This is a re-print of tests performed by Underwriters Laboratories, File Number CR316, Report Number 87T530. The original signed reports are maintained on file with Technical Services, Ajax. Copies are available on request.

This report describes a Cycle and Twist Test conducted in accordance with ANSI A151.1-1980, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Door and Hardware Reinforcings.

CONSTRUCTION DETAILS

The test assembly consisted of a single swing hollow metal (honeycomb) door constructed in accordance with Label Service Procedure CR316, Fire Door Frame, labelled fire exit hardware and door closer. The assembly was installed in the cycle apparatus frame.

Door
The door was a hollow metal (honeycomb) type designed for a 4’0” x 7’0” (1220 x 2134mm) opening.

Hardware
The door was provided with three (3) 4½” x 4” x .134” thick (114.7 x 101.6 x 3.4) full mortise hinges. They were secured to the door and frame with machine screws.

Exit Device
The door was equipped with a labelled fire exit device (crossbar type) manufactured by Sargent and Company. The crossbar was reinforced.

Door Closer
The door closer was Rixon-Firemark Model Number 6, listed. The closer was providing a closing force enough to engage the exit device latch bolt into the frame strike.

INSTALLATION

The door was installed in such a way that the center of gravity of the door was 18” (457mm) from the pivot center of the door. The exit device was installed in accordance with the manufacturer's installation instructions in such a way that it was mounted on the door at 65º to the plane of the door. The door closer was installed in accordance with the manufacturer's installation instructions. The door was arranged to open approximately 90º, whereupon the closer returned the door to the closed position by the power of the door closer.

TEST RECORD

Swing Test

Method
The assembly was installed as described above and operated through 1,000,000 cycles of operation. A general inspection of the door was made at 25,000 cycle intervals for the first 100,000 cycles and at 50,000 cycles intervals thereafter.

Results
The door operated freely throughout the 1,000,000 cycles. The door was fully operable with no visible indication of metal fatigue, cracking or deformation, the seams showed no evidence of the seam opening or spreading, the bottom and top channels and hardware reinforcements remained securely in place.
Twist Test

Method

The hinges were removed from the door frame and the door clamped in place by means of toggle clamps at three (3) corners. A force of 30 pounds (133.5 N) increments, up to 300 pounds (1335 N) was applied at the upper lock corner through a screw jack via a pressure pad 2.5 inches (63.5mm) in diameter. The deflection was noted and plotted against the force application to the corner. At the completion of each twist test, the hinges were reattached and the cycle test continued.

The twist test was conducted before the cycling test began, and at 25,000 cycle intervals for the first 100,000 cycles and at 50,000 cycle intervals thereafter.

Results

As a result of the test, the maximum deflection did not exceed ¼ inch (6.35mm) per 30 pounds (133.5 N) of force and the total deflection with 300 pounds (1335 N) of force did not exceed 2.5 inches (63.5mm).

The permanent deflection for the door did not exceed 1/8 inch (3.18mm) when the force was removed.

After Test Examination

Method

After completion of the swing and twist test the door was removed from the test apparatus and cut open into four (4) equal sections and the internal constructions of the door was inspected.

Results

The inspection showed that honeycomb core was laminated to the face sheets with no signs of delamination and all hardware and exit device reinforcements were securely attached to the door.

CONCLUSIONS

It is judged that the design and construction of the hollow metal (honeycomb) type door covered by this report comply with the requirements of ANSI A151.1-1980, American National Standard Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings for Level “A” doors.

Originally Signed by: Simon Fridlyand, P. Eng
Project Engineer
Construction Materials

Originally Reviewed by: John Roberts, P. Eng.
Managing Engineer
Construction Materials