

SOLAR INDUSTRIES SOLAR HEAT GAIN COEFFICIENT TEST REPORT

SCOPE OF WORK

NFRC 201-2020 TESTING ON BRONZE ACRYLIC SMOOTH OVER CLEAR ACRYLIC DOME ASSEMBLY

REPORT NUMBER

M4496.01-301-41 R0

TEST DATE

06/09/21

ISSUE DATE

06/24/21

RECORD RETENTION END DATE

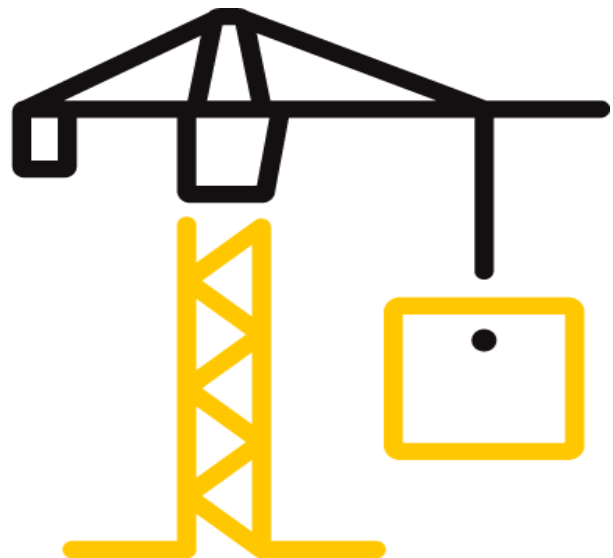
06/09/26

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TEST REPORT FOR SOLAR INDUSTRIES

Report No.: M4496.01-301-41 RO

Date: 06/24/21

REPORT ISSUED TO

SOLAR INDUSTRIES

P.O. Box 27337

SI Window Division

Tucson, AZ 85726

SECTION 1

SCOPE

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by Solar Industries to perform testing in accordance with NFRC 201-2020 on their Bronze Acrylic Smooth over Clear Acrylic Dome Assembly, Dome Assembly Only. Results obtained are tested values and were secured by using the designated test method. Testing was conducted in full compliance to NFRC standards at the Intertek B&C test facility in Fresno, California.

Unless differently required, Intertek reports apply the "Simple Acceptance" rule also called "Shared Risk approach," of ILAC-G8:09/2019, Guidelines on Decision Rules and Statements of Conformity.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

For INTERTEK B&C:

COMPLETED BY Jerry Bontilao, BSME

TITLE Project Lead

SIGNATURE

DATE 06/24/21

JB:ss

REVIEWED BY Tyler Westerling, P.E.

TITLE Operations Manager, IIRC

SIGNATURE

DATE 06/24/21

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SECTION 2

SUMMARY OF TEST RESULTS

Type:	Dome Assembly Only
Series/Model:	Bronze Acrylic Smooth over Clear Acrylic Dome Assembly
Unit Size:	49-1/4" x 49-1/4" (1250.95 mm x 1250.95 mm)
Solar Heat Gain Coefficient (SHGC):	0.41

SECTION 3

TEST SPECIMEN SUMMARY

SERIES/MODEL	Bronze Acrylic Smooth over Clear Acrylic Dome Assembly
TYPE	Dome Assembly Only
OVERALL SIZE	49-1/4" x 49-1/4" (1250.95 mm x 1250.95 mm)
NFRC STANDARD SIZE	39.370 x 39.370 (1000 mm wide x 1000 mm high)
TEST SAMPLE SUBMITTED BY	Client
TEST SAMPLE SUBMITTED FOR	Validation for Initial Certification or Recertification (production line unit) & plant qualification.

SECTION 4

TEST METHOD

The specimens were evaluated in accordance with the following:

NFRC 201-2020, *Interim Standard Test Method for Measuring the Solar Heat Gain Coefficient of Fenestration Systems Using Calorimetry Hot Box*

SECTION 5

MATERIAL SOURCE/INSTALLATION

Test samples were provided by Solar Industries. Detailed drawings, representative samples of the test specimen, and a copy of this report will be retained by Intertek B&C for a minimum of five years from the test completion date.

The specimen was installed into an extruded polystyrene foam panel with an R-value of 18 using silicone caulking.

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**SECTION 6
EQUIPMENT**

Testing was performed in the 48 inch Solar Calorimeter, ICN# 62060, located at 2524 East Jensen in Fresno, California, near the northeast corner of the lot and elevated approximately 15 feet from ground level. The foreground is desert and industrial buildings; the background is industrial buildings.

Calibration Information for the 48 inch Calorimeter, ICN 62060:

ICN/ASSET #	DESCRIPTION	LAST CALIBRATION DATE
4064	Moving Pyranometer	12/27/20
004065	Flowmeter	08/20/20

**SECTION 7
LIST OF OFFICIAL OBSERVERS**

NAME	COMPANY
Jerry A. Bontilao	Intertek B&C

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SECTION 8**TEST PROCEDURE**

Tracking system azimuth and altitude are read every minute and the calorimeter is moved to a position normal to the sun from chart stored in computer. The foreground is desert, the background is industrial buildings. Output was determined with flat characterization plate in place.

This test method does not include separate procedures to determine the heat flows due to either air movement or nighttime U-factor effects. As a consequence, the SHGC results obtained do not reflect the overall performance which may be found in field installations due to temperature differences, wind, shading, air leakage effects, and the thermal bridge effects specific to the design and construction of the fenestration system opening.

Since there is a wide variety of fenestration system openings in residential, commercial and industrial buildings, it is not feasible to select a "typical" surround panel construction in which to mount the fenestration test specimen. The selection of a relatively high thermal resistance surround panel places the focus of the test on the solar performance of the system. Therefore, it should be recognized that the solar heat gain coefficient results obtained from this test method, for ideal laboratory conditions in a highly insulating surround panel, should only be used for fenestration product comparisons or as input to performance analyses which also include thermal, air leakage and thermal bridge effects due to the surrounding building structure. To determine air leakage effects for windows and doors, refer to Test Method ASTM E283. For thermal transmittance refer to Test Method ASTM C 1199.

Ratings included in this report are for submittal to an NFRC-licensed IA for certification purposes and are not meant to be used for labeling purposes. Only those values identified on a valid Certificate of Authorization (CA) are to be used for labeling purposes.

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TEST SPECIMEN DESCRIPTION

MANUFACTURER	Solar Industries
PRODUCT TYPE	Dome Assembly Only
SERIES/MODEL	Bronze Acrylic Smooth over Clear Acrylic Dome Assembly
UNIT SIZE	49-1/4" x 49-1/4" (1250.95 mm x 1250.95 mm)
DAYLIGHT OPENING	47" x 47" (1194 mm x 1194 mm)

FRAME SIZE	No Frame Members
INTERIOR LAYER SIZE	N/A
EXTERIOR LAYER SIZE	N/A

GLAZING	
LAYER 1	0.125" thk. (3.175 mm) White Acrylic Smooth with 9-1/2" Dome Rise
LAYER 2	0.095" thk. (2.413 mm) Clear Acrylic with 8-3/8" Dome Rise

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SECTION 10

TEST RESULTS

Test Start Date: 06/09/21
Test Completion Date: 06/09/21
Time of Test: 11:31 PM

Test Duration

The test parameters were considered stable for five consecutive time constants (minimum of 10 minutes each) from 11:31 to 12:21.

Estimated Uncertainty: 2.74%

This was determined using ANSI/NCSL Z540-2-1997 type B evaluation as described in section 4.3 of the specification. For assumptions used for this calculation or for a description of the procedure contact the "Individual-In-Responsible-Charge (IIRC)" that signed this report.

HEAT FLOWS	MEASUREMENT
1. Heat Extracted From System (Q fluid)	2172.5 Btu/hr
2. Surround Panel Heat Flow (Qsp)	2.9 Btu/hr
3. Surround Panel Conductance	0.056 Btu/hr-ft ² -F
4. Heat Across Walls (Q walls)	-3.3 Btu/hr
5. Flanking Loss Heat Flow (Qfl)	2.970 Btu/hr
6. Auxiliary energy (Q aux)	22.4 Btu/hr
7. Maximum thermal transmittance (Q u-factor)	-14.7 Btu/hr
8. Net Specimen Heat Flow (Qs)	2162.1 Btu/hr

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SECTION 10 (Continued)

TEST RESULTS

TEST CONDITIONS	MEASUREMENT
1. Average Interior Air Temperature	75.6 °F
2. Average Exterior Air Temperature	73.6 °F
3. Surround panel inside temperature (tsp1)	83.7 °F
4. Surround panel outside temperature (tsp2)	98.8 °F
5. Maximum Solar Irradiation Es	341.7 Btu/hr-ft ²
6. Minimum Solar Irradiation Es	339.6 Btu/hr-ft ²
7. Average Solar Irradiation Es	340.6 Btu/hr-ft ²
8. Inlet Fluid Temperature	66.6 °F
9. Outlet Fluid Temperature	68.4 °F
10. Standardized Thermal Transmittance (Ust)*	0.56 Btu/hr-ft ² ·F
11. Maximum Exterior Surface Coefficient (Hh-sun)	6.5 Btu/hr-ft ² ·F
12. Minimum Exterior Surface Coefficient (Hh-sun)	4.8 Btu/hr-ft ² ·F
13. Average Exterior Surface Coefficient (Hh-sun)	5.6 Btu/hr-ft ² ·F
14. Standardized Weather Conductance (hstII)	5.1 Btu/hr-ft ² ·F
15. Maximum Wind Velocity	3.7 MPH
16. Minimum Wind Velocity	2.6 MPH
17. Average Wind Velocity	3.2 MPH
18. Average Wind Direction (North equals 360 degrees)	273 Degrees
19. Starting Azimuth	121 Degrees
20. Ending Azimuth	146 Degrees
21. Minimum Altitude	68 Degrees
22. Maximum Altitude	73 Degrees
23. Water Flow Rate	2.40 gpm

*Determined using ASTM C1363. For details see Intertek B&C Report # M3504.01-301-46 R0.

SECTION 11

CONCLUSION

Solar Heat Gain Coefficient (SHGC): 0.41

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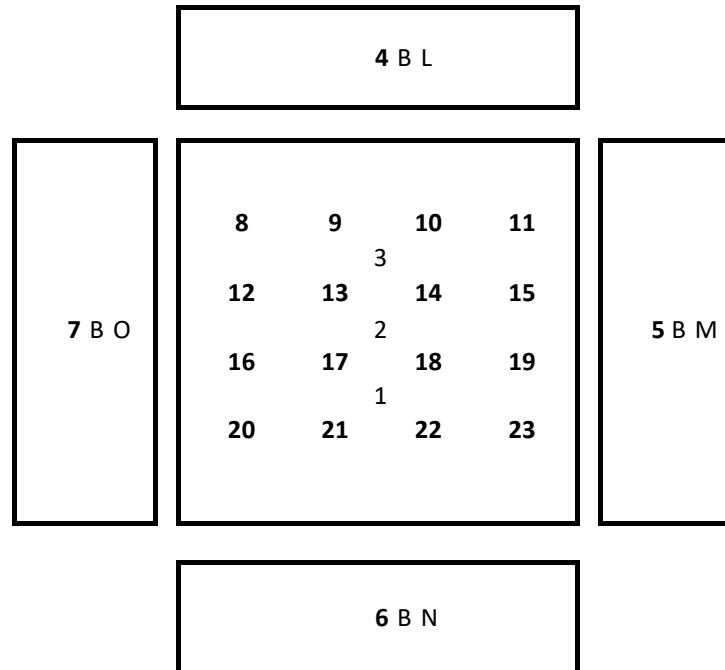
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SECTION 12

THERMOCOUPLES

Thermocouple Values

Absorber Plate Thermocouple Layout



Air Top	1	75.5 °F
Air Center	2	75.0 °F
Air Bottom	3	76.3 °F

Location 4	70.0 °F	Location 14	69.0 °F
Location 5	69.7 °F	Location 15	69.2 °F
Location 6	69.6 °F	Location 16	69.4 °F
Location 7	70.4 °F	Location 17	74.6 °F
Location 8	69.4 °F	Location 18	69.2 °F
Location 9	69.3 °F	Location 19	73.0 °F
Location 10	69.1 °F	Location 20	76.2 °F
Location 11	69.1 °F	Location 21	70.5 °F
Location 12	69.2 °F	Location 22	70.2 °F
Location 13	69.9 °F	Location 23	72.1 °F

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SECTION 13

PHOTOS



Bronze Acrylic Smooth - Exterior



Clear Acrylic - Interior



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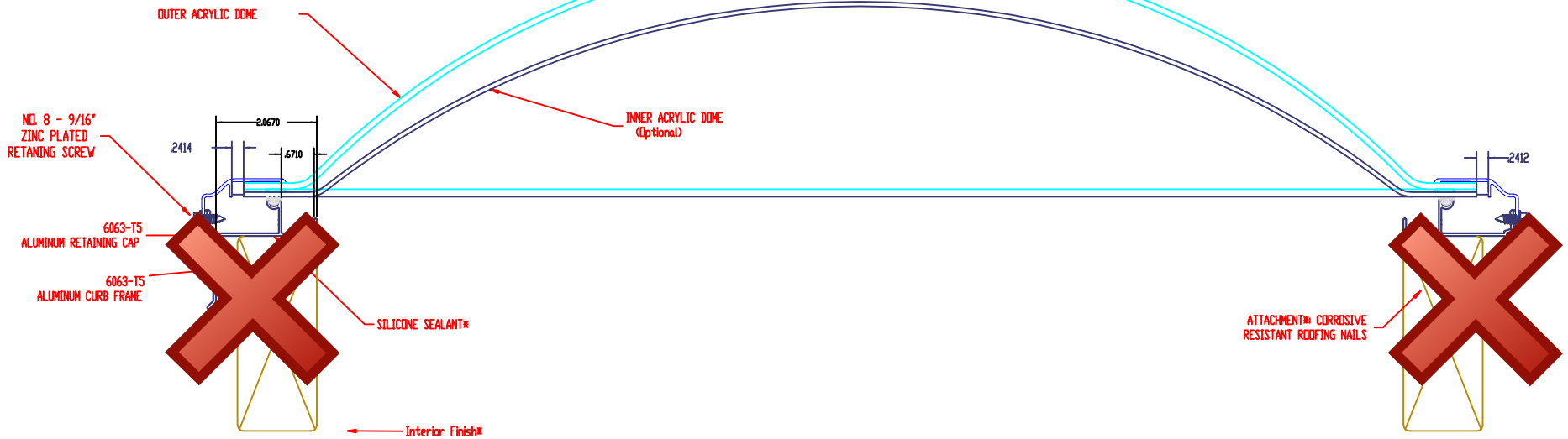
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SECTION 14

DRAWINGS

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SECTION 15

REVISION LOG

REVISION #	DATE	PAGES	REVISION
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