on labeled fire doors. Exposed parts shall be painted.
	C07382 Metal or plastic bearing of self lubricating type. Cast or forged bronze or 300 series stainless steel material. Mortised in door and jamb.
11.10 **Optional Offset Top Pivots**. Consult Manufacturer's catalog for maximum door weight. Tests required: 8.1 through 8.11	
	C07501 Removable pin, ball or roller bearings. Cast or forged bronze or forged aluminum material. Half surface mounted.
	C07511 Same as C07501 only half mortise mounted.
	C07521 Same as C07501 only full surface mounted.
11.11 **Pocket Door Pivots**. Consult manufacturer's catalog for maximum door weight. Test required: See Section 9.	

	C07601 For pocket door applications. Allows for a maximum door swing of 90 degrees. Concealed in jamb and door. Cast or forged bronze or forged aluminum material. C07611 Same as C07601 only made from ferrous material and is permitted to be used on labeled fire doors. Exposed parts shall be painted.

11.12 **Gate or Dwarf Door Closers**. Tests Required: 6.1, 6.2 and 9.1	
	C09503 Design optional. Liquid controlled closing action shall operate quietly and smoothly. Closer shall be single or double acting. Specify hand when single acting. Means of hanging the door included with closers except when hung on butt hinges. Adjustable hydraulic control from 40 degrees or more of door opening to closed position. Maximum door weight 75 lbs (34 Kg). Maximum door opening 90 degrees.
	C09513 Same as C09503 only for concealed application in 1 ¾ in. (44 mm) thick gates or doors.
	C09523 Same as C09503 only just for single acting doors. Also suitable for use on light interior doors.
11.13 **Light Screen or Combination Storm Door Closers**.	
	C09541 C09542 C09543 Modern hydraulic closer. For doors not over 36 x 84 x 1 1/8 in (914 x 2134 x 29 mm) 100 degrees opening. Suitable for use between doors when clearance is 3 5/8 in (92 mm) or more. Spindle bearings shall extend as close as practical to the point of attachment of the external arm and to the connection with internal working parts. Construction shall impede the loss of checking fluid. Checking regulation shall be accessible and shall provide and maintain close definite adjustment. Tests required: 6.1 at 30 degrees, 6.3, 6.4, and 6.6.4. Closing force shall be between 2 and 3 lbf (9 and 13 N) when measured in accordance with 6.4 at the 3 in (76 mm) mark..
	C09341 C09342 C09343 Tubular hydraulic closer. Compression type spring. The jamb bracket shall have a minimum of 4 holes for attaching screws and the door bracket a minimum of 2 holes for attaching screw. The closer shall control the door quietly in closing from 60 degrees in accordance with 6.1. Closing time shall be present or adjustable. An expanding member of suitable material shall be provided for the plunger so that it shall be maintained in the contract with the tube for checking. The piston rod shall fit closely in a bearing at end of tube. Construction shall impede the loss of checking fluid. Test required: Closing force between 2 and 3 lbf (9 and 13 N) as tested in accordance with 6.4 at the 3 in (76 mm) mark. Cycle test and measure

	closing speed in accordance with 6.6.4.
	C09351 C09352 C09353 Tubular pneumatic closer. One end of the tube shall permit access for servicing plunger when so specified. Covered helical torsion spring with means to adjust torque. Adjusting valve shall provide regulation of door closing speed. Adjusting valve position shall be held in place by friction or by a spring. Closer shall be quiet while operating. The jamb bracket shall have a minimum of 4 holes for attaching screws and the door bracket a minimum of 2 holes for attaching screws. Means shall be provided to permit a choice of increased door acceleration just prior to latching or a quiet buffered latching. A manually operated slide washer shall be provided for holding the door open at any desired angle. Bearing pins and screws when assembled shall be secured in place. Threaded portions of screws shall not be used as bearings. An expanding member of suitable material shall be provided for the plunger so it shall maintain contact with the tube for checking. The piston rod shall fit closely in a bearing at the end of the tube. An internal automatic hold-open means preset to hold the door open not less than 75 degrees with a manual release shall be provided as specified. Tests required: Cycle test and measure closing speed adjustability in accordance with 6.6.4.
	C09361 C09362 C09363 Tubular pneumatic closer. Compression spring type. The adjusting valve shall provide regulation of door closing speed. The adjusting valve position shall be held in place by friction or by a spring. The closer shall be quiet while operating. The jamb bracket shall have a minimum of 4 holes for attaching screws. Means shall be provided to permit a choice of increased door acceleration just prior to latching or a quiet buffered latching. A manually operated slide washer shall be provided for holding the door open at any desired angle. Bearing pins and screws when assembled shall be secured in place. Threaded portions of screws shall not be used as bearings. An expanding member of suitable material shall be provided for the plunger so it shall maintain contact with the tube for checking. The piston rod shall fit closely in a bearing at the end of the tube. Tested required: Cycle test and measure closing speed adjustability in accordance with 6.6.4.

11.14 **Explanation of Identifying Numbers**

The first letter (C) denotes the organizational Section in BHMA responsible for this Standard.

The first numeral indicated the material used:

0 - Optional material, i.e., the manufacturer's standard unless otherwise specified.

The second numeral identifies the type of product:

1	Surface closers, traditional type	5	Overhead concealed closers
2	Surface closers, modern type with cover	6	Floor concealed closers
3	Surface closers, modern type with no cover	7	Pivot sets
4	Concealed in door closers	9	Miscellaneous closers, includes dwarf and gate closers, and screen or combination storm door closers.

The third and fourth numerals identify the function or specific description of each item.

The fifth numeral designates the grade classification of the item:
1 - Grade 1, 2 Grade 2, 3 Grade 3.

Example: C02051
C - Section (C)
0 - Material (optional)
2 - Type of product (surface closer, modern, cover)
05 - Function (holder arm, regular mounting)
1 - Grade (grade 1)

APPENDIX A: USERS GUIDE (NOT A PART OF ANSI/BHMA A156.4)

A1 **Hand**: Some closers are reversible; many are not. The hands of doors are indicated if there is any question.

A2 **Fasteners**: Closers are generally furnished with wood screws and machine screws. If through bolts are required, they shall be specified.

A3 **Instructions**: Instructions for mounting are included with each closer. If template information is required for preparing doors or frames or both, so specify.

A4 **Packing**: Closers are usually individually packaged four to a carton. Specify accordingly if any unique packaging is required.

A5 **Finish**: Closers are painted in various colors. Pivots and floor closer cover plates are painted, plated or have natural finishes. Covers, arms, and accessories for surface mounted closers are sometimes available in plated finishes. Specify by BHMA code numbers as listed in the American National Standard ANSI/BHMA A156.18 for Materials and Finishes.

A6 **Installation and adjusting tools**: Tools for adjusting valves and spring power when applicable are finished with closers. On large orders it is not always customary to pack one with each closer. Specify number desired.

A7 **Options**: Optional features described in the Standard shall be specified by number.

Example: PT 4C (50% adjustable spring power. Do not specify options that conflict such as PT 4D and PT 4E (adjustable, factory pre-set, and hydraulic backcheck options).

A8 **Grades**: Users of this Standard note that generally each type of door closer is available in three grades (designated by the final digit of the type number). 1 is for grade 1; 2 is for grade 2; and 3 is for grade 3. Grade designation is based on performance criteria with grade 1 subject to the severest tests.

A9 **Size of Closers**: Type numbers do not designate size and size shall be specified. The schedule of sizes in Table 1 is based on standard closer installations for doors subject to normal operating conditions. Where strong drafts, excessive air pressure variations or extra heavy doors are encountered, the next larger size is applied. The use of corner brackets, parallel arms or top jamb mounting applications also require the use of a larger size. Follow the manufacturer's recommendations for applicable installations and the handling of unusual conditions. Within the minimum closing force required by this Standard, individual manufacturers vary closing force adjustments which makes one manufacturer's size range different from another's. Where low opening forces are required to meet barrier free criteria, Table 1 is not applicable. Low opening forces result in low closing forces and are not always acceptable in closing and latching the door.

A10 **Conformance Criteria**: Certification that products offered meet the requirements of this Standard and conform to the individual manufacturer's drawings, specifications, standards and quality assurance practices are available and in some circumstances are required. Buyer requirements determine the need for proof of conformance such as first article inspection, test laboratory reports, or listings. BHMA sponsors a third party certification program enabling producers to assert conformance to this Standard on the basis of periodic tests conducted regularly at unannounced times. The program is open to all manufacturers whether or not members of BHMA. Specifiers requiring assertions of conformance use the Directory of Certified Door Closers, available from BHMA, statements of conformance furnished by individual manufacturers, or test results acceptable to the buyer.

A11 **Preservation, Packaging, and Packing**: Unless other arrangements between buyer and seller are made, preservation, packaging and packing shall be sufficient to protect containers and their contents under normal shipping and handling conditions from the source of supply to the destination point.

A12 **Marking**: Unless other arrangements between buyer and seller are made, marking shall be accordance with the individual manufacturer's standard practice.

A13 **Recommended Testing Device, and Performance Data**

A13.1 The rotational speed of the actuator wand shall be selected to be in a range of 16 seconds per revolution. The following table shows pertinent information for these maximum and minimum speeds.

Performance Data	16 Sec. per revolution	22 Sec. per revolution
Seconds per door cycle including 1 sec. Dwell time	8	11
Opening time (81 degree rotation of actuator in seconds)	3.6	5.0
Closing time in cluding 1 second dwell time (99 degree rotation of actuator in seconds	4.4	6.0
Cycles per hour	450	327.3
Cycles per week	75,600	54,986
Weeks of testing for 2,000,000 cycles	26.5	36.4

A14 **Recommended Method for Measuring Force Compliance to ADA**

1. On the push side of the door, locate a point on the horizontal center line of the push plate or lock trim, at 1 inch (mm) from the latch edge of the door.

2. Mark the floor at apoint where the push side of the door's latch stile is at 70 degrees. Mark a second point where the push side is 3 inches from the latch.

3. Open the door so the latch is clear of the strike and the door is slightly off the stop.

4. Using a force gage on the mark determined in Step 1, gradually push the door open to the 70 degree mark established in Step 2. Observe the maximum force reading.

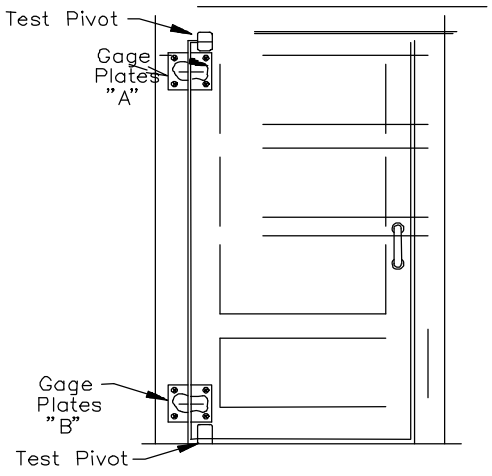
A15 **Recommended Method for Measuring Closing Time Compliance to ADA**

1. On the push side of the door, locate a point on the center line of the push plate or lock trim, or at 30 inches (762mm) from the hinge edge of the door, whichever is greater. Mark the floor at a point 30" from the hinge pivot when the door is open to the 12° position and another on the same side of the door when door is at the 90° position.

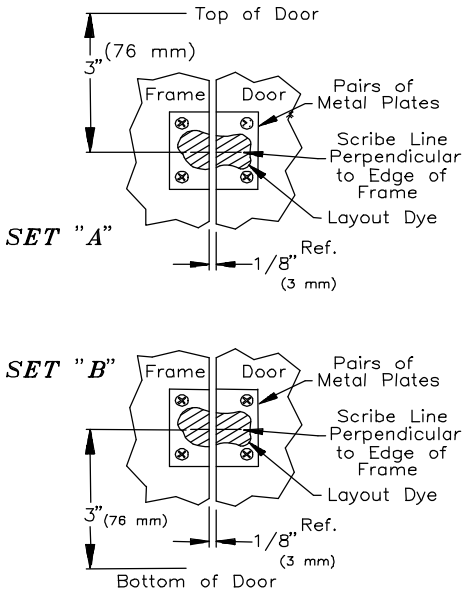
2. Hold the door at the 90 degree mark. Release the door and time the closing sweep between the two marks.

FIGURE 1

PIVOT TEST INSTALLATION



GAGE PLATES



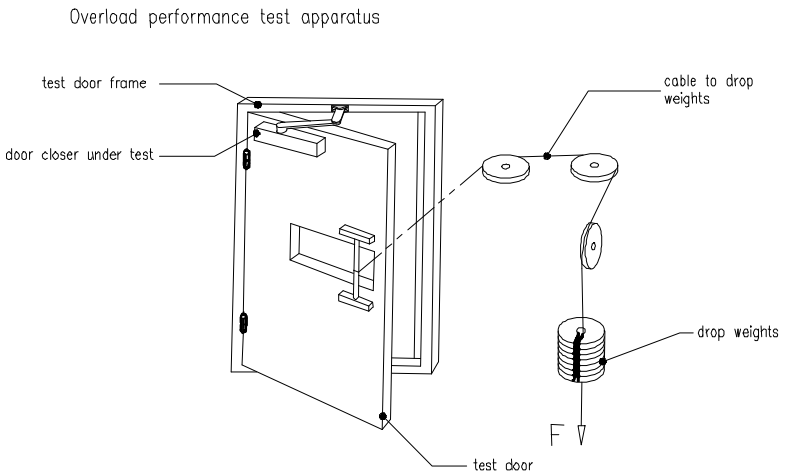


FIGURE 2: Typical general arrangement

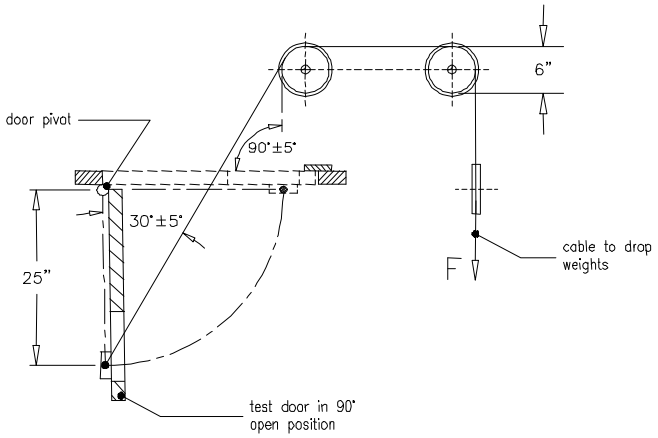
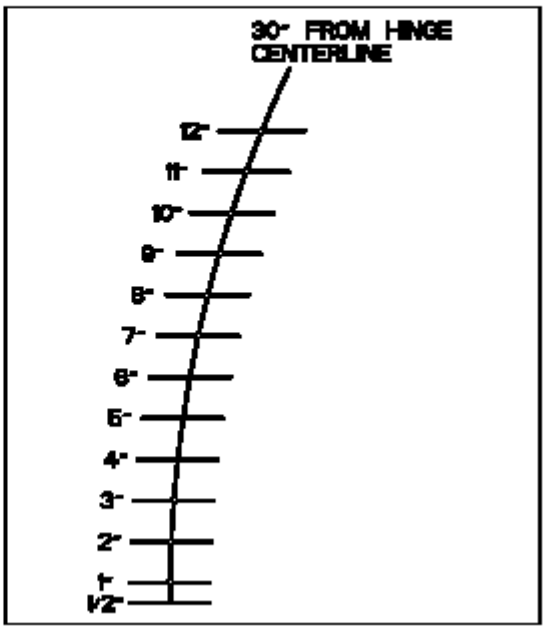


FIGURE 3: Arrangement for closing overload test

FIGURE 4

FLOOR TEMPLATE ILLUSTRATION FOR
INCH MEASUREMENTS



NOTES:
1. MAKE FROM 1/8" MIN PLEXIGLASS.
2. SHOWN FOR RIGHT HAND DOOR.
LEFT HAND VISIBLE THRU PLEXIGLASS.

Floor Template Illustration for Angular Measurements
FIGURE 5

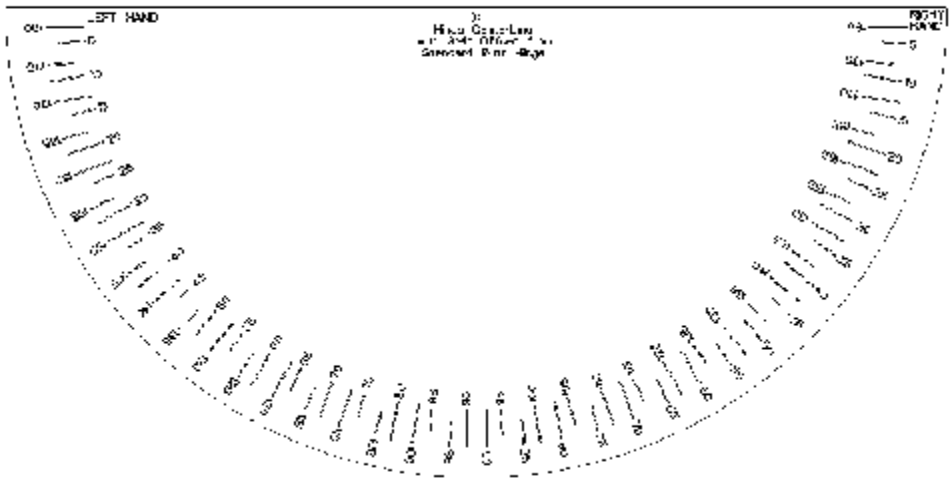


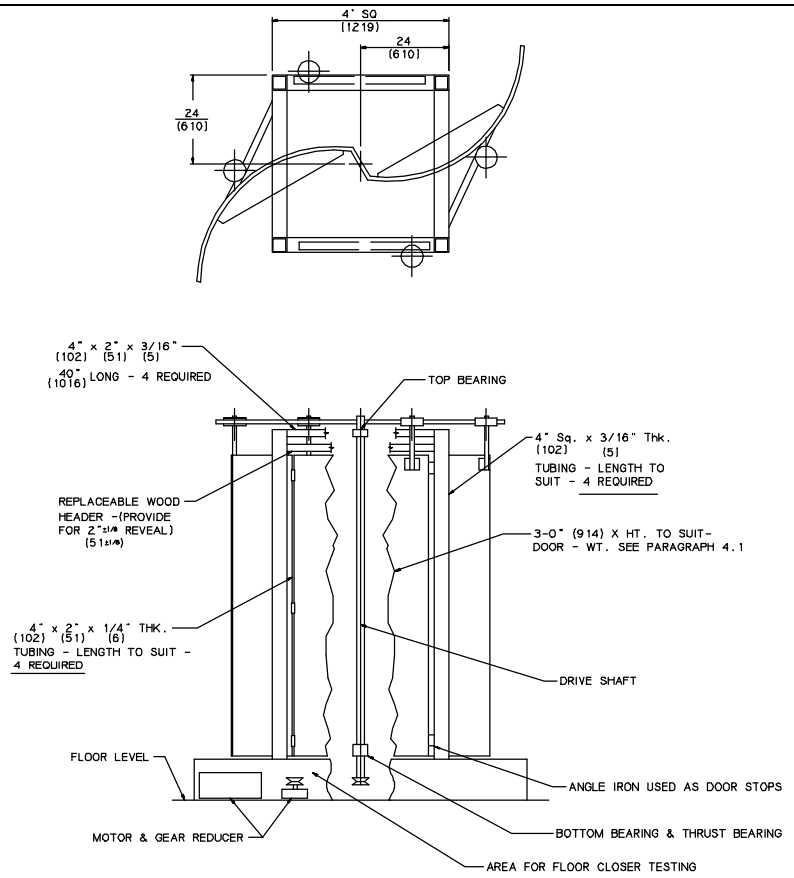
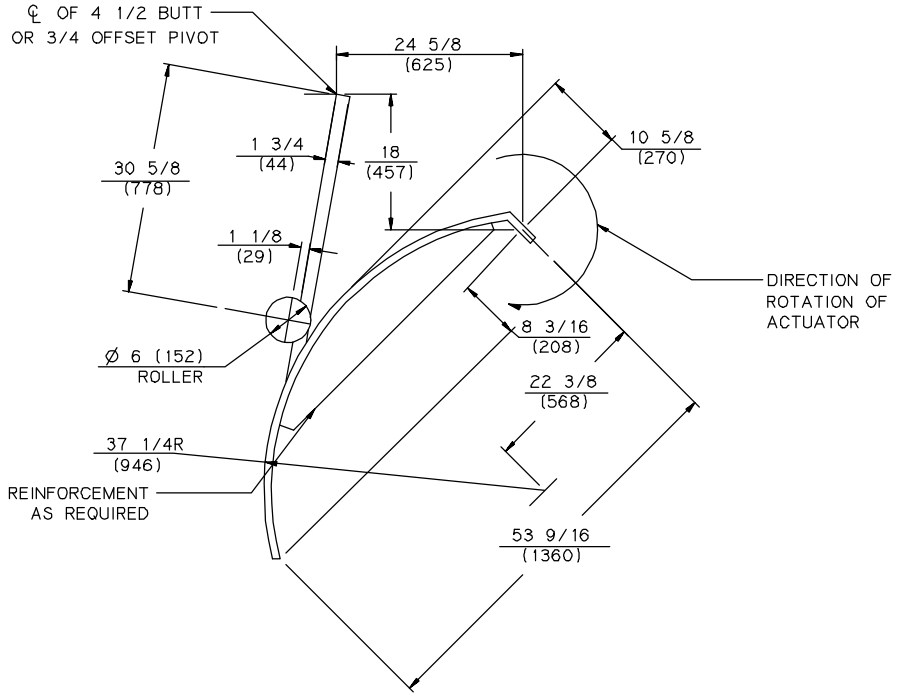
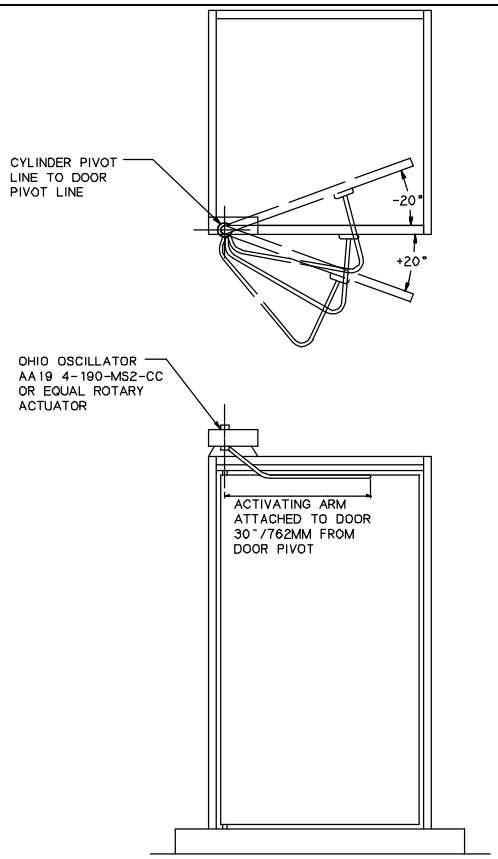
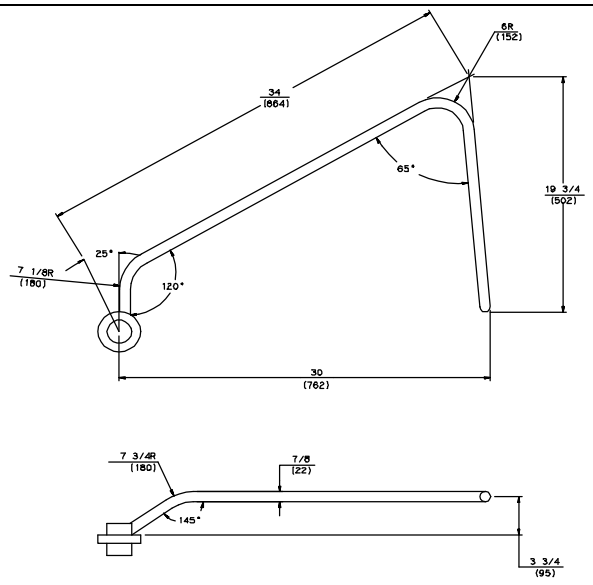
FIGURE 6A **DOOR CLOSER CYCLE TESTING DEVICE - TYPICAL CONSTRUCTION**	
FIGURE 6B **ACTUATOR DETAIL**	

***FIGURE* 7A** **DOUBLE ACTING FLOOR CLOSER TESTING DEVICE - TYPICAL CONSTRUCTION**	
FIGURE 7B **ACTUATOR DETAIL**	

NOTES:
1. NORMAL DOOR STOPS AND ROLLERS TO BE REMOVABLE.
2. AIR LIMIT SWITCHES TO BE INSTALLED TO REVERSE AIR SUPPLY DIRECTION AT $+20^0$ AND -20^0 OF DOOR ROTATION.
3. CYLINDER TO BE BOLTED ON FOR EASY REMOVAL.
4. DIMENSIONS IN INCHES/(MM).

TABLE A1

Field Application Guidelines

Type of Closer	Closer Size	Maximum Door Width (Interior) Inches (mm)	Maximum Door Width (Exterior Inches (mm)
Surface Mounted Closers	I	30 (762)	NA
	II	34 (864)	36 (914) light screen or combination storm doors
	III	38 (965)	30 (762)
	IV	48 (1219)	36 (914)
	V	Extra large and subject to strong drafts	42 (1067)
	VI	N/A	Extra heavy or of unusual height & width
Concealed in Door Closers	II	34 (864)	N/A
	III	38 (965)	N/A
	IV	48 (1219)	N/A
Overhead Concealed and Floor Closers	II	34 (864)	N/A
	III	38 (965)	30 (762)
	IV	48 (1219)	36 (914)
	V	Extra large and subject to strong drafts	42 (1067)
	VI	N/A	Extra heavy or of unusual height & width
Floor closers (type C06071 and C06072)	IV	For lead lined or extra heavy doors up to 1,000 lbs (454 kg)	
Light Screen or Combination Door Closers - See Para. 11.12	One size only. For light screen or combination doors not over 36 in (914 mm)		

TABLE A2
OPTIONAL SPECIFICATION FEATURES
AVAILABLE FOR
SURFACE OR CONCEALED IN DOORS,
CONCEALED OVERHEAD, AND FLOOR CLOSERS
(See 3. Performance Test Requirements and Appendix note A7 for more details)

TOTAL CYCLE REQUIREMENTS		Test Cycles	Surface or Concealed in Door closers	Concealed Overhead and Floor Closers
Grade I	Without Backcheck	2,000,000	PT 1	PT 5
	With Backcheck	1,500,000	PT 1	PT 5
Grade II	Without Backcheck	1,000,000	PT 2	PT 6
	With Backcheck	750,000	PT 2	PT 6
Grade III	With or without Backcheck	500,000	PT 3	PT 7

CYCLE REQUIREMENTS FOR CLOSERS WITH BACKCHECK					
Grade	Cycles into Backcheck	Cycles without Backcheck	Additional Cycles without Backcheck	Total Cycles	PT TEST
I	100,000	400,000	1,000,000	1,500,000	PT 1 & 5
II	50,000	200,000	500,000	750,000	PT 2 & 6
III	0	500,000	0	500,000	PT 3 & 7

Optional Features Available	Surface or Concealed in Door Closers	Concealed overhead and Floor Closers
Adjustable closing force up to 15% additional	PT 4A	
Adjustable closing force up to 35% additional		PT 8L
Adjustable closing force up to 50% additional	PT 4C	PT 8D
Adjustable hydraulic backcheck	PT 4D	PT 8F
Factory preset backcheck	PT 4E	PT 8K
Delayed action	PT 4F	PT 8J
Built-in factory dead stop	PT 4G	PT 8G
Adjustable closing force through a range of sizes	PT 4H	PT 8M
Advance backcheck	PT 4J	
Door under control from 7 degrees of maximum degree opening to the closed position		PT 8A
Automatic hold-open		PT 8B
Selector for choice of hold-open or non-hold-open		PT 8C
Door opening to 165 degrees		PT 8E

Example: C02011 x PT 4C and PT 4D (surface mounted door closer, Grade I, with 50% adjustable closing force, and adjustable hydraulic backcheck)