

# INOVUES, LLC

# THERMAL PERFORMANCE TEST REPORT

**SCOPE OF WORK**

BASE UNIT WITH INOVUES GLAZING SHIELD ATTACHED

**REPORT NUMBER**

I6637.02-116-46 R0

**TEST DATE**

07/13/18

**ISSUE DATE**

07/26/18

**RECORD RETENTION END DATE**

07/13/23

**PAGES**

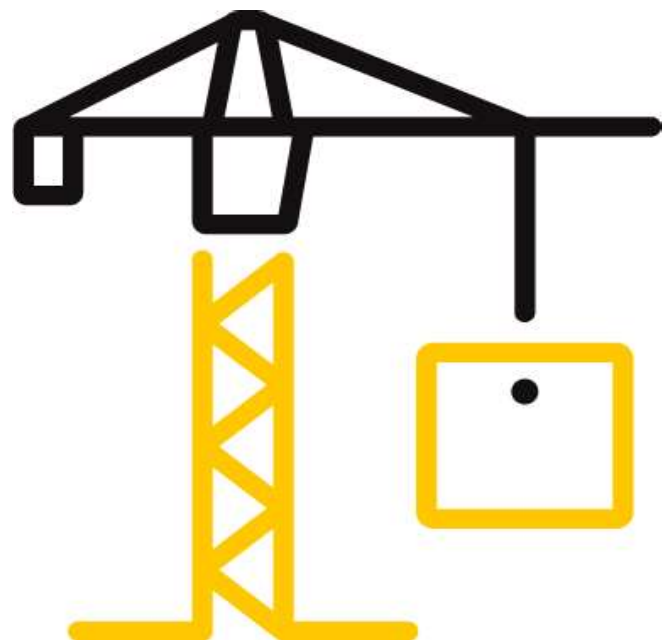
12

**DOCUMENT CONTROL NUMBER**

ATI 00025(c) (01/15/18)

RTTDS-R-AMER-Test-2822(c)

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**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**REPORT ISSUED TO**

**INOVUES, LLC**

2323 McCue Road

Houston, Texas 77056

**SECTION 1**

**SCOPE**

**SERIES/MODEL: CW + GS100LF (Base Unit with INOVUES Glazing Shield)**

**TYPE: Fixed**


Intertek Building & Construction (Intertek B&C) was contracted by INOVUES, LLC to evaluate the thermal performance per AAMA 1503-09. The purpose of this testing was to evaluate the Condensation Resistance and Thermal Transmittance. Results obtained are tested values and were secured by using the designated test method. Testing was conducted at Intertek B&C test facility in York, Pennsylvania. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.


**SECTION 2**

**SUMMARY OF TEST RESULTS**

Condensation Resistance Factor - Frame (CRFf):	79
Condensation Resistance Factor - Glass (CRFg):	58
Thermal Transmittance (U):	0.58 Btu/hr·ft <sup>2</sup> ·F

For INTERTEK B&C:

<b>COMPLETED BY</b>	Ryan P. Moser
<b>TITLE</b>	Senior Technician
<b>SIGNATURE</b>	 <small>Digitally Signed by: Ryan P. Moser</small>
<b>DATE</b>	07/26/18

<b>REVIEWED BY</b>	Shon W. Einsig
<b>TITLE</b>	Technician Team Leader, IIRC
<b>SIGNATURE</b>	 <small>Digitally Signed by: Shon W. Einsig</small>
<b>DATE</b>	07/26/18

RPM:pan

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**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**SECTION 3**

**TEST SPECIMEN SUMMARY**

<b>SERIES/MODEL</b>	CW + GS100LF (Base Unit with INOVUES Glazing Shield)
<b>TYPE</b>	Fixed
<b>OVERALL SIZE</b>	53" x 77"
<b>TEST SAMPLE SUBMITTED BY</b>	Client

**SECTION 4**

**TEST METHOD**

The specimens were evaluated in accordance with the following:

*AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections*

**SECTION 5**

**MATERIAL SOURCE/INSTALLATION**

The test specimen was provided by the client. Representative samples of the test specimen will be retained by Intertek B&C for a minimum of five years from the test completion date.

**Test Chamber Installation**

The test sample was installed in a vertical orientation, the exterior of the specimen was exposed to the cold side.

**SECTION 6**

**LIST OF OFFICIAL OBSERVERS**

<b>NAME</b>	<b>COMPANY</b>
Joel T. Chronister	Intertek B&C
Ryan P. Moser	Intertek B&C
Shon W. Einsig	Intertek B&C

**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**SECTION 7**

**TEST SAMPLE DESCRIPTION**

**Frame**

<b>MATERIAL</b>	AT (0.72"): Aluminum with Thermal Breaks - All Members		
<b>SIZE</b>	53" x 77"		
<b>DAYLIGHT OPENING</b>	48" x 72"	<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 / Sealed		

**Glazing Information**

<b>LAYER 1</b>	0.31"	INOVUES Glazing Shield (1/8" AGC Energy Select 73 (e=0.148, #2) / 0.060" PVB / 1/8" Clear) Laminated	
<b>GAP 1</b>	0.63"	Hybrid (Aluminum Profiles/Extrusions Between Adhesives/Sealants)	100% Air*
<b>LAYER 2</b>	1/4"	Tinted Glass	
<b>GAS FILL METHOD</b>	N/A*		
<b>DESICCANT</b>	Yes		

*\*Stated per Client/Manufacturer*

*N/A Non-Applicable*

**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

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**SECTION 7 (CONTINUED)**

**TEST SAMPLE DESCRIPTION (CONTINUED)**

**Weatherstripping**

DESCRIPTION	QUANTITY	LOCATION
EPDM gasket	1 row	Interior and exterior glazing perimeter
EPDM thermal isolator	1 row	Frame at pressure plate center
EPDM single-fin gasket	1 row	Exterior glazing perimeter at glazing shield

**Hardware**

DESCRIPTION	QUANTITY	LOCATION
Aluminum pressure plate	4	Exterior frame perimeter
Aluminum face cover	4	Exterior frame perimeter
Aluminum adaptor	1 row	Interior glazing perimeter
Aluminum spacer and panel	4 sets	Combine to make glazing shield

**Drainage**

DRAINAGE METHOD	SIZE	QUANTITY	LOCATION
Diameter weephole	0.31"	2	Exterior sill face cover

**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**SECTION 8**

**CONDENSATION RESISTANCE FACTOR**

1. Average Metering Room Air Temperature (th)	69.80 F
2. Average Cold Side Air Temperature (tc)	-0.41 F
3. Average of 14 Pre-Specified Frame Temperatures (FTp)	55.37 F
4. Average of 4 Roving Thermocouples (FTr)	48.66 F
5. Weighting Factor (W)	0.059
6. Weighted Frame Temperature (FT)	54.98 F
7. Average Glass Temperature (GT)	40.45 F
8. Condensation Resistance Factor – Frame (CRFf)	79
9. Condensation Resistance Factor – Glass (CRFg)	58

The CRF number was determined to be 58 (on the size as reported). When reviewing this test data, it should be noted that the glass temperature (GT) was colder than the frame temperature (FT) therefore controlling the CRF number. Refer to the 'CRF Report' page and the 'Thermocouple Location Diagram' page of this report.

**SECTION 9**

**THERMAL TRANSMITTANCE**

1. Average Metering Room Air Temperature (th)	69.80 F
2. Average Cold Side Air Temperature (tc)	-0.41 F
3. Measured Static Pressure Difference Across Test Specimen	0.00" ± 0.04" H <sub>2</sub> O
4. Test Specimen Projected Area (As)	28.34 ft <sup>2</sup>
5. Total Measured Input into Metering Box (Qtotal)	1337.52 Btu/hr
6. Total Correction	177.54 Btu/hr
7. Net Specimen Heat Loss (Qs)	1159.97 Btu/hr
8. Thermal Transmittance (U)	0.58 Btu/hr-ft <sup>2</sup> -F

**SECTION 10**

**TEST DURATION**

1. The environmental systems were started at 14:35 hours, 07/12/18.
2. The test parameters were considered stable for two consecutive four hour test periods from 21:56 hours, 07/12/18 to 05:56 hours, 07/13/18.
3. The thermal performance test results were derived from 01:56 hours, 07/13/18 to 05:56 hours, 07/13/18.

**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**SECTION 11**

**TEMPERATURE AND CONDENSATION RESISTANCE CALCULATION**

Time	03:56	04:26	04:56	05:26	05:56	Average
<b>Pre-Specified Thermocouples - Frame</b>						
1	51.50	51.51	51.47	51.53	51.47	51.50
2	51.45	51.42	51.45	51.48	51.45	51.45
3	51.48	51.47	51.46	51.53	51.50	51.49
4	58.51	58.43	58.47	58.43	58.44	58.46
5	57.80	57.77	57.78	57.76	57.78	57.78
6	57.62	57.68	57.63	57.66	57.66	57.65
7	59.34	59.31	59.30	59.33	59.33	59.32
8	57.97	57.97	57.97	57.97	57.97	57.97
9	58.39	58.39	58.40	58.41	58.35	58.39
10	56.39	56.45	56.44	56.45	56.46	56.44
11	55.89	55.90	55.90	55.92	55.89	55.90
12	54.48	54.46	54.46	54.48	54.49	54.47
13	52.80	52.82	52.82	52.82	52.78	52.81
14	51.56	51.56	51.56	51.57	51.56	51.56
FTp	55.37	55.37	55.37	55.38	55.37	55.37
<b>Pre-Specified Thermocouples - Glass</b>						
15	32.54	32.54	32.54	32.54	32.54	32.54
16	42.77	42.73	42.74	42.76	42.75	42.75
17	39.64	39.60	39.62	39.65	39.68	39.64
18	44.79	44.70	44.76	44.79	44.82	44.77
19	44.10	43.98	44.04	44.03	44.01	44.03
20	38.95	38.93	39.00	39.05	39.00	38.99
GT	40.46	40.42	40.45	40.47	40.47	40.45
<b>Cold Point (Roving) Thermocouples</b>						
21	48.50	48.50	48.50	48.50	48.50	48.50
22	48.61	48.61	48.61	48.61	48.61	48.61
23	48.69	48.69	48.69	48.69	48.69	48.69
24	48.84	48.84	48.84	48.84	48.84	48.84
FTr	48.66	48.66	48.66	48.66	48.66	48.66
W	0.059	0.059	0.059	0.059	0.059	0.059
FT	54.98	54.98	54.97	54.99	54.97	54.98
<b>Warm Side - Room Ambient Air Temperature</b>						
	69.79	69.81	69.80	69.81	69.81	69.80
<b>Cold Side - Room Ambient Air Temperature</b>						
	-0.35	-0.46	-0.43	-0.37	-0.39	-0.40
<b>Condensation Resistance Factor</b>						
CRFf	79	79	79	79	79	79
CRFg	58	58	58	58	58	58

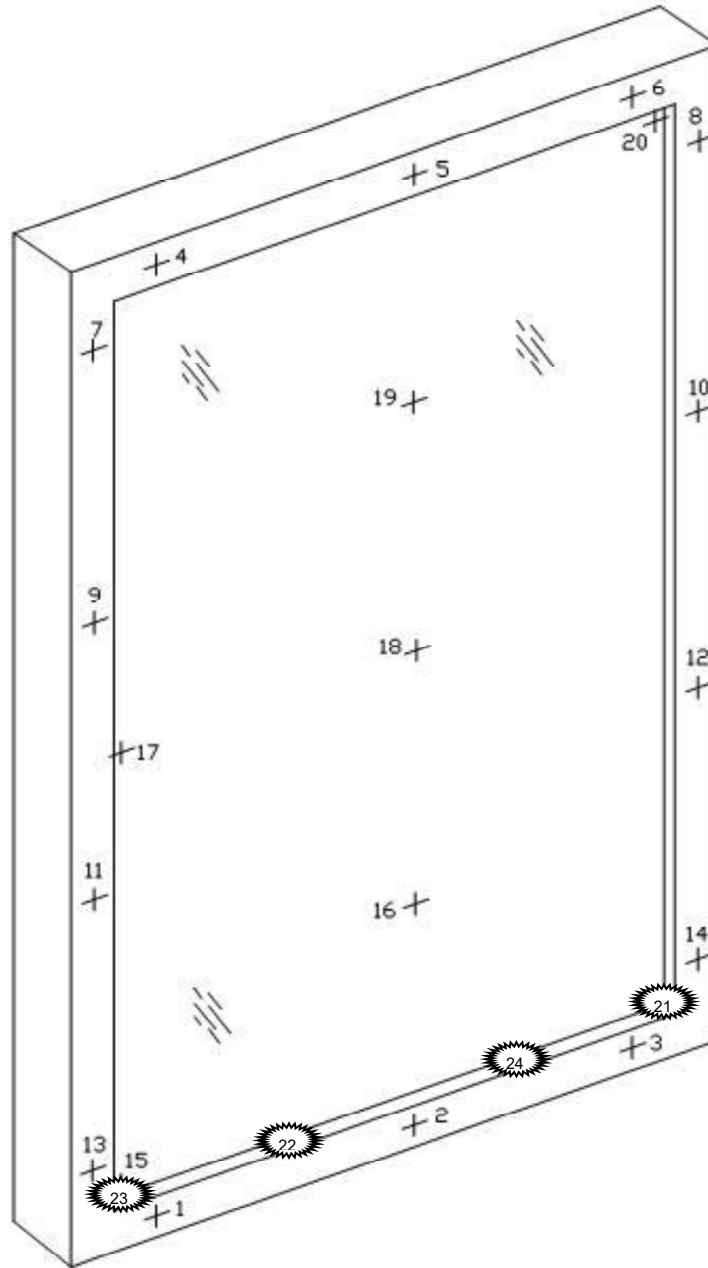
**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**SECTION 12**

**THERMOCOUPLE LOCATION DIAGRAM**



COLD POINT LOCATIONS	
21	48.50
22	48.61
23	48.69
24	48.84



**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**SECTION 13**

**GLAZING DEFLECTION**

	<b>FRAME</b>
<b>EDGE GAP WIDTH</b>	0.63"
<b>ESTIMATED CENTER GAP WIDTH</b> upon receipt of specimen in laboratory (after stabilization)	0.63"
<b>CENTER GAP WIDTH</b> at laboratory ambient conditions on day of testing	0.63"
<b>CENTER GAP WIDTH</b> at test conditions	0.63"

*Glass collapse determined using a digital glass and air space meter*

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.

Required annual calibrations for the Intertek B&C, 'thermal test chamber' (ICN 000001) in York, Pennsylvania were last conducted in May 2018 in accordance with Intertek B&C calibration procedure. A CTS Calibration verification was performed March 2018. A Metering Box Wall Transducer and Surround Panel Flanking Loss Characterization was performed April 2018.

ANSI/NCSS Z540-2-1997 type B uncertainty for this test was 2.01%.

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

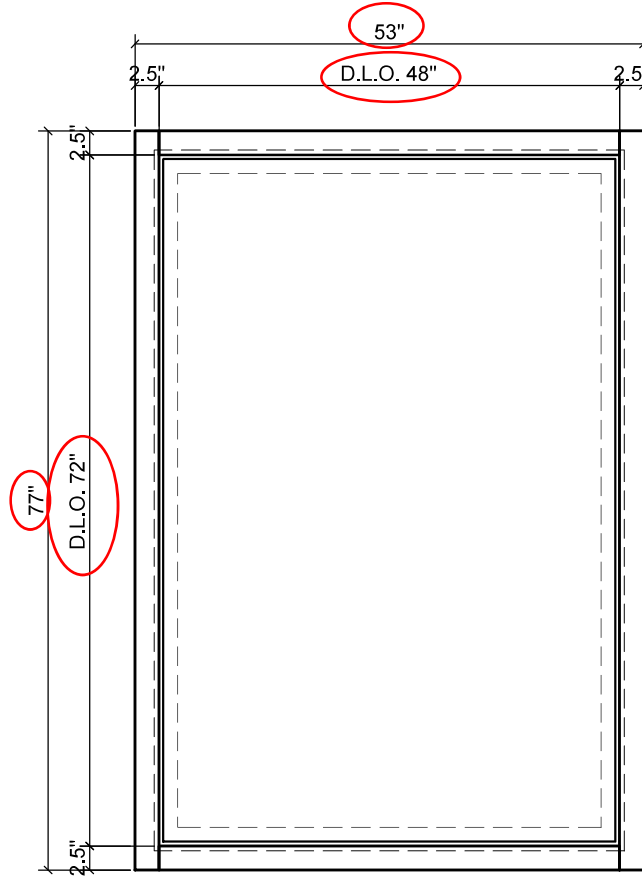
**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

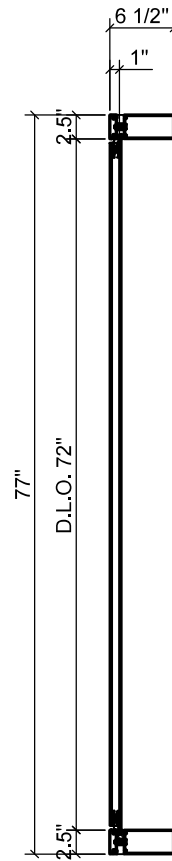
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**SECTION 14**  
**DRAWINGS**

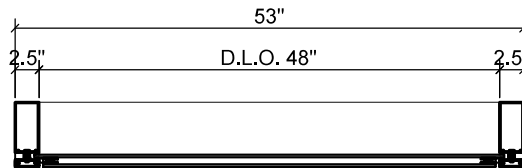
The test specimen drawings which follow have been reviewed by Intertek B&C and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Intertek B&C per the drawings included in this report. Any deviations are documented herein or on the drawings.



ELEVATION



SECTION



PLAN

**NOTES:**

PLAN, ELEVATION, AND SECTION ARE FOR SCHEMATIC PURPOSES

	Report #:	16575.01-109-44
	Date:	08/02/2018
	Verified by:	<i>Rev. L. Stoyl</i>

DRAWN BY: AA	SCALE 1:20	DIMENSIONS INCHES	SCH. DWG. NO. INO-002-01001	GLAZING SHIELD 1.0_PROTOTYPE 2_EPS
CHECKED BY:	DATE: 2018-04-24	CUSTOMER/REF.NO. ALLIANCE GLAZING TECHNOLOGIES		

**TEST REPORT FOR INOVUES, LLC**

Report No.: I6637.02-116-46 R0

Date: 07/26/18

**SECTION 15**

**REVISION LOG**

<b>REVISION #</b>	<b>DATE</b>	<b>PAGES</b>	<b>REVISION</b>
.02 R0	07/26/18	N/A	Original Report Issue