5.3 **Operational Tests** Perform operational tests of the respective hardware standard as an assembly with closer disconnected. Use initial and qualification test values as indicated in 5.1 and in the sequence listed in 5.3.1 and 5.3.2.

5.3.1 **Before Cycle Test** (Initial Values)

A156.2 Force to Retract Unloaded Bolt, Force to Retract Preloaded Bolt, Force to Latch Door.

9.1 **Force to Retract Unloaded Bolt** (Use no strike and either wood or metal mount)

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9.1.1 **By Lever** A torque meter shall be applied to the **lever** until the bolt is withdrawn to within 1/8 in. of the lock front. The measured torque to retract the bolt shall not exceed the maximum specified. Test both the outside and inside levers both upwards and downwards. When the lever is unidirectional, test only in the direction of operation.

9.1.2 **By Knob** A torque meter shall be applied to the knob until the bolt is withdrawn to within 1/8 in. of the lock front. The maximum measured torque to retract the bolt shall not exceed the maximum specified. Test both the outside and inside knobs clockwise and counterclockwise. When the knob is unidirectional, test only in the direction of operation.

9.1.3 **By Thumb Piece**. Center punch the thumb piece to receive a pointed rod connected to a force meter. Apply a perpendicular load at a point 1/4 in (6.4 mm) from the end of the thumb piece until the bolt is withdrawn to within 1/8 in. of the lock front.. The maximum load shall not exceed the value specified.

9.1.4 **By Paddle.** A force meter shall be applied to the **outside** paddle in the direction of the opening swing of the door 1 in. (25.4mm) from the free end of the paddle on the centerline until the bolt is withdrawn to within 1/8 in. of the lock front. Repeat to the **inside** paddle in the direction of the opening swing of the door 1 in. (25.4mm) from the free end of the paddle retracting the bolt.

9.1.5 **By Key** This test does not apply if the function allows a lock to be unlocked by the key to permit the bolt to be retracted by operating trim. With the dead locking latch bolt plunger depressed and the lockset in locked position, a torque meter shall be applied to the **key** and slowly rotated until the bolt is withdrawn to within 1/8 in. of the lock front. The maximum measured torque to retract the bolt shall not exceed the value specified. Repeat in the opposite direction (when the lock construction permits operation in both clockwise and counterclockwise directions).

9.1.6 **By Turn** A torque meter shall be applied to the inside and outside **turn**. The maximum measured torque to retract the bolt to within 1/8 in. of the lock front shall not exceed the maximum specified.

Requirements Force to Retract Bolt All Grades, maximum

Knobs	9 lbf-in. (1 Nm)
Levers	28 lbf-in. (3.1 Nm)
Thumb Pieces	9 lbf (40N)
Paddles	40 lbf (180N)
Keys	9 lbf-in.(0.7 Nm)
Turns	9 lbf-in. (1 Nm)

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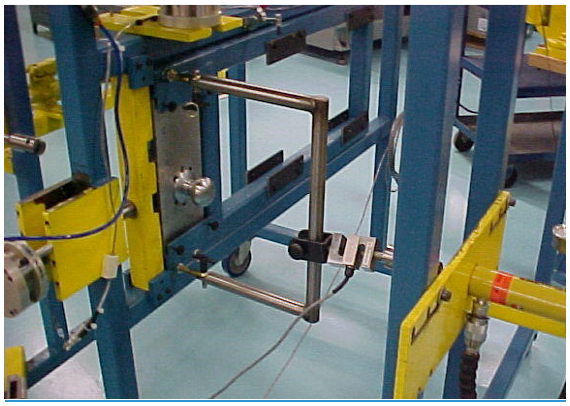
9.2 **Force to Retract Preloaded Bolt (Warped Door)**



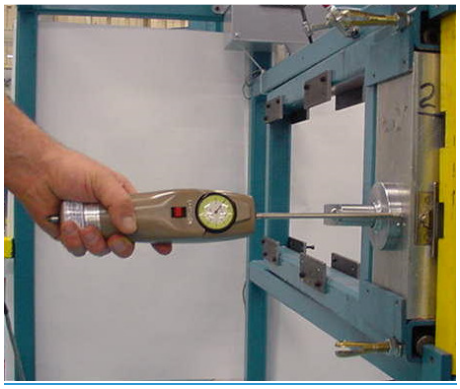
Perform per 9.1.1 through 9.1.6 (except use either strike and the wood or metal mount) while a 50 lbf (222 N) is initially applied perpendicular to the door at a point 1 in. (25.4 mm) from the lock edge of the door and on the center line of the latch bolt. The 50 lbf (222 N) shall load the latch bolt against the strike in the direction of opening the door. The maximum measured torque or force to retract the latch bolt to clear the strike without contact shall not exceed the maximum specified.

Requirements All Grades maximum

Knobs	Levers	Thumb Piece	Turn	Paddles	Key *
45 lbf-in. (5Nm)	70 lbf-in. (8Nm)	40 lbf (180N)	50 lbf-in. (5.6 Nm)	80 lbf (360N)	33 lbf-in. (3.7 Nm)

* Does not apply to functions where the lever, knob, or paddle, after it is unlocked by key, can be operated to retract the latch bolt.

9.5 **Force to Latch Door** Use either strike and the wood or metal mount. A force gage shall be applied perpendicular to the face of the door to a point 1 in. (25.4 mm) from the lock edge of the door and on the center line of the latch bolt when the door is open just within 1/4 in. (6.4 mm) of the latch bolt contacting the lip of the strike. Close the door slowly by pushing the force meter against the door until the latch bolt fully enters the strike opening. The test shall be conducted on both locked and unlocked conditions.



Requirements maximum

All Grades	4.5 lbf (20 N)

A156.3 Exit Devices - Exit Tests Section 8.2.1 only. Outside Trim – Torque or Force to Release Latch, Cylinder Operation.
A156.12 Force to Latch Door, Force to Retract Unloaded Bolt, Force to Retract Preloaded Bolt.
A156.13 Dead Bolt Torque, Force to Torque or Retract Latch Bolt or Latch Bolt and Dead Bolt, Force to Latch Door, Torque to Retract Latch Bolt by Key, Warped Door Test.

5.3.2 **After Cycle Test** (Qualification Values)
A156.2 Force to Retract Unloaded Bolt, Force to Retract Preloaded Bolt, Force to Latch Door.

11.4 At **50% of the Cycle Test,** repositioning and tightening of the test specimen is allowed, then repeat tests 9.1 through 9.5, requirements listed below, then complete the remaining cycling requirements.

Paragraph	Description	Grade	Requirements
9.1	Lever torque maximum	All Grades	34 lbf-in. (3.7 Nm)
	Knob torque maximum	All Grades	11 lbf-in. (1.2 Nm)
	Thumb piece maximum	All Grades	11 lbf (49 N)
	Paddle force maximum	All Grades	48 lbf (216 N)
	Key torque maximum	All Grades	11 lbf-in. (1.2 Nm)
9.2	Knob torque maximum warped door	All Grades	54 lbf-in. (6 Nm)
	Lever torque maximum warped door	All Grades	85 lbf-in. (9.6 Nm)
	Thumb piece force maximum warped door	All Grades	48 lbf (216 N)
	Paddle force maximum warped door	All Grades	96 lbf (427N)
	Key torque maximum warped door	All Grades	39 lbf-in (4.3 Nm)
9.3	Minimum Projection of Bolt when Depressed to Dead latched Position	Grade 1	$^{11}/_{32}$ in. (8.7 mm)
		Grades 2 & 3	13/64 in.(5.1 mm)
9.4	Dead latch plunger projection minimum	Grade 1	¼ in.(6.3 mm)
		Grades 2 & 3	11/64 in. (4.5 mm)
9.5	Force to Latch	All Grades	5.4 lbf (24 N)

11.5 **Performance After Cycle Test** At the completion of the cycle test, locks shall operate per the applicable functional descriptions.

A156.3 Exit Devices – Exit Tests, Outside Pull Tests, Inside Pull Tests, Push Test, Force to Latch Door Test. Outside Trim – Torque or Force to Release Latch, Cylinder Operation, Preloaded Door Test for Lever, Knob or Thumbpiece.
A156.12 Force to Latch Door, Force to Retract Unloaded Bolt, Force to Retract Preloaded Bolt.
A156.13 Dead Bolt Torque, Force to Torque or Retract Latch Bolt or Latch Bolt and Dead Bolt, Force to Latch Door, Torque to Retract Latch Bolt by Key, Warped Door Test.

5.7 **Closer Overload Abuse Test Procedure and Weights** Adjust the closing time from 90 degrees open to 10 seconds. Hold the test door open at 90 degrees with the cable and weights attached according to A156.4, 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.

Use the test weight described in 156.4 for the respective closer size. Repeat for ten cycles.

Door Impact Test Perform a Door Impact Test to the locked side of the door according to F476 Section 17 as shown in the chart below. The hardware shall be locked during this test. The door shall remain secure and not allow access from the locked side after completion of each impact test.

Hinge Impact Test Perform a Hinge Impact Test to the locked side of the door according to F476 Section 18 as shown in the chart below. The hardware shall be locked during this test. The door shall remain secure and not allow access from the locked side after completion of each impact test.