

HURRICANE ENGINEERING & TESTING INC.

Computer Controlled Product Testing & Design,
.....Wind Load Analysis

Large Missile Impact Test

November 29th, 2001.

REPORT NUMBER: **HETI-01-1112**

MANUFACTURER: Wayne-Dalton Door Systems Division.
2589 Country Road 168, Dundee, OH 44624

TEST LOCATION: Hurricane Engineering & Testing Inc.
8532 NW 64 Street Miami, FL 33166

SBCCI LISTING No.: TL - 9596A

LAB. CERTIFICATION NUMBER: 01-0417.03 (MIAMI-DADE COUNTY, FLORIDA)

PRODUCT: **Rolling Door**

MODEL: DS-350

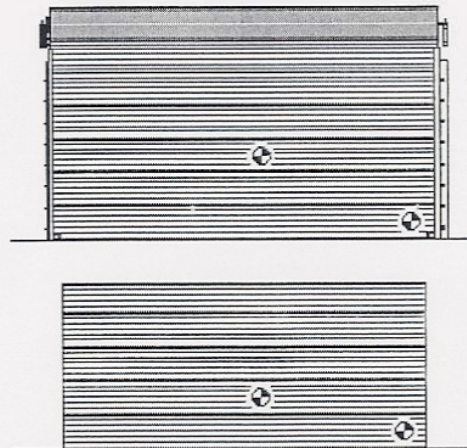
PRODUCT DESCRIPTION: 0.018" thick steel
(Tensile Test Report No. HETI-01-T110)

PRODUCT SIZE: 144" w x 96"h (size of opening)

DRAWING NUMBERS: 701-0545-2, 701-0546-2 and 701-0547-2 by Wayne-Dalton
Rolling Door Division. Dated 12-10-01.

NOTE: *HETI stamped drawing is an integral part of this report.*

TEST WITNESSED BY: (full or partial)
Syed Waqar Ali, Ph. D. (HETI)
Mr. Leonardo D. Savini, E.I. (HETI)
Mr. Eddy Philippe (HETI)



Typical impact locations of all samples, top, outrolled; bottom, inrolled. Not to scale.

Construction Details

**PRODUCT
MODEL**

Rolling Door
DS-350

PRODUCT SIZE(S)

150 3/4" w x 110 3/8" (excluding roll).
144" w x 96" h (size of opening).

SPECIAL NOTE

The panels were located @ 19" O.C. vertically and joined with a continuous horizontal seam that consisted of a 1/4" to 3/8" fold in the top and bottom of every panel.

TABLE OF COMPONENTS

COMPONENT	QUANTITY PER SAMPLE	SIZE	FASTENING PER COMPONENT
(5/16" BOLT & FLANGE NUT)	SEE COMPONENT	5/16"-18 X 5/8" TRUSS HEAD	---
PANELS	EIGHT	19.38" H X 148" X 0.63" D X 26 GA	SEE END WIND LOCKS AND SPECIAL NOTE
WIND LOCKS	THREE PER SECTION END @ 6 1/2" O.C.	2.20" X 1.30" X 1.1" X 0.33" TO 0.21" THICKNESS	TWO 1/8" X 0.42" STEEL RIVETS
ALUMINUM BOTTOM ANGLE CONNECTOR	ONE	2.94" H X 0.62" W X 148" X 0.066"	CONNECTED TO BOTTOM SEAM DESCRIBED IN SPECIAL NOTE
BOTTOM ANGLE	ONE	2" X 2" X 144" X 12 GA	SEE LOCK AND HANDLE
TRACK	TWO	2.44" W X 1.41" D X 100 3/8" H X 13 GA. ONE SIDE 1" DOUBLED	(8) (5/16" BOLT & FLANGE NUT) @ 12" O.C. START 6" FROM BOTTOM CONNECTED TO TRACK ADAPTER ANGLE.
TRACK ADAPTER ANGLE	TWO	2 3/4" X 2 3/4" X 95" H x 8 GA	SEE INSTALLATION

All steel components unless specified otherwise.

HARDWARE

Locks

(2) consisted of a pair of 1/4"-20 x 1" MS (machine screw) @ 2 5/8" O.C. and 3" from the ends of the bottom angle connector. The MS were installed through the bottom angle and the bottom angle connector. Each MS was secured with one nut without washer. Then a 1 1/4" wide x 12 GA x 9" long (2.17" throw with a 1/2" h x 5.3" hole) was placed encompassing the MS and nuts pair. Finally, one 0.88" washer was passed through each MS and secured with a flange nut.

Handle

(1) consisted of a pair of 1/4"-20 x 5/8" carriage bolts. Located at midspan of bottom angle. The carriage bolts were inserted through the bottom angle, the bottom angle adapter and the handle. Then, one flange nut per bolt was installed.

Counterbalance

The door was mounted with a wound spring mechanism.

INSTALLATION

JAMB SUBSTRATUM

One Side 3/16" thick steel and one side grout filled masonry blocks.

Connection	Fastener Type	Quantity	Spacing
track adapter angle - masonry substratum	3/8" x 5" Kingpin Wedge Anchor	8 per angle	12" O.C. starting 6" from bottom
track adapter angle - steel substratum	5/16"-12 x 1" Tek	8 per angle	12" O.C. starting 6" from bottom

The track angle was connected to the substratum prior to connecting it to the track.

The track adapter angle fasteners were located behind the track.

Test Results

Large Missile Impact Test Results

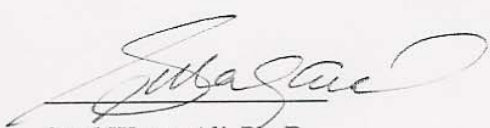
<i>Impact Location</i>	<i>Speed (feet per second)</i>	<i>Deflection max. (inches)</i>	<i>Permanent Set (inches)</i>
Sample I			
1) Center inrolled	50	7 7/8	2 3/8
2) Corner inrolled	50	4 1/2	3
3) Center outrolled	50	7 3/8	2 1/2
4) Corner outrolled	50	5 3/4	4 3/4
Sample II			
1) Center inrolled	50	7	2 1/2
2) Corner inrolled	50	5	3 1/2
3) Center outrolled	50	8 1/2	4
4) Corner outrolled	50	6 1/4	4 1/4
Sample III			
1) Center inrolled	50	7 1/2	2 1/2
2) Corner inrolled	50	5 3/4	4 3/4
3) Center outrolled	50	9	4 1/2
4) Corner outrolled	50	4 1/4	3 1/4

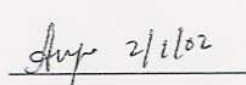
The samples were impacted with a #2 Southern Yellow Pine S4S, 2 x 4 missile, 9 lbs 96" long.

Conclusion

The system was tested in accordance with Miami-Dade County Protocols PA 201 with no deviations. The samples were structurally intact and operational and all parts were securely in place at the conclusion of each test.

NOTE: The above results were obtained using the designated test methods which indicates compliance with the performance requirements of the referenced specifications. This report does not constitute certification of the specimens tested.


Syed Waqar Ali, Ph. D.
President


Arshad Viqar, P.E.
Engineer of Record