



## **VELUX® SUN TUNNEL™ Residential Skylights – Guide Specification**

**VELUX Residential SUN TUNNEL** skylights provide a low cost method of transferring daylight through sloped roofing applications to interior spaces that benefit from daylight to reduce energy loads and enhance the visual quality of residential spaces. VELUX SUN TUNNEL skylights add value and increase the quality of life while maintaining privacy. The round highly reflective SUN TUNNEL light shaft requires no structural framing and can be assembled within minutes.

SUN TUNNEL skylights are frequently a crucial element in energy saving daylighting strategies for LEED-certified or other green building projects.

VELUX SUN TUNNEL skylights are available in standard kits that are ideal for most applications. A complementary set of accessories are available to ensure these standard kits can be configured to meet project needs.

VELUX test facilities ensure that new products comply with regulations and market demands for technical performance. VELUX testing ensures that our products are able to withstand the most difficult climatic conditions to which VELUX products are typically exposed to in the markets where they are sold. Our test procedures include load capacity, air and water tightness in a test chamber and a weather simulator, mechanical tests, impact test results, durability tests, U-factor and solar heat gain tests, burn brand resistance and visual inspection of the surface quality.

Contact **VELUX America LLC**, Greenwood, SC 29648; [www.VELUXusa.com](http://www.VELUXusa.com); (800) 888-3589

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SECTION 08 62 70 – TUBULAR UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Tubular unit skylight residential daylighting systems.

1.2 REFERENCE STANDARDS

Specifier: If retaining optional "References" article, edit to include standards cited in edited Section.

- A. General: Applicable edition of references cited in this Section is current edition published on date of issue of Project specifications, unless otherwise required by building code in force.
- B. American Architectural Manufacturers Association/Window & Door Manufacturers Association/Canadian Standards Association: [www.aamanet.org](http://www.aamanet.org), [www.wdma.com](http://www.wdma.com), [www.csagroup.org/us/en/services](http://www.csagroup.org/us/en/services):
  - 1. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/ Specification for Windows, Doors, and Skylights (NAFS)
  - 2. CSA A440S1-09 – Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440
  - 3. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems
  - 4. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
- C. ASTM International: [www.astm.org](http://www.astm.org):
  - 1. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - 2. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 3. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-supporting plastics in a Horizontal Position
  - 4. ASTM D 2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics
  - 5. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free
  - 6. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
  - 7. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings
  - 8. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  - 9. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
  - 10. ASTM E 408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
  - 11. ASTM E 1651 - Standard Test Method for Total Luminous Reflectance Factor by Use of 30/t Integrating-Sphere Geometry
  - 12. 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

- 13. ASTM E 1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
  - D. Code of Federal Regulations:
    - 1. 29 CFR 1910.23 (e) (8) - Occupational Safety and Health Standards for Walking-Working Surfaces to Guard Floor and Wall Openings and Holes
  - E. Illuminating Engineering Society of North America (IESNA): [www.ies.org](http://www.ies.org):
    - 1. IESNA – The Lighting Handbook
  - F. National Fenestration Rating Council: [www.nfrccommunity.org](http://www.nfrccommunity.org):
    - 1. NFRC 100 - Procedure for Determining Fenestration Product U-factors
    - 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence
  - G. National Fire Protection Association: [www.nfpa.org](http://www.nfpa.org):
    - 1. NFPA 70 - National Electrical Code
  - H. The Coatings Society (SSPC): [www.sspc.org](http://www.sspc.org):
    - 1. SSPC-SP 12/NACE NO. 5 - Surface Preparation And Cleaning Of Metal
- 1.3 COORDINATION

Specifier: Retain option in paragraph below that corresponds to the type of curb used on Project.

- A. Coordinate dimensions, locations, and details of skylight roof openings [specified in Section 061000 "Rough Carpentry"] [specified in Section 077200 "Roof Accessories"] with selected tubular unit skylight flashings. Verify requirements for roofing system terminations.
  - B. Coordinate tubular unit skylight interior termination locations with structural layout, ceiling layouts, and other ceiling-mounted items.
- 1.4 PREINSTALLATION MEETINGS
- A. Preinstallation Conference: Conduct conference at Project site prior to delivery of tubular unit skylight and installation of roof deck.
- 1.5 ACTION SUBMITTALS
- A. Product Data: For tubular unit skylights. Include standard construction details, product performance characteristics, and material descriptions, dimensions of individual components and profiles, and finishes.
    - 1. Include test reports of qualified independent testing agency or third party certificates verifying compliance with performance requirements.

Specifier: Retain "LEED Submittals" Paragraph when required for Project; this Paragraph stipulates documentation required from Contractor to support cited construction-phase credits.

Specifier: Review design-phase credits available related to tubular unit skylights, including contribution to IEQ Cr 6.1 Controllability of Systems, IEQ Cr 8.1. Daylighting, EA Cr 1 Energy Optimization, and ID Cr 1 Innovation in Design credits. Consult VELUX representative for detailed support data.

B. LEED Submittals:

1. Credit MR 4 Recycled Content: Documentation indicating the following:
  - a. Percentages by weight of post-consumer and pre-consumer recycled content.
  - b. Total weight of products provided.
  - c. Include statement indicating costs for each product having recycled content.

C. Shop Drawings: For tubular unit skylight work. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.

1. Lighting photometric study indicating compliance with performance requirements in accordance with IESNA. Include layout, spacing criteria and foot-candle report.

Specifier: Retain "Wiring Diagrams" Subparagraph if skylight dimmers are required for Project.

2. Wiring Diagrams: For power and control wiring for dimmers.

1.6 INFORMATIONAL SUBMITTALS

Specifier: Retain paragraphs below when Project requirements include compliance with Federal Buy American provisions or Florida approval. VELUX SUN TUNNEL complies with requirement.

- A. Buy American Act Certification: Submit documentation certifying that products comply with provisions of the Buy American Act 41 U.S.C 10a – 10d.
- B. Florida Product Approval Listing Number: Indicating that products comply with requirements of Florida Building Code. [www.floridabuilding.org/pr/pr\\_app\\_srch.aspx](http://www.floridabuilding.org/pr/pr_app_srch.aspx)
- C. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data.

1.8 QUALITY ASSURANCE

Specifier: VELUX America, Inc. has been producing skylights in the US for over 30 years and in Europe for an additional 30 years prior to that. VELUX has a reputation among architects and contractors as the most reliably performing skylight in the world.

- A. Manufacturer Qualifications: A qualified manufacturer listed in this Section with minimum 30 years' experience in the US manufacturing similar products in successful use on similar projects and able to provide tubular unit skylights meeting requirements.

Specifier: Retain "Approval of Manufacturers and Comparable Products" Subparagraph if Owner will consider product substitutions.

1. Approval of Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
  - a. Completed and signed Substitution Request form.
  - b. Product data, including photometric data and independent test data indicating compliance with requirements.
  - c. Sample product warranty.

#### 1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of tubular unit skylights that fail in materials or workmanship under normal use within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Deterioration of metals, metal finishes, dome, and other materials beyond normal weathering.
    - b. Breakage of glazing.
  2. Warranty Period:
    - a. Tubular Unit Skylight Assembly: 10 years from date of purchase.
    - b. Tunnel Reflective Coating: 20 years from date of purchase.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products of **VELUX America LLC**, Greenwood, SC 29648; [www.VELUXusa.com](http://www.VELUXusa.com); (800) 888-3589

Specifier: Retain "Substitutions" Paragraph and select one of two options based upon Project requirements.

- B. Substitutions: [None allowed by Owner] [As permitted under Instructions to Bidders and Section 012500 "Substitution Procedures"].
- C. Source Limitations: Obtain tubular unit skylights through single source from single manufacturer.

#### 2.2 TUBULAR DAYLIGHTING SYSTEMS

- A. System Description, General: Tubular unit skylight daylighting kits with exterior glazed opening, glazing retainers and gaskets, exterior flashing assembly with integral adjustable pivot device, reflective tunnel, interior diffuser assemblies, and accessories, as required to meet installation and performance requirements indicated.

Specifier: Select one or more of six models below to correspond to SUN TUNNEL assemblies required for Project. Assemblies are provided in kit form with 4 inch top collars, 24 inch reflective tunnel, (2) 12 inch universal elbows, and diffuser system with a lower frosted insulating diffuser. Additional accessories are available as listed below.

1. Pitched flashing dome kit with rigid tunnel.
  - a. Basis of Design: **VELUX SUN TUNNEL Skylight Kit Model TMR.**
2. Pitched flashing dome kit with flexible tunnel.
  - a. Basis of Design: **VELUX SUN TUNNEL Skylight Kit Model TMF.**
3. Low profile flashing dome kit with rigid tunnel.
  - a. Basis of Design: **VELUX SUN TUNNEL Skylight Kit Model TGR.**
4. Low profile flashing dome kit with flexible tunnel.
  - a. Basis of Design: **VELUX SUN TUNNEL Skylight Kit Model TGF.**
5. Curb mounted dome kit with rigid tunnel.
  - a. Basis of Design: **VELUX SUN TUNNEL Skylight Kit Model TCR.**
6. Curb mounted glass skylight lens with rigid tunnel.
  - a. Basis of Design: **VELUX SUN TUNNEL Skylight Kit Model TZR(L).**

B. Glazing: [Transparent, UV-resistant plastic dome] [Glass skylight lens]

1. Sizes: [10 inch (254 mm)] [14 inch (356 mm)] [and] [22 inch (559 mm)] diameter

Specifier: For TZR, TZRL and TZRQ model Sun Tunnels select subparagraph b. for glass. For all other Sun Tunnel models select first subparagraph a. for dome. Select polycarbonate option in "Dome" Subparagraph below for projects requiring high impact-resistant glazing. Coordinate with Performance Requirements article below.

2. Glazing:
  - a. [Dome: 0.125 inch (3.18 mm) minimum thickness injection molded transparent [impact modified acrylic] [polycarbonate] material; with UV-absorbing additive]
  - b. [Glass: 0.125 inch (3 mm) tempered glass outer pane with 0.25 inch (7 mm) diamond wire inner pane.]
3. Dome Seal: Adhesive-backed foam weatherstrip.

Specifier: Select one of three Configuration subparagraphs based upon installation type.

C. Flashing Assembly:

1. Self-flashed Configuration: One-piece formed, 14 to 60 deg. roof pitch.

2. Curb-flashed Configuration: One-piece formed, minimum 0 to 60 deg. roof pitch.
3. Curb mounted Configuration: One-piece glass skylight lens, 0 to 60 deg. roof pitch.

Specifier: Not all unit size diameters below are available for each flashing mode:  
 10 inch (254 mm) diameter available for Models TGR and TMR  
 14 inch (356 mm) diameter available for Models TGR, TMR, TCR, TMF, TGF, TZR, TZRL, and TZRQ  
 22 inch (559 mm) diameter available for TGF

4. Unit Sizes: As required to fit skylight sizes specified or indicated on Drawings.
5. Material: Galvanized steel sheet, 0.023-inch/24-ga.- (0.58-mm-) thick.
  - a. Finish: Powder coat, gray.
6. Intermediate Ring: High-impact plastic reflective tunnel receiver attached to top of roof flashing serving as mounting base for dome assembly and providing a thermal break between flashing and reflective tunnel, configured to channel condensed moisture out of assembly.
  - a. Intermediate Ring Seal: Santoprene O-ring providing weather tight seal with roof flashing.
  - b. Pivot Ring and Reflective Tunnel Collar: High-impact polymer pivoting socket mounted in intermediate ring and secured to factory-installed reflective tunnel collar 3.625 inch (92 mm) in height; adjustable for tunnel section alignment.

D. Flashing Accessories:

1. Fire Band: Dome edge protection band, as required for installation in fire-resistance-rated roof assemblies; matching flashing metal and finish.

E. Reflective Tunnels

1. Rigid Reflective Tunnel: Skylight light shaft formed from anodized aluminum sheet, 0.016-inch/26-ga.- (0.41-mm-) thick, with silver specular interior finish surface coated with vacuum-evaporated silicone oxide and titanium oxide protective surface.
  - a. Length: 24 inch (610 mm).
  - b. Diameter: As required for indicated flashing assembly sizes.
  - c. Reflectance: 99 percent reflectance when measured in accordance with ASTM E 1651 at 30 degrees from vertical. Total reflectance greater than 98 percent when measured in accordance with ASTM E 1651.
  - d. Color Rendition, ASTM E 408: As defined by CIE L\*a\*b\* color model, L equal to 99-100, values a\* and b\* shall not exceed +1 or be less than -1.
  - e. Rigid Tunnel Components:
    - 1) Rigid Tunnel Extension: One reflective tunnel, 24 inch (610 mm) length.
    - 2) Universal Reflective Elbows: Two reflective angle adaptors adjustable to 45 degrees, 11.5 inch (392 mm) length, 0.02 inch/24 ga. (0.51 mm) thick, and mounted at the top, middle, or bottom of reflective tunnel assemblies as required for application.

Specifier: **VELUX Flexi-Loc Fasteners** are engineered to enable extremely accurate and fast tool-free assembly of the reflective tunnel on the job site, ensuring compliant daylighting performance and precluding in-service disturbance of the reflective tunnel.

- f. Rigid Tunnel Fastening System: Manufacturer's recommended fastening devices consisting of spring tempered stainless steel pull clip mechanical fasteners allowing tunnel vertical and horizontal joints to be secured without the use of screws or tools, used in conjunction with pre-located punched holes in tunnel sections, that allow for a tight naturally-occurring tapered mating of interconnecting tunnel sections and elbows.

- 1) Basis of Design: **VELUX Flexi-Loc Fasteners.**

Specifier: Flexible Reflective Tunnel components is included with each SUN TUNNEL kit to enable onsite adjustments needed to coordinate with location of framing.

- 2. Flexible Reflective Tunnel: Reflective metalized polyester, fiberglass scrim and spring steel wire.
  - a. Length: 8 foot (2.4 m).
  - b. Diameter: As required for indicated flashing assembly sizes.

- F. Reflective Tunnel Accessories: Provide accessories indicated and as required for installation based upon roof, ceiling, and structural member configuration, skylight and diffuser locations indicated on Drawings, and manufacturer's recommendations, selected from the following:

- 1. Rigid Tunnel Extensions: Reflective rigid extension tunnel, 24 inch (610 mm) lengths fastened as required for application length.
  - a. Basis of Design: **VELUX Model ZTR Rigid Reflective Tunnel.**
- 2. Flexible Tunnel Extensions: Reflective flexible extension tunnel, lengths as required for application.
  - a. Basis of Design: **VELUX Model ZTF Flexible Reflective Tunnel.**
- 3. Rotating Couplers: Rotating adaptors allowing coupling of two elbows to create 90 deg. transition of tunnels using fastening system connections with rotating joint enabling alignment of tunnel sections.

### 2.3 DIFFUSERS

- A. Round ceiling diffuser assembly attached directly to bottom of reflective tunnel, with screw-in clear high visible light transmittance primary diffuser, frosted secondary diffuser separated by airtight seals providing insulating airspace.
  - 1. Size: As required for flashing assembly indicated.
  - 2. Lens Type: frosted lens above clear lens, minimum 92 percent visible light transmittance.

Specifier: Retain optional "Residential Energy Kit" Paragraph below for thermally-isolated diffuser and heat shield meeting ENERGY STAR criteria in all climate zones.

- B. Residential Energy Kit: Energy-Star-compliant diffuser consisting of a crackle diffuser disk mounted in screw-in primary diffuser and a prismatic diffuser disk mounted on the pivot ring.



1. Include semi-transparent heat shield configured to reduce solar heat gain.
2. Basis of Design: **VELUX Residential Energy Kit Model ZTC.**

C. Diffuser Accessories:

Specifier: Retain "Clear Lens" optional requirement below to substitute this style of diffuser lens for the SUN TUNNEL standard interior side lens included in the residential kits.

1. Clear lens.

Specifier: "Decorative Diffusers" Paragraph below describe optional designer treatments available from VELUX.

2. Decorative Diffusers: Ceiling level diffuser films placed on primary diffuser.
  - a. Basis of Design: **VELUX Decorative Diffuser Model ZTB.**
  - b. Metal Trim Finish: [Micro fresnel] [Brushed metal] [Triple wave] [Prismatic] [Bubbles] [Natural light].

## 2.4 SYSTEM ACCESSORIES

Specifier: Retain "Daylight Controller" Paragraph and show locations for dimmers on Drawings if required for Project.

- A. Daylight Controller and Power Supply Kit: Local dimmer control with low-profile paddle baffle design of reflective material. Provide for units for which dimmers are indicated.
  1. Daylight Controller: Basis of Design **VELUX Daylight Controller Model ZTK.**
    - a. Housing: Injection-molded copolymer.
    - b. Daylight Dimmer: Electro-mechanically-actuated daylight valve with 24 VDC input voltage providing adjustable daylight output between 2 and 100 percent.
  2. Daylight Power Supply and Switch: Basis of Design **VELUX Plenum Rated Power Supply Kit ZZZ 233**
    - a. Combination power supply and low voltage DC DP/DT switch, 120-277 VAC input and 24 VDC output, plenum rated, mounts directly to junction box, capable of operating up to ten daylight dimmer units. Switching allows reflective paddle to stop at any location between fully open and fully closed positions.
- B. Light Kit: Supplemental electrical light fixture kit with fluorescent GU24 lamp base, 120 VAC, 60 Hz, maximum 26 watt lamp.
  1. Basis of Design: **VELUX ZTL Light Kit.**
- C. Manual Blackout Shade: Sized to skylight diffuser opening.

## 2.5 PERFORMANCE REQUIREMENTS

- A. Daylighting: Provide daylighting photometric performance comparable to basis of design product at layout indicated, based upon daylighting profile of March 21, 9:00 am local time, at Project location by simulation in accordance with IESNA guidelines.

Specifier: Retain second subparagraph for TZR. Retain first subparagraph for all other SUN TUNNEL models.

- B. [Air Infiltration: Maximum air leakage through unit of **0.09 cfm/sq. ft. (0.5 L/s/sq. m)** of fixed area as determined according to ASTM E 283 at a static-air-pressure differential of **1.57 lbf/sq. ft. (75 Pa.)**]

[Air Infiltration: Maximum air leakage through unit of **0.01 cfm/sq. ft. (0.1 L/s/sq. m)** of fixed area as determined according to ASTM E 283 at a static-air-pressure differential of **1.57 lbf/sq. ft. (75 Pa.)**]

- C. Water Penetration under Static Pressure: No evidence of water penetration through complete unit when tested according to ASTM E 331 at a static-air-pressure differential of **15 lbf/sq. ft. (720 Pa)**.

Specifier: Retain "Windborne Debris Resistance" Paragraph if required by authorities having jurisdiction. Select optional polycarbonate glazing when retaining this Paragraph. Windborne-Debris Resistance: Provide tubular unit skylights capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed representative of those specified, according to ASTM E 1886 and ASTM E 1996, at not less than the following:

1. Missile Level C, Wind Zone 3 requirements, and +50/-50 psf cycle pressure minimum.

Specifier: Retain applicable paragraphs from following seven paragraphs based upon SUN TUNNEL models selected above.

- D. Thermal Performance Standards: NFRC 100 and 200:

Specifier: Retain below for Models TMR and TGR energy versions.

- a. Rigid tunnel Energy Star tubular unit skylights:
  - 1) U-Factor: **0.38 Btu/hr\*ft.\*deg. F (2.16 W/m2\*deg K)**.
  - 2) Solar Heat Gain Coefficient (SHGC): 0.25.

Specifier: Retain below for Models TMR and TGR base versions.

- a. Rigid tunnel standard tubular unit skylights:
  - 1) U-Factor: **0.55 Btu/hr\*ft.\*deg. F (3.12 W/m2\*deg K)**.
  - 2) Solar Heat Gain Coefficient (SHGC): 0.37.

Specifier: Retain below for Models TMF and TGF energy versions.

- a. Flexible tunnel Energy Star tubular unit skylights:
  - 1) U-Factor: **0.37 Btu/hr\*ft.\*deg. F (2.10 W/m2\*deg K)**.
  - 2) Solar Heat Gain Coefficient (SHGC): 0.18.

Specifier: Retain below for Models TMF and TGF base versions.

- b. Flexible tunnel standard tubular unit skylights:

- 1) U-Factor: 0.50 Btu/hr\*ft.\*deg. F (2.84 W/m2\*deg K).
- 2) Solar Heat Gain Coefficient (SHGC): 0.21.

Specifier: Retain below for Model TCR energy version.

- a. Curb-flashed Energy Star tubular unit skylights:
  - 1) U-Factor: 0.38 Btu/hr\*ft.\*deg. F (2.10 W/m2\*deg K).
  - 2) Solar Heat Gain Coefficient (SHGC): 0.25.

Specifier: Retain below for Model TCR base version.

- b. Curb-flashed standard tubular unit skylights:
  - 1) U-Factor: 0.55 Btu/hr\*ft.\*deg. F (2.16 W/m2\*deg K).
  - 2) Solar Heat Gain Coefficient (SHGC): 0.37

Specifier: Retain below for Model TZR and TZRL base versions.

- c. Curb-flashed, glass lens standard tubular unit skylights:
  - 1) U-Factor: 0.46 Btu/hr\*ft.\*deg. F (2.61 W/m2\*deg K).
  - 2) Solar Heat Gain Coefficient (SHGC): 0.38

- E. Unit Skylight Performance Grade Standards: AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS-11 or previous):

Specifier: Retain first three Subparagraphs below and delete following three Subparagraphs for IBC 2012 and 2015 code requirements; verify requirements of authorities having jurisdiction.

Specifier: Retain below for Models TMR, TMF, TGR, and TGF.

- a. Pitched and low-profile dome tubular unit skylights:
  - 1) Performance Grade (Primary Designator): TDDCC PG125.
  - 2) Design Pressure (DP): +300/-125 psf (+14.4/-5.98 kPa).

Specifier: Retain below for Model TCR.

- a. Curb-flashed dome tubular unit skylights:
  - 1) Performance Grade (Primary Designator): TDDCC PG165.
  - 2) Design Pressure (DP): +300/-165 psf (+14.4/-7.90 kPa).

Specifier: Delete first three Subparagraphs above and retain the first three Subparagraphs below for IBC 2009 and NBC code requirements, including CSA A440S1-09; verify requirements of authorities having jurisdiction.

Specifier: Retain below for Models TMR, TMF, TGR, and TGF.

- a. Pitched and low-profile dome tubular unit skylights:

- 1) Performance Grade (Primary Designator): CW-PG90 TDD.
- 2) Design Pressure (DP): +200/-90 psf (+9.58/-4.31 kPa).
- 3) Canadian Air Infiltration/Exfiltration Rating: Fixed.

Specifier: Retain below for Model TZR.

- a. Curb-flashed glass lens tubular unit skylights:
    - 1) Performance Grade (Primary Designator): CW-PG100
    - 2) Design Pressure (DP): +100/-100 psf (+14.4/-7.90 kPa).
    - 3) Canadian Air Infiltration/Exfiltration Rating: Fixed.
- F. Surface-Burning Characteristics of Plastic Glazing and other plastic components: Provide plastic glazing meeting NAFS and identical to specimens tested for fire-exposure behavior in accordance with test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Self-Ignition Temperature: 650 deg F (345 deg. C) or more for plastic glazing in thickness indicated when tested per ASTM D 1929.
  2. Smoke-Production Characteristics: Comply with either requirement below:
    - a. Smoke-Developed Index: 450 or less when tested per ASTM E 84 on plastic glazing in manner indicated for application.
    - b. Smoke Density: 75 or less when tested per ASTM D 2843 on plastic glazing in thickness indicated for application.
  3. Burning Characteristics: Tested and labeled in accordance with ASTM D 635.
    - a. Plastic Glazing for Domes: [Polycarbonate Class CC1] [Acrylic Class CC2].

Specifier: Retain second subparagraph below for TZR/TZRL/TZRQ, retain first subparagraph for all other models.

- G. [Fire Ratings for Roof Assemblies with Fire Classifications: Tubular unit skylight with dome edge protection band, and pass testing in accordance with the Class B Burn Brand portion of ASTM E 108 for use on roofs with Class A, B or C roof assemblies].
- [Fire Ratings for Roof Assemblies with Fire Classifications: Tubular unit skylight and pass testing in accordance with the Class A Burn Brand portion of ASTM E 108 for use on roofs with Class A, B or C roof assemblies].

Specifier: Retain "Electrical Components" Paragraph below if retaining requirement for dimmer.

- H. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- I. Fall Protection Standard Compliance: 29 CFR 1910.23: Passed.

## 2.6 MATERIALS

- A. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial steel or forming steel.
- B. Aluminum Sheet: Flat sheet complying with ASTM B 209 (ASTM B 209M).
- C. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers.
- D. Joint Sealants: As specified in Section 079200 "Joint Sealants."
- E. Mastic Sealants: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- F. Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

## 2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Galvanized Steel Sheet:
  - 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
    - a. Color: Neutral gray.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with tubular unit skylight installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install tubular unit skylights in accordance with manufacturer's written instructions and approved shop drawings. Coordinate installation of units with installation of substrates, air and vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that finished installation is weathertight.

1. Anchor tubular unit skylights securely to supporting substrates.
  2. For horizontal installation, install tubular unit skylights true to line and without distortion.
  3. For sloped roof installation, install tubular unit skylights on curbs specified in another section with tops of curbs parallel to finished roof slope.
- B. Where metal surfaces of tubular unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by tubular unit skylight manufacturer.
- C. Install tubular unit skylight curb counter flashing to produce weatherproof seal with curb and overlap with roofing system termination at top of curb.

### 3.3 FIELD QUALITY CONTROL

Specifier: Retain option in "Testing Agency" Paragraph below assigning responsibility for testing agency, if required.

- A. Testing Agency: [Owner will engage] [Engage] testing agency to perform tests and inspections.
1. Test for water leaks according to AAMA 501.2 after installation and curing of sealants but prior to installation of interior finishes.
  2. Perform test for total area of each tubular unit skylight.
- B. Work will be considered defective if it does not pass tests and inspections.
- C. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

### 3.4 CLEANING AND PROTECTION

- A. Clean exposed tubular unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- B. Replace glazing that has been damaged during construction period.
- C. Dimmer Assemblies: Test and adjust dimmer assemblies for proper operation.
- D. Protect tubular unit skylight surfaces from contact with contaminating substances resulting from construction operations.

END OF SECTION