element

Element Materials Technology
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Report Number: **ESP014366P-3**
Report Date: **December 16th, 2013**

STRUCTURAL PERFORMANCE TEST REPORT

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

Product Type and Series: **Series 145.095 SS Vinyl (NC) Fin & (Rep) Equal Leg Frame Non Impact Glass Horizontal Sliding Window**
HS-LC 50 1880 mm x 1600 mm (73" x 62") 05 Designation
LC-PG 50 1880 mm x 1600 mm (73" x 62")-HS 08 Designation

Tests Conducted: **AAMA/WDMA/CSA 101/I.S.2/A440-11** *"Standard/Specification for Windows, Door and Unit Skylights".*

TEST SPECIMEN

Design Pressure: Specimen 1- AAMA/A440-11NC (Fin) + 50.0 psf. - 50.0 psf
Specimen 2- AAMA/A440-11(Struct. Only) Rep (Equal Leg) + 50.0 psf. - 50.0 psf

Overall Size: All Specimens-1880 mm wide x 1600 mm high (73" wide x 62" high)

Configuration: All Specimens- **X/O** One (1) operable sash/One (1) Fixed sash

Frame and Sash Material: Extruded vinyl
All Specimens

Frame Construction:
All Specimens

The extruded vinyl fin/NC & equal leg/Rep. frame measured (74" wide x 63" high) buck opening overall. The vinyl fin/NC frame included a 1.125" integral fin. Frame corners utilized mitered and welded construction. Head, Sill and Jambs measured (3.652" wide x 2.500" high) *(refer to drawing #10008684-SH).* Fixed meeting stile was coped and butted, secured thru frame head/sill with two (2) #8 x 3.000" PPH Truss head screws *(drawing#143095SS-007Elevation meeting rail).*Two (2) vinyl slider track inserts were located in the frame sill and head *(refer to drawing # 10008469-SH)* and inserted on an aluminum slider track reinforcement in the frame sill and head and secured at each head, sill & jamb corner & c/l at fixed meeting rail with two (2) #8 x .750" PPH SMS *(refer to drawing # 10300189-SH).*

Sash Construction:
All Specimens

Sash constructed from extruded vinyl and utilized mitered and welded corner construction. One (1) fixed sash measured (36.5" wide x 60.75" high) overall. One (1) active sash measured (36.5"wide x 60.5" high) overall. The sash top and bottom rail measured (1.300" wide x 1.510" high) *(refer to drawing #10008857-SH).* The sash lock stile measured (1.551" wide x 1.250" high) *(refer to drawing #10008845-SH).* The sash pull stile measured (1.551" wide x 1.250" high) *(refer to drawing #10008882-SH).* The sash fixed meeting rail measured (1.524" wide x 2.118" high) *(refer to drawing #10008511-SH).*

Day lite opening:
All Specimens

Day lite opening for fixed lite measured 864 mm x 1518 mm (33.1875" wide x 57.00" high) overall Day lite opening for operable sash measured 1819 mm x 1448 mm (33.1875" wide x 55.875" high) overall.

Glazing:
All Specimens

¾" overall Insulated (Non-impact) glass consisting of the following: As viewed from the exterior, operable sash was exterior glazed as follows: One (1) piece of .125" annealed glass / one (1) .4375" nominal Quanex Duraseal spacer system (as stated by manufacturer) One (1) piece of .125" annealed glass. As viewed from the exterior, fixed lite was interior glazed as follows: One (1) piece of .125" annealed glass / one (1) .4375" nominal Quanex Duraseal spacer system (as stated by manufacturer) One (1) piece of .125" annealed glass. (reference drawing #3/4" I.G, 1/8" ANN /SPACER SYSTEM/ 1/8" ANN.). The operable sash was exterior glazed, fixed sash was interior glazed with an adhesive back bedding compound Structural silicone as stated by the manufacturer. The glazing utilized an extruded vinyl slide-in glazing bead around the exterior perimeter measuring .195" wide x .570" high overall with a .625" glass bite. (refer to drawing #10005470-SH).

Weather-stripping: All Specimens

Quantity	Description	Location
One (1) strip	Center fin wool pile .187 x .290" high	Sash stile
One (1) strip	Center fin wool pile .187 x .290" high	Sash top rail
One (1) strip	Center fin wool pile .187 x .290 high	Sash bottom rail
One (1) strip	Center fin wool pile .187 x .290 high	Sill riser for D/P 70 water

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Hardware & Location: All Specimens

Quantity	Description	Location
Two (2)	Keepers	Fixed Meeting Stile. Each located 8" c/l from head/sill. Each secured with two (2) #6 x .750" PFH fasteners.
Two (2)	Locks	Sash Lock Stile. Each located 8" c/l from sash corners. Each secured with two (2) #6 x 1.0" PFH self tapping fasteners.
Two (2)	Roller Housings	Sash Bottom Rail. One at each corner. Secured with two (2) #8 x .375" PPH fasteners.

Weep system: All Specimens

Quantity	Description	Location
Two (2)	Weep Covers	Sill face 2.00" from each sill corner *(drawing # W646000)* Draining to exterior
Two (2)	Weep Slots	Sill face 2.00" from each sill corner. Draining to exterior. *(drawing #100003356F-06)*
Two (2)	Weep Slots	Sill Frame under glass *(drawing #100003356F-06)*

Reinforcement:
All Specimens

One (1) extruded aluminum reinforcement was located in fixed meeting stile x full length *(refer to drawing #10300084).*
Two (2) extruded aluminum reinforcement were located in each sash rail x full length *(refer to drawing #10300082).*
One (1) extruded aluminum reinforcement was located in sash pull stile x full length *(refer to drawing #10300207).*

Sealant:

Latex caulking as Specimen needed to seal the test units to the wood bucks.

Screen:
All Specimens

Roll formed aluminum screen with fiberglass mesh, vinyl spline and plastic corner keys. Two (2) plastic pull tabs and two (2) aluminum spring clips.

Installation:
All Specimens

Test specimen was tested in a 2" x 12" S.Y.P. main test buck with a 2" x 4" pine/fur/spruce sub-buck utilizing twenty-six (26) #8 x 6mm (1.250") Phillips P.H., S.M.S. fasteners located as follows:

- **Frame head and sill:**
- Seven (7) located at 152mm (6.00") from each frame head, sill and jamb corner and 330 mm nominally (10.00") max. O/C thereafter.
- **Frame jambs:**
- Six (6) in each frame jamb located at 152 mm (6.00") from each frame head, sill and jamb corner and 330 mm nominally (10.00") max. O/C thereafter.

Surface Finish:

White

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Performance Test Results

Title of Test	Method	Measured	Allowed
Specimen: 1 (Fin)			
Operating Force	**ASTM E2068-00**		
Operable sash	Max. Force to maintain motion	21 lbs.	25/lbs
	Max. Force to initiate motion	28 lbs	Report only
	Force to open/close locks	7/19 lbs.	22.5
Air Infiltration @ 1.57psf	**ASTM E283-04**	0.04 cfm/ft²	0.34 cfm/ft²
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			
Water Resistance 5.0 gph/ft² WTP=7.50 psf	**ASTM E547-00** Four (4) 5 min. cycles	No Entry	No Entry
The specimen was tested with and without an insect screen installed.			

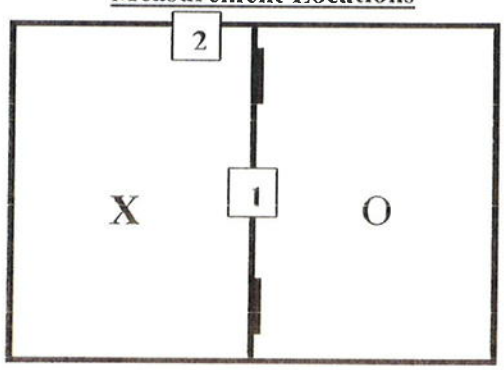
Paragraph

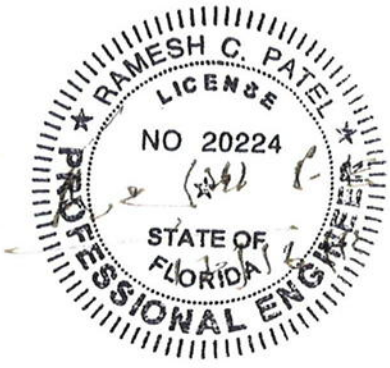
5.3.4.2 Specimen #1(Fin)

Uniform Structural Load was conducted to **ASTM E330-02** with no deviations to test method. Unit was tested to a **Design Pressure of +50.0psf**

Range of test	time	load		Deflection	Perm. Set	Allowable
Positive loads	(seconds)	psf				
½ Test load	10	37.5				
Design Load	10	50.0	Loc. 1	7.4 mm (0.342")		
			Loc. 2	6.1 mm (0.265")		
Test load	10	75.0	Loc. 1		1.1mm (0.073")	5.8mm (.228")
			Loc. 2		0.7mm (0.042")	1.2mm (.048")
Design Pressure of -50.0psf						
Negative loads	(seconds)	psf				
½ Test load	10	37.5				
Design Load	10	50.0	Loc. 1	7.0 mm (0.782")		
			Loc. 2	5.2 mm (0.450")		
Test load	10	75.0	Loc. 1		0.8mm (0.088")	5.8mm (.228")
			Loc. 2		0.5mm (0.039")	1.2mm (.048")

Measurement Locations





Performance Test Results: Cont.

5.3.4.2 Specimen #1(Fin)
Uniform Structural Load was conducted to **ASTM E330-02** with no deviations to test method. Unit was tested to a **Design Pressure of +/-50.0psf**

Location (1) - Max. Allowable Perm. Set after test load at center mid-span of the fixed meeting stile.(0.4% of 1556 mm (57.00") span) = 5.8 mm (0.228")

Location (1) - Max. Allowable Perm. Set after test load at longest unsupported span between installation fasteners frame head.(0.4% of 1556 mm (12.00") span) = 1.2 mm (0.048")

Title of Test	Method	Measured	Allowed
Specimen: 1 (Fin)			
Forced Entry Resistance	**ASTM F588-07**	Passed	
Type "A" Window Assembly T_1 = 10 minutes			
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 40.			
Welded Corner Test	**ASTM D 618-08**	Passed	

Note: When loaded to failure @ 39 lbs., the break did not extend along the entire weld line.

Deglazing **ASTM E 987-09**

	Allowed	Measured	Results
Lock Stile	70 lbs.	0.23mm (.009") = 1.8% < 90%	Passed
Lead Stile	70 lbs.	0.05mm (.002") = 0.4% < 90%	Passed
Bottom Rail	50 lbs.	0.05mm (.002") = 0.4% < 90%	Passed
Top Rail	50 lbs.	0.02mm (.001") = 0.2% < 90%	Passed

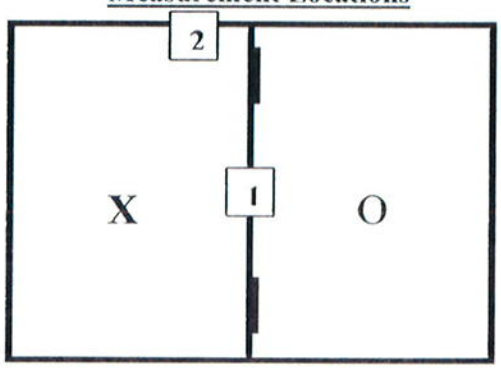
Paragraph

5.3.4.2 Specimen #2(Equal Leg) Structural only

Uniform Structural Load was conducted to **ASTM E330-02** with no deviations to test method. Unit was tested to a **Design Pressure of +50.0psf**

Range of test	time	load		**Deflection**	**Perm. Set**	**Allowable**
Positive loads	(seconds)	psf				
½ Test load	10	37.5				
Design Load	10	50.0	Loc. 1	7.4 mm (0.342")		
			Loc. 2	6.1 mm (0.265")		
Test load	10	75.0	Loc. 1		1.1mm (0.042")	5.8mm (.228")
			Loc. 2		0.7mm (0.037")	1.2mm (.048")
Design Pressure of -50.0psf						
Negative loads	(seconds)	psf				
½ Test load	10	37.5				
Design Load	10	50.0	Loc. 1	7.0 mm (0.782")		
			Loc. 2	5.2 mm (0.450")		
Test load	10	75.0	Loc. 1		0.8mm (0.038")	5.8mm (.228")
			Loc. 2		0.5mm (0.039")	1.2mm (.048")

Measurement Locations



Location (1) - Max. Allowable Perm. Set after test load at center mid-span of the fixed meeting stile.(0.4% of 1556 mm (57.00") span) = 5.8 mm (0.228")

Location (1) - Max. Allowable Perm. Set after test load at longest unsupported span between installation fasteners frame head.(0.4% of 1556 mm (12.00") span) = 1.2 mm (0.048")

Comment:

1. 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 Date: November 11, 2013

Test Completion Date: November 13, 2013

Remarks: Detailed 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 Element Materials Technology 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 that 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. Element Materials Technology assumes 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.

Element Materials Technology

Testing Performed/Witnessed By:

Mike Miller	Element Materials Technology
Washington Romero	Element Materials Technology

Client Present:

Dennis Cox	Deceuninck NA

Michael Miller
Documentation Manager
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cc:

Deceuninck NA	(2)
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