

New proposed BHMA A156.42-2019

**STANDARD  
FOR  
SOUND QUALITY OF EXIT DEVICE HARDWARE  
(ARCHITECTURAL HARDWARE)**

**SPONSOR**

**BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.**

**Revision A December 7, 2018**  
**Revision B January 7, 2019**  
**Revision C January 30, 2019**

## AMERICAN NATIONAL STANDARD

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Published by  
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.  
355 Lexington Avenue, New York, New York 10017  
[www.buildershardware.com](http://www.buildershardware.com)

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FOREWORD (This Foreword is not a part of ANSI/BHMA A156.42)

The general classification of builders hardware includes a wide variety of items which are divided into several categories. This Standard is a 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 necessary, material and dimensional requirements have been established to ensure safety and stability to which the public is entitled. There are no restrictions on design except for those dimensional requirements imposed for reasons given above.

This Standard is not intended to obstruct but rather to encourage the development of improved products, methods and materials. 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. Choice of grade and specific product are to be made on the basis of utility, aesthetics, security objectives and end use desired.

Users of this Standard consult applicable local building codes as to requirements affecting the functions of locks used on fire doors and doors within a mean of egress.

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## SCOPE

1.1 This Standard establishes methods for defining levels of acoustic performance for various types of architectural hardware whose non-acoustic performance aspects are described in the applicable BHMA product Standards. This Standard considers all sound generated by the product during operation including, but not limited to, mechanical and electrical

1.2 This standard provides for certification of A156.2 bored locks and A156.3 exit hardware, but does not encompass the entire door system.

1.3 Products must first be listed to appropriate BHMA standard listed in paragraph 1.2 before certification to this standard can be completed.

1.4 (*Additional or modified language to be considered at a later date*). Different product types and functions found within an architectural hardware product family must be evaluated, tested, and listed independently.

1.5 Tests described in this Standard are performed under laboratory conditions. In actual usage, results vary because of installation, door and frame construction, maintenance, and other environmental conditions.

## 2. GENERAL

2.1 All products certified to this standard shall be listed or labeled by a Nationally Recognized Testing Laboratory (NRTL) and be subject to periodic examination service.

2.2 Modifications to the product (e.g. lubrication, sound abatement material) may not be made during tests unless specified in manufacturer's installation instructions.

2.3 Failure of the test fixture does not constitute pass or failure of the tests. (TBD- include failure of acoustic sound of fixture)

2.4 The test equipment shall permit installation of the complete product in accordance with the manufacturer's recommendations as described in the template and instruction sheets regularly furnished. (TBD)

2.4 Included Products (TBD)

2.5 Excluded Products (TBD)

2.6 (PLACEHOLDER for later discussion as body is developed/ method developed) The manufacturer is permitted to request a waiver of all, or a portion, of the tests by presenting an engineering analysis demonstrating that the architectural hardware products sound generating qualities are less than or equivalent to a currently certified product. Evaluations are limited to products within the same ANSI/BHMA product category (i.e. A156.3 product cannot be used to evaluate A156.2 product). The analysis must clearly document that the hardware design is undistinguishable and operates the same. The Nationally Recognized Testing Laboratory responsible for the certification program must agree with the analysis and any justification must be documented in the lab report.)

2.7 **Values** Required values in this Standard are given in US units. The SI (metric) equivalents are approximate. All values which do not carry specific tolerances or are not marked maximum or minimum shall have the following tolerances: Linear dimensions shall be  $\pm 1/16$  in (1.6 mm). Pounds or pound force shall be  $\pm 5\%$ . Angular measurements shall be  $\pm 4$  degrees. Voltage measurements shall be  $\pm 5$  percent. Temperature measurements shall be  $\pm 4$  degrees F ( $\pm 2$  degrees C). **Velocity measurements, both linear and angular, shall be  $\pm$  TBD percent**

2.8 Grading TBD

2.9 **Reference to ANSI Standards** ANSI Standards are available from the American National Standards Institute, 11 W. 42nd Street, New York, NY 10036 or [www.buildershardware.com](http://www.buildershardware.com).

### Referenced Standards

**ISO532B (or DIN 45631) for calculating loudness- BHMA STAFF- add as placeholder**

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## 3. DEFINITIONS

**3.1 Sone - a unit of perceived loudness**

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**3.2 Hemi-anechoic chamber - room designed to completely absorb reflections of either sound**

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**3.3 Free field microphone - sound measurement instrument used in an anechoic chamber**

**3.4 Acoustic - the properties or qualities of sound**

**3.5 (Peak) instantaneous loudness (PIL) - correspond to peak perceived loudness of a sound**

**3.6 Transient sound - high amplitude, short-duration sound**

**3.7 Sound pressure level - logarithmic measure of the effective sound pressure of a sound relative to a reference value**

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## 4. GENERAL TEST PARAMETERS

4.1 Modifications to the product (e.g. lubrication, sound abatement material) may not be made during tests unless specified in manufacturer's installation instructions.

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4.2 Failure of the test fixture does not constitute pass or failure of the tests.

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4.3 The test equipment shall permit installation of the complete product in accordance with the manufacturer's recommendations as described in the template and instruction sheets regularly furnished.

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**4.4 Select one sample product for evaluation to this standard. (PLACE HOLDER)**

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## 5. TEST EQUIPMENT

5.1 Failure of the test equipment does not constitute a pass or failure of the tests.

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5.2The test equipment shall permit installation of the product in accordance with the manufacturer's recommendations as described in the instruction sheets furnished.

5.3 Measuring Equipment:

5.3.1 All instruments and equipment used to conduct tests for recording data need to be calibrated and maintained for effectiveness and continued accuracy.

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5.3.2 Calibration of equipment shall be traceable to the National Institute of Standards and Technology (NIST).

5.3.3The frequency of calibration depends on the recommendation of the particular test equipment manufacturer with a minimum being once per year.

Measuring equipment used shall have a known measurement error and be capable of qualifying the value being measured.

Sample Product

Tests shall be made using normal production product, complete with instructions-

Chamber – Hemi-anechoic or full-anechoic chamber (note that if a hemi anechoic chamber is utilized then the floor material will need to be defined.)

Minimum size and background noise rating to be determined

Test Fixture – Universal fixture made of extruded aluminum channel representing 3'x7' size opening  
Fixture design and specifications, such as stiffness, pivots, and door gaps, to be determined  
Utilize plastic/wood blocks for ease of mounting (specifications on blocks to be determined)





#### Microphone Array

Free field microphone B&K 4189 (or equivalent) at user left ear position (position TBD) on each side of opening

Equipment shall be "Class 1" per IEC 61672 specification

#### Data Acquisition System

Data acquisition front end B&K 3050-A-060 (or equivalent)

Optical laser tachometer B&K 2891 (or equivalent)

#### Data Analysis

$F_{max} = 20$  kHz

Calculate the peak of Instantaneous Loudness vs Time (ISO 532B, 0.01s window)

#### Actuation System- place holder TBD -

### **5. TEST PROCEDURE / METHODS**

#### Test Method for A156.2 Bored Locks

Baseline fixture noise (max loudness not to exceed TBD) prior to installing.

Install product according to manufacturer instructions.

Start in closed and latched position

For each test event measure peak instantaneous loudness (PIL) in sones per ISO532B and actuation speed with tachometer (sound metric to be determined)

Actuate lock from pull side of opening (method to be determined – manual, motor, etc.)

Actuate the knob, lever, key, or turn at  $TBD \pm TBD$  deg/s or actuate the thumb piece at  $TBD \pm TBD$  in/s until reaching a hard stop (or other limit TBD)

Open door to  $TBD \pm TBD$  degrees opening angle

Release lever, knob, key, or turn suddenly

Close door at TBD deg/s via repeatable method (e.g. weight drop, spring)

Verify door closed and latched

Repeat TBD times and average PIL across all events and both microphones

If applicable, repeat all tests again with actuating in the opposite direction

Actuate lock from push side of opening (method to be determined – manual, motor, etc.)

Actuate the knob, lever, key, or turn at TBD±TBD deg/s or actuate the thumb piece at TBD±TBD in/s until reaching a hard stop

Open door to TBD±TBD degrees opening angle

Release lever, knob, key, or turn suddenly

Close door at TBD deg/s via repeatable method (e.g. weight drop, spring)

Verify door closed and latched

Repeat TBD times and average PIL across all events and both microphones

If applicable, repeat all tests again with actuating in the opposite direction

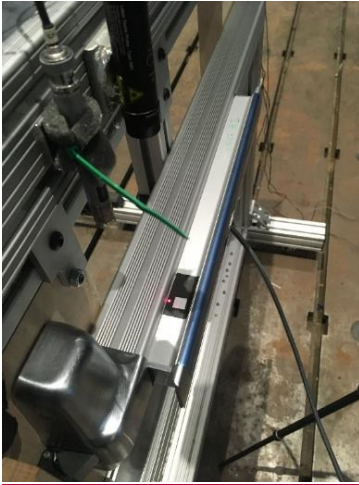
### **Test Method for A156.3 Exit Devices**

Baseline fixture noise (max loudness not to exceed TBD) prior to installing.

Install product according to manufacturer instructions.

Start in closed and latched position

For each test event measure peak instantaneous loudness (PIL) in sones per ISO532B and actuation speed with tachometer



Actuate trim from pull side of opening (method to be determined – manual, motor, etc.)

Actuate the knob, lever, key, or turn at TBD±TBD deg/s or actuate the thumb piece at TBD±TBD in/s until reaching a hard stop

Open door to TBD±TBD degrees opening angle

Release lever, knob, key, or turn suddenly

Close door at TBD deg/s via repeatable method (e.g. weight drop, spring)

Verify door closed and latched

Repeat TBD times and average PIL across all events and both microphones

If applicable, repeat all tests again with actuating in the opposite direction

Actuate device from push side of opening (method to be determined – manual, motor, etc.)

Push actuating bar at TBD±TBD in/s until reaching a hard stop  
Open door to TBD±TBD degrees opening angle  
Release actuating bar suddenly  
Close door at TBD deg/s via repeatable method (e.g. weight drop, spring)  
Verify door closed and latched  
Repeat TBD times and average PIL across all events and both microphones

**Requirements**

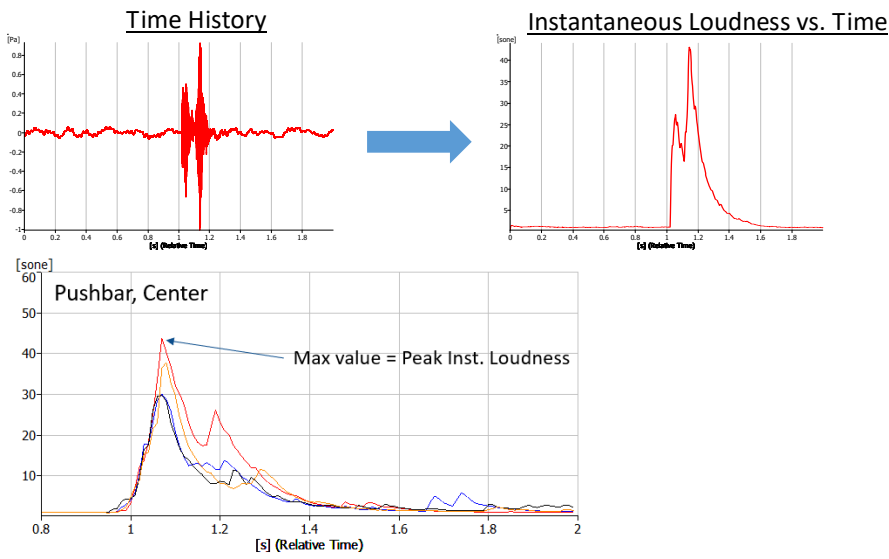
*Table 1 – Peak Instantaneous Loudness Requirements*

	<u>GOOD</u> Use Case: Office	<u>BETTER</u> Use Case: Educational	<u>BEST</u> Use Case: Medical
<u>Bored Locks</u>			
<u>Exit Devices</u>			
<u>Mortise Locks</u>			

EXAMPLE

**Appendix**

Peak instantaneous loudness determination



“Quiet room” spec suggestions



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## 6. DESCRIPTION & FUNCTION NUMBERS (placeholder)

### APPENDIX

Repeat for auxiliary functions

Deadbolt

Electric locking

Electric latch retraction

Key cylinder actuation (NL, HB)

Key locking

Pushbutton

Dogging

How to verify R&R of test?

How do we certify labs for this standard?

How do we determine GOOD / BETTER / BEST requirements (e.g. jury trials)?

Reference other standards – ASHRAE standard for fans