



Architectural Testing

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

**Rendered to:**

**EAGLE WINDOW & DOOR, INC.**

**SERIES/MODEL: Series 07 Clad Talon Single Hung Monumental with Impact Glazing  
PRODUCT TYPE: Aluminum Clad Wood Single Hung**

**Report No.: 93275.02-201-44  
Test Dates: 07/24/09  
Through: 07/27/09  
Report Date: 08/05/09  
Expiration Date: 07/24/13**

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## ASTM E 1886 and ASTM E 1996 TEST REPORT

Rendered to:

EAGLE WINDOW & DOOR, INC.  
2045 Kerper Boulevard  
Dubuque, Iowa 52001

Report No.: 93275.02-201-44  
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**Project Summary:** Architectural Testing, Inc. was contracted by Eagle Window & Door, Inc. to perform and validate testing on three Series 07 Clad Talon Single Hung Monumental with Impact Glazing, Aluminum Clad Wood Single Hung windows. The samples tested met the performance requirements set forth in the referenced test procedures for a  $\pm 2400$  Pa ( $\pm 50.0$  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.

**Impact Test Plan #:** 01-071409

**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 07 Clad Talon Single Hung Monumental with Impact Glazing

**Product Type:** Aluminum Clad Wood Single Hung window

**Test Specimen Description:** (Continued)

**Overall Size:** 1228 mm (48-3/8") wide by 2597 mm (102-1/4") high

**Bottom Sash Size:** 1130 mm (44-1/2") wide by 1244 mm (49") high

**Top Sash Size:** 1143 mm (45") wide by 1534 mm (1304-3/8") high

**Screen Size:** 1143 mm (45-1/4") wide by 2533 mm (99-3/4") high

**Overall Area:** 3.19 m<sup>2</sup> (34.4 ft<sup>2</sup>)

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

**Frame Construction:** Head frame corners were coped, butted, sealed with silicone, and secured with three 7/16" x 1-3/4" long staples per corner. Sill frame corners were coped, butted, sealed with a corner gasket and silicone, and secured with two #8 x 1-3/4" screws. Aluminum cladding was slip-fit over wood members, miter-cut at head corners and secured with a corner key and two #6 x 7/16" screws per corner. Sill corners were coped, butted sealed with a corner gasket and silicone, and secured with a #7 x 1-1/4" screw and a #6 x 7/16" screw.

**Sash Construction:** The lower sash and upper sash, top rail and stiles consisted of molded pine sections, the lower sash meeting rail was LVL. Upper sash corners were mortise-and-tenon construction and secured with glue and one 3/16" x 1-1/2" staple per corner. Aluminum cladding was slip-fit over wood members, upper sash corners were miter-cut, sealed with butyl and secured with a corner key and two #4 x 1/2" screws per corner. Lower sash corners were mortise-and-tenon construction; meeting rail corners were secured with glue and two 3/16" x 1-1/2" staples per corner; bottom rail corners were secured with glue and one #8 x 2-1/4" screw per corner. Aluminum cladding was slip-fit over wood members, corners were coped, butted and sealed with butyl.

**Weatherstripping:**

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Hollow vinyl bulb	1 Row	Lower sash bottom rail; upper sash meeting rail
Foam filled bulb	1 Row	Head jamb and side jambs
Wool pile	2	Side jambs at check rail

**Test Specimen Description:** (Continued)

**Glazing Details:** The sash were glazed with approximate 18 mm (11/16") insulating glass comprised of a 6.9 mm laminated exterior sheet and a 3.1 mm annealed interior sheet separated by a desiccant-filled stainless steel spacer system. The laminated sheet was comprised of two nominal 2.2 mm (3/32") annealed sheets separated by a 2.3 mm (0.090") SGP inner layer. The glass was set from the interior against Instant Glaze II silicone sealant and secured with wood glazing beads set on the interior, secured with 1" brad nails spaced 152 mm to 203 mm (6" to 8") on center.

**Drainage:** A sloped sill was utilized.

**Hardware:**

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Vinyl jamb liner with block-and-tackle balance	2	Jamb pockets
Sweep locks and keepers with integrated tilt latches	2	203 mm (8") from sash corner
Stainless steel tilt pins	4	Bottom corners of stiles

**Reinforcement:** No reinforcement was utilized.

**Screen Construction:** The screen was comprised of roll-formed aluminum with plastic corner keys. Fiberglass screen cloth was attached with a vinyl spline.

**Installation:**

**Assembly #1: Clip Installation:** The window was installed within a wood test frame with installation clips that were secured to the window with two #8 x 5/8" screws and to the buck on the interior and exterior with two #8 x 1-1/2" screws that were spaced 152 mm (6") from corners and 457 mm (18") on center around entire perimeter. The unit was sealed to the buck with silicone.

**Assembly #2: Jamb Screw Installation:** The window was installed within a wood test frame and secured with #8 x 3" screws spaced 152 mm (6") from corners and 457 mm (18") on center around entire perimeter. 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:** 26°C (78°F)  
**Missile Weight:** 4173 g (9.2 lbs)  
**Missile Length:** 2362 mm (93")  
**Muzzle Distance from Test Specimen:** 4.9 m (16 ft.)

**Test Unit #1**

**Impact #1:** Missile Velocity: 15.4 m/s (50.6 fps); orientation within  $\pm 5^\circ$  of vertical

**Impact Area:** Center of glazing of lower sash.

**Observations:** Missile hit target area. No rips, tears or penetrations.

**Results:** Pass

**Test Unit #2**

**Impact #1:** Missile Velocity: 15.5 m/s (51.0 fps); orientation within  $\pm 5^\circ$  of vertical

**Impact Area:** Upper left glazing corner of lower sash

**Observations:** Missile hit target area. No rips, tears or penetrations.

**Results:** Pass

**Test Unit #3**

**Impact #1:** Missile Velocity: 15.4 m/s (50.6 fps); orientation within  $\pm 5^\circ$  of vertical

**Impact Area:** Lower right glazing corner of lower sash

**Observations:** Missile hit target area. No rips, tears or penetrations.

**Results:** Pass

**Test Results:** (Continued)

**ASTM E 1886, Air Pressure Cycling**

**Test Unit #1**

**Design Pressure:**  $\pm 2400$  Pa ( $\pm 50.0$  psf)

**POSITIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
480 to 1200 (10.0 to 25.0)	3500	1.43	No rips, tears or penetrations.
0 to 1440 (0 to 30.0)	300	2.15	No rips, tears or penetrations.
1200 to 1920 (25.0 to 40.0)	600	1.15	No rips, tears or penetrations.
720 to 2400 (15.0 to 50.0)	100	1.85	No rips, tears or penetrations.

**NEGATIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
720 to 2400 (15.0 to 50.0)	50	1.84	No rips, tears or penetrations.
1200 to 1920 (25.0 to 40.0)	1050	1.36	No rips, tears or penetrations.
0 to 1440 (0 to 30.0)	50	1.25	No rips, tears or penetrations.
480 to 1200 (10.0 to 25.0)	3350	1.41	No rips, tears or penetrations.

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

**Result:** Pass

*Note:* Test Specimen #1 and #2 were cycled in a common chamber.

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #2

Design Pressure:  $\pm 2400$  Pa ( $\pm 50.0$  psf)

**POSITIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
480 to 1200 (10.0 to 25.0)	3500	1.43	No rips, tears or penetrations.
0 to 1440 (0 to 30.0)	300	2.15	No rips, tears or penetrations.
1200 to 1920 (25.0 to 40.0)	600	1.15	No rips, tears or penetrations.
720 to 2400 (15.0 to 50.0)	100	1.85	No rips, tears or penetrations.

**NEGATIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
720 to 2400 (15.0 to 50.0)	50	1.84	No rips, tears or penetrations.
1200 to 1920 (25.0 to 40.0)	1050	1.36	No rips, tears or penetrations.
0 to 1440 (0 to 30.0)	50	1.25	No rips, tears or penetrations.
480 to 1200 (10.0 to 25.0)	3350	1.41	No rips, tears or penetrations.

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

Result: Pass

*Note: Test Specimen #1 and #2 were cycled in a common chamber.*

Test Results: (Continued)

ASTM E 1886, Air Pressure Cycling

Test Unit #3

Design Pressure:  $\pm 2400$  Pa ( $\pm 50.0$  psf)

**POSITIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
480 to 1200 (10.0 to 25.0)	3500	1.14	No rips, tears or penetrations.
0 to 1440 (0 to 30.0)	300	1.47	No rips, tears or penetrations.
1200 to 1920 (25.0 to 40.0)	600	1.31	No rips, tears or penetrations.
720 to 2400 (15.0 to 50.0)	100	1.98	No rips, tears or penetrations.

**NEGATIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
720 to 2400 (15.0 to 50.0)	50	1.86	No rips, tears or penetrations.
1200 to 1920 (25.0 to 40.0)	1050	1.31	No rips, tears or penetrations.
0 to 1440 (0 to 30.0)	50	1.77	No rips, tears or penetrations.
480 to 1200 (10.0 to 25.0)	3350	1.16	No rips, tears or penetrations.

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

**Result:** Pass

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

**Impact Test Plan #:** 01-071409

**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:**

<u>Name</u>	<u>Company</u>
Chad Cornell	Eagle Window & Door, Inc.
Jim Welter	Eagle Window & Door, Inc.
Tony D. Gavin	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 specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

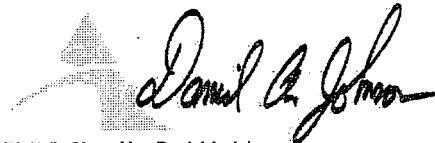
For ARCHITECTURAL TESTING, INC.



Digitally Signed by: Karl Lips-Eakins

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Karl A. Lips-Eakins  
Technician



Digitally Signed by: Daniel A. Johnson

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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 (42)