



AMERICAN NATIONAL STANDARD

FOR

INTERCONNECTED LOCKS



SPONSOR

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

AMERICAN NATIONAL STANDARDS INSTITUTE

Approved March 7, 2013

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 he has 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.

CAUTION NOTICE: This American National Standard is permitted to be revised or withdrawn at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of publication. Purchasers of American National Standards receive current information on all standards by calling or writing the American National Standards Institute.

Published by
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.
355 Lexington Avenue, New York, New York, 10017

Copyright © 2013 by the Builders Hardware Manufacturers
Association, Inc.

Not to be reproduced without
specific authorization from BHMA

Printed in the USA

This Standard was approved by ANSI under the Canvass Method. BHMA was accredited on 21 March 1983 by ANSI as a sponsor using the Canvass Method.

FOREWORD

(This Foreword is not a part of ANSI/BHMA A156.12)

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. Interconnected Locks is one such section and 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 insure 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.

The BHMA numbers which indicate functions of interconnected locks do not identify grade, finish, or design and are not intended to be used without necessary supplementary information. Individual manufacturer's catalogs are consulted.

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. Some communities require use of exterior door locks having a dead bolt with a 1 in. (25.4 mm) projection for the purpose of providing greater security. Only functions compatible with the requirements of the applicable building codes are used.

TABLE OF CONTENTS

<u>1. SCOPE</u>	<u>6</u>
<u>2. DEFINITIONS</u>	<u>6</u>
<u>3. GENERAL</u>	<u>9</u>
<u>4. DIMENSIONAL CHARACTERISTICS</u>	<u>9</u>
<u>5. DESCRIPTION AND FUNCTION NUMBERS OF SERIES 5000 INTERCONNECTED LOCKS</u>	<u>10</u>
<u>6. GENERAL TEST PARAMETERS</u>	<u>12</u>
<u>7 TEST EQUIPMENT AND FIXTURES</u>	<u>14</u>
<u>8 OPERATIONAL TESTS</u>	<u>22</u>
<u>9. CYCLE TESTS</u>	<u>25</u>
<u>10. STRENGTH TESTS</u>	<u>27</u>
<u>11. MATERIAL EVALUATION TESTS</u>	<u>30</u>
<u>12. SECURITY TESTS</u>	<u>31</u>
<u>13 FINISH TESTS</u>	<u>35</u>
<u>APPENDIX A USERS GUIDE (NOT A PART OF ANSI/BHMA A156.12)</u>	<u>36</u>

1. SCOPE

1.1 This Standard establishes performance requirements for Interconnected Locks and includes operational, cycle, strength, material evaluation, security, and finish tests.

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

1.3 **Grade Qualifications** (Also See Appendix A.) Manufacturers shall indicate the Grade level of their locks. Locks shall meet all tests for their grade listing. A Grade 1 lock shall meet all Grade 1 criteria, a Grade 2 lock shall meet all Grade 2 criteria, and a Grade 3 lock shall meet all Grade 3 criteria in each classification.

2. DEFINITIONS

2.1 **Armored Strike** A strike reinforced in such a way as to strengthen the frame to which it is applied.

2.2 **Auxiliary Lock** A lock having a latch bolt or dead bolt operated by a key, paddle and/or turn, and usually used in addition to a primary lock or latching device.

2.3 **Backset** The distance from the edge of the door measured at the centerline of the door thickness to the centerline of the function holes or cross bore.

2.4 **Bitting** 1. the number(s) which represent(s) the dimensions of the key, 2. the actual cut(s) or combination of a key

2.5 **Biometric Readers** Optical, Capacitive, Sound Energy, And Heat Sensitive Readers for decoding unique biometric features, including fingerprints, eye, facial, or speech recognition.

2.6 Bolts

2.6.1 **Auxiliary Dead Latch** A plunger which, when actuated, automatically locks a projected latch bolt against return by end pressure.

2.6.2 **Dead Bolt** A lock component having an end, which protrudes from, or is withdrawn into, the lock front by action of the lock mechanism. When the door is closed and the dead bolt thrown, it extends into a hole provided in the strike, locks the door, and does not retract with end pressure.

2.6.3 **Latch Bolt** A lock component having a beveled end which projects from the lock front in an extended position, but is forced back into the lock case by end pressure or drawn back by action of the lock mechanism. When the door is closed, the latch bolt projects into a hole provided in the strike, and holds the door in a closed position.

2.6.4 **Deadlocking Latch Bolt** A spring actuated latch bolt with a beveled end and incorporating a plunger which, when depressed, automatically locks the projected latch bolt against return by end pressure. Also called dead latch.

2.6.5 **Expanding or Interlocking Type Dead Bolt** A bolt which interlocks with its strike when fully engaged.

2.6.6 **Deadlocking Latch Bolt Plunger** A component of the latch bolt which, when actuated, automatically locks a projected latch bolt against return by end pressure.

2.7 **Bored Lock Series 4000** A lock installed in a round bored opening in the edge and face of a door.

2.8 **Cam** 1. a lock or cylinder component which transfers the rotational motion of a key or cylinder plug

to the bolt works of a lock, 2. the bolt of a cam lock.

2.9 Card Readers Insertion or swipe credit-card readers decode magnetic stripes and smart cards (memory cards and chip cards).

2.10 Case The housing of a lock.

2.11 Contact Memory Readers Electrical contact readers decode embedded EEROM chips and “touch memory” modules.

2.12 Credential A key, keycard, electronic key fob, PIN (personal identification number), biometric attribute, or other device, used in contact or proximity of the input device to transfer a code required for unlocking the locking device, or communicating with it for other access control purposes.

2.13 Cylinder The subassembly of a mechanical lock containing a plug with keyway and a body with movable retainers.

2.14 Cylinder Body The portion of a cylinder that surrounds the plug and contains the tumbler mechanism. The cylinder body is sometimes called a cylinder shell.

2.15 Cylinder Guard That portion that surrounds the otherwise exposed portion of a cylinder to protect the cylinder from wrenching, cutting, pulling or prying.

2.16 Cylinder Housing The portion of a mechanical lock that surrounds and retains the cylinder body. It is often part of a lock itself.

2.17 Cylinder Plug A component of the cylinder within the body, which is actuated when the correct key is used.

2.18 Electrified Input Devices The electrified locks equivalent to a cylinder for reading a credential and transmitting the “key code” to the controlling device. Examples include card readers, keypads, contact memory key readers, radio frequency (proximity) readers, optical readers, and biometric readers.

2.19 Handleset A handle with a thumbpiece.

2.20 Indicator Button The component of a hotel guest room lock which indicates on the outside that the dead bolt has been projected.

2.21 Input Devices Electrified input devices and push button mechanism.

2.22 Interconnected Lock A mechanically interconnected locking mechanism having a separate latch bolt or dead locking latch bolt and dead bolt designed for installation in round bored openings in the edge and face of a door. A single operation retracts all bolts.

2.23 Interchangeable Core (IC) A cylinder that is removed from the lock with a designated key.

2.24 Interchangeable Core (IC) Mortise Cylinder The combination of a mortise IC housing, integrated with a corresponding interchangeable core cylinder.

2.25 Interchangeable Core (IC) Rim Cylinder The combination of a rim cylinder IC housing, integrated with a corresponding interchangeable core cylinder.

2.26 Key A properly combined device specifically intended to operate a corresponding cylinder.

2.26.1 Display Key A key for guest rooms used as sample rooms or when extra security is required. This key locks a single guest room against other keys except emergency or shutout key.

2.26.2 Emergency Key A key that operates all guest room locks even when locked from the inside.

2.26.3 Emergency Release The component of a privacy, bedroom or bath lock receiving a blank

key or other device which when actuated enables entry from the outside.

2.27 **Keypads** Membrane or switch input readers decode digital pin codes mechanically entered.

2.28 **Keyway** The slot or hole in a cylinder plug within which a key is fully inserted to operate the cylinder.

2.29 **Locked** Locked is when the dead locking latch bolt or dead bolt or both cannot be retracted by operating the outside lever or knob.

2.30 **Lock Front** A plate fastened to the edge of a door through which the bolts pass.

2.31 **Loiding** Insertion of a piece of celluloid or other shim material between the door and the jamb at the latch bolt location to attempt forcible retraction of the latch bolt.

2.32 **Mechanical Pushbutton Mechanism** Decodes the input and releases a control shaft to activate the lock drive mechanism.

2.33 **Mortise Cylinder** A threaded cylinder, regularly supplied with a cam to actuate the lock mechanism.

2.34 **Mortise Lock or Latch** A lock or latch fitting into a mortised cavity prepared in the edge of a door. The bolts are operated by knobs, levers, turns, thumb pieces, paddles or cylinders engaging the mortise lock or latch through holes prepared in the faces of the door.

2.35 **Movable Detainer** Part of the mechanism of the cylinder which first should be moved by the key into a predetermined position before the key or plug can release. Examples include components known as pins, side bars, discs, and the like.

2.36 **Optical Readers** Single or bi-directional readers employing optical sensors for decoding visible credentials (bar codes and diagrams) or infrared serial transmissions.

2.37 **Paddle** The component that projects or retracts a dead bolt or latch bolt by pushing or pulling.

2.38 **Preassembled Lock Series 2000** A lock fitting into a notched cutout in a door.

2.39 **Push Button Mechanism** A mechanical coding device used in place of a key and cylinder.

2.40 **Radio Frequency Readers** Single or bi-directional readers employing antennas for decoding contactless RFID tags and proximity badges.

2.41 **Recessed Cylinder** A cylinder where the cylinder head is flush with, or recessed below, the outside surface of the trim to protect the cylinder from wrenching, cutting, pulling or prying.

2.42 **Rim Cylinder** A cylinder typically used with surface applied locks and attached with a back plate and machine screws. It has a tailpiece to actuate the lock mechanism.

2.43 **Rim Lock** A lock mounted on the inside face of a door.

2.44 **Strike** A mortised or surface mounted plate fastened to the door frame into which the bolts project.

2.45 **Strike Box** A housing used in back of a strike to enclose the bolt or bolt openings.

2.46 **Tailpiece** A bar projecting from the back of a rim, bored lock cylinder or a push button mechanism engaging the lock mechanism and when rotated by the key or turn either locks or unlocks the lock.

2.47 **Turn** The component that projects or retracts a dead bolt or latch bolt by turning. Sometimes called a turn piece or thumb

2.48 **Thumbpiece** A lever, projecting from a handle, pressed by the thumb to retract a latch bolt.

3. GENERAL

3.1 Cylinders and Input Devices for Locks Cylinders supplied or mated with locks shall meet the performance requirements for the appropriate cylinder types and grade level found in the ANSI/BHMA Standard A156.5-2010 for Cylinders and Input Devices for the lock to retain its grade listing. Assemblies take the grade level of the lowest graded component. Other mechanisms are permitted to be used in lieu of cylinders providing the performance and security criteria are equivalent to that of cylinders. Suffix D shall be indicated in the certified products directory for locks to be used only with drill resistance cylinders as evaluated in A156.5.

3.2 Tolerances Where only minus tolerances are given, the dimensions are permitted to be exceeded at the option of the manufacturers. 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 $\pm 2\%$. Degrees shall be ± 2 degrees.

3.3 Door and Frame Preparation The lock models described in this standard shall fit the door and frame preparations described in the ANSI/BHMA A156.115 Series. Other configurations are permitted to fit special opening templating requirements. See manufacturers' instructions for details.

3.4 Where levers are referenced, knobs, paddles, or handlesets are permitted to be used, except for tests which apply to specific trim.

3.5 Roses, escutcheons, knobs, levers, turns, paddles, and cylinder guards shall cover all door preparation openings.

3.6 No lock can provide complete security by itself. Locks may be defeated by forcible or technical means, or evaded by entry elsewhere on the property. No lock can substitute for caution, awareness of your environment, and common sense. Builders hardware is available in multiple performance grades to suit the application. In order to enhance security and reduce risk, consult a qualified locksmith or other security professional. For applications where pick resistance and other higher security protections are required users should consider locks meeting UL 437 or ANSI/BHMA A156.30 for High Security Cylinders.

3.7 Reference to other Standards Referenced standards are available from www.buildershardware.com, www.ansi.org, www.astm.org, and www.ul.com.

3.8 Values Required values in this Standard are given in US units. The SI (metric) equivalents are approximate.

3.9 Dead Latching When any function of a lock combines a dead bolt and auxiliary dead latch, the auxiliary dead latch shall be effective whenever the dead bolt is projected or the outside lever or knob is locked.

3.10 Codes Certain lock functions are not permitted on doors within a means of egress. Consult local Authority Having Jurisdiction. When locks and latches are used in fire door assemblies, they shall be listed for use in fire doors by a Nationally Recognized Testing Laboratory (NRTL) and shall be under an in-plant follow-up inspection service.

4. DIMENSIONAL CHARACTERISTICS

4.1 Door Preparation The specifications for the door thickness for these products are defined in the ANSI/BHMA A156.115 series standards. Typical thicknesses are 1 3/8 in. and 1 3/4 in. (35 mm and 44 mm); consult hardware manufacturer for other sizes.

4.2 Backset: $\pm 1/64$ in. (0.4 mm)

2 3/8 in. or 2 3/4 in. (60 mm or 70 mm)

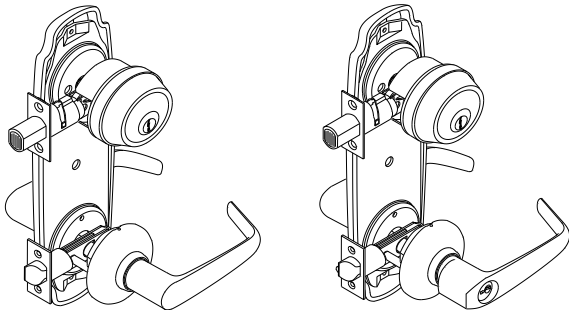
Other backsets are permitted to be used providing the performance and security are equivalent.

- 4.3 **Latch bolt/dead locking latch bolt throw** -1/16 in. (1.6 mm) tolerance: 1/2 in. (12.7 mm)
- 4.4 **Dead bolt throw** -1/16 in. (1.6 mm) tolerance: 1 in. (25.4 mm)
- 4.5 **Turn Length** 1 3/16 in. (30 mm) minimum overall.
- 4.6 **Knob Major Diameter** 1 13/16 in. (46 mm) minimum

5. DESCRIPTION AND FUNCTION NUMBERS OF SERIES 5000 INTERCONNECTED LOCKS

In the following lock descriptions, the functions are described using lever trim for brevity and clarity. It is acceptable to use models with knobs, or handlesets wherever levers are referenced. Similarly, where keys are referenced, it is acceptable to use credentials to operate input devices.

Some functions may be available with electrical operation in place of mechanical operation. The basic function shall remain the same as described.



F95 Entry Lock Latch bolt operated by lever from either side. Rotating turn from inside or key from outside extends dead bolt to locked position. Both dead bolt and latch bolt are retracted to unlocked position by operating inside lever.

F96 Entry Lock Deadlocking latch bolt is operated by lever from either side except when outside lever is made inoperable by locking device inside. When outside lever is locked, deadlocking latch bolt is operated by key outside restoring inside locking devices to unlocked position. Rotating turn from inside or key from outside extends dead bolt to locked position. Operating inside lever retracts both dead bolt and latch bolt. Closing door shall not release locking device inside.

F97 Entry Lock Deadlocking latch bolt is operated by lever from either side except when outside lever is made inoperable by locking device inside. When outside lever is locked, deadlocking latch bolt is operated by key outside. Inside locking device is manually operated to unlock outside lever. Rotating turn from inside or key from outside extends dead bolt to locked position. Operating inside lever retracts both dead bolt and latch bolt. Closing door shall not release locking device inside.

F98 Storeroom Lock Key in upper cylinder projects or retracts dead bolt. Inside lever retracts both dead bolt and latch bolt. Deadlocking latch bolt is operated by key in lever outside or by operating inside lever. Outside lever always inoperable. At the option of the individual manufacturer, operating the key in the outside lever shall permit the latch bolt to be retracted by operating the outside lever, providing the key cannot be removed in the unlocked position.

F99 Dormitory Lock Deadlocking latch bolt is operated by lever from either side except when outside lever is made inoperable by locking device inside. When outside lever is locked, deadlocking latch bolt is operated by key outside, restoring inside locking device to unlocked position. Operating inside lever

retracts both dead bolt and latch bolt. Closing door releases locking device inside.

F100 Hotel Motel Lock Deadlocking latch bolt is operated by key outside or operating inside lever. Outside lever is always inoperable. Rotating turn from inside or key from outside shall extend dead bolt to locked position. Both dead bolt and deadlocking latch bolt are permitted to be retracted individually by key outside. Operating inside lever retracts both dead bolt and latch bolt. A visual occupancy indicator shall be operated from inside and shut out all keys in lever or knob except an emergency key. Operating inside lever shall release indicator and shut out feature unless fixed in a shut out position by a special tool.

F102 Handle Set Trim Thumbpiece on outside and lever on inside retracts latch. Rotating turn from inside or key from outside extends dead bolt to locked position. Both dead bolt and latch bolt are retracted to unlocked position by operating inside lever.

F103 Handle Set Trim Deadlocking latch bolt is operated by thumbpiece outside or lever inside except when outside thumbpiece is locked or made inoperative by locking device inside or by key outside. When outside thumbpiece is locked or inoperative, deadlocking latch bolt and dead bolt are retracted by key or key and thumbpiece operation outside, or by operating inside lever. Rotating turn inside or key outside extends dead bolt to locked position. Thumbpiece outside remains locked or inoperative until unlocked by locking device inside or by key outside.

F104 Entry Lock Deadlocking latch bolt is operated by lever from either side except when outside lever or knob is made inoperable by locking device inside. When outside lever is locked, deadlocking latch bolt is operated by key outside, restoring inside locking device to unlocked position. Rotating turn from inside or key from outside extends dead bolt to locked position. Operating inside lever, key outside and turn inside, retract both dead bolt and deadlocking latch. Closing door shall not release locking device inside.

F105 Entry Lock Deadlocking latch bolt is operated by lever from either side except when outside lever is made inoperable by locking device inside. When outside lever is locked, deadlocking latch bolt is operated by key outside. Inside locking device shall be manually operated to unlock outside lever. Rotating turn from inside or key from outside extends dead bolt to locked position. Operating inside lever, key outside, and turn inside, retract both dead bolt and latch bolt. Closing door shall not release locking device inside.

F106 Dormitory Lock Deadlocking latch bolt is operated by lever from either side except when outside lever is made inoperable by locking device inside. When outside lever is locked, deadlocking latch bolt is operated by key outside, restoring inside locking device to unlocked position. Rotating turn from inside or key from outside extends dead bolt to locked position. Operating inside lever, key outside and turn inside retract both dead bolt and latch. Closing door releases locking device inside.

6. GENERAL TEST PARAMETERS

6.1 Lubrication shall not be applied at any time during the tests.

6.2 Where a lock function or design does not allow a specific test, the test is not required. See the appendix Chart 1 for applicable tests by function number.

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

6.4 **Mounting locks** The test equipment shall permit installation of the complete lockset with trim in accordance with the manufacturer's recommendations as described in the template and instruction sheets regularly furnished. Unless otherwise specified, locksets shall be properly mounted in accordance with the manufacturer's instructions. The lock front-to-strike spacing shall be 1/8 in. +/- 1/32 (3.2 +/- 0.8 mm) at centerline of bolt for all tests.

6.5 **Test Cylinders** Cylinders used for testing, shall have certification per ANSI/BHMA A156.5-2010 for Cylinders and Input Devices for Locks. For cycle testing, at the manufacturers discretion, the moveable detainers are allowed to be removed.

6.6 **Standard Test Methods for Security of Swinging Door Assemblies** Some of the test equipment, fixtures and strength tests required in this Standard are taken from ASTM F476-84 (2002). Descriptions of the test equipment, fixtures and strength tests required have been incorporated by reference to the specific paragraph numbers found in ASTM F476.

6.7 Tests shall be made using standard sets. Complete instructions and templates shall be included. Failure of any one lock in any of the tests shall constitute failure of the complete qualification tests.

6.8 Functions with Keyed *Inside* Locked Trim are subject to the same tests as Locked Outside Trim unless otherwise specified. Use separate samples.

6.9 Sample Test Locks [revisit at end]

Operational and Cycle Tests	Strength Tests	Security Tests	Finish Tests per Finish	Material Evaluation Test
3 lock samples (use same specimens for all operational tests) Subject three samples to cycle test 9.1 and performance after cycle test 9.6.	3 lock samples (use same specimens for all strength tests) Subject three samples to strength tests 8.1 through 8.6.	5 total, one specimen each test; 9 for double locking functions Subject one different lock for each security test	One specimen of trim parts shall be selected for each finish test and finish being tested.	1 lock sample is allowed to be used for the knob crush, rose dent and rose deformation

6.10 **Measuring Equipment** All instruments and equipment used to conduct tests for recording data need to be calibrated and maintained for effectiveness and continued accuracy. Calibration of equipment shall be traceable to the National Institute of Standards and Technology (NIST). The 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. Provide a linear measuring device accurate to reading