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AMERICAN NATIONAL STANDARD
FOR
DOOR CONTROLS - CLOSERS



SPONSOR
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

AMERICAN NATIONAL STANDARDS INSTITUTE

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AMERICAN NATIONAL STANDARD

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FORWARD

(This Forward is not a part of ANSI/BHMA A156.4-2013)

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.

Table of Contents

1. SCOPE	5
2. GENERAL	5
3. PREPARATION FOR PERFORMANCE TEST	6
4. TEST PROCEDURES Part 1: INITIAL STATIC TESTS	8
5. TEST PROCEDURES PART 2: INTERMEDIATE CYCLE TEST	15
6. TEST PROCEDURES PART 3: INTERIM STATIC TESTS	16
7. TEST PROCEDURES PART 4: FINAL CYCLE TEST	16
8. TEST PROCEDURE PART 5: FINAL STATIC TESTS.....	18
9. PIVOT PERFORMANCE TESTS.....	19
10. FINISH TESTS	20
11. TYPICAL ILLUSTRATION AND IDENTIFYING TYPE NUMBERS	21
APPENDIX A: Users Guide (not a part of ANSI/BHMA A156.4).....	33

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, www.ansi.org, 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 within ± 2 degrees. A tolerance of ± 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 (51 $\pm$ 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.

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. The door closer shall be installed in accordance with the manufacturer's instructions at a setting from 90 degrees to 110 degrees of door opening. (Except in the case of 3.5.1, after the control test, closer shall be remounted for 90 degrees of door opening.)

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 with the regulating valves fully open, open the door beyond 30 degrees, release, and measure the maximum force between 30 and 25 degrees. Open the door beyond 12 in. (305 mm) and release; measured between 12 in. (305 mm) and 2 in. (51 mm), the closing force shall exceed by at least 30%, the value measured at the 25 to 30 degree points.

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 = $((F2 - F1) / F2) \times 100$.

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 = $((F2 - F1) / F1) \times 100$.

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 meet the values 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 minimum 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 minimum 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 = $((F6 + F7 + F8) / (F3 + F4 + F5)) \times 100$

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 = $((F6 + F7 + F8) / (F3 + F4 + F5)) \times 100$

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(s) 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 To calibrate the test rig, use 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, and 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 100 degrees and release. Slowly open the delayed action regulating valve until the door begins to move. 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.