

**VELUX AMERICA, LLC.****DECK MOUNT GLASS-GLAZED UNIT
SKYLIGHTS
CURB MOUNT GLASS-GLAZED UNIT
SKYLIGHTS
TUBULAR DAYLIGHTING DEVICES**

CSI Section:
08 62 00 Unit Skylights

1.0 RECOGNITION

Verco America, LLC's Deck Mount Glass-Glazed Unit Skylights, Curb Mount Glass-Glazed Unit Skylights and Tubular Daylighting Devices recognized in this report have been evaluated for use as glazed skylights. The structural performance, air and water tightness, operating forces, durability and thermal and optical performance properties of the Deck Mount Glass-Glazed Unit Skylights, Curb Mount Glass-Glazed Unit Skylights and Tubular Daylighting Devices were evaluated for compliance with the following codes:

- 2015 and 2012 International Building Code® (IBC)
- 2015 and 2012 International Residential Code® (IRC)
- 2015 and 2012 International Energy Conservation Code® (IECC)
- 2016 California Building Code (CBC) – See attached Supplement

2.0 LIMITATIONS

Use of the VELUX Deck Mount Glass-Glazed Unit Skylights, Curb Mount Glass-Glazed Unit Skylights and Tubular Daylighting Devices recognized in this report is subject to the following limitations:

2.1 VELUX Deck Mount Glass-Glazed Unit Skylights, Curb Mount Glass-Glazed Unit Skylights and Tubular Daylighting Devices shall be installed in accordance with the applicable code, the manufacturer's instructions, and this report. In the event of a conflict, the more restrictive governs.

2.2 Deck and curb mount glass-glazed unit skylights shall not be used in Type I or II construction, over acid fume-containing spaces, in wind-borne debris regions or where unusual loading is expected.

2.3 Deck and curb mount glass-glazed unit skylights that are set at an angle of less than 45 degrees from the horizontal shall be mounted at least 4 inches (102 mm) above the plane of the roof except for R-3 occupancies with a minimum roof slope of 3-units vertical in 12 units horizontal.

2.4 Light transmitting plastic of tubular daylighting devices shall be mounted at least 4 inches (102 mm) above the plane of the roof except for R-3 occupancies with a minimum roof slope of 3-units vertical in 12 units or for buildings with a non-classified roof covering.

2.5 Aggregate area, separation and location of tubular daylighting devices shall be in accordance with IBC Sections 2606.7, 2610.5, 2610.6, 2610.7, 2610.8 and 803.1.1 for those occupancies within the scope of the IBC.

2.6 Installation of skylights and tubular daylighting devices shall be in accordance with IRC Section R308.6 for those occupancies within the scope of the IRC.

2.7 Edges of light transmitting plastic of tubular daylighting devices shall be protected by metal or noncombustible edge material except where non-classified roof coverings are permitted.

2.8 Electric motor-driven sash operators, in VSE, VSS, VCE and VCS skylights shall comply with the applicable electrical code requirements and are subject to approval of the code official.

**3.0 DECK MOUNT GLASS-GLAZED UNIT
SKYLIGHTS**

3.1 UESES: VELUX® FS, VS, VSE and VSS No Leak Skylights™ are unit skylights complying with IBC Section 2405.5 that provide natural light and views into the interior of building spaces. The skylights are intended for use on building roofs sloped from 3-units vertical in 12 units from the horizontal (25-percent slope) plane to 85 degrees from the horizontal plane. Each unit contains an integral supporting frame with continuous mounting flange intended for direct attachment to roofing substrate. VS, VSE and VSS skylights provide natural ventilation via an operable top-hinged sash. FS units are fixed. The glass is continuously supported on all four sides.

3.2 DESCRIPTION

3.2.1 Insulating Glass Units: Insulating glass units (IGU) used in deck mount glass-glazed unit skylights complying with Section 10.2 of AAMA/WDMA/CSA 101/I.S.2/A440-11 comply with ASTM E2190 and are constructed from a 1/8-inch (3.2 mm) thick clear Low-E³-coated tempered glass lite outboard, a sheet of 7/32 inch (5.6 mm) thick laminated glass lite inboard and a stainless-steel spacer system for an overall thickness of 3/4 inch (15.9 mm). The Laminated glass lite inboard is comprised of two sheets of 3/32 inch (2.4 mm) thick heat strengthened glass that are each permanently bonded to either a 0.030 or 0.090 inch (0.8 or 2.3 mm) thick polyvinyl butyral (PVB) clear interlayer. When increased thermal performance is desired, an additional Low-E coating



is applied on the interior glass surface of the IGU. The space between glass lites is filled with 95 percent argon gas.

3.2.2 Assembly Details: Condensation control gasketing for all skylight models directs accumulated water droplets from the inner glass surface to the exterior without compromising required air tightness.

VELUX FS, VS, VSE and VSS skylights consist of several integrated components: one panel of flat IGU top-mounted onto an aluminum-clad wood sash (VS, VSE and VSS), or directly onto an aluminum-clad wood frame (FS). Top-hinged sash on any VS, VSE or VSS skylight is fastened to and supported on a similar aluminum-clad wood frame. Sash and frames are manufactured from white-finished pine wood having a nominal specific gravity of 0.47 and are covered on the weather-exposed sides with roll-formed aluminum cladding that is coated with Kynar and lacquer.

Frames have mortised corners secured with adhesive and aligned and stabilized by a 1¾ inch (44.5 mm) long corner nail. A continuous galvanized steel mounting flange with mitered and welded corners is attached to the lower part of the frame and rests upon a foam isolation pad to interface with the mounting surface. Galvanized nails secure the flange to the frame every 9 inches (229 mm) or less. Only the VS, VSE and VSS frames have a support ledge all around the interior face, to which a gasket is stapled for a tight seal with the sash frame. The frames also support the fixed half of the extruded aluminum sash hinge on the top of the frame head, fastened with 1 inch (25.4 mm) long No. 8 screws spaced at 10 inches (254 mm) on center.

VELUX VS, VSE and VSS skylight sashes also use a mortise joint corner construction with one 5/16 inch (7.9 mm) long staple at each corner. The rotating half of the extruded aluminum hinge is fastened with 1 inch (25.4 mm) long No. 8 screws spaced at 10 inches (254 mm) on center. The IGU is secured with hot-applied primary sealant bonded to roll formed aluminum glazing retaining profiles that are secured to the sash or frame using No. 8 stainless steel screws of various lengths (1 and 2-1/2 inches (25.4 and 63.5 mm) for VS, VSE and VSS and 1-1/4 inch (31.8 mm) for FS spaced every 9 inches (229 mm). All VS, VSE and VSS skylights are equipped with insect screens.

VSE and VSS skylights employ an electric motor-driven sash operator with radio frequency remote control and have exterior sensors to automatically trigger the operator to close an open sash when rain droplets are present. VSS skylights use solar powered batteries to operate the sash. VS skylights utilize a manually-driven rotary operator.

Sizes, general dimensions and fastener requirements for deck mount units are described in [Tables 1](#) (FS) and [2](#) (VS/VSE/VSS) and [Figures 1](#) (FS), [2](#) (FS), [3](#) (VS/VSE/VSS) and [4](#) (VS/VSE/VSS) of this report. Certified energy, light and comfort factors (U, SHGC, VT and CR) shall conform to 2015 IRC Section N1101.10.3, 2012 IRC Section

N1101.12.3 and 2015 and 2012 IECC Sections C303.1.3 and R303.1.3 (NFRC 100 and 200) and NFRC 500 for all sizes and are shown in [Table 3](#) of this report.

3.3 DESIGN AND INSTALLATION

Based on the positive and negative performance grade ratings listed in [Tables 1](#) and [2](#) of this report, the product size(s) shall be selected that have performance grades in excess of the design pressures that are applicable to the unit's final location. Uplift wind ratings recognized in this report are based on attachment to a lumber substrate exhibiting a minimum specific gravity of 0.43 as defined in Table 11.3.2A of the ANSI/AF&PA NDS with full nail engagement. Installation on wood substrates with a specific gravity less than 0.43 may result in a lower wind uplift rating.

4.0 CURB MOUNT GLASS-GLAZED UNIT SKYLIGHTS

4.1 USES: VELUX® FCM, VCE, VCM, and VCS No Leak Skylights™ are unit skylights complying with IBC Section 2405.5 that provide natural light and views into the interior of building spaces. The skylights are intended for use on building roofs sloped from 0° (0:12 slope) from the horizontal plane to 60° from the horizontal plane. Each unit is designed to attach to a site-built curb that is constructed from nominal 2-inch (50.8 mm) by 4-inch (102 mm) wood members of sufficient strength to transfer the skylight loads to the framing members. Skylights may be attached to other curb materials of equal or greater size and strength. VCE, VCM and VCS skylights provide natural ventilation via an operable top-hinged sash supported by an integral frame assembly. FCM units are fixed. Glass is continuously supported on all four sides using a roll-formed aluminum frame (assembled with ASA corner keys) to resist uplift wind loads. Curb mount products are particularly well-suited for replacement of existing curb-mounted skylights.

4.2 DESCRIPTION

4.2.1 Insulating Glass Units: Insulating glass units (IGU) used in curb mount glass-glazed unit skylights complying with Section 10.2 of AAMA/WDMA/CSA 101/IS.2/A440-11 comply with ASTM E2190 and are constructed from either a 1/8 inch (3.18 mm) or 5/32 inch (3.97 mm) thick clear Low-E³-coated tempered glass lite outboard, a sheet of 7/32 inch (5.56 mm) thick laminated glass lite inboard and a stainless-steel spacer system for an overall thickness of 5/8 inch (15.9 mm). The Laminated glass lite inboard is comprised of two sheets of 3/32 inch (2.4 mm) thick heat strengthened glass that are each permanently bonded to either a 0.030 or 0.090 inch (0.8 or 2.3 mm) thick polyvinyl butyral (PVB) clear interlayer. When increased thermal performance is desired, an additional Low-E coating is applied on the interior glass surface of the IGU. The space between glass lites is filled with 95 percent argon gas.



4.2.2 Assembly Details: Condensation and air leakage control is accomplished through the use of baffled weep holes in the pane support gasketing.

VELUX FCM, VCE, VCM and VCS skylights consist of several integrated components. One panel of aluminum-framed flat IGU is bottom-mounted onto a rigid polyvinyl chloride (PVC) sash for the VCE, VCM and VCS skylights and is directly mounted in the field onto the site-built curb for the FCM skylight. Hot-applied primary sealant is bonded to the aluminum frame prior to IGU placement, for all three models. Top-hinged sashes on the VCE, VCM and VCS Skylights are fastened to and supported on a similar rigid PVC frame with extruded aluminum counter flashing. This frame is supported in the field by the site-built curb. VELUX FCM skylight utilizes a dual-durometer thermoplastic elastomer (TPE) inner frame gasket that is T-nailed to the glazing frame to lock the IGU in place for sealant curing and handling stability. VCE, VCM and VCS counter flashing is a mitered and welded frame that is used to fasten the entire unit to the site-built curb. All VELUX VCE, VCM and VCS skylights are equipped with insect screens.

VCE and VCS skylights employ an electric motor-driven sash operator with radio frequency remote control and have exterior sensors to automatically trigger the operator to close an open sash when rain droplets are present. VCS skylights use solar powered batteries to operate the sash. VCM skylights utilize a manually-driven rotary operator. Sizes, general dimensions and fastener requirements for curb mount units are described in [Tables 4](#) (FCM) and [5](#) (VCE/VCM/VCS) and [Figures 5](#) (FCM), [6](#) (VCE/VCM/VCS) and [7](#) (VCE/VCM/VCS) of this report. Certified energy, light and comfort factors (U, SHGC, VT and CR) for all sizes shall conform to 2015 IRC Section N1101.10.3, 2012 IRC Section N1101.12.3 and 2015 and 2012 IECC Sections C303.1.3 and R303.1.3 (NFRC 100 and 200) and NFRC 500. The ratings are shown in [Table 6](#) of this report.

4.3 DESIGN AND INSTALLATION

Based on the positive and negative performance grade ratings listed in [Tables 4](#) and [5](#) of this report, the product size(s) shall be selected that have performance grades in excess of the design pressures that are applicable to the unit's final location. Uplift wind ratings recognized in this report are based on attachment of the curb to a lumber substrate exhibiting a minimum specific gravity of 0.43 as defined in Table 11.3.2A of the ANSI/AF&PA NDS with full nail engagement. Installation on lumber substrates with a specific gravity less than 0.43 may result in a lower wind uplift rating.

5.0 TUBULAR DAYLIGHTING DEVICES

5.1 USES: VELUX SUN TUNNEL™ TCR, TGR, TGF, TMR, and TMF Residential Skylights, and TCC, TGC and TMC Commercial Skylights are tubular daylighting

devices (TDD) complying with 2015 IBC Sections 1709.6 and 2405 and 2012 IBC Section 1710.6 and 2405 that collect and conduct natural light from above into building spaces. All series listed are intended for use on building roofs sloped up to 60 degrees from the horizontal plane. The TGF, TGR, TMF and TMR series are designed for slopes of 3 unit's vertical in 12 units from the horizontal plane (25-percent) and above.

5.2 DESCRIPTION

5.2.1 VELUX SUN TUNNEL™ TCC, TCR, TGC, TGF, TGR, TMC, TMF and TMR Skylights are series of tubular daylighting devices, each consisting of an exterior steel roof flashing capped with a clear molded acrylic copolymer (Plexiglas® HFI-7) exterior dome unit, and an interior diffuser assembly consists of extruded aluminum and a single acrylic diffuser joined by a rigid metallic telescopic or flexible tunnel tube with a reflective interior surface. The Dome materials comply as Class CC2 light-transmitting plastics in accordance with criteria prescribed in IBC Section 2606.4 and the standard referenced in IBC Section 2405.5.

5.2.2 ASSEMBLY DETAILS

TGC, TGF and TGR standard series consist of a low profile flashing that mounts to the roof deck, projects 4 inches (102 mm) upward and aligns the dome base to be parallel to the roof deck. TMC, TMF and TMR standard series consist of a pitched flashing that mounts to the roof deck and projects 9 inches (229 mm) upward on the downward roof slope and allows the dome base to be inclined relative to the adjacent roof. TCC and TCR standard series consist of a square flashing designed for mounting on a site-built curb of any material or height. Optional tile roof flashing kits are available for all the series.

Each SUN TUNNEL series is available in up to three model sizes – 10, 14 and 22 inches (254, 355 and 559 mm) defined by the tunnel diameter - depending on the series selected. Domes for all available in 10 and 14 inches (254 and 355 mm) models and the 22-inch (559 mm) TGF are the traditional “shallow dish” shape proven on residential buildings. Domes for all other 22-inch (559 mm) models use a new light-directing assembly that is significantly taller and houses the SunCurve Daylight Directing device more appropriate for larger, nonresidential spaces. An optional 12 or 36-inch (305 or 914 mm) long steel turret extender is available for all 14 and 22 inch (355 and 559 mm) flashings if the dome elevation needs to be higher than standard. An optional galvanized steel fire band is available to protect the dome edge where Class A, B or C roof coverings are required.

Flexible tunnels are used on the TGF and TMF series, in 14 and 22-inch (355 and 559 mm) sizes. Rigid tunnels with elbow fittings are used for all other standard series. Rigid tunnel joints are easily fastened in the field with Flexi



Loc™ spring clips and sealed with metalized tape, included in standard kits. Where building insulation is installed at the roof level, an optional thermal break section may be inserted into 14 and 22 inch (355 and 559 mm) rigid tunnels in line with that insulation for enhanced energy performance. Assemblies with this option carry numbers ending in E0 and have certified thermal ratings. Where needed, a power-operated daylight controller wafer is available as an additional rigid tunnel option.

Diffuser Assemblies: Three bottom designs are available:

- Type THC, for use where a rigid ceiling will support the diffusers and lower tunnel. This assembly holds up to four light diffusing acrylic glazing layers, with two being standard. Two additional layers are recommended when the attic insulation is at the ceiling, and are available as part of the ‘residential’ Energy Kit. That kit also includes a heat gain shield that is attached to the underside of the shallow dome. [10, 14 and 22 (254, 355 and 559 mm)].
- Type TOC, used where no ceiling exists. This assembly caps the tunnel end using one diffusing acrylic layer. [14 and 22 inch (355 and 559 mm) only].
- Type TTC, used where there is a non-rigid ceiling and a square diffuser is required. This assembly includes a transition section to fit the round tunnel bottom and support a 24 in square panel of diffusing acrylic. [14 and 22 inch (355 and 559 mm) only]. Each diffuser type utilizes one of three available lower glazing finishes – frosted, prismatic, or Fresnel-patterned. The THC diffuser option with a frosted finish is the standard for TCR, TGF, TGR, TMF and TMR series assemblies. The base kits for these series are shipped complete, with all parts used in the tested specimens.

There is no complete “Base Kit” available for the TCC, TGC and TMC series. These products are packaged in subassembly cartons that shall be ordered together and field assembled to create assemblies qualified by the tested ones. The following are the assembly model numbers covered herein:



EVALUATION REPORT

Number:

199

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Residential Models Shipped as Complete Kits

TCR 014 0000US TCR 014 0000USE0	TGF 014 0000 TGF 014 0000E0 TGF 022 0000 TGF 022 0000E0	TGR 010 0000 TGR 010 0000E0 TGR 014 0000 TGR 014 0000E0	TMF 014 0000 TMF 014 0000E0	TMR 010 0000 TMR 010 0000E0 TMR 014 0000 TMR 014 0000E0
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Commercial Models Shipped as Separate Subassemblies

TCC 014 ...	TGC 014 ...	TMC 014 ...	TCC 022 ...	TGC 022 ...
... 0000TH	... 0000TH	... 0000TH	... 3000TH	... 3000TH
... 0000THE0	... 0000THE0	... 0000THE0	... 3000THE0	... 3000THE0
... 0000TO	... 0000TO	... 0000TO	... 3000TO	... 3000TO
... 0000TOE0	... 0000TOE0	... 0000TOE0	... 3000TOE0	... 3000TOE0
... 0000TT	... 0000TT	... 0000TT	... 3000TT	... 3000TT
... 0000TTE0	... 0000TTE0	... 0000TTE0	... 3000TTE0	... 3000TTE0
... 0002TH	... 0002TH	... 0002TH	... 3002TH	... 3002TH
... 0002THE0	... 0002THE0	... 0002THE0	... 3002THE0	... 3002THE0
... 0002TO	... 0002TO	... 0002TO	... 3002TO	... 3002TO
... 0002TOE0	... 0002TOE0	... 0002TOE0	... 3002TOE0	... 3002TOE0
... 0002TT	... 0002TT	... 0002TT	... 3002TT	... 3002TT
... 0002TTE0	... 0002TTE0	... 0002TTE0	... 3002TTE0	... 3002TTE0
... 0003TH	... 0003TH	... 0003TH	... 3003TH	... 3003TH
... 0003THE0	... 0003THE0	... 0003THE0	... 3003THE0	... 3003THE0
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... 0003TT	... 0003TT	... 0003TT	... 3003TT	... 3003TT
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Sizes, general dimensions and fastener requirements for tubular daylighting devices are described in [Tables 7](#) and [8](#) and [Figures 8](#) (TGF/TMF), [9](#) (TGR/TMR), and [10](#) (TCR/TCC/TGC/TMC) of this report. Certified energy and comfort factors (U and SHGC) applicable to many listed models for all sizes shall conform to Sections N1101.10.3 and N1101.12.3 of the 2015 and 2012 IRC, respectively, and 2015 and 2012 IECC Sections C303.1.3 and R303.1.3 are shown in [Table 9](#) of this report



5.3 DESIGN AND INSTALLATION

Based on the positive and negative performance grade ratings listed in [Tables 7](#) and [8](#) of this report, identify the product size(s) that have performance grades in excess of the design pressures that are applicable to the unit's final location.

Uplift wind ratings recognized in this report are based on attachment to a wood substrate exhibiting a minimum specific gravity of 0.43 as defined in Table 11.3.2A of the ANSI/AF&PA NDS full nail engagement. Installation on wood substrate with a specific gravity less than 0.43 result in a lower wind uplift rating.

Suspension wires may be required in some projects such as where there is no rigid ceiling to offer support at the diffuser level. A kit is available for this purpose.

6.0 IDENTIFICATION

6.1 VELUX FS, VS, VSE, VSS FCM, VCE, VCM and VCS skylights covered by this report shall be identified with permanent labeling that includes the following information:

- Manufacturer's name, address, full model number and traceability code number.

6.2 VELUX FS, VS, VSE, VSS, FCM, VCE, VCM and VCS skylights covered by this report shall be identified with temporary pane labeling that includes the following information:

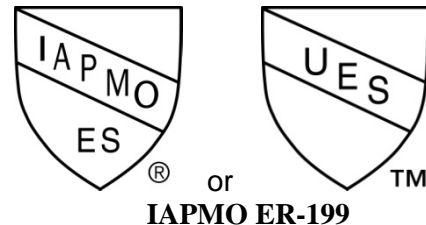
- Manufacturer's name and address, tested model size and designation, glass type and thickness, NFRC-certified ratings and WDMA or other approved labeling agency.
- Primary and secondary designators as required by the AAMA/WDMA/CSA 101/I.S.2/A440 specification including but not limited to the positive and negative performance grade ratings.
- IAPMO ES or UES Marks of Conformity and evaluation report number (ER-199)

6.3 VELUX SUN TUNNEL™ TCC, TCR, TGC, TGF, TGR, TMC, TMF, and TMR skylights covered by this report shall be identified with permanent labeling that includes the following information:

- Risk of Fall and ID label with the manufacturer's name, address and a traceability code number placed at the bottom center of the flashing during factory subassembly.
- The full assembly model number and any applicable NFRC ID number is printed on an adhesive label that will need to be applied to a specified interior surface at installation

6.4 VELUX SUN TUNNEL™ TCC, TCR, TGC, TGF, TGR, TMC, TMF, and TMR skylights covered by this report shall be identified with temporary labeling that includes the following information:

- Manufacturer's name and address, tested model size and designation, dome type, NFRC-certified ratings and WDMA or other approved labeling agencies.
- Primary and secondary designators as required by the AAMA/WDMA/CSA 101/I.S.2/A440 specification including but not limited to the positive and negative performance grade ratings.
- IAPMO ES or UES Marks of Conformity and evaluation report number (ER-199).



8.0 SUBSTANTIATING DATA

Reports of component and assembly testing and evaluation in accordance with AAMA/WDMA/CSA 101/I.S.2/A440-11, NFRC 100, 200 and 500.

8.0 CONTACT INFORMATION

VELUX AMERICA, LLC.

P.O. Box 5001

Greenwood, South Carolina 29648-5001

(864) 941-4828

www.veluxusa.com



9.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on Verco America, LLC's Deck Mount Glass-Glazed Unit Skylights, Curb Mount Glass-Glazed Unit Skylights and Tubular Daylighting Devices to assess conformance to the codes shown in Section 1.0 of this report, and serves as documentation of the product certification.

Brian Gerber, P.E., S.E.
Vice President, Technical Operations
Uniform Evaluation Service

Richard Beck, PE, CBO, MCP
Vice President, Uniform Evaluation Service

GP Russ Chaney
CEO, The IAPMO Group

For additional information about this evaluation report please visit

www.uniform-es.org or email us at info@uniform-es.org



EVALUATION REPORT

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Table 1 – VELUX FS Skylights – Glass Weight = 5 psf

Skylight Description		NAFS Performance Grades		Other NAFS Designators		
Size Code	Unit size ⁽¹⁾ (inches)	Download (PG _{Pos})	Uplift (PG _{Neg})	Primary	Maximum Air Leakage ⁽²⁾	Max. Pressure with No Water Penetration ⁽²⁾
A06	14-½ x 45-3/4	+16,758 Pa (+350 psf)	-5,040 Pa (-105 psf)	SKG-PG105 775x1397* (31x55*)	0.1 L/s/m ² (<0.01 cfm/ft ²)	720 Pa (15 psf)
C01	21 x 26-7/8					
C04	21 x 37-7/8					
C06	21 x 45-3/4					
C08	21 x 54-7/16					
D26	22-½ x 22-15/16					
D06	22-½ x 45-3/4					
M02	30-1/16 x 30					
M04	30-1/16 x 37-7/8					
M06	30-1/16 x 45-3/4					
M08	30-1/16 x 54-7/16					
S01	44-¼ x 26-7/8	+7,670 Pa (+160 psf)	-3,360 Pa (-70 psf)	SKG-PG70 1137x1175 (45x46)	0.1 L/s/m ² (0.01 cfm/ft ²)	720 Pa (15 psf)
S06	44-1/4 x 45-3/4					

⁽¹⁾ Rough opening dimensions⁽²⁾ Based on tested size indicated in Primary Designator**Table 2 – VELUX VS, VSE and VSS Skylights – Glass Weight = 5 psf**

Skylight Description		NAFS Performance Grades		Other NAFS Designators		
Size Code	Unit size ⁽¹⁾ (inches)	Downward (PG _{Pos})	Uplift (PG _{Neg})	Primary	Maximum Air Leakage ⁽²⁾	Max. Pressure with No Water Penetration ⁽²⁾
C01	21 x 26-7/8	+19,152 Pa (+440 psf)	-5,040 Pa (-105 psf)	SKG-PG105 775x1390* (30x55*)	0.1 L/s/m ² (<0.01 cfm/ft ²)	720 Pa (15 psf)
C04	21 x 37-7/8					
C06	21 x 45-3/4					
C08	21 x 54-7/16					
M04	30-1/16 x 37-7/8					
M06	30-1/16 x 45-3/4					
M08	30-1/16 x 54-7/16					
S01	44-1/4 x 26-7/8	+17,715 Pa (+370 psf)	-3,120 Pa (-65 psf)	SKG-PG65 1197x1238 (47x49)	0.1 L/s/m ² (0.02 cfm/ft ²)	720 Pa (15 psf)
S06	44-1/4 x 45-3/4					

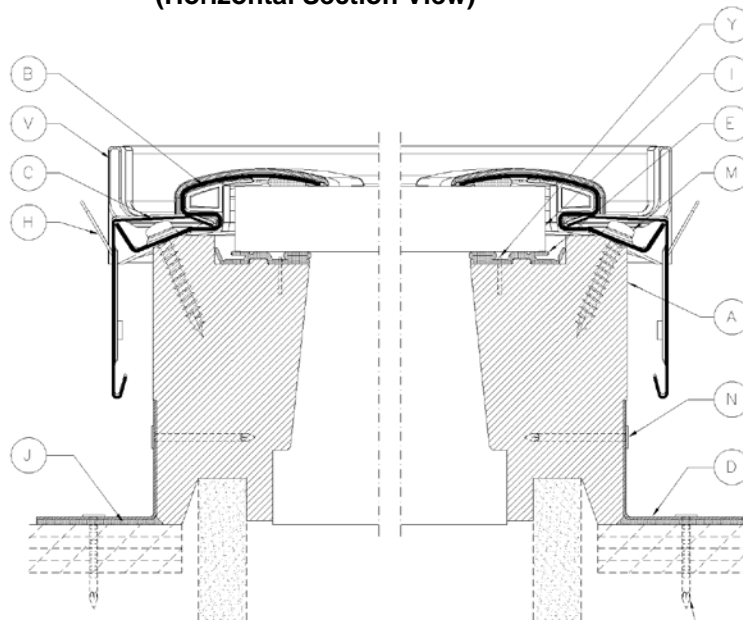
⁽¹⁾ Rough opening dimensions⁽²⁾ Based on tested size indicated in Primary Designator**Table 3: Deck Mount Skylights - Energy, Light and Comfort**

Model/Glazing	U-Factor (Btu/ft ² °F/hr)	Solar Heat Gain Coefficient (SHGC)	Visible Transmittance (VT)	Condensation Resistance (CR)
FS ...04	0.44	0.26	0.60	50
FS ...06	0.42	0.26	0.60	52
FS ...08	0.44	0.25	0.44	50
FS ...99 94	0.38	0.26	0.60	42
VS...04	0.42	0.23	0.53	53
VS...06	0.40	0.23	0.52	55
VS...08	0.42	0.22	0.39	53
VS...99 94	0.37	0.23	0.52	44

1. U-factors and Solar Heat Gain Coefficient, Visible Transmittance have been determined in accordance with NFRC 100 and NFRC 200, respectively by an accredited, independent laboratory, and labeled and certified by the manufacturer.

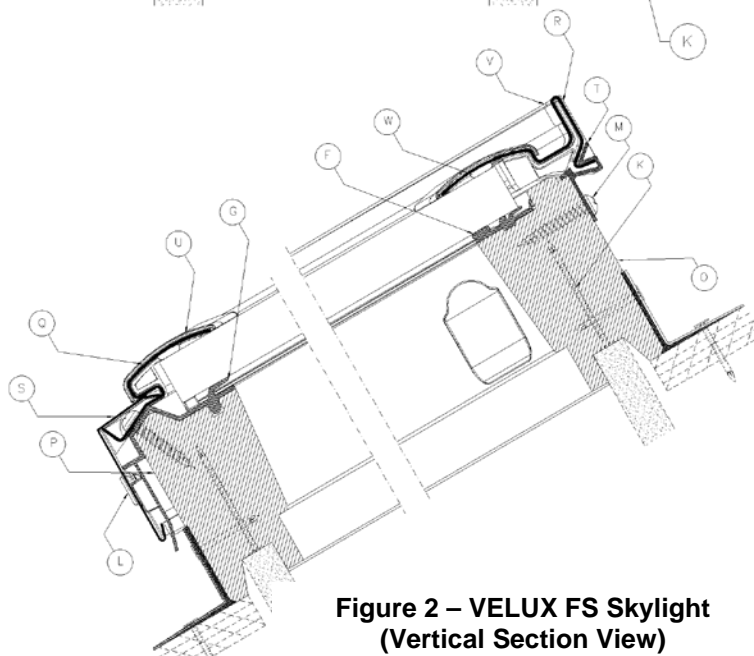
2. Condensation Resistance have been determined in accordance with NFRC 500 by an accredited, independent laboratory, and labeled and certified by the manufacturer.

**Figure 1 – VELUX FS Skylight
(Horizontal Section View)**



COMPONENT SCHEDULE	
ITEM	COMPONENT
A	Side Frame
B	Side glazing profile
C	Side frame cover
D	Deck Seal
E	FSS gasket
F	TGS gasket
G	UFA gasket
H	Frame cover with tab
I	Pane
J	Foam, Deck seal

FASTENER SCHEDULE	
ITEM	FASTENER
K	Nail
L	Plug
M	Screw
N	Nail
Y	Staple



**Figure 2 – VELUX FS Skylight
(Vertical Section View)**

COMPONENT SCHEDULE	
ITEM	COMPONENT
O	Top Frame
P	Bottom Frame
Q	Bottom glazing profile
R	Top glazing profile
S	Bottom frame cover
T	Top glazing profile retainer
U	Bottom corner key
V	Top left corner key
W	Sealant

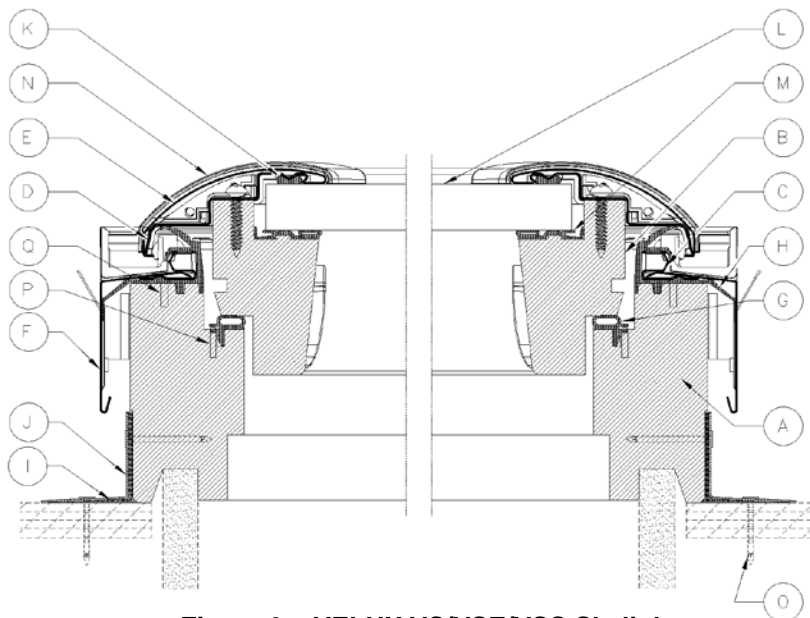


Figure 3 – VELUX VS/VSE/VSS Skylight
(Horizontal Section View)

COMPONENT SCHEDULE	
ITEM	PART/COMPONENT
A	Side frame
B	Side sash
C	GSP rail
D	Glazing profile
E	Covering
F	Side & Bottom Frame covering
G	Frame gasket
H	FTSA gasket
I	Foam, Deck seal
J	Deck seal
K	Sealant
L	Pane
M	FSS gasket
N	Sash corner key

COMPONENT SCHEDULE	
ITEM	COMPONENT
Y	Top frame
Z	Top sash
AA	Bottom frame
BB	Bottom sash
CC	Hinge corner key
DD	Hinge corner key
EE	GSP rail
FF	Operator cover
GG	BSCA gasket
HH	TGS gasket
II	Frame Hinge
JJ	Sash Hinge
KK	Glazing profile
LL	Frame cover
MM	Covering
NN	TSFA Frame gasket
OO	FTSA gasket
PP	Bottom frame gasket
QQ	Foam, Sash hinge
RR	Operator

FASTENER SCHEDULE	
ITEM	PART/COMPONENT
O	Nail
P	Staple
Q	Staple

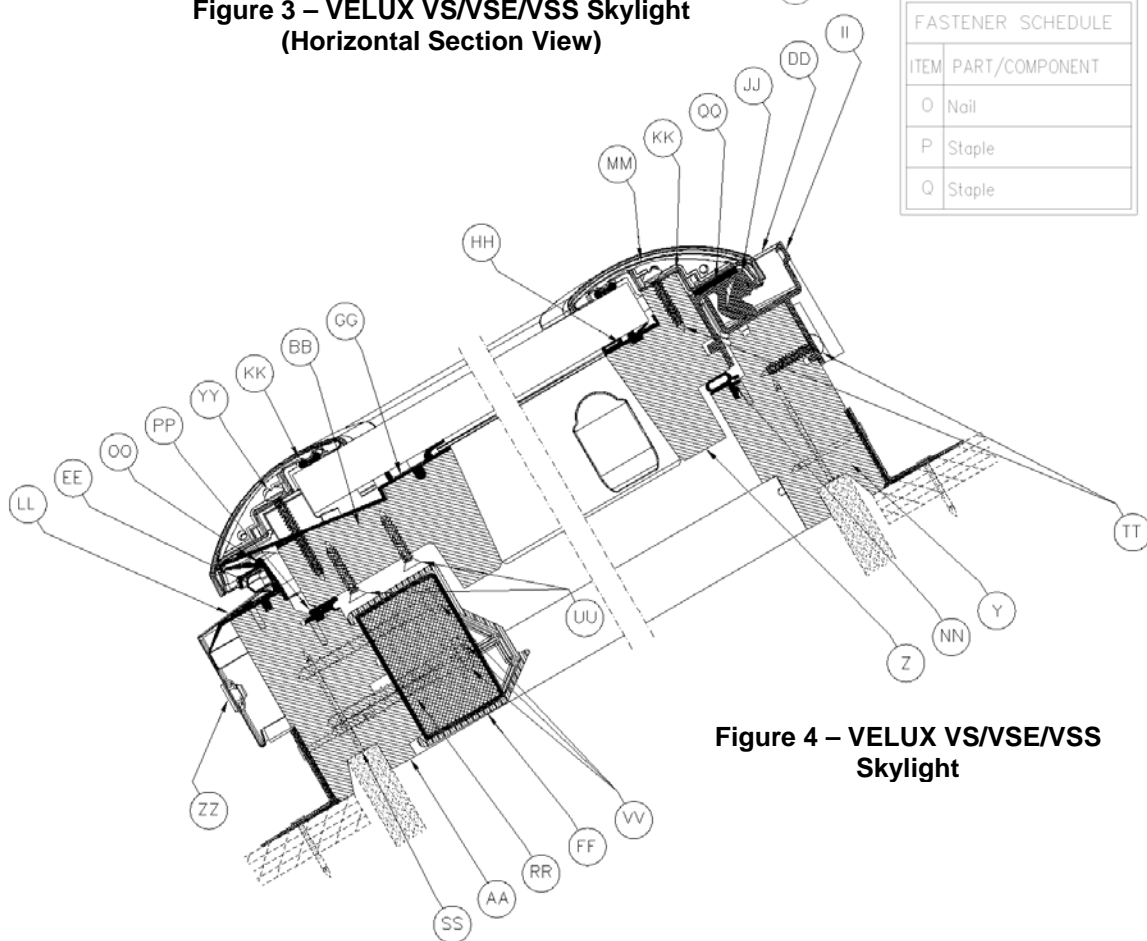


Figure 4 – VELUX VS/VSE/VSS
Skylight

FASTENER SCHEDULE	
ITEM	COMPONENT
SS	Nail
TT	Screw
UU	Screw
VV	Wood screw
YY	Screw
ZZ	Plug



EVALUATION REPORT

Number: 199

Originally Issued: 10/08/2010

Revised: 09/12/2017

Valid Through: 09/30/2018

Table 4 – VELUX FCM Skylights – Glass Weight = 5 psf

Skylight Description		NAFS Performance Grades		Other NAFS Designators		
Size Code	Unit size ⁽¹⁾ (inches)	Download (PGPos)	Uplift (PGNeg)	Primary	Maximum Air Leakage ⁽²⁾	Max. Pressure with No Water Penetration ⁽²⁾
1430	17-1/2 x 33-1/2	+11,990 Pa (+250 psf)	-5,760 Pa (-120 psf)	SKG-PG120 1308 x 1308 (51x51*)	0.1 L/s/m ² (0.02 cfm/ft ²)	720 Pa (15 psf)
1446	17-1/2 x 49-1/2					
2222	25-1/2 x 25-1/2					
2230	25-1/2 x 33-1/2					
2234	25-1/2 x 37-1/2					
2246	25-1/2 x 49-1/2					
3030	33-1/2 x 33-1/2					
3046	33-1/2 x 49-1/2					
3434	37-1/2 x 37-1/2					
4646	49-1/2 x 49-1/2					
2270	25-1/2 x 73-1/2	+ 9,590 Pa (+200 psf)	-4,800 Pa (-100 psf)	SKG-PG100 660 x1854* (26 x 73*)	0.1 L/s/m ² (0.01 cfm/ft ²)	720 Pa (15 psf)

Table 5 – VELUX VCE, VCM and VCS Skylights – Glass Weight = 5 psf

Skylight Description		NAFS Performance Grades		Other NAFS Designators		
Size Code	Unit size ⁽¹⁾ (inches)	Downward (PGPos)	Uplift (PGNeg)	Primary	Maximum Air Leakage ⁽²⁾	Max. Pressure with No Water Penetration ⁽²⁾
2222	25-1/2 x 25-1/2	+11,052 Pa (+230 psf)	-2,560 Pa (-45 psf)	SKG-PG45 1305 x 1305 (51x51*)	0.1 L/s/m ² (0.02 cfm/ft ²)	720 Pa (15 psf)
2234	25-1/2 x 37-1/2					
2246	25-1/2 x 49-1/2					
3030	33-1/2 x 33-1/2					
3046	33-1/2 x 49-1/2					
3434	37-1/2 x 37-1/2					
4646	49-1/2 x 49-1/2					

⁽¹⁾ Outside Curb dimensions

⁽²⁾ Based on tested size indicated in Primary Designator

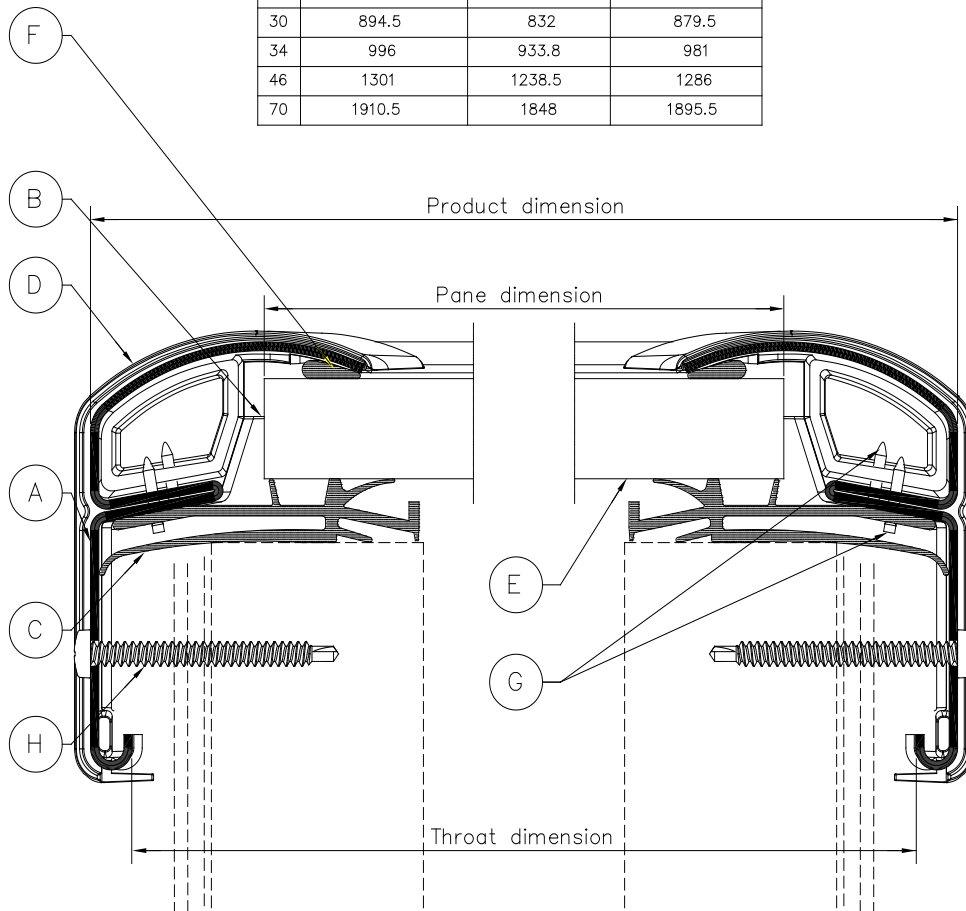
Table 6: Curb Mount Skylights - Energy, Light and Comfort

Model/Glazing	U-Factor (Btu/ft ² /°F/hr)	Solar Heat Gain Coefficient (SHGC)	Visible Transmittance (VT)	Condensation Resistance (CR)
FCM ...04	0.48	0.27	0.63	50
FCM ...06	0.46	0.27	0.62	51
FCM ...08	0.48	0.26	0.46	50
FCM ...99 94	0.43	0.25	0.57	42
VC...04	0.53	0.24	0.55	58
VC...06	0.50	0.24	0.54	59
VC...08	0.53	0.23	0.40	58
VC...99 94	0.48	0.22	0.49	49

1. U-factors and Solar Heat Gain Coefficient, Visible Transmittance shall be determined in accordance with NFRC 100 and NFRC 200, respectively and by an accredited, independent laboratory, and labeled and certified by the manufacturer.
2. Condensation Resistance shall be determined in accordance with NFRC 500 and by an accredited, independent laboratory, and labeled and certified by the manufacturer.

**Figure 5 – VELUX FCM Skylight
Horizontal Section View
(Typical for Vertical Section View)**

Code	Product dimensions	Pane dimensions	Throat dimensions
14	488	426	473
22	691	629	676
30	894.5	832	879.5
34	996	933.8	981
46	1301	1238.5	1286
70	1910.5	1848	1895.5



COMPONENT SCHEDULE	
ITEM	PART/COMPONENT
A	Outer Frame
B	Pane Spacer
C	Inner frame gasket
D	Corner Key
E	Pane
F	Sealant

FASTENER SCHEDULE	
ITEM	PART/COMPONENT
G	T-nail
H	Wood Screw

Figure 6 – VELUX VCM/VCE/VCS Skylight Horizontal Section View

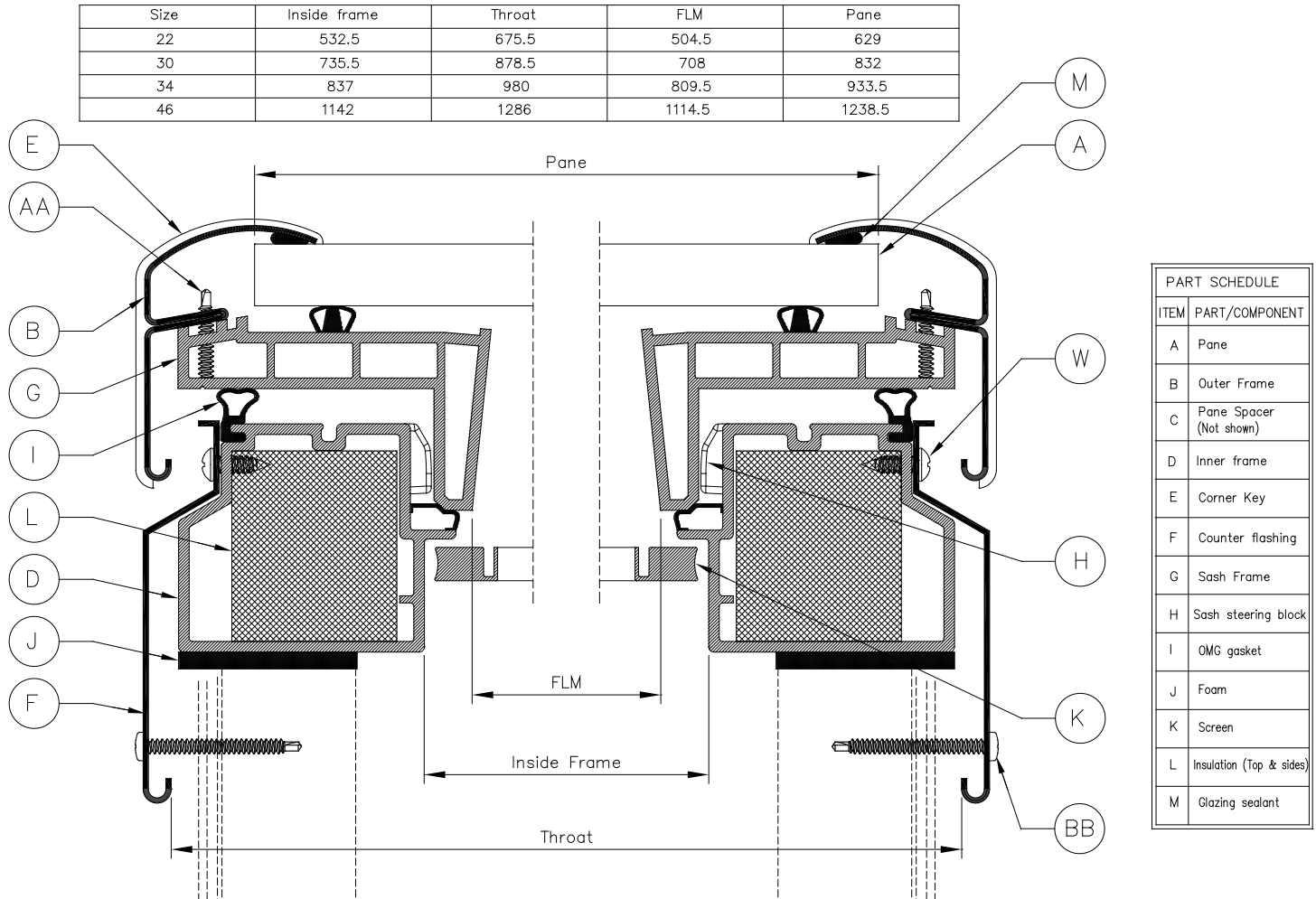
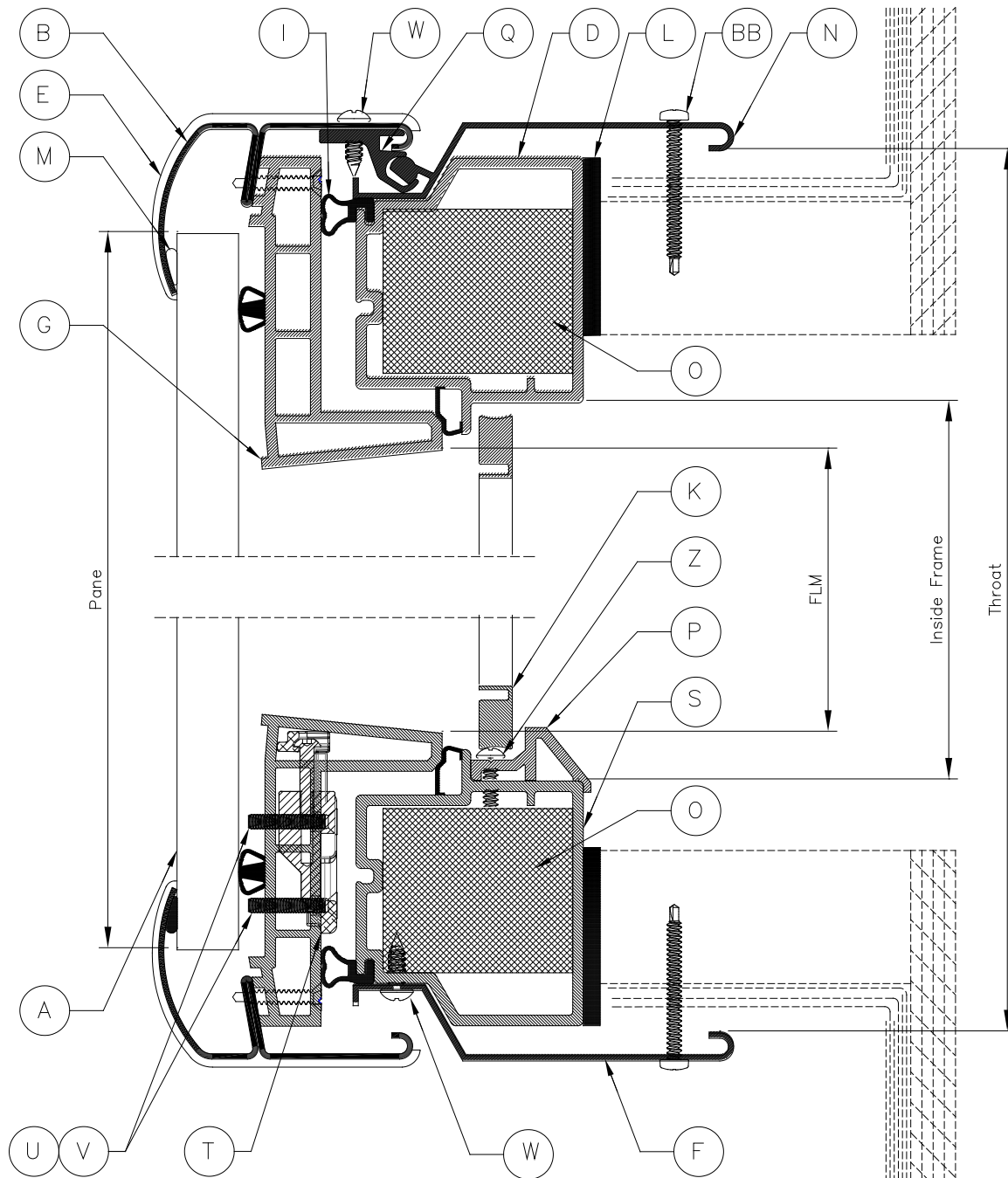


Figure 7 – VELUX VCM/VCE/VCS Skylight Vertical Section View

Size	Inside frame	Throat	FLM	Pane
22	532.5	675.5	504.5	629
30	735.5	878.5	708	832
34	837	980	809.5	933.5
46	1142	1286	1114.5	1238.5



PART SCHEDULE	
ITEM	PART/COMPONENT
N	Counter flashing
O	Insulation (Bottom, left)
P	Screen retainer (Bottom only)
Q	Hinge socket
R*	Plug
S	Operator
T	Chain attachment
U	Screw
V	8-32 Threaded Insert
W	Self tapping Pan head Screw
X*	Machine Screw
Y*	Brass Insert
Z	Screw
AA	Screw
BB	Pan Head Screw

* Note designates, this Item is Not Shown
Items X (Machine Screw) & Item Y (Brass Insert) are used in Item S (Operator).



Table 7 – VELUX SUN TUNNEL™ Skylights (Residential)

Skylight Description		NAFS Performance Grades		Other NAFS Designators		
Model Code	Unit size ⁽¹⁾ (inches)	Download (PG _{Pos})	Uplift (PG _{Neg})	Primary	Maximum Air Leakage ⁽²⁾	Max. Pressure with No Water Penetration ⁽²⁾
TGF 014	14	+14,364 Pa (+300 psf)	-6,064 Pa (-125 psf)	TDDCC-PG125 Size Tested 559 mm (22")	0.2 L/s/m ² (0.04 cfm/ft ²)	720 Pa (15 psf)
TGF 022	22					
TMF 014	14					
TGR 010	10					
TGR 014	14					
TMR 010	10					
TMR 014	14					
TCR 014	14	+14,364 Pa (+300 psf)	-7,980 Pa (-165 psf)	TDDCC-PG165 Size Tested 356 mm (14")	0.5 L/s/m ² (0.09 cfm/ft ²)	720 Pa (15 psf)

Table 8 – VELUX SUN TUNNEL™ Skylights (Commercial)

Skylight Description		NAFS Performance Grades		Other NAFS Designators		
Model Code	Unit size ⁽¹⁾ (inches)	Download (PG _{Pos})	Uplift (PG _{Neg})	Primary	Maximum Air Leakage ⁽²⁾	Max. Pressure with No Water Penetration ⁽²⁾
TCC 014	14	+14,364 Pa (+300 psf)	-7,023 Pa (-145 psf)	TDDOC/TDDCC- PG145 Size Tested 356 mm (14")	1.4 L/s/m ² (0.28 cfm/ft ²)	720 Pa (15 psf)
TGC 014						
TMC 014						
TCC 022	22	+14,364 Pa (+300 psf)	-6,224 Pa (-130 psf)	TDDOC/TDDCC- PG130 Size Tested 559 mm (22")	1.5 L/s/m ² (0.30 cfm/ft ²)	720 Pa (15 psf)
TGC 022						

⁽¹⁾ Nominal tunnel size

⁽²⁾ Based on tested size indicated in Primary Designator

Table 9: SUN TUNNEL™ Skylights - Energy and Comfort

Assembly Names	U-Factor (Btu/ft ² /°F/hr)	Solar Heat Gain Coefficient (SHGC)
TGF/TMF (all)	0.50	0.21
TGR/TMR ...E0 (w/ Energy Kit)	0.38	0.25
TCR ...E0 (w/ Energy Kit)	0.38	0.25
TCC/TGC/TMC 014 ...TOE0 (w/ Energy Kit) Insulation at Roof	0.55	0.28
TCC 014 ...THE0 (w/ Energy Kit) Insulation at Ceiling	0.38	0.25
TCC 022 ...TTE0 (w/ Energy Kit) Insulation at Roof	0.43	0.22
TGC 022 ...TTE0 (w/ Energy Kit) Insulation at Roof	0.41	0.26

1. U-factors and Solar Heat Gain Coefficient shall be determined in accordance with NFRC 100 and NFRC 200, respectively and by an accredited, independent laboratory, and labeled and certified by the manufacturer.

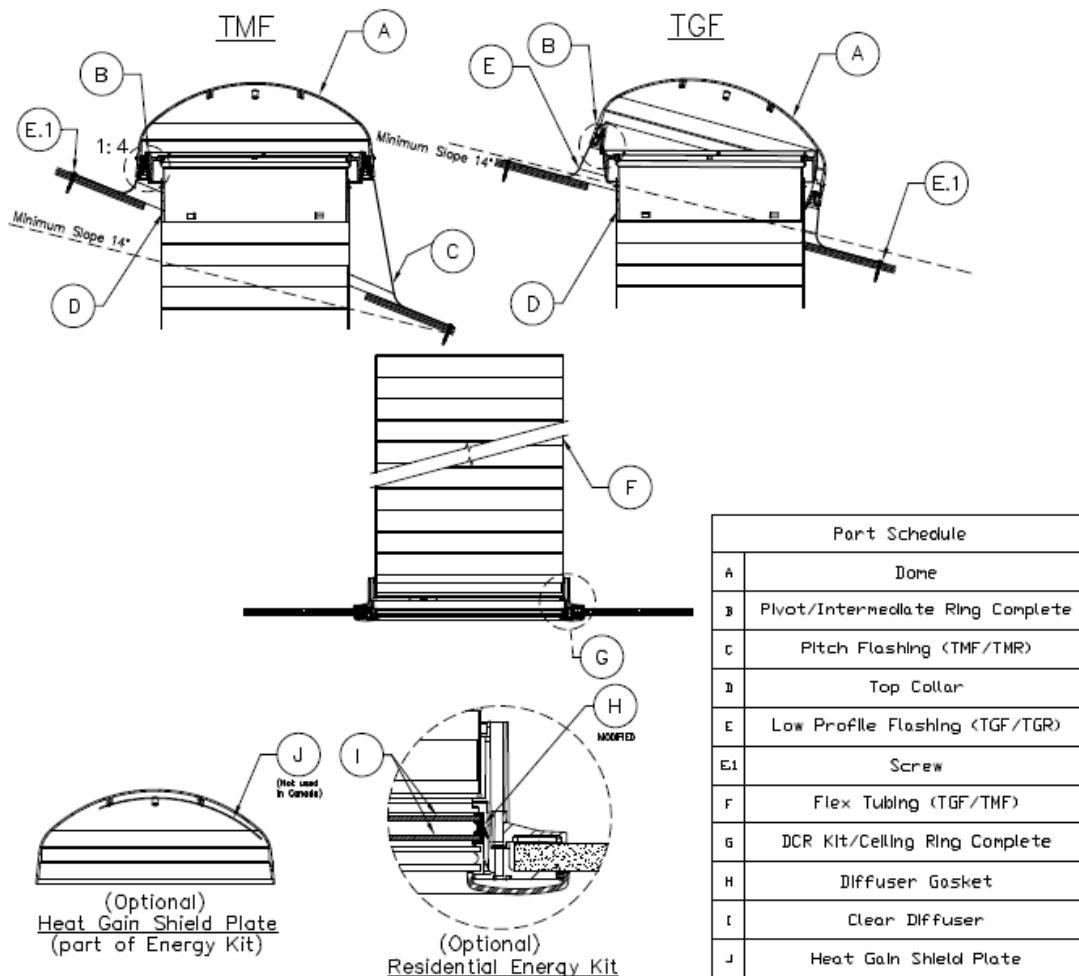
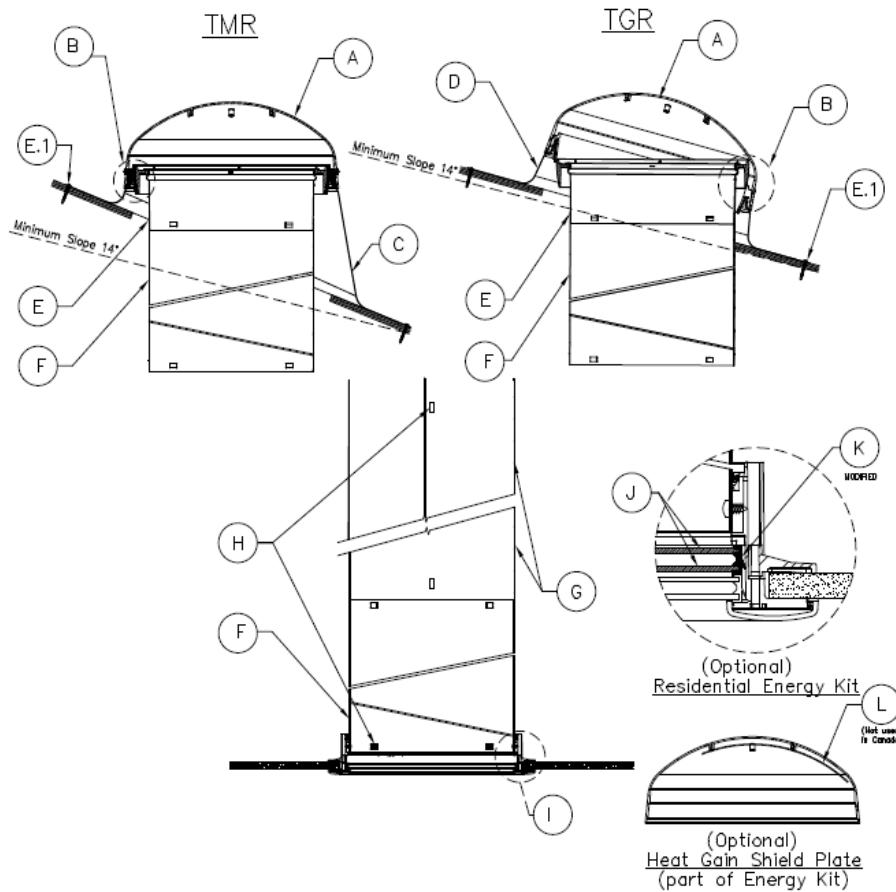


Figure 8 – VELUX SUN TUNNEL™ (TGF/TMF) Skylight



Part Schedule	
A	Dome
B	Pivot/Intermediate Ring Complete
C	Pitched Flashing (TMF/TMR)
D	Low Profile Flashing (TGF/TGR)
E	Top Collar
E.1	Screw
F	Elbow (TGR/TMR)
G	Rigid Tube (TGR/TMR)
H	Pull Clip (TGR/TMR)
I	DCR Kit/Ceiling Ring Complete
J	Clear Diffuser
K	Diffuser Gasket
L	Heat Gain Shield Plate

Figure 9 – VELUX SUN TUNNEL™ (TGR/TMR) Skylight

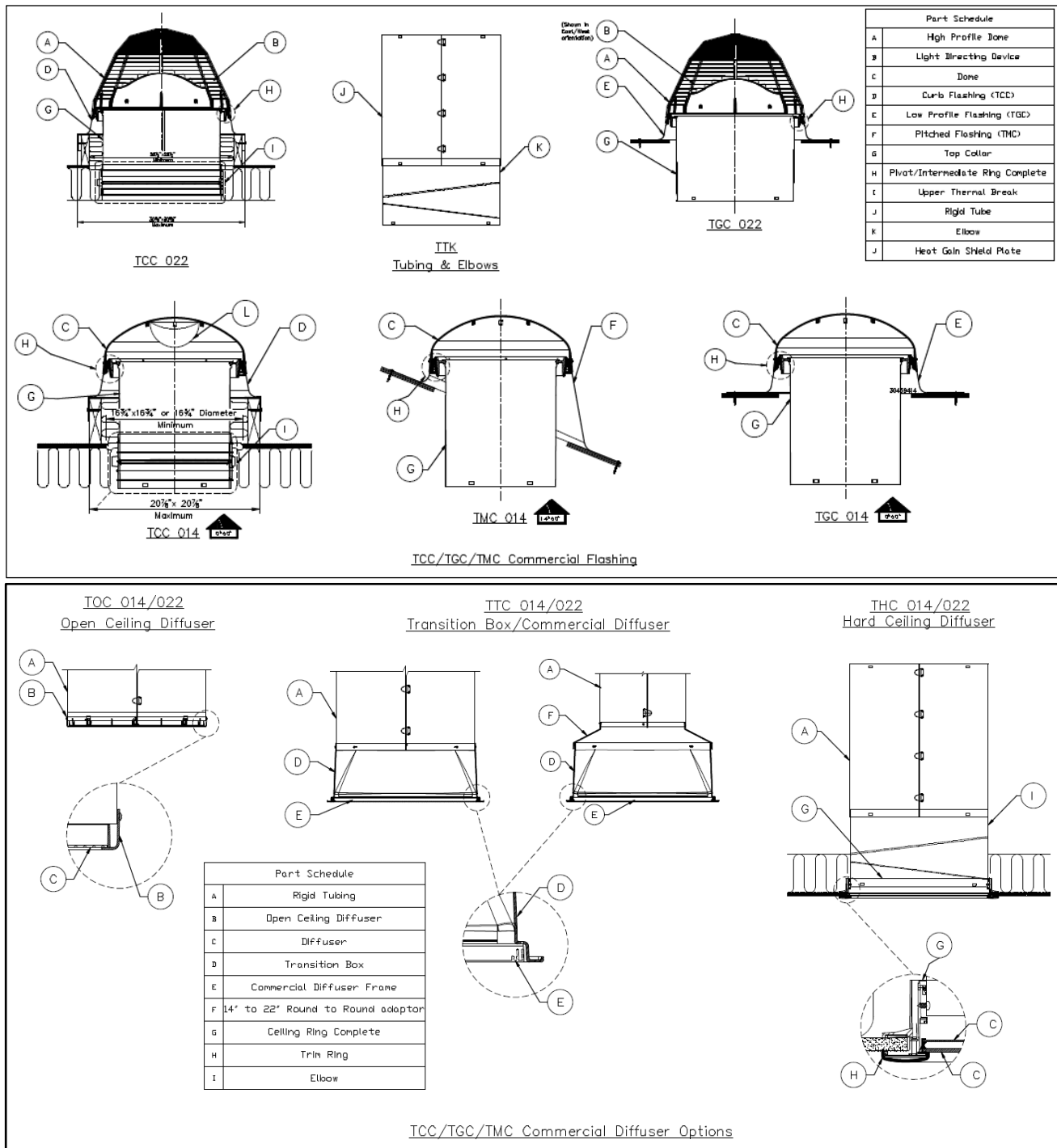


Figure 10 – VELUX SUN TUNNEL™ (TCC/TCR/TGC/TMC) Skylight
(Note – TCR is similar to TCC 014 with THC Diffuser)



CALIFORNIA SUPPLEMENT

VELUX AMERICA, LLC

- **VELUX FS, VS, VSE and VSS Deck Mount Glass-Glazed Unit Skylight**
- **VELUX FCM, VCE, VCS and VCM Curb Mount Glass-Glazed Unit Skylights**
- **VELUX SUN TUNNEL™ Skylights (TCC, TCR, TGC, TGF, TGR, TMC, TMF and TMR) (plastic-glazed tubular daylighting devices)**

CSI Section:

08 62 00 Unit Skylights

1.0 Compliance with the following codes

- 2016 California Building Code (CBC)

2.0 Requirements:

All information in ER-199, dated 09/12/2017 corresponding to compliance under the International Building Code (IBC) also apply to compliance under the CBC. Additional requirements for compliance with the CBC are provided in Section 3.0 of this supplement

3.0 Additional Requirements:

3.1 Compliance for Materials Used

Reports of material testing and evaluation in accordance with Clauses 10 and 11 of AAMA/WDMA/CSA 101/I.S.2/A440-11 and -08 comply with the applicable requirements of CBC Chapter 7A and Section 1505.1 for fire resistance and Section 2405 and Chapter 26 for light transmitting plastic components. Acrylic Domes are in compliance with CBC Sections 2606 and 2610.

3.2 Glazing Requirements

For those applications subject to the requirements of the Division of the State Architect-Structural Safety/Community Colleges (DSA-SS/CC) or the Office of Statewide Planning and Development (OSHPD 1 & 4), Table 1 of this supplement provides information to verify compliance with the additional provisions of Section 2403.2.1 and Table 2403.2.1 of the 2016 California Building Code.

4.0 Contact Information

VELUX America, LLC.

P.O. Box 5001

Greenwood, South Carolina 29648-5001

(864) 941-4828

www.veluxusa.com

Table 1 –Glass Area, Nominal Frame Lap and Glass Edge Clearance

Skylight Model	Largest Size Glass Area (ft ²)	Nominal Design Values - mm (in.)					
		Frame Lap			Glass Edge Clearance		
		Sides	Bottom	Top	Sides	Bottom	Top
FS	13.29	23 (7/8)	23 (7/8)	22 (7/8)	3 (1/8)	4 (1/8)	6 (1/4)
VS / VSE / VSS	12.02	12 (1/2)	14 (1/2)	14 (1/2)	4.5 (3/16)	3 (1/8)	3 (1/8)
FCM	16.51	18 (3/4)	18 (3/4)	18 (3/4)	31 (1-1/4)	31 (1-1/4)	31 (1-1/4)
VCE / VCM / VCS	16.51	18 (3/4)	18 (3/4)	18 (3/4)	31 (1-1/4)	31 (1-1/4)	31 (1-1/4)