Architectural Testing

TEST REPORT

Report No.: A8865.01-301-41

Rendered to:

BRISTOLITE SKYLIGHTS
Santa Ana , California

TYPE: Dome Assembly Only
SERIES/MODEL: Nano Insulgel - ALT-CM-2-CPM/16 mm CNANO Thermally Broken Aluminum Frame / Prismatic over Nano Silica Aerogel filled 16 mm Polycarbonate Multi-Wall Glazing

Specification: *NFRC 201-2010 "Interim Standard Test Method for Measuring the Solar Heat Gain Coefficient of Fenestration Systems Using Calorimetry Hot Box Methods".*

Summary of Results	
Solar Heat Gain Coefficient (SHGC)	0.42
Unit Size: 48" x 48" (1220mm x 1220 mm) (Non-Standard Size)	
Testing was performed in the 48" Solar Calorimeter ICN# 62060	

Test Completion Date: 04/26/11

Reference must be made to Report No. A8865.01-301-41, dated 06/16/11 for complete test specimen description and data.

1.0 Report Issued To: Bristolite Skylights
401 E. Goetz Ave
Santa Ana , California 92707

2.0 Test Laboratory: Architectural Testing, Inc.
2524 E. Jensen Ave
Fresno, California 93706
(559) 233-8705

3.0 Project Summary:

3.1 Product Type: Dome Assembly Only

3.2 Series/Model: Nano Insulgel - ALT-CM-2-CPM/16 mm CNANO Thermally Broken Aluminum Frame / Prismatic over Nano Silica Aerogel filled 16 mm Polycarbonate Multi-Wall Glazing

3.3 Test Date: 04/26/11

3.4 Overall Size: 48" x 48" (1220mm x 1220 mm) (Non-Standard Size)

3.5 NFRC Standard Size: 47" x 47" (1200 mm x 1200 mm)

3.6 Test Sample Submitted by: Manufacturer

3.7 Test Sample Submitted for: Validation for Initial Certification (Prototype Unit)

4.0 Test Specification:

NFRC 201-2010 "Interim Standard Test Method for Measuring the Solar Heat Gain Coefficient of Fenestration Systems Using Calorimetry Hot Box Methods".

5.0 Test Specimen Description:

5.1 Glazing: 1, 2

Layer 1:	0.174" Clear 100% Impact Modified Prismatic Acrylic with 11" Rise
Layer 2:	16 mm thick Lexan Structured Clear Polycarbonate Nano Insulgel Filled Glazing Panel

6.0 Test Results:

6.1 Heat Flows:

1.	Heat Extracted From System (Q_{fluid})	2284.6	Btu/hr
2.	Surround Panel Heat Flow (Q_{sp})	2.0	Btu/hr
3.	Surround Panel Conductance	0.056	Btu/hr·ft^2·F
4.	Heat Across Walls (Q_{walls})	34.8	Btu/hr
5.	Flanking Loss Heat Flow (Q_{fl})	2.970	Btu/hr
6.	Auxiliary energy (Q_{aux})	38.9	Btu/hr
7.	Maximum thermal transmittance ($Q_{u\text{-}factor}$)	-47.1	Btu/hr
8.	Net Specimen Heat Flow (Q_s)	2253.1	Btu/hr

6.2 Test Conditions:

1.	Average Interior Air Temperature	75.3	F
2.	Average Exterior Air Temperature	61.0	F
3.	Surround panel inside temperature (t_{sp1})	72.8	F
4.	Surround panel outside temperature (t_{sp2})	85.4	F
5.	Maximum Solar Irradiation Es	336.3	Btu/hr·ft²
6.	Minimum Solar Irradiation Es	329.0	Btu/hr·ft²
7.	Average Solar Irradiation Es	332.8	Btu/hr·ft²
8.	Inlet Fluid Temperature	68.1	F
9.	Outlet Fluid Temperature	69.8	F
10.	Standardized Thermal Transmittance (U_{st})*	0.20	Btu/hr·ft²·F
11.	Maximum Exterior Surface Coefficient ($H_{h\text{-}sun}$)	7.6	Btu/hr·ft²·F
12.	Minimum Exterior Surface Coefficient ($H_{h\text{-}sun}$)	6.3	Btu/hr·ft²·F
13.	Average Exterior Surface Coefficient ($H_{h\text{-}sun}$)	6.8	Btu/hr·ft²·F
14.	Standardized Weather Conductance (h_{stII})	5.1	Btu/hr·ft²·F
15.	Maximum Wind Velocity	0.8	MPH
16.	Minimum Wind Velocity	0.8	MPH
17.	Average Wind Velocity	3.8	MPH
18.	Average Wind Direction (North equals 360 degrees)	322	Degrees
19.	Starting Azimuth	108	Degrees
20.	Ending Azimuth	118	Degrees
21.	Minimum Altitude	44	Degrees
22.	Maximum Altitude	48	Degrees
*Determined using ASTM 1199. For details see ATI report A9280.01-301-46-R0			

6.0 Test Results: (Continued)

6.3 Test Duration:

1.	The test parameters were considered stable for five consecutive time constants (minimum of 10 minutes each) from 08:52 to 09:42

6.4 Calibration Information 48 inch Calorimeter ICN 62060

1.	Moving Pyranometer ICN 004604	02/16/10
2.	Flowmeter ICN 004065	01/28/10
3.	Thermocouple	11/17/10
4.	Surround Panel Conductivity	12/02/09
5.	Power Input	11/18/10
6.	Fluid Temperature	11/19/10
7.	Miscellaneous Power Input Last Calibration	11/17/10
8.	Metering Box Last Calibration	12/02/10
9.	Calibration Transfer Standard	12/15/10

The specimen was installed into an extruded polystyrene foam panel with an R-value of 18 using silicone caulking. 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 calorimeter is located at 2524 East Jensen in Fresno, California near the northeast corner of the lot elevated approximately 15 feet from ground level. The foreground is desert, the background is industrial buildings.

The estimated uncertainty of this test is 2.56%

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

"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 E 283. 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 Certification Authorization Report (CAR) are to be used for labeling purposes.

Detailed drawings, representative samples of the test specimen and a copy of this report will be retained by Architectural Testing for a period of four years. This report is the exclusive property of the client so named herein and relates only to the fenestration product tested. This report may not be reproduced, except in full, without the approval of the laboratory.

For ARCHITECTURAL TESTING, INC.

Digitally Signed for: Niilo Smeds by Shannon Stein

Niilo Smeds
Technician

Digitally Signed by: Tyler Westerling

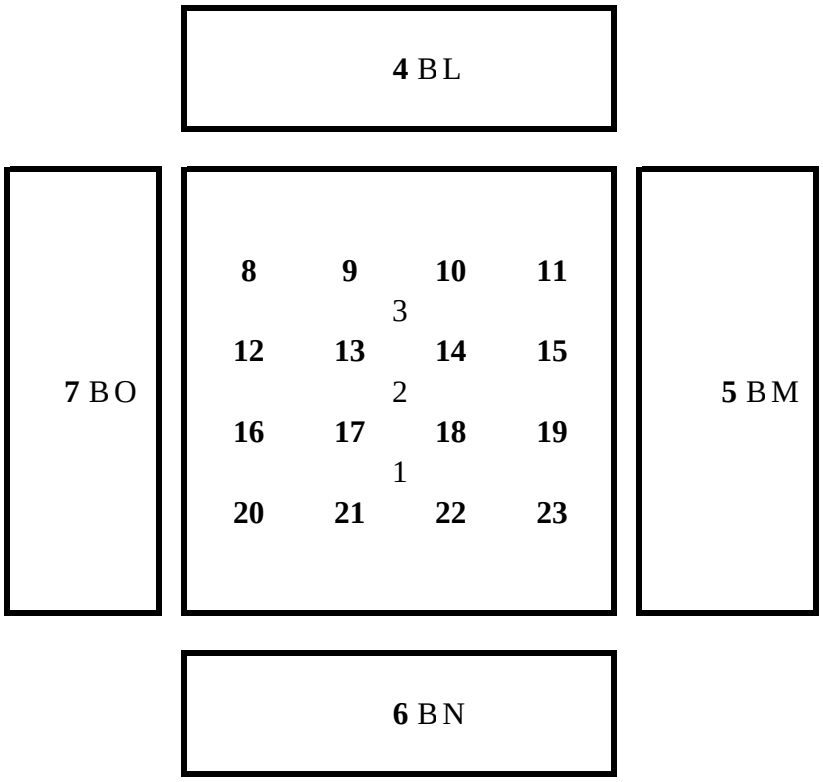
Tyler Westerling, P.E.
Project Engineer
Individual-In-Responsible-Charge

TW:ss

Attachments (pages): This report is complete only when all attachments listed are included.

Appendix-A: Heat Exchanger Thermocouple Location and Temperatures (1)

Appendix A
Absorber Plate Thermocouple Layout



Air Top	1	78.3 F
Air Center	2	74.2 F
Air Bottom	3	73.4 F

Location	4	0.0 F	Location	14	71.0 F
Location	5	72.8 F	Location	15	71.2 F
Location	6	72.2 F	Location	16	72.3 F
Location	7	73.3 F	Location	17	74.8 F
Location	8	72.0 F	Location	18	71.3 F
Location	9	71.8 F	Location	19	246.4 F
Location	10	71.5 F	Location	20	74.2 F
Location	11	71.5 F	Location	21	71.2 F
Location	12	71.2 F	Location	22	72.7 F
Location	13	71.3 F	Location	23	71.7 F