TEST REPORT

Report No.: F2597.01-109-47

Rendered to:

MI WINDOWS AND DOORS, LLC
Gratz, Pennsylvania

PRODUCT TYPE: Aluminum Single Hung Window
SERIES/MODEL: 515

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

	Summary of Results	
Title	**Test Specimen #1**	**Test Specimen #2**
AAMA/WDMA/CSA 101/I.S.2/A440-08	Class R-PG25 1324 x 2438 (52 x 96)-H	Class R-PG40 1324 x 1829 (52 x 72)-H
Design Pressure	±1200 Pa (±25.06 psf)	+1920 Pa (+40.10 psf)
Negative Design Pressure	N/A	-2160 Pa (-45.11 psf)
Air Infiltration	0.66 L/s/m^2 (0.13 cfm/ft^2)	N/A
Water Penetration Resistance Test Pressure	290 Pa (6.06 psf)	N/A

Test Completion Date: 11/09/15

Reference must be made to Report No. F2597.01-109-47, dated 04/21/16 for complete test specimen description and detailed test results.

1.0 Report Issued To: MI Windows and Doors, LLC
650 West Market Street
P.O. Box 370
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: Aluminum Single Hung Window

3.2 Series/Model: 515

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-PG25 1324 x 2438 (52 x 96)-H
2	101/I.S.2/A440-08	Class R-PG40 1324 x 1829 (52 x 72)-H

3.4 Test Dates: 11/02/15 - 11/09/15

3.5 Test Record Retention End Date: All test records for this report will be retained until November 9, 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.

3.9 List of Official Observers:

Name	Company
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 Specimen #1:

Overall Area: 3.2 m² (34.75 ft²)	**Width**		**Height**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	1324	52-1/8	2438	96
Interior sash	1273	50-1/8	911	35-7/8
Screen	1256	49-7/16	905	35-5/8

Test Specimen #2:

Overall Area: 2.4 m² (26.0 ft²)	**Width**		**Height**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	1324	52-1/8	1829	72
Interior sash	1273	50-1/8	911	35-7/8
Screen	1256	49-7/16	905	35-5/8

5.0 Test Specimen Description: (Continued)

The following descriptions apply to all specimens.

5.2 Frame Construction:

Frame Member	Material	Description
Head, sill, and jambs	Aluminum	Extruded
Fixed meeting rail	Aluminum	Extruded

	Joinery Type	Detail
Head/jamb corners	Coped and butted	Sealed with silicone and secured with two #6 x 3/4" long pan head screws per corner
Sill/jamb corners	Coped and butted	Sealed with a butyl backed foam pad and secured with two #6 x 3/4" long pan head screws per corner
Fixed meeting rail	Coped and butted	Sealed with silicone and secured at each end with two #6 x 3/4" long pan head screws, through the jamb into the meeting rail

5.3 Sash Construction:

Sash Member	Material	Description
Rails and stiles	Aluminum	Extruded

	Joinery Type	Detail
Stile/bottom rail corner	Coped and butted	Secured with one #6 x 3/4" long pan head screws per corner
Stile/meeting rail corner	Coped and butted	Secured with two #6 x 3/4" long pan head screws per corner

5.0 Test Specimen Description: (Continued)

5.4 Weatherstripping:

Description	Quantity	Location
0.187" backed by 0.190" finseal weatherstrip	1 Row	Fixed meeting rail
0.187" backed by 0.190" finseal weatherstrip	1 Row	Sash lock rail
0.187" backed by 0.270" finseal weatherstrip	2 Rows	Sash stiles
Slide in 0.400" hollow vinyl bulb seal	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: (Fixed Glass)

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
5/8" IG	Metal reinforced butyl spacer	1/8" clear annealed	1/8" clear annealed	Interior glazed onto a bead of silicone and secured with PVC snap-in glazing beads

Test Specimen #1: (Sash Glass)

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
5/8" IG	Metal reinforced butyl spacer	3/32" clear annealed	3/32" clear annealed	Interior glazed onto a bead of silicone and secured with PVC snap-in glazing beads

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	Inches	
Fixed daylight opening	1	1222 x 1457	48-1/8 x 57-3/8	1/2"
Sash daylight opening	1	1222 x 826	48-1/4 x 32-1/2	1/2"

5.0 Test Specimen Description: (Continued)

5.5 Glazing: (Continued)

Test Specimen #2:

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
5/8" IG	Metal reinforced butyl spacer	3/32" clear annealed	3/32" clear annealed	Interior glazed onto a bead of silicone and secured with PVC snap-in glazing beads

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Fixed daylight opening	1	1222 x 838	48-1/8 x 33	1/2"
Sash daylight opening	1	1226 x 829	48-1/4 x 32-5/8	1/2"

5.6 Drainage: A sloped sill was utilized.

5.7 Hardware:

Description	Quantity	Location
Sweep lock	2	8" from each end of the interior meeting rail
Spiral balances	2	One per jamb
Surface mount tilt latches	2	Ends of lock rail
Metal pivot bar	2	Ends of bottom rail

5.8 Reinforcement: No reinforcement was utilized.

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.

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

Title of Test	Results	Allowed	Note
Operating Force, per ASTM E 2068	Initiate motion: 147 N (33 lbf) Maintain motion: 98 N (22 lbf) Locks: 4 N (1 lbf)	Report only 155 N (35 lbf) max. 100 N (22.5 lbf) max.	
Air Leakage, Infiltration per ASTM E 283 at 75 Pa (1.57 psf)	0.66 L/s/m^2 (0.13 cfm/ft^2)	1.5 L/s/m^2 (0.3 cfm/ft^2) max.	1
Water Penetration, per ASTM E 547	N/A	N/A	3
Uniform Load Deflection, per ASTM E 330	N/A	N/A	3
Uniform Load Structural, per ASTM E 330	N/A	N/A	3
Forced Entry Resistance, per ASTM F 588, Type: A - Grade: 10	Pass	No entry	
Thermoplastic Corner Weld	Pass	Meets as stated	
Deglazing, 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
Optional Performance			
Water Penetration, per ASTM E 547 at 290 Pa (6.06 psf)	Pass	No leakage	2
Uniform Load Deflection, per ASTM E 330 Deflections taken at meeting rail +1200 Pa (+25.06 psf) -1200 Pa (-25.06 psf)	 16.3 mm (0.64") 15.2 mm (0.60")	 Report only	 4, 5, 6
Uniform Load Structural, per ASTM E 330 Permanent sets taken at meeting rail +1800 Pa (+37.59 psf) -1800 Pa (-37.59 psf)	 0.51 mm (0.02") 1.0 mm (0.04")	 4.8 mm (0.19") max. 4.8 mm (0.19") max.	 5, 6

Test Specimen #2:

Title of Test	Results	Allowed	Note
Uniform Load Deflection, per ASTM E 330	N/A	N/A	3
Uniform Load Structural, per ASTM E 330	N/A	N/A	3
Optional Performance			
Uniform Load Deflection, per ASTM E 330 Deflections taken at meeting rail +1920 Pa (+40.10 psf) -2160 Pa (-45.11 psf)	 22.1 mm (0.87") 24.1 mm (0.95")	 Report only	 4, 5, 6
Uniform Load Structural, per ASTM E 330 Permanent sets taken at meeting rail +2880 Pa (+60.15 psf) -3240 Pa (-67.67 psf)	 2.8 mm (0.11") 3.0 mm (0.12")	 4.8 mm (0.19") max. 4.8 mm (0.19") 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.

Digitally Signed by: Jeremy R. Bender

Jeremy R. Bender
Lead Technician

Digitally Signed by: Timothy J. McGill

Timothy J. McGill
Manager - Product Testing

JRB:cmd/asm/cmd

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.

Revision Log

Rev. #	Date	Page(s)	Revision(s)
1	12/22/15	Page 6	Changed overall IG size
2	01/20/16	Page 5	Changed overall IG size
3	04/21/16	Cover, page 1	Revised Series/Model

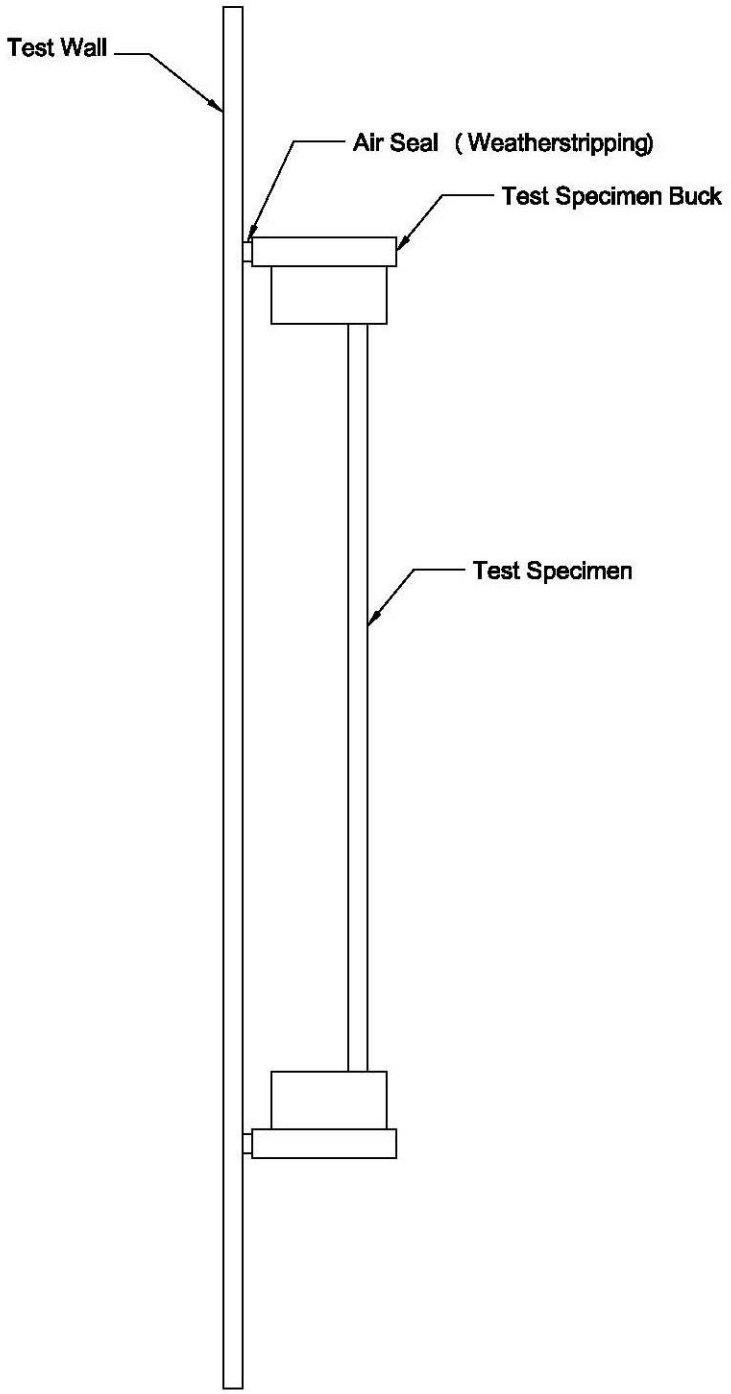
Appendix A

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.*