



**ASTM E 1886 and ASTM E 1996
TEST REPORT**

Rendered to:

EAGLE WINDOW & DOOR, INC.

**SERIES/MODEL: Series 93 5-0 x 8-0 Clad Auxiliary Fixed
PRODUCT TYPE: Aluminum Clad Fixed Wood Window**

Report No.:	82757.02-201-44
Test Date:	05/05/08
Through:	05/06/08
Original Report Date:	05/23/08
Revised Report Date:	06/05/08
Expiration Date:	05/05/12

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ASTM E 1886 and ASTM E 1996 TEST REPORT

Rendered to:

EAGLE WINDOW & DOOR, INC.
2045 Kerper Boulevard
Dubuque, Iowa 52004-1072

Report No.: 82757.02-201-44
Test Date: 05/05/08
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Original Report Date: 05/23/08
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Expiration Date: 05/05/12

Project Summary: Architectural Testing, Inc. was contracted by Eagle Window & Door, Inc. to perform testing on a Series 93 5-0 x 8-0 Clad Auxiliary Fixed, Aluminum Clad Fixed Wood Window in 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 +2640, -3120 Pa (+55.0, -65.0 psf) Design Pressure with missile impacts corresponding to Missile Level D and Wind Zone 3. 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 93 5-0 x 8-0 Clad Auxiliary Fixed

Product Type: Aluminum Clad Fixed Wood Window

Test Specimen Description: (Continued)

Overall Size: 1524 mm (60") wide by 2438 mm (96") high

Daylight Opening Size: 1426 mm (56-1/8") wide by 2340 mm (92-1/8") high

Overall Area: 3.7 m² (40.0 ft²)

Finish: Interior wood was natural and the exterior aluminum cladding was white.

Frame Construction: The wood frame was comprised of laminated veneer lumber (LVL) with corners square cut, butted, sealed with silicone and secured with two (2) 11 mm (7/16") crown by 38 mm (1-1/2") long staples 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 and two (2) #6 by 11 mm (7/16") screws and one #10 by 64 mm (2-1/2") screw per corner.

Glazing Details: The window utilized a nominal 30 mm (1-11/64") thick insulating glass fabricated from an exterior 13.7 mm laminated sheet and an interior 4.7 mm (3/16") heat strengthened sheet separated by an aluminum spacer. The laminated sheet was comprised of two sheets of nominal 5.7 mm (1/4") annealed with a 2.3 mm (0.090) SGP inner layer. The glass was set from the interior against butyl rubber mastic and silicone. Wood glazing stops with single sided adhesive foam tape were utilized on the interior and secured with 32 mm (1-1/4") brads spaced 25 mm (1") from each corner and 152 mm to 203 mm (6" to 8") on center.

Installation: The window was installed within a nominal double wood test buck. The window was secured to the wood surround with masonry clips spaced 152 mm (6") from each corner and 406 mm (16") on center. The masonry clips were secured to the frame with four (4) #8 by 16 mm (5/8") screws and to the wood surround with four (4) #8 by 38 mm (1-1/2") screws. Silicone sealant was also applied over the fastener heads, masonry clips and rough opening.

Test Results: The following results have been recorded:

ASTM E 1886, Large Missile Impact

Conditioning Temperature: 22°C (71°F)
Missile Weight: 4082 g (9.0 lbs)
Missile Length: 2413 mm (95")
Muzzle Distance from Test Specimen: 4.9 m (16 ft.)

Test Unit #1

Impact #1: Missile Velocity: 15.0 m/s (49.1 fps); orientation within $\pm 5^\circ$ of vertical
Impact Area: Center of glazing
Observations: No rips, tears or penetrations
Results: Pass

Impact #2: Missile Velocity: 15.1 m/s (49.5 fps); orientation within $\pm 5^\circ$ of vertical
Impact Area: Lower left glazing corner
Observations: No rips, tears or penetrations
Results: Pass

Test Unit #2

Impact #1: Missile Velocity: 15.1 m/s (49.7 fps); orientation within $\pm 5^\circ$ of vertical
Impact Area: Lower left glazing corner
Observations: No rips, tears or penetrations
Results: Pass

Impact #2: Missile Velocity: 15.0 m/s (49.1 fps); orientation within $\pm 5^\circ$ of vertical
Impact Area: Center of glazing
Observations: No rips, tears or penetrations
Results: Pass

Test Unit #3

Impact #1: Missile Velocity: 15.2 m/s (50.0 fps); orientation within $\pm 5^\circ$ of vertical
Impact Area: Upper left glazing corner
Observations: No rips, tears or penetrations
Results: Pass

Impact #2: Missile Velocity: 15.2 m/s (50.0 fps); orientation within $\pm 5^\circ$ of vertical
Impact Area: Center of glazing
Observations: No rips, tears or penetrations
Results: Pass

Test Results: (Continued)

ASTM E 1886, Air Pressure Cycling

Test Unit #1

Design Pressure: +2640, -3120 Pa (+55.0, -65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
530 to 1320 (11.0 to 27.5)	3500	1.95	No rips, tears or penetrations
0 to 1580 (0 to 33.0)	300	2.87	No rips, tears or penetrations
1320 to 215 (27.5 to 44.0)	600	1.50	No rips, tears or penetrations
790 to 2640 (16.5 to 55.0)	100	2.68	No rips, tears or penetrations

NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
935 to 3120 (19.5 to 65.0)	50	2.46	No rips, tears or penetrations
1560 to 2490 (32.5 to 52.0)	1050	1.99	No rips, tears or penetrations
0 to 1670 (0 to 39.0)	50	3.14	No rips, tears or penetrations
625 to 1560 (13.0 to 32.5)	3350	1.77	No rips, tears or penetrations

Result: Pass

Test Results: (Continued)

ASTM E 1886, Air Pressure Cycling

Test Unit #2

Design Pressure: +2640, -3120 Pa (+55.0, -65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
530 to 1320 (11.0 to 27.5)	3500	1.95	No rips, tears or penetrations
0 to 1580 (0 to 33.0)	300	2.87	No rips, tears or penetrations
1320 to 215 (27.5 to 44.0)	600	1.50	No rips, tears or penetrations
790 to 2640 (16.5 to 55.0)	100	2.68	No rips, tears or penetrations

NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
935 to 3120 (19.5 to 65.0)	50	2.46	No rips, tears or penetrations
1560 to 2490 (32.5 to 52.0)	1050	1.99	No rips, tears or penetrations
0 to 1670 (0 to 39.0)	50	3.14	No rips, tears or penetrations
625 to 1560 (13.0 to 32.5)	3350	1.77	No rips, tears or penetrations

Result: Pass

Test Results: (Continued)

ASTM E 1886, Air Pressure Cycling

Test Unit #3

Design Pressure: +2640, -3120 Pa (+55.0, -65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
530 to 1320 (11.0 to 27.5)	3500	1.57	No rips, tears or penetrations
0 to 1580 (0 to 33.0)	300	2.14	No rips, tears or penetrations
1320 to 215 (27.5 to 44.0)	600	1.71	No rips, tears or penetrations
790 to 2640 (16.5 to 55.0)	100	2.66	No rips, tears or penetrations

NEGATIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
935 to 3120 (19.5 to 65.0)	50	2.81	No rips, tears or penetrations
1560 to 2490 (32.5 to 52.0)	1050	1.83	No rips, tears or penetrations
0 to 1670 (0 to 39.0)	50	2.40	No rips, tears or penetrations
625 to 1560 (13.0 to 32.5)	3350	1.55	No rips, tears or penetrations

Result: Pass

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

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:

<u>Name</u>	<u>Company</u>
Tony D. Gavin	Architectural Testing, Inc.
Karl A. Lips-Eakins	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 specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.



Digitally Signed by: Eric Schoenthaler

Eric J. Schoenthaler
Project Manager



Digitally Signed by: Daniel A. Johnson

Daniel A. Johnson
Director - Regional Operations

EJS/mb

Attachments (Pages):

Appendix A: WDMA Submittal Forms (2)

Appendix B: Drawings (9)