Architectural Testing

TEST REPORT

Report No.: B2718.02-301-47

Rendered to:

MI WINDOWS AND DOORS, INC.
Prescott Valley, Arizona

PRODUCT TYPE: Polyvinyl Chloride (PVC) XO Horizontal Sliding Window
SERIES/MODEL: EC 160

SPECIFICATION: AAMA/WDMA/CSA 101/I.S.2/A440-05, *Standard/Specification for Windows, Doors, and Unit Skylights.*

CAWM 301, *Forced Entry Resistance Test for Windows.*

Test Dates: 08/23/11
Through: 06/18/12
Report Date: 07/13/12
Revision 2 Date: 07/31/12
Record Retention End Date: 06/18/16

Architectural Testing

Summary of Results

	Summary of Results	
Title	**Test Specimen #1**	**Test Specimen #2**
Primary Product Designator	HS-C30 2432 x 1522 (96 x 60)	HS-R20 2128 x 1825 (84 x 72)
Design Pressure	±1440 Pa (±30.08 psf)	±960 Pa (±20.05 psf)
Air Infiltration	0.25 L/s/m^2 (0.05 cfm/ft^2)	0.30 L/s/m^2 (0.06 cfm/ft^2)
Water Penetration Resistance Test Pressure	290 Pa (6.06 psf)	290 Pa (6.06 psf)

	Summary of Results
Title	**Test Specimen #3**
Primary Product Designator	HS-LC40 1828 x 1524 (72 x 60)
Design Pressure	±1920 Pa (±40.10 psf)
Air Infiltration	-
Water Penetration Resistance Test Pressure	-

Test Completion Date: 06/18/2012

Reference must be made to Report No. B2718.02-301-47 dated 07/31/12 for complete test specimen description and detailed test results.

1.0 Report Issued To: MI Windows and Doors, Inc.
7555 East State Route 69
Prescott Valley, Arizona 86314

2.0 Test Laboratory: Architectural Testing, Inc.
2524 East Jensen Avenue
Fresno, California 93706
(559) 233 - 8705

3.0 Project Summary:

3.1 Product Type: Polyvinyl Chloride (PVC) XO Horizontal Sliding Window

3.2 Series/Model: EC 160

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test methods. The specimens tested successfully met the performance requirements for the following ratings: Test Specimen #1: **HS-C30 2432 x 1522 (96 x 60)**; Test Specimen #2: **HS-R20 2128 x 1825 (84 x 72)**; Test Specimen #3: **HS-LC40 1828 x 1524 (72 x 60)**.

This product was originally tested as the Mikron Industries, Inc. Series/Model: 10200 Slider – Finless, Polyvinyl Chloride (PVC) XO Horizontal Sliding Window and is a reissue of the original Report No. B2718.01-301-47. This report is reissued in the name of MI Windows and Doors, Inc. through written authorization by Mikron Industries, Inc.

3.4 Test Dates: 08/23/2011 – 06/18/2012

3.5 Test Record Retention End Date: All test records for this report will be retained until June 18, 2016.

3.6 Test Location: MI Windows and Doors, Inc. test facility in Prescott Valley, Arizona. 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 specimens will be retained by Architectural Testing for a minimum of four years from the test completion date.

3.8 Drawing Reference: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Architectural Testing per the drawings located in Appendix B. Any deviations are documented herein or on the drawings.

3.0 Project Summary: (Continued)

3.9 List of Official Observers:

Name	Company
Mike Maystadt	MI Windows and Doors, Inc.
Wayne Battram	MI Windows and Doors, Inc.
David Douglass	Architectural Testing, Inc.
Jeffrey Osugi	Architectural Testing, Inc.

4.0 Test Specifications:

AAMA/WDMA/CSA 101/I.S.2/A440-05, *Standard/Specification for Windows, Doors, and Unit Skylights.*

CAWM 301, *Forced Entry Resistance Test for Windows.*

5.0 Test Specimen Description:

5.1 Product Sizes:

Test Specimen #1:

Overall Area: 3.70 m^2 (39.84 ft^2)	**Width**		**Height**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	2432	95-3/4	1522	59-15/16
Interior panel	1221	48-1/16	1450	57-1/16
Screen	1175	46-1/4	1443	56-13/16

Test Specimen #2:

Overall Area: 3.88 m^2 (41.80 ft^2)	**Width**		**Height**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	2128	83-3/4	1825	71-7/8
Interior panel	1073	42-1/4	1761	69-5/16
Screen	1012	39-13/16	1741	68-9/16

Test Specimen #3:

Overall Area: 2.79 m^2 (29.99 ft^2)	**Width**		**Height**	
	millimeters	**inches**	**millimeters**	**inches**
Overall size	1828	71-15/16	1524	60
Interior panel	917	36-1/8	1452	57-3/16

The following descriptions apply to all specimens except where noted.

5.0 Test Specimen Description: (Continued)

5.2 Frame Construction:

Frame Member	Material	Description
Head, sill and jambs	PVC	Two internal hollows were filled with Aircell foam.
Exterior meeting stile	PVC	
Roller track	PVC	Snap fit to sill and held back 1-1/4" from active jamb and 3/4" from fixed jamb.

	Joinery Type	Detail
Head, sill and jambs	Mitered	Fully welded.
Exterior meeting stile	Coped	Secured through the frame with two #8 x 3" Phillips pan head screws with washers and rubber gaskets.

5.3 Panel Construction:

Panel Member	Material	Description
Top rail, bottom rail, each stile.	PVC	Two internal hollows were filled with Aircell foam. The interlock was held back 1-1/2" from each end. A 0.070" lip was utilized at each lock.

	Joinery Type	Detail
All corners	Mitered	Fully welded.

5.4 Weatherstripping:

Description	Quantity	Location
0.260" high polypile with triple fin	1 Row	Top rail, bottom rail and jamb stile. All members of frame.
0.450" high polypile	1 Row	Interior meeting stile
Hollow wrapped foam gasket	1 Row	Each meeting stile.

5.0 Test Specimen Description: (Continued)

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	Polycarbonate-butyl composite	1/8" Annealed	1/8" Annealed	Exterior glazed onto a 3/8" wide x 1/16" high glazing tape and secured with a PVC snap in glazing bead. The corners of the glazing tape were sealed.

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Fixed light	1	1135 x 1415	44-11/16 x 55-11/16	1/2"
Panel	1	1133 x 1364	44-5/8 x 53-11/16	1/2"

Test Specimen #2:

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
3/4" IG	Polycarbonate-butyl composite	1/8" Annealed	1/8" Annealed	Exterior glazed onto a 3/8" wide x 1/16" high glazing tape and secured with a PVC snap in glazing bead. The corners of the glazing tape were sealed.

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Fixed light	1	983 x 1718	38-11/16 x 67-5/8	1/2"
Panel	1	985 x 1671	38-3/4 x 65-13/16	1/2"

5.0 Test Specimen Description: (Continued)

Test Specimen #3:

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
3/4" IG	Polycarbonate-butyl composite	1/8" Annealed	1/8" Annealed	Exterior glazed onto a 3/8" wide x 1/16" high glazing tape and secured with a PVC snap in glazing bead. The corners of the glazing tape were sealed.

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Fixed light	1	827 x 1413	32-9/16 x 55-5/8	1/2"
Panel	1	829 x 1364	32-5/8 x 53-11/16	1/2"

5.6 Drainage:

Drainage Method	Size	Quantity	Location
Weephole with cover	1-1/2 x 5/16" (1-1/16" x 3/16" effective)	4	3" from each end and 3 - 6" from each side of center through exterior sill face.
Weephole	1/8" x 1/8"	2	3-1/2" from each end through screen / glazing track.
Weephole	1" x 1/8"	4	1-5/8" and 27 - 27-1/2" from each end through exterior sill leg.
Weepnotch	1" x 5/16"	2	Through exterior leg of roller track at each center sill leg weephole.
Weepnotch	1-1/4" x 5/16"	2	15/16" from each end through exterior leg of roller track.
Weephole	3/8" x 3/16"	2	3/16" from each end through first layer of horizontal internal webbing.
Weephole	1-1/2" x 1/4"	2	Each end through first layer of vertical internal webbing.
Weephole	1/2" x 1/8" oval	4	1/4" from each end on bottom rail and 2-5/8" from each end through snap in glazing bead track.

5.0 Test Specimen Description: (Continued)

5.7 Hardware:

Description	Quantity	Location
Cam lock	2	9" from each end on interior meeting stile secured with two #6 x 1" Phillips flat head self-drilling into reinforcement.
Keeper	2	Opposite each lock on exterior meeting stile secured with two #6 x 1" Phillips flat head self-drilling screws into reinforcement.
Plastic rollers with housing	2	2-1/4" from each end on bottom rail secured with two #8 x 1/2" Phillips pan head screws.

5.8 Reinforcement

Drawing Number	Location	Material
M-9265	Exterior meeting stile	Aluminum
M-9264	Interior meeting stile	Aluminum

5.9 Screen Construction:

Frame Material	Corner Construction	Mesh Type	Mesh Attachment Method
Extruded aluminum	Mitered with corner key	Fiberglass	Hollow spline

6.0 Installation:

The specimen was installed into a Spruce-Pine-Fir wood buck. The rough opening allowed for a 3/16 – 1/4" shim space. The exterior perimeter of the window was sealed with silicone.

Location	Anchor Description	Anchor Location
Head and jambs	#8 x 1-1/2" Phillips flat head screws.	3-4" from corner and 10-12" on center through the frame.

7.0 Test Results: The temperature during testing was 20 - 27°C (68 - 80°F). The results are tabulated as follows:

Test Specimen #1:

Title of Test	Results	Allowed	Note
Operating Force, per ASTM E 2068	Initiate motion: 121 N (27.3 lbf) Maintain motion: 68 N (15.3 lbf) Locks: 13 N (3.0 lbf)	Report Only 115 N (25.9 lbf) max. 100 N (22.5 lbf) max.	
Air Leakage, Infiltration per ASTM E 283 at 75 Pa (1.57 psf)	0.25 L/s/m² (0.05 cfm/ft²)	1.5 L/s/m² (0.3 cfm/ft²) max.	1
Water Penetration, per ASTM E 547	N/A	N/A	3
Uniform Load Deflection, per ASTM E 330 taken at exterior meeting stile +1440 Pa (+30.08 psf) -1440 Pa (-30.08 psf)	 27.5 mm (1.08") 25.5 mm (1.00")	 Report Only	4,5,6
Uniform Load Structural, per ASTM E 330 taken at exterior meeting stile +2160 Pa (+45.11 psf) -2160 Pa (-45.11 psf)	 2.5 mm (0.10") 3.3 mm (0.13")	 4.4 mm (0.17") max.	5,6
Forced Entry Resistance, per ASTM F 588, Type: A - Grade: 10	Pass	No entry	
Forced Entry Resistance, per CAWM 301, Type: I	Pass	No entry	
Thermoplastic Corner Weld	Pass	Meets as stated	
Deglazing, per ASTM E 987 Operating direction, 320 N (71.9 lbf) Remaining direction, 230 N (51.7 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

Test Specimen #2:

Title of Test	Results	Allowed	Note
Operating Force, per ASTM E 2068	Initiate motion: 141 N (31.7 lbf) Maintain motion: 49 N (11.0 lbf) Locks: 27 N (6.0 lbf)	Report Only 90 N (20.2 lbf) max. 100 N (22.5 lbf) max.	
Air Leakage, Infiltration per ASTM E 283 at 75 Pa (1.57 psf)	0.30 L/s/m² (0.06 cfm/ft²)	1.5 L/s/m² (0.3 cfm/ft²) max.	1
Water Penetration, per ASTM E 547	N/A	N/A	3
Uniform Load Deflection, per ASTM E 330 taken at exterior meeting stile +2160 Pa (+20.05 psf) -2160 Pa (-20.05 psf)	30.0 mm (1.18") 30.8 mm (1.21")	Report Only	4,5,6
Uniform Load Structural, per ASTM E 330 taken at exterior meeting stile +1440 Pa (+30.08 psf) -1440 Pa (-30.08 psf)	0.5 mm (0.02") 4.3 mm (0.17")	7.0 mm (0.28") max.	5,6
Forced Entry Resistance, per ASTM F 588, Type: A - Grade: 10	Pass	No entry	
Forced Entry Resistance, per CAWM 301, Type: I	Pass	No entry	
Thermoplastic Corner Weld	Pass	Meets as stated	

7.0 Test Results: (Continued)

Test Specimen #2: (Continued)

Title of Test	Results	Allowed	Note
Deglazing, per ASTM E 987 Operating direction, 320 N (71.9 lbf) Remaining direction, 230 N (51.7 lbf)	 Pass Pass	 Meets as stated Meets as stated	
Optional Performance			
Water Penetration, per ASTM E 547 at 290 Pa (6.06 psf)	Pass	No leakage	2

Test Specimen #3:

Title of Test	Results	Allowed	Note
Optional Performance			
Uniform Load Deflection, per ASTM E 330 taken at exterior meeting stile +1920 Pa (+40.10 psf) -1920 Pa (-40.10 psf)	 25.8 mm (1.02") 28.0 mm (1.10")	 Report Only	 3,4,5,6
Uniform Load Structural, per ASTM E 330 taken at exterior meeting stile +2880 Pa (+60.15 psf) -2880 Pa (-60.15 psf)	 2.3 mm (0.09") 5.3 mm (0.21")	 5.8 mm (0.23") max.	 3,5,6

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.

This report is reissued in the name of MI Windows and Doors, Inc. through written authorization by Mikron Industries, Inc. to whom the original report was rendered. The original Mikron Industries, Inc. Report No. is B2718.01-301-47.

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.

Digitally Signed by: David Douglass

David Douglass
Project Manager

Digitally Signed by:Leaton Kirk

Leaton Kirk
Director – Regional Operations

JO: ms

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Alteration Addendum (1)
Appendix-B: Drawings (13) Complete drawings packet on file with Architectural Testing, Inc.

Revision Log

Rev. #	Date	Page(s)	Revision(s)
1	7/25/12	Cover, 1, 9	Changed rating of Test Specimen #3 from C to LC class. Revised allowed permanent set for Test Specimen #3.
2	7/31/12	Cover, 1	Revised Test Specimen #2 width from 1228 mm to 2128 mm.

Appendix A

Alteration Addendum

Alteration #1: Date – 10/18/11
Cause for alteration – Specimen #1 Failed water penetration test.
Remedial action taken – Moved exterior sill face weephole. Moved center sill leg weepholes. Enlarged interior webbing weephole.

Alteration #2: Date – 10/17/12
Cause for alteration - Specimen #2 Failed water penetration test.
Remedial action taken – Changed weatherstripping to triple fin. Added two weepholes to exterior sill face. Cut roller track to 1-1/4" from active jamb. Locks moved to 9" from corner.

Appendix B

Drawings

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