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THE ENSOLTIS CORPORATION
SOLAR HEAT GAIN COEFFICIENT TEST REPORT

SCOPE OF WORK
NFRC 201-2020 TESTING ON ENSOLCOMP THERMAL PANEL

REPORT NUMBER
M6515.01-301-41 R0

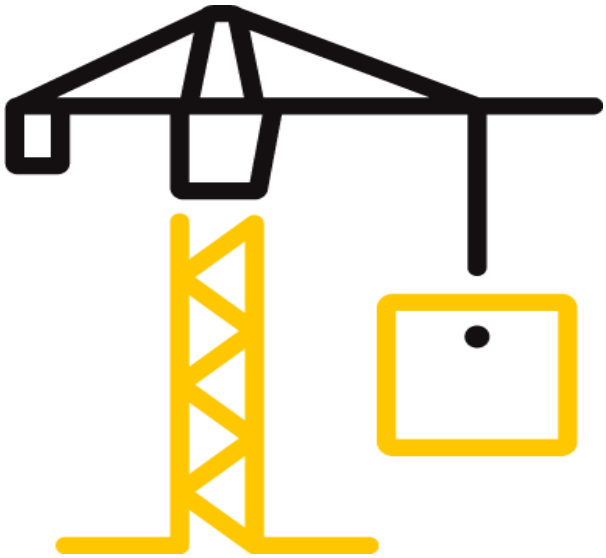
TEST DATE
10/14/21

ISSUE DATE **REVISED DATE**
11/02/21 11/15/21

RECORD RETENTION END DATE
10/14/26

PAGES
12

DOCUMENT CONTROL NUMBER
RTTDS-R-AMER-Test-2953 (06/26/18)



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TEST REPORT FOR THE ENSOLTIS CORPORATION
Report No.: M6515.01-301-41 R1
Date: 11/15/21

REPORT ISSUED TO
THE ENSOLTIS CORPORATION
15205 Road 28-1/2
Madera, CA 93638

SECTION 1
SCOPE

Architectural Testing, Inc. (an Intertek company) dba Intertek Building & Construction (B&C) was contracted by The ENSOLTIS Corporation to perform testing in accordance with NFRC 201-2020 on their Ensolcomp Thermal Panel, Ensolcomp Thermal Panel System. 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	**REVIEWED BY**	Tyler Westerling, P.E.
TITLE	Project Lead	**TITLE**	Operations Manager, IIRC
SIGNATURE	Digitally Signed by: Jerry Bontilao	**SIGNATURE**	Digitally Signed by: Tyler Westerling
DATE	11/15/21	**DATE**	11/15/21

JB:ss

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SECTION 2
SUMMARY OF TEST RESULTS

Type:	Ensolcomp Thermal Panel System
Series/Model:	Ensolcomp Thermal Panel
Unit Size:	84" x 84" (2133.6 mm x 2133.6 mm) (Model Size)
Solar Heat Gain Coefficient (SHGC):	0.04

SECTION 3
TEST SPECIMEN SUMMARY

SERIES/MODEL	Ensolcomp Thermal Panel
TYPE	Ensolcomp Thermal Panel System
OVERALL SIZE	84" x 84" (2133.6 mm x 2133.6 mm) (Model Size)
NFRC STANDARD SIZE	78.7" x 78.7" (2000 mm wide x 2000 mm high)
GROUPING:	N/A
TEST SAMPLE SUBMITTED BY	Client
TEST SAMPLE SUBMITTED FOR	Not Applicable

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 The ENSOLTIS Corporation. 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 84 inch Solar Calorimeter, ICN# 62061, 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 84 inch Calorimeter, ICN 62061:

ICN/ASSET #	DESCRIPTION	LAST CALIBRATION DATE
4059	Moving Pyranometer	12/03/20
INT00175	Flowmeter	02/23/21

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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SECTION 9
TEST SPECIMEN DESCRIPTION

MANUFACTURER	The Ensoltis Corporation
PRODUCT TYPE	Ensolcomp Thermal Panel System
SERIES/MODEL	Ensolcomp Thermal Panel
OVER-ALL UNIT SIZE	84" x 84" (2133.6 mm x 2133.6 mm) (Model Size)

CONSTRUCTION *

The Ensolcomp Thermal Panel System consisted of one layer of 15/32" CDX Plywood, one layer of synthetic roofing underlayment meeting ICC-ES AC 188, one layer of 2 1/8" thick Ensolcomp Thermal Panel fastened to deck with 3" cap nails, two layers of 30 lb. ASTM roofing felt, one layer of 30-year dimensional shingles meeting ASTM D 3462 fastened to roof deck with 3 ½" roofing nails.

Heat Flow Summary

	1	2	3	4	
Roof Exterior Temperatures	153.4	153.1	145.0	147.0	°F
Roof Interior Temperatures	84.0	83.8	80.9	78.8	°F
Roof Underside Temperature				77.0	°F
Heat Flow Through Roof				596.95	Btu/hr·ft
Heat Flow Through Roof Per ft²				13.77	Btu/hr·ft²
Solar Irradiance Per ft²				343.45	Btu/hr·ft²
Solar Heat Gain Factor					0.040
Reduction of Heat Transfer*				4.92	hr·ft²°F/Btu

*Calculated using the average surface temperature difference, multiplied by the roof area (daylight opening of 79" x 79"), divided by the total energy flow.

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Date: 11/15/21

SECTION 10
TEST RESULTS

Test Start Date: 10/14/21
Test Completion Date: 10/14/21
Time of Test: 12:37 PM

Test Duration

The test parameters were considered stable for five consecutive time constants (minimum of 10 minutes each) from 12:37 to 13:27.

Estimated Uncertainty: 2.99%

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)	565.8 Btu/hr
2. Surround Panel Heat Flow (Qsp)	15.5 Btu/hr
3. Surround Panel Conductance	0.056 $Btu/hr \cdot ft^2 \cdot F$
4. Heat Across Walls (Q walls)	-102.5 Btu/hr
5. Flanking Loss Heat Flow (Qfl)	42.828 Btu/hr
6. Auxiliary energy (Q aux)	45.1 Btu/hr
7. Maximum thermal transmittance (Q u-factor)	-32.1 Btu/hr
8. Net Specimen Heat Flow (Qs)	597.0 Btu/hr

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SECTION 10 (Continued)

TEST RESULTS

TEST CONDITIONS	MEASUREMENT
1. Average Interior Air Temperature	74.5 °F
2. Average Exterior Air Temperature	68.7 °F
3. Surround panel inside temperature (tsp1)	77.8 °F
4. Surround panel outside temperature (tsp2)	126.8 °F
5. Maximum Solar Irradiation Es	344.8 Btu/hr·ft²
6. Minimum Solar Irradiation Es	341.1 Btu/hr·ft²
7. Average Solar Irradiation Es	343.4 Btu/hr·ft²
8. Inlet Fluid Temperature	72.3 °F
9. Outlet Fluid Temperature	73.4 °F
10. Standardized Thermal Transmittance (Ust)*	0.13 Btu/hr·ft²·F
11. Maximum Exterior Surface Coefficient (Hh-sun)	6.0 Btu/hr·ft²·F
12. Minimum Exterior Surface Coefficient (Hh-sun)	3.2 Btu/hr·ft²·F
13. Average Exterior Surface Coefficient (Hh-sun)	4.3 Btu/hr·ft²·F
14. Standardized Weather Conductance (hstII)	5.1 Btu/hr·ft²·F
15. Maximum Wind Velocity	4.6 MPH
16. Minimum Wind Velocity	1.6 MPH
17. Average Wind Velocity	2.9 MPH
18. Average Wind Direction (North equals 360 degrees)	353 Degrees
19. Starting Azimuth	177 Degrees
20. Ending Azimuth	193 Degrees
21. Minimum Altitude	44 Degrees
22. Maximum Altitude	45 Degrees
23. Water Flow Rate	2.24 gpm

*Determined using NFRC 102. For details see Intertek B&C Report # M6516.01-301-46 R0.

SECTION 11

CONCLUSION

Solar Heat Gain Coefficient (SHGC): 0.040

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SECTION 12
THERMOCOUPLES

Thermocouple Values
Temperatures during maximum irradiation
Air and heat exchanger temperatures

LOCATION		TEMPERATURE	LOCATION		TEMPERATURE
Air Top	97	74.2 °F	Location	125	73.0 °F
Air Center	98	74.8 °F	Location	126	72.8 °F
Air Bottom	99	74.6 °F	Location	127	72.9 °F
Location	100	72.9 °F	Location	128	73.0 °F
Location	101	72.9 °F	Location	129	73.0 °F
Location	102	72.9 °F	Location	130	72.9 °F
Location	103	72.9 °F	Location	131	72.9 °F
Location	104	72.8 °F	Location	132	72.7 °F
Location	105	72.9 °F	Location	133	72.8 °F
Location	106	72.6 °F	Location	134	73.1 °F
Location	107	73.0 °F	Location	135	73.0 °F
Location	108	72.6 °F	Location	136	72.8 °F
Location	109	73.4 °F	Location	137	73.3 °F
Location	110	73.5 °F	Location	138	72.8 °F
Location	111	73.6 °F	Location	139	72.9 °F
Location	112	73.4 °F	Location	140	73.1 °F
Location	113	72.8 °F	Location	141	72.9 °F
Location	114	73.5 °F	Location	142	73.0 °F
Location	115	73.2 °F	Location	143	72.8 °F
Location	116	73.2 °F	Location	144	73.0 °F
Location	117	73.4 °F	Location	145	72.9 °F
Location	118	73.2 °F	Location	146	73.4 °F
Location	119	73.0 °F	Location	147	72.7 °F
Location	120	73.1 °F	Location	148	73.0 °F
Location	121	73.1 °F	Location	149	72.9 °F
Location	122	73.1 °F	Location	150	72.8 °F
Location	123	73.3 °F	Location	151	72.8 °F
Location	124	73.1 °F	Location	152	72.8 °F

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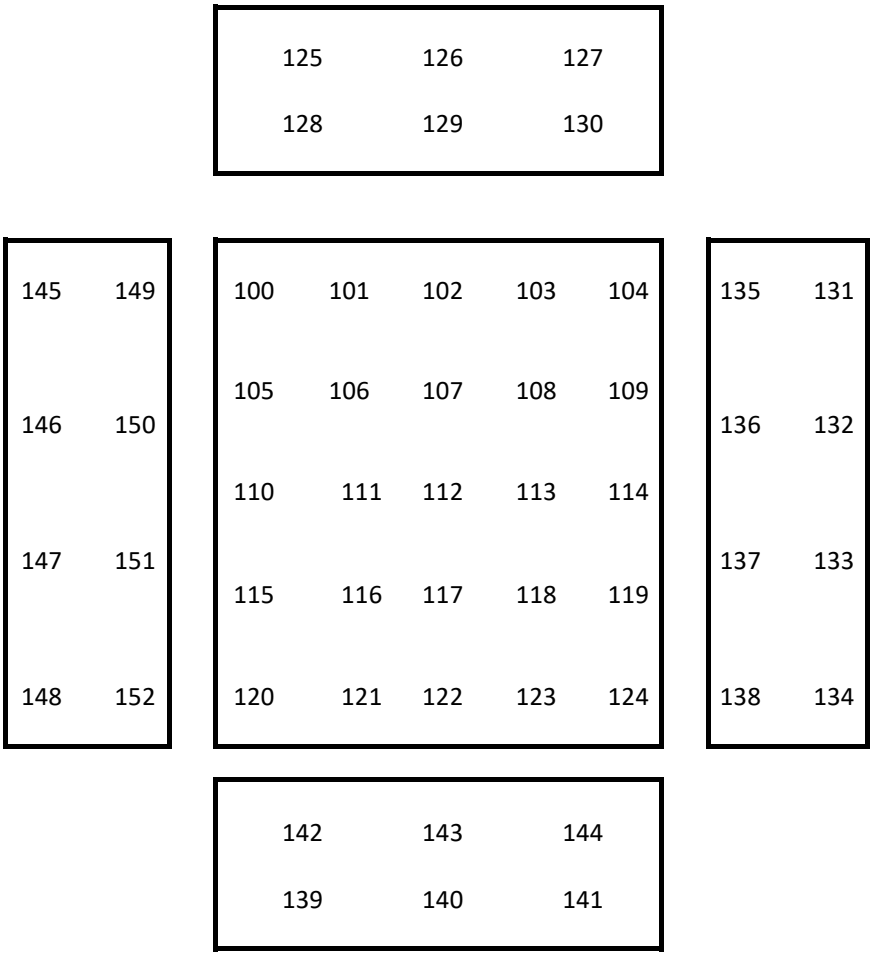
SECTION 12 (Continued)

Thermocouple Locations



84 INCH CALORIMETER

FACING CALORIMETER

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SECTION 13
PHOTOS

Ensolcomp Thermal Panel

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SECTION 14

REVISION LOG

REVISION #	DATE	PAGES	REVISION
.01R0	11/02/21	N/A	Original Report Issue
.01R1	11/15/21	All	The description of the "Series/Model", the "Product Type", and the "Construction" of the assembly have been corrected as shown in the Cover Page and in Sections 2, 3 and 9. Changed "Ensoltis" to "Ensolcomp" and "CDX" to "CDX Plywood" of the construction of the assembly.