Architectural Testing

# ASTM E 1886 and ASTM E 1996
# TEST REPORT

**Rendered to:**

**EAGLE WINDOW & DOOR, INC.**

**SERIES/MODEL: 6080 Clad Ascent French Sliding Door with Harbor Master IG Mulled to a 3080 Clad Ascent French Sliding Door Sidelite with Harbor Master IG**

**PRODUCT TYPE: Aluminum Clad Sliding Door Mulled to an Aluminum Clad Sidelite/Fixed Door**

| | |
|---|---|
| **Report No.:** | **96807.02-201-44** |
| **Test Dates:** | **12/08/09** |
| **Through:** | **12/11/09** |
| **Report Date:** | **02/02/10** |
| **Test Record Retention Date:** | **12/08/13** |

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

Architectural Testing

# ASTM E 1886 and ASTM E 1996 TEST REPORT

Rendered to:

EAGLE WINDOW & DOOR, INC.
2045 Kerper Boulevard
Dubuque, Iowa 52001-1072

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| Report No.: | 96807.02-201-44 |
| Test Dates: | 12/08/09 |
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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 6080 Clad Ascent French Sliding Door with Harbor Master IG Mulled to a 3080 Clad Ascent French Sliding Door Sidelite with Harbor Master IG, Aluminum Clad Sliding Door Mulled to an Aluminum Clad Sidelite/Fixed Door 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**: 6080 Clad Ascent French Sliding Door with Harbor Master IG Mulled to a 3080 Clad Ascent French Sliding Door Sidelite with Harbor Master IG

**Product Type**: Aluminum Clad Sliding Door Mulled to an Aluminum Clad Sidelite/Fixed Door

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**Test Specimen Description**: (Continued)

**Overall Size**: 2838 mm (111-3/4") wide by 2438 mm (96") high

**French Door Size**: 1822 mm (71-3/4") wide by 2438 mm (96") high

**Active Panel Size**: 946 mm (37-1/4") wide by 2369 mm (93-1/4") high

**Passive Panel Size**: 946 mm (37-1/4") wide by 2369 mm (93-1/4") high

**Daylight Opening Size** (2): 705 mm (27-3/4") wide by 2032 mm (80") high

**Fixed Door/Sidelite Size**: 965 mm (38") wide by 2438 mm (96") high

**Fixed Door/Sidelite Panel Size**: 946 mm (37-1/4") wide by 2369 mm (93-1/4") high

**Daylight Opening Size**: 705 mm (27-3/4") wide by 2032 mm (80") high

**Overall Area**: 6.8 $m^2$ (73.7 $ft^2$)

**Finish**: Interior wood was natural; exterior aluminum cladding was painted.

**French Door Frame Construction**: The frame was comprised of aluminum extrusions slip-fit over wood side and head jambs. At the head, the aluminum extrusions were mitered, sealed with silicone and secured with a corner key and one #5 x 1-3/4" screw. The wood jambs were square-cut, sealed with silicone and fastened with three #8 x 1-3/4" screws. The sill was comprised of a painted fiberglass pultrusion with an oak threshold and a vinyl stationary panel support block that was secured with five #10 x 1" screws. The sill was notched to allow the side jamb to sit on top, sealed with a neoprene pad and fastened with three #8 x 2-1/2" screws and one #6 x 1" screw in each corner.

**Fixed Door/Sidelite Frame Construction**: The frame was comprised of aluminum extrusions slip-fit over wood side and head jambs. At the head, the aluminum extrusions were mitered, sealed with silicone and secured with a corner key and one #5 x 1-3/4" screw. The wood jambs were square-cut, sealed with silicone and fastened with three #8 x 1-3/4" screws. The sill was comprised of a painted fiberglass pultrusion with an oak threshold and a vinyl stationary panel support block that was secured with five #10 x 1" screws. The sill was notched to allow the side jamb to sit on top, sealed with a neoprene pad and fastened with three #8 x 2-1/2" screws and one #6 x 1" screw in each corner.

**Test Specimen Description**: (Continued)

**French Door Panel Construction**: Wood stiles and rails were joined by two 19 mm (3/4") by 102 mm (4") hardwood dowels secured with glue and one 2-1/2" brad. Extruded aluminum cladding was mitered at the corners, sealed with silicone and secured with a corner key and one #5 x 1-3/4" screw. The stationary panel meeting stile had a full-length extruded aluminum cover strip that also formed the interlock, fastened with #8 x 1" screws 38 mm (1-1/2") from each end and spaced 203 mm (8") to 254 mm (10") on center. The active panel had a full length interlocks secured to the stile with #6 x 1" screws 38 mm (1-1/2") from each end and spaced 203 mm (8") to 254 mm (10") on center. The stationary panel was set atop the stationary support block, sealed with silicone to the frame and secured through the jamb with #8 x 2-1/8" screws spaced 152 mm (6") from head and sill; and one spaced at the midspan.

**Fixed Door/Sidelite Panel Construction**: Wood stiles and rails were joined by two 19 mm (3/4") by 102 mm (4") hardwood dowels secured with glue and one 2-1/2" brad. Extruded aluminum cladding was mitered at the corners, sealed with silicone and secured with a corner key and one #5 x 1-3/4" screw. The panel was set atop the stationary support block, sealed with silicone to the frame and secured through the jambs with #8 x 2-1/8" screws spaced 152 mm (6") from head and sill; and one spaced at the midspan.

**Weatherstripping**:

| Description | QuantityL | ocation |
|---|---|---|
| Foam-filled vinyl bulb | 1 Row | Head jamb parting stop and locking jamb parting stop |
| Foam-filled vinyl bulb | 1 Row | Fixed panel interlock |
| Wool pile with center fin | 1 Row | Active panel bottom rail, fixed panel interlock |
| Pile weatherstrip pad | 1 | Base of interlocks |

**Glazing**: The panels utilized a nominal 19 mm (3/4") thick insulating glass unit fabricated from two nominal 3.1 mm (1/8") sheets of tempered glass separated by a desiccant-filled metal spacer system. The glass was set from the interior against an Instant Glaze II sealant. 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.

**Test Specimen Description**: (Continued)

**Drainage**:

| Description | QuantityL | ocation |
|---|---|---|
| 25 mm (1") by 1 mm (0.040) weep holes | 2 | Vinyl stationary panel support block |

**Hardware**:

| Description | QuantityL | ocation |
|---|---|---|
| Adjustable steel rollers | 2 | Active panel, 279 mm (11") from each end |
| Latch with handle | 1 | Lock stile of operating panel, 991 mm (39") from bottom rail with keeper on inactive panel |
| Manual foot bolts | 1 | Active panel meeting stile near sill |

**Reinforcement**: No reinforcement was utilized.

**Mullion**: The door and fixed door/sidelite were mulled together with a 51 mm (2") x 127 mm (5") LVL mullion. Each unit was secured to the LVL mullion with 1/2" x 1" - GC20 corrugated fasteners 51 mm (2") to 76 mm (3") from head and sill spaced 203 mm (8") on center. The door jamb was additionally secured to the mullion with two #10 x 2-1/2" screws through each hinge. The exterior was sealed with silicone and secured with an aluminum mullion cap that was snap fit into the frame accessory kerfs. The ends of the mullions were sealed with silicone.

**Installation**: The door was installed within a wood test frame and secured with steel installation straps 152 mm (6") from each corner and mullion, and spaced 533 mm (21") on center on the jambs and head jambs. Each installation strap was secured to the frames with four #8 x 5/8" screws and to the bucks, on the exterior and interior, with two #8 x 1-1/2" screws. The sill was set onto three beads of silicone sealant. The operable door head jamb was secured with four #8 x 2-1/2" screws through the head jamb at midspan and one through head jamb 152 mm (6") from each corner. The operable door head jamb was additionally secured with two #10 x 2-1/2" screws through the head jamb bracket at midspan. The operable door sill was secured with two #10 x 2" screws through the sill bracket at midspan. 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**: 21°C (70°F)
**Missile Weight**: 4082 g (9.0 lbs)
**Missile Length**: 2426 mm (95-1/2")
**Muzzle Distance from Test Specimen**: 4.9 m (16 ft.)

**Test Unit #1**

**Impact #1**: Missile Velocity: 15.5 m/s (50.9 fps); orientation within ±5° of horizontal

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

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

**Impact Area**: Lower right corner of operable panel
**Observations**: Missile hit target area; no rips, tears or penetrations
**Results**: Pass

**Impact #3**: Missile Velocity: 15.4 m/s (50.6 fps); orientation within ±5° of horizontal

**Impact Area**: Midspan of mullion
**Observations**: Missile hit target area; no damage
**Results**: Pass

**Impact #4**: Missile Velocity: 15.4 m/s (50.6 fps); orientation within ±5° of horizontal

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

**Impact #5**: Missile Velocity: 15.4 m/s (50.66 fps); orientation within ±5° of horizontal

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

**Test Results:** (Continued)

**ASTM E 1886,** ***Large Missile Impact***

**Conditioning Temperature:** 21°C (70°F)
**Missile Weight:** 4082 g (9.0 lbs)
**Missile Length:** 2426 mm (95-1/2")
**Muzzle Distance from Test Specimen:** 4.9 m (16 ft.)

**Test Unit #2**

**Impact #1:** Missile Velocity: 15.2 m/s (50.0 fps); orientation within ±5° of horizontal

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

**Impact #2:** Missile Velocity: 15.4 m/s (50.5 fps); orientation within ±5° of horizontal

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

**Impact #3:** Missile Velocity: 15.2 m/s (50.0 fps); orientation within ±5° of horizontal

**Impact Area:** Midspan of mullion
**Observations:** Missile hit target area; no damage
**Results:** Pass

**Impact #4:** Missile Velocity: 15.1 m/s (49.4 fps); orientation within ±5° of horizontal

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

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

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

**Test Results:** (Continued)

**ASTM E 1886, *Large Missile Impact***

**Conditioning Temperature:** 21°C (70°F)
**Missile Weight:** 4082 g (9.0 lbs)
**Missile Length:** 2426 mm (95-1/2")
**Muzzle Distance from Test Specimen:** 4.9 m (16 ft.)

**Test Unit #3**

**Impact #1**: Missile Velocity: 15.5 m/s (50.9 fps); orientation within ±5° of horizontal

**Impact Area:** Upper left glazing corner of operable panel
**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:** Midspan of meeting stile
**Observations:** Missile hit target area; no damage
**Results:** Pass

**Impact #3**: Missile Velocity: 15.1 m/s (49.4 fps); orientation within ±5° of horizontal

**Impact Area:** Midspan of mullion
**Observations:** Missile hit target area; no damage
**Results:** Pass

**Impact #4**: Missile Velocity: 15.1 m/s (49.6 fps); orientation within ±5° of horizontal

**Impact Area:** Upper left glazing corner of sidelite
**Observations:** Missile hit target area; no rips, tears or penetrations
**Results:** Pass

**Impact #5**: Missile Velocity: 15.1 m/s (49.6 fps); orientation within ±5° of horizontal

**Impact Area:** Center of glazing of sidelite.
**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:** +2880, -3120 Pa (+60.0/-65.0 psf)

**POSITIVE PRESSURE**

| Pressure Range Pa (psf) | Number of Cycles | Average Cycle Time (seconds) | Observations |
|---|---|---|---|
| 580 to 1440 (12.0 to 30.0) | 3500 | 2.70 | No additional damage or deglazing was observed. |
| 0 to 1725 (0 to 36.0) | 300 | 3.45 | No additional damage or deglazing was observed. |
| 1440 to 2300 (30.0 to 48.0) | 600 | 2.90 | No additional damage or deglazing was observed. |
| 865 to 2880 (18.0 to 60.0) | 100 | 3.51 | No additional damage or deglazing was observed. |

**NEGATIVE PRESSURE**

| Pressure Range Pa (psf) | Number of Cycles | Average Cycle Time (seconds) | Observations |
|---|---|---|---|
| 935 to 3120 (19.5 to 65.0) | 50 | 3.19 | No additional damage or deglazing was observed. |
| 1560 to 2495 (32.5 to 52.0) | 1050 | 2.29 | No additional damage or deglazing was observed. |
| 0 to 1870 (0 to 39.0) | 50 | 3.58 | No additional damage or deglazing was observed. |
| 625 to 1560 (13.0 to 32.5) | 3350 | 2.99 | No additional damage or deglazing was observed. |

**Result:** Pass

**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) | Observations |
|---|---|---|---|
| 580 to 1440 (12.0 to 30.0) | 3500 | 2.53 | No additional damage or deglazing was observed. |
| 0 to 1725 (0 to 36.0) | 300 | 2.27 | No additional damage or deglazing was observed. |
| 1440 to 2300 (30.0 to 48.0) | 600 | 2.31 | No additional damage or deglazing was observed. |
| 865 to 2880 (18.0 to 60.0) | 100 | 2.61 | No additional damage or deglazing was observed. |

**NEGATIVE PRESSURE**

| Pressure Range Pa (psf) | Number of Cycles | Average Cycle Time (seconds) | Observations |
|---|---|---|---|
| 935 to 3120 (19.5 to 65.0) | 50 | 2.83 | No additional damage or deglazing was observed. |
| 1560 to 2495 (32.5 to 52.0) | 1050 | 2.19 | No additional damage or deglazing was observed. |
| 0 to 1870 (0 to 39.0) | 50 | 2.45 | No additional damage or deglazing was observed. |
| 625 to 1560 (13.0 to 32.5) | 3350 | 2.09 | No additional damage or deglazing was observed. |

**Result:** Pass

**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) | Observations |
|---|---|---|---|
| 580 to 1440 (12.0 to 30.0) | 3500 | 1.99 | No additional damage or deglazing was observed. |
| 0 to 1725 (0 to 36.0) | 300 | 2.35 | No additional damage or deglazing was observed. |
| 1440 to 2300 (30.0 to 48.0) | 600 | 1.97 | No additional damage or deglazing was observed. |
| 865 to 2880 (18.0 to 60.0) | 100 | 2.55 | No additional damage or deglazing was observed. |

**NEGATIVE PRESSURE**

| Pressure Range Pa (psf) | Number of Cycles | Average Cycle Time (seconds) | Observations |
|---|---|---|---|
| 935 to 3120 (19.5 to 65.0) | 50 | 2.71 | No additional damage or deglazing was observed. |
| 1560 to 2495 (32.5 to 52.0) | 1050 | 2.34 | No additional damage or deglazing was observed. |
| 0 to 1870 (0 to 39.0) | 50 | 2.58 | No additional damage or deglazing was observed. |
| 625 to 1560 (13.0 to 32.5) | 3350 | 2.20 | 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.*

**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:**

| Name | Company |
|---|---|
| Chad Cornell | Eagle Window & Door, Inc. |
| Jim Welter | Eagle Window & Door, Inc. |
| Jason A. Needham | Architectural Testing, Inc. |
| Jon P. Kasuboski | 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.

Digitally Signed by: Eric Schoenthaler

Eric J. Schoenthaler
Project Manager

Digitally Signed by: Daniel A. Johnson

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)