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SECTION 08625

TUBULAR DAYLIGHTING DEVICE

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**** NOTE TO SPECIFIER ** Solatube International, Inc.; residential and commercial tubular daylighting devices.**

This section is based on the products of Solatube International, Inc., which is located at:

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Solatube Daylighting Systems (DS) use advanced optics to significantly improve the way daylight is harnessed. Solatube International has added breakthrough technology throughout the system to capture more sunlight on the roof, transfer more sunlight through the tubing and effectively diffuse the light in the building interior. Solatube Daylighting Systems set performance standards never seen before. Highly effective and simple to install, these models can transform dark interior rooms and light more expansive spaces when used in multiples, creating a unique architectural effect.

Solatube Daylighting Systems can accommodate virtually any ceiling configuration including suspended ceilings, finished drywall ceilings, and open ceilings making them appropriate for a wide variety of commercial and residential applications, including office, retail, warehouse, industrial, education, healthcare facilities, multifamily housing, and custom homes. These Daylighting Systems provide significant energy savings, improved environments, and high-quality lighting.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Tubular daylighting device, consisting of roof dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.

**** NOTE TO SPECIFIER ** Delete the following paragraph if no daylight dimmers, security bars, light fixtures or ventilation accessories are specified.**

- B. Accessories.

1.2 RELATED SECTIONS

**** NOTE TO SPECIFIER ** Delete any sections below not relevant to this project; add others as required.**

- A. Section 07311 - Asphalt Shingles: Flashing of skylight base.
- B. Section 07320 - Roof Tiles: Flashing of skylight base.
- C. Section 07510 - Built-Up Bituminous Roofing: Flashing of skylight base.
- D. Section 07530 - Electrometric Membrane Roofing: Flashing of skylight base.
- E. Section 07550 - Modified Bituminous Membrane Roofing: Flashing of skylight base.
- F. Section 07600 – Flashing: Metal flashings.
- G. Section 08620 - Unit Skylights: Skylights without reflective tube.
- H. Section 08630 - Metal Framed Skylights.
- I. Section 15810 - Ducts: Fan vent duct and connections.
- J. Section 16150 - Equipment Wiring: Electrical connections.
- K. Section 16500 – Lighting Equipment and Controls: Light bulbs and lamps.

1.3 REFERENCES

**** NOTE TO SPECIFIER ** Delete references from the list below that are not actually required by the text of the edited section.**

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.
- B. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.
- D. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.
- E. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.
- F. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.
- G. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.
- H. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.

- I. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).
- J. UL 181 - Factory Made Air Ducts and Air Connectors
- K. UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials; 2004.
- L. ICBO/ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.4 PERFORMANCE REQUIREMENTS

- A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:
 - 1. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
 - 2. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.
 - 3. Uniform Load Test:

**** NOTE TO SPECIFIER ** Select the following Paragraph for use with Solatube Model 160 DS or 290 DS. Delete if not applicable.**

- a. No breakage, permanent damage to fasteners, hardware parts, or damage to make system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 60 psf (2.87 kPa) in accordance with ICBO/ICC AC-16 Section A, or Negative Load of 70 psf (3.35 kPa) if tested per ICBO/ICC AC-16 Section B.
- b. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.
- 4. Fire Testing:
 - a. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2006 International Building Code.
 - b. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929.
 - c. Smoke Density - Rating no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84) in way intended for use. Classification C.
 - d. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635.
 - e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1: U.B.C. Standard 26-7. See ASTM D 635.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

- C. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.
- D. Verification Samples: As requested by Architect.
- E. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

**** NOTE TO SPECIFIER ** Delete the following paragraphs if LEED is not applicable. Several opportunities exist for LEED credits when using daylighting systems specified. Contact Solatube International, Inc. for additional information.**

- F. LEED Submittals: Provide documentation of how the requirements of Credit will be met:
 - 1. List of Daylight Credits available for the products specified.
 - 2. Data on Energy Optimization Performance Credits for the products specified.
 - 3. Data on Regional Credits which may be available for the project location. (LEED 2.1)
 - 4. Data on Perimeter and Non-Perimeter Controllability of Systems for use of Daylight Dimmer option with the products specified.
 - 5. Data on potential Innovation in Design Credits which may be available for the innovative use of the products specified.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 15 years.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

- A. Daylighting Device: Manufacturer's standard warranty for 10 years.

**** NOTE TO SPECIFIER ** Delete if optional electric components are not required.**

- B. Electrical Parts: Manufacturer's standard warranty for 5 years, unless otherwise indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Solatube International, Inc.; 2210 Oak Ridge Way, Vista, CA 92081. ASD. Tel. Toll Free: 888-765-2882. Tel: (760) 477-1120. Fax: (760) 597-4488. Email: commsales@solatube.com. Web: www.solatube.com.

**** NOTE TO SPECIFIER ** Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.**

- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 TUBULAR DAYLIGHTING DEVICES

- A. Tubular Daylighting Devices General : Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICBO/ICC AC-16.

**** NOTE TO SPECIFIER ** Brighten Up Series Solatube Model 290 DS used for daylighting systems with suspended or hard ceilings.**

- B. Brighten Up Series: Solatube Model 290 DS: 14 Inch (350 mm) Daylighting System:
 - 1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - a. Outer Dome Glazing: Type DA, 0.125 inch (3.25 mm) minimum thickness impact resistant injection molded acrylic classified as CC2 material; UV inhibiting, impact modified acrylic blend.

**** NOTE TO SPECIFIER ** Include the following paragraph if required. Delete if not required. Acrylic Shock Inner Dome meets Florida Building Code High Velocity Wind Zone requirements. Use Shock Inner Domes only in high velocity wind zones.**

- b. Optional Shock Inner Dome Glazing: Type DI, 0.115 inch (2.9 mm) minimum thickness high impact resistant injection molded acrylic required for high velocity wind zones.
 - c. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
 - d. LightTracker Reflector: Aluminum sheet, thickness 0.015 inch (0.4 mm) with Spectralight Infinity. Positioned in dome to capture low angle sunlight.
 - 2. Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
 - a. Base Material: Sheet steel, corrosion resistant, meeting ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 inch (0.7 mm) thick.

**** NOTE TO SPECIFIER ** Select one or more of the following flashing paragraphs and delete those not required. Steel bases are available both flat and pitched. For a different roof slope use the base that is the closest fit but be aware that the skylight dome will not be mounted precisely level.**

- b. Base Flat: Flat Type FF4, no pitch 4 inches (102 mm) high.
 - c. Base Flat: Flat Type FF6, no pitch 6 inches (152 mm) high.
 - d. Base Pitched: Pitched Type FPM, 22.5 degrees slope from horizontal, 4 inches (102 mm) high.
 - e. Tile Roof No Pitch: No Pitch Type FFT, 4 inches (102 mm) high. Tile Roof Counter-Flashing: corrugated aluminum 1100-0, 0.020 inch (.508 mm).
 - f. Tile Roof Pitched: Pitched Type FPT, 22.5 degrees slope from horizontal, 4 inches (102 mm) high. Tile Roof Counter-Flashing: corrugated aluminum 1100-0, 0.020 inch (.508 mm).

- g. Curb Cap: Type FCM provided as specified in Section 07600.

**** NOTE TO SPECIFIER ** The following flashing paragraphs are optional. Select those required and delete those not required. Flashing insulator is intended to seal the roof opening and prevent condensation forming on the flashing interior from exposure to humid air in unventilated spaces. Metal roof flashing kit is available for sealing base flat or pitched flashing specified above.**

- h. Flashing Insulator: Type F1. Thermal isolation material for use under flashing.
- i. Metal Roof Flashing Kit: Type MR. Includes Butyl tape, flashing screws, speed nuts, corner washers and polyurethane sealant.

**** NOTE TO SPECIFIER ** Select the following dome edge protection band paragraph when roof is fire rated. Delete if not required.**

- j. Dome Edge Protection Band: Type PB, For fire rated roofs. Aluminized steel. Nominal thickness of 0.028 inches (0.7 mm).

**** NOTE TO SPECIFIER ** Select one of the following turret extension paragraphs and delete those not required. If more than one size is required indicate requirements on the Drawings.**

- 3. Roof Flashing Turret Extensions: Provide manufacturer's standard extensions for applications requiring:
 - a. Type T02: Additional lengths of 2 inches (50 mm) extension.
 - b. Type T04: Additional lengths of 4 inches (100 mm) extension.
 - c. Type T012: Additional lengths of 12 inches (300 mm) extension.
 - d. Type T024: Additional lengths of 24 inches (600 mm) extension.
 - e. Type T036: Additional lengths of 36 inches (900 mm) extension.
 - f. Type T048: Additional lengths of 48 inches (1200 mm) extension.
- 4. Dome Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact acrylic; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
- 5. Reflective Extension Tube: Aluminum sheet, thickness 0.015 inch (0.4 mm).
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
 - b. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
 - c. Tube Diameter: Approximately 14 inches (356 mm).
- 6. Reflective 30 degree Adjustable tube: Aluminum sheet, thickness .015 inch (0.4 mm)
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.

**** NOTE TO SPECIFIER ** The following paragraph is optional. Delete if not required.**

- 7. Reflective 90 degree Adjustable tube: Aluminum sheet, thickness .018 inch (0.5 mm)
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
 - b. Extension Tube Angle Adapter: Provide manufacturer's standard adaptors for applications requiring:
 - 1) Type A1 one 0 to 90 degree extension tube angle adapter.

- 2) Type A2 two 0 to 90 degree extension tube angle adapters.
- 8. Ceiling Ring: Injection molded impact resistant acrylic. Nominal thickness is 0.110 inches (2.8 mm).
- 9. Dual Glazed Diffuser Assembly:
 - a. Upper glazing: Acrylic plastic classified as CC2 material. The nominal thickness is 0.040 inches (1.020 mm).

**** NOTE TO SPECIFIER ** Select one of the following lower glazing diffuser lens paragraphs.**

- b. Lower glazing (Optiview Fresnel Lens): Molded polycarbonate plastic classified as CC1 material. The nominal thickness is 0.022 inches (0.61 mm).
- c. Lower glazing (Vusion): Acrylic plastic classified as CC2 material. The nominal thickness is 0.090 inches (2.29 mm).
- d. Diffuser Trim Ring: Injection molded acrylic.

**** NOTE TO SPECIFIER ** Select one of the following diffuser trim ring option paragraphs.**

- 1) White Trim (Optiview Fresnel Lens): Type L1.
- 2) White Trim (Vusion): Type L4.
- 3) Stainless-tone Trim (Optiview Fresnel Lens): Type L5.
- 4) Stainless-tone Trim (Vusion): Type L6.
- 5) Frosted Shade (Optiview Fresnel Lens): Type L7.
- 6) Frosted Shade (Vusion): Type L8.

**** NOTE TO SPECIFIER ** The following paragraph is optional. Delete if not required. If required, select one of the following effect lens and delete those not required. The Effect lens adjusts the light to soften and/or warm the light. ICC approval pending.**

- e. Effect Lens: Acrylic plastic classified as CC2 material. The nominal thickness is 0.090 inches (2.29 mm).
 - 1) Warm Effect Lens: Type WL.
 - 2) Softening Effect Lens: Type SL
 - 3) Warm Softening Effect Lens: Type WSL

**** NOTE TO SPECIFIER ** The following accessories are optional. Select those required and delete those not required.**

- 10. Accessories:
 - a. Lighting Fixture for 290 DS model: Bracket mounted inside system just above diffuser; UL listed.

**** NOTE TO SPECIFIER ** Delete one of the following two paragraphs. Note that lamps are not provided with fixture.**

- 1) Incandescent: Type INC, for two 100 W incandescent lamp, ceramic screw-in lamp holder, medium base, one lamp.
- 2) Fluorescent: Type CFL, dedicated compact fluorescent fixture, for one 26 W, 4-pin lamp.
- 3) Electrical Requirements: 110 V, 15 amp GFCI circuit for damp and wet conditions.

**** NOTE TO SPECIFIER ** Select one of the following two dimmer control paragraphs for use with Solatube Model 290-DS only. Delete if not applicable.**

- b. Local Dimmer Control: Provided with dimmer switch and cable.
 - 1) Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; Maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, 22 gauge cable; providing daylight output between 2 and 100 percent.

- 2) Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: A maximum of 10 units can be connected to one switch.
- 3) Cable: Type CA, Two conductor, 22 gauge, low voltage cable (500 ft.) for multiple unit DC connections.

**** NOTE TO SPECIFIER ** Coordinate Automated Programmable Dimmer Control with lighting control system provided by others. Contact Solatube for additional information on pre-approved lighting control manufacturers.**

Using Solatube pre-approved lighting control manufacturer, the 0-10 V Daylight Dimmer system is capable of supporting the following operating scenarios: program the preset buttons on the lighting control system to signal the 0-10 V Daylight Dimmer to provide a scene-based control and automatically adjust the daylight to desired levels; and program the astronomical clock on the lighting control system to execute time based control commands. Coordinate with Lighting Control System specified in Section 16500.

- c. 0 to 10 V Dimmer Control:
 - 1) Daylight Dimmer: Type DV, provided with 0-10 V Daylight Dimmer with programmable scene-based control. Uses universal input voltages ranging between 90 and 277 V AC at 50 or 60 Hz; maximum current draw of 50 ma per unit.
 - 2) Coordinate with Lighting Equipment and Control System specified in Section 16500.
 - 3) Controller: Requires solid state, low voltage controller capable of 0 to 10 V DC modulating input control of up to 40 daisy chained 0 to 10 V dimmer units. Controller provided as specified in Section 16500.
 - 4) Control Wiring: Requires two conductor, low voltage, 22 gauge cable from lighting controller to 0-10 V dimmer and connecting 0-10 V dimmers. Up to 40 units can be connected to a single lighting controller. Lighting controller should have a minimum capacity of 100 ma.
- d. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required

2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION