



**TEST REPORT**

**Report No.:** E9329.01-109-47

**Rendered to:**

MI WINDOWS AND DOORS, LLC  
Gratz, Pennsylvania

**PRODUCT TYPE:** Polyvinyl Chloride (PVC) Single Hung Window  
**SERIES/MODEL:** 3500

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

Title	Summary of Results	
	Test Specimen #1	Test Specimen #2
AAMA/WDMA/CSA 101/I.S.2/A440-08	Class R-PG15 1219 x 2134 (48 x 84)-H	Class R-PG15 1219 x 2134 (48 x 84)-H
Design Pressure	+720 Pa (+15.04 psf)	+720 Pa (+15.04 psf)
Negative Design Pressure	-960 Pa (-20.05 psf)	-960 Pa (-20.05 psf)
Air Infiltration	0.9 L/s/m <sup>2</sup> (0.18 cfm/ft <sup>2</sup> )	N/A
Water Penetration Resistance Test Pressure	220 Pa (4.60 psf)	N/A

**Test Completion Date:** 07/29/15

Reference must be made to Report No. E9329.01-109-47, dated 09/11/15 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.,  
an Intertek company ("Intertek-ATI")  
130 Derry Court  
York, Pennsylvania 17406-8405  
717-764-7700

### 3.0 Project Summary:

**3.1 Product Type:** Polyvinyl Chloride (PVC) Single Hung Window

**3.2 Series/Model:** 3500

**3.2.1 This product also labeled under the following names:** 3540, 3250, 3240, 1255, M-3500, S-3500, S-3540, 3500SPSH, 3540SPSH, 3250SPSH, 3240SPSH, 3500HPSPSH, 1255HP

**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(s)	Title	Summary of Results
1	101/I.S.2/A440-08	Class R-PG15 1219 x 2134 (48 x 84)-H
2	101/I.S.2/A440-08	Class R-PG15 1219 x 2134 (48 x 84)-H

**3.4 Test Dates:** 07/07/15 - 07/29/15

**3.5 Test Record Retention End Date:** All test records for this report will be retained until July 29, 2019.

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

**3.7 Test Specimen Source:** The test specimen(s) were provided by the client. Representative samples of the test specimen(s) will be retained by Intertek-ATI for a minimum of four years from the test completion date.

**3.8 Drawing Reference:** The test specimen drawings have been reviewed by Intertek-ATI and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek-ATI per the drawings on file with Intertek-ATI. 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>
Richie Williard	MI Windows and Doors, LLC
Jeremy R. Bender	Intertek-ATI

#### 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 Specimens #1 and #2:

Overall Area: 2.6 m <sup>2</sup> (28.0 ft <sup>2</sup> )	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	1219	48	2134	84
Interior sash	1168	46	1057	41-5/8
Screen	1149	45-1/4	1029	40-1/2

*The following descriptions apply to all specimens.*

##### 5.2 Frame Construction:

Frame Member	Material	Description
Head, sill, and jambs	PVC	Extruded, the sill utilized a vinyl snap-in sill, sealed with silicone
Fixed meeting rail	PVC	Extruded

	Joinery Type	Detail
All corners	Mitered	Thermally welded
Fixed meeting rail	Coped and butted	PVC end clips were utilized on the ends of the meeting rail and secured to the fixed meeting rail with three #6 x 1-1/4" long screws per clip and secured to the frame with three #6 x 5/8" long screws.

## 5.0 Test Specimen Description: (Continued)

### 5.3 Sash Construction:

Sash Member	Material	Description
Rails and stiles	PVC	Extruded

	Joinery Type	Detail
All corners	Mitered	Thermally welded

### 5.4 Weatherstripping:

Description	Quantity	Location
3/16" round, foam-filled, vinyl bulb seal	1 Row	Fixed meeting rail
0.187" backed by 0.240" high polypile with center fin	1 Row	Interior vertical sill leg, interior meeting rail, and sash stiles
1/4" round, foam-filled, vinyl bulb seal with single leaf	1 Row	Bottom rail
0.187" backed by 0.310" high polypile with center fin	1 Row	Sash stiles

**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.*

#### Sash:

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
3/4" IG	Metal reinforced butyl	1/8" clear annealed	1/8" clear annealed	The glass was interior glazed against a bed of silicone and secured with PVC snap-in glazing beads.

#### Fixed glass:

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
3/4" IG	Metal reinforced butyl	1/8" clear annealed	1/8" clear annealed	The glass was interior glazed against double-sided adhesive tape and secured with PVC snap-in glazing beads.

## 5.0 Test Specimen Description: (Continued)

### 5.5 Glazing: (Continued)

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Sash daylight opening	1	1092 x 978	43 x 38-1/2	1/2"
Fixed daylight opening	1	1118 x 972	44 x 38-1/4	1/2"

### 5.6 Drainage: A sloped sill was utilized.

Drainage Method	Size	Quantity	Location
Weepslot	1/2" long by 1/16" wide	4	Bottom rail, 2-1/2" from the ends, draining onto the sill
Weephole	1/2" long by 3/16" wide	2	Sill, 2" from the ends, draining into the hollow below
Weepslot	1" wide by 3/16" high	4	Sill, interior hollow, draining through the intermediate hollow and into the exterior hollow
Weepslot	1" wide by 1/8" high	2	Sill face, 3" from the ends draining the unit

### 5.7 Hardware:

Description	Quantity	Location
Metal cam locks with adjacent keepers	2	Interior meeting rail, 7" from the ends
Recessed vinyl tilt latches	2	Interior meeting rail ends
Constant force balances	2	One per jamb sash pocket
Metal pivot pars	2	Bottom rail ends

### 5.8 Reinforcement:

Drawing Number	Location	Material
GVL-451-020	Interior meeting rail and bottom rail	Roll-formed steel liner
RF-104S-020	Fixed meeting rail	Roll-formed steel liner

## 5.0 Test Specimen Description: (Continued)

### 5.9 Screen Construction:

Frame Material	Corner Construction	Mesh Type	Mesh Attachment Method
Roll-formed aluminum	Square-cut and keyed	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.

### Test Specimen #1:

Location	Anchor Description	Anchor Location
Head, sill, and jambs	#6 x 1-5/8" long screws	2" from the corners and spaced 8" to 10" on center, through the mounting fin into the wood buck

### Test Specimen #2:

Location	Anchor Description	Anchor Location
Jambs	#8 x 2" long pan head screws	4" from the head and sill

**7.0 Test Results:** The temperature during testing was 22°C (71°F). The results are tabulated as follows:

**Test Specimen #1:**

Title of Test	Results	Allowed	Note
<b>Operating Force,</b> per ASTM E 2068	Initiate motion: 49 N (11 lbf) Maintain motion: 80 N (18 lbf) Latches: 9 N (2 lbf) Locks: 13 N (3 lbf)	Report only  155 N (35 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> (0.18 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 Deflections taken at meeting rail +720 Pa (+15.04 psf) -720 Pa (-15.04 psf)	9.4 mm (0.37") 8.1 mm (0.32")	Report only	4, 5, 6
<b>Uniform Load Structural,</b> per ASTM E 330 Permanent sets taken at meeting rail +1080 Pa (+22.56 psf) -1080 Pa (-22.56 psf)	0.8 mm (0.03") 0.8 mm (0.03")	4.6 mm (0.18") max. 4.6 mm (0.18") max.	5, 6
<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	

**7.0 Test Results:** (Continued)

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

Title of Test	Results	Allowed	Note
<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	
<b>Optional Performance</b>			
<b>Water Penetration,</b> per ASTM E 547 at 220 Pa (4.60 psf)	Pass	No leakage	2
<b>Uniform Load Deflection,</b> per ASTM E 330 Deflections taken at meeting rail +720 Pa (+15.04 psf) -960 Pa (-20.05 psf)	9.4 mm (0.37") 10.9 mm (0.43")	Report only	4, 5, 6
<b>Uniform Load Structural,</b> per ASTM E 330 Permanent sets taken at meeting rail +1080 Pa (+22.56 psf) -1440 Pa (-30.08 psf)	0.8 mm (0.03") 1.3 mm (0.05")	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 Deflections taken at meeting rail +760 Pa (+15.04 psf) -960 Pa (-20.05 psf)	9.7 mm (0.38") 10.7 mm (0.42")	Report only	4, 5, 6
<b>Uniform Load Structural,</b> per ASTM E 330 Permanent sets taken at meeting rail +1080 Pa (+22.56 psf) -1440 Pa (-30.08 psf)	1.0 mm (0.04") 0.8 mm (0.03")	4.6 mm (0.18") max. 4.6 mm (0.18") max.	5, 6



## 7.0 Test Results: (Continued)

*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.*

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

For ARCHITECTURAL TESTING, Inc.

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Jeremy R. Bender  
Senior Technician

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Timothy J. McGill  
Manager - Product Testing

JRB:asm

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

Appendix-A: Alteration Addendum (1)

Appendix-B: Location of Air Seal (1)

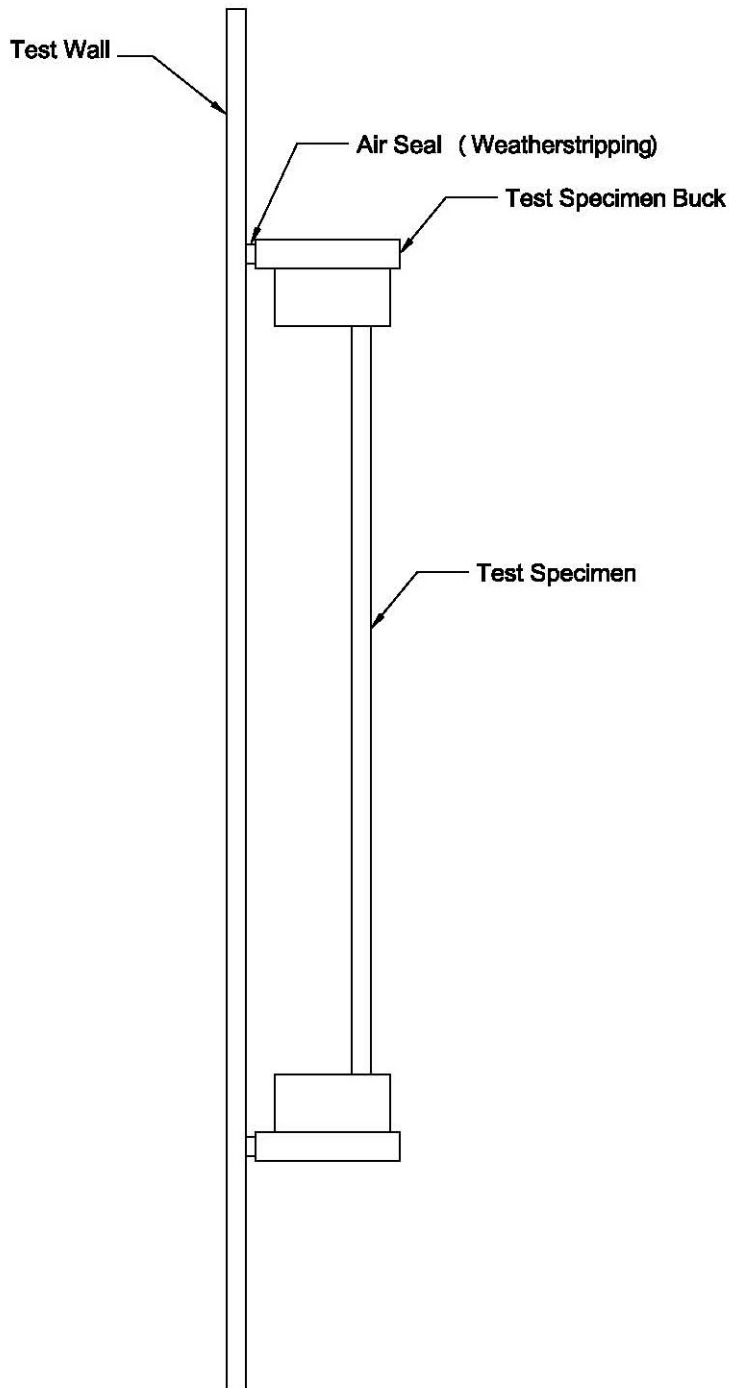
Appendix-C: Complete drawings packet on file with Intertek-ATI.

**Appendix A**  
**Alteration Addendum**

*Note: No alterations were required.*

### Appendix B

**Location of Air Seal:** The air seal between the test specimen and the test wall is detailed below. The seal is made of foam weatherstripping and is attached to the edge of the test specimen buck. The test specimen buck is placed against the test wall and clamped in place, compressing the weatherstripping and creating a seal.



## **Appendix C**

### **Drawing(s)**

***Note:** Complete drawings packet on file with Intertek-ATI.*