

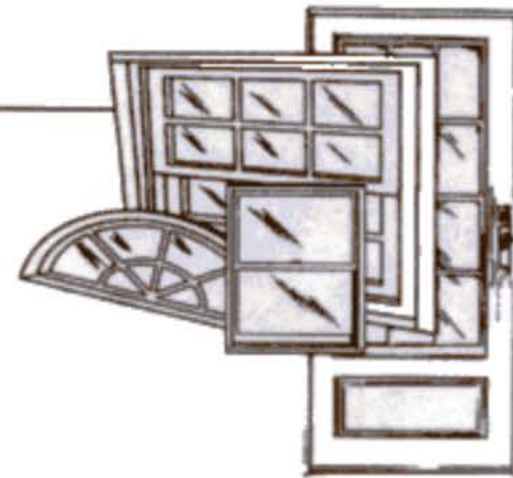
CERTIFIED TESTING LABORATORIES

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Report No.: CTLA-1539W
Report Date: June 27, 2006

Client: Tornado SafeRoom, Inc.
8325 Hwy. 96 East
Murfreesboro, TN 37130

STRUCTURAL PERFORMANCE TEST REPORT

Product Type and Series: Galvanized Steel Tornado SafeRoom® Two Person Room

Test Specifications: **ASTM E330-02:** "Test Method For Structural Performance Of Exterior Windows, Curtain Walls and Doors By Uniform Static Air Pressure Difference."

ASTM E 1886-02 "Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials."

ASTM E 1996-02 "Standard Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors, and Storm Shutters Impacted by Windborne Debris in Hurricanes."

Project Scope: Mr. Floyd Arnold contacted Certified Testing Laboratories (CTL) with regards to conducting testing on one (1) Tornado SafeRoom. The test method requested is described in the test specifications listed above.

**Test Specimen
Fabrication:**

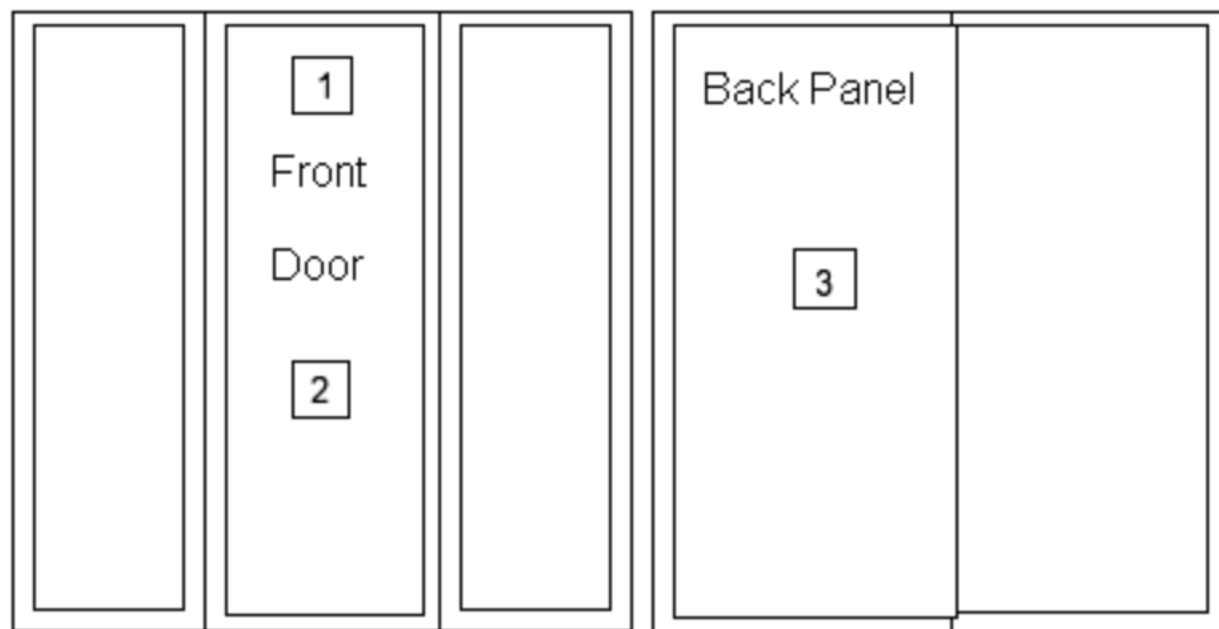
The Tornado SaferRoom was fully assembled at Certified Testing Lab. facility by the client. The specimen was secured at the base and tested on a solid concrete foundation with ½" x 4" Ram-set Red Head LDT anchor bolts.

**Additional
Description:**

The Tornado SafeRoom side plates, back plates, front plates and door were constructed of 10 gauge galvanized steel. The roof plate was constructed of ¼" thick black carbon steel. Each plate was bolted together with 1 ¼" x ½" hexagon bolts, and nylox nuts to 2.500" x 2.500" x ¼" mounting angles. The door was mounted to the Tornado Safe room with two (2) galvanized steel custom pin hinges. The Tornado Safe room measured 60" wide x 55" high x 30" deep. One (1) operable hinged door measured 30" wide x 54" high. Two (2) galvanized steel angles were secured to the exterior face of the door. Each angle measured ¼" thick x 31" long and was located at 5.000" center line from top and bottom of door. Three (3) ½" x 20" long galvanized steel rods were utilized to latch door. Reference drawing # CTL-001 thru 007 figures 1-8 dated 6/27/06 signed and sealed by this laboratory.

PERFORMANCE TEST RESULTS

Measurement locations



Test Sequence: ASTM E330-02 Deflection Gauge Set at boxes 1, 2, and 3

1. $\frac{1}{2}$ Test Pressure Positive
2. $\frac{1}{2}$ Test Pressure Negative
3. Test Pressure Positive
4. Test Pressure Negative

Deflection / Permanent Set was measured with Three (3) Dynavision Laser indicators SN-S1002145, SN-S1002142, and SN-S1002143

Measurements were taken at:

- Location 1 Center mid-span of the front door 2.00" from the top
- Location 2 Center mid-span of the front door
- Location 3 Center mid-span of back panel

ASTM E330-02

Uniform structural load was conducted to ASTM E330-02 with no deviations to test method. Unit was tested to a Design Pressure of +/-385.0psf

Range of test	time	load	<u>Perm. set</u>	<u>Allowable</u>	
Positive loads	(seconds)	psf			
½ test load	30	385.0			
Test load	30	577.5	location 1	0.112"	N/A
			location 2	0.101"	N/A
			location 3	0.057"	N/A
			<u>Perm. set</u>	<u>Allowable</u>	
Range of test	time	load			
Negative loads	(seconds)	psf			
½ test load	30	385.0			
Test load	30	577.5	location 1	0.010"	N/A
			location 2	0.012"	N/A
			location 3	0.002"	N/A

PERFORMANCE TEST RESULTS-Large Missile Test

Specimen 1: ASTM E 1996-02 (Only one specimen tested)

Specimens were tested to **ASTM E 1886-02 and 1996-02** with no deviation to the test specifications. All specimens were tested to the Wind Zone 4 requirements stated in section 5 of **ASTM E 1996-02**. Missile level D. The missile orientation was perpendicular to the metal surface at impact. Each specimen was impacted with an 8' ft., 9 lb. #2 southern yellow pine 2" x 4" at the following locations.

Note:

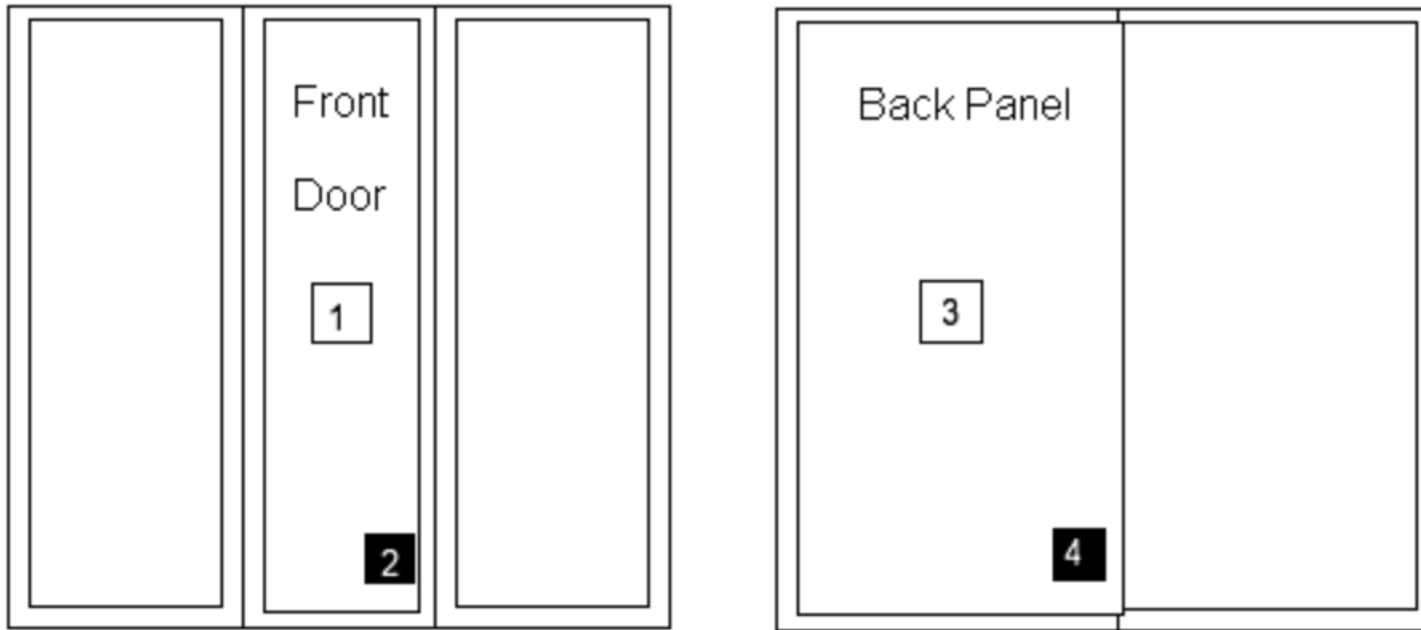
X- measurement from left edge of test specimen.

Y- measurement from top edge of test specimen.

Type and weight of missile: # 2 Southern Yellow Pine 2 x 4, Length approx. 96" & 9 lb.

Specimen 1	<u>Impact No.</u>	<u>Speed Ft/Sec.</u>	<u>Speed Mph</u>	<u>X Meas.</u>	<u>Y Meas.</u>
	1.	148.3	100.0	30.0"	27.0"
	2.	148.1	100.0	43.0"	46.0"
	3	148.3	100.0	14.0"	24.0"
	4	148.4	100.0	25.0"	48.0"

None of the impacts penetrated the specimen and the Tornado SafeRoom door remained operable.



Note: At the conclusion of this test there were no signs of damage.

PERFORMANCE TEST RESULTS- Cyclic Static Air Pressure Loading

Specimen 1: ASTM E 1886-02

Specimens were tested to **ASTM E 1886-02 and 1996-02** with no deviation to the test specifications. The specimen was tested to the requirements of section 5.4 table 1 in **ASTM E 1996-02**.

Note: (Only one specimen tested)

Positive loads (Design Pressure) +385.0 psf, - 385.0 psf

<u>Range of Test</u>	<u>Actual Load psf</u>		<u>Cycles/min.</u>	<u># of Cycles</u>
0.2 - 0.5	77.0	192.5	3500	55
0.0 - 0.6	0.00	231.0	300	55
0.5 - 0.8	193.0	308.0	600	55
0.3 - 1.0	116.0	385.0	100	55
4500 cycles				

Deflection taken center mid-span

Deflection

Set

.500"

.000"

Negative loads

<u>Range of Test</u>	<u>Actual Load psf</u>		<u># of Cycles</u>	<u>Cycles/min.</u>		
0.3 - 1.0	116.0	385.0	50	55		
	0.5 - 0.8		193.0	308.0	1050	55
	0.0 - 0.6		0.00	231.0	50	55
	0.2 - 0.5		77.0	192.5	3350	55
4500 cycles						

Deflection taken center mid-span

Deflection

Set

9000 cycles completed

.750"

.125"

Specimen showed no resultant failure after cycle test.

Remarks: At the conclusion of the test there was no damage to the Tornado SafeRoom and no visible signs of failure observed. All the locks were operable and the door opened and closed without any pressure being applied. The Tornado SafeRoom was tested to 450 miles per hour = Design Pressure of 385psf = 577.5 pounds per square foot positive and negative

Test Date: June 14, 2006 thru June 20, 2006

Remarks: Detailed drawings were available for laboratory records and comparison to the test specimen at the time of this report and will be retained by CTL for a period of four (4) years. The results obtained apply only to the specimen tested.

Certified Testing Laboratories certified that the Tornado SafeRoom model Two Person SafeRoom when manufactured to the specifications called out on the drawings signed and sealed by this laboratory, will meet the criteria established by this test report.

Certified Testing Laboratories assumes that all information provided by the client is accurate and that the physical and chemical properties of the components are as stated by the manufacturer.

Certified Testing Laboratories, Inc.

Client Present:

Floyd Arnold- Tornado SafeRoom, Inc.

Testing Performed & Witnessed by:

Ryan Blakely- Certified Testing Lab.
Ted Scanlon- Certified Testing Lab.
Kenny Stringer- Certified Testing Lab.
Michael Miller/ Senior Lab. Technician

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