



Architectural Testing

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

**Rendered to:**

**EAGLE WINDOW & DOOR INC.**

**SERIES/MODEL: 4020 Double Hung Transom  
with Monolithic Impact Glazing  
PRODUCT TYPE: Aluminum Clad Fixed Wood Window  
with Monolithic Impact Glazing**

Report No.: 72964.02-201-44  
Test Dates: 05/29/07  
Report Date: 07/09/07  
Expiration Date: 05/29/11

849 Western Avenue North  
St. Paul, MN 55117  
phone: 651-636-3835  
fax: 651-636-3843  
www.archtest.com



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

Rendered to:

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

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Test Dates: 05/29/07  
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Expiration Date: 05/29/11

**Project Summary:** Architectural Testing, Inc. (ATI) was contracted by Eagle Window & Door, Inc. to perform testing on a Series/Model 4020 Double Hung Transom with Monolithic Impact, Aluminum Clad Wood Fixed window with Monolithic Impact Glazing. The sample tested successfully met the performance requirements for a +2640, -3120 Pa (+55.0, -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.

**Test Procedure:** 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.*

**Test Specimen Description:**

**Series/Model:** 4020 Double Hung Transom with Monolithic Impact Glazing

**Product Type:** Aluminum Clad Fixed Wood Window with Monolithic Impact Glazing

**Overall Size:** 1219 mm (48") wide by 610 mm (24") high

**Sash Size:** 1160 mm (45-11/16") wide by 554 mm (21-13/16") high

**Overall Area:** 0.74 m<sup>2</sup> (8.0 ft<sup>2</sup>)

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

**Test Specimen Description: (Continued)**

**Glazing Details:** The sash was glazed with nominal 9 mm (0.334") monolithic glass comprised of two 3 mm (1/8") annealed sheets and a 2 mm (0.090") PVB interlayer. The glass was set from the interior against InstantGlaze II silicone sealant, backfilled with silicone and secured with wood glazing beads set on the interior, secured with 25 mm (1") brad nails spaced 152 mm to 203 mm (6" to 8") on center.

**Daylight Opening Size:** 1035 mm (40-3/4") wide by 451mm (17-3/4") high

**Weatherstripping:**

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Hollow vinyl bulb with 10 mm (3/8") leaf	1 Row	Sash bottom rail

**Frame Construction:** Head frame corners were coped, butted, sealed with silicone and secured with three 11 mm (7/16") by 44 mm (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 by 44 mm (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 by 11 mm (7/16") screws per corner. Sill corners were coped, butted sealed with a corner gasket and silicone and secured with a #7 by 32 mm (1-1/4") screw and a #6 by 11 mm (7/16") screw.

**Sash Construction:** Sash corners were mortise-and-tenon construction; sash upper corners were secured with glue and two #8 by 38 mm (1-1/2") screws per corner; sash lower corners were secured with glue and one #8 by 57 mm (2-1/4") and one #8 by 38 mm (1-1/2") screw per corner. Aluminum cladding was slip-fit over wood members, sash upper corners were miter-cut, sealed with butyl and secured with a corner key and two #4 by 13 mm (1/2") screws per head corner. Sash lower corners were coped, butted and sealed with butyl.

**Hardware:** No hardware was utilized.

**Installation:** The window was installed within a wood test frame and secured with installation clips that were secured to the window with two #8 by 16 mm (5/8") screws and to the buck on the interior and exterior with two #8 by 38 mm (1-1/2") screws that were spaced 305 mm (12") from each corner on all four sides and at midspan of head and sill. 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:** 24°C (75°F)  
**Missile Weight:** 4082 g (9.0 lbs)  
**Missile Length:** 2470 mm (97-1/4")  
**Muzzle Distance from Test Specimen:** 4.88 m (16 ft.)

**Test Unit #1**

**Impact #1:** Missile Velocity: 15.0 m/s (49.3 fps)  
**Impact Area:** Center of glazing  
**Observations:** No rips, tears or penetration  
**Results:** Pass

**Impact #2:** Missile Velocity: 15.1 m/s (49.6 fps)  
**Impact Area:** Lower right glazing corner  
**Observations:** No rips, tears or penetration  
**Results:** Pass

**Test Unit #2**

**Impact #1:** Missile Velocity: 15.2 m/s (49.8 fps)  
**Impact Area:** Lower right glazing corner  
**Observations:** No rips, tears or penetration  
**Results:** Pass

**Impact #2:** Missile Velocity: 15.0 m/s (49.2 fps)  
**Impact Area:** Center of glazing  
**Observations:** No rips, tears or penetration  
**Results:** Pass

**Test Unit #3**

**Impact #1:** Missile Velocity: 15.0 m/s (49.1 fps)  
**Impact Area:** Upper left glazing corner  
**Observations:** No rips, tears or penetrations  
**Results:** Pass

**Impact #2:** Missile Velocity: 15.1 m/s (49.5 fps)  
**Impact Area:** Center of glazing  
**Observations:** No rips, tears or penetration  
**Results:** Pass

Test Results: (Continued)

ASTM E 1886-02, 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
526 to 1316 (11.0 to 27.5)	3500	1.80 sec.	No rips, tears or penetration
0 to 1579 (0.0 to 33.0)	300	2.14 sec.	No rips, tears or penetration
1316 to 2105 (27.5 to 44.0)	600	1.96 sec.	No rips, tears or penetration
790 to 2632 (16.5 to 55.0)	100	2.18 sec.	No rips, tears or penetration

**NEGATIVE PRESSURE**

Pressure Range Pa(psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
933 to 3110 (19.5 to 65.0)	50	2.12 sec.	No rips, tears or penetration
1555 to 2488 (32.5 to 52.0)	1050	1.96 sec.	No rips, tears or penetration
0 to 1866 (0.0 to 39.0)	50	2.25 sec.	No rips, tears or penetration
622 to 1555 (13.0 to 32.5)	3350	1.94 sec.	No rips, tears or penetration

Result: Pass

Test Results: (Continued)

ASTM E 1886-02, 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
526 to 1316 (11.0 to 27.5)	3500	1.80 sec.	No rips, tears or penetration
0 to 1579 (0.0 to 33.0)	300	2.14 sec.	No rips, tears or penetration
1316 to 2105 (27.5 to 44.0)	600	1.96 sec.	No rips, tears or penetration
790 to 2632 (16.5 to 55.0)	100	2.18 sec.	No rips, tears or penetration

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0 to 1866 (0.0 to 39.0)	50	2.25 sec.	No rips, tears or penetration
622 to 1555 (13.0 to 32.5)	3350	1.94 sec.	No rips, tears or penetration

Result: Pass

Test Results: (Continued)

**ASTM E 1886-02, 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
526 to 1316 (11.0 to 27.5)	3500	1.80 sec.	No rips, tears or penetration
0 to 1579 (0.0 to 33.0)	300	2.14 sec.	No rips, tears or penetration
1316 to 2105 (27.5 to 44.0)	600	1.96 sec.	No rips, tears or penetration
790 to 2632 (16.5 to 55.0)	100	2.18 sec.	No rips, tears or penetration

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0 to 1866 (0.0 to 39.0)	50	2.25 sec.	No rips, tears or penetration
622 to 1555 (13.0 to 32.5)	3350	1.94 sec.	No rips, tears or penetration

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:** 2 x 4 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.

**List of Official Observers:**

<u>Name</u>	<u>Company</u>
Thad McKinley	Eagle Window & Door, Inc.
Joe Cogan	Eagle Window & Door, Inc.
Karl A. Lips-Eakins	Architectural Testing, Inc.
Eric J. Schoenthaler	Architectural Testing, Inc.

**Drawing Reference:** The attached drawings have been checked by ATI and are representative of the samples tested.

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(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

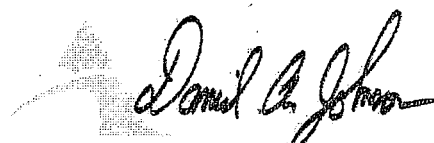
For ARCHITECTURAL TESTING, INC.



Digitally Signed by: Eric Schoenthaler

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Eric J. Schoenthaler  
Project Manager



Digitally Signed by: Daniel A. Johnson

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Daniel A. Johnson  
Director - Regional Operations

EJS:mb

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix-A: WDMA Submittal forms (2)

Appendix-B: Drawings (25)