



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

Rendered to:

CR LAURENCE CO., INC.

SERIES/MODEL: ENTICE Window Wall

TYPE: Glazed Wall Systems (Site-built)

Summary of Results			
Thermal Transmittance (U-Factor)		0.44	
Condensation Resistance Factor - Frame (CRF _f)		40	
Condensation Resistance Factor - Glass (CRF _g)		59	
Unit Size:	78-3/4" x 79"		
Layer 1:	1/4"	Clear	
Gap:	0.54"	A1-D: Aluminum Spacer	100% Air**
Layer 2:	1/4"	PPG Solarban 70XL (e=0.018*, #3)	

Reference must be made to Report No. E8225.02-301-46, dated 11/13/15 for complete test specimen description and data.



AAMA 1503-09 THERMAL PERFORMANCE TEST REPORT

Rendered to:

CR LAURENCE CO., INC.
2100 E 38th St
Vernon, California 90058

Report Number: E8225.02-301-46
Test Date: 10/11/15
Report Date: 11/13/15

Test Sample Identification:

Series/Model: ENTICE Window 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 | -0.40 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 _f) | 40 |
| Condensation resistance factor - Glass (CRF _g) | 59 |
| 2. Thermal transmittance due to conduction (U) | 0.44 |
| (U-factors expressed in Btu/hr·ft ² ·F) | |

Test Sample Description:

Frame:

Material:	AT (0.38"): Aluminum with Thermal Breaks - All Members - Skip & Debridge*		
Size:	78-3/4" x 79"		
Daylight Opening:	36-1/4" x 70" (x2)	Glazing Method:	Pocket
Exterior Color:	Mill Finish	Exterior Finish:	Mill Finish
Interior Color:	Mill Finish	Interior Finish:	Mill Finish
Corner Joinery:	Square Cut / No Fasteners / Unsealed		

Glazing Information:

Layer 1:	1/4"	Clear	
Gap:	0.54"	A1-D: Aluminum Spacer	100% Air**
Layer 2:	1/4"	PPG Solarban 70XL (e=0.018*, #3)	
Gas Fill Method:	N/A**		
Desiccant:	Yes		

**See Drawings in Appendix D for Skip/Debridge Measurements*

***Stated per Client/Manufacturer*

N/A Non-Applicable

Test Sample Description: (Continued)

Weatherstripping:

Description	Quantity	Location
No weatherstripping.		

Hardware:

Description	Quantity	Location
No hardware.		

Drainage:

Drainage Method	Size	Quantity	Location
No visible weeps.			

Test Duration:

1. The environmental systems were started at 13:55 hours, 10/10/15.
2. The thermal performance test results were derived from 06:53 hours, 10/11/15 to 10:53 hours, 10/11/15.

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	-0.40 F
FT_p	=	Average of pre-specified frame temperatures (14)	29.33 F
FT_r	=	Average of roving thermocouples (4)	20.39 F
W	=	$[(FT_p - FT_r) / (FT_p - (T_c + 10))]$ x 0.40	0.181
FT	=	$FT_p(1-W) + W (FT_r)$ = Frame Temperature	27.71 F
GT	=	Glass Temperature	40.91 F
CRF_g	=	Condensation resistance factor – Glass	59
		$CRF_g = (GT - T_c) / (T_h - T_c) \times 100$	
CRF_f	=	Condensation resistance factor – Frame	40
		$CRF_f = (FT - T_c) / (T_h - T_c) \times 100$	

The CRF number was determined to be 40 (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	-0.40 F
P	= Static pressure difference across test specimen	0.00 psf
	15 mph dynamic perpendicular wind at exterior	
	Nominal sample area	43.20 ft ²
	Total measured input to calorimeter	1463.85 Btu/hr
	Calorimeter correction	131.02 Btu/hr
	Net specimen heat loss	1332.84 Btu/hr
U	= Thermal Transmittance	0.44 Btu/hr·ft ² ·F

Glazing Deflection:

	Left Glazing	Right Glazing
Edge Gap Width	0.54"	0.54"
Estimated center gap width upon receipt of specimen in laboratory (after stabilization)	0.48"	0.49"
Center gap width at laboratory ambient conditions on day of testing	0.48"	0.49"
Center gap width at test conditions	0.40"	0.43"

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.

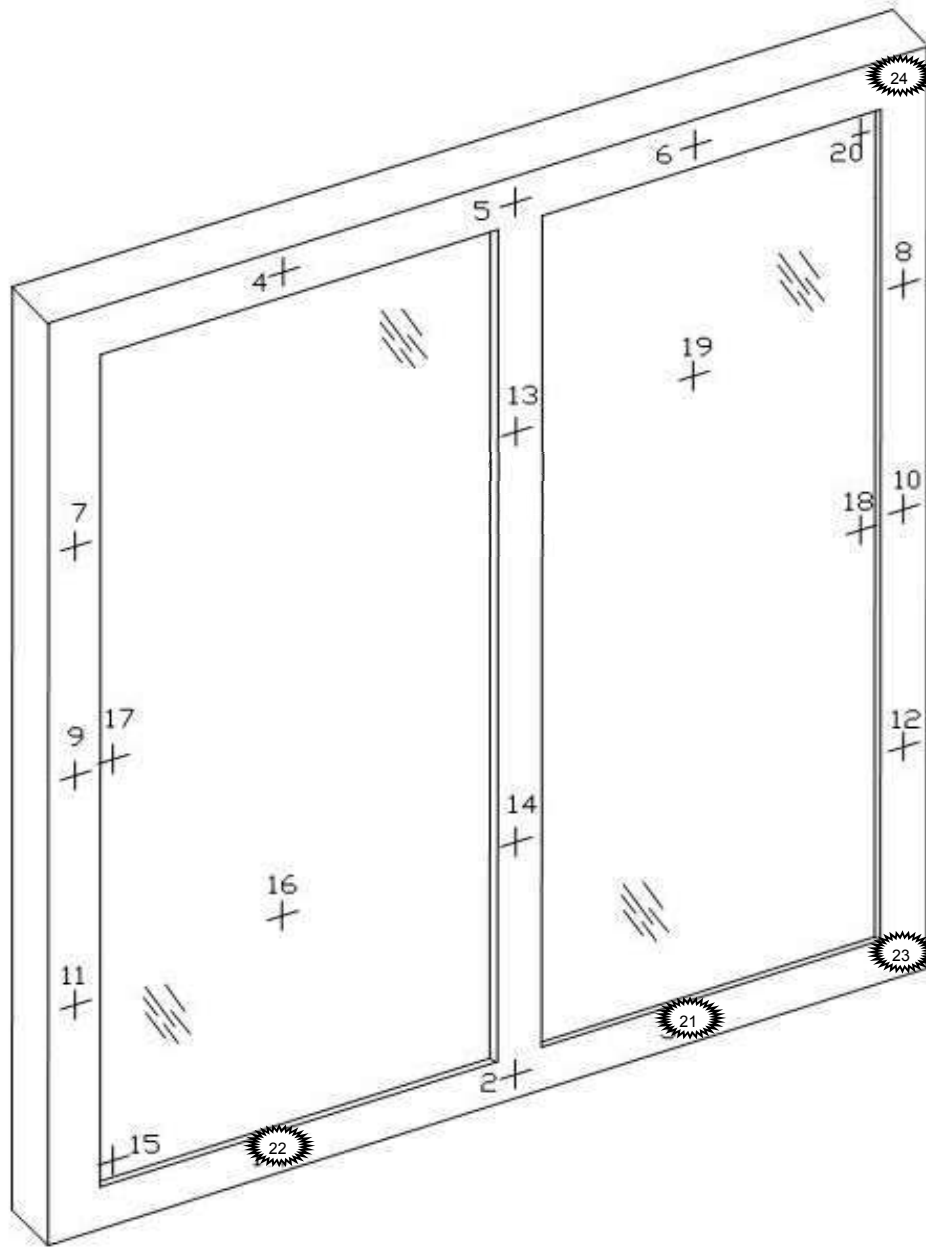
Prior to testing the specimen was sealed with silicone on the interior side and checked for air infiltration per Section 9.3.4.

Required annual calibrations for the Architectural Testing Inc., an Intertek company ("Intertek-ATI"), 'thermal test chamber' (ICN 004287) in Fresno, California were last conducted in April 2015 in accordance with Intertek-ATI calibration procedure. A CTS Calibration verification was performed August 2015. A Metering Box Wall Transducer and Surround Panel Flanking Loss Characterization was performed June 2015.





CRF Report

Time:	08:53	09:23	09:53	10:23	10:53	AVERAGE
Pre-specified Thermocouples - Frame						
1	21.14	21.03	21.06	20.96	20.87	21.01
2	21.96	22.01	22.04	21.93	21.92	21.97
3	19.96	20.19	20.18	20.05	20.00	20.07
4	24.37	24.47	24.54	24.44	24.43	24.45
5	23.51	23.56	23.56	23.50	23.51	23.53
6	25.88	24.30	23.41	24.49	7.91	21.20
7	34.63	34.68	34.63	34.54	34.60	34.62
8	32.12	32.10	31.97	32.04	32.07	32.06
9	37.34	37.34	37.07	37.28	37.10	37.23
10	31.42	31.38	31.17	31.18	31.07	31.24
11	39.90	39.88	39.55	39.74	39.64	39.74
12	28.32	28.21	28.13	28.02	28.02	28.14
13	38.14	37.99	37.99	37.96	37.92	38.00
14	37.57	37.33	37.42	37.25	37.35	37.38
FT _p	29.73	29.61	29.48	29.53	28.31	29.33
Pre-specified Thermocouples - Glass						
15	28.28	28.02	28.23	28.17	28.19	28.18
16	55.04	54.91	54.98	54.94	54.87	54.95
17	43.03	42.98	43.03	42.95	42.90	42.98
18	35.71	35.63	35.67	35.55	35.57	35.62
19	53.55	53.66	53.70	53.60	53.69	53.64
20	29.99	30.14	30.13	30.04	30.06	30.07
GT	40.93	40.89	40.95	40.88	40.88	40.91
Cold Point (Roving) Thermocouples						
21	19.96	20.19	20.18	20.05	20.00	20.07
22	21.14	21.03	21.06	20.96	20.87	21.01
23	20.33	20.30	20.21	20.07	19.97	20.18
24	20.08	20.60	20.21	20.55	20.14	20.31
FT _R	20.38	20.53	20.42	20.41	20.24	20.39
W	0.19	0.18	0.18	0.18	0.17	0.18
FT	27.99	27.96	27.83	27.86	26.92	27.71
Warm Side - Room Ambient Air Temperature						
	69.84	69.79	69.76	69.76	69.73	69.78
Cold Side - Room Ambient Air Temperature						
	-0.38	-0.40	-0.37	-0.41	-0.39	-0.39
CRF _f	40	40	40	40	39	40
CRF _g	59	59	59	59	59	59

Thermocouple Location Diagram



Cold Point Locations

-  21. 20.07
-  22. 21.01
-  23. 20.18
-  24. 20.31

Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention end date for this report is October 11, 2019.

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 Intertek-ATI.

For INTERTEK-ATI



Digitally Signed by: William Smeds

William Simon Smeds
Technician



Digitally Signed by: Kenny C. White

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

WSS:ss
E8225.02-301-46

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix-A: Drawings (11)



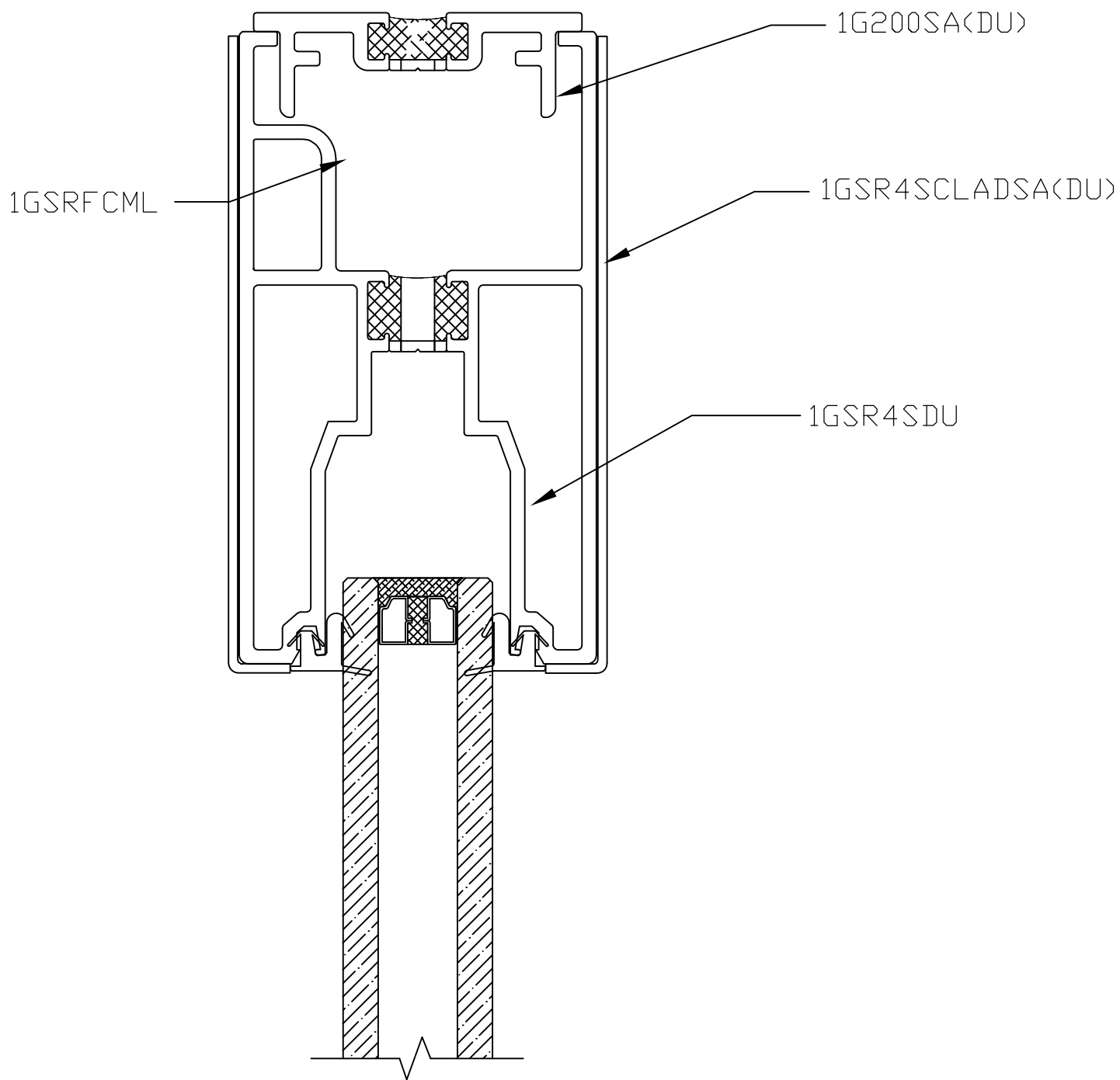
Intertek-ATI is accredited by the International Accreditation Service (IAS) under the specific test methods listed under lab code TL-144, in accordance with the recognized International Standard ISO/IEC 17025:2005. The laboratory's accreditation or test report in no way constitutes or implies product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

Revision Log

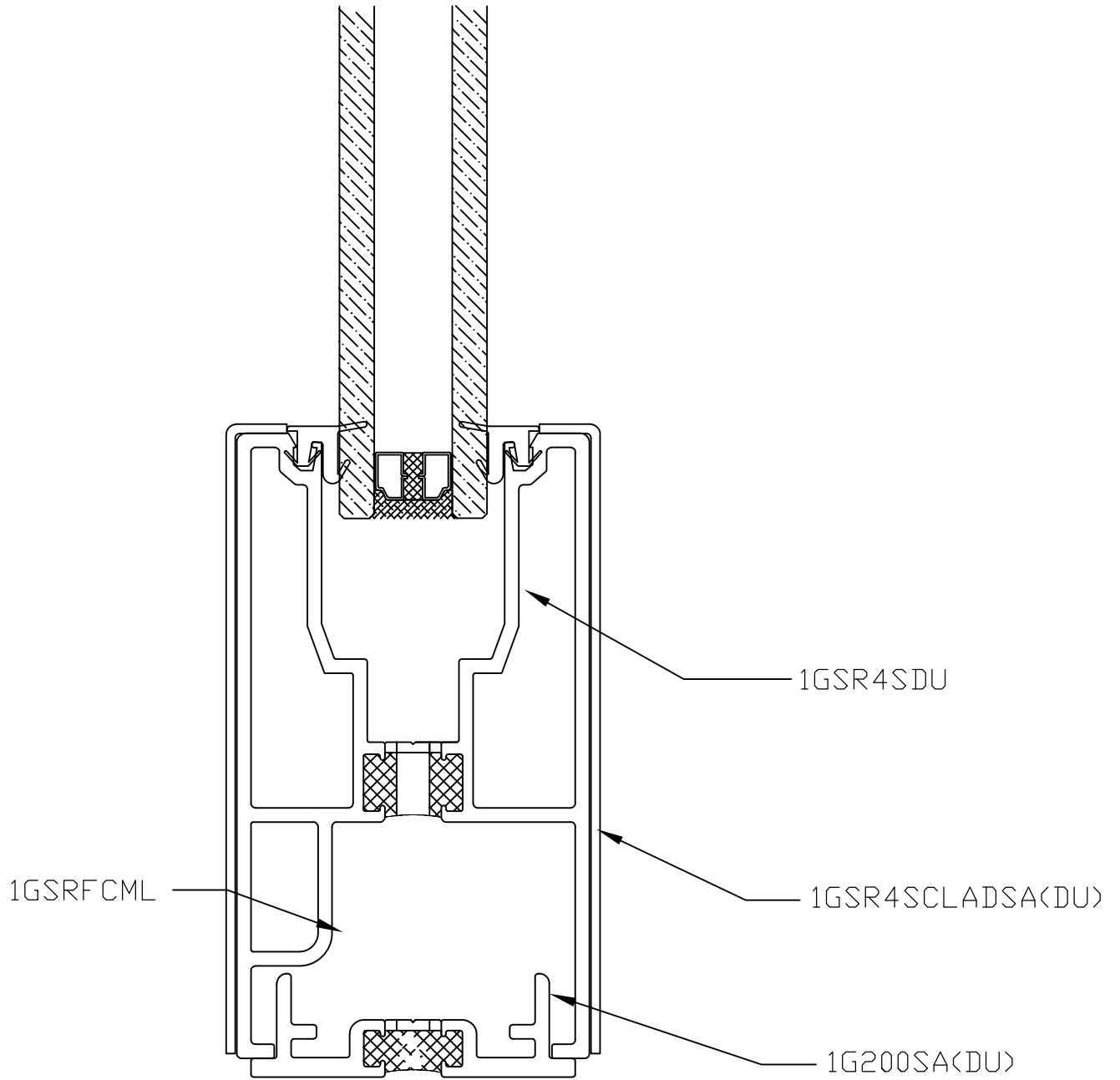
<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	11/13/15	All	Original Report Issue. Work requested by Mr. Gyu-Hyeon Kim of CR Laurence Co., Inc.

This report produced from controlled document template ATI 00025(c), revised 03/14/2013.

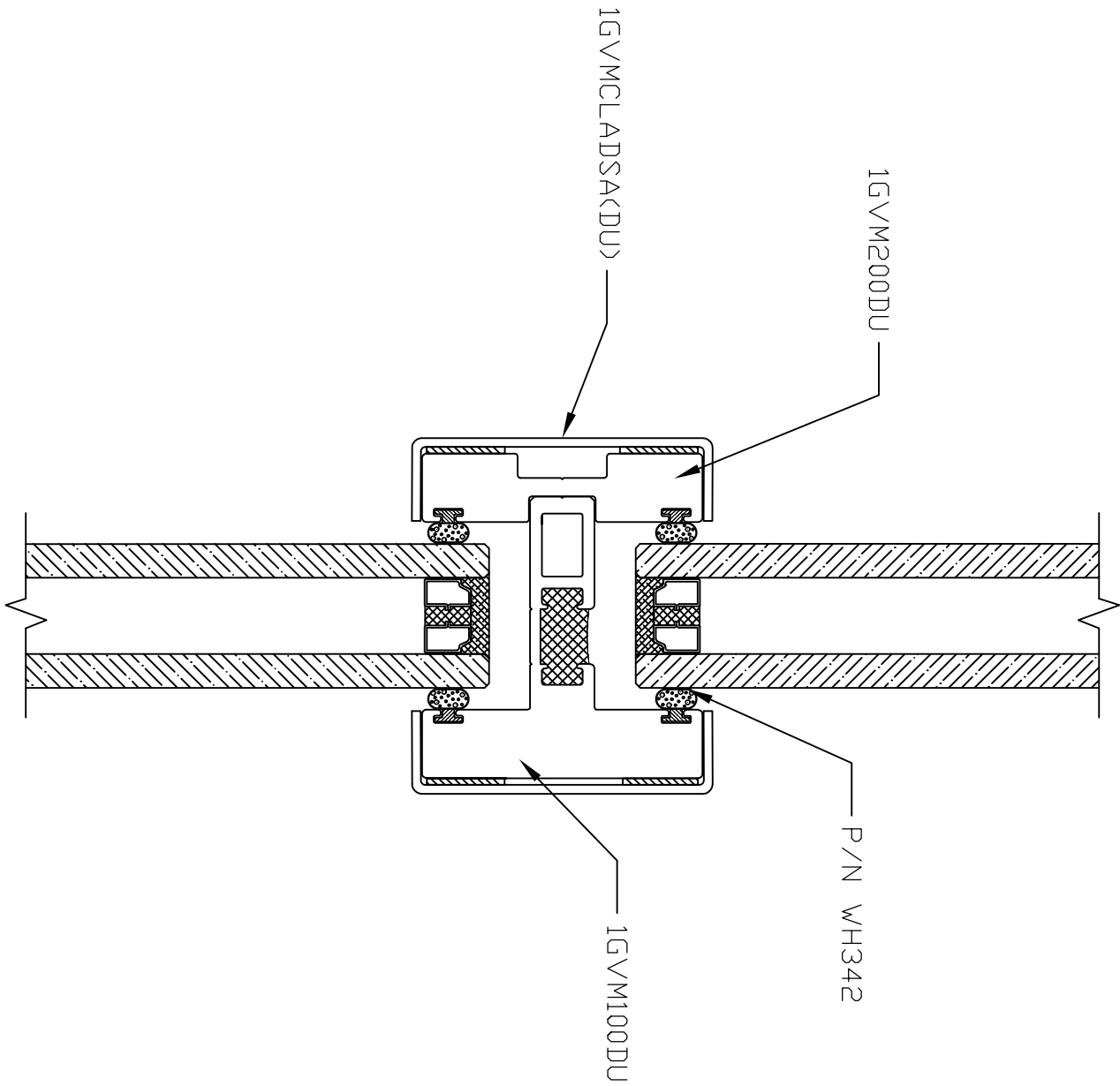
Appendix A: Drawings



ENTICEMENT WINDOW WALL HEAD ALUMINUM CLAD



**ENTICE WINDOW WALL
SILL
ALUMINUM CLAD**



**ENTICE WINDOW WALL
VERT. MULLION
ALUMINUM CLAD**