

NATIONAL CERTIFIED TESTING LABORATORIES

8350 PARKLINE BLVD/SUITE 320 • ORLANDO, FL 32809
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ASTM E1996 COMPLIANCE STATEMENT

On July 5th, 2005, Storm Depot of America, Inc. completed impact testing at National Certified Testing Laboratories in Orlando, FL. All tests were performed in full accordance with ASTM E1886 and ASTM E1996 with no deviations.

Manufacturer: Storm Depot of America, Inc. dba Storm-Busters
Product Series: Storm-Busters' 15 CF Hurricane Storm Panels
Product Configuration Tested: Single Panel
Tested Size: 48" x 96" overall
Glazing Configuration: N/A

Level of Protection: Basic Protection
Wind Zone: Wind Zone 4 - Greater than 140 mph
Assembly Height above Ground: Less than or equal to 30 feet

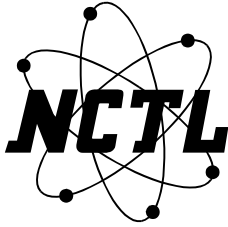
Impact Missile Used: Missile D
Positive Design Pressure: + 65 psf
Negative Design Pressure: - 65 psf

See NCTL Report 210-3163-1 for complete specimen description and test results.

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STRUCTURAL PERFORMANCE TEST REPORT

Report No.: NCTL-210-3163-1

Test Date: 07/06/05

Report Date: 07/07/05

Client: Storm Depot of America, Inc. dba Storm-Busters
720 N. Harbor City Blvd.
Melbourne, FL 32935

Test Specimen: Storm-Busters' 15 CF Hurricane Storm Panel
(48" x 96"- D/P Positive 65psf and Negative 65psf)

Test Method: ASTM E330-90, "Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference." ASTM E1886-02, "Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile and Exposed to Cyclic Pressure Differentials"; ASTM E1996-02, "Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes".

TEST SPECIMEN DESCRIPTION

General: The specimen tested was a hurricane storm panel which consisted of two (2) sheets of straight fluted corrugated polypropylene. The overall dimensions were 48" x 96" x 0.625" thick. Both layered sheets were heat sealed with 3m high strength 90 adhesive and sonically welded with 0.500" diameter spot welds at one hundred sixty-two (162) points evenly spaced; nine (9) rows horizontally and eighteen (18) rows vertically. The interior layer measured 0.200" thick with both outer walls as well as the interior fluted walls measuring 0.010" thick. The exterior layer measured 0.425" thick with the inner most wall measuring 0.035" thick, the exterior wall measured 0.030" thick, and the interior fluted walls measured 0.020" thick. Both layers, when adhered together, were cross fluted giving the overall panel added strength.

Installation: Each hurricane storm panel was installed into the test buck with twenty-four (24) 0.25"/20 x 3.50" Tapcon S.G. Anchors with one (1) 0.25" washer and one (1) washer/wing nut each; eight (8) on each jamb and four (4) at the head and sills. They were located 6" from each corner and 14" on center thereafter on the jambs and 12" on center thereafter at the head and sills.

Interior and Exterior Surface Finish: The interior and exterior surface finish was translucent white plastic.

TEST RESULTS

<u>Title of Test and Method</u>	<u>Measured</u>		<u>Allowed</u>	
	<u>Loc. #1</u>	<u>Loc. #2</u>	<u>Loc. #1</u>	<u>Loc. #2</u>
Uniform Load Structural - ASTM E330				
97.5 psf Exterior	0.002"	0.026"	0.056"	0.048"
97.5 psf Interior	0.005"	0.013"	0.056"	0.048"

Loc. # 1 - Center between Fasteners at the Head

Loc. # 2 - Center between Fasteners on the Jamb

Loc. # 1 - Maximum Allowable Permanent Set (0.004" x 14" length of span) = 0.056"

Loc. # 2 - Maximum Allowable Permanent Set (0.004" x 12" length of span) = 0.048"

Sampling: The sampling of the product(s) in this test report was accomplished by the client in accordance with the specification(s) the sample was tested to.

TEST PARAMETERS

The appropriate missile to be used for impact tests was selected in accordance with section 6 of ASTM E1996 based on the following criteria:

Level of Protection:	Basic Protection
Wind Zone:	Wind Zone 4 - greater than 140 mph
Assembly Height Above Ground Level:	Less than or equal to 30 feet

IMPACT TEST RESULTS

Large missile impact tests were conducted using a #2 Southern Yellow Pine 2 x 4 measuring 92" in length and weighing 9.25 lbs (Missile D) as shown in Table 2 of ASTM E 1996. Missile speeds and locations were in accordance with section 5.3 and Table 2 ASTM E1996. For pass/fail criteria, no penetration is defined as no tear longer than 5 inches in length and 1/16" wide or no opening through which a 3" diameter solid sphere can freely pass per section 7 of ASTM E 1996. All specimens were conditioned at 70° F ± 15° F prior to testing. Missile orientation at impact complies with section 11.2.2 of ASTM E1886.

Specimen # 1

<u>Impact No.</u>	<u>Impact Location</u>	<u>Missile Speed</u>	<u>Results</u>
1	Center of Panel	50 feet/sec 34 mph	No Penetration
2	Top Right Corner of Panel	50 feet/sec 34 mph	No Penetration

Specimen # 2

<u>Impact No.</u>	<u>Impact Location</u>	<u>Missile Speed</u>	<u>Results</u>
1	Bottom Left Corner of Panel	50 feet/sec 34 mph	No Penetration
2	Center of Panel	50 feet/sec 34 mph	No Penetration

Specimen # 3

<u>Impact No.</u>	<u>Impact Location</u>	<u>Missile Speed</u>	<u>Results</u>
1	Top Right Corner of Panel	50 feet/sec 34 mph	No Penetration
2	Center of Panel	50 feet/sec 34 mph	No Penetration

PRESSURE CYCLING TEST RESULTS

After completion of the impact tests, the specimens were pressure cycled in accordance with Table 1 of ASTM E1996. The duration of each air pressure cycle was between 1 and 5 seconds. Where required, two (2) mil plastic film was used to obtain cycle loads. The film did not affect the performance of the specimen or influence the results of the test. For pass/fail criteria, no opening is defined as no tear longer than 5 inches in length and 1/16" wide or no opening through which a 3" diameter solid sphere can freely pass per section 7 of ASTM E 1996.

Specimen # 1

<u>Positive Loading Range</u>	<u>Pressures</u>	<u>No. of Cycles</u>	<u>Results</u>
0.2 DP to 0.5 DP	13.0 psf to 32.5 psf	3500	Passed
0.0 DP to 0.6 DP	0.0 psf to 39.0 psf	300	Passed
0.5 DP to 0.8 DP	32.5 psf to 52.0 psf	600	Passed
0.3 DP to 1.0 DP	19.5 psf to 65.0 psf	100	Passed

<u>Negative Loading Range</u>	<u>Pressures</u>	<u>No. of Cycles</u>	<u>Results</u>
-0.3 DP to -1.0 DP	19.5 psf to 65.0 psf	50	Passed
-0.5 DP to -0.8 DP	32.5 psf to 52.0 psf	1050	Passed
-0.0 DP to -0.6 DP	0.0 psf to 39.0 psf	50	Passed
-0.2 DP to -0.5 DP	13.0 psf to 32.5 psf	3350	Passed

Specimen # 2

<u>Positive Loading Range</u>	<u>Pressures</u>	<u>No. of Cycles</u>	<u>Results</u>
0.2 DP to 0.5 DP	13.0 psf to 32.5 psf	3500	Passed
0.0 DP to 0.6 DP	0.0 psf to 39.0 psf	300	Passed
0.5 DP to 0.8 DP	32.5 psf to 52.0 psf	600	Passed
0.3 DP to 1.0 DP	19.5 psf to 65.0 psf	100	Passed

<u>Negative Loading Range</u>	<u>Pressures</u>	<u>No. of Cycles</u>	<u>Results</u>
-0.3 DP to -1.0 DP	19.5 psf to 65.0 psf	50	Passed
-0.5 DP to -0.8 DP	32.5 psf to 52.0 psf	1050	Passed
-0.0 DP to -0.6 DP	0.0 psf to 39.0 psf	50	Passed
-0.2 DP to -0.5 DP	13.0 psf to 32.5 psf	3350	Passed

Specimen #3

<u>Positive Loading Range</u>	<u>Pressures</u>	<u>No. of Cycles</u>	<u>Results</u>
0.2 DP to 0.5 DP	13.0 psf to 32.5 psf	3500	Passed
0.0 DP to 0.6 DP	0.0 psf to 39.0 psf	300	Passed
0.5 DP to 0.8 DP	32.5 psf to 52.0 psf	600	Passed
0.3 DP to 1.0 DP	19.5 psf to 65.0 psf	100	Passed

<u>Negative Loading Range</u>	<u>Pressures</u>	<u>No. of Cycles</u>	<u>Results</u>
-0.3 DP to -1.0 DP	19.5 psf to 65.0 psf	50	Passed
-0.5 DP to -0.8 DP	32.5 psf to 52.0 psf	1050	Passed
-0.0 DP to -0.6 DP	0.0 psf to 39.0 psf	50	Passed
-0.2 DP to -0.5 DP	13.0 psf to 32.5 psf	3350	Passed

Testing Observed by: Daniel Ocasio (NCTL)
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Rick Moffett (NCTL)
Christopher Bennett (NCTL)
Jim Munch (Storm Depot of America, Inc.)
Jim Moore (P.T.C.)

The listed results were secured by using the ASTM E1886 test method and indicate compliance with the performance requirements of ASTM E1996 for the listed test parameters at the following design pressures:

Positive Design Pressure: + 65.0 psf
Negative Design Pressure: - 65.0 psf

TEST COMPLETED 07/06/05

Detailed drawings were available for laboratory records and compared to the test specimens at the time of this report. A copy of this report along with representative sections of the test specimens will be retained by NCTL for a period of four (4) years. The results obtained apply only to the specimens tested. No conclusions of any kind regarding the adequacy or inadequacy of the glass in the test specimens may be drawn from this test. This report does not constitute certification of the product, which may only be granted by a certification program validator.

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