



Equivalency Evaluation to 5th Edition (2014) FBC

Date: October 13, 2015

PTC Report No.: 2396-EER

Report Revision No.: 0

PTC Project No.: 415-0316

Product Mfg.: Solatube International, Inc.
2210 Oak Ridge Way
Vista, CA 92081

Product Name: Solatube M74 DS Curb Mount Open Ceiling TDD - Dual Glazed
Solatube M74 DS Curb Mount Open Ceiling TDD - Single Glazed

Product Category: Sky Lights

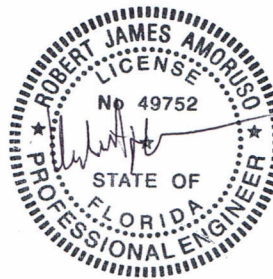
Product Sub-Category: Skylight

Compliance Method: Product Approval Rule 61G20-3.015 – Equivalency of Standards

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Project Scope

Evaluate equivalency of testing standards used for the performance testing of Solatube M74 DS Curb Mount Open Ceiling TDD - Dual Glazed for conformance to the 5th Edition (2014) Florida Building Code – Building and Residential Volumes including the High Velocity Hurricane Zone (HVHZ) and Solatube M74 DS Curb Mount Open Ceiling TDD - Single Glazed Tubular Daylight Devices for conformance to the 5th Edition (2014) Florida Building Code – Building and Residential Volumes including the High Velocity Hurricane Zone (HVHZ).

Description of Product – Installation Requirements

See Reference 1 for a description of the product, its installation and other pertinent data related to its approved use.

Performance and Testing Standards

Reference 2.a conducted air, water and structural testing including impact and cyclic loading to the following standard(s).

1. AAMA/WDMA/CSA 101/I.S.2/A440-11, North American Fenestration Standard/Specification for windows, doors, and skylights.
2. ASTM E1886-13, Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
3. ASTM E1996-12, Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Windborne Debris in Hurricanes.
4. ASTM E283-04, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
5. ASTM E330-02, Standard Test Method for Structural Performance of Exterior windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
6. ASTM E547-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference
7. TAS201-94, Impact Test Procedures.
8. TAS202-94, Criteria for Testing Impact & Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure.
9. TAS203-94, Criteria for Testing Products Subjected to Cyclic Wind Pressure Loading.

Reference 2.b.i conducted plastic testing to the following standard(s).

1. ASTM D638-03, Standard Test Method for Tensile Properties of Plastics
2. ASTM D638-06, Standard Test Method for Tensile Properties of Plastics
3. ASTM D1929-96 (2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
4. ASTM D1929-12, Standard Test Method for Determining Ignition Temperature of Plastics.

5. ASTM D2843-99(2004), Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
6. ASTM D2843-10, Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
7. ASTM E84-04, Standard Test Method for Surface Burning Characteristics of Building Materials

Reference 2.b.ii conducted plastics testing to the following standard(s) in which NOA No. NOA 12-0605.05 confirms that plastic testing meets the 2010 FBC/FRC.

1. ASTM D638, Standard Test Method for Tensile Properties of Plastics
2. ASTM D1929, Standard Test Method for Determining Ignition Temperature of Plastics.
3. ASTM D2843, Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.

References and Supporting Documents

1) Drawings

- a. M74 DS-O-DPP-FC-B-L2-REG, signed and sealed by Robert J. Amoruso, P.E. on 10/13/15, *Solatube M74 DS Curb Mount Open Ceiling TDD - Dual Glazed.*
- b. M74 DS-O-DP-FC-B-L2-REG, signed and sealed by Robert J. Amoruso, P.E. on 10/13/15, *Solatube M74 DS Curb Mount Open Ceiling TDD - Single Glazed.*

2) Testing

a. Performance Testing

- i. Architectural Testing Inc. (Fresno, CA) **Test Report No. 08050.01-301-44** Dated 7/14/2014
 1. Solatube M74-DS Open Ceiling Tubular Daylight Device
 2. ASTM E1886-13 and ASTM E1996-12
 3. Series/Model M74 DS-O-DP-FC-B-L2 (Single Dome)
 4. Series/Model M74 DS-O-DDP-FC-B-L2 (Dual Dome)
 5. Wind Zone 4, Missile Level D
 6. DP = 80 psf
- ii. Architectural Testing Inc. (Fresno, CA) **Test Report No. D8050.02-301-44** Dated 7/14/2014
 1. Solatube Open Ceiling Tubular Daylighting Device M74 DS
 2. Series/Model M74 DS-O-DP-FC-B-L2 (Single Dome)
 3. Series/Model M74 DS-O-DDP-FC-B-L2 (Dual Dome)
 4. TAS-201, TAS-202, and TAS 203 (Signed and Sealed by Tyler Westerling, P.E.)
 5. Large Missile Impact
 6. DP = 80 psf
- iii. Architectural Testing Inc. (Fresno, CA) **Test Report No. D8050.03-301-44** Dated 7/14/2014
 1. Solatube M74-DS Open Ceiling Tubular Daylight Device

2. Occupational Safety and Health Administration/ U.S. Department of Labor Regulations Standards - 29 CFR 1926 Subpart M (Fall Protection), 1926.501(b)(4)(i); 1926.501(i)(2); 1926.S01(b)(4)(ii)
- iv. Architectural Testing Inc.(Fresno, CA) **Test Report No. 08051.01-301-44** Dated 7/14/2014,
 1. Solatube Open Ceiling Tubular Daylighting Device M74 OS
 2. AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS
 3. Series/Model M74 DS-O-DP-FC-B-L2 (Single Dome)
 4. Series/Model M74 DS-O-DDP-FC-B-L2 (Dual Dome)
 5. DP = 80 psf
- v. Architectural Testing Inc. (Fresno, CA) **Test Report No. D8051.02-301-44** Dated 7/14/2014
 1. Solatube M74 DS Single Glazed and Dual Glazed - Tubular Daylighting Device - Open Ceiling testing
 2. ICC-ES AC-16 (Part A3.1, A3.2, A3.3, A4.3 & Part 84.1), ASTM E 283-04, ASTM E 330-02 and ASTM E 547-00
 3. Series/Model M74 DS-O-DP-FC-B-L2 (Single Dome)
 4. Series/Model M74 DS-O-DDP-FC-B-L2 (Dual Dome)
 5. DP = 80 psf

b. Plastics Testing

- i. International Code Council Evaluation Services – Evaluation Reports
 1. ICC-ES ESR-1407
 2. ICC-ES ESR-1864
 3. ICC-ES ESR-1659
 4. ICC-ES ESR-2591
 5. ICC-ES ESR-2728
- ii. Miami-Dade Product Control Notice of Acceptance (NOA) No.
 1. NOA 12-0605.05

3) Reports

- a. PTC Report No. 2396, Rev. 0, *Solatube M74 DS Curb Mount Open Ceiling TDD – Product Evaluation to the 5th Edition (2014) FBC*, Dated 10/13/15, signed and sealed by Robert J. Amoruso, P.E.

4) 5th Edition (2014) Florida Building Code & 5th Edition (2014) Florida Residential Code

- a. Testing and Labeling Requirements
 - i. Section 1626 – Impact Tests (HVHZ – WBDR)
 - ii. Section 1626.2 – Large Missile Impact Tests
 - iii. Section 1710.6 – Skylights and Sloped Glazing
 - iv. Section 2405 – Sloped Glazing and Skylights
 - v. Section 2410.4 – Product Approval Required
 - vi. Section 2610 – Light-Transmitting Plastic Skylight Glazing
 - vii. Section 2610.2 – Light-Transmitting Plastic Skylight Glazing, Mounting
 - viii. Section R308.6 – Skylights and Sloped Glazing

- b. Glazing Requirements
 - i. Section 2405.1 – Sloped Glazing and Skylights - Scope
 - ii. Section 2405.2 – Allowable Glazing Materials and Limitations
 - iii. Section R308.6 – Skylights and Sloped Glazing
- c. Plastics Requirements
 - i. Section 2603.3 – Foam Plastic Insulation
 - ii. Section 2606.4 – Specifications, Light-transmitting plastics
 - iii. Section 2614.2 – Definitions, Approved Plastics

Equivalency Evaluation – Air, Water and Structural; Impact and Cyclic

Performance testing meets one or more of the adopted 5th Edition (2014) Florida Building Code and 5th Edition (2014) Florida Residential Code. In those cases where performance testing standard revision levels are not contained in the adopted code, the methods of testing and subsequent results were compared and found to be in conformance with the current edition of the code. For product testing, the following testing standard versions were used.

- 1) AAMA/WDMA/CSA 101/I.S.2/A440-11
- 2) ASTM E1886-13
- 3) ASTM E1996-12
- 4) ASTM E283-04
- 5) ASTM E330-02
- 6) ASTM E547-00
- 7) TAS 201-94, TAS 202-94 and TAS 203-94 – based on 2010 FBC/FRC (see reference 2.a.ii for testing).

Solatube TDD Performance Testing		Florida Building Code		
Testing Standard	Standard Revision Level	5th Edition (2014) FBC	5th Edition (2014) FRC	5th Edition (2014) FEC
AAMA/WDMA/CSA 101/I.S.2/A440	11	11	11	---
ASTM E1886	13	05	05	---
ASTM E1996	12	12	12	---
ASTM E283	04	---	---	04
ASTM E330	02	02	---	---
ASTM E547	04	---	---	---

Reference 2.a.ii tested uniform static air pressure in accordance with TAS-202-94, *Criteria for Testing Impact & Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure*

- Testing to the above procedure documented in Reference 2.a.ii is based on conformance to the 2010 FBC – Test Protocols.
- **CONCLUSION:** Testing and documented results in Reference 2.a.ii are compliant with the 5th Edition (2014) FBC – Building Volume, Residential Volume and Test Protocols. It has been concluded that no revisions or changes to the referenced standards have occurred that affect the results of design, testing or engineering of the approved product(s).

Reference 2.a.ii tested impact performance in accordance with TAS-201-94, *Impact Test Procedures*

- Testing to the above procedure documented in Reference 2.a.ii is based on conformance to the 2010 FBC – Test Protocols.
- **CONCLUSION:** Testing and documented results in Reference 2.a.ii are compliant with the 5th Edition (2014) FBC – Building Volume, Residential Volume and Test Protocols. It has been concluded that no revisions or changes to the referenced standards have occurred that affect the results of design, testing or engineering of the approved product(s).

Reference 2.a.ii tested post-impact cyclic wind pressure loading performance in accordance with TAS-203-94, *Criteria for Testing Products Subject to Cyclic Wind Pressure Loading*.

- Testing to the above procedure documented in Reference 2.a.ii is based on conformance to the 2010 FBC – Test Protocols.
- **CONCLUSION:** Testing and documented results in Reference 2.a.ii are compliant with the 5th Edition (2014) FBC – Building Volume, Residential Volume and Test Protocols. It has been concluded that no revisions or changes to the referenced standards have occurred that affect the results of design, testing or engineering of the approved product(s).

Equivalency Evaluation – Plastics Testing

The changes in revision level of the ASTM Standard Test Methods and Practices as part of the 5th Edition (2014) FBC and 5th Edition (2014) FRC have been reviewed and found not to affect the method of testing, acceptance criteria, or reporting criteria in such a manner as to result in any change in the performance of the aforementioned product. As such, test results obtained from testing to these standards are valid for demonstrating compliance to the 5th Edition (2014) FBC/FRC. The following table compares the revision levels of the Standards used in testing vs. those required by the 5th Edition (2014) FBC/FRC. It has been determined that Standards used in testing are equivalent to those in the 5th Edition (2014) FBC/FRC in accordance with Product Approval Rule 61G20-3.015(5)(d) – Equivalence of Standards.

Solatube TDD Plastics Testing				Florida Building Code	
ITEM NO.	MATERIAL	ASTM Standard	Standard Revision Level	5th Edition (2014) FBC	5th Edition (2014) FRC
1	Bayer Material Science / Makrolon SL	ASTM G155	05a **	05a	n/a
		ASTM D638	03 **	03	n/a
		ASTM D635	06 ** ++	06	n/a
		ASTM D1929	96(2001)e1 **	96(2001)e1	n/a
		ASTM D2843	99(2004)e01 **	99(2004)e01	n/a
2	Eastman / Spectar	ASTM D635	03	06	n/a
		ASTM D1929	96(2001)e1	96(2001)e1	n/a
		ASTM D2843	99(2004)	99(2004)e01	99
	Plaskolite / Vivak	ASTM D635	06	06	n/a
		ASTM D1929	ASTM D1929-12	96(2001)e1	n/a
		ASTM D2843	10	99(2004)e01	n/a
16	R-Max / TSX-8500	ASTM E84	04	09	09
	DOW / Thermax Sheathing		04	09	09
25	Plaskolite / Optix	ASTM D635	03	06	n/a
		ASTM D1929	96(2001)e1	96(2001)e1	n/a
		ASTM D2843	99(2004)	99(2004)e01	n/a
<p align="center">**NOA 12-0605.05 confirms testing meets 2010 FBC. Based on comparison above and review of associated ASTM standards, results documented in NOA 12-0605.05 demonstrate compliance with the 5th Edition (2014) Florida Building Code. ++ ICC-ES ESR-2728 confirms testing meets 2010 FBC. Based on comparison above and review of associated ASTM standards, results documented in ICC-ES ESR-2728 demonstrate compliance with the 5th Edition (2014) Florida Building Code.</p>					