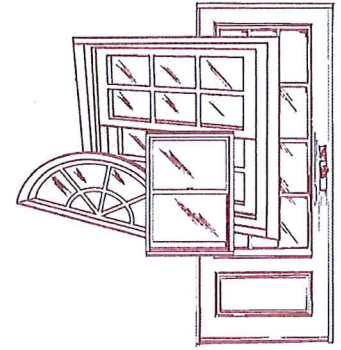


# Certified Testing Laboratories

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Report Number: CTLA 3006WA  
Report Date: October 17, 2014

## STRUCTURAL PERFORMANCE TEST REPORT

Test Requested By: Deceuninck North America, LLC  
351 North Garver Road  
Monroe, Ohio 45050

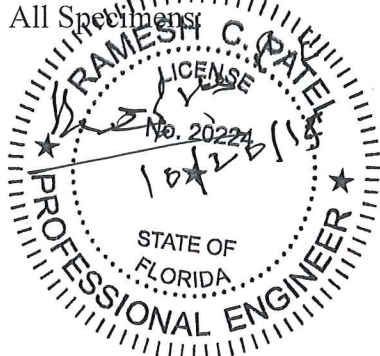
Product Type and Series: Series 623.620 PD/With Impact Brackets – High Pressure Vinyl Equal Leg Frame Impact Sliding Glass Door  
LC-PG 65-4876 mm x 2438 mm (192” x 96”) SD

Tests Conducted: AAMA/WDMA/CSA 101/I.S.2/A440-11 “Standard/Specification for Windows, Door and Unit Skylights”.  
AAMA 506-08 “Voluntary Specifications for Impact and Cycle Testing of Fenestration Products.”  
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-1996-09 “Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Windborne Debris in Hurricanes.”

### TEST SPECIMEN

Design Pressure: + 65.0 - 65.0  
Overall Size: 4876 mm x 2438 mm (192” wide x 96” high)  
All Specimens:  
Configuration: O/X/X/O Two (2) operable panels / Two (2) fixed panels  
All Specimens:  
Frame and Sash Material: Extruded vinyl  
All Specimens:

Frame Construction: The extruded vinyl main equal leg frame measured 4876 mm wide x 2438 mm high (192" wide x .96") high. The frame corners utilized coped and butted corner construction, secured with three (3) # 8 x 76mm (2.5") Phillips PH fasteners. Head and jamb extrusions measured 127.2 mm 5.008" wide x 51mm (2.007") high (refer to drawing # 10001100\_SH). The frame sill extrusion measured 127 mm (5.088") wide x 51mm(2.007") high (refer to drawing #10001101\_SH).The frame sill had vinyl sill insert running full length of fixed panel that measured 46mm (1.800") wide x 26mm (1.020") high and secured to frame utilizing four #8 x 32mm (1.250") Phillips CS self-drilling SMS (refer to drawing # 10001105\_SH). The frame sill incorporated a friction fit Waterdam sill extender that measured 6mm (.226") wide x 18mm (.701") high (refer to drawing # 200008052). An extruded vinyl frame adapter was utilized at the interior perimeter of the main frame and measured 54mm x 26mm (2.128" wide x 1.051" high).



**Panel Construction:** The operable panels measured 1245 mm (49.187") wide x 2369mm (93.500") high overall. The fixed panels measured 1238mm (49.187") wide x 2369mm (93.500") high overall. The panels utilized mitered and welded corner construction. The vinyl sash stiles, rails and interlock measured 45mm (1.755") wide x 102 mm (4.000") high (*refer to drawing # 10001102\_SH*).

The operable and fixed panel interlock stiles had an interlocking vinyl sash adapter measuring 51 mm (2.002") wide x 58 mm (2.279") high (*refer to drawing # 10001117\_SH Sash Adapter*) secured through the stile with nine (9) #8 x 16mm (0.625") Phillips PH self-drilling SMS located 102 mm (4") from top and bottom of panel and a maximum of 305 mm (12") on center thereafter.

The fixed panels were secured to frame head/sill with an aluminum HD/Impact (L) shaped bracket measuring 46 mm (1.500") wide x 77 mm (3.000") high overall (*refer to drawing # 623620PD*) and was secured to fixed panel interlock stile with two (2) #8 x 25mm (1.00") Phillips CS self-drilling SMS and to frame head/sill utilizing two (2) #8 x 19mm(0.750") Phillips CS self-drilling SMS and two (2) #8 x 64mm(2.500") Phillips CS fasteners per bracket

The fixed panels each had three (3) aluminum snubbers each measuring 45mm (1.780") wide x 32mm (1.242") high x 762 mm (30") long. Two (2) were secured equal distance on the frame jamb at each fixed panel location with nine (9) #8 x 32 mm (1.250") Phillips F.H. self-tapping S.M.S. The third aluminum snubber was centered at the frame head fixed panel. This frame head fixed panel snubber utilized no fasteners and was inserted between the frame head pocket and fixed panel sash top rail (*refer to drawing # 10300148*).

Two (2) aluminum T-Brackets were located at frame head of the operable panel track pocket c/l of the operable panel. The tracks/guides measured 47mm (1.845") wide x 29mm (1.145") high x 305mm (12.00") long. Each track/guide was secured to the frame head with eight (8) #8 x 64mm (2.500") Phillips F.H self-tapping S.M.S. (*refer to drawing # 10300213SH*).

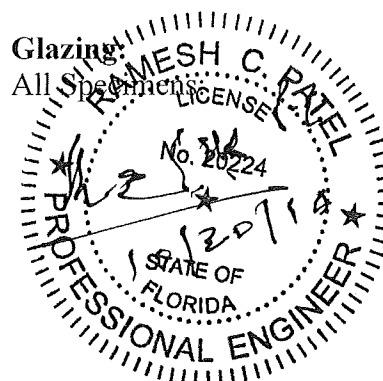
The four (4) lite 6061-T65 vertical aluminum astragal bar measured 58mm (4.00") wide x 60mm (.500") thick x full length. A vinyl astragal adapter was utilized on the interior and exterior of the vertical aluminum astragal, and measured 1.772" wide x 1.915" high (*refer to drawing # 10001183/ EMS 10-61-500*). The four (4) lite aluminum astragal was secured to the operable panel keeper stile with eight (8) #8 x 52mm (2.00") Phillips P.H.S.M.S. The fasteners were located at 127mm (5.00") from the each end of the vertical astragal and 305mm (12.000") on center thereafter.

**Day lite opening:**  
All Specimens:

Daylight opening for the fixed and operable panels measured 1038 mm (40.750") wide x 2162 mm (85.00") high.

**Glazing:**

All Specimens:



1.000" overall insulated glass consisting of the following as viewed from exterior to interior: One (1) exterior piece of .1875" tempered glass / one (1) .375" Duraseal / Quanex spacer system / one (1) piece of .125" annealed glass / 0.090" SGP interlayer by (Dupont) as stated by mfg.) / one (1) piece of .125" annealed glass. Setting block was Tremco dense rubber extrusion. Exterior glazed with silicone back bedding compound (Sikaflex 552 as stated by Mfg.), .625" glass bite (*refer to drawing # PA-007*) The glazing utilized an extruded vinyl snap-in glazing bead measuring (.283" wide x .977" high) overall with (*refer to drawing # 1001111\_SH Glazing Bead*)

**Reinforcement:**  
All Specimens:

One (1) H shaped aluminum reinforcement measuring 50mm (1.971") wide x 39mm (1.555") high x full length was located in each fixed panel interlock stile; passive panel interlock stile and operable panel astragal stile (*refer to drawing # 10300151*).

The fixed panel interlock reinforcement and the operable interlock reinforcement were secured through the interlock into stile with nine (9) #8 x 16mm (0.625") Phillips PH self-drilling SMS located 102 mm (4") from top and bottom of panel and a maximum of 305 mm (12") on center thereafter.

The operable panel astragal reinforcement was secured to the panel thru the astragal with eight (8) #8 x 52mm (2.00") Phillips P.H.S.M.S. The fasteners were located at 127mm (5.00") from the each end of the vertical astragal and 305mm (12.000") on center thereafter.

One (1) aluminum square tube reinforcement was inserted into each H shaped aluminum reinforcement at each operable panel vertical interlock rail and measured (1.00" wide x 1.00" high x .125" thick x full length). The tubular reinforcement was free floating (No fasteners were utilized) (*refer to drawing # 10300151-A & EMS 19-61-140*).

One (1) free floating aluminum reinforcement measuring 50 mm (1.965") wide x 39 mm (1.555") high x full length was located in each fixed panel jamb stile and active panel lockstile (*refer to drawing # 10300150*).

One (1) aluminum rail insert reinforcement in each operable panel bottom rail measured 1.555" wide x 1.971" high. Each rail insert was secured to the bottom rails with two (2) #8 x .750" TEK screws (*refer to drawing # 10300152*)

One (1) 1.500" x 1.500" x 8' x .125" aluminum "L" angle was located at frame sill interior, center mid-span. Secured to rough opening butted against interior frame sill attached to rough opening with eight (8) #12 x 1.500" Phillips SMS, 3" from each end and 12" OC thereafter. (*refer to drawing # EMS 11-63-275*).

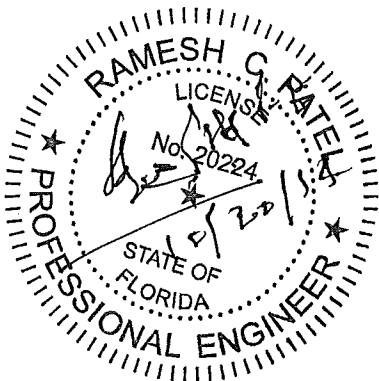
Four (4) Nylon Impact Brackets, One (1) each located at the operable panels interlock stiles, top/bottom rail interface. Secured with three (3) #8 x 2.5" PFH TEK SMS three (3) per bracket (*refer to drawing # 011H055-D*)

**Weep System:**  
All Specimens:

Four (4) weep notches that measured 25 mm (1.00") wide x 6 mm (.250") high were located as follows. One (1) at each corner of the exterior face of the frame sill and one (1) at each corner of the interior track leg of the frame sill. Each weep notch measured 76 mm (3.00") c/l from the frame jamb/sill corner connection.

**Weather-stripping:** All Specimens:

<u>Quantity</u>	<u>Description</u>	<u>Location</u>
Two (2) strips	Fin seal 9mm (.270") wide x 6 mm (.250") high	One (1) operable panel track and one (1) fixed panel track frame head
One (1) strip	Fin seal 9mm (.270") wide x 6 mm (.250") high	One (1) operable panel track frame sill
Two (2) strips	Fin seal 9mm (.270") wide x 6 mm (.250") high	One (1) each frame jamb.
Four (4) strip	Fin seal 9mm (.270") wide x 6mm (.250") high	One each operable and fixed panel interlock
Two (2) strips	Fin seal 9mm (.270") wide x 6mm (.250") high	Astragal one (1) on exterior and one (1) on interior



**Hardware:** All Specimens:

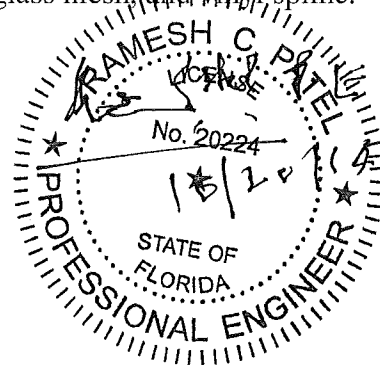
<u>Quantity</u>	<u>Description</u>	<u>Location</u>
Four (4)	Steel front adjustable tandem roller, 42mm (1.66") OD wheels, each secured with two (2) # 8 x 25mm(1.00") Phillips PH SMS (Amesbury Group) Ref. dwg.# 1988-8000-REV-SS	Each operable panel bottom rail corner
Two (2)	Inside/Outside Pull Handle	Located at lock stile of the operable panels
One (1)	Gemini II Lock with 2450 Trimplate, secured with four (4) # 10 x 32mm (1.250") Phillips flat head screws.	Lock stile of the operable panels located 972mm (38.250") c/l measuring from bottom of panel.
One (1)	Steel keeper (Gemini 1") secured with four (4) #8 x 76mm (3.00") Phillips P.H. screws.	Latch stile of the operable panels located 972mm (38.250") c/l measuring from bottom of panel.

**Installation:** All Specimens: The specimen was secured to the 50 mm x 305 mm double stacked (2" x 12") wood test buck utilizing #8 x 38 mm (1.500") Phillips PH SMS. Eight (8) in each frame jamb located at 152mm (6.00") from each end and a max. of 12" on center thereafter. Sixteen (16) in the frame head and frame sill located at 152 mm (6.00") from each end and a max. of 12" on center thereafter. (refer to drawing # 623620PD-007 OXXO).

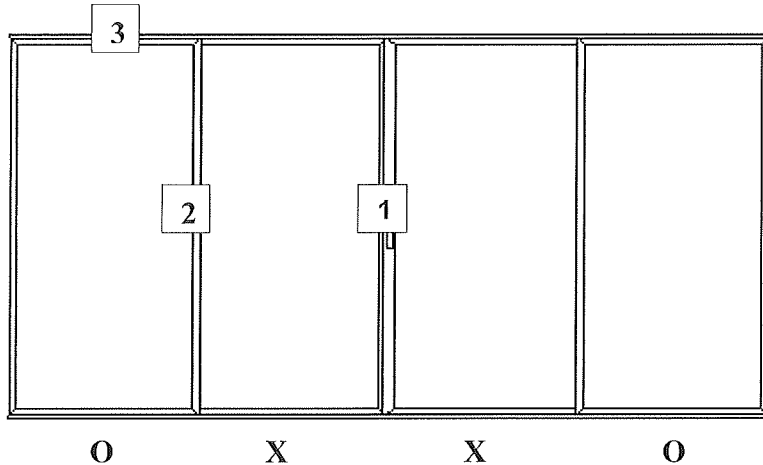
**Sealant:** Silicone caulking as needed to seal the test units to the wood bucks.

**Screen:** Roll formed aluminum screen with fiberglass mesh, and vinyl spline.

**Surface Finish:** White vinyl



**Performance Test Results**

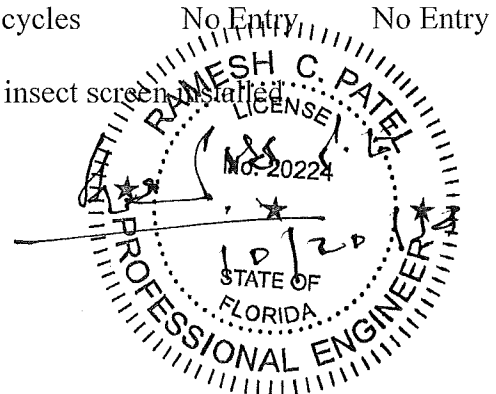


Deflection / Permanent Set were measured with three (3) dial indicators Mitutoyo control #'s A068, A067 & A070. Measurements were taken at #1 center mid-span of astragal, #2 center mid-span of interlock & #3 longest span between installation fasteners at frame head

**Specimen 1**

**Performance Test Results**

<u>Title of Test</u>	<u>Method</u>	<u>Measured</u>	<u>Allowed</u>
Operating Force Operable sash	ASTM E2068 Max. Force to maintain motion Max. Force to initiate motion	18 lbs. 27 lbs	20.23/lbs 30.35/lbs
Air Infiltration @ 1.57psf / 75 Pa The tested specimen meets the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440-11. Measured air recorded in two (2) decimals at client's request	ASTM E283	0.28 cfm/ft <sup>2</sup>	0.34 cfm/ft <sup>2</sup>
Water Resistance 5.0 gph/ft <sup>2</sup> WTP= 9.75 psf / 467 Pa The specimen was tested with and without an insect screen installed	ASTM E547 Four (4) 5 min. cycles	No Entry	No Entry



**Performance Test Results: Cont.**

**Specimen 1**

Uniform Structural Load

ASTM E330

**Design Pressure of +65.0psf**

Range of test	time	load		<u>Deflection</u>	<u>Perm. Set</u>	<u>Allowable</u>
<b>Positive loads</b>	(seconds)	psf				
½ Test load	10	48.75				
Design Load	10	65.0	Loc. 1	38.13 mm (1.501")	Gross	Record only
Test load	10	97.5	Loc. 1		3.74 mm (0.147")	9.5mm (.373")
Design Load	10	65.0	Loc. 2	28.68 mm (1.129")	Gross	Record only
Test load	10	97.5	Loc. 2		2.08 mm (0.082")	1.2mm (.373")
Design Load	10	65.0	Loc. 3	0.53 mm (0.021")	Gross	Record only
Test load	10	97.5	Loc. 3		0.10 mm (0.004")	9.5mm (.048")

**Design Pressure of -65.0psf**

Negative loads	(seconds)	psf				
½ Test load	10	48.75				
Design Load	10	65.0	Loc. 1	42.16 mm (1.660")	Gross	Record only
Test load	10	97.5	Loc. 1		1.90 mm (0.075")	9.5mm (.373")
Design Load	10	65.0	Loc. 2	33.53 mm (1.320")	Gross	Record only
Test load	10	97.5	Loc. 2		3.30 mm (0.130")	9.5mm (.373")
Design Load	10	65.0	Loc. 3	0.330 mm (0.013")	Gross	Record only
Test load	10	97.5	Loc. 3		0.203 mm (0.008")	1.2mm (.048")

Location (1) -Center mid-span astragal .004% of 2368mm (93.250") span = 9.5 mm (.373") allowable  
Permanent set

Location (2) -Center mid-span of the interlock .004% of 2368mm (93.250") span = 9.5 mm (.373")  
allowable permanent set

Location (3) -Longest span between installation anchors, frame head .004% of 305mm (12.00") span =  
1.2mm (.048") allowable permanent set

Forced Entry Resistance **ASTM F842** Passed No Entry

Type "C" Window Assembly T1= 5 min

L1/300 lbs-Passed, L2/175 lbs-Passed, L3/30lbs-Passed, L4/50lbs-Passed

Tools used: a spatula (10.1.1.1) and a piece of stiff wire (10.1.1.2)

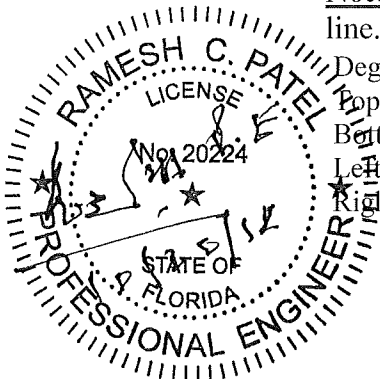
The test specimen meets the performance Grade 10.

Welded Corner Test **ASTM D 618** Passed

Test Procedure "A"

**Note:** When loaded to failure @ 47 lbs., the break did not extend along the entire weld line.

		<b>ASTM E 987</b>	<u>Measured</u>	<u>Allowed</u>	<u>Result</u>
Deglazing					
Top Rail	51.94 lbs.		0.28mm (.011") = 18%	< 90%	Passed
Bottom Rail	51.94 lbs.		0.46mm (.018") = 29%	< 90%	Passed
Left Stile	71.94 lbs.		0.23 mm (.009") = 14%	< 90%	Passed
Right Stile	71.94 lbs.		0.25 mm (.010") = 16%	< 90%	Passed



**Large Missile Impact**

Specimens 2, 3 & 4: AAMA 506-08/ASTM E-1996-09

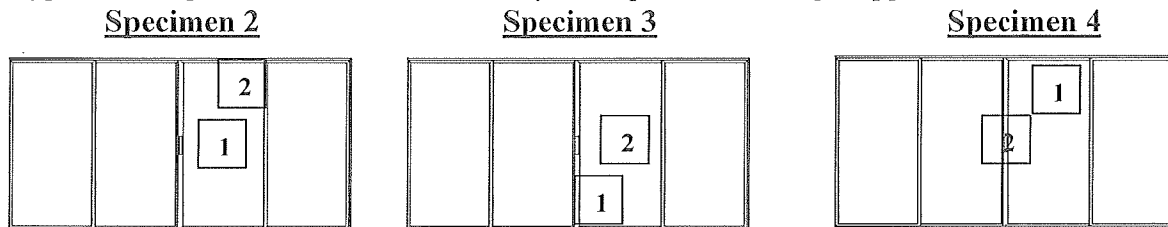
Specimens were tested to ASTM E-1886-05 and 1996-09 with no deviation to the test specifications. All specimens were tested to the Wind Zone 4 requirements stated in section 5 of ASTM E-1996-09. Missile level D. The missile orientation was perpendicular to the glass surface at impact. Each specimen was impacted with an 8 ft., 9 lb. Southern yellow pine 2" x 4" at the following locations:

**Note:**

X- measurement from left edge of test specimen.

Y- measurement from top edge of test specimen.

Type and weight of missile: #2 Southern yellow pine 2 x 4, length approx. 96" & 9 lb.



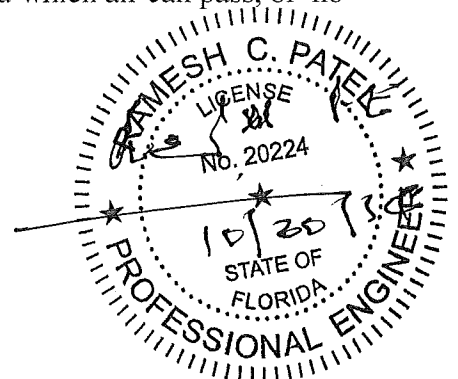
**Specimens 2, 3 and 4: ASTM E-1996-09.**

Specimen	Impact Loc.	Speed Ft/Sec	X Meas.	Y Meas.
No. 2	Loc: 1.	49.9	122.5"	47.50"
	Loc: 2.	50.1	139.00"	10.50"

Specimen	Impact Loc.	Speed Ft/Sec	X Meas.	Y Meas.
No. 3	Loc: 1.	50.0	105.00"	87.00"
	Loc: 2.	50.2	122.00"	47.00"

Specimen	Impact Loc.	Speed Ft/Sec	X Meas.	Y Meas.
No. 4	Loc: 1.	50.1	137.00"	09.50"
	Loc: 2.	50.2	96.00"	47.50"

**Results:** All specimens tested resisted the large missile impact, without penetration of the inner plane of the glazing. With no tear forming longer than 5" and wider than 1/16" thru which air can pass, or no opening through which a 3" diameter solid sphere could freely pass.



**Air Pressure Cycling**

All Specimens: AAMA 506-08/ASTM E-1996-09

Specimens were tested to AAMA 506-08/ASTM E-1996-09 with no deviation to the test specifications.  
 All specimens were tested to the requirements of section 5.4 table 1 in ASTM E-1996-09.

**Specimen 2**

**Design Load**      + 65.0 psf, -65.0 psf

+ Positive loads

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .2 - .5	13.0	32.5	3500	55
+ .0 - .6	0.00	39.0	300	55
+ .5 - .8	32.5	52.0	600	55
+ .3 - 1.0	19.5	65.0	100	55

4500 cycles complete

-Negative Loads

**Deflection/ Set**  
 1.750" 0.1875"

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .3 - 1.0	19.5	65.0	50	55
+ .5 - .8	32.5	52.0	1050	55
+ .0 - .6	0.00	39.0	50	55
+ .2 - .5	13.0	32.5	3350	55

4500 cycles complete

9000 cycles completed

**Deflection/ Set**  
 2.000" 0.250"

**Specimen 3**

**Design Load**      + 65.0 psf, -65.0 psf

+ Positive loads

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .2 - .5	13.0	32.5	3500	55
+ .0 - .6	0.00	39.0	300	55
+ .5 - .8	32.5	52.0	600	55
+ .3 - 1.0	19.5	65.0	100	55

4500 cycles complete

-Negative Loads

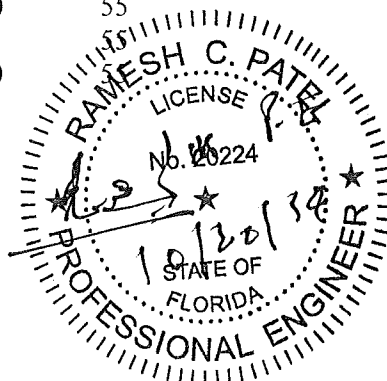
**Deflection/ Set**  
 1.875" 0.250"

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .3 - 1.0	19.5	65.0	50	55
+ .5 - .8	32.5	52.0	1050	55
+ .0 - .6	0.00	39.0	50	55
+ .2 - .5	13.0	32.5	3350	55

4500 cycles complete

9000 cycles completed

**Deflection/ Set**  
 2.125" 0.375"





**Specimen 4**

**Design Load** + 65.0 psf, -65.0 psf  
**+ Positive loads**

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .2 - .5	13.0	32.5	3500	55
+ .0 - .6	0.00	39.0	300	55
+ .5 - .8	32.5	52.0	600	55
+ .3 - 1.0	19.5	65.0	100	55

4500 cycles complete

**-Negative Loads**

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .3 - 1.0	19.5	65.0	50	55
+ .5 - .8	32.5	52.0	1050	55
+ .0 - .6	0.00	39.0	50	55
+ .2 - .5	13.0	32.5	3350	55

4500 cycles complete

**9000 cycles completed**

Deflection/ Set  
1.625" 0.1875"

Deflection/ Set  
2.000" 0.3125"

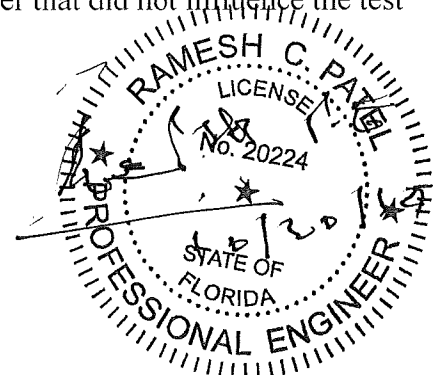
**Note:** The windows were operable at the end of cycle test.

**Results:** All specimens tested resisted the large missile impact, without penetration of the inner plane of the glazing and resisted the cycle pressure loading specified in Table 1. With no tear forming longer than 5" and wider than 1/16" thru which air can pass, or no opening through which a 3" diameter solid sphere could freely pass.

**Comment:**

1. At the conclusion of testing it was determined that the tested specimens passed the criteria of Wind Zone 4 set forth in ASTM E 1886-05 and ASTM E 1996-09.
2. The tested specimens were separated and conditioned for 4 hrs. Between 59 and 95 degrees Fahrenheit.
3. Nominal 2-mil polyethylene film was used to seal against air leakage during structural loads. The film was used in a manner that did not influence the test results.

**Test Dates:** January 27<sup>th</sup> 2014 thru June 13<sup>th</sup> 2014



**Remarks:** Detail drawings were available for laboratory records and comparison to the test specimen at the time of this report. A copy of this report along with representative sections of the test specimen will be retained by Certified Testing Laboratories for a period of four (4) years.  
The results obtained apply only to the specimen tested. This test report does not constitute certification of this product, but only the above test results were obtained using the designated test methods and they indicate compliance with the performance requirements (paragraphs as listed) of the above referenced specifications.

Certified Testing Laboratories assumed that all information provided by the client is accurate and that the physical and chemical properties of the components are as stated by the manufacturer.

Certified Testing Laboratories

**Testing Performed By:**

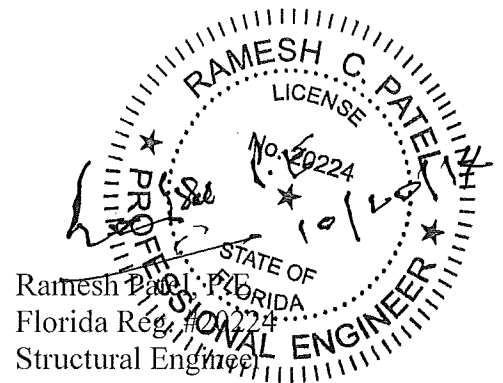
Mike Miller Certified Testing Laboratories  
Washington Romero Certified Testing Laboratories

**Client Present:**

Dennis Cox Deceuninck NA



Michael Miller  
Documentation Manager  
Certified Testing Laboratories



cc: Deceuninck NA (2)  
Ramesh Patel P.E. (1)  
File (1)