

PRODUCT PERFORMANCE TEST REPORT

Report No.: D7226.01-121-24

Test Date: May 29, 2014

Rendered to:

Natural Light Energy Systems
Phoenix, Arizona

PRODUCT TYPE: Tubular Daylight Device (TDD)
SERIES/MODEL: 21 inch Natural Light Tubular Skylight

SPECIFICATION: ASTM E 108-11, *Standard Test Methods for Fire Tests of Roof Coverings (Burning Brand Only)*

Burning Brand	Classification	Result
BB #1	Class B	Pass
BB #2	Class B	Pass
BB #3	Class B	Pass
BB #4	Class B	Pass
BB #5	Class B	Pass
BB #6	Class B	Pass
BB #7	Class B	Pass
BB #8	Class A	Fail

This report contains in its entirety:

Cover Page: 1 page
Report Body: 6 pages
Photographs: 3 pages

Reference must be made to Report No. D7226.01-121-24 for complete test specimen description and detailed test results.

1.0 Report Issued To: Natural Light Energy Systems
10821 North 23rd Avenue #1
Phoenix, Arizona 85029

2.0 Test Laboratory: Architectural Testing, Inc.
130 Derry Court
York, Pennsylvania 17406
717-764-7700

3.0 Project Summary:

3.1 Introduction: This fire test standard aims to measure relative fire characteristics of roof coverings under simulated fire scenarios which originate outside the building. Under controlled laboratory conditions, the behavioral response of materials, products or assemblies as affected by heat and flame are described. The performances of the roof covering systems are described only under specific conditions. Information is not provided by these tests that are applicable to any scenarios other than the specific conditions experienced during testing. Information is not provided by these tests that are applicable to actual fire situations because of the inherent differences between the classes as it pertains to fire source and fire application; no comparison between the classes exist. Results from tests are applicable to the specifics of the test and the aspect in which the tests were conducted, and are not applicable to similar materials or the results of those materials when used in concert with other materials.

3.2 Product Type: Tubular Daylight Device (TDD)

3.3 Series/Model: 21 inch Natural Light Tubular Skylight

3.4 Compliance Statement: Results obtained are tested values and were secured by using the designated test method(s). This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

3.5 Test Dates: 5/29/2014

3.6 Test Sample Source: The specimens were shipped to Architectural Testing directly from the customer. Representative samples of the test specimen(s) will be retained by Architectural Testing for a minimum of four years from the test completion date.

3.0 Project Summary: (continued)

3.7 Test Method:

3.7.1 ASTM E108-11, *Standard Methods for Fire Tests of Roof Coverings*

3.7.1.1 Class B procedures for *Calibration* and *Burning Brand* were followed for the testing outlined in this report. Per the client's request, additional brands were placed on the specimen beyond what is required by ASTM E108.

4.0 Test Details:

4.1 Specimen Description: Class B test deck for the *Burning Brand* tests were constructed of 2x4 lumber and 5/8 inch Type X gypsum board. The TDD was attached to the test deck with 1-1/2 inch drywall screws. A ring was cut out of the test deck so observations could be made on the progress of the flame penetration from the burning brands.

4.2 Storage Information: Decks were stored in the fire laboratory prior to testing. Typical laboratory conditions are 60-80°F and 50-65% relative humidity.

4.3 Moisture Content: Moisture content of the lumber and plywood were verified prior to testing. Plywood was less than 8% and the lumber was within 8-10%.

4.4 Equipment Calibration: A Fire Test Apparatus as described in ASTM E 108 was used to generate 12 ± 0.5 mph air current. Air speed of the Fire Test Apparatus was calibrated prior to testing. A gas burner with flame temperature of $1630 \pm 50^\circ\text{F}$ was used to ignite the brands for testing. See Section 5.1 for more information on equipment calibration.

4.5 Burning Brand Procedure: After calibration of equipment, a test specimen described in Section 4.1 was placed into the steel framed holder for testing at a 0:12 slope. Brands were oven conditioned at 105 to 120°F for a minimum of 24 hours prior to testing and weight verified to be within 500 ± 50 grams. Each Class B brand consisted of three layers of six 1 inch by 1 inch by 6 inch strips of Douglas Fir forming a grid of 6 inch square by 2-1/4 inch thick. The brand was ignited by exposing each 6 inch by 6 inch face for 30 seconds, each 2-1/4 inch by 6 inch face for 30 seconds, and the and the 6 inch by 6 inch faces again for 30 seconds into the gas burner. Total duration of ignition exposure was 4 minutes. After the brand was ignited, it was placed onto the test specimen and secured in place with No. 18 soft iron wire. Location of each brand was on the edge of the TDD ring facing the side the skylight adjacent to the wind currents. Fire Test Apparatus without flame but only air current was turned on and the specimen was tested until the brand ceased to exhibit burning characteristics. After the brand was extinguished, another brand was placed in the same location. This procedure was repeated for seven Class B brands and the TDD still did not allow flames to penetrate the ring or through the translucent dome. Specimen only failed when a Class A brand was placed against the ring.

4.0 Test Details: (continued)

4.6 Drawings: The test specimen drawings have been reviewed by Architectural Testing and are representative of the test specimen(s) reported herein. Test specimen construction was verified by Architectural Testing per the drawings located in Appendix B. Any deviations are documented herein or on the drawings.

4.7 Official Observers:

<u>Name</u>	<u>Company</u>
Scott Gingrich	Architectural Testing, Inc.
Ben Green	Architectural Testing, Inc.

5.0 Test Data & Observations:

5.1 Calibration Information:

May 29, 2014
 Average Wind Speed: 11.7 mph
 Ambient Temperature: 64°F
 Humidity: 69%

5.2 Results:

Burning Brand:

Time (min:sec)	Event	Observations
00:01	Brand placed on deck	Start of test, 1 st Class B Brand placed
05:49	Smoking	Smoke leaking between gypsum board and flashing
15:30	Brand consumed	1 st Class B Brand consumed
15:30	Brand placed on deck	2 nd Class B Brand placed
32:00	Brand consumed	2 nd Class B Brand consumed
32:00	Brand placed on deck	3 rd Class B Brand placed
47:43	Brand consumed	3 rd Class B Brand consumed
47:43	Brand placed on deck	4 th Class B Brand placed
49:26	Substrate Fatigue	Gypsum board is starting to show signs of burn through.
1:02:26	Brand consumed	4 th Class B Brand consumed
1:02:26	Brand placed on deck	5 th Class B Brand placed
1:16:00	Brand consumed	5 th Class B Brand consumed

5.0 Test Data & Observations: (continued)

Time (min:sec)	Event	Observations
1:16:00	Brand placed on deck	6 th Class B Brand placed
1:19:36	Dome Fatigue	Dome starting to discolor and melt
1:26:02	Brand consumed	6 th Class B Brand consumed
1:26:02	Brand placed on deck	7 th Class B Brand placed
1:38:20	Brand consumed	7 th Class B Brand consumed
1:38:20	Brand placed on deck	1 st Class A Brand placed
1:39:18	Dome Fatigue	Ignition and melting of dome.
1:40:21	Dome Fatigue	Dome dripping to floor. Drippings still flaming on floor
1:42:44	Ring Fatigue	Ring melting through
1:45:00	End of test	
After Test	PASS , when subjected to Class B brands.	

Test Conclusion:

The test specimen provided to Architectural Testing by Natural Light Energy Systems and described in this test report **met** the conditions of acceptance of ASTM E 108-11 Class B *Burning Brand* procedures at a 0:12 slope on a noncombustible deck.

The service life of this report will expire on the stated Test Record Retention End Date, at which time such materials as drawings, data sheets, samples of test specimens, copies of this report, and any other pertinent project documentation, shall be discarded without notice.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen(s) tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.

Scott Gingrich
Technician – Fire Testing

Matthew Freeborn
Manager – Fire Testing

MDF:ddr

Attachments (pages): This report is complete only when all attachments listed are included.
Appendix A: Photographs (5)

This report produced from controlled document template ATI 00538, revised 01/19/12.

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
0	06/20/2014	N/A	Original report issue

Appendix A

Photographs

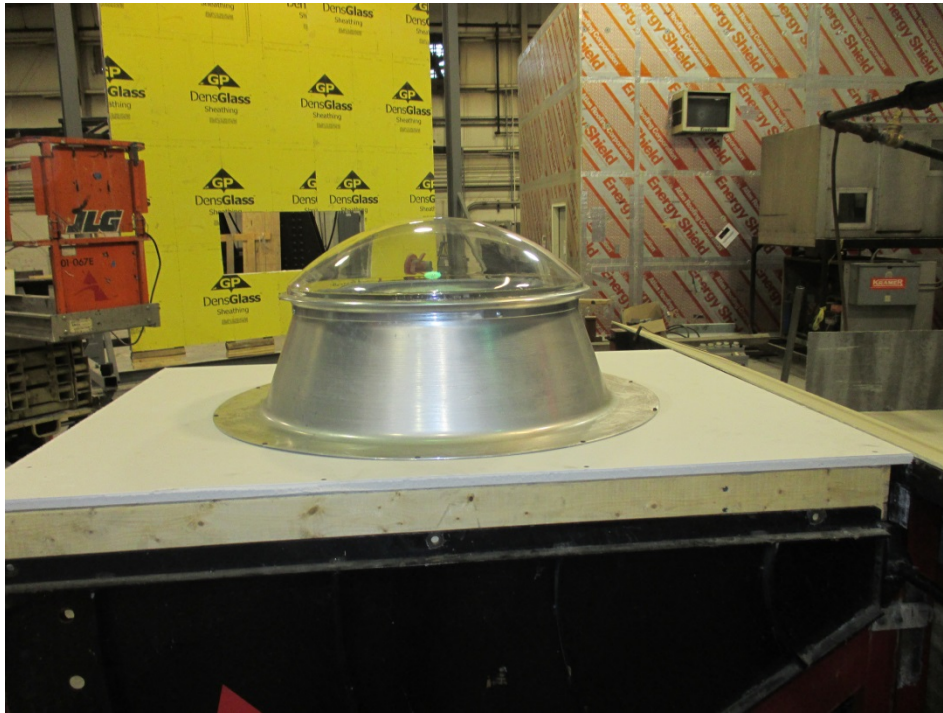


Photo No. 1
Specimen Mounted (Pre-test)



Photo No. 2
Underside of Specimen & Test Deck (Pre-test)



Photo No. 3
Ignition of Brands

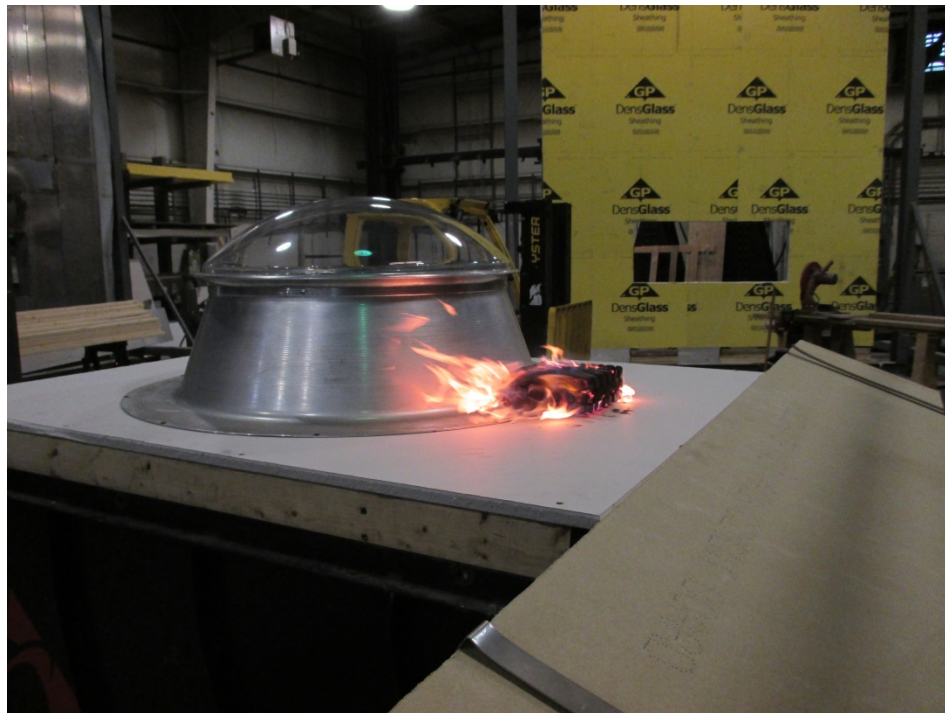


Photo No. 4
Location of Brands



Photo No. 5
Burning Brand (During Test)



Photo No. 6
Underside of Gypsum Board (During Test)



Photo No. 7
Class A Brand (During Test)

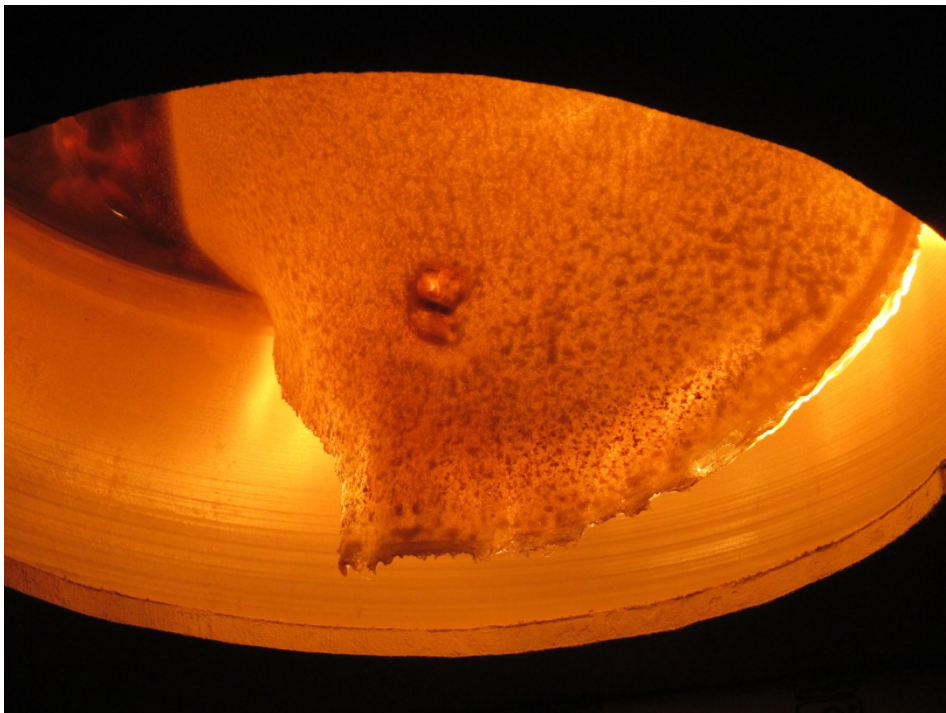


Photo No. 8
Melting of Dome after Class A Brand Exposure (During Test)



Photo No. 9
Specimen Post Seven Class B & One Class A Brand Exposure