VELUX America Inc.
SPECIFICATION FOR MODEL TCR 022 0000 (Acrylic)
COMMERCIAL VELUX SUN TUNNEL ™

SECTION 08620
TUBULAR SKYLIGHTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Engineered tubular daylighting system, TCR VELUX SUN TUNNEL™, consisting of an exterior curb mounted or self flashed roof flashing with a condensation management system, transparent acrylic dome, factory assembled 22-inch diameter telescopic rigid tube, and (either) an interior ceiling adapter assembly with a square prismatic diffuser (or) an open ceiling round dual diffuser system. Structural expansion joint created through the self aligning pivot device used to secure and align the upper elbow.

1.02 Related Sections

A. Section 01352 – LEED Requirements

B. Section 01524 – Construction Waste Management

C. Section 07311 - Asphalt Shingles: Flashing of skylight base.

D. Section 07320 - Roof Tiles: Flashing of skylight base.

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

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

G. Section 075440 – Shingle ply Membrane Roofing Mechanically Fastened TPO: Skylight curb flashing

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

I. Section 07720 – Roof Accessories: Skylight Curb

J. Section 08620 - Unit Skylights: (Skylights without reflective tube.)

K. Section 08630 - Metal Framed Skylights.

1.02 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440-08 – North American Fenestration Standard/Specification for windows, doors, and skylights (Includes all applicable reference standards).

B. AAMA/WDMA/CSA 101/I.S.2/A440-05 – Standard/Specification for windows, doors, and unit skylights (Includes all applicable reference standards).

C. ANSI 101/I.S.2/NAFS-02 – Voluntary Performance Specification for Windows, Skylights, and Glass Doors (Includes all applicable reference standards).

D. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

E. ASTM D 635-03 – Test Method for Rate of Burning and/or Extent of Time of Burning of Self-supporting plastics in a Horizontal Position.

F. ASTM D 638-03 – Standard Test Method for Tensile Properties of Plastics.

G. ASTM D-1003 – 00 - Standard Test Method for Haze and Luminous Transmittance of Transparent plastics.

H. ASTM D-1929-96(2001) – Standard Test Method for Ignition Properties of Plastics.

I. ASTM G 155-05a – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.

J. ASTM D 2843 – 99(2004) – Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics

K. ASTM E 330 – Structural Performance of Exterior Windows, Curtain Walls, and Doors

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

M. 29 CFR 1910.23(e)(8) – Occupational Safety and Health Standards for Walking-Working Surfaces to Guard Floor and Wall Openings and Holes.

N. ISO 9001 – Standardized Requirements for a Quality Management System

O. ISO 14001 certified – Standardized Requirements for Environmental Management Systems

P. International Building Code (IBC) – Model building code developed by International Code Council

Q. International Energy Conservation Code (IECC) – Model Energy Building Code

R. International Residential Code (IRC) – Comprehensive Residential Code That Creates Minimum Regulation for One and Two Family Dwellings of Three Stories or Less.

1.03 QUALITY ASSURANCE

A. Commercial Tubular Daylighting Device (VELUX SUN TUNNEL) with exterior flashing, exterior dome, pivot device, upper and lower elbows, rigid telescopic tunnel, and diffuser assemblies required for complete and weatherproof installation shall be manufactured to the highest standards of quality, environmental stewardship and craftsmanship in accordance with VELUX Manufacturing Standards, in ISO 9001 and ISO 14001-certified facilities.

1.04 SYSTEM DESCRIPTION

A. Exterior Dome: 92% transparent impact resistant acrylic includes UV absorbers to prevent UV transmittance and yellowing.

B. Flashing System: One piece Neutral grey powder coated galvanized steel flashing with mounting flange. The TCR P1 curb mounted flashing projects 4” above the curb and the TCR Q1 pan flashing projects 8” or 10.5” above the roof deck. Flashing systems adaptable to roof slopes ranging from 0 to 30 degrees. Optional turret and fire resistant dome rings are available and required for fire-rated roof coverings.

C. Pivot/Intermediate rings: Pivoting socket joint which secures upper elbow, allows for an additional 11 degrees of adjustability to help align tunnel sections, and provides a thermal break between the flashing and the connecting dome and the upper elbow.

D. Condensation Control: Integral internal condensation collection gutter and drainage slots

E. Insect Barrier/Dome Seal – polyurethane foam between the dome and the intermediate ring.

F. Rigid elbow: 30 degree adjustable, 22-inch nominal outside diameter, 98% specular super reflective physical vapor deposition coated silver backed aluminum with a 20 year warranty. Adjust up to 30 degrees and can be used as an upper or lower elbow.

G. Rigid telescopic tunnel: 36” to 60” telescopic rigid 22-inch nominal diameter, 98% supper specular reflective physical vapor deposition coating silver backed aluminum with a 20 year warranty.

H. Rigid 2 ft coupler tunnel: 24” telescopic rigid 22-inch nominal diameter, 98% super specular reflective physical vapor deposition coating silver backed aluminum with a 20 year warranty.

I. Optional flexible lower elbow/Expansion Joint (for round to square ceiling diffuser option only): Fabricated 22-inch nominal diameter, up to 24” in length, 87% reflective metalized polyester, fiberglass scrim and spring steel wire, easy connect flexible bending expansion joint. Adjust up to 40 degrees.

J. Ceiling Adapter Assembly (for ceiling diffuser option): Ceiling Adapter Assembly for suspended tile ceilings and finished ceilings: White ABS thermoplastic, dimension at the top of the assembly is 21.25-inch diameter, dimensions at the bottom of 23.875-inch x 23.875-inch square, 9.25-inch overall height tested in accordance with ASTM D635 and ASTM D1929. Interior surface - white diffuse. Adapter assembly is factory attached to flexible tunnel, and houses prismatic diffuser and steel diffuser frame. Adaptor assembly designed for installation in standard acoustical tile ceiling system. Not included with open ceiling configuration.

K. Diffuser Frame Assembly (for ceiling diffuser option):

L. Round Ceiling Ring: (for open ceiling diffuser option) a 22” round paintable dual diffuser assembly with a paintable acrylic trim ring and mounting ring.

M. Diffuser(s): square removable K-12 prismatic acrylic diffuser (for ceiling diffuser option) or round dual crackled clear upper diffuser with frosted lower diffuser, ½” air gap and air tight Santoprene gasket (for open ceiling diffuser option).

N. Supporting Hardware: Eye hooks, eye bolts, and washers to connect the provided support wire between the roof framing and the lower end of the rigid tunnel. Also contain ceiling box support clips that work with the suspended ceilings.

1.05 ACCESSORIES

A. Light Control: ZTK 24volt light control damper system for the TCR 022 VELUX Sun Tunnels. Manufactured out of 0.0315" (0.8mm) 98% reflective Alanod miro silver and operated with a 24 volt dc motor (< or = 40 mA) and powered by a 24volt KES 160 VELUX power supply through a reversing circuit. Up to 10 light controls can be fully opened and closed within 7 seconds. In conjunction with the VELUX power supply the light control can be controlled by third party systems that use relays and a reversing circuit to channel the 24 volts from the VELUX power supply to the ZTK in one direction to open and the other to close. 5 year product warranty.

B. ZTA turret extenders, to be used with the TCR P1 in areas where the domes need to be elevated and additional 6.5" or 9".

C. ZZZ 192 fire ring for the TCR P1 and Q1 flashings are available in 6.5" and 9" heights and correspond to the 6.5" and 9" turrets that are available for the TCR P1 and that are already integrated with the TCR Q1.

D. 3M Fire Barrier Plenum Wrap: A fire resistant wrap consisting of a patented inorganic blanket encapsulated with a scrim-reinforced foil. Provides a flexible, non-combustible enclosure for cables and pipes in return air plenums. Provided by 3M.

E. Dual ceiling Ring Complete (30439022): 22" ceiling ring assembly complete with dual diffusers, gaskets, anchor latches, and trim ring. A gasket creates the ½" air space between the crackled clear diffuser and the lower frosted diffuser.

1.06 PERFORMANCE RATINGS

A. Configuration: Fixed, after final alignment.

B. Condensation Control: Integral internal condensation collection gutter and drainage slots

Round to square single prismatic diffuser option

C. Curb mounted TCR P1 with round to square ceiling diffuser independently tested in accordance with listed standards, for compliance with the unit skylight provisions of the 2003 and 2006 IBC, IECC and IRC, as follows:

1. **ANSI 101/I.S.2/NAFS-02** (for 2003 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 150 psf

2. **AAMA/WDMA/CSA 101/I.S.2/A440-05** (Uniform load test for 2006 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 150 psf

3. **AAMA/WDMA/CSA 101/I.S.2/A440-08** (Uniform load test for 2008 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 150 psf

D. Self Flashed TCR Q1 with round to square ceiling diffuser independently tested in accordance with listed standards, for compliance with the unit skylight provisions of the 2003 and 2006 IBC, IECC and IRC, as follows:

1. **ANSI 101/I.S.2/NAFS-02** (for 2003 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 55 psf

2. **AAMA/WDMA/CSA 101/I.S.2/A440-05** (Uniform load test for 2006 codes)
   i. Downward design pressure = 250 psf
   ii. Uplift Design Pressure = 45.00 psf

3. **AAMA/WDMA/CSA 101/I.S.2/A440-08** (Uniform load test for 2008 codes)
   i. Downward design pressure = 250 psf
   ii. Uplift Design Pressure = 42.50 psf

4. Air Infiltration: 0.9 L/s/m² (0.18 cfm/ft ²) when tested at a positive test pressure 75 Pa (1.6 psf). Canadian Air Infiltration/Exfiltration Level A2

5. Water Penetration Resistance Test Pressure: 720 Pa (15.05 psf). No uncontrolled water leakage at or below this pressure.

6. Fire testing: Class B Burn Brand - Roof covering rating with fire ring.

7. Fall-through resistance: 400 ft-lbs impact, no skylight damage at or below this impact rating.

Open ceiling dual diffuser option

E. Curb mounted TCR P1 with open ceiling diffuser independently tested in accordance with listed standards, for compliance with the unit skylight provisions of the 2003 2006 and 2006 IBC, IECC and IRC, as follows:

1. **ANSI 101/I.S.2/NAFS-02** (for 2003 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 150 psf

2. **AAMA/WDMA/CSA 101/I.S.2/A440-05** (Uniform load test for 2006 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 150 psf

3. **AAMA/WDMA/CSA 101/I.S.2/A440-08** (Uniform load test for 2006 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 150 psf

F. Self flashed TCR Q1 with open ceiling diffuser independently tested in accordance with listed standards, for compliance with the unit skylight provisions of the 2003 2006 and 2006 IBC, IECC and IRC, as follows:

1. **ANSI 101/I.S.2/NAFS-02** (for 2003 codes)
   i. Downward design pressure = 150 psf
   ii. Uplift Design Pressure = 55 psf

2. **AAMA/WDMA/CSA 101/I.S.2/A440-05** (Uniform load test for 2006 codes)
   i. Downward design pressure = 250 psf
   ii. Uplift Design Pressure = 45 psf

3. **AAMA/WDMA/CSA 101/I.S.2/A440-08** (Uniform load test for 2006 codes)
   i. Downward design pressure = 250 psf
   ii. Uplift Design Pressure = 42.50 psf

4. Air Infiltration: 0.1 L/s/m² (0.01 cfm/ft ²) when tested at a positive test pressure 75 Pa (1.6 psf). Air infiltration maximum 0.0083 cfm per foot of crack length at 75 Pa (1.6 psf). Canadian Air Infiltration Exfiltration Level A3

5. Water Penetration Resistance Test Pressure: 720 Pa (15.05 psf). No uncontrolled water leakage at or below this pressure when tested in accordance with ASTM E 331.

6. Fire testing: Class B Burn Brand - Roof Covering Rating with fire ring.

7. Fall-through resistance: 400 ft-lbs impact, no skylight damage at or below this impact rating.

1.06 SUBMITTALS

A. Manufacturer's unit dimensions, rough opening and finished framing dimensions, affected related work, and installation requirements are shown in manufacturer's installation instructions.

B. Product Data: TCR 022 configurations, size and lengths are indicated in manufacturer's printed material.

C. LEED Submittals: Daylight simulations provided upon request based on specific products, location, and desired criteria. Contact VELUX.

1.07 DELIVERY, HANDLING, STORAGE

A. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.

B. Store and protect products in accordance with manufacturer's recommendations.

1.06 WARRANTY

D. Rigid Tunnel – Refer to manufacture's standard warranty for a period of (20) years from the date of purchase

E. VELUX Acrylic Clarity: Refer to manufacture's standard warranty for a period of (10) ten years from the date of purchase.

F. VELUX SUN TUNNEL Skylights – Refer to manufacture's standard warranty for a period of (10) ten years from the date of purchase for non-electric parts and (5) years from the date of purchase for electric parts.

1.07 DELIVERY, HANDLING, STORAGE

Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact

PART 2 PRODUCTS

2.01 MANUFACTURER

A. VELUX America Inc., 450 Old Brickyard Road, P.O. Box 5001, Greenwood, SC 29648-5001, www.VELUXusa.com contact VELUX code and specifications department, tel: 1-800-888-3589, Fax: 1-864-941-5000.

2.02 PRODUCT SUBSTITUTIONS

B. Substitutions: No substitutions permitted

2.02 MATERIALS

A. Exterior Dome: 0.125-inches thick injection molded acrylic with UV absorbers.

B. Flashing System: one piece neutral grey curb G 90 24 gauge (0.023”) aluminized sheet steel.

C. Pivot/Intermediate rings: Polypropylene co-polymer with UV inhibitors, color black.

D. Insect Barrier/Dome Seal – polyurethane foam

E. Fasteners: Exterior dome to flashing system #8 x ¾” Philips 18–8 stainless steel corrosion-resistant screws, Flashing to roof sheeting 1 ½” pan head 18-8 stainless steel screws, Intermediate ring to flashing system #10 x ½” Phillips Flat head, Tunnel joint screws #6 x 3/8” Phillips pan head self drilling.

F. Rigid Tunnel: 98% total light reflection, moisture resistant, corrosion resistant, UV resistant, and extreme temperature resistant with a 20 year warranty.

G. Flexible Tunnel (optional lower elbow): Metalized polyester, fiberglass scrim and spring steel wire, 22” nominal outside diameter, 24-inches in length meeting the requirements of ASTM E84.

O. Ceiling Adapter Assembly for suspended tile ceilings and finished ceilings: White acrylonitrile, butadiene, and styrene (ABS) thermoplastic.

H. Dual diffuser gasket: Santoprene 8000 TPV

I. Acrylic: 21.5-inch x 21.5-inch x 0.125-inch, clear prismatic, K-12, acrylic to maximize light output and diffusion. Dual round diffusers for the open ceiling option, crackled clear over frosted.

J. Open Ceiling Diffuser: round dual crackled clear upper diffuser with frosted lower diffuser, ½" air gap and air tight Santoprene gasket.

2.06 FABRICATION

A. Finish, fabricate and shop prepare all assemblies under responsibility of the manufacturer.

B. Fabricate to allow for thermal movement of materials where subject to a temperature differential.

C. Provisions shall be made to insure against accumulated water in contact with system components.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify rough opening dimensions and proper orientation of tubular daylighting device.

3.02 INSTALLATION

A. Install in accordance with manufacturer's installation instructions.

B. Align tubular daylighting device free of warp or twist, maintain dimensional tolerances.

C. Attach tubular daylighting system to site built roof curb with manufacturer's screws to accommodate construction tolerances and other irregularities.

D. Provide thermal isolation when components penetrate or disrupt building insulation. Pack fibrous insulation in rough opening to maintain continuity of thermal barriers.

E. Coordinate attachment and seal of perimeter air and vapor barrier material.