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1. Subject
   Solatube Tubular Daylighting Devices

2. Research Scope
   2.1 Building Codes:
   2006 International Building Code (IBC)
   2006 International Residential Code (IRC)
   1997 Uniform Building Code (UBC)
   2007 Florida Building Code (FBC) including
   High Velocity Hurricane Zones for 160 DS, 290 DS and 750 DS models
   2.2 Properties
   Structural Performance
   Durability (UV, Weathering)
   Burning

3. Description
   3.1 Solatube Tubular Daylighting Device (TDD) Models recognized by this report are;

   The Solatube Brighten Up® Series Models 160 DS (10 inch Tube Dia.), 290 DS (14 inch Tube Dia.) daylighting systems.
   The Solatube SolaMaster® Series Models 330 DS-O, 330 DS-C, 750 DS-O and 750 DS-C are lighting systems available in a 21 inch tube diameter. The “O” and “C” designation refers to Open (O) and Closed (C) ceiling configurations.
   These TDD models consist of three primary assemblies; the roof dome assembly, reflective tube assembly and diffuser assembly. These assemblies are detailed in Figures 1, 2, and 3.

   3.1.1 Roof Dome Assembly.
   Primary components of the dome assembly are the dome, dome ring or tube ring and flashing.

   3.1.1.1 A single dome manufactured from impact resistant acrylic polymer is utilized on Models 160 DS, 290 DS, 330 DS and 750 DS.

   3.1.1.2 Models 160 DS, 290 DS and 750 DS utilize an additional inner dome manufactured from impact resistant acrylic polymer or polycarbonate (750 DS) when installation is within the High Velocity Hurricane Zone as defined by the FBC.

   3.1.1.3 A dome ring (160 DS & 290 DS) manufactured from impact resistant Acrylic polymer or tube ring (330 DS & 750DS) manufactured from PVC, connects the inner reflective tube, inner reflector, inner dome and outer dome to the flashing.

   3.1.1.4 A powder coated steel dome edge protection band is utilized to protect the dome edge on installations on roof assemblies with fire classifications of A, B or C.

   3.1.1.5 Powder coated metal flashings are self mounting and are available in pitched and flat configurations. For models 160 DS and 290 DS, the flat configuration is available in both 4 and 6 inch lengths. For models 330 DS and 750 DS, only flat configurations in 4, 8 and 11 inch lengths are available. Also a support flashing with integral curb cap is available for the 290 DS, 330 DS and 750 DS models.

   3.1.2 Reflective Tubes

   Reflective tubes and angle adapters have a high reflectance interior tube finish and are manufactured from .015” thick aluminum for 160 DS and 290 DS, and .018” for 330 DS and 750 DS.

   Two inch wide polymer/foil tape is utilized at all joints between tube sections and at vertical seams of each tube.

   3.1.3 Daylight Dimmer Assembly

   A switch operated, electrically driven Daylight Dimmer Assembly is available for installation above the bottom tube on 160 DS / 290 DS and above the round-to-square for 330 DS / 750 DS. The Dimmer Assembly is used to restrict natural light from entering the room. See Section 7.3 and Figure 5.
3.1.4 Light Kit Assembly
Switch operated, electric light kits are available for installation into the bottom tube for the 160 DS and 290 DS models only. The kits contain either an incandescent or fluorescent light bulb. See Section 7.3 and Figure 4.

3.1.5 Diffuser Assembly.
The Diffuser Assemblies are either single or dual glazed with acrylic or polycarbonate plastic diffusers classified as a CC2 plastic material. Diffusers have a flame spread index not exceeding 200 and a smoke development index not exceeding 450 when tested in accordance with ASTM E 84.

A dress (trim) ring is mounted over the assembly edge for aesthetic purposes
The ceiling ring is manufactured from injection molded impact resistant acrylic and is used to connect the reflective tubing and diffusers to the interior room ceiling.

4. Performance Characteristics
4.1 Models identified in this report have been tested for deflection and structural response under uniform loading in both the positive (inward) and negative (outward) directions in accordance with ICC-ES AC16. The maximum allowable positive and negative design loads for each model size combination, and associated anchoring, are indicated in Tables 1.

4.2 Models identified in this report have met the air infiltration and water penetration acceptance criteria identified in ICC-ES AC16 when tested in accordance with Sections 5.3.2 and 5.3.3 of AAMA/WDMA/CSA 101/I.S.2/A440-05.

4.3 Florida Building Code
4.3.1 Models 160 DS, 290 DS, 330 DS and 750 DS have been tested to show compliance to AAMA/WDMA/CSA 101/I.S.2/A440-05 Standard Specification for Windows, Doors, and Unit Skylights. Testing was performed by a Miami-Dade County approved testing facility and were signed and sealed by a Professional Engineer with current registration in the state of Florida.

4.3.2 Light Transmitting Plastics forming part of the models identified in this report have been shown to have a self-ignition temperature greater than 650°F when tested in accordance with ASTM D 1929, A smoke development index less than 450 when tested in accordance with ASTM E 84, and a combustibility classification of CC2 when tested in accordance with ASTM D 635.

4.3.3 High Velocity Hurricane Zones (HVHZ)
Models 160 DS, 290 DS and 750 DS have been additionally tested to show compliance with the requirements of the 2007 Florida Building Code for use in locations designated as High Velocity Hurricane Zones. Testing has shown;

4.3.3.1 Sufficient resistance to windborne debris, as stated in Section 1626 of the Florida Building Code when tested to FBC Test Protocol TAS 201-94.

4.3.3.2 Sufficient resistance to wind forces as determined by Section 1620 of the Florida Building Code when tested to FBC Test Protocol TAS 202-94.

4.3.3.3 Sufficient resistance to cyclic wind pressure loading as determined by Sections 1625, Table 1625.4 and Table 1626 of the Florida Building Code when tested to FBC Test Protocol TAS 203-94.

4.3.3.4 Sufficient weathering resistance of plastics with outdoor exposure when tested to ASTM G 155 for a period of 4500 hours and subsequent testing to ASTM D 638.

5. Installation
Installation shall be in accordance with the manufacturer's installation instructions and this report. Where differences occur between this report and the manufacturer's installation instructions, this report shall govern.

5.1 The dome attachment for the 10" 160 DS and 14" 290 DS models is accomplished by attaching the dome ring to the flashing and top tube with four (4) #8x1" truss washer head screws and plastic spacers with a snap fit between the dome and dome ring. See Figure 1.

5.2 Diffuser assemblies for the 10" 160 DS and 14" 290 DS models are comprised of an acrylic ceiling ring, an acrylic dress ring and dual glazed diffuser. The dress ring is snap fitted onto the ceiling ring.
5.3 The Dome attachment for the 21" 330 DS and 750 DS models is accomplished with three (3) #8x1-5/8” washer head sheet metal screws passing through three (3) equally spaced plastic spacers, flashing and into the tube ring. See Figure 2.

5.4 The Dome Assembly for the 21" 330 DS-O and 750 DS-O (Open Ceiling) models utilize a butyl putty seal (referred to as a glazing rope in installation instructions) between the flashing and tube ring. See Figures 2 and 3.

5.5 For the 21" 330 DS-C and 750 DS-C (Closed Ceiling) models, the tube ring should be sealed to the outer face of the top reflector tube with 2” wide polymer/foil tape.

5.6 Diffuser assembly for the 21" 330 DS-O and 750 DS-O (Open Ceiling) models is comprised of an acrylic dress ring and a single glazed diffuser. The assembly is snapped into the four (4) equally spaced slots provided in the end of the extension tube.

5.7 For the 21" 330 DS-C and 750 DS-C (Closed Ceiling) models consist of a square diffuser assembly that connects to the round reflective tube through a square to round transition section.

5.8 Installation for compliance with the IBC and IRC shall be in accordance with IBC Section 2405 and 2610 and, IRC Section R308.6

5.9 Installation for compliance with the UBC shall be in accordance with UBC Section 2409 and 2603.7

5.10 Installation for compliance with the FBC shall be in accordance with FBC Section 2405 and 2610.

5.11 For installation on roof assemblies with fire classifications A, B, or C, metal dome edge protective rings shall be installed on the 160 DS, 290 DS, 330 DS and 750 DS models utilizing the 4” flashings. Other flashings noted in Section 3.1.1.5 may be needed in order to maintain the required minimum 4” distance from roof deck to dome edge.

6. Supporting Evidence

6.1 Manufacturer's drawings and installation instructions.

6.2 Reports of testing and engineering analysis in accordance with ICC-ES AC16, Acceptance Criteria for Plastic Glazed Skylights, effective March 1, 2008


6.5 Reports of Testing to ASTM D635-06 Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position with equivalency to ASTM D635-03.


6.8 Testing for Florida Building Code was performed by a Miami-Dade County approved testing facility (Architectural Testing, Inc. Laboratory in Fresno, CA) with reports signed and sealed by a Professional Engineer registered in the State of Florida. These reports are;


6.8.2 Reports of testing to Testing Application Standard (TAS) 201-94 “Impact Test Procedures as required by Section 1626 of the Florida Building Code.


6.8.4 Reports of testing to Testing Application Standard (TAS) 203-94 “Criteria for Testing Products subject to Cyclic Wind Pressure Loading” as required by Sections 1625, Table 1625.4 and Table 1626 of the Florida Building Code.
7. Conditions of Use

The Solatube Tubular Daylighting devices identified in this report are deemed to comply with the referenced building codes subject to the following conditions:

7.1 Installation shall comply with the manufacturers installation instructions, this report, IBC Section 2405 and 2610, IRC Section R308.6, UBC Section 2409 and 2603.7, and FBC Sections 2405 and 2610.

7.2 The wind uplift rating recognized in this report (See Table 2) is based on attachment to S-P-F wood curbing (Specific Gravity, G=0.42), 5/8” Group 2 Plywood and 22 gauge 33 ksi minimum yield steel deck. Installation on a wood substrate with a lesser specific gravity or lesser thickness may result in a lower wind uplift rating.

7.3 Daylight dimmer, incandescent light and fluorescent light assemblies were only evaluated for effects on performance when TDDs were tested in accordance with ICC-ES AC16. Evaluation of these assemblies for compliance to electrical codes is not part of this report.

7.4 Where required by the building official, engineering calculations and details shall be provided. The calculations shall verify that the anchorage complies with the building code for the type of framing and condition of the supporting construction.

7.5 Model 330 DS shall not be installed in High Velocity Hurricane Zones as defined by the Florida Building Code.

7.6 Models 160 DS, 290 DS and 750 DS shall utilize the additional inner dome for use in High Velocity Hurricane Zones as defined by the Florida Building Code.

7.7 All products are manufactured in accordance with the manufacturer’s approved quality control system with inspections by Keystone Certifications, Inc. (AA-714).

8. Identification

Solatube Tubular Daylighting devices produced in accordance with this report shall be identified with permanent labeling that includes the following information:

8.1 The manufacturers name and/or logo, address model number and allowable loads

8.2 The plastic dome glazing thickness and classification (CC2)

8.3 The Name or logo of the independent inspection agency, Keystone Certifications, Inc. (AA-714)

8.4 The ATI Code Compliance Research Report mark and report number (CCRR-0131)

9. Code Compliance Research Report Use

9.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

9.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product or manufacturer by ATI.

9.3 Reference to the Architectural Testing internet web site address at www.archtest.com is recommended to ascertain the current version and status of this report.
### Table 1 – Maximum Allowable Design Loads and Applicable Codes

<table>
<thead>
<tr>
<th>Model Series</th>
<th>Model No</th>
<th>Dia. (inch)</th>
<th>Dome Thickness (inch)</th>
<th>IBC, IRC, UBC</th>
<th>FBC</th>
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</thead>
<tbody>
<tr>
<td>Solatube Brighten-Up® Series</td>
<td>160 DS</td>
<td>10</td>
<td>0.125</td>
<td>+70 -60</td>
<td></td>
</tr>
<tr>
<td></td>
<td>290 DS</td>
<td>14</td>
<td>0.125</td>
<td>+150</td>
<td>+70 -70</td>
</tr>
<tr>
<td>Solatube SolaMaster® Series</td>
<td>330 DS-O²</td>
<td>21</td>
<td>0.168</td>
<td>+70 -70</td>
<td>+150</td>
</tr>
<tr>
<td></td>
<td>330 DS-C²</td>
<td>21</td>
<td>0.168</td>
<td>+70 -70</td>
<td>+150</td>
</tr>
<tr>
<td></td>
<td>750 DS-O</td>
<td>21</td>
<td>0.210</td>
<td>+150</td>
<td>+70 -70</td>
</tr>
<tr>
<td></td>
<td>750 DS-C</td>
<td>21</td>
<td>0.210</td>
<td>+150</td>
<td>+70 -70</td>
</tr>
</tbody>
</table>

1. Positive (+) loads are directed inward; negative (-) are directed outward.
2. Models 330 DS are not approved for use in High Velocity Hurricane Zones as defined by the FBC.
3. Values indicated are positive and negative design pressure ratings for use with the FBC.
4. Allowable design loads for consideration of water penetration are limited to those values indicated under Wind Loads.

### Table 2

Anchorage Descriptions for Recognized Wind Uplift Design Pressures

<table>
<thead>
<tr>
<th>Model #s</th>
<th>Anchorage</th>
<th>Substrate</th>
<th>Anchor Description and Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 DS</td>
<td>Metal Flange to wood curb</td>
<td>SPF (S.G. ≥ .42) wood curb</td>
<td>Qty 8 #10 x 2” Screw</td>
</tr>
<tr>
<td>290 DS</td>
<td>Metal Flange to wood deck</td>
<td>5/8” Type 2 Plywood</td>
<td>Qty 8 #10 x 2” Screw</td>
</tr>
<tr>
<td></td>
<td>Metal Flange to Metal Deck</td>
<td>22 gauge steel 33ksi Min Yield</td>
<td>Qty 8 #10 TEKS</td>
</tr>
<tr>
<td>330 DS-O²</td>
<td>Metal Flange to wood curb</td>
<td>SPF (S.G. ≥ .42) wood curb</td>
<td>Qty 16 #10 x 2” Screw</td>
</tr>
<tr>
<td>330 DS-C²</td>
<td>Metal Flange to wood deck</td>
<td>5/8” Type 2 Plywood</td>
<td>Qty 16 #10 x 2” Screw</td>
</tr>
<tr>
<td>750 DS-O</td>
<td>Metal Flange to Metal Deck</td>
<td>22 gauge steel 33ksi Min Yield</td>
<td>Qty 16 #10 TEKS</td>
</tr>
<tr>
<td>750 DS-C</td>
<td>Metal Flange to Metal Deck</td>
<td>22 gauge steel 33ksi Min Yield</td>
<td>Qty 16 #10 TEKS</td>
</tr>
</tbody>
</table>

1. Models 330 DS are not approved for use in High Velocity Hurricane Zones as defined by the FBC.
Figure 1 - 160 DS & 290 DS Solatube with Details
Figure 2 - 330 DS Solatube with Details
Figure 3 - 750 DS Solatube with Details
Figure 4 - Typical Solatube Light Kit Assemblies

Notes:
1) Evaluation of these Light Fixtures for compliance to applicable electrical codes is not part of this report.
Figure 5 - Typical Solatube Daylight Dimmer Assembly