



Equivalency Evaluation to 5th Edition (2014) FBC

Date: June 24, 2015

PTC Report No.: 2167-EER

Report Revision No.: 2

PTC Project No.: 415-0316

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

Product Name: Solatube Smart LED 10" Tubular Daylight Device - HVHZ

Product Category: Sky Lights

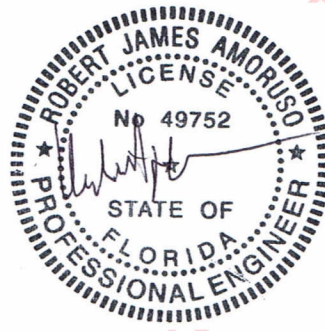
Product Sub-Category: Skylight

Compliance Method: Product Approval Rule 61G20-3.015(4)(d) – Equivalency of Standards

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Project Scope

Evaluate equivalency of testing standards used for the performance testing of Solatube Smart LED 10" Tubular Daylight Device 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) TAS 201-94 - *Impact Test Procedures*
- 2) TAS 202-94 - *Criteria for Testing Impact & Nonimpact Resistant Building Envelope Components Using Uniform Static Air Pressure*
- 3) TAS 203-94 - *Criteria for Testing Products Subject to Cyclic Wind Pressure Loading*

Reference 2.b, 2.c, 2.d, 2.e, 2.g, 2.h and 2.i conducted plastics testing to the following standard(s).

- 1) ASTM G155-05a, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non Metallic Materials*
- 2) ASTM G155-00ae1, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non Metallic Materials*
- 3) ASTM D638-03, *Standard Test Method for Tensile Properties of Plastics*
- 4) ASTM D635-06, *Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.*
- 5) ASTM D635-74, *Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.*
- 6) ASTM D1929-96 (2001)e1, *Standard Test Method for Determining Ignition Temperature of Plastics.*
- 7) ASTM D1929-96, *Standard Test Method for Determining Ignition Temperature of Plastics.*
- 8) ASTM D1929-68(1975), *Standard Test Method for Determining Ignition Temperature of Plastics.*
- 9) ASTM E84-06, *Standard Test Method for Surface Burning Characteristics of Building Materials*
- 10) ASTM E84-09a, *Standard Test Method for Surface Burning Characteristics of Building Materials*
- 11) ASTM D2843-99(2004)e1, *Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.*
- 12) ASTM D 2843-99, *Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.*

- 13) ASTM D 2843-93, *Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics*.

Reference 2.f recorded ICC/FBC conforming plastics testing in the following evaluation reports.

- 1) ICC-ES Report No. ER-1084
- 2) ICC-ES Report No. ESR-1635

References and Supporting Documents

1) Drawings

- a. SOLA0008, Rev. B, dated 5/11/15, signed and sealed by Robert J. Amoruso, PE, *Solatube Smart LED 10" Tubular Daylight Device – Installation Anchorage Details*.

2) Testing (note that References 2.b thru 2.i have the BOM Item description and (Item No.) shown.

a. Performance Testing

- i. Architectural Testing Inc. Test Report No. 85320.01-301-18, dated 9/08/08, *Solatube Impact 160 DS (10") and 290 DS (14") Tubular Daylight Device testing to TAS 201, TAS 202 and TAS 203*, signed and sealed by Joshua M. Royce, P.E.
- ii. Architectural Testing Inc. Test Report No. B9609.01-301-18, dated 8/14/12, *Solatube Smart LED System Tubular Daylight Device testing to TAS 201, TAS 202 and TAS 203*, signed and sealed by Tyler Westerling, P.E.

b. OUTER DOME (1), DOME RING (2), TOP TUBE CLIP (6) AND INNER DOME (20) testing for High Impact Acrylic PMMA (Poly(methyl methacrylate))

- i. Intertek Test Report No. 3143957-004, dated 9/24/08, testing to ASTM G155-05a and D638-08 in accordance with ASTM D2565-99.
- ii. SGS Test Report No. 177:013002-01-R1, dated 6/10/08, testing to ASTM D635-06.
- iii. SGS Test Report No. 177:013002-02-R1, dated 6/10/08, testing to ASTM D1929-96.
- iv. SWRI Test Report No. 01.12693.01.139, dated 4/5/07, testing to ASTM E84-06.

c. OUTER DOME (1), DOME RING (2), TOP TUBE CLIP (6) AND INNER DOME (20) testing for High Impact Acrylic PMMA (Poly(methyl methacrylate))

- i. Architectural Testing Inc. Test Report No. 58735.01-106-18, dated 1/4/07, testing to ASTM G155-00ae1 and D638-03.
- ii. SGS Test Report No. 177:002666-03, dated 1/2/07, testing to ASTM D635-06.
- iii. SGS Test Report No. 177:002666-01, dated 1/13/07, testing to ASTM D1929-96(2001)e1.
- iv. SGS Test Report No. 177:002666-02, dated 1/2/07, testing to ASTM D2843-99.

d. EFFECT LENS (14), PET-GAG (PET – Polyethylene Terephthalate, High Frequency Welding Grade - GAG) testing

- i. SGS Test Report No. 2138368-1, dated 8/27/10, testing to ASTM D635-06.

- ii. SGS Test Report No. 2138368-3, dated 2/2/10, testing to ASTM D1929-96(2001)e1.
 - iii. SGS Test Report No. 2138368-2, dated 8/31/10, testing to ASTM E84-09a.
- e. DRESS RING (18) testing for Medium Impact Acrylic PMMA (Poly(methyl methacrylate))
 - i. SGS Test Report No. 177:013002-01-R1, dated 6/10/08, testing to ASTM D635-06.
 - ii. SGS Test Report No. 177:013002-02-R1, dated 6/10/08, testing to ASTM D1929-96.
 - iii. SWRI Test Report No. 01.12693.01.139, dated 4/5/07, testing to ASTM E84-06.
 - iv. Intertek Test Report No. 3143957-004, dated 9/24/08, testing to ASTM G155-05a and D638-08 in accordance with ASTM D2565-99.
 - f. DRESS RING (18) testing for Medium Impact Acrylic PMMA (Poly(methyl methacrylate))
 - i. ICC-ES Report No. ER-1084 demonstrates compliance to I-Codes for use in skylight applications. Report No. ER-1084 and 5th Edition (2014) FBC requirements same based on review of documented results.
 - ii. ICC-ES Report No. ESR-1635 demonstrates compliance to I-Codes for use in skylight applications. Report No. ESR-1635 and 5th Edition (2014) FBC requirements same based on review of documented results.
 - g. DIFFUSER PANEL (17) testing for Medium Impact Acrylic PMMA (Poly(methyl methacrylate))
 - i. SGS Test Report No. 177:013002-03-R1, dated 6/10/08, testing to ASTM D635-06.
 - ii. SGS Test Report No. 177:013002-04-R1, dated 6/10/08, testing to ASTM D1929-96.
 - iii. SWRI Test Report No. 01.13536.01.060, dated 1/30/08, testing to ASTM E84-06.
 - h. DIFFUSER PANEL (17) testing for Polycarbonate
 - i. SGS Test Report No. 153367-2, dated 4/2/01, testing to ASTM D635-74.
 - ii. SGS Test Report No. 153367-1, dated 4/2/01, testing to ASTM D1929-68(1975).
 - iii. SGS Test Report No. 153367-3, dated 4/2/01, testing to ASTM D2843-93.
 - i. SMART LED BASE (13) testing for Polycarbonate
 - i. ATI Test Report No. C3440.01-106-31, dated 12/3/12, testing to ASTM D1929-96(2001)e1, ASTM D2843-99(2004)e1 and ASTM D635-06.

3) Reports

- a. PTC Report No. 2167, Rev. 2, *Solatube Smart LED 10" Tubular Daylight Device – Evaluation Report*, Dated 6/24/15, 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
- c. Plastics Requirements
 - i. Section 2606.4 – Specifications, Light-transmitting plastics
 - ii. Section 2614.2 – Definitions, Approved Plastics

Equivalency Evaluation – Plastics Testing

Test Standard used	5th Edition (2014) FBC/FRC Standard Revision Level	Comments
ASTM D635-06 ASTM D635-74	ASTM D635-06	Same revision level used in test as required in code. -- OR -- Review of the revision year required by the code and that used in testing indicate no significant changes that would affect test results.
ASTM D638-03	ASTM D638-03	Same revision level used in test as required in code.
ASTM D1929-96 (2001)e1 ASTM D1929-96 ASTM D1929-68(1975)	ASTM D1929-96 (2001)e1	Same revision level used in test as required in code. -- OR -- Review of the revision year required by the code and that used in testing indicate no significant changes that would affect test results.
ASTM D2843-99(2004)e1 ASTM D2843-99 ASTM D2843-93	ASTM D 2843- 99(2004)e01	Same revision level used in test as required in code. -- OR -- Review of the revision year required by the code and that used in testing indicate no significant changes that would affect test results.
ASTM E84-06 ASTM E84-09a	ASTM E84-09	Review of the revision year required by the code and that used in testing indicate no significant changes that would affect test results.
ASTM G155-05a ASTM G155-00ae1	ASTM G155-05a	Same revision level used in test as required in code. -- OR -- Review of the revision year required by the code and that used in testing indicate no significant changes that would affect test results.

Equivalency Evaluation – Air, Water and Structural Testing including Impact and Cyclic Loading

Reference 2.a 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 is based on conformance to the 2010 and 2007 FBC – Test Protocols with 2009 Supplements.
- **CONCLUSION:** Testing and documented results in Reference 2.a 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 tested impact performance in accordance with TAS-201-94, *Impact Test Procedures*

- Testing to the above procedure documented in Reference 2.a is based on conformance to the 2010 and 2007 FBC – Test Protocols with 2009 Supplements.
- **CONCLUSION:** Testing and documented results in Reference 2.a 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 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 is based on conformance to the 2010 and 2007 FBC – Test Protocols with 2009 Supplements.
- **CONCLUSION:** Testing and documented results in Reference 2.a 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).