ANSI/SDI A250.4

Revised July 2018

Test Procedure &
Acceptances Criteria for –
Physical Endurance for
Steel Doors, Frames &
Frame Anchors





ANSI/SDI A250.4 - 2018

- The focus of this standard is on commercial hollow metal doors, frames, and their applicable hardware and how it can be used by design professionals in both the selection and specification of commercial door openings
- First adopted as an SDI Standard in 1980 as the first attempt to replicate on-site door usage in an operable test environment on doors, frames, and hardware
- Adopted as ANSI A156.4 in 1994 and then re-published and adopted as ANSI A250.4 in 1999



Description of A250.4

This standard provides manufacturers with:

- 1 A uniform method of evaluation for lifecycle testing of components and assemblies
- 2 Multiple testing procedure methods
- 3 Cycle tests at designated level of cycles
- 4 Twist tests at designated cycle points
- Operable tests with door cycles using commercial hinges, exit device, and closer
- 6 How length of cycles tested relate to use and application
- 7 Proper guidance for design professionals in specifying commercial door openings



A250.4 Overview - Performance Test

ANSI/SDI A250.4 establishes a performance test method for commercial hollow metal openings through replicating field operating conditions for:

- Operable hardware
- Door swings opens 60°± 5°
- Cycles 15 cycles / minute
- Twist tests at predefined intervals

AMERICAN NATIONAL STANDARD

ANSI/SDI A250.4-2018

American National Standard

Test Procedure and Acceptance Criteria for – Physical Endurance for Steel Doors, Frames and Frame Anchors

1 Purpose

The primary purpose of this procedure shall be to establish a standard method of testing the performance of a steel door mounted in a hollow metal or channel iron frame installed with appropriate anchors, under conditions that might reasonably be considered an accelerated field operating condition.

The user of this performance standard must temper their usage with the knowledge that there are many variables that affect door and frame performance, such as different hardware, anchors, glass and louver cutouts, field modification by parties other than the manufacturer, environmental factors, such as heat, cold, moisture, etc.

1.1 Reference documents

ANSI/BHMA A156.1-2013 Butts and Hinges

ANSI/BHMA A156.3-2014 Exit Devices

ANSI/BHMA A156.4-2013 Door Controls - Clos-

2 Apparatus and equipment

The apparatus and equipment used shall be the same when testing doors or frames with frame anchors. The main testing structure shall be constructed as shown in figures 1 and 2. The structure shall conform to the parts shown, except the opening width and height are permitted to vary to allow the testing of various door sizes. The test frame for testing doors and frames shall be anchored in such a manner as to ensure rigidity.

The swinging mechanism shall be in two parts:

2.1 Door opener

The door opener shall be an air cylinder positioned at 65° to the plane of the door in its closed and latched position that will actuate an exit device mounted on the test door. The contact point shall be set to push the door open 60° ±5°, and retract to allow the door closer to bring the door back into its original closed position and then begin the cycle again. See the requirements in figures 1 and 1A.

2.2 Hardware

The exit device, door closer and hinges used in testing shall be selected based on the door manufacturers' recommendations for the testing level described in Swing Test Form 1. The manufacturer and model numbers shall be recorded in the report. All hardware shall be applied to the door and frame with fasteners provided by the hardware manufacturer (for example, machine screws or sex bolts) in the location recommended by the door manufacturer. The hardware shall conform to the latest editions of American National Standards ANSI/BHMA A156.1, 3 and 4. The device shall be set to close the door at a rate of 15 cycles, ± 1, per minute.

Inspect all hardware and silencers at regular intervals, and adjust or replace as necessary. It is acceptable to apply lubrication to hinges and exit devices.

Note: Where the applicable BHMA Test Standards have been followed, this information shall be recorded in the test report.



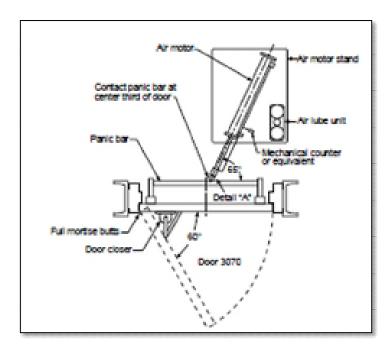
A250.4 Overview - Performance Test

Test Apparatus:

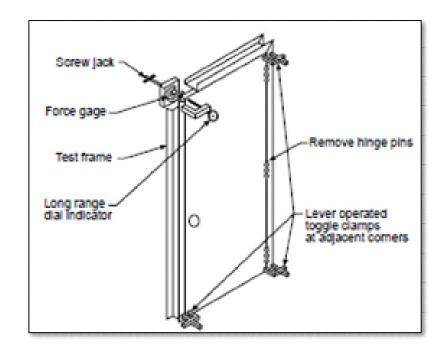
Test fixture with pneumatic cylinder to cycle the door at designated rates

Two-part testing:

- Cycle Test
- Twist Test



Cycle Test



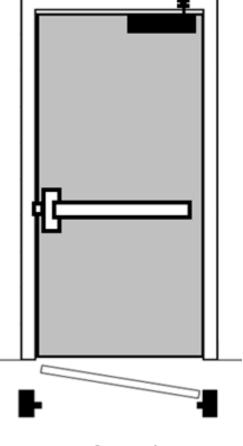
Twist Test



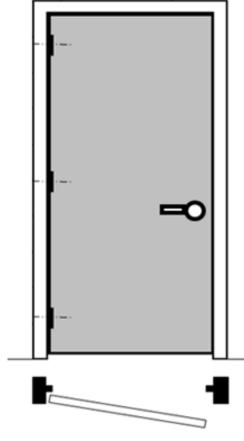
A250.4 Overview -Performance Test

Operable Opening:

- Exit device
- Door closer
- Hinges



Push Side of Door



Pull Side of Door



A250.4 Overview - Performance Test

Test Specimen Door:

- 3070 nominal size door
- Production doors are used
- Detailed description of the construction

Test Specimen Frame:

- Production frames are used
- Detailed construction description
- KD or Welded

Test Specimen Anchors:

Snap-in or welded

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3 Preparation for test

The door shall be hung in the frame on the hinges. Care shall be taken to ensure the hinges are properly applied to the door and frame as recommended by the hinge manufacturer, and any hinge fillers or shims, are in place. The clearances between the door and the frame shall be recorded in the test report.

The door frame shall be securely fastened to the test frame opening structure in accordance with the door manufacturer's instructions. The manufacturer is permitted to select anchors for specific wall applications (i.e., wood stud anchors or steel stud anchors, lose or welded in or existing masonry wall anchors).

Silencers shall be installed on the frame and the stop face of the door shall contact the silencers. The frame shall be plumb, square, and rigid.

When applicable, wall surface materials (e.g., drywall) shall be applied to the test frame opening at the frame throat to simulate actual construction conditions.

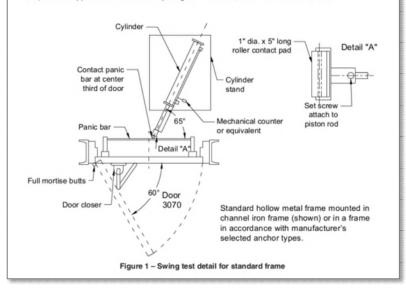
4 Test specimen

4.1 Doors

Unless specified otherwise, the test shall be performed on a 3'-0" x 7'-0" nominal size door. A detailed description of the construction of the door and the applicable processes such as welding, bonding, etc., used for attaching components, shall be recorded in the test report, Swing Test Form 1, under the "remarks" section.

4.2 Frames

Unless specified otherwise, the test shall be performed on a 3'-0" x 7'-0" nominal size frame having a 5 ¾" jamb depth. A detailed description of the door frame and the applicable processes such as welding, bonding, etc. used for attaching components, shall be recorded in the report, Swing Test Form 2. under the "remarks" section.





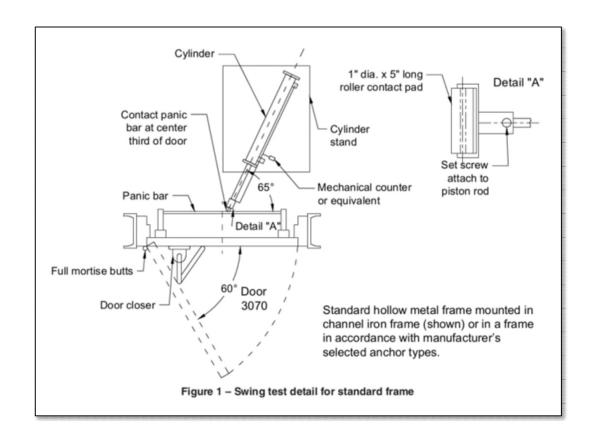
A250.4 Overview - Swing Test

Purpose:

- Full-sized operable door to simulate actual applications
- Evaluate door panel degradation

Cycles:

- Level "A" = 1,000,000 cycles
- Level "B" = 500,000 cycles
- Level "C" = 250,000 cycles



Refer to ANSI A250.8 for guidance in selecting the correct cycle levels in relationship to opening use, application and abuse.



A250.4 Overview - Twist Test

Purpose:

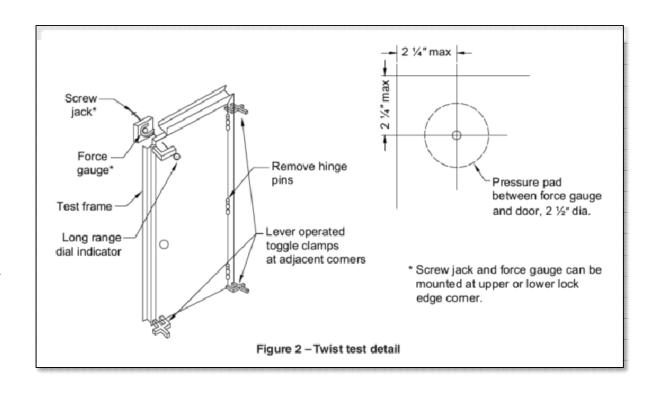
- Simulate abuse
- Evaluate door panel degradation

Conducted at:

- 25,000 cycle intervals for the first
- 100,000 cycles and at 50,000 cycle intervals for the balance of the test

Load pressure:

- Loads in 30 lb. increments
- Max 300 lb. load applied
- Reduce load in 30 lb. increments





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