

**TEST REPORT**

**Report No.:** C7326.01-109-47

**Rendered to:**

MI WINDOWS AND DOOR, LLC  
Gratz, Pennsylvania

**PRODUCT TYPE:** PVC Single Hung Window  
**SERIES/MODEL:** 3540

**SPECIFICATION:** AAMA/WDMA/CSA 101/I.S.2/A440-08, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

**Test Dates:** 04/10/13  
**Through:** 08/28/13  
**Revision 1:** 10/02/13  
**Report Date:** 09/17/13

**Summary of Results**

<b>Summary of Results</b>		
<b>Title</b>	<b>Test Specimen #1</b>	<b>Test Specimen #2</b>
Primary Product Designator	Class LC-PG30 1219 x 2438 (48 x 96)-H	Class LC-PG25 1219 x 2165* (48 x 85*)-H
Design Pressure	±1440 Pa (±30.08 psf)	±1200 Pa (±25.06 psf)
Air Infiltration	0.9 L/s/m <sup>2</sup> (0.17 cfm/ft <sup>2</sup> )	N/A
Water Penetration Resistance Test Pressure	260 Pa (5.43 psf)	N/A

<b>Summary of Results</b>		
<b>Title</b>	<b>Test Specimen #3</b>	<b>Test Specimen #4</b>
Primary Product Designator	Class LC-PG35 914 x 1880* (36 x 74*)-H	Class LC-PG35 1118 x 1829* (44 x 72*)-H
Design Pressure	±2400 Pa (±50.13 psf)	+1680 Pa (+35.30 psf)
Negative Design Pressure	N/A	-2260 Pa (-47.20 psf)
Air Infiltration	N/A	N/A
Water Penetration Resistance Test Pressure	N/A	N/A

**Test Completion Date:** 08/28/2013

Reference must be made to Report No. C7326.01-109-47, dated 10/02/13 for complete test specimen description and detailed test results.



**1.0 Report Issued To:** MI Windows and Doors, LLC  
P.O. Box 370  
650 West Market Street  
Gratz, Pennsylvania 17030-0370

**2.0 Test Laboratory:** Architectural Testing, Inc.  
130 Derry Court  
York, Pennsylvania 17406-8405  
717-764-7700

**3.0 Project Summary:**

**3.1 Product Type:** PVC Single Hung Window

**3.2 Series/Model:** 3540

**3.2.1 This product also labeled under the following names:** 3540SPSH, 3240, and 3240SPSH

**3.3 Compliance Statement:** Results obtained are tested values and were secured by using the designated test method(s). The specimens tested successfully met the performance requirements for the following ratings: Test Specimen #1: **Class LC-PG30 1219 x 2438 (48 x 96)-H**; Test Specimen #2: **Class LC-PG25 1219 x 2165\* (48 x 85\*)-H**; Test Specimen #3: **Class LC-PG35 914 x 1880\* (36 x 74\*)-H**; Test Specimen #4: **Class LC-PG35 1118 x 1829\* (44 x 72\*)-H**.

*General Note: An asterisk (\*) next to the size designation indicates that the size tested for optional performance was smaller than the Gateway test size for the product type and class.*

**3.4 Test Dates:** 04/10/2013 - 08/28/2013

**3.5 Test Record Retention End Date:** All test records for this report will be retained until September 17, 2017.

**3.6 Test Location:** MI Windows and Doors, LLC test facility in Gratz, Pennsylvania. Calibration of test equipment was performed by Architectural Testing in accordance with AAMA 205-01 "In-Plant Testing Guidelines for Manufacturers and Independent Laboratories".

**3.7 Test Sample Source:** The test specimens were provided by the client. Representative samples of the test specimen(s) will be retained by Architectural Testing for a minimum of four years from the report completion date.

**3.8 Drawing Reference:** The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimens reported herein. Test specimen construction was verified by Architectural Testing per the drawings on file with Architectural Testing. Any deviations are documented herein or on the drawings.

### 3.0 Project Summary: (Continued)

#### 3.9 List of Official Observers:

<u>Name</u>	<u>Company</u>
Rick Sawdey	MI Windows and Doors, LLC
Jeremy R. Bender	Architectural Testing, Inc.

### 4.0 Test Specification(s):

AAMA/WDMA/CSA 101/I.S.2/A440-08, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

### 5.0 Test Specimen Description:

#### 5.1 Product Sizes:

##### Test Specimen #1:

Overall Area: 2.9 m <sup>2</sup> (32.0 ft <sup>2</sup> )	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	1219	48	2438	96
Interior sash	1172	46-1/8	892	35-1/8
Screen	1149	45-1/4	870	34-1/4

##### Test Specimen #2:

Overall Area: 2.6 m <sup>2</sup> (28.4 ft <sup>2</sup> )	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	1219	48	2165	85-1/4
Interior sash	1172	46-1/8	894	35-3/16
Screen	1149	45-1/4	870	34-1/4

##### Test Specimen #3:

Overall Area: 1.7 m <sup>2</sup> (18.0 ft <sup>2</sup> )	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	914	36	1880	74
Interior sash	865	34-1/16	926	36-7/16
Screen	845	33-1/4	902	35-1/2

## 5.0 Test Specimen Description: (Continued)

### 5.1 Product Sizes: (Continued)

#### Test Specimen #4:

Overall Area: 2.0 m <sup>2</sup> (22.0 ft <sup>2</sup> )	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	1118	44	1829	72
Interior sash	1068	42-1/16	900	35-7/16
Screen	1048	41-1/4	873	34-3/8

*The following descriptions apply to all specimens.*

### 5.2 Frame Construction:

Frame Member	Material	Description
Head, sill, jambs, and fixed meeting rail	PVC	Extruded, the sill utilized a snap-in extruded PVC sill adaptor, sealed with adhesive foam tape and silicone.

	Joinery Type	Detail
Head, sill, and jambs	Mitered	Thermoplastic weld
Fixed meeting rail	Coped and butted	Secured at each end with PVC end caps. The end caps were secured to the fixed meeting rails with three #6 x 1-1/8" long Phillips flat head screws and secured to the jambs using three #6 x 5/8" long screws

### 5.3 Sash Construction:

Sash Member	Material	Description
Rails and stiles	PVC	Extruded

	Joinery Type	Detail
All corners	Mitered	Thermoplastic weld

**5.0 Test Specimen Description:** (Continued)

**5.4 Weatherstripping:**

Description	Quantity	Location
0.187" backed by 1/8" diameter offset foam-filled vinyl bulb	1 Row	Fixed meeting rail
0.187" backed by 0.240" high polypile with center fin	1 Row	Sash stiles, interior meeting rail, and sill adaptor
0.187" backed by 0.310" high polypile with center fin	1 Row	Sash stiles
0.187" backed by 5/16" diameter offset foam-filled bulb	1 Row	Sash bottom rail

**5.5 Glazing:** *No conclusions of any kind regarding the adequacy or inadequacy of the glass in any glazed test specimen(s) can be made.*

**Test Specimen #1:**

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
3/4" IG	Metal reinforced butyl	1/8" clear annealed	1/8" clear annealed	Sash - Interior glazed against a bead of silicone and secured using snap-in PVC glazing beads. Fixed - Interior glazed against double-sided foam tape and secured using snap-in PVC glazing beads.

**Test Specimens #2, #3, and #4:**

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
3/4" IG	Metal reinforced butyl	3/32" clear annealed	3/32" clear annealed	Sash - Interior glazed against a bead of silicone and secured using snap-in PVC glazing beads. Fixed - Interior glazed against double-sided foam tape and secured using snap-in PVC glazing beads.

## 5.0 Test Specimen Description: (Continued)

### Test Specimen #1:

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Sash daylight opening	1	1095 x 818	43-1/8 x 32-3/16	1/2"
Fixed daylight opening	1	1121 x 1440	44-1/8 x 56-11/16	1/2"

### Test Specimen #2:

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Sash daylight opening	1	1095 x 818	43-1/8 x 32-3/16	1/2"
Fixed daylight opening	1	1121 x 1165	44-1/8 x 45-7/8	1/2"

### Test Specimen #3:

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Sash daylight opening	1	791 x 851	31-1/8 x 33-1/2	1/2"
Fixed daylight opening	1	818 x 849	32-3/16 x 33-7/16	1/2"

### Test Specimen #4:

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Sash daylight opening	1	994 x 826	39-1/8 x 32-1/2	1/2"
Fixed daylight opening	1	1019 x 829	40-1/8 x 32-5/8	1/2"

## 5.0 Test Specimen Description: (Continued)

### 5.6 Drainage:

Drainage Method	Size	Quantity	Location
Weephole	1/2" long by 3/16" wide	2	Glazing channel, 1" from each end, draining to hollow below
Weephole	1/2" long by 1/16" wide	2	Sash bottom rail, 2-1/2" from each end
Weep notch	1-1/16" long by 1/8" high	2	Exterior sill leg ends
Weephole	1" long by 1/8" high	2	Sill face, 3" from each end, draining to exterior sill hollow
Weephole	5/8" long by 1/4" high	2	Sill sash track ends, draining to central hollow
Weephole	5/8" long by 1/4" high	2	Sill central hollow ends, draining to exterior sill hollow
Weephole	1/2" long by 5/32" wide	2	Sill adaptor track, 1" from each end, draining to exterior sill hollow
Weephole	1/2" long by 3/16" wide	2	Sill, 2-1/2" from each end, draining to exterior sill hollow

### 5.7 Hardware:

Description	Quantity	Location
Metal cam lock	2	Interior meeting rail, 7" from each end with keepers aligned opposite on fixed meeting rail
PVC surface mount tilt latch	2	Interior meeting rail ends
Coil balances	2	One in each jamb
Metal pivot bar	2	Bottom rail ends





**5.0 Test Specimen Description:** (Continued)

**5.8 Reinforcement:**

<b>Drawing Number</b>	<b>Location</b>	<b>Material</b>
GVL-451-020	Sash rails and stiles	Steel
RF-104S-020	Fixed meeting rail	Steel

**5.9 Screen Construction:**

<b>Frame Material</b>	<b>Corner Construction</b>	<b>Mesh Type</b>	<b>Mesh Attachment Method</b>
Roll-formed aluminum	Square-cut and keyed with plastic keys	Fiberglass	Flexible vinyl spline

**6.0 Installation:**

The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 1/8" shim space. The exterior perimeter of the window was sealed with sealant.

<b>Location</b>	<b>Anchor Description</b>	<b>Anchor Location</b>
Jambs	#8 x 1-1/4" long pan head screws	3" from head and sill and one midspan, through the frame into the wood buck



**7.0 Test Results:** The temperature during testing was 21°C (70°F). The results are tabulated as follows:

**Test Specimen #1:**

<b>Title of Test</b>	<b>Results</b>	<b>Allowed</b>	<b>Note</b>
<b>Operating Force,</b> per ASTM E 2068	Initiate motion: 53 N (12 lbf) Maintain motion: 67 N (15 lbf) Latches: 18 N (4 lbf) Locks: 13 N (3 lbf)	Report Only  135 N (30 lbf) max.  100 N (22.5 lbf) max.  100 N (22.5 lbf) max.	
<b>Air Leakage,</b> Infiltration per ASTM E 283 at 75 Pa (1.57 psf)	0.9 L/s/m <sup>2</sup> (0.17 cfm/ft <sup>2</sup> )	1.5 L/s/m <sup>2</sup> (0.3 cfm/ft <sup>2</sup> ) max.	1
<b>Water Penetration,</b> per ASTM E 547	N/A	N/A	3
<b>Uniform Load Deflection,</b> per ASTM E 330	N/A	N/A	3
<b>Uniform Load Structural,</b> per ASTM E 330	N/A	N/A	3
<b>Forced Entry Resistance,</b> per ASTM F 588, Type: A - Grade: 10	Pass	No entry	
<b>Thermoplastic Corner Weld</b>	Pass	Meets as stated	
<b>Deglazing,</b> per ASTM E 987 Operating direction, 320 N (70 lbf) Remaining direction, 230 N (50 lbf)	Pass  Pass	Meets as stated  Meets as stated	



**7.0 Test Results:** (Continued)

**Test Specimen #1:** (Continued)

Title of Test	Results	Allowed	Note
<b>Optional Performance</b>			
<b>Water Penetration,</b> per ASTM E 547 at 260 Pa (5.43 psf)	Pass	No leakage	2
<b>Uniform Load Deflection,</b> per ASTM E 330 taken at meeting rail +1440 Pa (+30.08 psf) -1440 Pa (-30.08 psf)	20.1 mm (0.79") 16.8 mm (0.66")	Report Only	4, 5, 6
<b>Uniform Load Structural,</b> per ASTM E 330 taken at meeting rail +2160 Pa (+45.11 psf) -2160 Pa (-45.11 psf)	4.3 mm (0.17") 2.8 mm (0.11")	4.6 mm (0.18") max. 4.6 mm (0.18") max.	5, 6

**Test Specimen #2:**

Title of Test	Results	Allowed	Note
<b>Optional Performance</b>			
<b>Uniform Load Deflection,</b> per ASTM E 330 taken at meeting rail +1200 Pa (+25.06 psf) -1200 Pa (-25.06 psf)	15.5 mm (0.61") 16.5 mm (0.65")	Report Only	4, 5, 6
<b>Uniform Load Structural,</b> per ASTM E 330 taken at meeting rail +1800 Pa (+37.59 psf) -1800 Pa (-37.59 psf)	2.0 mm (0.08") 2.8 mm (0.11")	4.6 mm (0.18") max. 4.6 mm (0.18") max.	5, 6

**7.0 Test Results:** (Continued)**Test Specimen #3:**

Title of Test	Results	Allowed	Note
<b>Optional Performance</b>			
<b>Uniform Load Deflection,</b> per ASTM E 330 taken at meeting rail +2400 Pa (+50.13 psf) -2400 Pa (-50.13 psf)	10.9 mm (0.43") 8.6 mm (0.34")	Report Only	4, 5, 6
<b>Uniform Load Structural,</b> per ASTM E 330 taken at meeting rail +3600 Pa (+75.19 psf) -3600 Pa (-75.19 psf)	2.0 mm (0.08") 3.0 mm (0.12")	3.0 mm (0.12") max. 3.0 mm (0.12") max.	5, 6

**Test Specimen #4:**

Title of Test	Results	Allowed	Note
<b>Optional Performance</b>			
<b>Uniform Load Deflection,</b> per ASTM E 330 taken at meeting rail +1690 Pa (+35.30 psf) -2260 Pa (-47.20 psf)	12.9 mm (0.51") 19.8 mm (0.78")	Report Only	4, 5, 6
<b>Uniform Load Structural,</b> per ASTM E 330 taken at meeting rail +2535 Pa (+52.95 psf) -3390 Pa (-70.80 psf)	2.0 mm (0.08") 3.6 mm (0.14")	4.1 mm (0.16") max. 4.1 mm (0.16") max.	5, 6

*Note 1: The tested specimen meets (or exceeds) the performance levels specified in AAMA/WDMA/CSA 101/I.S.2/A440 for air leakage resistance.*

*Note 2: With and without insect screen.*

*Note 3: The client opted to start at a pressure higher than the minimum required. Test results are reported under Optional Performance.*

*Note 4: The deflections reported are not limited by AAMA/WDMA/CSA 101/I.S.2/A440 for this product designation. The deflection data is recorded in this report for special code compliance and information only.*

*Note 5: Loads were held for 10 seconds.*

*Note 6: 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.*



Architectural Testing will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Architectural Testing, Inc. for the entire test record retention period.

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 specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, Inc.

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Jeremy R. Bender  
Technician

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Michael D. Stremmel, P.E.  
Senior Project Engineer

JRB:vlm/dem

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix-A: Alteration Addendum (1)

Appendix-B: Complete drawings packet on file with Architectural Testing, Inc.



### Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
1	10/02/13	Summary Page and Page 4	Revised Test Specimen #3 Design Pressure in results table. Revised Test Specimen #'s in glazing description.



## Appendix A

### Alteration Addendum

- Alteration #1:** Date - 05/22/13  
Cause for alteration - Test Specimen #1 - Fixed Daylight Opening glass broke while trying to achieve +45 psf  
Remedial action taken - Replaced Fixed Daylight Opening glass
- Alteration #2:** Date - 05/22/13  
Cause for alteration - Test Specimen #3 - Tilt latch disengaged while trying to achieve +75 psf  
Remedial action taken - Replaced sash
- Alteration #3:** Date - 06/11/13  
Cause for alteration - Test Specimen #1 - Tilt latch disengaged while trying to achieve +45 psf  
Remedial action taken - Replace sash



**Architectural Testing**

Test Report No.: C7326.01-109-47

Revision 1: 10/02/13

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## **Appendix B**

### **Drawings**

***Note:** Complete drawings packet on file with Architectural Testing, Inc.*