



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

**Rendered to:**

**EAGLE WINDOW & DOOR, INC.**

**SERIES/MODEL: 8080 Series 05 Clad Ascent French Sliding Door SP1 with Harbor  
Master Mono Muller to a 4080 Series 05 Clad Ascent French Sliding Door Sidelite SL1  
with Harbor Master Mono**

**PRODUCT TYPE: Aluminum Clad Sliding Glass Door with Impact Glazing Muller to an  
Aluminum Clad Sidelite/Fixed Door with Impact Glazing**

**Report No.: 98173.04-201-18**  
**Test Dates: 03/22/10**  
**Through: 03/26/10**  
**Report Date: 04/12/10**  
**Test Record Retention Date: 03/22/14**



## ASTM E 1886 and ASTM E 1996 TEST REPORT

Rendered to:

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

Report No.: 98173.04-201-18  
Test Dates: 03/22/10  
Through: 03/26/10  
Report Date: 04/12/10  
Test Record Retention Date: 03/22/14

**Project Summary:** Architectural Testing, Inc. was contracted by Eagle Window & Door, Inc. to perform testing on three Series/Model 8080 Series 05 Clad Ascent French Sliding Door SP1 with Harbor Master Mono Muller to a 4080 Series 05 Clad Ascent French Sliding Door Sidelite SL1 with Harbor Master Mono, Aluminum Clad Sliding Glass Door with Impact Glazing Muller to an Aluminum Clad Sidelite/Fixed Door with Impact Glazing 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  $\pm 2880$  Pa ( $\pm 60.0$  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:** 8080 Series 05 Clad Ascent French Sliding Door SP1 with Harbor Master Mono Muller to a 4080 Series 05 Clad Ascent French Sliding Door Sidelite SL1 with Harbor Master Mono

**Product Type:** Aluminum Clad Sliding Glass Door with Impact Glazing Muller to an Aluminum Clad Sidelite/Fixed Door with Impact Glazing

**Overall Size:** 3753 mm (147-3/4") wide by 2438 mm (96") high

**French Door Size:** 2432 mm (95-3/4") wide by 2438 mm (96") high

**Active Panel Size:** 1248 mm (49-1/8") wide by 2362 mm (93") high

**Passive Panel Size:** 1248 mm (49-1/8") wide by 2362 mm (93") high

**Daylight Opening Size (2):** 1010 mm (39-3/4") wide by 2035 mm (80-1/8") high

**Fixed Door/Sidelite Size:** 1270 mm (50") wide by 2438 mm (96") high

**Fixed Door/Sidelite Panel Size:** 1248 mm (49-1/8") wide by 2369 mm (93-1/4") high

**Daylight Opening Size:** 991 mm (39") wide by 2045 mm (80-1/2") high

**Overall Area:** 9.2 m<sup>2</sup> (98.5 ft<sup>2</sup>)

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

**French Sliding Door Frame Construction:** The frame was comprised of aluminum extrusions slip fit over LVL wood side and head jambs. At the head, the aluminum frame joints were mitered, sealed with silicone and secured with a corner key and one #5 x 1-3/4" screw. 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 2-1/2" screws through the sill into the wood jamb and one #6 x 1" screw into the aluminum cladding. A stationary panel support block was secured to the sill with five #10 x 1" screws.

**Fixed Door/Sidelite Frame Construction:** The frame was comprised of aluminum extrusions slip fit over LVL wood side and head jambs. At the head, the aluminum frame joints were mitered, sealed with silicone and secured with a corner key and one #5 x 1-3/4" screw. 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 2-1/2" screws through the sill into the wood jamb and one #6 x 1" screw into the aluminum cladding. A stationary panel support block was secured to the sill with five #10 x 1" screws.

**Test Specimen Description:** (Continued)

**French Door Panel Construction:** The LVL wood stiles and rails were joined by two 19 mm (3/4") x 102 mm (4") hardwood dowels secured with glue and two 2-1/2" brad. Extruded aluminum cladding was square-cut and butted at the corners and sealed with silicone. The fixed panel meeting stile had a full-length extruded aluminum cover strip that also formed the interlock and was fastened with a #8 x 1" pan-head screw 38 mm (1-1/2") from each end and spaced 203 mm (8") to 254 mm (10") on center. The fixed panel was secured through the frame jamb with three #8 x 2-1/8" screws 152 mm (6") from head and sill then one at the midspan.

**Fixed Door/Sidelite Panel Construction:** The LVL wood stiles and rails were joined by two 19 mm (3/4") x 102 mm (4") hardwood dowels secured with glue and two 2-1/2" brad. Extruded aluminum cladding was square-cut and butted at the corners and sealed with silicone. The fixed panel was set into place against a silicone bedding and secured into place through each jamb with three #8 x 2-1/8" screws 152 mm (6") from each end and midspan

**Weatherstripping:**

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Foam filled vinyl leaf	1 Row	Lock jamb and head jamb
Wool pile with center fin	1 Row	Bottom rail of operable panel and fixed panel interlock
10 mm (3/8") foam-filled weatherstrip	1 Row	Fixed panel interlock
Closed-cell foam pad	1	Base of interlock
Pile weatherstrip pad	1	Top of interlock

**Glazing Details:** Both units utilized a 10.1 mm (0.397") thick monolithic unit fabricated from two nominal 3.9 mm (5/32") annealed sheets separated by a 2.3 mm (0.090") thick DuPont SentryGlas® Plus interlayer. 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. Glass bite was 13 mm (1/2").

**Test Specimen Description:** (Continued)

**Drainage:**

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
1" wide by 1/8" deep weep slot	2	Atop of the sill to the interior of the sill track, 25 mm (1") from each jamb

**Hardware:**

<u>Description</u>	<u>Quantity</u>	<u>Location</u>
Adjustable steel rollers	2	Active panel, 279 mm (11") from each end
Adjustable mortise latch with handle	1	Lock stile of operating panel, 991 mm (39") from bottom rail with keeper located on jamb

**Reinforcement:** The fixed panel meeting rail was reinforced with an aluminum reinforcement secured with #8 x 1-3/4" screws 76 mm (3") from each end and spaced 229 mm (9") on center. (See Eagle drawing: A60A)

**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 exterior was sealed, top and bottom, 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 spaced 533 mm (21") on center on the lock jamb and head jamb. 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 fixed jamb was mulled to a sidelite. The sill was set onto a bead of silicone sealant. The head jamb was additionally secured with #8 x 2-1/2" screws, two at the meeting stile and one spaced 76 mm (3") from each corner. The head was additionally secured with two #10 x 2-1/2" screws through a meeting stile reinforcement clips and head jamb into the buck. The sill was additionally secured through a meeting stile reinforcement clip and the sill with two #10 x 2" screws. The locking jamb was additionally secured through the lock keeper with two #10 x 2-1/2" screws. 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:** 4173 g (9.2 lbs)

**Missile Length:** 2448 mm (96-3/8")

**Muzzle Distance from Test Specimen:** 4.9 m (16 ft.)

**Test Unit #1**

**Impact #1:** Missile Velocity: 15.2 m/s (49.8 fps); orientation within  $\pm 5^\circ$  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 (50.0 fps); orientation within  $\pm 5^\circ$  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: 15.3 m/s (50.1 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan bottom rail of active panel

**Observations:** Missile hit target area; cracked bottom rail on interior.

**Results:** Pass

**Impact #4:** Missile Velocity: 14.9 m/s (49.0 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan of meeting stiles

**Observations:** Missile hit target area; dented exterior cladding, cracked fixed panel glazing.

**Results:** Pass

**Impact #5:** Missile Velocity: 15.3 m/s (50.1 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan of the mullion

**Observations:** Missile hit target area; dented exterior cladding.

**Results:** Pass

**Test Results:** (Continued)

**ASTM E 1886, Large Missile Impact**

**Test Unit #1 (Continued)**

**Impact #6:** Missile Velocity: 15.2 m/s (50.0 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Center of glazing of sidelite/fixe door

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

**Results:** Pass

**Impact #7:** Missile Velocity: 14.9 m/s (49.0 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Lower right glazing corner of sidelite/fixe door

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

**Results:** Pass

**Test Unit #2**

**Impact #1:** Missile Velocity: 15.1 m/s (49.6 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Center of glazing of active panel

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

**Results:** Pass

**Impact #2:** Missile Velocity: 15.1 m/s (49.7 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Upper left glazing corner of active panel

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

**Results:** Pass

**Impact #3:** Missile Velocity: 15.1 m/s (49.6 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan bottom rail of active panel

**Observations:** Missile hit target area; cracked bottom rail on interior.

**Results:** Pass

**Impact #4:** Missile Velocity: 15.1 m/s (49.6 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan of meeting stiles

**Observations:** Missile hit target area; dented exterior cladding.

**Results:** Pass

**Test Results:** (Continued)

**ASTM E 1886, Large Missile Impact**

**Test Unit #2** (Continued)

**Impact #5:** Missile Velocity: 15.0 m/s (49.1 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan of mullion

**Observations:** Missile hit target area; dented exterior cladding.

**Results:** Pass

**Impact #6:** Missile Velocity: 15.2 m/s (49.9 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Center of glazing of sidelite/ fixed door

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

**Results:** Pass

**Impact #7:** Missile Velocity: 15.2 m/s (50.0 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Upper left glazing corner of sidelite/ fixed door

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

**Results:** Pass

**Test Unit #3**

**Impact #1:** Missile Velocity: 15.2 m/s (49.9 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Center of glazing of active panel

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

**Results:** Pass

**Impact #2:** Missile Velocity: 15.1 m/s (49.5 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Lower left glazing corner of active panel

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

**Results:** Pass

**Impact #3:** Missile Velocity: 15.1 m/s (49.6 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan bottom rail of active panel

**Observations:** Missile hit target area; cracked bottom rail on interior.

**Results:** Pass

**Test Results:** (Continued)

**ASTM E 1886, Large Missile Impact**

**Test Unit #3** (Continued)

**Impact #4:** Missile Velocity: 15.0 m/s (49.3 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan of meeting stiles

**Observations:** Missile hit target area; no damage.

**Results:** Pass

**Impact #5:** Missile Velocity: 15.0 m/s (49.3 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Midspan of mullion

**Observations:** Missile hit target area; no damage.

**Results:** Pass

**Impact #6:** Missile Velocity: 15.2 m/s (49.9 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Center of glazing of sidelite/fixed door

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

**Results:** Pass

**Impact #7:** Missile Velocity: 15.1 m/s (49.5 fps); orientation within  $\pm 5^\circ$  of horizontal

**Impact Area:** Lower left glazing corner of sidelite/fixed door

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

**Results:** Pass

*Note: See Architectural Testing Sketch #2 for impact locations.*

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #1

Design Pressure: ±2880 Pa (±60.0 psf)

**POSITIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)				
			#1	#2	#3	#4	#5
575 to 1440 (12.0 to 30.0)	3500	1.82	3.3 (0.13)	5.8 (0.23)	1.8 (0.07)	4.3 (0.17)	24.4 (0.96)
0 to 1725 (0 to 36.0)	300	2.55	3.3 (0.13)	6.6 (0.26)	1.8 (0.07)	4.6 (0.18)	29.2 (1.15)
1440 to 2300 (30.0 to 48.0)	600	2.05	4.3 (0.17)	8.9 (0.35)	1.8 (0.07)	6.1 (0.24)	38.1 (1.50)
865 to 2880 (18.0 to 60.0)	100	2.98	4.8 (0.19)	10.2 (0.40)	1.8 (0.07)	6.9 (0.27)	43.7 (1.72)
			<b>Permanent Set</b>				
			1.5 (0.06)	1.5 (0.06)	0.8 (0.03)	2.0 (0.08)	3.6 (0.14)

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#6	#7	#8	#9
575 to 1440 (12.0 to 30.0)	3500	--	4.6 (0.18)	2.5 (0.10)	3.6 (0.14)	2.5 (0.10)
0 to 1725 (0 to 36.0)	300	--	5.1 (0.20)	2.5 (0.10)	4.6 (0.18)	2.5 (0.10)
1440 to 2300 (30.0 to 48.0)	600	--	6.1 (0.24)	3.6 (0.14)	5.6 (0.22)	3.6 (0.14)
865 to 2880 (18.0 to 60.0)	100	--	7.1 (0.28)	4.1 (0.16)	6.6 (0.26)	4.1 (0.16)
			<b>Permanent Set</b>			
			1.8 (0.07)	0.5 (0.02)	1.0 (0.04)	0.5 (0.02)

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #1

Design Pressure:  $\pm 2880$  Pa ( $\pm 60.0$  psf)

**NEGATIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)				
			#1	#2	#3	#4	#5
865 to 2880 (18.0 to 60.0)	50	2.91	5.6 (0.22)	11.2 (0.44)	2.5 (0.10)	7.6 (0.30)	44.7 (1.76)
1440 to 2300 (30.0 to 48.0)	1050	2.40	5.1 (0.20)	9.4 (0.37)	2.3 (0.09)	6.4 (0.25)	38.6 (1.52)
0 to 1725 (0 to 36.0)	50	2.93	3.6 (0.14)	7.1 (0.28)	1.8 (0.07)	4.6 (0.18)	30.7 (1.21)
575 to 1440 (12.0 to 30.0)	3350	2.45	3.6 (0.14)	6.1 (0.24)	1.3 (0.05)	3.6 (0.14)	25.4 (1.00)
<b>Permanent Set</b>							
			2.0 (0.08)	2.0 (0.08)	0.5 (0.02)	0.8 (0.03)	4.6 (0.18)

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#6	#7	#8	#9
865 to 2880 (18.0 to 60.0)	50	--	8.1 (0.32)	4.6 (0.18)	6.4 (0.25)	5.1 (0.20)
1440 to 2300 (30.0 to 48.0)	1050	--	7.4 (0.29)	4.3 (0.17)	5.6 (0.22)	4.3 (0.17)
0 to 1725 (0 to 36.0)	50	--	5.8 (0.23)	3.3 (0.13)	4.3 (0.17)	3.3 (0.13)
575 to 1440 (12.0 to 30.0)	3350	--	5.1 (0.20)	3.0 (0.12)	3.6 (0.14)	3.0 (0.12)
<b>Permanent Set</b>						
			2.0 (0.08)	0.8 (0.03)	1.0 (0.04)	0.8 (0.03)

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

**Result:** Pass

*Note: See Architectural Testing Sketch #1 for indicator locations*

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #2

Design Pressure:  $\pm 2880$  Pa ( $\pm 60.0$  psf)

**POSITIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)				
			#1	#2	#3	#4	#5
575 to 1440 (12.0 to 30.0)	3500	1.93	2.0 (0.08)	5.3 (0.21)	1.3 (0.05)	3.3 (0.13)	22.6 (0.89)
0 to 1725 (0 to 36.0)	300	2.70	2.5 (0.10)	6.1 (0.24)	1.8 (0.07)	3.8 (0.15)	25.4 (1.00)
1440 to 2300 (30.0 to 48.0)	600	2.04	2.7 (0.11)	8.1 (0.32)	2.0 (0.08)	4.8 (0.19)	32.8 (1.29)
865 to 2880 (18.0 to 60.0)	100	2.98	3.0 (0.12)	9.7 (0.38)	2.5 (0.10)	5.3 (0.21)	40.1 (1.58)
			<b>Permanent Set</b>				
			0.3 (0.01)	0.5 (0.02)	0.3 (0.01)	0.8 (0.03)	2.3 (0.09)

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#6	#7	#8	#9
575 to 1440 (12.0 to 30.0)	3500	--	4.1 (0.16)	2.0 (0.08)	2.0 (0.08)	0.8 (0.03)
0 to 1725 (0 to 36.0)	300	--	4.8 (0.19)	2.5 (0.10)	2.5 (0.10)	3.8 (0.15)
1440 to 2300 (30.0 to 48.0)	600	--	6.1 (0.24)	3.0 (0.12)	3.0 (0.12)	4.1 (0.16)
865 to 2880 (18.0 to 60.0)	100	--	7.4 (0.29)	3.6 (0.14)	3.8 (0.15)	4.3 (0.17)
			<b>Permanent Set</b>			
			0.8 (0.03)	0.3 (0.01)	0.3 (0.01)	3.0 (0.12)

**Test Results:** (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #2

Design Pressure:  $\pm 2880$  Pa ( $\pm 60.0$  psf)

**NEGATIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)				
			#1	#2	#3	#4	#5
865 to 2880 (18.0 to 60.0)	50	2.64	5.8 (0.23)	11.4 (0.45)	3.0 (0.12)	8.6 (0.34)	37.1 (1.46)
1440 to 2300 (30.0 to 48.0)	1050	2.08	5.3 (0.21)	9.9 (0.39)	2.3 (0.09)	7.6 (0.30)	35.6 (1.40)
0 to 1725 (0 to 36.0)	50	2.97	3.3 (0.13)	7.1 (0.28)	2.0 (0.08)	4.8 (0.19)	25.1 (0.99)
575 to 1440 (12.0 to 30.0)	3350	2..02	3.3 (0.13)	6.6 (0.26)	2.0 (0.08)	4.6 (0.18)	22.1 (0.87)
			<b>Permanent Set</b>				
			2.3 (0.09)	2.0 (0.08)	1.0 (0.04)	2.5 (0.10)	5.1 (0.20)

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#6	#7	#8	#9
865 to 2880 (18.0 to 60.0)	50	--	9.7 (0.38)	3.8 (0.15)	3.6 (0.14)	2.3 (0.09)
1440 to 2300 (30.0 to 48.0)	1050	--	7.6 (0.30)	3.0 (0.12)	3.0 (0.12)	2.0 (0.04)
0 to 1725 (0 to 36.0)	50	--	7.9 (0.31)	2.5 (0.10)	2.3 (0.09)	1.0 (0.02)
575 to 1440 (12.0 to 30.0)	3350	--	7.4 (0.29)	2.5 (0.10)	2.0 (0.08)	1.0 (0.02)
			<b>Permanent Set</b>			
			3.6 (0.14)	0.8 (0.03)	0.5 (0.02)	2.0 (0.02)

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

**Result:** Pass

*Note:* See Architectural Testing Sketch #1 for indicator locations

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #3

Design Pressure:  $\pm 2880$  Pa ( $\pm 60.0$  psf)

**POSITIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)				
			#1	#2	#3	#4	#5
575 to 1440 (12.0 to 30.0)	3500	1.81	2.3 (0.09)	5.3 (0.21)	0.8 (0.03)	1.8 (0.07)	17.0 (0.67)
0 to 1725 (0 to 36.0)	300	2.85	2.0 (0.08)	6.1 (0.24)	0.3 (0.01)	1.5 (0.06)	21.1 (0.83)
1440 to 2300 (30.0 to 48.0)	600	2.65	3.6 (0.14)	8.1 (0.32)	0.8 (0.03)	2.3 (0.09)	25.4 (1.00)
865 to 2880 (18.0 to 60.0)	100	1.98	5.1 (0.20)	10.9 (0.43)	1.0 (0.04)	3.0 (0.12)	30.5 (1.20)
<b>Permanent Set</b>							
			1.8 (0.07)	1.3 (0.05)	<0.3 (<0.01)	0.8 (0.03)	1.5 (0.06)

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#6	#7	#8	#9
575 to 1440 (12.0 to 30.0)	3500	--	2.8 (0.11)	2.3 (0.09)	3.6 (0.14)	1.5 (0.06)
0 to 1725 (0 to 36.0)	300	--	3.3 (0.13)	2.0 (0.08)	3.3 (0.13)	1.5 (0.06)
1440 to 2300 (30.0 to 48.0)	600	--	4.1 (0.16)	2.5 (0.10)	4.6 (0.18)	1.5 (0.06)
865 to 2880 (18.0 to 60.0)	100	--	4.8 (0.19)	3.3 (0.13)	5.8 (0.23)	1.8 (0.07)
<b>Permanent Set</b>						
			1.0 (0.04)	0.3 (0.01)	0.3 (0.01)	<0.3 (<0.01)

Test Results: (Continued)

ASTM E 1886, *Air Pressure Cycling*

Test Unit #3

Design Pressure:  $\pm 2880$  Pa ( $\pm 60.0$  psf)

**NEGATIVE PRESSURE**

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)				
			#1	#2	#3	#4	#5
865 to 2880 (18.0 to 60.0)	50	2.06	6.9 (0.27)	12.2 (0.48)	2.8 (0.11)	6.1 (0.24)	39.1 (1.54)
1440 to 2300 (30.0 to 48.0)	1050	2.10	5.8 (0.23)	10.4 (0.41)	2.8 (0.11)	5.8 (0.23)	34.0 (1.34)
0 to 1725 (0 to 36.0)	50	2.98	5.1 (0.20)	8.1 (0.32)	2.3 (0.09)	4.8 (0.19)	26.7 (1.05)
575 to 1440 (12.0 to 30.0)	3350	2.13	5.1 (0.20)	7.4 (0.29)	2.3 (0.09)	4.8 (0.19)	24.1 (0.95)
<b>Permanent Set</b>							
			3.0 (0.12)	2.8 (0.11)	0.8 (0.03)	3.0 (0.12)	6.1 (0.24)

Pressure Range Pa (psf)	Number of Cycles	Average Cycle Time (seconds)	Maximum Deflection at Indicator mm (inch)			
			#6	#7	#8	#9
865 to 2880 (18.0 to 60.0)	50	--	8.1 (0.32)	4.8 (0.19)	7.6 (0.30)	3.0 (0.12)
1440 to 2300 (30.0 to 48.0)	1050	--	7.4 (0.29)	4.3 (0.17)	7.4 (0.29)	3.0 (0.12)
0 to 1725 (0 to 36.0)	50	--	6.1 (0.24)	3.3 (0.13)	5.8 (0.23)	2.5 (0.10)
575 to 1440 (12.0 to 30.0)	3350	--	5.8 (0.23)	3.3 (0.13)	5.8 (0.23)	2.5 (0.10)
<b>Permanent Set</b>						
			2.3 (0.09)	1.0 (0.04)	2.3 (0.09)	1.0 (0.04)

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

**Result: Pass**

*Note: See Architectural Testing Sketch #1 for indicator locations*

**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

**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.
Joe Cogan	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.

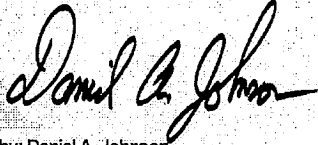
Results obtained are tested values and were secured by using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.



Digitally Signed by: 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: Sketches (2)
- Appendix-C: Drawings (48)