Architectural Testing

AAMA 1503-09 THERMAL PERFORMANCE TEST REPORT

Rendered to:

INTERNATIONAL ARCHITECTURAL PRODUCTS, INC.
DBA: UNITED STATES ALUMINUM

SERIES/MODEL: 8000
TYPE: Vertical Slider (Single Hung)

Summary of Results	
Thermal Transmittance (U-Factor)	0.55
Condensation Resistance Factor - Frame (CRF_f)	50
Condensation Resistance Factor - Glass (CRF_g)	64

Unit Size	47-1/4" x 59" (1200 mm x 1499 mm)
Layer 1	1/4" PPG Solarban 60 (e=0.035*, #2)
Gap	0.54" Gap, Aluminum Spacer (A1-D), 100% Air-Filled*
Layer 2	1/4" Clear Lami (1/8" - 0.030" PVB - 1/8")

Reference must be made to Report No. A0595.01-301-46, dated 06/25/10 for complete test specimen description and data.

2524 E. Jensen Ave
Fresno, CA 93706
phone: 559-233-8705
fax: 559-233-8360
www.archtest.com

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AAMA 1503-09 THERMAL PERFORMANCE TEST REPORT

Rendered to:

INTERNATIONAL ARCHITECTURAL PRODUCTS, INC.
DBA: UNITED STATES ALUMINUM
720 Cel-River Road
Rock Hill, South Carolina 29730

Report Number:	A0595.01-301-46
Test Date:	04/30/10
Report Date:	06/25/10
Test Record Retention Date:	04/30/14

Test Sample Identification:

Series/Model: 8000

Type: Vertical Slider (Single Hung)

Test Sample Submitted by: Client

Test Procedure: The condensation resistance factor (CRF) and thermal transmittance (U) were determined in accordance with AAMA 1503-09, *Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections*

1. Average warm side ambient temperature 69.80 F
2. Average cold side ambient temperature -0.74 F
3. 15 mph dynamic wind applied to test specimen exterior.
4. 0.0" ±0.04" static pressure drop across specimen.

Test Results Summary:

1. Condensation resistance factor - Frame (CRF_f) 50
   Condensation resistance factor - Glass (CRF_g) 64
2. Thermal transmittance due to conduction (U) 0.55
   (U-factors expressed in Btu/hr·ft^2·F)

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Test Sample Description:

CONSTRUCTION	Frame	Interior Sash
Size (in.) Non-Standard	47-1/4 x 59	46 x 30-1/2
Daylight Opening (in.)	43-1/4 x 24-1/2	40-1/4 x 24-1/2
CORNERS	Coped	Coped
Fasteners	Screws	Screws
Sealant	Yes	Yes
MATERIAL	AT (0.25") Skip/Debridge 2"/15"	AT (0.25") Skip/Debridge 2"/15"
Color Exterior	Gray	Gray
Finish Exterior	Mill Finish	Mill Finish
Color Interior	Gray	Gray
Finish Interior	Mill Finish	Mill Finish
GLAZING METHOD	Exterior	Exterior

Glazing Information:

Layer 1	1/4" PPG Solarban 60 (e=0.035*, #2)
Gap	0.54" Gap, Aluminum Spacer (A1-D), 100% Air-Filled*
Layer 2	1/4" Clear Lami (1/8" - 0.030" PVB - 1/8")
Gas Fill Method	N/A*

**Stated per Client/Manufacturer*
NA Non-Applicable
See Description Table Abbreviations

Test Sample Description: (Continued)

COMPONENTS			
	Type	**Quantity**	**Location**
WEATHERSTRIP			
	Polypile with center & side fins	2 Rows	Sill.
	Polypile with center & side fins	1 Row	Jambs. Interior meeting rail. Exterior meeting rail.
HARDWARE			
	Block & tackle balance system	1	Jambs.
	Metal auto-lock	2	Interior sill.
DRAINAGE			
	2" x 1/4" weephole	2	Sill face.

Test Duration:

1. The environmental systems were started at 15:29 hours, 04/29/10.

2. The thermal performance test results were derived from 03:50 hours, 04/30/10 to 07:50 hours, 04/30/10.

Condensation Resistance Factor (CRF):

The following information, condensed from the test data, was used to determine the condensation resistance factor:

T_h	=	Warm side ambient air temperature	69.80 F
T_c	=	Cold side ambient air temperature	-0.74 F
FT_p	=	Average of pre-specified frame temperatures (14)	35.77 F
FT_r	=	Average of roving thermocouples (4)	26.26 F
W	=	$[(FT_p - FT_r) / (FT_p - (T_c + 10))] \times 0.40$	0.144
FT	=	$FT_p(1-W) + W (FT_r)$ = Frame Temperature	34.40 F
GT	=	Glass Temperature	44.35 F
CRF_g	=	Condensation resistance factor – Glass	64
		$CRF_g = (GT - T_c) / (T_h - T_c) \times 100$	
CRF_f	=	Condensation resistance factor – Frame	50
		$CRF_f = (FT - T_c) / (T_h - T_c) \times 100$	

The CRF number was determined to be 50 (on the size as reported). When reviewing this test data, it should be noted that the frame temperature (FT) was colder than the glass temperature (GT) therefore controlling the CRF number. Refer to the 'CRF Report' page and the 'Thermocouple Location Diagram' page of this report.

Thermal Transmittance (U_c):

T_h	=	Average warm side ambient temperature	69.80 F
T_c	=	Average cold side ambient temperature	-0.74 F
P	=	Static pressure difference across test specimen	0.00 psf
		15 mph dynamic perpendicular wind at exterior	
Nominal sample area			19.36 ft^2
Total measured input to calorimeter			814.14 Btu/hr
Calorimeter correction			56.52 Btu/hr
Net specimen heat loss			757.63 Btu/hr
U	=	Thermal Transmittance	0.55 $Btu/hr \cdot ft^2 \cdot F$

Glazing Deflection (in.):

	Frame	Interior Sash
Edge Gap Width	0.54	0.54
Estimated center gap width upon receipt of specimen in laboratory (after stabilization)	0.50	0.50
Center gap width at laboratory ambient conditions on day of testing	0.50	0.50
Center gap width at test conditions	0.45	0.45

The sample was inspected for the formation of frost or condensation, which may influence the surface temperature measurements. The sample showed no evidence of condensation/frost at the conclusion of the test.

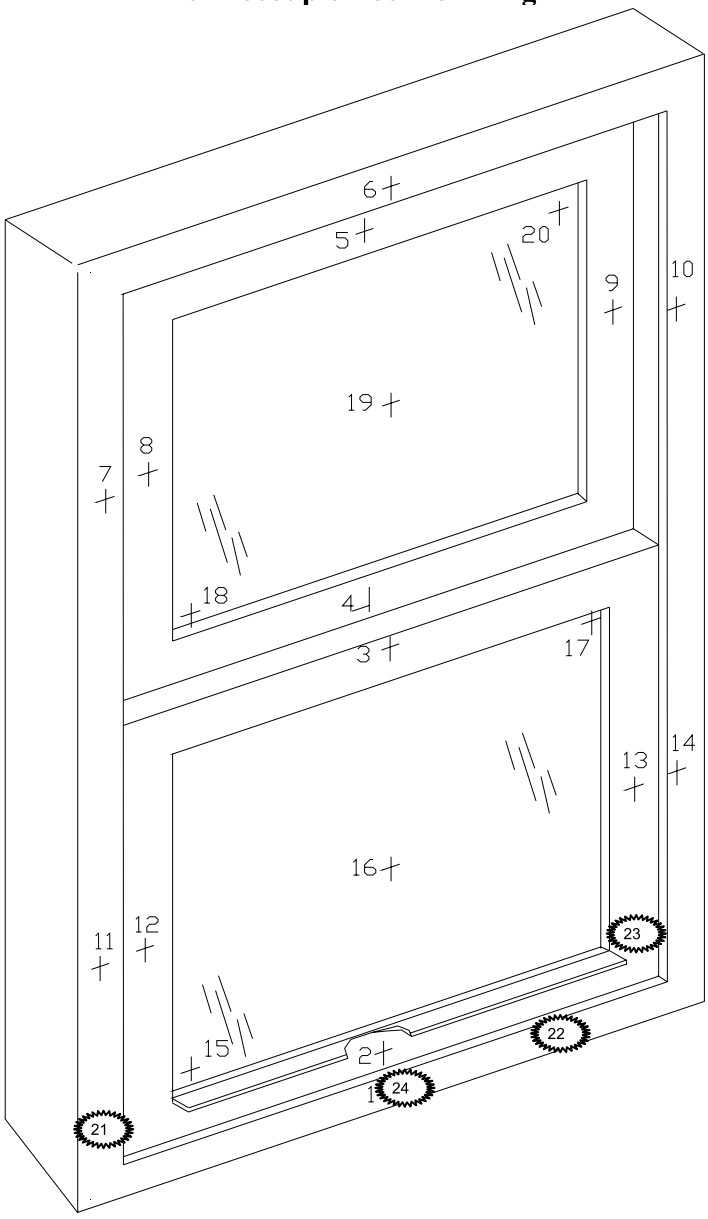
A calibration of the Architectural Testing Inc. 'thermal test chamber' (ICN 004287) in Fresno, California was conducted in April 2010 in accordance with Architectural Testing Inc. calibration procedure.

Prior to testing the specimen was sealed with silicone on the interior side and checked for air infiltration per Section 9.3.4.

CRF Report

Time:	05:50	06:20	06:50	07:20	07:50	AVERAGE
Pre-specified Thermocouples - Frame						
1	26.91	26.96	26.90	26.97	27.00	26.95
2	28.84	28.89	28.90	28.92	28.88	28.89
3	44.44	44.51	44.48	44.51	44.52	44.49
4	37.15	37.19	37.25	37.21	37.19	37.20
5	41.42	41.52	41.45	41.55	41.56	41.50
6	41.78	41.66	41.73	41.78	41.78	41.75
7	40.62	40.56	40.60	40.61	40.60	40.60
8	39.06	39.04	39.08	39.07	39.06	39.06
9	40.12	40.12	40.12	40.12	40.12	40.12
10	42.98	43.05	43.06	43.03	43.00	43.02
11	29.25	29.25	29.31	29.24	29.26	29.26
12	29.90	29.90	29.90	29.90	29.90	29.90
13	29.19	29.12	29.20	29.20	29.15	29.17
14	28.86	28.83	28.84	28.89	28.85	28.86
FT_P	35.75	35.76	35.77	35.79	35.78	35.77
Pre-specified Thermocouples - Glass						
15	33.94	33.91	33.89	33.93	33.86	33.91
16	53.69	53.74	53.69	53.72	53.62	53.69
17	47.56	47.58	47.56	47.58	47.55	47.57
18	32.74	32.80	32.80	32.82	32.75	32.78
19	55.51	55.52	55.47	55.57	55.55	55.52
20	42.55	42.61	42.66	42.62	42.58	42.60
GT	44.33	44.36	44.34	44.37	44.32	44.35
Cold Point (Roving) Thermocouples						
21	26.90	26.82	26.94	26.91	26.98	26.91
22	26.88	26.96	26.85	26.94	26.96	26.92
23	24.29	24.18	24.27	24.24	24.26	24.25
24	26.91	26.96	26.90	26.97	27.00	26.95
FT_R	26.25	26.23	26.24	26.26	26.30	26.26
W	0.14	0.14	0.14	0.14	0.14	0.14
FT	34.39	34.39	34.40	34.42	34.42	34.40
Warm Side - Room Ambient Air Temperature						
	69.79	69.81	69.81	69.80	69.79	69.80
Cold Side - Room Ambient Air Temperature						
	-0.74	-0.74	-0.74	-0.74	-0.74	-0.74
CRF_f	50	50	50	50	50	50
CRF_g	64	64	64	64	64	64

Thermocouple Location Diagram



Cold Point Locations

21. 26.91
22. 26.92
23. 24.25
24. 26.95

Detailed drawings, data sheets, representative samples of test specimens, a copy of this report, or other pertinent project documentation will be retained by Architectural Testing, Inc. for a period of four years from the original test date. At the end of this retention period such materials shall be discarded without notice and the service life of this report by Architectural Testing will expire. Results obtained are tested values and were secured by using the designated test methods. 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.

William Smeds/KCW
Digitally Signed by: William Smeds by Kenny C. White

Simon Smeds
Technician

K.C. White
Digitally Signed by:Kenny C. White

Kenny C. White
Laboratory Manager
Individual-In-Responsible-Charge

WSS:he
A0595.01-301-46

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Description Table Abbreviations (1)
Appendix-B: Drawings (17)