SECTION 08625

TUBULAR DAYLIGHTING DEVICE

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tubular daylighting device.

B. 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 07500 – Membrane Roofing: Flashing of skylight base.

D. Section 07510 - Built-Up Bituminous Roofing: Flashing of skylight base.

E. Section 07530 - Electrometric Membrane Roofing: Flashing of skylight base.

F. Section 07550 - Modified Bituminous Membrane Roofing: Flashing of skylight base.

G. Section 07600 – Flashing and Sheet Metal: Metal curb flashings.

H. Section 08620 - Unit Skylights: Skylights without reflective tube.

I. Section 08630 - Metal Framed Skylights.

J. Section 13800 – Building Automation Controller.

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 A 792/A 792M – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process

F. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.

G. 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.

H. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.

I. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.

J. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.

K. 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.

L. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane

M. 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.

N. ASTM D 1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).

O. ASTM D 2843 – Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.

P. ASTM F 1642-12 – Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading

Q. AAMA/WDMA/CSA 101/I.S.2/A440 - Standard/Specification for Windows, Doors, and Unit Skylights; 2011

R. UL 2108 - Low Voltage Lighting Systems

S. GSA-TS01-2003: Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings

T. Unified Facilities Criteria (UFC) 4-010-01, Change October 2013, DoD Minimum Antiterrorism Standards for Buildings

U. CSA C22.2 No. 250.0 – Luminaires.

V. ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

W. Florida Building Code TAS 201 – Impact Test Procedures.

X. Florida Building Code TAS 202 – Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading.

Y. Florida Building Code TAS 203 – Criteria for Testing Products Subject to Cyclic Wind Pressure Loading

Z. IBC Section 1710 - Load Test Procedure for Wind Load Testing on Rooftop Daylight Collecting System - Structural Performance Testing - Devised by ATI PE); 2012

AA. IBC Section 2606.7.2 – Installation – Diffuser Fall Out Test (Devised by PE); 2012

BB. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014

CC. OSHA 29 CFR - 1910.23 (e)(8) (Guarding Requirements for Skylights); 1926 Subpart M (Fall Protection); 1926.501(b)(4)(i); 1926.501(i)(2); 1926.501(b)(4)(ii)

DD. California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1)

1.4 PERFORMANCE REQUIREMENTS

A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:
   1. Air Infiltration Test:
      a. Single and Dual Glazed Dome (M74 DS Type DP & DPP): Passes Air infiltration; maximum of 0.05 cfm/ft^2 (0.3 L/s/m^2) when tested according to AAMA/WDMA/CSA 101/I.S.2/A440-11, ICC-ES AC-16, and ASTM E 283.
      b. Single and Dual Glazed Dome (M74 DS Type DP & DPP): meets or exceeds the air leakage performance levels with a maximum 0.4 cfm/ft^2 when tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 and ASTM E 283.
      c. Air exfiltration will not exceed 0.4 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:
      a. Single and Dual Glazed Dome (M74 DS Type DP & DPP): Passes water resistance; no uncontrolled water leakage with a pressure differential of 12.11 psf (580 Pa) or 15 percent of design pressure and a water spray rate of 5 gallons/hour/sf for 24 minutes when tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-11, ICC-ES AC-16, ASTM E 547, ASTM E 331, and TAS 202.
      b. Single and Dual Glazed Dome (Type DP & DPP): Design Pressure ±80.20 psf (±3.84 kPa).
         1) Passes uniform load test: 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 240.6 psf (11.52 kPa) or Negative Load of 160 psf (7.66 kPa) when tested

according to AAMA/WDMA/CSA 101/I.S.2/A440-11, ICC-ES AC-16, and ASTM E 330

3. Hurricane Resistance:
    a. Large Missile Impact test:
        1) Single Glazed Dome (Type DP) Passes:
            (a) A minimum of missile level D for Wind Zone 4. No signs of penetration, rupture, or opening when tested in accordance with ASTM E 1886 and ASTM E 1996.
            (b) No signs of penetration, rupture, or opening when tested in accordance with TAS 201
        2) Dual Glazed Dome (Type DPP) Passes:
            (a) No signs of penetration, rupture, or opening when tested in accordance with TAS 201
    b. Uniform Static Air Pressure Test: Passes Design pressure rating a minimum of plus or minus 80.2 psf (3.84 kPa) when tested in accordance with ASTM E 1886, ASTM E 1996, and TAS 202
    c. Air Infiltration Test:
        1) Single Glazed Dome (Type DP) Passes:
            (a) Air Infiltration a maximum 0.05 cfm/ft^2 at 1.57 psf (25 mph) test pressure when tested in accordance to TAS 202
            (b) Air Infiltration a maximum 0.05 cfm/ft^2 at 6.24 psf (50 mph) test pressure when tested in accordance to TAS 202
        2) Dual Glazed Dome (Type DPP) Passes:
            (a) Air Infiltration a maximum 0.04 cfm/ft^2 at 1.57 psf (25 mph) test pressure when tested in accordance to TAS 202
            (b) Air Infiltration, a maximum 0.05 cfm/ft^2 at 6.24 psf (50 mph) test pressure when tested in accordance to TAS 202.
    d. Water Penetration Test:
        1) Single Glazed Dome (Type DP) Passes: No sign of water penetration at 12.11 psf (0.580 kPa) or 15 percent of Design Load when tested in accordance with TAS 202.
        2) Dual Glazed Dome (Type DPP) Passes: No sign of water penetration at 12.11 psf (0.580 kPa) or 15 percent of Design Load when tested in accordance with TAS 202.
    e. Cyclic Wind Pressure Loading:
        1) Single Glazed Dome (Type DP): Passes. No signs of failure during the cyclic load test when tested in accordance with ASTM E 1886, ASTM E 1996, and TAS 203.
        2) Dual Glazed Dome (Type DPP): Passes. No signs of failure during the cyclic load test when tested in accordance with ASTM E 1886, ASTM E 1996, and TAS 203.
4. Wind Load Test:
    a. Daylight Collector System (Type C): Passes: No sign of failure or destruction when a maximum 2.5 times design load is applied laterally to the exposed cylindrical section when tested in accordance with 2012 IBC Section 17103 and 2010 Florida Building Code Section 1715.3 - Load Test Procedure for Wind Load Testing on Rooftop Daylight Collecting System - Structural Performance Testing - Devised by Architectural Testing Inc. PE); 2012.
    b. Design Load: 69.7 psf.
    c. Force Coefficients of Chimneys, Tanks, Rooftop Equipment, & Similar Structures according to ASCE/SEI 7-10 Figure 29.5-1
        1) Cross-section: Round

2) Type of surface: Moderately smooth
3) Ratio (h/D): 1.4
4) Force coefficient: 0.6

5. Fire Testing:
   a. Fire Rated Roof Assemblies:
      1) Roof Assemblies: When used with the Dome Edge Protection Band and mounted on curbs 4 inches high or greater, all domes shall meet the prescriptive fire rating requirements for Class A, B, and C roof assemblies as described in the 2012 International Building Code.
6. Self-Ignition Temperature Testing:
   a. Outer Dome Glazing (Type DP & DPP): Self-Ignition Temperature greater than 650 degrees F when tested in accordance with ASTM D 1929.
   b. Inner Dome Glazing (Type DPP): Self-Ignition Temperature greater than 650 degrees F when tested in accordance with ASTM D 1929.
   c. Cylinder Collector (Type C): Self-Ignition Temperature greater than 650 degrees F when tested in accordance with ASTM D 1929.
   d. Diffuser (Type – All M74 DS): Self-Ignition Temperature greater than 650 degrees F when tested in accordance with ASTM D 1929.
7. Smoke Density Rating:
   a. Outer Dome Glazing (Type DP & DPP):
      1) Smoke Density Rating no greater than 450 per ASTM Standard E 84.
      2) Smoke Density Rating no greater than 75 per ASTM Standard D 2843
   b. Inner Dome Glazing (Type DPP): Smoke Density Rating no greater than 75 per ASTM Standard D 2843
   c. Cylinder Collector (Type C):
      1) Smoke Density Rating no greater than 450 per ASTM Standard E 84
      2) Smoke Density Rating no greater than 75 per ASTM Standard D 2843
   d. Light Transmitting Diffuser (Type – All M74 DS): Smoke Density Rating no greater than 75 per ASTM Standard D 2843
8. Rate of Burn and/or Extent of Burn:
   a. Outer Dome Glazing (Type DP & DPP): Minimum CC-1 Classification less than 1 inch (25 mm) extent of burn per ASTM D 635
   b. Inner Dome Glazing (Type DPP): Minimum CC-2 Classification less than 2.5 inches/min (62 mm/min) rate of burn per ASTM D 635.
   c. Cylinder Collector (Type C): S Minimum CC-1 Classification less than 1 inch (25 mm) extent of burn per ASTM D 635
      1) Raybender Daylight Lens (Type C): Minimum CC-2 Classification less than 2.5 inches/min (62 mm/min) rate of burn per ASTM D 635.
   d. Diffuser (Type – All M74 DS): Minimum CC-2 Classification less than 2.5 inches/min (62 mm/min) rate of burn per ASTM D 635.
9. Interior Finish Classification (IBC Section 803):
   a. Outer Dome Glazing (Type DP & DPP): Class B per ASTM E 84
   b. Cylinder Collector (Type C): Class B per ASTM E 84
   c. Diffuser (Type – All M74 DS): Comply with IBC Section 2606.7.2 (Diffuser Fall Out Test).
10. Fall Protection Performance

a. Passes fall protection test: (M74 DS – All Types) No penetration of dome or curb cap shall occur when subject to 700 Lb (318.2 Kg)/60 second static load test and 700 Lb (318.2 Kg)/2-foot (610 mm) impact drop test when tested in accordance with OSHA 29 CFR 1926 Subpart M (Fall Protection) 1926.501(b)(4)(i); 1926.501(i)(2); and 1926.501(b)(4)(ii).
b. Passes fall protection test: California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1)
c. Static test performed to demonstrate that a M74 DS tubular daylight device system, installed according to the manufacturer's instructions and in new or undamaged condition can support a 350-Lb (159 Kg) weight at any one time based on 1926.502(i)(2).
d. Impact test was performed to demonstrate the adequacy of the 700 Lb (318.2 Kg) static test results

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. 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

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 ICC AC-16.

B. SkyVault Series: Solatube Model M74 DS - O Open Ceiling, 28.5 inch (724 mm) Daylighting System:
   1. Daylight Collector (Type C) with key components consisting of:
      a. Collector Dome: Polycarbonate 0.118 inch (3 mm) minimum thickness classified as CC1 material; UV inhibiting; (100 percent UVC, 100 percent UVB and 98.8 percent of the range of UVA transmission). Dimensions: 31.5 inches (800 mm) diameter by 6 inches (152 mm) high.
      b. Collector Cylinder: Polycarbonate 0.093 inch (2.4 mm) minimum thickness, classified as CC1 material; UV inhibiting, blocks all radiation <380nm: 100 percent UVC, 100 percent UVB and 76 percent of the range of UVA transmission). Dimensions: Dimensions 35.88 inches (911 mm) high by 51.5 inches (1308 mm) arc length.
      c. Collector Cylinder Back Panel: Support for collector assembly. Fabricated of corrosion resistant zincalum steel sheet CS-B AZ50, conforming to ASTM A792/A 792M, with a thickness of 0.0276 inch (0.7 mm). Dimensions: 36 inches (914 mm) high by 48 inches (1219 mm) arc length.
      d. Collector Cylinder LightTracker Reflector: Daylight reflector. Aluminum sheet, thickness 0.018 inch (0.5 mm). Interior Finish: Spectralight

Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields specular reflectance greater than 99 percent for the Visible Light spectrum (400 nm to 760 nm) and less than 20% reflectance for Infrared (IR) wavelengths longer than 980nm, resulting in a spectrally-selective Total Solar Spectrum (400 nm to 2500 nm) less than 80.2 percent. 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. Dimensions: 36 inches (914 mm) high by 48 inches (1219 mm) arc length.

e. Micro-replicated Raybender HD Fresnel Lens: Daylight collecting lens. Impact resistant acrylic, 0.020 inch (0.51 mm) thick film with linear prism lens structure, classified as CC2 material. Dimension: 16 inch (406 mm) high by 51.75 inch (1314 mm) arc length.

f. Cylinder Collector Stanchion: “U” shaped support connecting the dome ring to the base cone assembly; (2) each. Fabricated of corrosion resistant galvanized steel sheet (G90), conforming to ASTM A 653/A 653M, with a thickness of 0.052 inch (1.3 mm). Dimensions: 36 inches (914) high by 0.50 inches (12.7 mm) wide by 0.375 inches (9.5 mm) deep.

g. Base Cone Assembly: Conical shaped support connecting the daylight collection system to the curb-cap of associated TDD unit. Fabricated of corrosion resistant stainless steel (302/304), conforming to ASTM A 463/A 463M, with a thickness of 0.034 inch (0.86 mm). Dimensions: 35.9 inches (912 mm) major diameter by 30.385 inches (772 mm) minor diameter by 2.28 inches (58 mm) high.

h. Upper seal (M74 DS Type C): Outer Dome, Cylinder Dome, and Back Panel interface. Adhesive backed PU foam “D” profile with water resistant polymeric skin. Dimension: 0.375 inch (9.5 mm) wide by 0.25 inch (6.35 mm) high.

i. Lower seal (M74 DS Type C): Outer Dome and Support Cone interface. Adhesive backed 45-degree angle pile weather-strip. Dimension: 0.670 inch (17 mm) high by 0.27 inch (6.85mm) wide.

2. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.

   a. Fasteners: Non-corrosive metal fasteners including: non-magnetic stainless steel, zinc plated steel, aluminum, or injection molded nylon.

   a. Outer Dome Glazing: Type DP, 0.118 inch (3 mm) minimum thickness, vacuum formed polycarbonate classified as CC1 material; UV inhibiting (100 percent UVC, 100 percent UVB and 98.8 percent of the range of UVA transmission).

      1) Outer Dome Seals: Adhesive Back Closed Cell Foam Seal 0.25 inch (6.3 mm) tall by 0.75 inch (19 mm) wide.

   b. Dual Dome Glazing:

      1) Outer Dome Glazing: Type DP, 0.118 inch (3 mm) minimum thickness, vacuum formed polycarbonate classified as CC1 material; UV inhibiting; (100 percent UVC, 100 percent UVB and 98.8 percent of the range of UVA transmission).

      2) Inner Dome Glazing: Type DPP, 0.040 inch (1 mm) minimum thickness, copolyester (PETG) polyethylene terephthalate with glycol classified as CC2 material.

      3) Seals:

(a) Inner Dome Seal: Adhesive back closed cell foam seal 0.125 inch (3.2 mm) or 0.188 inch (4.8 mm) tall by 0.375 inch (9.5 mm) wide.
(b) Dome Assembly Seal: Adhesive backed pile weather-strip, 0.350 inch (8.9 mm) tall by 0.187 inch (4.8 mm) wide.

3. Security Guard: Type SG, welded powder coated steel or stainless steel rods 1/8-inch diameter mounted with an 8-inch maximum cross section. Assembly fastened with 1/8-inch diameter blind rivets in 6 locations to Curb-Cap assembly.
4. Curb Cap Flashing Base: One piece, seamless, leak-proof flashing and base support for dome and top of tube and cap flashing. Fabricated of galvanized steel, conforming to ASTM A653/A653M or ASTM A463/A463M or ASTM A792/A792M, with a thickness of 0.0276 inch (0.7 mm) plus or minus .004 inch (.01 mm).
   a. Base Style: Type FC, Curb-cap, with inside dimensions of 35.5 inches by 35.5 inches (905 mm by 905 mm) to cover curb specified in Section 07600.
   b. Insulation: Nominal 1-inch thick thermal isolation pad to reduce thermal conduction between curb-cap and tubing and thermal convection between room air and curb-cap. Rated R-6 ($^{O}Fxft^{2}xhr/Btu$) Insulation is Polyisocyanurate foam utilizing CFC, HCFC, & HFC free blowing agent. Type-1 Class-1 per ASTM C 1289; Passes UL 1715 (15-minute thermal barrier per IBC 2603.4); Attic ventilation may be required per IBC 1203.2.
   c. Curb Seal: Includes a double bead of adhesive backed closed cell foam seal 0.188 inch (4.8mm) tall by 0.375 inch (9.5mm) wide to reduce air infiltration.
5. Dome Edge Protection Band: For Classified Roof Assemblies. For approved assemblies, curb height (by others or built on site) must be more than 8 inches (203 mm). Galvanized steel. Nominal thickness of 0.039 inch (1 mm).
6. Tube Collar: Attached to top of curb-cap section; 0.018 inch (0.45 mm) nominal thickness aluminum conforming to ASTM B 209.
   a. Interior Finish: Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields specular reflectance greater than 99 percent for the Visible Light spectrum (400 nm to 760 nm) and less than 20% reflectance for Infrared (IR) wavelengths longer than 980nm, resulting in a spectrally-selective Total Solar Spectrum (400 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.
7. Reflective Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm) conforming to ASTM B 209 with Tab-Lock tube joint structural connection system.
   a. Extension Tube:
      1) Reflective extension tube, Type E1, 24 inches (610 mm)
      2) Reflective extension tube, Type EL, 48 inches (1220 mm) long.
      3) Belt Alignment Tab aligns Tube Belt on to tube in the correct location.
      4) Interior Finish: Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical

surface yields specular reflectance greater than 99 percent for the Visible Light spectrum (400 nm to 760 nm) and less than 20% reflectance for Infrared (IR) wavelengths longer than 980nm, resulting in a spectrally-selective Total Solar Spectrum (400 nm to 2500 nm) less than 80.2 percent.

5) 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.

b. Tab-Lock

1) Tab-Lock captures adjoining tube or tube connector using periodic opposing hooks integrated in the tube perimeter with mating retention detents.

2) Hook system allows ease of tube engagement or disengagement for single operator from man-lift or rooftop.

3) System intertwines the ends of the adjoining tubes and tube connectors between each Tab-Lock station.

4) Intertwining function accepts tubes and connectors of common diameters which reduces light loss up to 2 percent per tube joint relative to tubes with 0.3 inch (7.6 mm) diameter difference.

c. Tube Belt:

1) Sheet-metal belt 2 inch (50.8 mm) wide by 28.5 inch (724 mm) nominal diameter by 0.022 inch (0.5 mm) thick CS-B AZ-50 ASTM A 792 with 0.10 inch (2.5mm) diameter stainless steel type 302 ASTM A 313 torsion spring actuated toggle clamp.

2) Retains Tab-Lock tube joint structural connection system; stiffens linear tube assembly; and prevents tube rotation or disengagement under normal use.

3) Includes locking tab to prevent unintentional Tube Belt Latch opening due to handling, service, vibration, or normal operation or use.

8. Diffuser Assemblies for Tubes Not Penetrating Ceilings (Open Ceiling): Solatube Model M74 DS-O. 28.5 inch (724 mm) diameter diffuser attached directly to bottom of tube (Type: B).

a. Diffuser Collar: Attached to diffuser lens; 0.018 inch (0.45 mm) nominal thickness aluminum.

1) Interior Finish: Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields specular reflectance greater than 99 percent for the Visible Light spectrum (400 nm to 760 nm) and less than 20% reflectance for Infrared (IR) wavelengths longer than 980nm, resulting in a spectrally-selective Total Solar Spectrum (400 nm to 2500 nm) less than 80.2 percent.

2) 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.

b. Lens: Type L2, Prismatic lens designed to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.100 inch (2.5 mm) thick. Classified as CC2.

c. Diffuser Seal: “L” shaped EPDM closed cell foam, 0.86 in (21.8 mm) wide by 1.37 in (34.8mm) tall by 0.16 in (4.1 mm) thick to minimize condensation and bug, dirt and air infiltration per ASTM E 283.

9. Optional Amplifier (Type: A): 36 inch (914 mm) diameter amplifier diffuser attached directly to bottom of tube.

a. Amplifier: Type A, Conical shaped assembly 23.7 inches (602 mm) tall, 28.5 inches (724 mm) upper diameter, and 36 inches (914 mm) lower diameter.
    1) Amplifier collimates incident light. Light reflects off 2 successively angled facets designed to mix the light to reduce glare and to correct the incident angle by 15 degrees and 25 degrees successively thereby improving the transmission efficiency through the diffuser lens by reducing retro-reflection due to first surface refraction and concentrating the distribution of light by reducing the cone of illumination relative to the incident angle correction.
    2) Assembly comprised of 3 multifaceted segments to be joined together with 15 - 0.125 Inch (3 mm) rivets.
    3) Tube Connect Slots at upper perimeter receive 6 Tab-Lock Hook features from adjoining tube for mechanical tube engagement.
    4) Interior Finish: Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields specular reflectance greater than 99 percent for the Visible Light spectrum (400 nm to 760 nm) and less than 20% reflectance for Infrared (IR) wavelengths longer than 980nm, resulting in a spectrally-selective Total Solar Spectrum (400 nm to 2500 nm) less than 80.2 percent.
    5) 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.
b. Lens: Type L2, Prismatic lens designed to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.100 inch (2.5 mm) thick. Classified as CC2.
c. Amplifier Diffuser Collar: Attached to diffuser lens; 0.018 inch (0.45 mm) nominal thickness aluminum.
    1) Interior Finish: Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields specular reflectance greater than 99 percent for the Visible Light spectrum (400 nm to 760 nm) and less than 20% reflectance for Infrared (IR) wavelengths longer than 980nm, resulting in a spectrally-selective Total Solar Spectrum (400 nm to 2500 nm) less than 80.2 percent.
    2) 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.
d. Amplifier Diffuser Belt:
    1) Sheet-metal belt 2 inch (50.8 mm) wide by 36 inch (914mm) nominal diameter by 0.022 inch (0.5 mm) thick CS-B AZ-50 ASTM A792 with 0.10 inch (2.5 mm) diameter stainless steel Type 302 ASTM A 313 torsion spring actuated toggle clamp.
    2) Retains Tab-Lock tube joint structural connection system; stiffens linear tube assembly; and prevents tube rotation or disengagement under normal use.
    3) Includes locking tab to prevent unintentional Latch opening due to handling, service, vibration, or normal operation or use.

e. Diffuser Seal: “L” shaped EPDM closed cell foam, 0.86 inch (21.8 mm) wide by 1.37 inch (34.8mm) tall by 0.16 inch (4.1 mm) thick to minimize condensation and bug, dirt and air infiltration per ASTM E 283.

10. 0 to 10 V Dimmer Control: Low Voltage Daylight Dimmer, Type D1, is an Electro-mechanically actuated daylight valve; 0-10 V Control, Class-2, UL Listed. Low voltage Daylight Dimmer provides for programmable (0 to 10VDC) scene-based dimming control for daylight output between 0.5 and 100 percent, auxiliary 12VDC dimming control for daylight output between 0.5 and 100 percent, or auxiliary ON/OFF control. Input voltage: 24VAC at 50 or 60 Hz. Daylight Dimmer assembly integrated with a 12-inch Upper and a 12-inch Lower Transition Tube made of Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance to form a nominal 24.9 inch (633mm) tube assembly with integrated Tab-Lock connections.
    1) Programmable (0 to 10VDC) Control: requires lighting controller or building automation controller capable of producing a signal between 0 and +10 VDC (Min 50mA) to incrementally modulate up to 48 daisy chained Daylight Dimmers (Current Sinking or Current Sourcing) between fully closed at 0 to 1 volts to fully open at 9 to 10 volts.
       Note: Coordinate with Lighting Controller specified in Section 16500 or Building Automation Controller specified in Section 13800.
        (a) 0 to 10 VDC control requires CL-2 (Min), 18 AWG, stranded copper, two conductor, twisted cable from lighting controller to first dimmer and interconnecting between subsequent dimmers.
    2) Auxiliary 12VDC Dimming Control: requires 12VDC Dimming Switch (Current Sourcing; 12VDC power supply not required).
        (a) 12VDC dimming control requires CL-2 (Min), 22 AWG, stranded, three conductor, twisted cable from switch to first dimmer and CL-2 (Min), 18 AWG, stranded copper, two conductor, twisted cable; interconnecting subsequent dimmers.
    3) Auxiliary ON/OFF Control: requires commercial or residential single pole electric light switch.
        (a) ON/OFF control requires CL-2 (Min), 22 AWG, stranded, three conductor, twisted cable from switch to first dimmer and CL-2 (Min), 18 AWG, stranded copper, two conductor, twisted cable; interconnecting subsequent dimmers.
    4) Control Cable: Aggregate Length not to exceed 2,110 feet (643 m). Voltage drop not to exceed (0.5 VDC) between first unit output and last unit input. The control wires are polarity and input/output sensitive, accuracy is important in wiring.
    5) Power Cable: requires CL-2 (Min), 16 AWG, stranded, three conductor, cable from transformer to first 0-10 V dimmer and interconnecting between subsequent 0-10 V dimmers.
    6) Power can be transformed from line voltage through use of a UL Listed Class-2, 24VAC Transformer, with a maximum recommended cable length (spacing) not to exceed 40 feet (12,192 mm) between units and aggregate power cable length of 450 feet (137.2m). Maximum number of Daylight Dimmer Units per transformer is as follows.

(a) Solatube M74DS Units: A maximum of 2 Daylight Dimmers can be connected to each 20VA Class-2 Transformer (Type TR20); and a maximum of 8 Daylight Dimmers can be connected to each 96VA Class-2 Transformer (Type TR96).

7) Low Voltage Daylight Dimmer, Type D1, primary circuit current draw when powered by a 24VAC transformer at 120VAC:

(a) Primary Circuit (120VAC) Current Draw for each Solatube model M74DS Low Voltage Daylight Dimmer: Static Closed position current draw of 21mA; Static Open position current draw of 27mA; Maximum Operating current draw of 71mA.

NOTE: Lighting controller, auxiliary switch(s), and cable provided by others; optional 20VA remote transformer, Type TR20, and optional 96VA remote transformer, Type TR96, are available from Solatube International, Incorporated.

11. Options/Accessories

a. Thermal Insulation Panel with Integral 24 inches (610 mm) Extension Tube: Type TIP, high-performance dual-glazed, thermally-broken tube insulation system consisting of two acrylic panels, spaced 1.0 inch (25.4 mm) apart, classified CC2 Class C material, 0.110 inch (2.8 mm) thick, housed in a polyethylene terephthalate glycol-modified (PETG) or acrylonitrile butadiene styrene (ABS) band classified as CC2 material 0.060 inch (1.5 mm) thick by 1.75 inch (44.5 mm) high with Spectralight Infinity high reflectance specular finish interior surface, and assembled with stainless steel disk spacers 0.0197 inch (0.5 mm) thick and aluminum rivets 0.13 inch (3.2 mm) fastened periodically around the perimeter. Dual-glazed Panel assembly integrated with a 12-inch Upper and a 12-inch Lower Transition Tube made of Spectralight Infinity with Cool Tube Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance to form a nominal 24.9 inch (633mm) tube assembly with integrated Tab-Lock connections.

b. Optional Low-voltage Transformer: Solatube Remote Transformer, Type TR20, is a 20VA, 24VAC, 50/60HZ, UL Listed, UL Category XOKV7, CE Marked, Class-2 Transformer with cover plate mounting system configured for easy field assembly onto standard 4.06 inch by 4.06 inch (103 mm by 103 mm) square junction box: Inherently Limited, Primary: 120VAC, 208VAC, 240VAC, and 277VAC.

c. Optional Low-voltage Transformer: Solatube Remote Transformer, Type TR96, is a 96VA, 24VAC, 50/60HZ, UL Listed, UL Category XOKV7, CE Marked, Class-2 Transformer with cover plate mounting system configured for easy field assembly onto standard 4.06-in x 4.06-in (103mm x 103mm) square junction box: Inherently Limited, Primary: 120VAC, 240VAC, 277VAC and 480VAC.

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