

**AAMA 1503-09 THERMAL PERFORMANCE  
TEST REPORT**

**Rendered to:**

**US ALUMINUM INC., DIVISION OF CR LAURENCE CO., INC.**

**SERIES/MODEL: FT 451 Storefront - Inside Set**

**TYPE: Glazed Wall Systems (Site-built)**

<b>Summary of Results</b>	
Thermal Transmittance (U-Factor)	0.44
Condensation Resistance Factor - Frame (CRF <sub>f</sub> )	49
Condensation Resistance Factor - Glass (CRF <sub>g</sub> )	66
Unit Size	79" x 79" (2007 mm x 2007 mm)
Layer 1	1/4" Clear
Gap 1	0.50" Gap, Super Spacer Standard (OF-S), 100% Air-Filled*
Layer 2	1/4" AGC Comfort TiAC36 LowE (e=0.034*, #3)

Reference must be made to Report No. C2485.02-201-46, dated 11/29/12 for complete test specimen description and data.

**AAMA 1503-09 THERMAL PERFORMANCE TEST REPORT**

Rendered to:

US ALUMINUM INC., DIVISION OF CR LAURENCE CO., INC.  
200 Singleton Drive  
Waxahachie, Texas 75165

Report Number: C2485.02-201-46  
Test Date: 09/12/12  
Report Date: 11/29/12  
Test Record Retention Date: 09/12/16

**Test Sample Identification:**

**Series/Model:** FT 451 Storefront - Inside Set

**Type:** Glazed Wall Systems (Site-built)

**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                  | -0.41 F |
| 3. 15 mph dynamic wind applied to test specimen exterior. |         |
| 4. 0.0" $\pm$ 0.04" static pressure drop across specimen. |         |

**Test Results Summary:**

- |  |      |
|--|------|
| 1. Condensation resistance factor - Frame (CRF <sub>f</sub> )  | 49   |
| Condensation resistance factor - Glass (CRF <sub>g</sub> )   | 66   |
| 2. Thermal transmittance due to conduction (U)<br>(U-factors expressed in Btu/hr·ft <sup>2</sup> ·F) | 0.44 |

**Test Sample Description:**

<b>CONSTRUCTION</b>	<b>Frame</b>
Size (in.)	79 x 79
Daylight Opening (in.)	36-1/2 x 75 (x2)
<b>CORNERS</b>	Square Cut
Fasteners	Screws
Sealant	No
<b>MATERIAL</b>	AT (0.21")
Color Exterior	Gray
Finish Exterior	Anodized
Color Interior	Gray
Finish Interior	Anodized
<b>GLAZING METHOD</b>	Exterior

**Glazing Information:**

<b>Layer 1</b>	1/4" Clear
<b>Gap 1</b>	0.50" Gap, Super Spacer Standard (OF-S), 100% Air-Filled*
<b>Layer 2</b>	1/4" AGC Comfort TiAC36 LowE (e=0.034*, #3)
<b>Gas Fill Method</b>	N/A
<b>Desiccant</b>	Yes

*\*Stated per Client/Manufacturer*

*NA Non-Applicable*

*See Description Table Abbreviations*

**Test Sample Description:** (Continued)

<b>COMPONENTS</b>		
<b>Type</b>	<b>Quantity</b>	<b>Location</b>
<b>WEATHERSTRIP</b>		
No weatherstrip		
<b>HARDWARE</b>		
No hardware		
<b>DRAINAGE</b>		
No drainage		

**Test Duration:**

1. The environmental systems were started at 12:00 hours, 09/11/12.
2. The thermal performance test results were derived from 03:36 hours, 09/12/12 to 07:36 hours, 09/12/12.

**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	-0.41 F
$FT_p$	=	Average of pre-specified frame temperatures (14)	34.58 F
$FT_r$	=	Average of roving thermocouples (4)	27.54 F
$W$	=	$[(FT_p - FT_r) / (FT_p - (T_c + 10))]$ x 0.40	0.113
$FT$	=	$FT_p(1-W) + W (FT_r)$ = Frame Temperature	33.78 F
$GT$	=	Glass Temperature	46.20 F
$CRF_g$	=	Condensation resistance factor – Glass	66
		$CRF_g = (GT - T_c) / (T_h - T_c)$ x 100	
$CRF_f$	=	Condensation resistance factor – Frame	49
		$CRF_f = (FT - T_c) / (T_h - T_c)$ x 100	

The CRF number was determined to be 49 (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):**

$T_h$	= Average warm side ambient temperature	69.80 F
$T_c$	= Average cold side ambient temperature	-0.41 F
P	= Static pressure difference across test specimen 15 mph dynamic perpendicular wind at exterior	0.00 psf
	Nominal sample area	43.34 ft <sup>2</sup>
	Total measured input to calorimeter	1446.87 Btu/hr
	Calorimeter correction	104.16 Btu/hr
	Net specimen heat loss	1342.71 Btu/hr
U	= Thermal Transmittance	0.44 Btu/hr·ft <sup>2</sup> ·F

**Glazing Deflection (in.):**

	Left Glazing	Right Glazing
Edge Gap Width	0.50	0.50
Estimated center gap width upon receipt of specimen in laboratory (after stabilization)	0.34	0.32
Center gap width at laboratory ambient conditions on day of testing	0.34	0.32
Center gap width at test conditions	0.27	0.27

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.

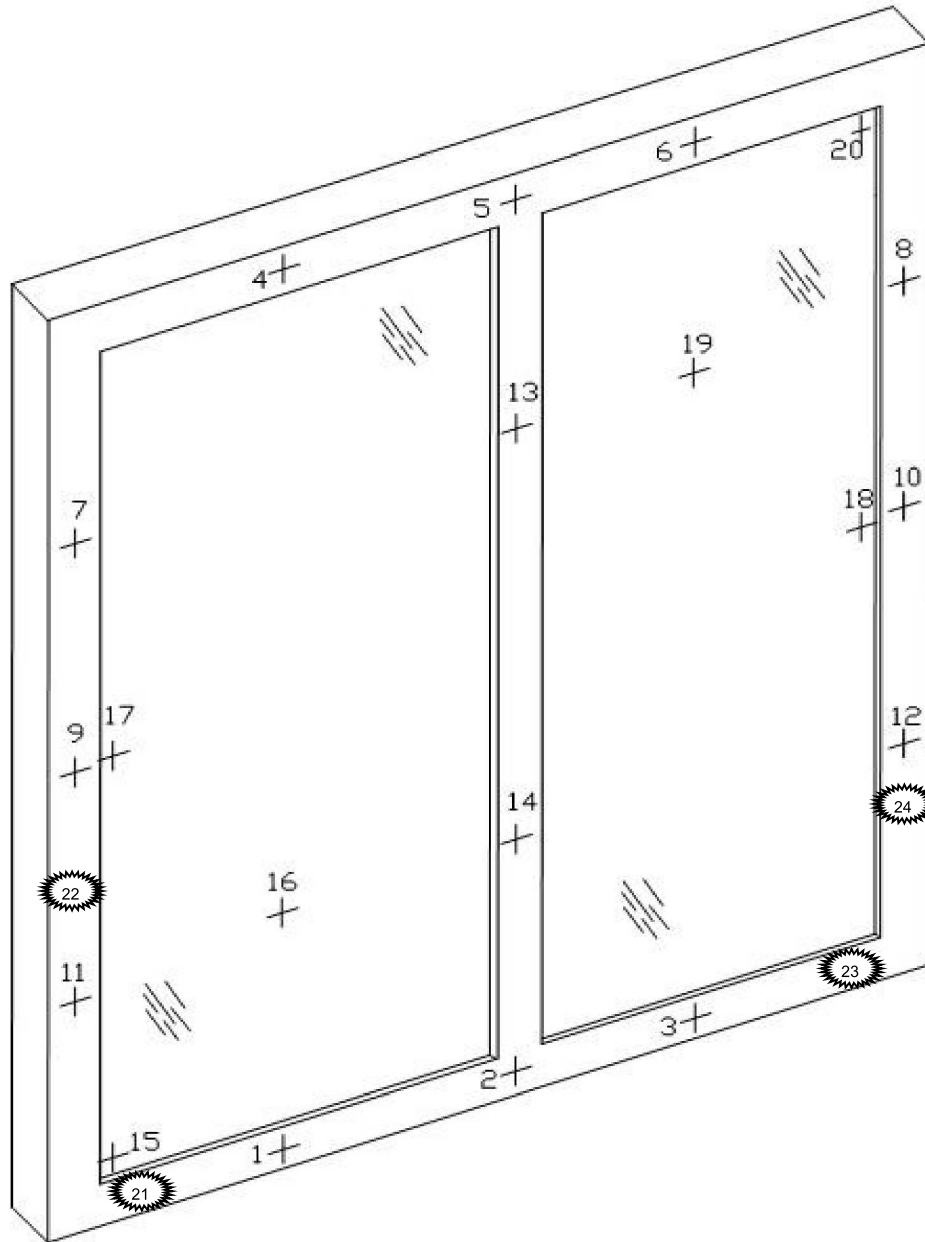
A calibration of the Architectural Testing Inc. 'thermal test chamber' (ICN N000235) in St. Paul, Minnesota was conducted in October 2011 in accordance with Architectural Testing Inc. calibration procedure.

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:	05:36	06:06	06:36	07:06	07:36	AVERAGE
<b>Pre-specified Thermocouples - Frame</b>						
1	32.87	32.85	32.87	32.92	32.89	32.88
2	31.25	31.20	31.23	31.24	31.25	31.23
3	34.50	34.45	34.51	34.53	34.49	34.49
4	47.35	47.38	47.38	47.41	47.43	47.39
5	39.23	39.18	39.24	39.27	39.25	39.23
6	48.06	48.10	48.09	48.11	48.13	48.10
7	31.72	31.69	31.72	31.76	31.70	31.72
8	33.96	33.97	33.97	33.99	34.00	33.98
9	27.85	27.82	27.86	27.87	27.85	27.85
10	30.79	30.80	30.85	30.84	30.82	30.82
11	26.59	26.55	26.63	26.63	26.60	26.60
12	29.80	29.82	29.80	29.86	29.86	29.83
13	37.02	37.00	37.01	37.03	36.99	37.01
14	32.94	32.91	32.93	32.96	32.94	32.94
FT <sub>p</sub>	34.57	34.55	34.58	34.60	34.59	34.58
<b>Pre-specified Thermocouples - Glass</b>						
15	35.39	35.44	35.39	35.41	35.43	35.41
16	50.00	50.01	49.99	50.00	49.98	50.00
17	42.71	42.67	42.68	42.76	42.75	42.71
18	43.56	43.51	43.51	43.50	43.51	43.52
19	53.39	53.38	53.39	53.41	53.37	53.39
20	52.12	52.24	52.19	52.20	52.24	52.20
GT	46.20	46.21	46.19	46.21	46.21	46.20
<b>Cold Point (Roving) Thermocouples</b>						
21	27.59	27.56	27.58	27.59	27.55	27.57
22	27.85	27.82	27.86	27.87	27.85	27.85
23	28.20	28.16	28.14	28.14	28.13	28.15
24	26.59	26.55	26.63	26.63	26.60	26.60
FT <sub>R</sub>	27.56	27.52	27.55	27.56	27.53	27.54
W	0.11	0.11	0.11	0.11	0.11	0.11
FT	33.78	33.76	33.78	33.81	33.79	33.78
<b>Warm Side - Room Ambient Air Temperature</b>						
	69.79	69.79	69.80	69.81	69.79	69.80
<b>Cold Side - Room Ambient Air Temperature</b>						
	-0.47	-0.36	-0.36	-0.45	-0.42	-0.41
CRF <sub>f</sub>	49	49	49	49	49	49
CRF <sub>g</sub>	66	66	66	66	66	66

Thermocouple Location Diagram



Cold Point Locations

- 21. 27.57
- 22. 27.85
- 23. 28.15
- 24. 26.60



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.



Digitally Signed by: Michael Resech

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Michael P. Resech  
Senior Project Manager  
Individual-In-Responsible-Charge



Digitally Signed by: Daniel A. Johnson

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Daniel A. Johnson  
Director – Regional Operations  
Individual-In-Responsible-Charge

MDT:mpr  
C2485.02-201-46

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

Appendix-A: Description Table Abbreviations (1)

Appendix-B: Submittal Form and Drawings (11)

### Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
02-R0	11/29/12	All	Original Report Issue. Work requested by Don Willard of US Aluminum Inc., Division of CR Laurence Co., Inc.