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CR LAURENCE CO., INC.

THERMAL PERFORMANCE TEST REPORT

SCOPE OF WORK
HP3252 GLAZED WALL SYSTEM

REPORT NUMBER
K0614.02-301-46

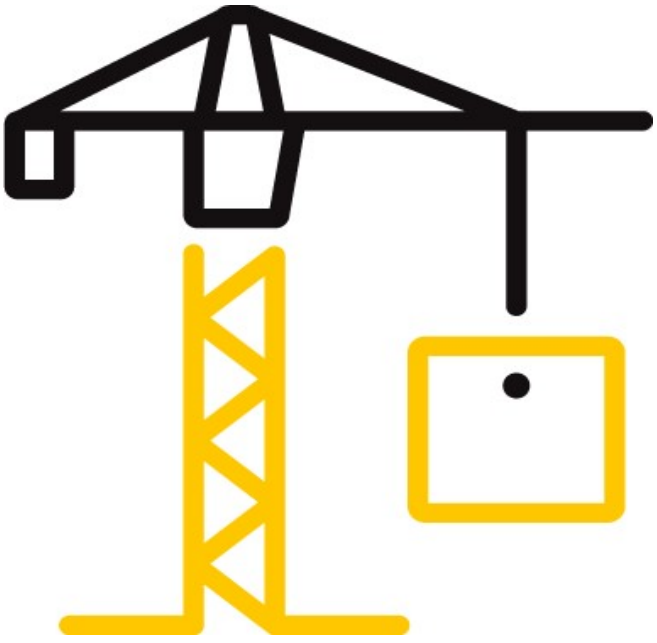
TEST DATE
09/24/19

ISSUE DATE
01/09/20

RECORD RETENTION END DATE
09/24/24

PAGES
21

DOCUMENT CONTROL NUMBER
RTTDS-R-AMER-Test-2822(c) (07/07/18)



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TEST REPORT FOR CR LAURENCE CO., INC.
Report No.: K0614.02-301-46
Date: 01/09/20

REPORT ISSUED TO

CR LAURENCE CO., INC.
2503 East Vernon Avenue
Los Angeles, California 90058

SECTION 1

SCOPE

SERIES/MODEL: HP3252
TYPE: Glazed Wall System

Intertek Building & Construction (Intertek B&C) was contracted by CR Laurence Co., Inc. to evaluate the thermal performance per AAMA 1503-09. The purpose of this testing was to evaluate the Condensation Resisance 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 Fresno, California. 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):	77
Condensation Resistance Factor - Glass (CRFg):	71
Thermal Transmittance (U):	0.41 Btu/hr·ft^2·F

For INTERTEK B&C:

COMPLETED BY	William Simon Smeds	**REVIEWED BY**	Kenny C. White
TITLE	Technician	**TITLE**	Laboratory Manager, IIRC
SIGNATURE	Digitally Signed by: William Smeds	**SIGNATURE**	Digitally Signed by: Kenny C. White
DATE	01/09/20	**DATE**	01/09/20

WSS:ss

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SECTION 3
TEST SPECIMEN SUMMARY

SERIES/MODEL	HP3252
TYPE	Glazed Wall System
OVERALL SIZE	78-3/4" x 78-3/4"
TEST SAMPLE SUBMITTED BY	C.R. Laurence Co., Inc. - Vernon, California

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 C.R. Laurence Co., Inc. - Vernon, California. Representative samples of the test specimen will be retained by Intertek B&C for a minimum of two 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

NAME	COMPANY
William Simon Smeds	Intertek B&C

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SECTION 7
TEST SAMPLE DESCRIPTION

Frame

MATERIAL	AT (0.31"): Aluminum with Thermal Breaks - All Members		
SIZE	78-3/4" x 78-3/4"		
DAYLIGHT OPENING	35-3/8" x 73-5/8" (x2)	**GLAZING METHOD**	Exterior
EXTERIOR COLOR	Grey	**EXTERIOR FINISH**	Anodized
INTERIOR COLOR	Grey	**INTERIOR FINISH**	Anodized
CORNER JOINERY	Square Cut / Screws / Sealed		

Glazing Information

LAYER 1	1/4"	Solarban 72VT (e=0.018*, #2)	
GAP	0.57"	SS-D: Stainless Steel Spacer	100% Air*
LAYER 2	1/4"	Clear	
GAS FILL METHOD		N/A*	
DESICCANT		Yes	

**Stated per Client/Manufacturer*
N/A Non-Applicable

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SECTION 7 (CONTINUED)
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.			

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SECTION 8
CONDENSATION RESISTANCE FACTOR

1.	Average Metering Room Air Temperature (th)	69.80	F
2.	Average Cold Side Air Temperature (tc)	-0.38	F
3.	Average of 14 Pre-Specified Frame Temperatures (FTp)	54.38	F
4.	Average of 4 Roving Thermocouples (FTr)	47.36	F
5.	Weighting Factor (W)	0.063	
6.	Weighted Frame Temperature (FT)	53.94	F
7.	Average Glass Temperature (GT)	49.51	F
8.	Condensation Resistance Factor – Frame (CRFf)	77	
9.	Condensation Resistance Factor – Glass (CRFg)	71	

The CRF number was determined to be 71 (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)	-0.38	F
3.	Measured Static Pressure Difference Across Test Specimen	0.00" ± 0.04"	H_2O
4.	Test Specimen Projected Area (As)	43.07	ft^2
5.	Total Measured Input into Metering Box (Qtotal)	1338.24	Btu/hr
6.	Total Correction	87.67	Btu/hr
7.	Net Specimen Heat Loss (Qs)	1250.57	Btu/hr
8.	Thermal Transmittance (U)	0.41	$Btu/hr \cdot ft^2 \cdot F$

SECTION 10
TEST DURATION

1. The environmental systems were started at 13:52 hours, 09/23/19.
2. The test parameters were considered stable for two consecutive four hour test periods from 23:03 hours, 09/23/19 to 07:03 hours, 09/24/19.
3. The thermal performance test results were derived from 03:03 hours, 09/24/19 to 07:03 hours, 09/24/19.

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SECTION 11
TEMPERATURE AND CONDENSATION RESISTANCE CALCULATION

Time	05:03	05:33	06:03	06:33	07:03	**Average**
Pre-Specified Thermocouples - Frame						
1	50.20	50.21	50.30	50.33	50.32	50.27
2	47.85	47.86	47.92	47.93	47.97	47.91
3	51.03	51.10	51.06	51.14	51.12	51.09
4	59.02	58.97	59.11	59.12	59.07	59.06
5	61.12	61.11	61.13	61.16	61.18	61.14
6	59.85	59.85	59.87	59.93	59.88	59.88
7	56.97	56.99	57.04	57.05	57.04	57.02
8	57.36	57.37	57.38	57.35	57.36	57.36
9	54.32	54.34	54.33	54.39	54.38	54.35
10	55.00	55.03	55.04	54.98	55.05	55.02
11	47.99	48.10	48.14	48.07	48.14	48.09
12	48.67	48.79	48.85	48.66	48.81	48.76
13	61.83	61.85	61.81	61.81	61.83	61.83
14	49.52	49.51	49.55	49.57	49.55	49.54
FTp	54.34	54.36	54.39	54.39	54.41	54.38
Pre-Specified Thermocouples - Glass						
15	33.87	33.78	33.86	33.93	33.86	33.86
16	55.80	55.76	55.82	55.79	55.78	55.79
17	50.59	50.56	50.63	50.64	50.58	50.60
18	50.24	50.26	50.27	50.21	50.25	50.25
19	56.37	56.27	56.36	56.64	56.58	56.44
20	50.15	50.14	50.15	50.15	50.16	50.15
GT	49.51	49.46	49.51	49.56	49.53	49.51
Cold Point (Roving) Thermocouples						
21	45.39	45.39	45.44	45.43	45.40	45.41
22	47.99	48.10	48.14	48.07	48.14	48.09
23	47.85	47.86	47.92	47.93	47.97	47.91
24	48.03	48.05	48.05	48.08	47.92	48.03
FTr	47.31	47.35	47.39	47.38	47.36	47.36
W	0.063	0.063	0.063	0.063	0.063	0.063
FT	53.89	53.92	53.95	53.95	53.96	53.94
Warm Side - Room Ambient Air Temperature						
	69.79	69.82	69.83	69.83	69.81	69.81
Cold Side - Room Ambient Air Temperature						
	-0.28	-0.42	-0.34	-0.35	-0.37	-0.35
Condensation Resistance Factor						
CRFf	77	77	77	77	77	77
CRFg	71	71	71	71	71	71

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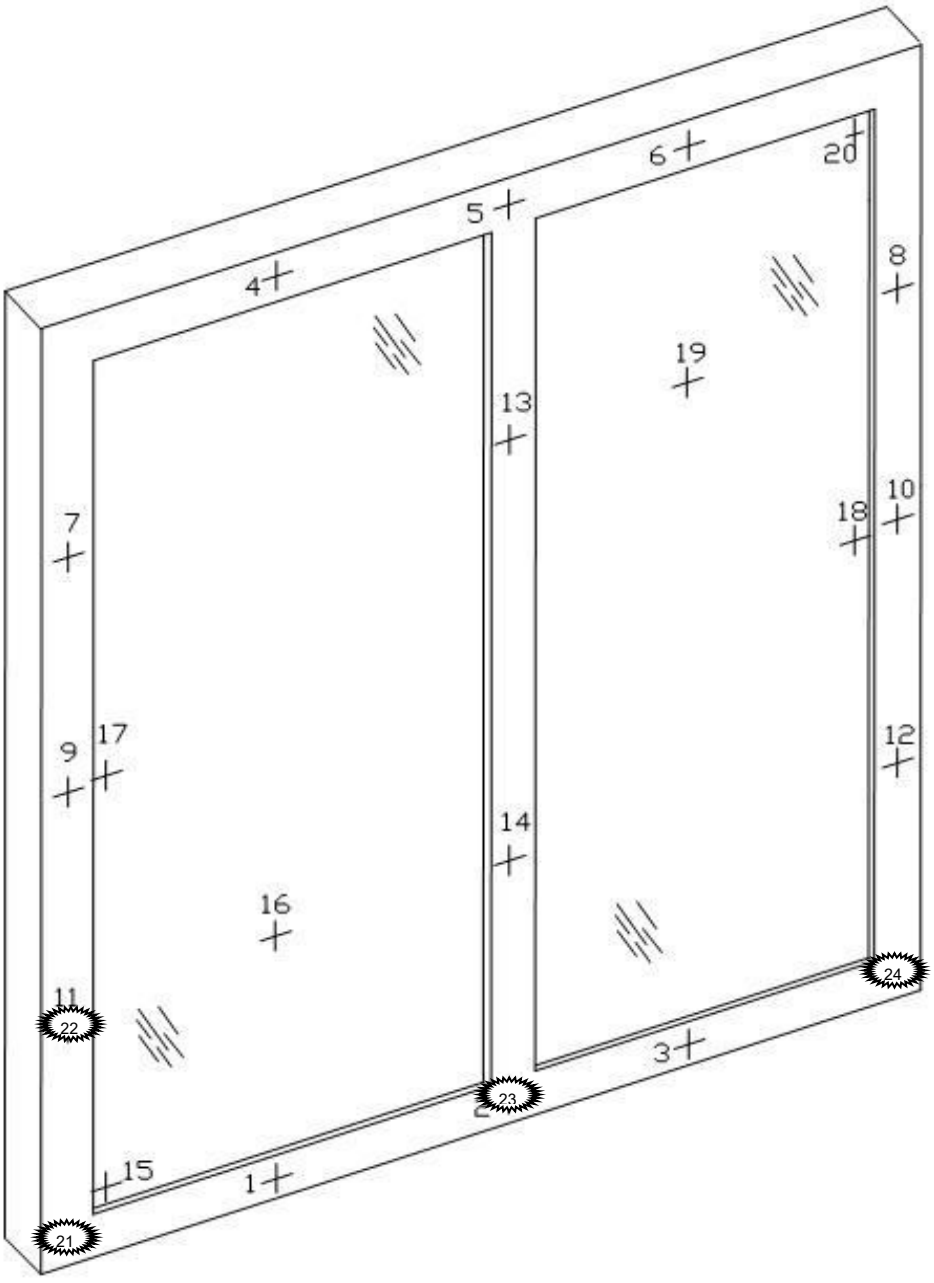
SECTION 12
THERMOCOUPLE LOCATION DIAGRAM



COLD POINT LOCATIONS	
21	45.41
22	48.09
23	47.91
24	48.03

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SECTION 13
GLAZING DEFLECTION

	Left Glazing	Right Glazing
EDGE GAP WIDTH	0.57"	0.57"
ESTIMATED CENTER GAP WIDTH upon receipt of specimen in laboratory (after stabilization)	0.52"	0.48"
CENTER GAP WIDTH at laboratory ambient conditions on day of testing	0.52"	0.48"
CENTER GAP WIDTH at test conditions	0.43"	0.41"

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 004287) in Fresno, California were last conducted in October 2018 in accordance with Intertek B&C calibration procedure. A CTS Calibration verification was performed December 2018. A Metering Box Wall Transducer and Surround Panel Flanking Loss Characterization was performed March 2019.

ANSI/NCSL Z540-2-1997 type B uncertainty for this test was 1.57%.

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

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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.

	Bill Of Materials - 3252 HP Curtain Wall	
CW905	Vertical Mullion - 5" Tubular	Anodized Aluminum
PC927	Horizontal Mullion - 5" Open Back	Anodized Aluminum
PW901	F-Cap	Anodized Aluminum
TB927	Polyamide Pressure Bar	Polyamide
PC931	Glazing Adapter - Perimeter Bar	Anodized Aluminum
CW950	Insert Plate	Anodized Aluminum
	Pour and Debridge	Urethane/Polyurethane
NP930	Interior Glazing Gasket	EPDM
NP927	Exterior Glazing Gasket	EPDM
NP928	Pressure Bar Gasket	Vinyl
SS905	Reinforcement	Rolled Steel
	Glass	
	1/4" Solarban72VT - 1/2" Air - 1/4" Clear	
	Spacer	
	Stainless Steel	

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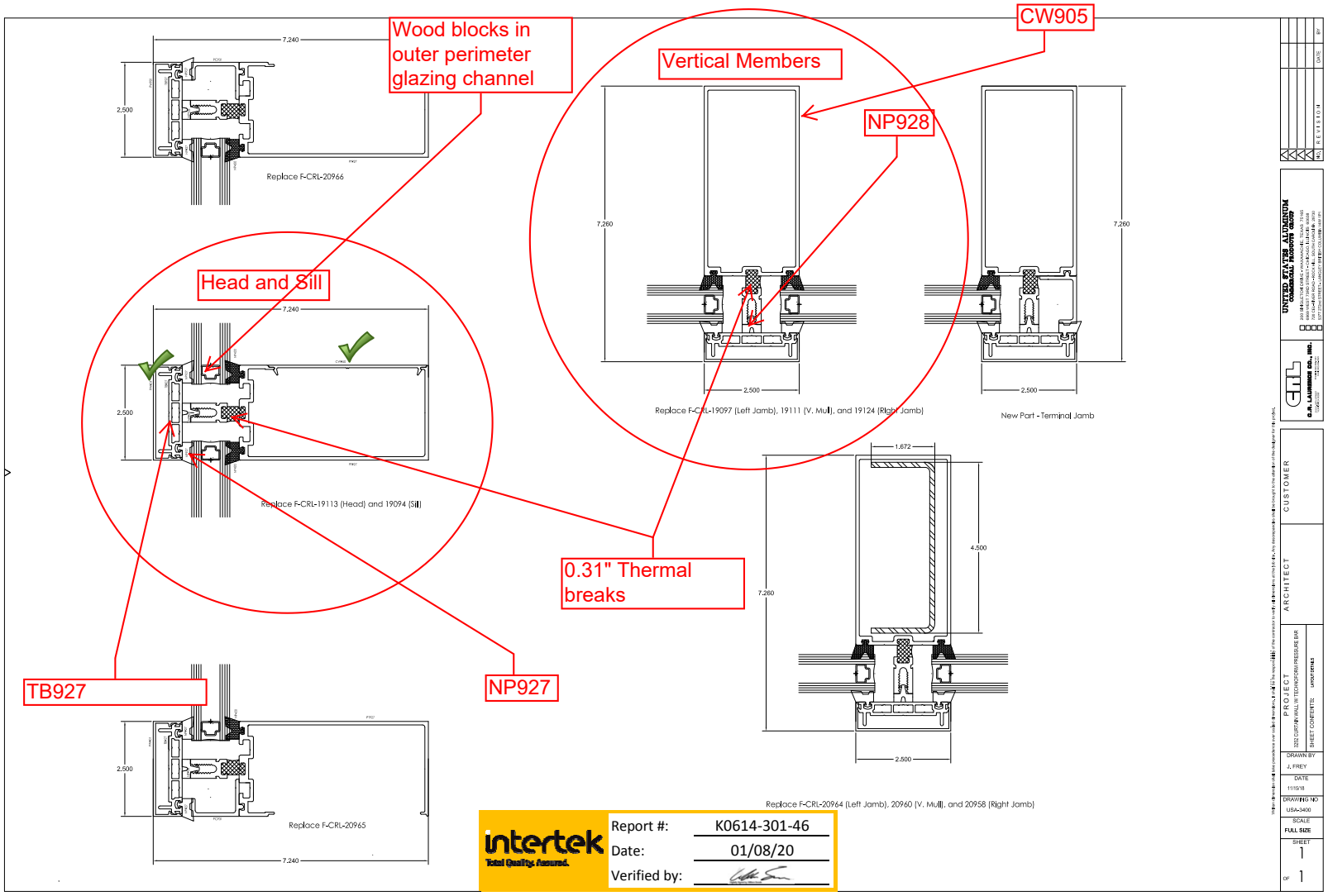

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UNITED STATES ALUMINUM COMMERCIAL PRODUCTS GROUP

REVISION

PROJECT
SHEET CONTENTS:
CUSTOMER
ARCHITECT
DRAWN BY: J. FREY
DATE: 11/15/18
DRAWING NO: USA-3400
SCALE: FULL SIZE
SHEET 1 OF 1

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SECTION 15
REVISION LOG

REVISION #	DATE	PAGES	REVISION
.02 R0	01/09/20	N/A	Original Report Issue