



TEST REPORT

Report No.: D8836.01-109-44

Rendered to:

REHAU CONSTRUCTION LLC
Leesburg, Virginia

PRODUCT TYPE: Single Hung window
SERIES/MODEL: 190

SPECIFICATION(S): AAMA/WDMA/CSA 101/I.S.2/A440-11, *NAFS 2011 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

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

Title	Summary of Results
AAMA/WDMA/CSA 101/I.S.2/A440-08 and -11	Class LC-PG40 1099 x 1895 (43 x 75)-H
Design Pressure	±1920 Pa (±40.10 psf)
Air Infiltration	0.1 L/s/m ² (0.01 cfm/ft ²)
Canadian Air Infiltration/Exfiltration Level	A3
Water Penetration Resistance Test Pressure	290 Pa (6.06 psf)

Test Completion Date: 06/24/2014

Reference must be made to Report No. D8836.01-109-47, dated 08/14/14 for complete test specimen description and detailed test results



1.0 Report Issued To: REHAU Construction LLC
1500 Edwards Ferry Road
Leesburg, Virginia 20176

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: Single Hung Window

3.2 Series/Model: 190

3.3 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). The specimen tested successfully met the performance requirements for a **Class LC-PG40 1099 x 1895 (43 x 75)-H** rating.

3.4 Test Date: 06/24/2014

3.5 Test Record Retention End Date: All test records for this report will be retained until June 24, 2018.

3.6 Test Location: Architectural Testing, Inc. test facility in York, Pennsylvania.

3.7 Test Specimen Source: The test specimen(s) was 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 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 assembly drawings and bill of materials located in Appendix D and TDS drawings on file with Architectural Testing. Any deviations are documented herein or on the drawings.

3.9 List of Official Observers:

<u>Name</u>	<u>Company</u>
Jim Reed	REHAU Construction LLC
Eric M. Brennan	Architectural Testing, Inc.

4.0 Test Specification(s):

AAMA/WDMA/CSA 101/I.S.2/A440-11, *NAFS 2011 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

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

CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights*

5.0 Test Specimen Description:

5.1 Product Sizes:

Overall Area: 2.1 m ² (22.4 ft ²)	Width		Height	
	millimeters	inches	millimeters	inches
Overall size	1099	43-1/4	1895	74-5/8
Sash size	1041	41	929	36-9/16
Screen	1048	41-1/4	908	35-3/4

5.2 Frame Construction:

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

	Joinery Type	Detail
All corners	Mitered	Thermally welded
Fixed meeting rail	Coped and butted	Secured at each end with two #8 x 2" long TEK screws

5.3 Sash Construction:

Sash Member	Material	Description
Rails and stiles	PVC	Extruded

	Joinery Type	Detail
All corners	Mitered	Thermally welded

5.0 Test Specimen Description: (Continued)

5.4 Weatherstripping:

Description	Quantity	Location
0.187" backed by 0.210" high polypile with fin	1 Row	All sash rails and 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.*

Glass Type	Spacer Type	Interior Lite	Exterior Lite	Glazing Method
3/4" IG	Aluminum	1/8" tempered	1/8" tempered	The glass was set from the exterior against a double-sided adhesive backed glazing tape and secured with snap-on vinyl glazing beads

Location	Quantity	Daylight Opening		Glass Bite
		millimeters	inches	
Sash daylight opening	1	954 x 845	37-9/16 x 33-1/4	1/2"
Fixed daylight opening	1	1016 x 879	40 x 34-5/8	1/2"

5.6 Drainage:

Drainage Method	Size	Quantity	Location
Weepslot with cover	1" long by 3/16" wide	2	Sill sash track, 3" from the ends, draining into the hollow below.
Weepslot	1/2" long by 1/8" high	2	Sill interior hollow ends, draining into the center hollow
Weepslot	1/2" long by 1/8" high	2	Sill, center hollow ends, draining into the exterior hollow
Weep hole	3/16" diameter	2	Sill screen track, 3" from the ends, draining into the hollow below
Weepslot with cover	1-1/2" long by 1/4" high	2	Sill face, 3" from the ends, draining the exterior hollow

5.0 Test Specimen Description: (Continued)

5.7 Hardware:

Description	Quantity	Location
1/4" turn locks	2	Interior meeting rail, 6-1/2" from the ends.
Ultralift balances	2	One per jamb, in the jamb sash pocket

5.8 Reinforcement:

Drawing Number	Location	Material
TDS_399006	Sash top and bottom rails	Aluminum
TDS_399001	Sash stiles	Aluminum
TDS_500125	Fixed meeting rail	Aluminum

5.9 Screen Construction:

Frame Material	Corner Construction	Mesh Type	Mesh Attachment Method
Aluminum	Square-cut with a PVC corner key	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 foam sealant.

Location	Anchor Description	Anchor Location
Head, sill, and jambs	#10 x 5/8" long pan head screw	Located 4" from the corners and spaced 8-1/2" on center, through the nail fin into the wood buck

7.0 Test Results: The temperature during testing was 26°C (79°F). The results are tabulated as follows:

Title of Test	Results	Allowed	Note
Operating Force, per ASTM E 2068	Initiate motion: 102 N (23 lbf) Maintain motion: 97 N (22 lbf) Locks: 31 N (7 lbf)	200 N (45 lbf) max. 100 N (22 lbf) max. 100 N (22.5 lbf) max.	
Air Leakage, Infiltration per ASTM E 283 at 75 Pa (1.57 psf)	0.1 L/s/m ² (0.01 cfm/ft ²)	1.5 L/s/m ² (0.3 cfm/ft ²) max.	1
Air Leakage, Exfiltration per ASTM E 283 at 75 Pa (1.57 psf)	0.1 L/s/m ² (0.02 cfm/ft ²)	1.5 L/s/m ² (0.3 cfm/ft ²) max.	1
Canadian Air Infiltration/Exfiltration Level	A3	N/A	
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	
Insect Screen Serviceability 60 N (13.5 lbs)	Pass	N/A	

7.0 Test Results: (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 +1920 Pa (+40.10 psf) -1920 Pa (-40.10 psf)	11.9 mm (0.47") 10.9 mm (0.43")	Report Only	4, 5, 6
Uniform Load Structural, per ASTM E 330 Permanent sets taken at meeting rail +2880 Pa (+60.15 psf) -2880 Pa (-60.15 psf)	0.3 mm (0.01") 1.3 mm (0.05")	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.



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Architectural Testing 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 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.

Eric M. Brennan
Project Manager

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

EMB:cmd/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-B: Photograph(s) (1)

Appendix-C: Drawing(s) (2) 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	08/14/14	Summary page, Page 2	Added specification AAMA/WDMA/CSA 101/I.S.2/A440-11

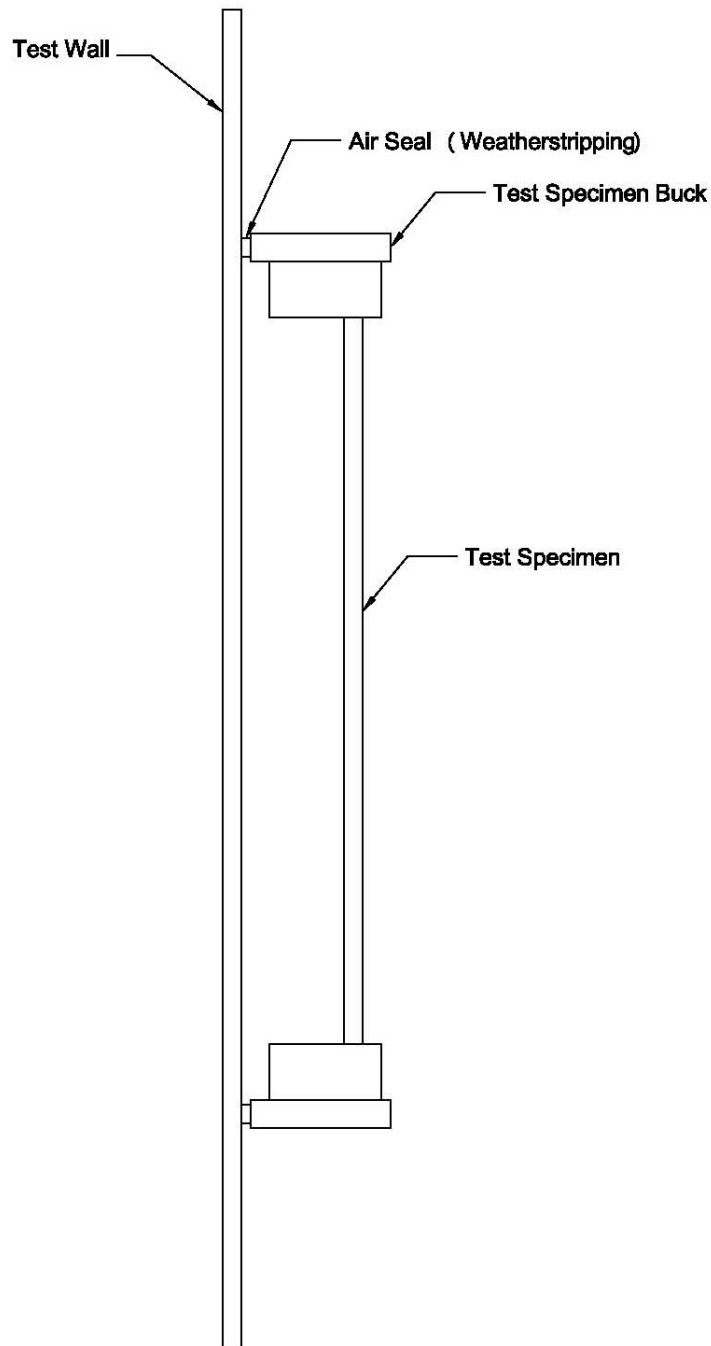
Appendix A

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
Photograph(s)



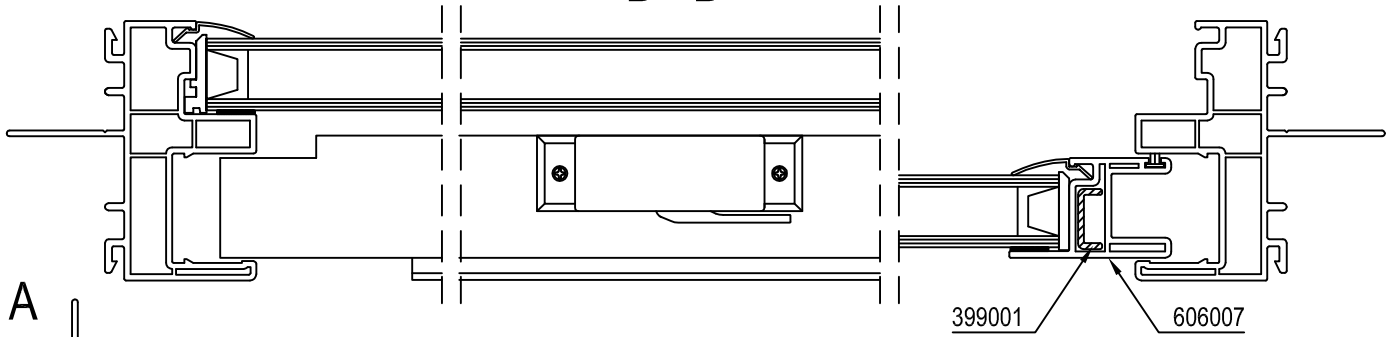
Photo No. 1
190 Single Hung

Appendix D

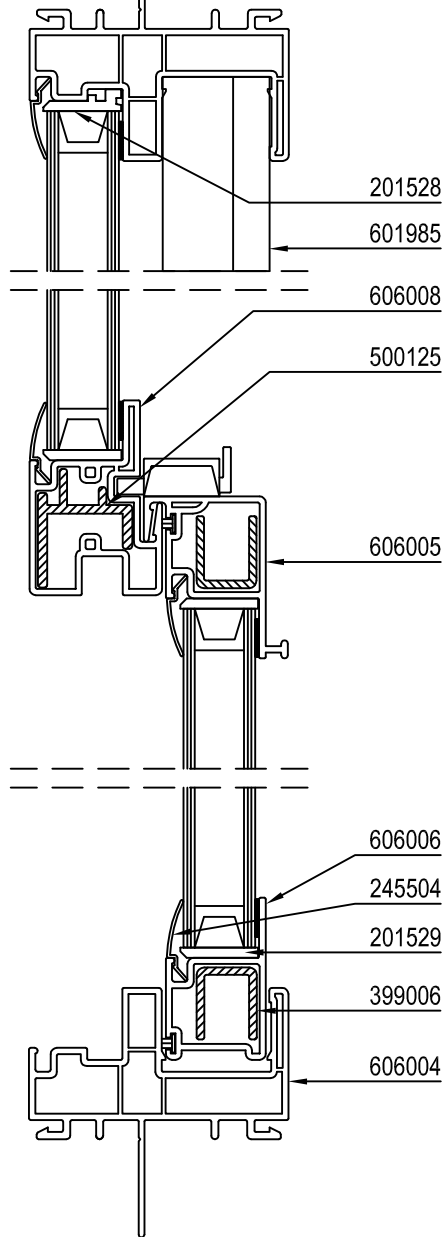
Drawing(s)

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

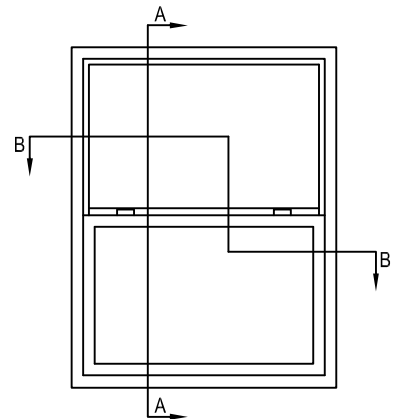
B - B



A - A



 Architectural Testing	Report #:	D8836
	Date:	07/25/14
	Verified by:	



			System: 190		
			Title: Single Hung Window		
			Date: 02/07/2014		
			Scale: 1:2		
		REHAU Construction LLC 1501 Edwards Ferry Road, NE Leesburg, Virginia 20176 Tel: (703) 777-5255	Drawn by: JWB		
-	-		Drawing No.: 2412-14-019		
			Rev.:		
Rev #	Revision Description & Date		© 2014 REHAU. Do not disclose without written permission		

BILL OF MATERIALS

**REHAU®**

Unlimited Polymer Solutions



Architectural Testing

Report #: D8836

Date: 07/25/14

Verified by:

Product: 190 - Single Hung Window

Article / Part No.	Description
201528	Fixed Lite Setting Block
201529	Standard Setting Block
245504	Standard Glazing Stop
399001	Jamb Sash Reinforcement
399006	Interlock Sash / Sill Sash Reinforcement
500125	Fixed Meeting Rail Reinforcement
601985	Sash Stop
606004	Single Hung / Single Slider Frame
606005	Interlock Sash
606006	Sill Sash
606007	Jamb Sash
606008	SS / SH Transom
Notes: Quantity estimate based on rough estimate	