Architectural Testing

ASTM E 1886 and ASTM E 1996
TEST REPORT

Rendered to:

EAGLE WINDOWS AND DOORS

SERIES/MODEL: 6080 Series 05 Clad Outswing French Door SP1 with Harbor Master IG Mulled to a 3080 Series 05 Clad Outswing French Door Sidelite SL1 with Harbor Master IG

PRODUCT TYPE: Aluminum Clad Outswing Hinged Glass Door with Impact Glazing Mulled to an Aluminum Clad Sidelite/Fixed Door

Report No.:	**95122.02-201-44**
Test Dates:	**10/23/09**
Through:	**01/19/10**
Report Date:	**01/19/10**
Test Record Retention Date:	**10/23/13**

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

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EAGLE WINDOWS & DOORS
2045 Kerper Boulevard
Dubuque, Iowa 52001

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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 Series 05 Clad Outswing French Door SP1 with Harbor Master IG Mulled to a 3080 Series 05 Clad Outswing French Door Sidelite SL1 with Harbor Master IG, Aluminum Clad Outswing Hinged Glass Door with Impact Glazing 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 ±3120 Pa (±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 Series 05 Clad Outswing French Door SP1 with Harbor Master IG Mulled to a 3080 Series 05 Clad Outswing French Door Sidelite SL1 with Harbor Master IG

Product Type: Aluminum Clad Outswing Hinged Glass Door with Impact Glazing Mulled to an Aluminum Clad Sidelite/Fixed Door

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Test Specimen Description: (Continued)

Overall Size: 2808 mm (110-9/16") wide by 2421 mm (95-5/16") high

French Door Size: 1830 mm (72-1/16") wide by 2421 mm (95-5/16") high

Active Panel Size: 883 mm (34-3/4") wide by 2369 mm (93-1/4") high

Passive Panel Size: 902 mm (35-1/2") wide by 2369 mm (93-1/4") high

Daylight Opening Size (2): 641 mm (25-1/4") wide by 2045 mm (80-1/2") high

Fixed Door/Sidelite Size: 927 mm (36-1/2") wide by 2421 mm (95-5/16") high

Fixed Door/Sidelite Panel Size: 883 mm (34-3/4") wide by 2369 mm (93-1/4") high

Daylight Opening Size: 737 mm (29") wide by 2045 mm (80-1/2") high

Overall Area: 6.8 m^2 (73.2 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 frame joints were mitered, sealed with silicone and secured with a corner key. The wood jambs were sealed with silicone and fastened with three #8 x 1-3/4" screws per corner. The sill was comprised of an aluminum extrusion slip-fit over a polyethylene / wood fiber composite material with an oak threshold. The sill was butted to the side jamb, sealed with silicone and fastened with three #8 x 1-3/4" screws per 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 frame joints were mitered, sealed with silicone and secured with a corner key. The wood jambs were sealed with silicone and fastened with three #8 x 1-3/4" screws per corner. The sill was comprised of an aluminum extrusion slip-fit over a polyethylene / wood fiber composite material with an oak threshold. The sill was butted to the side jamb, sealed with silicone and fastened with three #8 x 1-3/4" screws per corner.

Test Specimen Description: (Continued)

French Door Panel Construction: The wood stiles and rails were joined by two 3/4" x 4" hardwood dowels secured with glue and one 2-1/2" brad. Extruded aluminum cladding was square-cut and butted at the corners, sealed with silicone and secured with a corner key and one #7 x 7/8" screw. The inactive panel astragal was made up of a wood member with an extruded aluminum cover on the exterior surface. The astragal assembly was sealed with silicone and fastened to the inactive panel with six #7 x 1-1/4" screws and six #8 x 2" screws.

Fixed Door/Sidelite Panel Construction: The wood stiles and rails were joined by two 3/4" x 4" hardwood dowels secured with glue and one 2-1/2" brad. Extruded aluminum cladding was square-cut and butted at the corners, sealed with silicone and secured with a corner key and one #7 x 7/8" screw. The panel was secured to the frame with rigid PVC dual-durometer continuous spacer bracket that was secured to the frame with #8 x 3/4" screws spaced 76 mm (3") to 152 mm (6") from corners and 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 spaced to 76 mm (3") to 152 mm (6") from corners and 356 mm (14") to 406 mm (16") on center. The panel bottom rail was secured with three anchor clips secured to the sill and the panel with #8 x 3/4" screws. The clips were spaced 152 mm (6") from each corner and midspan.

Weatherstripping:

Description	QuantityL	ocation
6 mm (1/4") foam filled vinyl bulb	1 Row	Top rail of panels
Q-lon leaf seal	1 Row	Perimeter of frame and astragal

Glazing: The panel utilized nominal 21 mm (13/16") insulating glass fabricated from one nominal 3.9 mm tempered interior lite, and a 8.6 mm laminated exterior lite. The laminated sheet was comprised of two 3.1 mm annealed sheets and a 2.3 mm (0.090") SGP inner layer separated by a desiccant-filled spacer system. The glass was set from the interior against an Instant Glaze II sealant and backfilled with silicone. Wood glazing stops with a single sided adhesive foam tape were utilized on the interior and secured with 1-1/4" brad nails spaced 25 mm (1") from each corner and 152 mm (6") to 203 mm (8") on center.

Drainage: No drainage was utilized.

Test Specimen Description: (Continued)

Hardware:

Description	QuantityL	ocation
Butt hinges	8	279 mm (11") and 914 mm (36") from top and bottom of each panel
Three point locking mechanism	1	Active panel
Latch and deadbolt strike	1	Active panel lock stile
Shoot bolts with locking handle	1	Passive panel
Manual surface bolts	2	Top and bottom of passive panel.

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 and each unit was secured a #8 x 2-1/2" screw through the sill spaced 152 mm (6") from each corner. The door head jamb was secured with seven #8 x 2-1/2" screws through the strike plate at midspan. The door sill was secured with two #8 x 2-1/8" screws through the strike plate at midspan. The door jamb was additionally secured with two #10 x 2-1/2" screws through each hinge. 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: 4128 g (9.1 lbs)
Missile Length: 2410 mm (94-7/8")
Muzzle Distance from Test Specimen: 4.9 m (16 ft.)

Test Unit #1

Impact #1: Missile Velocity: 15.3 m/s (50.1 fps); orientation within ±5° of horizontal

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

Impact #2: Missile Velocity: 15.2 m/s (49.8 fps); orientation within ±5° of horizontal

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

Impact #3: Missile Velocity: 15.2 m/s (49.9 fps); orientation within ±5° of horizontal

Impact Area: Midspan of astragal
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: Vertical and horizontal center of bottom rail of passive panel
Observations: Missile hit target area; no damage.
Results: Pass

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

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

Test Results: (Continued)

ASTM E 1886, *Large Missile Impact*

Test Unit #1 (Continued)

Impact #6: Missile Velocity: 15.0 m/s (49.3 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 #7: Missile Velocity: 15.3 m/s (50.1 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

Impact #8: Missile Velocity: 15.2 m/s (49.8 fps); orientation within ±5° of horizontal

Impact Area: Vertical and horizontal center of bottom rail of sidelite
Observations: Missile hit target area; no damage.
Results: Pass

Test Unit #2

Impact #1: Missile Velocity: 15.4 m/s (50.5 fps); orientation within ±5° of horizontal

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

Impact #2: Missile Velocity: 15.2 m/s (49.9 fps); orientation within ±5° of horizontal

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

Impact #3: Missile Velocity: 15.0 m/s (49.1 fps); orientation within ±5° of horizontal

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

Test Results: (Continued)

ASTM E 1886, *Large Missile Impact*

Test Unit #2 (Continued)

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

Impact Area: Vertical and horizontal center of bottom rail of passive panel
Observations: Missile hit target area; no damage.
Results: Pass

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

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

Impact #6: Missile Velocity: 15.1 m/s (49.7 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 #7: Missile Velocity: 15.0 m/s (49.2 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 #8: Missile Velocity: 15.0 m/s (49.1 fps); orientation within ±5° of horizontal

Impact Area: Vertical and horizontal center of bottom rail of sidelite
Observations: Missile hit target area; no damage
Results: Pass

Test Unit #3

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

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

Test Results: (Continued)

ASTM E 1886, *Large Missile Impact*

Test Unit #3 (Continued)

Impact #2: Missile Velocity: 15.2 m/s (49.9 fps); orientation within ±5° of horizontal

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

Impact #3: Missile Velocity: 15.2 m/s (49.8 fps); orientation within ±5° of horizontal

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

Impact #4: Missile Velocity: 15.2 m/s (49.8 fps); orientation within ±5° of horizontal

Impact Area: Vertical and horizontal center of bottom rail of passive panel
Observations: Missile hit target area; no damage.
Results: Pass

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

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

Impact #6: Missile Velocity: 15.1 m/s (49.5 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 #7: Missile Velocity: 15.4 m/s (50.4 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*

Test Unit #3 (Continued)

Impact #8: Missile Velocity: 15.1 m/s (49.6 fps); orientation within ±5° of horizontal

Impact Area: Vertical and horizontal center of bottom rail of sidelite
Observations: Missile hit target area; no damage
Results: Pass

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #1

Design Pressure: ±3120 Pa (±65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
625 to 1560 (13.0 to 32.5)	3500	1.86	No additional damage or deglazing was observed.
0 to 1870 (0 to 39.0)	300	2.87	No additional damage or deglazing was observed.
1560 to 2495 (32.5 to 52.0)	600	1.91	No additional damage or deglazing was observed.
935 to 3120 (19.5 to 65.0)	100	2.98	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	2.88	No additional damage or deglazing was observed.
1560 to 2495 (32.5 to 52.0)	1050	2.05	No additional damage or deglazing was observed.
0 to 1870 (0 to 39.0)	50	3.00	No additional damage or deglazing was observed.
625 to 1560 (13.0 to 32.5)	3350	2.04	No additional damage or deglazing was observed.

Result: Pass

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #2

Design Pressure: ±3120 Pa (±65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
625 to 1560 (13.0 to 32.5)	3500	1.92	No additional damage or deglazing was observed.
0 to 1870 (0 to 39.0)	300	2.93	No additional damage or deglazing was observed.
1560 to 2495 (32.5 to 52.0)	600	1.95	No additional damage or deglazing was observed.
935 to 3120 (19.5 to 65.0)	100	2.95	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	2.92	No additional damage or deglazing was observed.
1560 to 2495 (32.5 to 52.0)	1050	2.14	No additional damage or deglazing was observed.
0 to 1870 (0 to 39.0)	50	2.99	No additional damage or deglazing was observed.
625 to 1560 (13.0 to 32.5)	3350	2.27	No additional damage or deglazing was observed.

Result: Pass

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #3

Design Pressure: ±3120 Pa (±65.0 psf)

POSITIVE PRESSURE

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Observations
625 to 1560 (13.0 to 32.5)	3500	1.89	No additional damage or deglazing was observed.
0 to 1870 (0 to 39.0)	300	2.25	No additional damage or deglazing was observed.
1560 to 2495 (32.5 to 52.0)	600	2.38	No additional damage or deglazing was observed.
935 to 3120 (19.5 to 65.0)	100	2.31	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	2.38	No additional damage or deglazing was observed.
1560 to 2495 (32.5 to 52.0)	1050	2.21	No additional damage or deglazing was observed.
0 to 1870 (0 to 39.0)	50	2.84	No additional damage or deglazing was observed.
625 to 1560 (13.0 to 32.5)	3350	1.98	No additional damage or deglazing was observed.

Result: Pass

Note: Test Specimen #2 and #3 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

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.
Jon P. Kasuboski	Architectural Testing, Inc.
Dax R. Stoehr	Architectural Testing, Inc.
Karl A. Lips-Eakins	Architectural Testing, Inc.