



NATIONAL CERTIFIED TESTING LABORATORIES

FIVE LEIGH DRIVE • YORK, PENNSYLVANIA 17406 • TELEPHONE (717) 846-1200
FAX (717) 767-4100
www.nctlinc.com

STRUCTURAL & IMPACT PERFORMANCE TEST REPORT

Report No: NCTL-110-11301-1
Test Date: 04/21/08
Report Date: 05/05/08
Expiration Date: 04/30/12
Revision Date: 05/12/08

Client: Bovard Studio Inc.
2281 Highway 34 East
Fairfield, IN 52556

Tests Conducted: Florida Building Code 2004 TAS 201-94, "Impact Test Procedures"; Florida Building Code 2004 TAS 202-94, "Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure." Florida Building Code 2004 TAS 203-94, "Criteria for Testing Products Subjected to Cyclic Pressure Loading."

Design Pressures:

Specimen 1	(TAS-202) Structural Only	"1850"	+ 75 psf. -75 psf.
Specimen 2	(TAS-201/203)	"1850"	+ 75 psf. -75 psf.
Specimen 3	(TAS-201/203)	"1850"	+ 75 psf. -75 psf.
Specimen 4	(TAS-201/203)	"1850"	+ 75 psf. -75 psf.

TEST SPECIMEN DESCRIPTION

Model Designation: Series "1850"

General: The test specimen was a twin fixed "shutter" aluminum prime window measuring 100-1/4" wide by 97-1/2" high overall. The fixed lites were glazed to the frame members, providing a viewing area of 45-5/16" wide by 93-3/16" high. An extruded aluminum angle measuring 2-1/4" x 2-1/4" x 3/16" was fastened to the buck and frame with evenly spaced #10 x 2" self tapping screws at the exterior frame perimeter. One (1) steel 2-3/4" x 1" mullion bar was fastened to the buck with four (4) screws and a metal mounting bracket. The fixed lites were fastened to the mullion with two (2) screws on 12" centers. The frame was of butt-type corner construction. Frame members were not thermally broken.

Glazing: The fixed lites were interior exterior glazed using 3/8" laminated glass a silicone back-bedding, an exterior glazing gasket, and a snap-in extruded aluminum glazing bead. The laminated glass consisted of two (2) lites of 3/16" heat strengthened glass separated by a Dupont "Sentry Glass Plus" 0.090" thick interlayer. The glazing bead was secured to the frame using #10 x 2" self tapping screws on approximately 12" centers.

Weatherseals: No weatherseals employed.

5/15/08

Weeps: Six (6) vent holes measuring 7/16" x 3-1/4" were evenly spaced at the interior and exterior jamb faces.

Interior & Exterior Surface Finish: White painted aluminum.

Sealant: The frame corners were sealed with a silicone sealant. The exterior glazing perimeter was sealed with a silicone sealant.

Installation: The test specimen was installed into a 2" x 12" standard grade lumber test buck. The specimen was fastened to the buck via #10 x 2" self tapping screws located on approximately 12" centers through the aluminum angle, frame and glazing bead. The exterior perimeter was sealed with a silicone sealant.

STATIC AIR PRESSURE TESTS

Static Tests were conducted per ASTM E330 in accordance with TAS/PA 202-94 – load durations of 30 seconds (Para. 5.2.3).

Specimen 1

Design Load + 75.0 psf, -75.0 psf.

Positive Loads

Range of Test	Actual Load	Deflection	Perm. Set
Half Test Load	+ 56.20 psf	N/A	N/A
Design Load	+ 75.00 psf	0.396"	0.004"
Test Load	+ 112.50 psf	0.571"	0.003"

Negative Loads

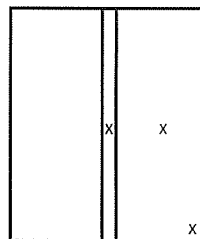
Half Test Load	- 56.25 psf	N/A	N/A
Design Load	- 75.00 psf	0.378"	0.004"
Test Load	- 112.50 psf	0.574"	0.001"

Results: Upon completion of Static Air Pressure testing, there was no permanent deformation of the test specimens.

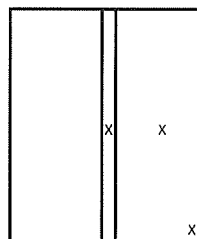
LARGE MISSILE IMPACT TEST

Impact tests were conducted in accordance with TAS 201-94/ PA 201-94.

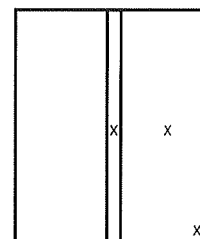
Type and weight of missile: #2 Southern Yellow Pine 2x4, Length 102" & 9 lbs.



Specimen 2



Specimen 3



Specimen 4

Note: All impacts rejected the missile impacts without allowing penetration.

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CYCLE TEST

Cycle tests were conducted in accordance with TAS/ PA 203-94 – with continuous cycle durations of 1 to 3 seconds.

Specimen 2

Design Pressure +75.0/ -75.0

Positive Loads

Range of Test	Actual	# of Cycles	Result
+0.2 to +0.5 DP	15.0 psf to 37.5 psf	3,500	Passed
+0.0 to +0.6 DP	00.0 psf to 45.0 psf	300	Passed
+0.5 to +0.8 DP	37.5 psf to 60.0 psf	600	Passed
+0.3 to +1.0 DP	22.5 psf to 75.0 psf	100	Passed

Negative Loads

Range of Test	Actual	# of Cycles	Result
-0.3 to -1.0 DP	22.5 psf to 75.0 psf	50	Passed
-0.5 to -0.8 DP	37.5 psf to 60.0 psf	1,050	Passed
-0.0 to -0.6 DP	00.0 psf to 45.0 psf	50	Passed
-0.2 to -0.5 DP	15.0 psf to 37.5 psf	3,350	Passed

Specimen 3

Design Pressure +75.0/ -75.0

Positive Loads

Range of Test	Actual	# of Cycles	Result
+0.2 to +0.5 DP	15.0 psf to 37.5 psf	3,500	Passed
+0.0 to +0.6 DP	00.0 psf to 45.0 psf	300	Passed
+0.5 to +0.8 DP	37.5 psf to 60.0 psf	600	Passed
+0.3 to +1.0 DP	22.5 psf to 75.0 psf	100	Passed

Design Pressure +75.0/ -75.0

Negative Loads

Range of Test	Actual	# of Cycles	Result
-0.3 to -1.0 DP	22.5 psf to 75.0 psf	50	Passed
-0.5 to -0.8 DP	37.5 psf to 60.0 psf	1,050	Passed
-0.0 to -0.6 DP	00.0 psf to 45.0 psf	50	Passed
-0.2 to -0.5 DP	15.0 psf to 37.5 psf	3,350	Passed

Specimen 4

Design Pressure +75.0/ -75.0

Positive Loads

Range of Test	Actual	# of Cycles	Result
+0.2 to +0.5 DP	15.0 psf to 37.5 psf	3,500	Passed
+0.0 to +0.6 DP	00.0 psf to 45.0 psf	300	Passed
+0.5 to +0.8 DP	37.5 psf to 60.0 psf	600	Passed
+0.3 to +1.0 DP	22.5 psf to 75.0 psf	100	Passed

Negative Loads

Range of Test	Actual	# of Cycles	Result
-0.3 to -1.0 DP	22.5 psf to 75.0 psf	50	Passed
-0.5 to -0.8 DP	37.5 psf to 60.0 psf	1,050	Passed
-0.0 to -0.6 DP	00.0 psf to 45.0 psf	50	Passed
-0.2 to -0.5 DP	15.0 psf to 37.5 psf	3,350	Passed

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Results: No resultant failure, distress or permanent deformation with a recovery of at least 90% over maximum deflection.


Where required, plastic film (2-mil) was used to seal against air leakage. The film did not affect the performance of the specimens or influence the results of the tests. All tests were conducted in accordance with the TAS 201, TAS 202 and TAS 203 test methods. Upon completion of all testing, the specimens meet the requirements of Sections 1606, 1620 and 1626 of the "Florida Building Code, Building" and the TAS 201, 202 and 203 protocols.

This test report was prepared by National Certified Testing Laboratory (NCTL), for the exclusive use of the above named client and 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.


Detailed drawings were available for laboratory records and compared to the test specimen at the time of this report. A list of the component drawings reviewed for product verification is included as an appendix to this report. A copy of this report along with representative sections of the test specimen will be retained by NCTL. This report does not constitute certification or approval of the product, which may only be granted by a certification program validator or recognized approval entity. All tests were conducted in compliance with the referenced specifications. This report may not be reproduced, except in full, without the written consent of NCTL.

NATIONAL CERTIFIED TESTING LABORATORIES


JUSTIN L. BUPP
Technician


ROBERT H. ZEIDERS, P.E.
Vice-President Engineering & Quality

JLB/akl



5/15/08

APPENDIX A

List of Component Drawings Reviewed for Product Verification

(Ref: NCTL-110-11301-1)

*See Attached Bill of Materials
Any deviations are noted.*

Note: The above referenced component drawings along with representative sections of the test specimen will be retained per internal procedure by NCTL.

John E. Duff

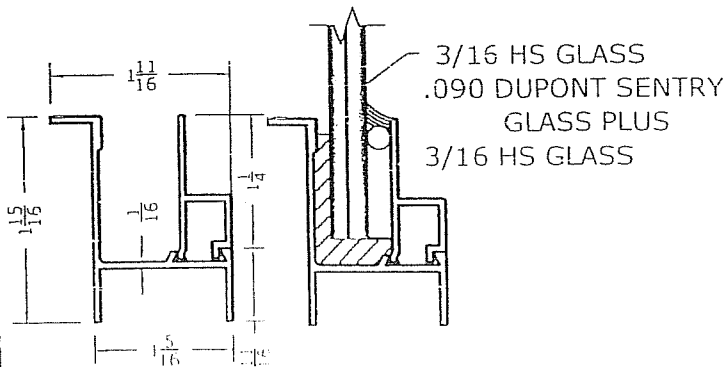
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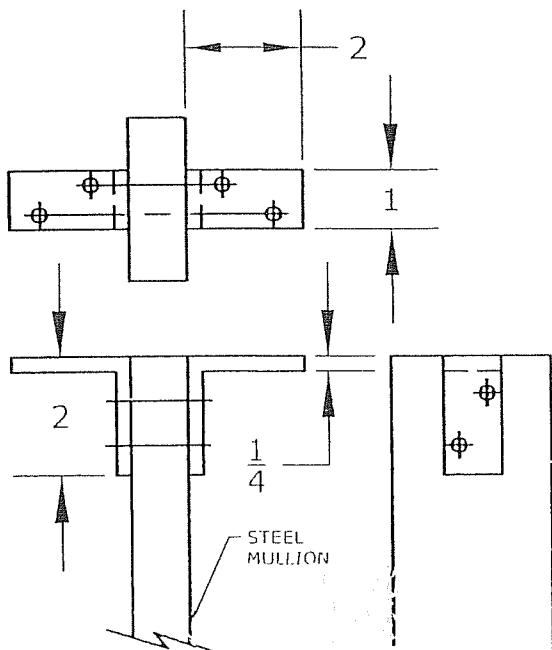
Bovard Studio Inc.
 2281 Hwy. 34 E.; Fairfield, IA 52556
 Phone: (641) 472-2824; Fax: (641) 472-0974

1770 SERIES
 LAMINATED HURRICANE MODEL

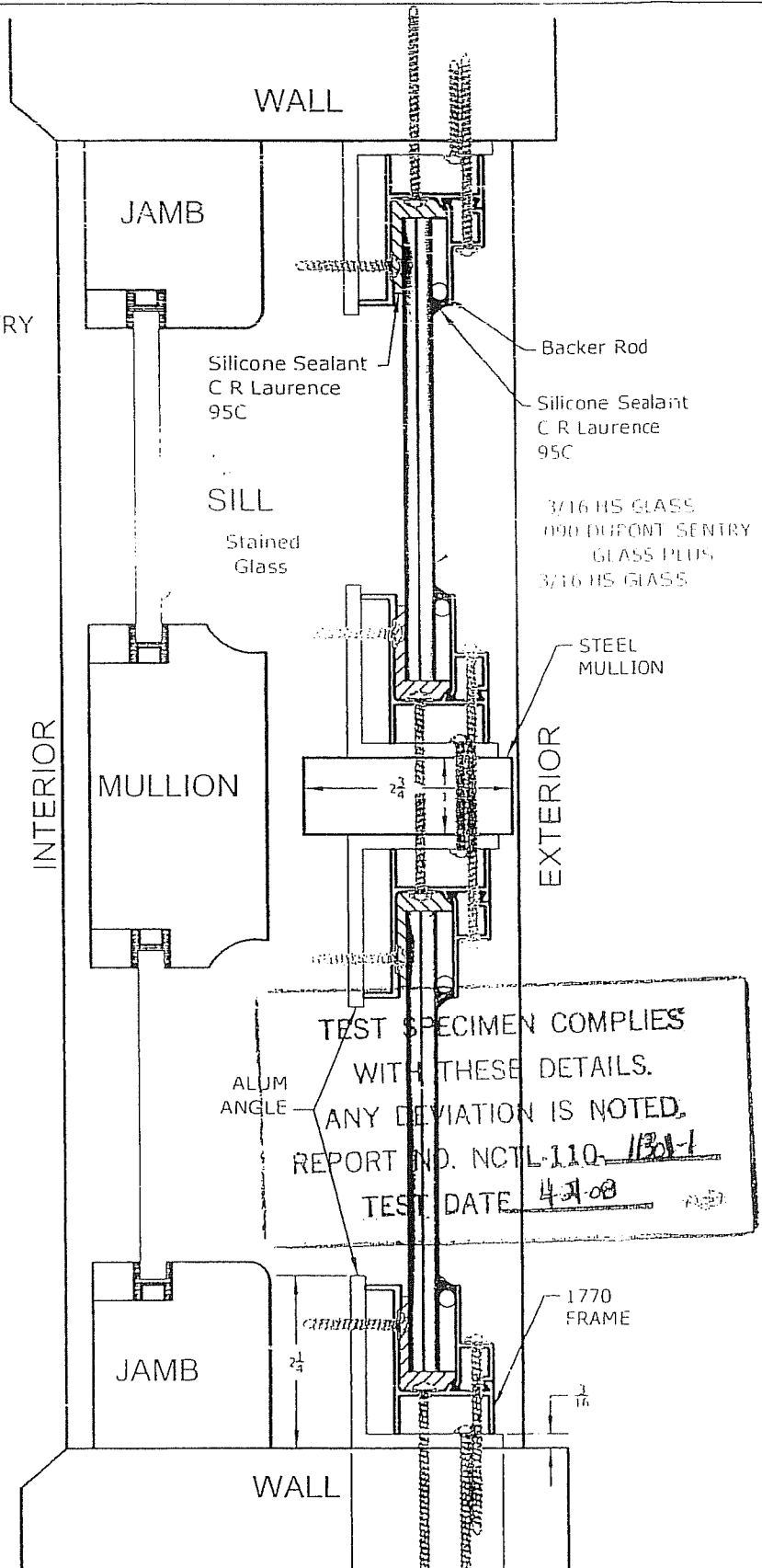
Perimeter Frame



Alum. Mullion Bracket for Steel Mullion



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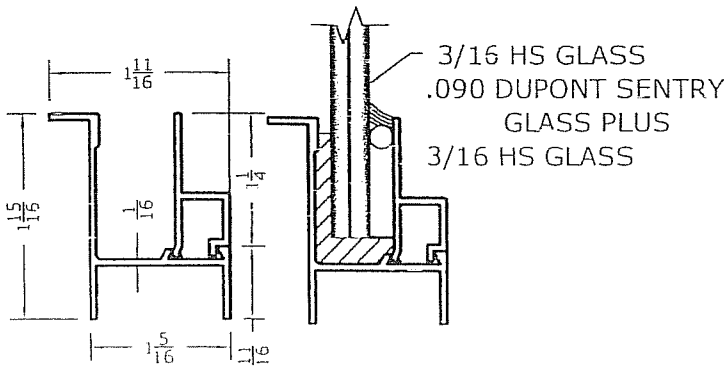




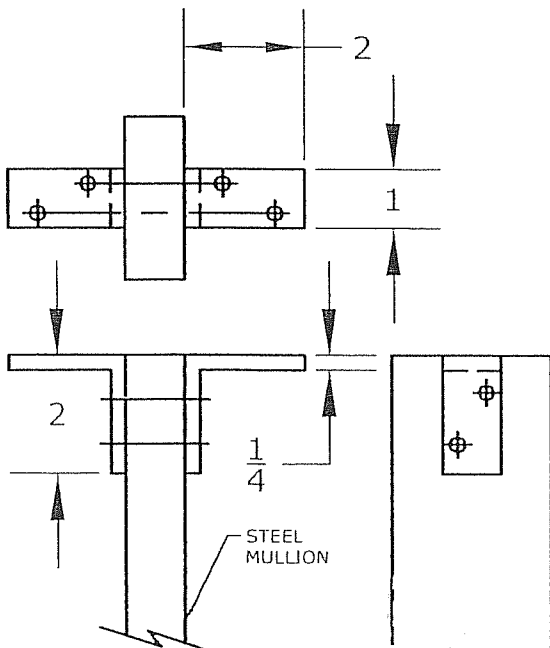
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 Phone: (641) 472-2824; Fax: (641) 472-0974

1770 SERIES LAMINATED HURRICANE MODEL

Perimeter Frame



Alum. Mullion Bracket for Steel Mullion



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 5/9/08

