

**Accelerated  
Physical Endurance  
Test Procedure  
for Steel Doors, Frames  
and Frame Anchors**



# Accelerated Physical Endurance Test Procedure for Steel Doors, Frames and Frame Anchors

## 1 Purpose

The purpose of this test procedure is to provide a manufacturer with a method of quickly testing the performance of doors.

This test procedure will provide performance data on an accelerated basis and is not intended to simulate field operating conditions. The test procedure will subject the product tested to more severe, out-of-the-ordinary conditions than those experienced in normal field operation.

## 2 Apparatus and Equipment

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, allowing the testing of various door sizes.

The cycling mechanism shall be positioned so that the connecting arm is perpendicular to the stop face of the door. It shall have a threaded swivel connector that is attached to the door through either the lock cut-out or by means of a bracket mounted directly to the door face. The cycling mechanism shall have a 4" (inch) operating stroke so that the door lock edge will be opened approximately 4" (inches) from the frame stop and then returned to its original position. The minimum cycle rate shall be one cycle per second. A mechanical counter or equivalent shall be used to record the cycles.

## 3 Preparation for Test

The door shall be hung in the frame on hinges that conform to the most current edition of ANSI A156.7, "Template Hinge Dimensions". The hinges and their location shall be noted on Form 1 of the report.

Care shall be taken to ensure the hinges are properly applied to the door and frame, and any hinge fillers are in place. The initial clearances between the door and frame shall be recorded as part of the performance test report.

Silencers shall be installed on the frame, and the stop face of the door shall contact them.

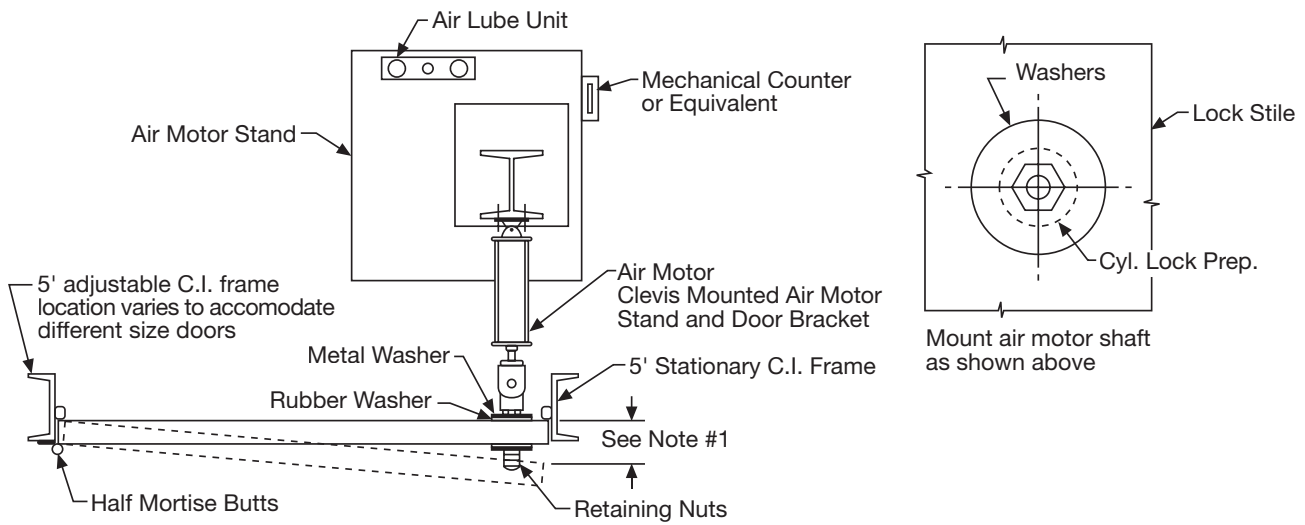
## 4 Test Specimen

The test shall be performed on a 3'0" wide x 7'0" high nominal size door; although, other sizes can be evaluated at the discretion of the sponsor. Production doors shall be used, except when this procedure is used in experimental work.

A detailed description of the door construction shall be recorded as part of the test report. This information shall cover all components as well as applicable processes (such as welding, bonding, etc.) used for attaching and connecting components.

## 5 Cycle Test

The duration of the test shall be 250,000 cycles for Level C; 500,000 cycles for Level B; 1,000,000 cycles for Level A; or longer, if specified by the test sponsor. A general inspection of the door shall be made at 25,000 cycle intervals for the first 100,000 cycles and at 50,000 cycles thereafter until the completion of the required number of cycles. The general inspection shall cover all components readily accessible, such as face skins, exposed hinge and/or lock edges, head and sill closures, flush-closing channels, hinge reinforcements, etc. Additionally, the inspection shall cover the integrity and reliability of processes, such as welding, bonding, staking, mechanical interlocking, etc., used to connect the various door components.



**NOTES:**

- 1 Door should open approximately 4"
- 2 Cycle Rate — minimum one cycle per second
- 3 Door to contact mute

**Figure 1 – Slam Test Detail**

Successfully tested Level B and A doors shall be deemed to have passed the Level C cycling criteria. The results shall be recorded on a standard performance report "Door Test Form 1."

When an independent third party organization is employed to certify the overall performance of the door design, they shall validate the initial, mid-point, and final observations.

**6 Twist Test**

Any deterioration of the door construction as a result of the cycle testing shall be determined through a series of twist tests. These tests shall occur prior to the onset of the cycle test and at the end of the cycle test.

During the twist test, the hinge pins shall be removed and the door moved to the twist test fixture (if a separate fixture is used) and clamped in place as shown in Figure 2.

If the same fixture is used for both the cycle test and twist test, the hinge pins shall be re-

moved and the door clamped in place as shown in Figure 2.

Pressures in 30-pound increments shall be applied at the upper lock corner through the screw jack, or equivalent device, and force gage in an area as described in Figure 2. The deflection noted on the dial indicator shall be plotted against the load applied to the corner. A maximum 300 pounds pressure shall be applied. The pressure shall then be reduced in 30-pound increments and the deflection recorded on the report form. A smooth curve drawn through the points shall graphically demonstrate the reaction of the door. Use "Performance Report – Door Test Form 2" to graphically represent the deflections.

Measurements for deflections shall be taken one minute or less after the force has been stabilized.

At the completion of each twist test, and prior to the continuance of the cycle test, the hinges shall be inspected and lubricated or replaced, if necessary.

## 7 Acceptance Criteria

**7.1** Doors shall not show any visible signs of metal fatigue cracking, or deformation on the edges or the door face.

**7.2** Doors of either laminated or welded construction shall not delaminate or have weld breakage in excess of 10% of total bonded or welded surface.

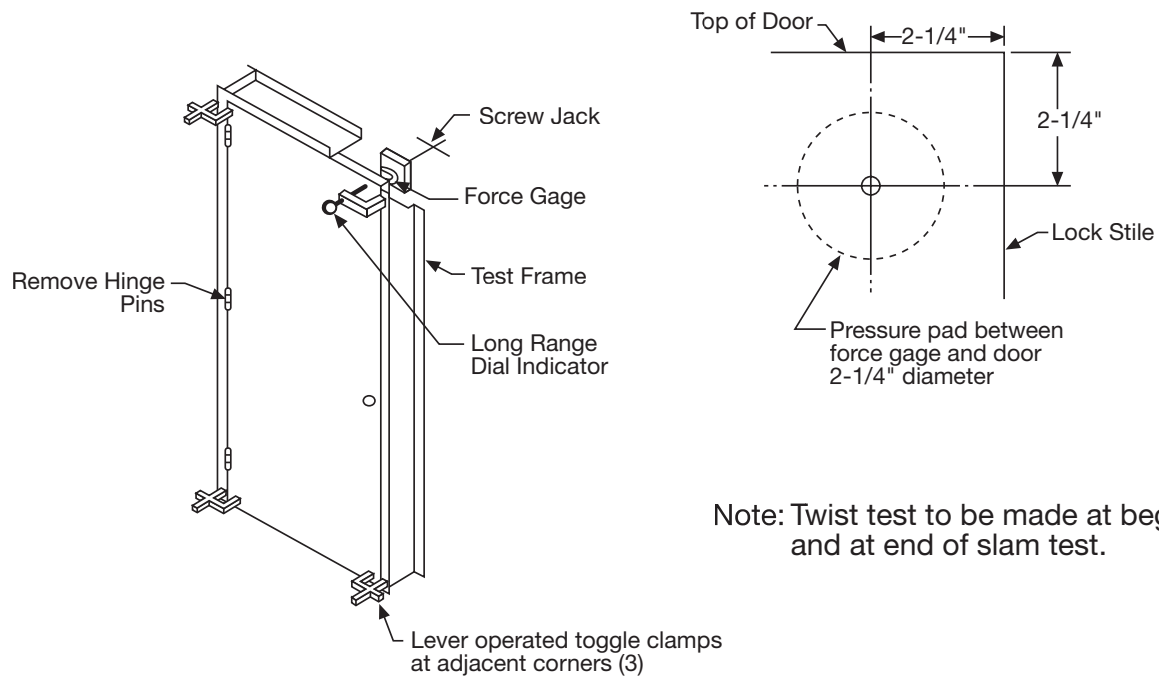
**7.3** Top, bottom, or edge channels must remain securely in place, with no signs of weld or bond breakage.

**7.4** Doors of stile and panel or stile and rail construction shall not be misaligned.

**7.5** Where visible seams are inherent in the door design, no opening or spreading shall occur.

**7.6** As a result of the twist test, the maximum deflection shall not exceed 2-½" when loaded to 300 lb for Level C doors. For Level B and A doors, the maximum deflection shall not exceed 1-¼" when loaded to 300 lb.

**7.7** Permanent deflection measured within 5-minutes after the force is removed shall not exceed ⅛".



Note: Twist test to be made at beginning and at end of slam test.

**Figure 2 – Twist Test Detail**

**Performance Report – Cycle Test Form No. 1**

Door Manufacturer: \_\_\_\_\_ Door Model: \_\_\_\_\_ Hinge Manufacturer: \_\_\_\_\_  
 Weight of Door: \_\_\_\_\_ Door Size: \_\_\_\_\_ Hinge Model: \_\_\_\_\_  
 Test No.: \_\_\_\_\_ Start Test Date: \_\_\_\_\_ Finish Test Date: \_\_\_\_\_

		Inspection Intervals – (000)																						
		25	50	75	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	
Edge Condition	Top																							
	Intermediate																							
	Bottom																							
Top Closer Condition																								
Bottom Closer Condition																								
Condition of Core																								
Condition of Panels																								

"S" indicates satisfactory performance. Use footnotes under remarks for any further explanations.

Remarks: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### Performance Report – Twist Test Form No. 2

Test No: \_\_\_\_\_ Date: \_\_\_\_\_  
Door Manufacturer: \_\_\_\_\_ Door Model: \_\_\_\_\_  
Door Size: \_\_\_\_\_ Weight of Door: \_\_\_\_\_

