Architectural Testing

ASTM E 1886 and ASTM E 1996
TEST REPORT

Rendered to:

EAGLE WINDOW & DOOR, INC.

PRODUCT TYPE: Series 02 Clad Outswing French Door Transom with Harbor Master Mono
SERIES/MODEL: Aluminum Clad Wood Transom Window with Impact Glass

Report No.:	**95125.03-201-18**
Test Dates:	**10/23/09**
Through:	**10/27/09**
Report Date:	**12/01/09**
Test Record Retention Date:	**10/23/13**

849 Western Avenue North
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EAGLE WINDOW & DOOR, INC.
2045 Kerper Boulevard
Dubuque, Iowa 52004-1072

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Project Summary: Architectural Testing, Inc. was contracted by Eagle Window & Door, Inc. to perform and validate testing on a Series/Model Series 02 Clad Outswing French Door Transom with Harbor Master Mono, Aluminum Clad Wood Transom Window with Impact Glass at the Architectural Testing, Inc. test facility in St. Paul, Minnesota. The samples tested met the performance requirements set forth in the referenced test procedures for a +2880/-3120 Pa (+60.0/-65.0 psf) Design Pressure with missile impacts corresponding to Missile Level D and Wind Zone 4. Test specimen description and results are reported herein. The samples were provided by the client.

Test Procedures: The test specimens were evaluated in accordance with the following:

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 Wind Borne Debris in Hurricanes.*

ASTM E 1886-05, *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 1996-05, *Standard Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.*

Test Specimen Description:

Series/Model: Series 02 Clad Outswing French Door Transom with Harbor Master Mono

Product Type: Aluminum Clad Wood Transom Window with Impact Glass

Overall Size: 1830 mm (72-1/16") wide by 918 mm (36-1/8") high

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Test Specimen Description: (Continued)

Sash Size: 1791 mm (70-1/2") wide by 876 mm (34-1/2") high

Daylight Opening Size: 1648 mm (64-7/8") wide by 730 mm (28-3/4") high

Finish: Exterior aluminum cladding was painted white, interior wood was natural.

Glazing Details: The window utilized a nominal 8.6 mm HarborMaster monolithic laminated glass. The glass was comprised of two nominal 3.1 mm (1/8") annealed sheets separated by a 2.3 mm (0.090") DuPont SGP interlayer. The glass was set from the interior against Instant Glaze II silicone sealant and back-filled with silicone. Wood glazing stops with single-sided adhesive foam tape were utilized on the interior and secured with 1-1/4" brad nails 25 mm (1") from each corner and spaced 152 mm (6") to 203 mm (8") on center.

Weatherstripping:

Description	QuantityL	ocation
Hollow vinyl bulb	1 Row	Sash stiles and top rail

Frame Construction: The wood frame was comprised of pine with corners square-cut, butted, sealed with caulk and secured with three #8 x 1-3/4" screws per corner. Extruded aluminum cladding was slip-fit over the wood frame members with the corners miter-cut, sealed with silicone and secured with a nylon corner key.

Sash Construction: Sash corners utilized mortise-and-tenon construction secured with wood glue and one #7 x 1-1/4" screw per corner. Extruded aluminum cladding was slip-fit over the wood sash members with the corners square-cut and butted. The panel was secured to the frame with rigid PVC dual-durometer continuous spacer bracket that was secured to the frame perimeter with #8 x 3/4" screws 76 mm (3") to 152 mm (6") from corners and spaced 356 mm (14") to 406 mm (16") on center. The panel was set in a bed of perimeter sealant and secured through the spacer bracket with #8 x 1" screws 76 mm (3") to 152 mm (6") from corners and spaced 356 mm (14") to 406 mm (16") on center.

Hardware: No hardware was utilized

Drainage: No drainage was utilized.

Reinforcement: No reinforcement was utilized.

Test Specimen Description: (Continued)

Installation: The unit was installed within a wood test buck and secured steel installation straps. The straps were secured to the units with four #8 x 5/8" screws and to the buck, on the interior and exterior, with two #8 x 1-1/2" screws. The steel installation straps were spaced 152 mm (6") from each corner and 508 mm (20") on center on the head and sill. The steel installation straps were spaced 152 mm (6") from each corner on the jambs. The unit was sealed to the buck with silicone.

Test Results: The following results have been recorded:

ASTM E 1886, *Large Missile Impact*

Conditioning Temperature: 22°C (71°F)
Missile Weight: 4173 g (9.2 lbs)
Missile Length: 2413 mm (95")
Muzzle Distance from Test Specimen: 4.9 m (16 ft.)

Test Unit #1

Impact #1: Missile Velocity: 15.1 m/s (49.7 fps); orientation within ±5° of horizontal

Impact Area: Center of glazing
Observations: Missile hit target area, no, rips, tears or penetrations
Results: Pass

Impact #2: Missile Velocity: 15.1 m/s (49.5 fps); orientation within ±5° of horizontal

Impact Area: Lower left glazing corner
Observations: Missile hit target area, no, rips, tears or penetrations
Results: Pass

Test Unit #2

Impact #1: Missile Velocity: 15.0 m/s (49.1 fps); orientation within ±5° of horizontal

Impact Area: Center of glazing
Observations: Missile hit target area, no, rips, tears or penetrations
Results: Pass

Test Results: (Continued)

ASTM E 1886, *Large Missile Impact*

Test Unit #2 (Continued)

Impact #2: Missile Velocity: 15.1 m/s (49.4 fps); orientation within ±5° of horizontal

Impact Area: Upper right glazing corner
Observations: Missile hit target area, no, rips, tears or penetrations
Results: Pass

Test Unit #3

Impact #1: Missile Velocity: 15.0 m/s (49.1 fps); orientation within ±5° of horizontal

Impact Area: Center of glazing
Observations: Missile hit target area, no, rips, tears or penetrations
Results: Pass

Impact #2: Missile Velocity: 15.0 m/s (49.1 fps); orientation within ±5° of horizontal

Impact Area: Lower right glazing corner
Observations: Missile hit target area, no, rips, tears or penetrations
Results: Pass

***Note**: See Architectural Testing Sketch #2 for impact locations.*

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #1
Design Pressure: +2880/-3120 Pa (+60.0/-65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#1	#2	#3	#4
580 to 1440 (12.0 to 30.0)	3500	1.77	0.5 (0.02)	0.5 (0.02)	0.08 (0.03)	0.5 (0.02)
0 to 1725 (0 to 36.0)	300	2.31	0.8 (0.03)	0.5 (0.02)	0.08 (0.03)	0.5 (0.02)
1440 to 2300 (30.0 to 48.0)	600	1.97	1.0 (0.04)	0.8 (0.03)	0.08 (0.03)	0.8 (0.03)
865 to 2880 (18.0 to 60.0)	100	2.80	1.0 (0.04)	0.8 (0.03)	1.0 (0.04)	1.0 (0.04)
			Permanent Set			
			0.8 (0.03)	0.5 (0.02)	0.8 (0.03)	0.5 (0.02)

NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#1	#2	#3	#4
935 to 3120 (19.5 to 65.0)	50	2.92	1.0 (0.04)	0.5 (0.02)	0.8 (0.03)	0.5 (0.02)
1560 to 2495 (32.5 to 52.0)	1050	1.50	0.3 (0.01)	0.5 (0.02)	0.5 (0.02)	0.5 (0.02)
0 to 1870 (0 to 39.0)	50	2.93	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
625 to 1560 (13.0 to 32.5)	3350	1.74	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
			Permanent Set			
			0.3 (0.01)	<0.3 (<0.01)	<0.3 (<0.01)	<0.3 (<0.01)

***Observations**: No additional damage or deglazing was observed.*

Result: Pass

Note: See Architectural Testing Sketch #1 for indicator locations. All test specimens were cycled in a common chamber.

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #2
Design Pressure: +2880/-3120 Pa (+60.0/-65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#1	#2	#3	#4
580 to 1440 (12.0 to 30.0)	3500	1.77	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
0 to 1725 (0 to 36.0)	300	2.31	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
1440 to 2300 (30.0 to 48.0)	600	1.97	0.3 (0.01)	0.5 (0.02)	0.5 (0.02)	0.5 (0.02)
865 to 2880 (18.0 to 60.0)	100	2.80	0.3 (0.01)	0.5 (0.02)	0.5 (0.02)	0.8 (0.03)
			Permanent Set			
			0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	<0.3 (<0.01)

NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#1	#2	#3	#4
935 to 3120 (19.5 to 65.0)	50	2.92	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
1560 to 2495 (32.5 to 52.0)	1050	1.50	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.5 (0.02)
0 to 1870 (0 to 39.0)	50	2.93	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
625 to 1560 (13.0 to 32.5)	3350	1.74	<0.3 (<0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
			Permanent Set			
			<0.3 (<0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)

Observations: *No additional damage or deglazing was observed.*

Result: Pass

Note: *See Architectural Testing Sketch #1 for indicator locations. All test specimens were cycled in a common chamber.*

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #3
Design Pressure: +2880/-3120 Pa (+60.0/-65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#1	#2	#3	#4
580 to 1440 (12.0 to 30.0)	3500	1.77	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
0 to 1725 (0 to 36.0)	300	2.31	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
1440 to 2300 (30.0 to 48.0)	600	1.97	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.5 (0.02)
865 to 2880 (18.0 to 60.0)	100	2.80	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.8 (0.03)
			Permanent Set			
			<0.3 (<0.01)	<0.3 (<0.01)	<0.3 (<0.01)	0.3 (0.01)

NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#1	#2	#3	#4
935 to 3120 (19.5 to 65.0)	50	2.92	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
1560 to 2495 (32.5 to 52.0)	1050	1.50	0.3 (0.01)	0.5 (0.02)	0.3 (0.01)	0.3 (0.01)
0 to 1870 (0 to 39.0)	50	2.93	0.3 (0.01)	0.5 (0.02)	0.3 (0.01)	0.3 (0.01)
625 to 1560 (13.0 to 32.5)	3350	1.74	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)	0.3 (0.01)
			Permanent Set			
			<0.3 (<0.01)	<0.3 (<0.03)	0.3 (0.01)	0.3 (0.01)

***Observations**: No additional damage or deglazing was observed.*

Result: Pass

Note: See Architectural Testing Sketch #1 for indicator locations. All test specimens were cycled in a common chamber.

General Note: Upon completion of testing, the specimens met the requirements of Section 7 of ASTM E 1996.

Test Equipment:

Cannon: Constructed from steel piping utilizing compressed air to propel the missile

Missile: 2x4 Southern Pine

Timing Device: Electronic Beam Type

Cycling Mechanism: Computer controlled centrifugal blower with electronic pressure measuring device

Deflection Measuring Device: Linear transducers

Tape and film were used to seal against air leakage during structural testing. In our opinion, the tape and film did not influence the results of the test.

Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen reported herein.

List of Official Observers:

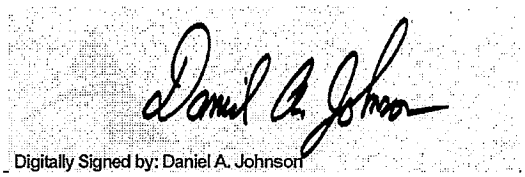
Name	Company
Chad Cornell	Eagle Window & Door, Inc.
Jim Welter	Eagle Window & Door, Inc.
Mark D. Lewke	Architectural Testing, Inc.
Jon P. Kasuboski	Architectural Testing, Inc.
Zane G. Wybest	Architectural Testing, Inc.
Karl A. Lips-Eakins	Architectural Testing, Inc.
Eric J. Schoenthaler	Architectural Testing, Inc.

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period, such materials shall be discarded without notice and the service life of this report will expire.

Results obtained are tested values and were secured by using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Eric J. Schoenthaler
Project Manager



Daniel A. Johnson
Director - Regional Operations

EJS/jb

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: WDMA Submittal Forms (2)
Appendix-B: Drawings (16)