

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

**Rendered to:**

**GAMCO CORPORATION**

**SERIES/MODEL: Curtain Wall**

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

<b>Summary of Results</b>		
Thermal Transmittance (U-Factor)		0.47
Condensation Resistance Factor - Frame (CRF <sub>f</sub> )		65
Condensation Resistance Factor - Glass (CRF <sub>g</sub> )		66
<b>Unit Size:</b>	78-3/4" x 78-3/4"	
<b>Layer 1:</b>	1/4"	Clear
<b>Gap 1:</b>	0.50"	A1-D: Aluminum Spacer
<b>Layer 2:</b>	1/4"	PPG Solarban 60 (e=0.035*, #3)
		90% Argon*

Reference must be made to Report No. E5512.01-116-46.

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

Rendered to:

GAMCO CORPORATION  
131-10 Maple Avenue  
Flushing, New York 11355**Test Sample Identification:****Series/Model:** Curtain Wall**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> )  | 65   |
| 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) | 0.47 |

**Test Sample Description:**

**Frame:**

<b>Material:</b>	AU (0.15"): Aluminum with Thermal Improvement - All Members		
<b>Size:</b>	78-3/4" x 78-3/4"		
<b>Daylight Opening:</b>	35-3/4" x 73-3/4" (x2)	<b>Glazing Method:</b>	Exterior*
<b>Exterior Color:</b>	Clear	<b>Exterior Finish:</b>	Anodized
<b>Interior Color:</b>	Clear	<b>Interior Finish:</b>	Anodized
<b>Corner Joinery:</b>	Square Cut / Screws / Unsealed		

\*Exterior pressure plate was screwed 6" O.C.

**Glazing Information:**

<b>Layer 1:</b>	1/4"	Clear	
<b>Gap 1:</b>	0.50"	A1-D: Aluminum Spacer	90% Argon*
<b>Layer 2:</b>	1/4"	PPG Solarban 60 (e=0.035*, #3)	
<b>Gas Fill Method:</b>	Single-Probe Method*		
<b>Desiccant:</b>	Yes		

*\*Stated per Client/Manufacturer*

*N/A Non-Applicable*

**Test Sample Description: (Continued)**

**Weatherstripping:**

<b>Description</b>	<b>Quantity</b>	<b>Location</b>
EPDM glazing gasket	1 row	Interior glazing perimeter
EPDM glazing gasket	1 row	Exterior glazing perimeter
Thermal isolator	1 row	Frame at pressure plate center
EPDM gasket	1 row	Head, sill and jambs

**Hardware:**

<b>Description</b>	<b>Quantity</b>	<b>Location</b>
Aluminum pressure plate	7	Four exterior horizontals, three exterior verticals
Aluminum face cover	7	Four exterior horizontals, three exterior verticals

**Drainage:**

<b>Drainage Method</b>	<b>Size</b>	<b>Quantity</b>	<b>Location</b>
No visible weeps			

**Test Duration:**

1. The environmental systems were started at 07:05 hours, 04/14/15.
2. The thermal performance test results were derived from 02:06 hours, 04/15/15 to 06:06 hours, 04/15/15.

**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)	45.81 F
$FT_r$	=	Average of roving thermocouples (4)	40.13 F
$W$	=	$[(FT_p - FT_r) / (FT_p - (T_c + 10))]$ x 0.40	0.063
$FT$	=	$FT_p(1-W) + W (FT_r)$ = Frame Temperature	45.46 F
$GT$	=	Glass Temperature	46.21 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	65
		$CRF_f = (FT - T_c) / (T_h - T_c)$ x 100	

The CRF number was determined to be 65 (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	-0.41 F
P	= Static pressure difference across test specimen	0.00 psf
	15 mph dynamic perpendicular wind at exterior	
	Nominal sample area	43.07 ft <sup>2</sup>
	Total measured input to calorimeter	1481.48 Btu/hr
	Calorimeter correction	73.42 Btu/hr
	Net specimen heat loss	1408.07 Btu/hr
U	= Thermal Transmittance	0.47 Btu/hr·ft <sup>2</sup> ·F

**Glazing Deflection:**

	Left Glazing	Right Glazing
Edge Gap Width	0.50"	0.50"
Estimated center gap width upon receipt of specimen in laboratory (after stabilization)	0.59"	0.59"
Center gap width at laboratory ambient conditions on day of testing	0.59"	0.59"
Center gap width at test conditions	0.50"	0.50"

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.

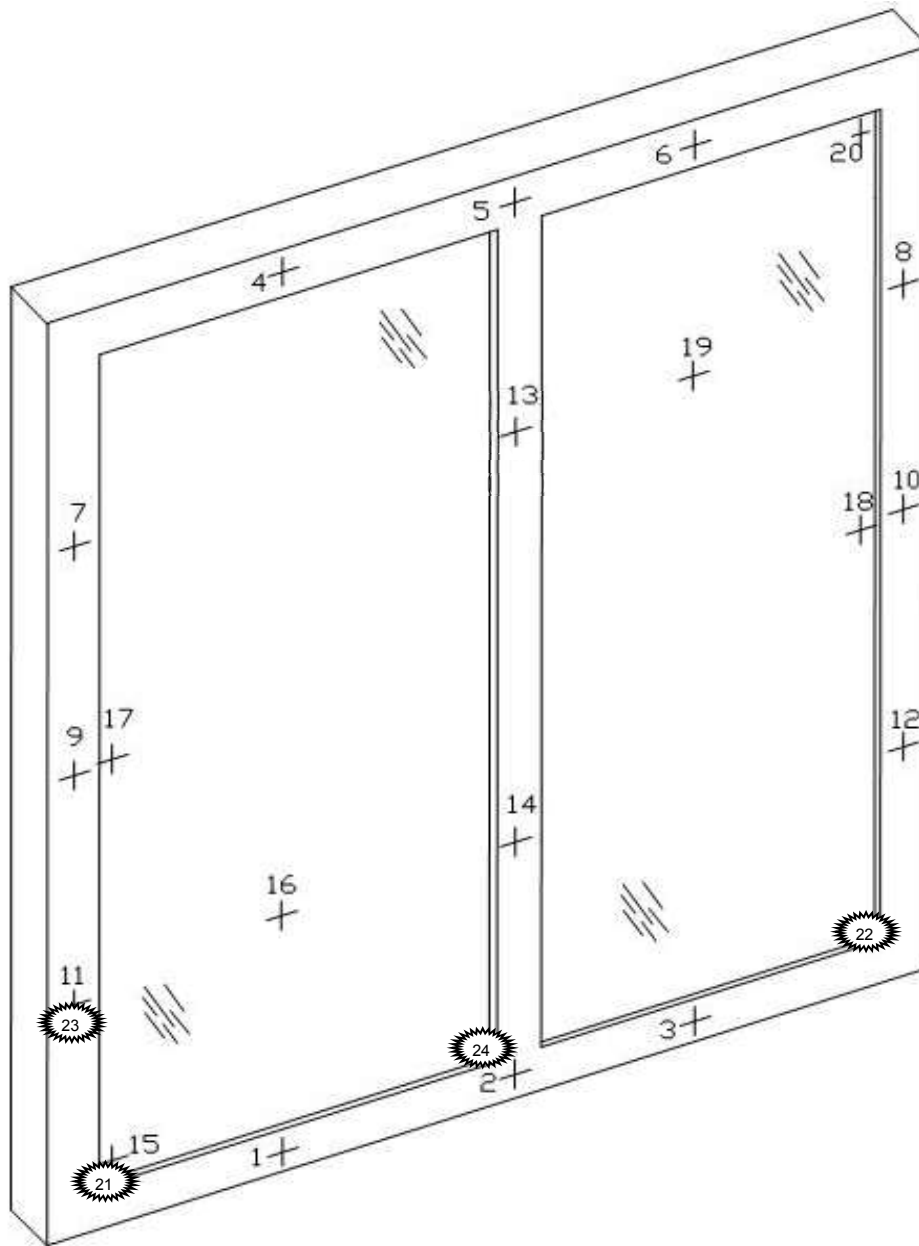
Prior to testing the specimen was sealed with silicone on the interior side and checked for air infiltration per Section 9.3.4.

Required annual calibrations for the Architectural Testing Inc. 'thermal test chamber' (ICN 000001) in York, Pennsylvania were last conducted in May 2014 in accordance with Architectural Testing Inc. calibration procedure. A CTS Calibration verification was performed December 2014. A Metering Box Wall Transducer and Surround Panel Flanking Loss Characterization was performed December 2014.





**CRF Report**

Time:	04:06	04:36	05:06	05:36	06:06	AVERAGE
<b>Pre-specified Thermocouples - Frame</b>						
1	42.92	42.90	42.88	42.90	42.95	42.91
2	43.86	43.84	43.83	43.85	43.82	43.84
3	43.21	43.22	43.23	43.21	43.24	43.22
4	48.54	48.52	48.48	48.55	48.50	48.52
5	48.22	48.22	48.22	48.25	48.23	48.23
6	49.71	49.70	49.72	49.71	49.70	49.71
7	46.57	46.57	46.58	46.58	46.54	46.57
8	49.07	49.06	49.06	49.08	49.06	49.07
9	42.88	42.88	42.86	42.89	42.88	42.88
10	46.54	46.53	46.54	46.52	46.54	46.53
11	40.78	40.77	40.79	40.74	40.77	40.77
12	43.91	43.91	43.94	43.95	43.93	43.93
13	49.72	49.70	49.73	49.72	49.71	49.72
14	45.51	45.50	45.51	45.52	45.51	45.51
FT <sub>p</sub>	45.82	45.81	45.81	45.82	45.81	45.81
<b>Pre-specified Thermocouples - Glass</b>						
15	36.85	36.87	36.87	36.83	36.84	36.85
16	55.72	55.66	55.70	55.73	55.75	55.71
17	42.10	42.08	42.10	42.10	42.10	42.10
18	42.22	42.21	42.21	42.15	42.17	42.19
19	58.20	58.21	58.24	58.23	58.23	58.22
20	42.16	42.21	42.19	42.23	42.21	42.20
GT	46.21	46.21	46.22	46.21	46.22	46.21
<b>Cold Point (Roving) Thermocouples</b>						
21	37.70	37.70	37.70	37.70	37.70	37.70
22	40.10	40.10	40.10	40.10	40.10	40.10
23	40.80	40.80	40.80	40.80	40.80	40.80
24	41.90	41.90	41.90	41.90	41.90	41.90
FT <sub>R</sub>	40.13	40.13	40.13	40.13	40.13	40.13
W	0.06	0.06	0.06	0.06	0.06	0.06
FT	45.46	45.45	45.46	45.46	45.46	45.46
<b>Warm Side - Room Ambient Air Temperature</b>						
	69.79	69.80	69.78	69.80	69.81	69.80
<b>Cold Side - Room Ambient Air Temperature</b>						
	-0.43	-0.42	-0.43	-0.43	-0.39	-0.42
CRF <sub>f</sub>	65	65	65	65	65	65
CRF <sub>g</sub>	66	66	66	66	66	66

### Thermocouple Location Diagram



#### Cold Point Locations

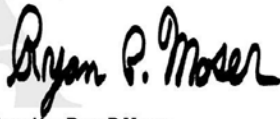
	21. 37.70
	22. 40.10
	23. 40.80
	24. 41.90



Architectural Testing, Inc. 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 tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

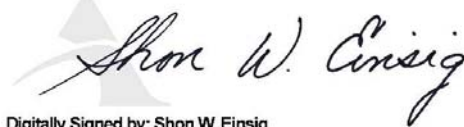
For ARCHITECTURAL TESTING, INC.



Digitally Signed by: Ryan P. Moser

---

Ryan P. Moser  
Senior Technician



Digitally Signed by: Shon W. Einsig

---

Shon W. Einsig  
Senior Technician  
Individual-In-Responsible-Charge

RPM:klb  
E5512.01-116-46

Attachments (pages): This report is complete only when all attachments listed are included.  
Appendix-A: Drawings (6)



Architectural Testing, Inc. is accredited by the International Accreditation Service (IAS) under the specific test methods listed under lab code TL-144, in accordance with the recognized International Standard ISO/IEC 17025:2005. The laboratory's accreditation or test report in no way constitutes or implies product certification, approval, or endorsement by IAS.

### Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
.01R0	04/20/15	All	Original Report Issue. Work requested by Howard Nguyen of Gamco Corporation