

NATIONAL CERTIFIED TESTING LABORATORIES

1464 GEMINI BOULEVARD • ORLANDO, FLORIDA 32837
PHONE (407) 240-1356 • FAX (407) 240-8882

January 11, 2000

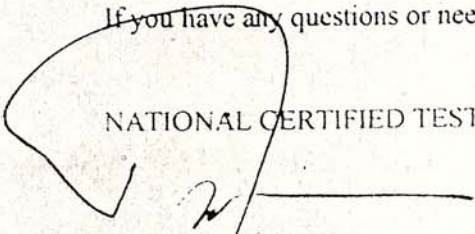
On January 11, 2000 testing was conducted on your Shutter Systems Inc.'s "Assembly 1" (0-145" thick) reinforced fiberglass impact resistant screen membrane structure. Your product was successfully tested in and exceeded The Dade County Building Code Compliance Office Protocols. PA 201-94, Impact Test Procedures. PA 202-94, Criteria for Testing Impact & Non Impact Resistant Building Envelope Components using Uniform Static Air Pressure. PA 203-94, Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

Your products successfully achieved an "Impact" design pressure rating of 60 psf positive and 55 psf negative.

An official detailed Florida registered professional engineer sealed test report will be forwarded to you immediately upon completion.

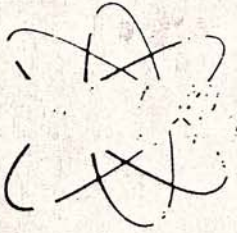
If you have any questions or need further information, you can reach me at your convenience.

NATIONAL CERTIFIED TESTING LABORATORIES, INC.



MICHAEL LANE
Division Manager

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Report No.: NCTL-210-2277-1,2,3 (S)(C)(I)(F) DC Not. No. N/A

Page 1 of 5
Date: 02-23-00

NCTL-Certification No.: 98-0430-01

Test Date: 01-11-00

Test Requested By:

Test Conducted - DCBCCD PA 201-94, PA 202-94 & PA 203-94.

Design Pressure - +60.0 psf (Positive) -55.0 psf (Negative)

(1) DESCRIPTION OF UNIT:

Model Designation - Assembly "I" Reinforced fiberglass impact resistant screen membrane structure.

Overall Size - 4'0-3/8" wide x 8'0-1/8" high.

Configuration - (XX)

No. & Size of Shuter Panels - Two (2) each shutter measured 2'0-1/6" wide by 6'0-3/8" high.

(2) MATERIAL CHARACTERISTICS:

Shutter Panel Material - Both active panels consisted of a combination of a wood main panel with a (0.145" thick) reinforced fiberglass screen membrane.

Frame Material - Wood frame substrate.

Shutter Panel Construction - Each panel was constructed from 11/16" thick laminated standard exterior wood shutter panels. 1" thick wood rails and stiles were glued channel fitted at the panel perimeter. A 0.145" thick reinforced fiberglass impact resistant screen membrane was fastened to the exterior perimeter using eighteen (18) (# 6 x 1") Hex head screws; 10" on center.

Hardware -

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
6" "T" hinge (specimen No. 1)	Four (4) total; two (2) per stile	15" from each end of each panel stile.
6" Hasp hinge (specimen No. 2)		
6" off set strap hinge specimen No.3)		
Flush mounted 25" long 3/4" galvanized pipe. Security lock (1/8" wall thickness)	Two (2)	25" from the top and bottom edge of both panels.
3/4" "U" clamp	Four (4)	Spaced 7" on center per panel at security lock positions.
3/16-1-1/2" carriage bolts	Eight (8)	Two (2) at each "U" clamp.

Additional Description - Each specimen was tested for Static Air, Forced Entry Test, Impact Test and Cyclic Test and installed in a wood test buck.

Installation - Each panel was directly fastened to the wood test buck substrate using only the hinges supplied for each specimen (see hardware) (# 8 x 1") flat head wood screws were used to fasten the hinge plate to the buck; four (4) per hinge.

STATIC AIR PRESSURE TESTS

Static tests were conducted in accordance with PA 202-94

Specimen No. 1

Design Load +60.0 psf, -55.0 psf.

<u>+ Positive Loads</u>	<u>time (sec.)</u>	<u>psf load</u>	<u>max deflection (panel)</u>	<u>perm set (panel)</u>	<u>% of recovery</u>
1/2 Test	30	45.0	N/A		
Design	30	60.0	0.450"		
Test	30	90.0	0.750"	0.050"	93.3%

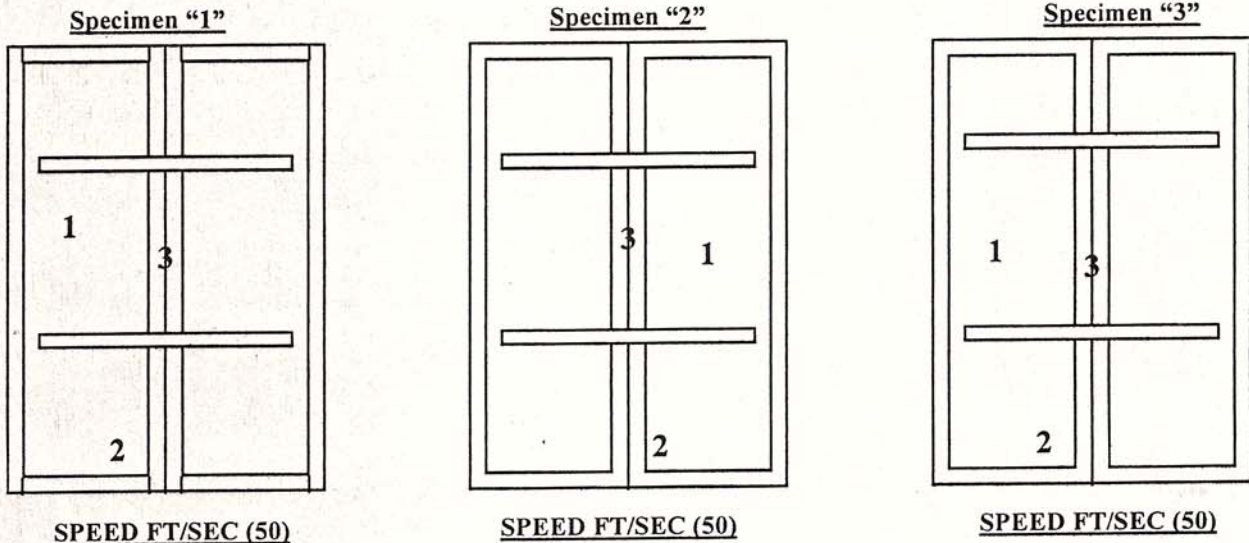
<u>- Negative Load</u>	<u>time (sec.)</u>	<u>psf load</u>	<u>max deflection (panel)</u>	<u>perm set (panel)</u>	<u>% of recovery</u>
1/2 Test	30	41.3	N/A		
Design	30	55.0	0.660"		
Test	30	82.5	1.250"	0.125"	90%

Max. allowable deflection (positive load = 2.000" / negative = L/30 = 2.412"

Max. allowable permanent set (0.4% of "L" = 0.289")

"L" = Length of panel

75 mph egress note: A 75 mph velocity (14.4 psf) positive and negative pressuer test was performed with only the lower security pipe engaged.



Type and weight of missile: # 2 Southern Yellow Pine 2 x 4 length approximately 89-5/16" & 9 lb.

Description of specimens after impact test

Specimen "1": the first impact was made in the center of the left operable panel. There was no penetration. The exterior skin did not crack, no openings. Inboard panel remained intact. All locks remained engaged. The second impact was made at the lower right corner of left panel. There was no penetration. Inboard panel remained intact. All locks remained engaged. The third impact was made at midspan where active panels meet in closed position. There was no penetration. The exterior skin did not crack, no openings all locks remained engaged.

Description of specimens after impact test

Specimen "2": the first impact was made in the center of the right operable panel. There was no penetration. The exterior skin did not crack, no openings. Inboard panels remained intact. All locks remained engaged. The second impact was made at lower left corner of right active panel. There was no penetration. Inboard panels remained intact. All locks remained engaged. The third impact was made at midspan where active panels meet in closed position. There was no penetration. The exterior skin did not crack, no openings all locks remained engaged.

Description of specimens after impact test

Specimen "3": the first impact was made in the center of the left operable panel. There was no penetration. The exterior skin did not crack, no openings. Inboard panel remained intact. All locks remained engaged. The second impact was made at the lower right corner of left panel. There was no penetration. Inboard panel remained intact. All locks remained engaged. The third impact was made at midspan where active panels meet in closed position. There was no penetration. The exterior skin did not crack, no openings all locks remained engaged.

FORCED ENTRY TEST

Forced Entry test was conducted in accordance with DCBCCD PA 202-94

Specimen No. 1

<u>Size</u>	<u>Time</u>	<u>Result</u>
4'0-3/8" wide x 6'0-1/8"	2 minutes	Passed

NOTE: Specimen No. 1 was operable before and after all tests.

FATIGUE LOADING TEST (Table 23F)

Fatigue loading was conducted in accordance with DCBCCD PA 203-94.

Specimen "1"

Design Loads +60.0 psf

Loads	30.0 psf	36.0 psf	78.0 psf				
Cycle #	0600	601-670	671				
			<u>Max. Defl.</u>	<u>Perm set</u>	<u>% Recovery</u>	<u>cycles/min.</u>	
			0.590"	0.040"	93.2%	60	

Design Loads -55.0 psf

Loads	27.5 psf	33.0 psf	71.5 psf				
Cycle #	0600	601-670	671				
			<u>Max. Defl.</u>	<u>Perm set</u>	<u>% Recovery</u>	<u>cycles/min.</u>	
			0.900"	0.051"	94.3%	60	

FATIGUE LOADING TEST (Table 23F)

Fatigue loading was conducted in accordance with DCBCCD PA 203-94.

Specimen "2"

Design Loads +60.0 psf

Loads	30.0 psf	36.0 psf	78.0 psf				
Cycle #	0600	601-670	671				
			<u>Max. Defl.</u>	<u>Perm set</u>	<u>% Recovery</u>	<u>cycles/min.</u>	
			0.600"	0.025"	95.8%	60	

Design Loads -55.0 psf

Loads	27.5 psf	33.0 psf	71.5 psf				
Cycle #	0600	601-670	671				
			<u>Max. Defl.</u>	<u>Perm set</u>	<u>% Recovery</u>	<u>cycles/min.</u>	
			0.890"	0.060"	93.2%	60	

FATIGUE LOADING TEST (Table 23F)

Fatigue loading was conducted in accordance with DCBCCD PA 203-94.

Specimen "3"

Design Loads +60.0 psf

Loads	30.0 psf	36.0 psf	78.0 psf				
Cycle #	0600	601-670	671				
			<u>Max. Defl.</u>	<u>Perm set</u>	<u>% Recovery</u>	<u>cycles/min.</u>	
			0.700"	0.028"	96.0%	60	

Design Loads -55.0 psf

Loads	27.5 psf	33.0 psf	71.5 psf				
Cycle #	0600	601-670	671				
			<u>Max. Defl.</u>	<u>Perm set</u>	<u>% Recovery</u>	<u>cycles/min.</u>	
			0.940"	0.071"	92.4%	60	

Note:

- 1) A 2 mil polyethylene film was used on the cycle tests and it is the opinion of the undersigned that they had no influence on the results of these tests.

Observers - Don Hartley (Shutter Systems Inc.)
Michael Lane (NCTL)
Neal Eubanks (NCTL)

NATIONAL CERTIFIED TESTING LABORATORIES, INC.

MICHAEL E. LANE, Division Manager

All Tests Certified and Witnessed By:

Barry Portnoy, P.E.
5767 Major Blvd.
Orlando, FL 32819
P.E. No. 16258

Disclaimer: This test report was prepared by National Certified Testing Laboratories, Inc. (NCTL), for the exclusive use of the above named client, it does not constitute certification of this product. The results are for that particular specimen tested and does not imply the quality of similar or identical products manufactured or installed from specifications identical to the tested product. NCTL is a testing lab and assumes that all information provided by the client is accurate and does not guarantee or warranty any product tested or installed.

