

Report Number: CTLA 1561W  
Report Date: August 24, 2006

## STRUCTURAL PERFORMANCE TEST REPORT

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

Product Type and Series: Series 143.095 SH-ST Vinyl Fin Frame Impact Single Hung Window With Nailing Fin Trim (48" x 72")

Tests Conducted: 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, Curtain Walls, Doors, and Storm Shutters Impacted by Windborne Debris in Hurricanes."

### TEST SPECIMEN

Design Pressure: All Specimens- Vinyl Fin Frame Single Hung Window  
+ 50.0 psf. - 50.0 psf

Overall Size: All Specimens- 47 1/2" wide x 71 1/2" high (window size)

Configuration: All Specimens- One (1) fixed top lite/ one (1) operable sash bottom  $\frac{O}{X}$

Frame and Sash Material: Extruded vinyl  
All Specimens

Frame Construction: The extruded vinyl fin frame measured 47 1/2" wide x 71 1/2" high buck opening overall. All frame members were measured as follows: the frame head extrusion measured 3.652" wide x 2.500" high (refer to drawing #10008687.SH ), the frame jamb extrusion measured 3.652" wide x 2.500" high (refer to drawing #10008686.SH ) and the High Rise frame sill extrusion measured 3.729" wide x 2.246" high (refer to drawing #10008672.SH ). The frame member corners utilized mitered and welded construction

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**Sash Construction:** One (1) fixed lite top measuring 36" wide x 45" high overall. One (1) active sash measuring 44.250" wide x 35" high overall. The sash stiles measured 1.300" wide x 1.250" high (refer to drawing #10008842.SH ). The sash lock rails measured 1.300" wide x 1.250" high (refer to drawing #10008845.SH ). The sash lift rails measured 1.300" wide x 1.250" high (refer to drawing #10008882.SH ). Sash constructed from extruded vinyl and utilized mitered and welded corner construction.. Fixed meeting rail measured 1.524" wide x 2.118" high (refer to drawing #10008511.SH ) and was secured to the frame jambs with two (2) extruded vinyl mullion clips, one (1) per each jamb and measured 1.254" wide x 2.500" high (refer to drawing #E-12512 ). The mullion clip was secured to the frame jambs with two (2) #6 x .625" Phillips F.H. S.M.S. per each frame jamb. One (1) #8 x 3.000" Phillips.F.H., S.M.S., fastener was used to secure the fixed meeting rail to the frame jambs, one (1) per each jamb.

**Day lite opening:** Day lite opening for fixed lite measured 42.500" wide x 32.250" high overall. Day lite opening for operable sash measured 41.750" wide x 32" high overall

**Glazing:** 3/4" overall laminated glass consisting of the following: One (1) exterior piece of 1/8" annealed glass / one (1) .250" aluminum reinforced butyl swiggle spacer system (as stated by manufacturer) One (1) interior piece of 1/8" annealed glass / .090" laminate by Solutia / One (1) interior piece of 1/8" annealed glass. Exterior glazed with an adhesive back bedding compound Sikaflex-552® as stated by the manufacturer (refer to drawing #142194DH-DP50 ). The glazing utilized an extruded vinyl snap-in glazing bead measuring .195" wide x .570" high overall with a .625" glass bite. (refer to drawing #10005470 SH). Glass was manufactured by Thompson I.G. Inc. as stated by the manufacturer.

**Weather-stripping:**  
 All Specimens

<u>Quantity</u>	<u>Description</u>	<u>Location</u>
Two (2) strips	Wool pile with integral fin .290" high	One each sash stile
One (1) strip	Wool pile with integral fin .290" high	Frame sill
One (1) strip	Wool pile .290" high	Frame sill interior leg.
One (1) strip	Wool pile w/o fin .187" wide x .200" high	Fixed meeting rail
One (1) strip	Vinyl bulb .384" wide x .300" high	Bottom sash rail

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**Hardware & Location:**

All Specimens

<u>Quantity</u>	<u>Description</u>	<u>Location</u>
Two (2)	FS-550 Spring Loaded Balance System	One (1) per each frame jamb
Two (2)	Metallic tilt latch spring loaded	One (1) 1.500" c/l from each sash top rail corner
Two (2)	Aluminum impact clip reinforcements	One (1) 1.500" c/l from each sash top rail corner Located under the metallic tilt latch
Two (2)	Cast aluminum cam locks	One (1) 8" c/l from each jamb corner on sash top rail locking into keepers in the fixed meeting rail.

**Weep system:** Two (2) weep slots located at 2.500" c/l from each corner of frame jamb and frame sill on exterior of screen retaining leg measuring 1.00" wide x .125" high overall.  
 All Specimens

**Reinforcement:** One (1) extruded aluminum reinforcement was located in fixed meeting rail and was secured at each frame jamb with one (1) #8 x 3.000" Phillips F.H. S.M.S., fasteners The reinforcement measured 1.085" wide x 1.064" high x full length (refer to drawing # ). Per each active sash stiles and rails one (1) extruded aluminum reinforcement was utilized. The aluminum reinforcements measured 1.018" wide x .345" high x full length and were secured at the active sash top rails with eight (8) #8 x 1.000" Phillips F.H. S.M.S. The aluminum reinforcements in the active sash stiles and bottom rail were free floating inserted and did not utilize any fasteners. Two (2) metallic sill interlocks were secured to the frame sill exterior leg with two (2) #8 x .375" Phillips F.H. S.M.S. Each interlock was located at 15" c/l from each sill corner and measured .379" wide x 1.840" high.  
 All Specimens

**Sealant:** Narrow joint seam sealer on all hairline joinery. Silicone caulking as needed to seal the test units to the wood bucks.  
 All Specimens

**Screen:** N/A

**Installation:** Test specimens were tested in a 2" x 10" S.Y.P. main test buck and a 2" x 4" sub-buck with a 1.500" wide x 1.000" thick pine/fur/spruce nailing fin around the exterior perimeter utilizing sixteen (16) #8 x 1.500" Philips flat head C.S., S.M.S. fasteners located as follows:  
 All Specimens

- **Frame head:** Three (3) located at 7", 24" and 41" measuring from left jamb to right jamb.
- **Frame sill:** Three (3) located at 7", 24" and 41" measuring from left jamb to right jamb.
- **Frame jambs:** Five (5) in each frame jamb located at 4.500", 21.500", 37", 54" and 69.750" measuring from frame head to frame sill.

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**Surface Finish:**                      White vinyl  
 All Specimens

**Performance Test Results**

**Large Missile Impact**

All Specimens: **ASTM E-1996-02**

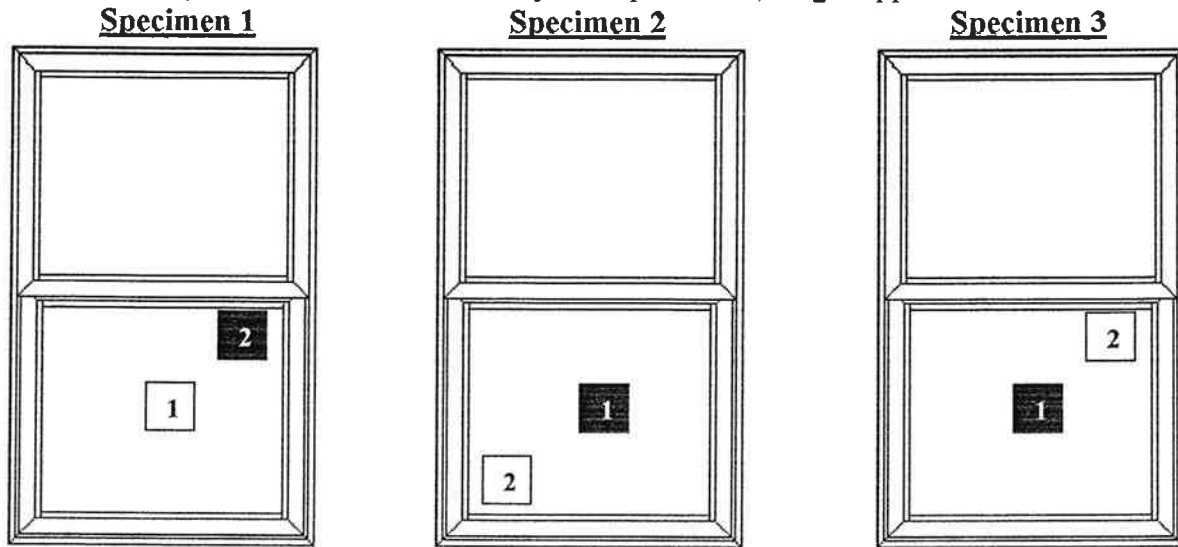
Specimens were tested to **ASTM E-1886-02 and 1996-02** with no deviation to the test specifications. All specimens were tested to the Wind Zone 4 requirements stated in section 5 of **ASTM E-1996-02**, Missile level D. The missile orientation was perpendicular to the glass surface at impact. Each specimen 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 1, 2 and 3: ASTM E-1996-02.

<b>Specimen</b>	<b>Impact Loc.</b>	<b>Speed Ft/Sec</b>	<b>X Meas.</b>	<b>Y Meas.</b>
No. 1	Loc: 1.	49.9	23.000"	57.000"
	Loc: 2.	49.3	34.500"	44.000"

<b>Specimen</b>	<b>Impact Loc.</b>	<b>Speed Ft/Sec</b>	<b>X Meas.</b>	<b>Y Meas.</b>
No. 2	Loc: 1.	49.9	23.500"	56.500"
	Loc: 2.	50.3	9.500"	63.000"

<b>Specimen</b>	<b>Impact Loc.</b>	<b>Speed Ft/Sec</b>	<b>X Meas.</b>	<b>Y Meas.</b>
No. 3	Loc: 1.	49.7	24.000"	57.000"
	Loc: 2.	49.9	34.000"	44.500"

**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" or no opening through which a 3" diameter solid sphere could freely pass.

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**Air Pressure Cycling**

All Specimens: ASTM E-1886-02

Specimens were tested to ASTM E-1886-02 and 1996-02 with no deviation to the test specifications.  
All specimens were tested to the requirements of section 5.4 table 1 in ASTM E-1996-02.

**Specimen 1**

**Design Load**      + 50.0 psf, -50.0 psf  
+ Positive loads

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .2 - .5	10.0	25.0	3500	55
+ .0 - .6	0.00	30.0	300	55
+ .5 - .8	25.0	40.0	600	55
+ .3 - 1.0	15.0	50.0	100	55

4500 cycles complete

Deflection/ Set  
1.750" 0.125"

-Negative Loads

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .3 - 1.0	15.0	50.0	50	55
+ .5 - .8	25.0	40.0	1050	55
+ .0 - .6	0.00	30.0	50	55
+ .2 - .5	10.0	25.0	3350	55

4500 cycles complete

Deflection/ Set  
2.375" 0.250"

9000 cycles completed

**Specimen 2**

**Design Load**      + 50.0 psf, -50.0 psf  
+ Positive loads

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .2 - .5	10.0	25.0	3500	55
+ .0 - .6	0.00	30.0	300	55
+ .5 - .8	25.0	40.0	600	55
+ .3 - 1.0	15.0	50.0	100	55

4500 cycles complete

Deflection/ Set  
2.000" 0.0625"

-Negative Loads

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .3 - 1.0	15.0	50.0	50	55
+ .5 - .8	25.0	40.0	1050	55
+ .0 - .6	0.00	30.0	50	55
+ .2 - .5	10.0	25.0	3350	55

4500 cycles complete

Deflection/ Set  
2.250" 0.250"

9000 cycles completed

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**Air Pressure Cycling: Continued**

**ASTM E-1886-02**

**Specimen 3**

**Design Load      + 50.0 psf, -50.0 psf  
+ Positive loads**

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .2 - .5	10.0	25.0	3500	55
+ .0 - .6	0.00	30.0	300	55
+ .5 - .8	25.0	40.0	600	55
+ .3 - 1.0	15.0	50.0	100	55

4500 cycles complete

**Deflection/ Set**  
1.875" 0.1875"

**-Negative Loads**

<u>Range of test</u>	<u>Actual load PSF</u>		<u># of cycles</u>	<u>Cycles/min</u>
+ .3 - 1.0	15.0	50.0	50	55
+ .5 - .8	25.0	40.0	1050	55
+ .0 - .6	0.00	30.0	50	55
+ .2 - .5	10.0	25.0	3350	55

4500 cycles complete

**Deflection/ Set**  
2.125" 0.250"

**9000 cycles completed**

**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" 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 1886-02 and ASTM E 1996-02.
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 Date:** August 1, 2006

**Test Completion Date:** August 3, 2006

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8/25/06

**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 CTL 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.

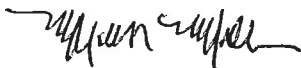
Certified Testing Laboratories

**Testing Performed By:**

- Kenny Stringer CTL
- Ted Scanlon CTL
- Gary Nations CTL
- Ryan Blakely CTL

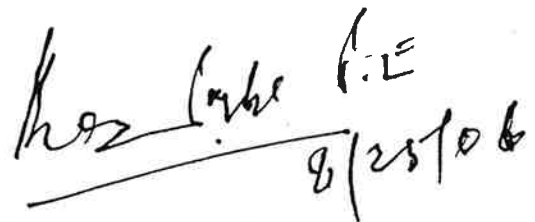
**Client Present:**

- Dennis Cox Deceuninck NA
- Jonathan Morton Deceuninck NA



Michael Miller  
Senior Lab Technician  
Certified Testing Laboratories

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