



SECTION 08625

TUBULAR DAYLIGHTING DEVICE

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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.
- B. Tubular daylighting device with LED Fixture, consisting of roof dome, reflective tube, integrated Smart LED fixture, daylight sensing controls, and diffuser/fixture assembly; configuration as indicated on the Drawings.
- C. Accessories.

1.2 RELATED SECTIONS

- 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

- A. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.
- C. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.
- D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.
- E. ASTM A792/A 792M – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
- F. 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.
- G. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.
- H. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.
- I. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.
- J. ASTM E 1886 - 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.
- K. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane
- L. 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.
- M. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).
- N. UL 181 - Factory Made Air Ducts and Air Connectors
- O. UL 2108 - Low Voltage Lighting Systems
- P. CSA C22.2 No. 250.0 – Luminaires.
- Q. ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.
- R. Florida Building Code TAS 201 – Impact Test Procedures.

- S. Florida Building Code TAS 202 – Criteria for Testing Impact and Non Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading.
- T. Florida Building Code TAS 203 – Criteria for Testing Products Subject to Cyclic Wind Pressure Loading

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:
 - 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 ICC AC-16 Section A, or Negative Load of 70 psf (3.35 kPa) if tested per ICC AC-16 Section B.
 - b. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting 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 70 psf (3.35 kPa).
 - c. 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. Hurricane Resistance:
 - a. Meets Florida Building Code TAS, 201, TAS, 202 and TAS 203 for Impact and non impact components.
 - b. Meets ASTM E 1886 and ASTM E1996 for missile and cyclic pressure differential testing.
 - 5. 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 ASTM D-1929.
 - c. Smoke Density - Rating no greater than 450 per 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 per ASTM D 635.
 - e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1 per 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. Electrical wiring diagrams for connection of LED fixtures.
- E. Verification Samples: As requested by Architect.
- F. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.
- G. 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 Perimeter and Non-Perimeter Controllability of Systems for use of Daylight Dimmer option with the products specified.
 4. 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 20 years.
- B. LED equipment certified and labeled by UL and CSA labels.

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.
- B. Electrical Parts: Manufacturer's standard warranty for 5 years, unless otherwise indicated.
- C. LED Emitters, Drivers and Controls: Manufacturer's standard warranty for 3 years against failure.

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

2.2 TUBULAR DAYLIGHTING DEVICES WITH INTEGRATED LED FIXTURE AND DAYLIGHT HARVESTING AND OPTIONAL OCCUPANCY CONTROLS

- A. Tubular Daylighting Devices General : Tubular daylighting device with integrated LED fixture including daylight harvesting and available occupancy controls; complying with ICC AC-16.
- B. Solatube Smart LED System: Solatube Model S160 SL.
 - 1. Roof Dome Assembly: 10 inch (250 mm) transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - a. Outer Dome Glazing: Type DU 0.125 inch (3 mm) minimum thickness injection molded acrylic classified as CC1 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.
 - b. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
 - c. Optional Shock Inner Dome Glazing: Type DUI, 0.115 inch (2.9 mm) minimum thickness classified as CC1 material. High impact injection molded acrylic required for high velocity wind zones.
 - 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 or ASTM A792/A 792M, 0.028 inch (0.7 mm) plus or minus .006 inch (.015 mm) thick.
 - b. Base Flat: Flat Type F4, no pitch 4 inches (102 mm) high.
 - c. Base Flat: Flat Type F6, no pitch 6 inches (152 mm) high.
 - d. Base Pitched: Pitched Type FP, 22.5 degrees slope from horizontal, 4 inches (102 mm) high.
 - e. Tile Roof No Pitch: No Pitch Type FT, 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. Flashing Insulator: Type F1. Thermal isolation material for use under flashing.
 - h. Metal Roof Flashing Kit: Type MR. Includes Butyl tape, flashing screws, speed nuts, corner washers and polyurethane sealant.
 - i. Dome Edge Protection Band: Type PB, for fire rated roofs. Aluminized steel. Nominal thickness of 0.028 inches (0.7 mm).
3. Roof Flashing Turret Extensions: Provide manufacturer's standard extensions for applications requiring:
 - a. Type T2: Additional lengths of 2 inches (50 mm) extension.
 - b. Type T4: Additional lengths of 4 inches (100 mm) extension.
 - c. Type T12: Additional lengths of 12 inches (300 mm) extension.
 - d. Type T24: Additional lengths of 24 inches (600 mm) extension.
 - e. Type T36: Additional lengths of 36 inches (900 mm) extension.
 - f. Type T48: Additional lengths of 48 inches (1200 mm) extension.
 4. Tube 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 (250 nm to 2500 nm) less than 80.2 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 10 inches (250 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 (250 nm to 2500 nm) less than 80.2 percent.
 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 (250 nm to 2500 nm) less than 80.2 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. Solatube IC-rated Smart LED Primary Fixture: Type 430P LED Light Fixture, 14 inch diameter (350 mm). UL and CSA Listed.
 - a. Amplifier Housing: Injection molded polycarbonate housing with minimum thickness of 0.078 inches (2 mm), overall outer diameter of 16.33 inches (415 mm) tapering to an outer diameter of 9.84 inches (250 mm) and 8.26 inches (210 mm) tall. Housing includes an integrated ceiling ring with nominal thickness of 0.110 inches (2.8 mm).
 - b. Amplifier: One piece of Spectralight specular, enhanced aluminum consisting of 16 facets with a minimum thickness of 0.015 inches (0.39 mm), mechanically secured to inside of housing.

- c. Amplifier/Heat Sync system maintains LED junction temperature <92 degrees C at Attic Ambient <50 degrees C.
 - d. Daylight Sensor: Factory set photo cell offers continuous LED ON/OFF modulation according to daylight intensity.
 - e. Light Optimizing Lens: Fresnel lens technology redirects both solar and electric light down to diffuser assembly. Minimum 0.031 inches (0.8 mm) thick.
 - f. Light Emitting Diodes (LED): Four 3000K high efficacy emitters at a CRI = 80. Color variation is maintained within 4-step MacAdam Ellipse. LED are bonded to amplifier/heat-sink with thermal transfer adhesive and mechanically secured to amplifier with fasteners concealed under amplifier housing.
 - g. Driver: UL and CSA Listed. Universal input values ranging between 100 and 240V input at 50-60Hz. Rated output power 32 watts. Mounted remote from luminaire and enclosed in junction box assembly.
 - 1) Dedicated cable connects Driver to Primary Smart LED Amplifier Controller through unique 2-pin polarized plug connector.
 - 2) Cable Length 4 feet (1220 mm) from driver to Smart LED primary luminaire.
9. Solatube IC-rated Smart LED Secondary Fixture: Type 430S LED Light Fixture, 14 inch diameter (350 mm). Must be used in conjunction with Type: 430P (Primary unit). UL and CSA Listed.
- a. Amplifier Housing: Injection molded polycarbonate housing with minimum thickness of 0.078 inches (2 mm), overall outer diameter of 16.33 inches (415 mm) tapering to an outer diameter of 9.84 inches (250 mm) and 8.26 inches (210 mm) tall. Housing includes an integrated ceiling mounting ring with nominal thickness of 0.110 inches (2.8 mm).
 - b. Amplifier: One (1) piece of Spectralight Specular enhanced aluminum consisting of sixteen (16) facets with a minimum thickness of 0.015 inches (0.39 mm), mechanically secured to inside of housing.
 - c. Amplifier/Heat Sync system maintains LED junction temperature <92 degrees C at Attic Ambient <50 degrees C.
 - d. Daylight Sensor: Factory set photo cell offers continuous LED ON/OFF modulation according to daylight intensity.
 - e. Light Optimizing Lens: Fresnel lens technology redirects both solar and electric light down to diffuser assembly. Minimum 0.031 inches (0.8 mm) thick.
 - f. Light Emitting Diodes (LED): Four 3000K high efficacy emitters at a CRI = 80. Color variation is maintained within 4-step MacAdam Ellipse. LED are bonded to amplifier/heat-sink with thermal transfer adhesive and mechanically secured to amplifier with fasteners concealed under amplifier housing.
 - g. Dedicated cable connects Secondary Smart LED Unit to Primary Unit through unique 2-Pin polarized plug connector. Cable length 15 feet (4572 mm)
10. Dual Glazed Diffuser Assembly:
- a. Lower glazing with integral injection molded acrylic Dress Ring classified as CC2 material. Nominal thickness is 0.110 inches (2.8 mm):
 - 1) Classic Vusion Diffuser: Molded acrylic plastic classified as CC2 material (nominal thickness 0.090 inches (2.29 mm) with injection molded acrylic Diffuser Trim Ring. Type L4.

- 2) Classic OptiView (Fresnel Lens) Diffuser: Molded polycarbonate plastic classified as CC1 material, nominal thickness 0.022 inches (0.61 mm) with injection molded acrylic Diffuser Trim Ring. Type L1.
 - 3) JustFrost Decorative Fixture: Full-tempered glass lens (nominal thickness is 0.16 inches (4 mm)), and decorative metal fasteners. Type L9.
 - 4) TierDrop Decorative Fixture: Three layers of full-tempered frosted glass lens (nominal thickness is 0.16 inches (4 mm)). Bottom layer is continuous with two stepped full-tempered glass rings on top and decorative metal fasteners. Type L10.
 - 5) OptiView Decorative Fixture: Molded polycarbonate plastic Fresnel Lens classified as CC1 material (nominal thickness is 0.022 inches (0.61 mm)) with full-tempered frosted glass bezel (nominal thickness is 0.16 inches (4 mm)), and decorative metal fasteners. Type L11.
 - 6) VividShade Decorative Fixture: Full-tempered frosted glass lens (nominal thickness is 0.16 inches (4 mm)), integral flame retardant linen shade with translucent frosted PVC inner liner, nominal thickness 0.16 inches (0.4mm); decorative zinc plated steel (concealed) and stainless steel (exposed) fasteners. Type L12.
- b. Lower glazing with integral 2-piece aluminum/zinc alloy coated steel Fixture Mounting Ring, 23 gauge; nominal thickness 0.031 inches (0.787 mm):
 - 1) AuroraGlo Decorative Fixture: Glass Bowl acid etched lens, with two-tone black/bronze painted decorative metal trim ring. Low profile. Type L16.
 - 2) AuroraGlo Decorative Fixture: Glass Bowl acid etched lens, with white painted decorative metal trim ring. Low profile. Type L15.
 - 3) QuadraFrost Decorative Fixture: Hand-fabricated Metal Housing with integral full-tempered frosted glass lens inserts (nominal thickness is 0.16 inches (4 mm) each). Type L14.
 - c. Upper glazing: PET GAG plastic with EPDM low density sponge seal to minimize condensation and bug, dirt, and air infiltration per ASTM E 283. The nominal thickness is 0.039 inches (0.99 mm).
 - 1) Natural Effect Lens: Type LN.
 - 2) Softening Effect Lens: Type LS.
11. Accessories:
 - a. Occupancy Sensor: Rated for 5 volts. Current Consumption 170 μ A, Service Temperature minus 4 degrees F to 140 degrees F (minus 20 degrees C to 60 degrees C), detection range: 16.4 feet (5000 mm), included viewing angle 82 degrees to 92 degrees, temperature difference between target and surroundings should be >7.2 degrees F (4 degrees C). Type:OC.
 - b. Local Dimmer Control utilizing a butterfly baffle design of Spectralight Infinity reflective material to minimize shadowing when in use. 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.
- c. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required,
- 1) Electrical Requirements: 115 V; install fan on same switch as internal light fixture.
 - 2) Electrical Requirements: 115 V; wall switch.

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.
- C. Coordinate requirements for power supply, conduit and wiring.

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.
- C. Inspect installation to verify secure and proper mounting. Test each fixture to verify operation, control functions, and performance. Correct deficiencies.

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