Proposed BHMA A156.32-2019

STANDARD

FOR

INTEGRATED DOOR OPENING ASSEMBLIES

SPONSOR

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

Subcommittee Copy January 7, 2019
Revision A February 8, 2019
Revision B February 27, 2019
Revision C March 5, 2019

~~Changes in 2014 edition~~
~~Added 20 pound preload to cycle test – more rigorous, real world evaluation~~
~~Stipulated no added lubrication or adjustments during testing~~
~~Updated reference documents~~
~~Eliminated prescriptive test door size~~
~~Added FRP and aluminum to test door types~~
~~Deleted unnecessary definitions~~

AMERICAN NATIONAL STANDARD

An American National Standard implies a consensus of those substantially concerned with its scope and provisions. An American National Standard is intended as a guide to aid the manufacturer, the consumer and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether they have approved the Standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the Standard. American National Standards are subject to periodic review and users are cautioned to obtain the latest editions.

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FOREWORD (This Foreword is not a part of ANSI/BHMA A156.32)

The general classification of builders hardware includes a wide variety of items which are divided into several categories. To recognize this diversity, a sectional classification system has been established. Section Q for Integrated Door Opening ~~and Hardware~~ Assemblies, is one such section and this Standard is the result of the collective efforts of members of the Builders Hardware Manufacturers Association, Inc. (BHMA) who manufacture these products. The total Product Standards effort is therefore, a collection of sections, each covering a specific category of items.

Strength, cycle, and operational tests have been established to insure safety and stability to which the public is entitled. There are no restrictions on design.

This Standard is not intended to obstruct but rather to encourage the development of improved products, methods and materials. BHMA recognizes that errors will be found, items will become obsolete, and new products and methods will be developed. With this in mind the Association plans to update, correct and revise these Standards on a regular basis. It shall also be the responsibility of manufacturers to request such appropriate revisions.

The BHMA numbers that indicate functions of delayed egress locks do not identify size of design and are not intended to be used without necessary supplementary information. Individual manufacturer's catalogs should be consulted.

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1. SCOPE

1.1. This Standard establishes requirements for Integrated Door Opening Assemblies ~~with steel, wood and fiberglass reinforced doors~~ which are supplied complete and ready to install to the customer with integral hardware. At a minimum, they shall include a door panel, ~~frame,~~ hanging device, and latching mechanism.

1.2. Performance requirements include operational, cycle, and abuse ~~and optional security tests~~.

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

1.4. Assemblies provided for fire protection shall have components that have been tested and listed for use on fire door openings by a Nationally Recognized Testing Laboratory (NRTL) and shall be under an in-plant follow-up inspection program.

1.5 The tests in this Standard were selected to verify the performance and interaction of the door/frame/hardware assembly in a way not covered in their component standards. Hardware components shall be certified to the requirements of the applicable ANSI/BHMA Standards where a certification program is provided. The grade of the hardware components shall be equal to or higher than the grade of the integrated door opening assembly.

2. DEFINITIONS

2.1 **Integrated Door Opening Assembly** A door panel, factory or factory authorized installed operating hardware and hanging mechanism, combined with a frame as defined by door assembly manufacturer's specifications, and other hardware accessories required to complete the door opening.

2.2 **Closing Device** A means of closing a door from a partially or fully opened position.

2.3 **Labeled** Equipment or materials to which have been attached a label, symbol, or other identifying mark of an organization , that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

2.4 **Hanging Device** A device used to attach the door to the frame, and which supports the door through an opening cycle.

2.5 **Latching Mechanism** ~~A spring loaded or bolt type mechanism that engages the strike when~~ A mechanism that secures the door ~~is~~ in the closed position and releases for the opening of the door.

2.6 **Trim** The operating and non-operating decorative elements, including knobs, levers, push / pulls, and other trim accessories, used to either release the latch mechanism, or serve as a pull or handle to open the door.

3. GENERAL

3.1 Any additional products included in an integrated door opening assembly which may affect structure or operation shall be installed in the tested assembly including, but not limited to: closing devices, holders, stops, lights, louvers, mag locks, electric strikes, coordinators, gasketing, thresholds, power transfers, power door operators, and mullions.

3.2 Approved frame types may be shipped and installed separately. Frames are to be installed following the manufacturer's written instructions which shall include: wall substrate, anchors (number, size, type, spacing), location and attachment of any reinforcements, location and attachment of gasketing if required, hanging devices (number, type, location and size), and location of latching mechanism.

3.3 Components which comprise an Integrated Door Opening Assembly shall be installed by the manufacturer or their authorized agent.

3.4 When used in fire rated openings, consult the manufacturer for published listing information.

3.5 **Tolerances** All values which do not carry specific tolerances or are not marked maximum or minimum shall have the following tolerances: Linear dimensions shall be ± 1/16 in (1.6 mm). Pounds or pound force shall be ± 2%. Degrees shall be ± 2 degrees. Where only minus tolerances are given, the dimensions are permitted to be exceeded at the option of the manufacturers.

3.6 **Reference to Other Standards.** American National Standards referenced in this Standard are available from www.buildershardware.com and the American National Standards Institute, 1430 Broadway, New York, NY 10018.

ANSI/BHMA A156.1-~~2013~~2016 for Hinges, A156.2-~~2011~~2017 for Bored and Preassembled Locks and Latches, A156.3-2014 for Exit Devices, A156.4-2013 for Door Controls – Closers, A156.12-~~2013~~2018 for Interconnected Locks and Latches, A156.13-~~2012~~2017 for Mortise Locks and Latches, A 156.26-~~2010~~ 2017 for Continuous Hinges. Other ANSI/BHMA Standards may also apply to additional hardware included on Integrated Door Opening Assemblies. Std currently open (double check dates before balloting/ canvass this std)

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ANSI/SDI A250.4-2011 Test Methods for Steel Doors

ASTM F476-2014 Standard Test Method for Security of Swinging Door Assemblies

~~3.7 Consult local authorities having jurisdiction for applicable building codes.~~

4. TEST METHODS

4.1 **Integrated Door Opening Assemblies** . Use full frame sections, and install with fasteners as specified by manufacturer's instruction. When the frame is not specified by the manufacturer, a frame meeting A250.4 shall be used for the testing. For cycle tests, use a closing device appropriately sized for the door or the closer being qualified with the assembly. Provisions shall be made for mounting appropriate measuring devices. When testing pairs of doors, requirements of this standard apply to both leaves.

4.2 No part of the assembly shall be repaired, adjusted or lubricated during the duration of the regular cycle test. Lubricants that were applied during the manufacturing as standard procedure shall be permitted.

5. PERFORMANCE TESTS

5.1 **Test Sequence** (Perform on same sample)
Grade 1 1,000,000 cycles total
Grade 2 500,000 cycles total

~~Test~~	~~Grade 1~~	~~Grade 2~~
~~1. Perform Initial Hinge Evaluation~~	~~x~~	~~x~~
~~2. Hardware Operational Tests – Initial Values~~	~~x~~	~~x~~
~~3. 5000 Slam Cycles~~	~~x~~	~~x~~
~~4. Twist Test~~	~~x~~	~~x~~
~~5. 490,000 Regular Cycles~~	~~x~~	~~x~~
~~6. 5000 Slam Cycles Hardware~~	~~x~~	~~x~~
~~7. Twist Test~~	~~x~~	~~x~~
~~8. Hardware Operational Tests – Qualification Values~~		~~x~~
~~9. 495,000 Regular Cycles~~	~~x~~	
~~10. 5000 Slam Cycles~~	~~x~~	
~~11. Twist Test~~	~~x~~	
~~12. Hardware Operational Tests – Qualification Values~~	~~x~~	
~~13. Vertical and Lateral Wear Test~~	~~x~~	~~x~~
~~14. Overload Test~~	~~x~~	~~x~~
~~15. Closer Overload Abuse Test~~	~~x~~	~~x~~
~~16. Door Impact Test~~	~~x~~	~~x~~
~~17. Hinge Impact Test~~	~~x~~	~~x~~

Test	Paragraph	Grade 1	Grade 2
1. Perform Initial Hinge Evaluation	5.2	x	x
2. Operational Tests – Initial Values	5.3	x	x
3. 5000 Slam Cycles	5.5	x	x
4. Twist Test	5.6	x	x
5. 490,000 Regular Cycles	5.4.1 & 5.4.2	x	x
6. 5000 Slam Cycles Hardware	5.5	x	x
7. Twist Test	5.6	x	x
8. Hardware Operational Tests – Qualification Values	5.3		x
9. 495,000 Regular Cycles	5.4.1	x	
10. 5000 Slam Cycles	5.5	x	
11. Twist Test	5.6	x	
12. Hardware Operational Tests – Qualification Values	5.3	x	
13. Vertical and Lateral Wear Test	5.9	x	x
14. Overload Test	5.10	x	x
15. Closer Overload Abuse Test	5.7 & 5.8	x	x
16. Door Impact Test	5.11	x	x
17. Hinge Impact Test	5.12	x	x

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5.2 **Initial Vertical and Lateral Hinge Wear Measurement** At the start of the testing, the specimen shall be accurately measured to determine any vertical or lateral clearance between hinge leaves and knuckles. Measurements shall be taken at mid-travel of door. Angle of opening shall be the same for final measurements as for original measurements within 2 degrees. Vertical measurement is between adjacent jamb and door knuckles. Lateral measurement is between inner edge of jamb leaf and adjacent door knuckle. If this location is at the center of the hinge, one measurement per hinge at the center shall suffice. If this

location is not at the center of the hinge, two measurements, as equally distant from center of hinge as practicable, shall be taken; the qualifying lateral measurement is the average of these two.

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.
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.
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.

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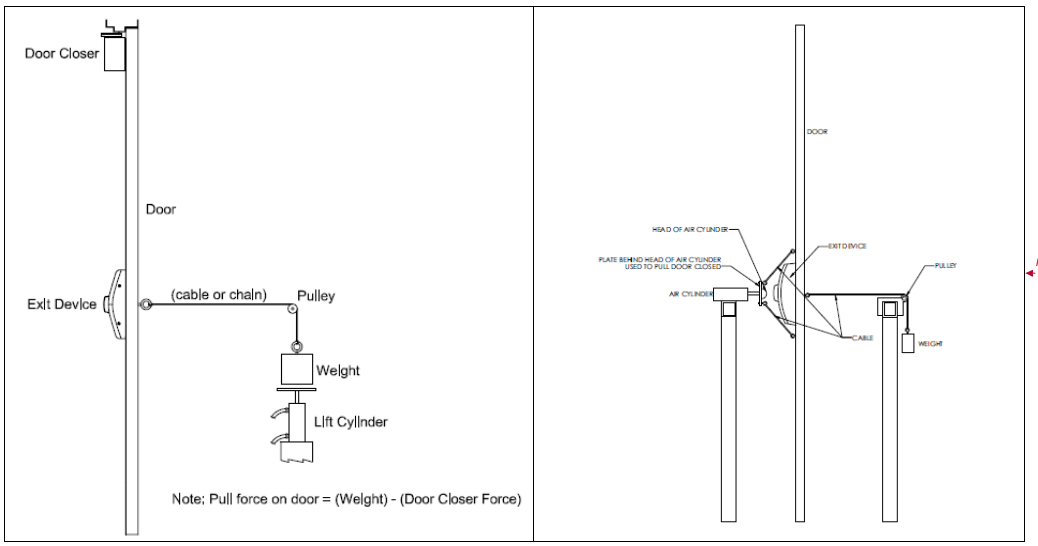
5.4 **Cycle Test**

5.4.1 **– Regular Cycle Tests (Grade 1)** With the door latched, apply a force to the door, that results in a net 20 to 22 lbf load on the latch(es), approximately 3 in. (76mm) from the latch edge and 40 in. (1020 mm) from the floor in the direction of the door swing until the door is opened. The force shall be applied using weights. Each cycle shall include the unlatching of the hardware from the egress side, opening the door from the egress side to 60 degrees, releasing the door, and latching the door. For exit devices, the opening force shall be applied to device itself. For all other trim the opening force shall be applied to the face of the door at hardware height. For all configurations the force shall be applied continuously rather than throwing the door open. The minimum closing speed shall be three seconds. Rotate levers and knobs in one direction only until the total cycles have been met for the grade being evaluated.

Suggested methods for applying the 20 pound load are shown below for exit devices:



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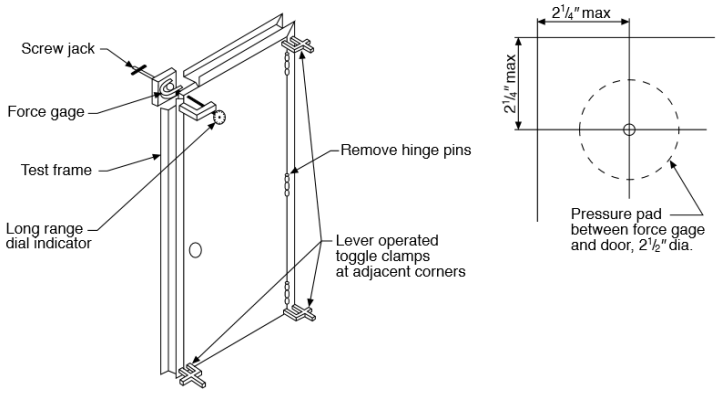
5.4.2 **Regular Cycle Tests** (**Grade 2)** No door preload requirements for Grade 2
Each cycle shall include the unlatching of the hardware from the egress side, opening the door from the egress side to 60 degrees, releasing the door, and latching the door. For exit devices, the opening force shall be applied to device itself. For all other trim the opening force shall be applied to the face of the door at hardware height. For all configurations the force shall be applied continuously rather than throwing the door open. The minimum closing speed shall be three seconds. Rotate levers and knobs in one direction only until the total cycles have been met for the grade being evaluated.

5.5 **Slam Cycle Test** Fully open both general and latch speed regulating door closer valves, Each cycle shall include unlatching of the hardware from the egress side, opening the door to 30 degrees, releasing the door, and latching the door. For exit devices, the opening force shall be applied to the device itself. For all other trim, the opening force shall be applied to the face of the door at approximately hardware height. Rotate levers or knobs in one direction only. After the second set of slam cycles, hardware fasteners may be retightened.

5.6 **Twist Test** The deterioration of the door strength during the cycle test, shall be checked through a series of twist tests. During the twist test, the latching device shall be unlatched and the hinges attached to the door and frame. The door is then clamped at the upper latch side. Loads in 30 lb. increments shall be applied at the lower lock edge corner through the screw jack and force gage in the area illustrated in figure 2. The deflection noted on the dial indicator shall be plotted against the load applied to the corner. A maximum 300 lb. load shall be applied. The load shall then be reduced in 30 lb. increments and corresponding deflections

recorded and plotted. Use the failure criteria and locations of A250.4.



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.

~~5.8~~ **Overload Abuse Test Weights**

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)

5.~~9~~8 **Vertical and Lateral Wear Test** Measure the specimen to determine the displacement between leaves and knuckles compared to the initial reading. Record measurements of wear for all hinges. The measurements of the greatest wear shall be compared to the permissible figures.

Requirements Vertical Wear Maximum	
Grade 1	Grade 2
.020 in (0.5 mm)	.030 in (0.76 mm)
Requirements Lateral Wear Maximum	
All Grades: .062 in (1.6 mm)	

5.~~10~~ **9 Overload Test** ~~A static load test shall precede and follow the dynamic load test using the same setup and door weights. With the door in the 0 degree (closed) position, add and remove 150 lbs (69 kg) at a point on the door at a horizontal distance from the hinge axis equal to the test door width shown in paragraph 4.6.1. Lateral shift of the door is away from the jamb at the top hinge. Adaptations of the procedure and limits are permitted if necessary for certain special purpose hinges. Lateral~~

~~displacement shall not exceed the values given below.~~ Lateral Displacement shall not exceed the values given below when measured in accordance with 5.8. Test shall precede and follow the test using the same setup and door weights as 5.8, with the door in 0 degree (closed) position, add 150 lbs (69 kg), at a point on the door at a horizontal distance of 36 in.from the hinge axis, then remove after 30 seconds. Lateral shift of the door is away from the jamb at the top hinge. Adaptations of the procedure and limits are permitted if necessary for certain special purpose hinges. Take measurements in accordance with the procedures in 5.8.

Requirements Maximum	All Grades: .062 in (1.6 mm)

5.~~11~~ 10 **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.

Grade 1	**Grade 2**
Grade 2 Requirements plus two blows of 90 ft-lbf (120J)	Two blows of ~~50~~60ft-lbf (80J)

5.11 **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.

Grade 1	**Grade 2**
Grade 2 Requirements plus two blows of 90 ft-lbf (120J)	Two blows of ~~50ft~~60ft-lbf (80 J)

5.~~13~~12 **Axial Load Test** Apply the load specified below to the locked trim perpendicular to the face of the door in the direction of opening. After completion of this test the door shall remain secure and not allow access from the locked side. Also,the lock shall remain operational, verified by repeating the operational tests. For the various types of trim, the load shall be applied as specified:

Knobs and Levers Apply the load along the axis..

Paddle Apply the load to the locked outside lever 2 in. (51 mm) +/- 1/16 from the pivoting axle.

Outside Pull or Handleset Apply the load dynamometer to the pull or handleset at the highest point of the curve, or on center on straight pull configurations.

Grade 1	**Grade 2**
500 lbf (2300 N)	300 lbf (1350 N)

6. EXPLANATION OF TYPE NUMBERS

First character denotes Section
Q
Second character denotes door material
1 – wood

2 – hollow metal
3 – fiberglass
4 – FRP
5 – Aluminum

Third character denotes door type
1 – single door, single acting
2 – pair of doors, single acting
3 – pair of doors, double egress
4 – other

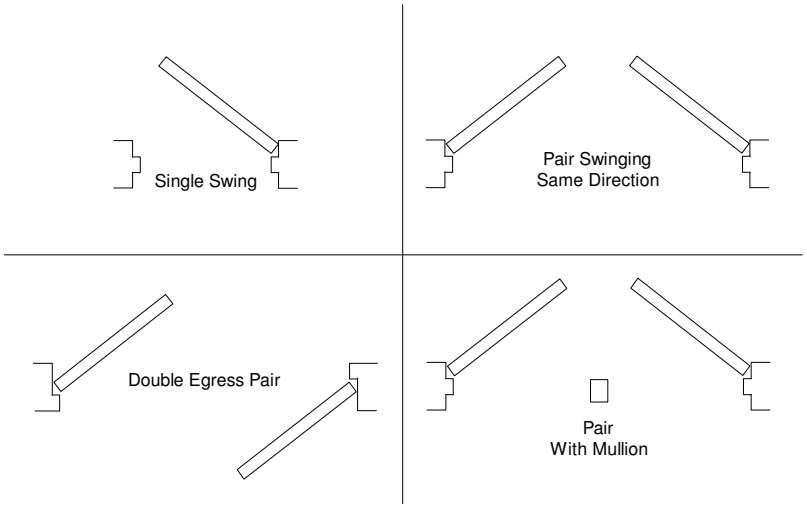
Fourth character denotes hardware type
1 – mortise (A156.13)
2 – cylindrical (A156.2)
3 – exit device (A156.3)
4 – other

Fifth character denotes the grade of the assembly
1 – Grade 1
2 – Grade 2

Example: Q1221 denotes a grade one integrated door opening assembly with a pair of single acting wood doors with a cylindrical lock.

7. ILLUSTRATIONS

Door Swing Configurations



APPENDIX A

A-1 The term "authority having jurisdiction" is used in this Standard. The term is defined in the NFPA Life Safety Code (NFPA 101). In this Standard, it applies to building officials, fire marshals and fire department personnel responsible for enforcing building or fire codes.

A-2 **Conformance Criteria.** Certification that products offered meets 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 proofs of conformance such as first article inspection, test laboratory reports, or listings. Specifiers requiring assertions of conformance utilize statements of conformance by individual manufacturers, or test reports acceptable to the buyer.

A-3 **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.

A-4 Unless other arrangements between buyer and seller are made, marking shall be in accordance with the individual manufacturer's standard practice.

A-5 **Installation Adjustment and Cleaning.** Refer to and comply with manufacturer's instructions.

A-6 **Owner's Manual** All Integrated Door Opening Assemblies are furnished with an Owner's Manual providing important information.

A-7 **Rationale for Tests** Tests included in this standard were selected based on their relevance to their performance in the entire assembly; tests which were adequately checked as a component were not included.

A-8 **Integrated Door Opening Assemblies** may also be separately rated for properties such as windstorm resistance, ballistic, acoustic properties etc. See applicable standards.

PARKING LOT

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#1 ASSA ABLOY – February 7th, 2019 (Josh Peabody #2)

1. **Sections/Tables/Figures Proposed for Revision (e.g. Section 1.2 or 1.2.2.):**

5.3.1 Before Cycle Test (Initial Values) &
5.3.2 After Cycle Test (Qualification Values)

2. **Revise as follows:**

- Add new text as follows …."A156.2 Bored and Preassembled Locks and Latches – Force to Retract Unloaded Bolt (9.1), Force to Retract Preloaded Bolt (9.2) and Force to Latch Door (9.5)."
- Add new text as follows …."A156.3 Exit Devices – Exit Tests (8.2.1), Outside Trim – Torque or Force to Release Latch Test (9.1) and Cylinder Operation Test (9.2)"
- Add new text as follows …."A156.12 Interconnected Locks – Force to Latch Door (8.2), Force to Retract Unloaded Bolt (8.1) and Force to Retract Preloaded Bolt (8.5)"

- Add new text as follows …."A156.13 Mortise Locks & Latches – Dead Bolt Torque (8.1), Force or Torque or Retract Latch Bolt or Latch Bolt and Dead Bolt (8.2), Force to Latch Door (8.3), Torque to Retract Latch Bolt by Key (8.4) and Warped Door Test (8.7)"

3. Reason/ Supporting Information:

Clarity of intent.

Notes from Feb 7th meeting

1. 5.3.1 add location (sections) of information located in referenced standards.
    - Group discussed that adding locations of information in other standards could be problematic if the standard number changes before .31 is revisited.
    - Dick Kreidel (ASSA ABLOY) proposed that the values could be placed within .32 so that an individual would not have to be referred to other standards to obtain the information.
    - After further discussion the group agreed to place in the parking lot and revisit at a later time.

#2 ASSA ABLOY – February 7th, 2019 (Josh Peabody #6)

1.Sections/Tables/Figures Proposed for Revision (e.g. Section 1.2 or 1.2.2.):

5.4.1 – Regular Cycle Tests (Grade 1) &

5.4.2 – Regular Cycle Tests (Grade 2)

2 Revise as follows:

- Update Section 5.4 with the following:

5.4.1 - **Cycle Tests** (**Grade 1)** With the door latched, apply a force to the door, that results in a net 20 to 22 lbf load on the latch(es), approximately 3 in. (76mm) from the latch edge and 40 in. (1020 mm) from the floor in the direction of the door swing until the door is opened. The force shall be applied using weights (see typical methods below). Doors shall be opened by pushing on the actuating bar. The door shall be required to close and latch after each cycle. Suggested methods shown below:

5.4.2 - **Cycle Tests** (**All Other Grades)** Doors shall be opened by pushing on the actuating bar. The door shall be required to close and latch by operation of the door closer.

Requirements		
Grade 1	Grade 2	Grade 3
500,000	250,000	100,000

3. Reason/ Supporting Information:

This is a direct 'cut and paste' from A156.3. The methods of how we cycle and the cycle count defining grades should be the same between the two specs.

Notes from Feb 7th meeting

Proposal to update Section 5.4 on cycles to align with A156.3.

- Patricia Yulkowski (Total Door) noted that there are multiple cycles based on the hardware (as referenced to other standards), and that the cycles should not be hardware components, but the entire system.
- Jen Manning stated that customers can drop into std door opening and get the same products without going to integrated systems, which saves them money. So group should consider aligning the standard to the component levels of other standards.
- Group discussed the varying amount of cycles across products and decided to place the item in the parking lot until the breadth of the hardware cycle requirements in the other standards could be reviewed.