

**VELUX® HFC and HVC Modular Skylights**

VELUX Modularity sums up the benefits of having a complete product system with 100 percent prefabricated components, one single module design, and an innovative installation principle that ensures fast and easy installation. All essential components are created, tested and integrated in a controlled environment and pre-fitted prior to delivery. A unique bracket system with a simple clamp design guarantees a predictable installation process, making it possible to fit an entire module within minutes.

VELUX Modular Skylights were developed in close cooperation with the renowned architects from London-based Foster + Partners. Together we have created an intelligent design that meets all international standards and requirements for commercial buildings.

Glazing Options: With low-energy glazing units VELUX Modular Skylights offer one of the lowest overall U-values for frame and glazing assembly on the market. Units are available with standard insulating laminated glass, with high-performance low-e glazing and triple-glazing unit options for both fixed and venting modules.

Composite Pultruded Frame and Sash: A life-cycle assessment shows that VELUX Modular Skylights offer a better environmental profile than traditional aluminum skylights, due to a better overall energy performance. The unique engineered composite of glass-fiber and polyurethane offer low thermal conductivity, low thermal expansion, and high section modulus – all highly desirable characteristics for roof-mounted daylighting systems.

Flashings: The prefabricated modular flashing comes with integrated insulation and snow stop.

Four types of unit configurations available:

Longlights are bands of VELUX Modular Skylights, pre-fitted with installation brackets and clamps that guarantee a fast and secure installation. The flashing allows for configurations with a pitch of 5 to 30 degrees.

Wall-mounted Longlights are bands of VELUX Modular Skylights mounted against a vertical wall, pre-fitted with installation brackets and clamps that guarantee a fast and secure installation. The flashing allows for configurations with a pitch of 5 to 45 degrees.

Ridgelight, with a 25 – 40 degree pitch, is a classic looking solution, consisting of two rows of skylights that support each other. The construction is a self-supporting structure. The galvanized steel mounting bracket at the bottom and the project-specific interlocking ridge bracket at the top ensures a precise and easy installation without need for on-site adjustment.

Northlights are strips of VELUX Modular Skylights. The characteristic upright design is primarily for installations that are directed towards the northern hemisphere for soft and reflected lighting. Northlight installations are applicable for pitches from 25 to 90 degrees. The galvanized steel bracket system for fastening the module consists of brackets and clamps in top and bottom, ensuring a precise and easy installation.

Ventilation and roller blind sunscreening components are subtly integrated within the VELUX Modular Skylight design. Operators for venting modules and roller shades are concealed in the slim profiles, meaning there is no visual difference to distinguish between fixed and venting modules.

Venting Modular Skylights and blinds are powered and controlled from a VELUX control unit. This control unit is an open system solution connected to ± 24 V DC and can be connected to, and integrated in, common building automation fieldbus systems. A combined rain and wind sensor is available as an accessory.

To achieve a trouble-free installation process the sub-construction needs to accommodate the unique module installation system. VELUX Modular Skylights require an accurate fixed dimensioned substructure. Likewise the strength of the sub-construction needs to be calculated from project to project, based on the building design and application size. Hence the sub-construction is not part of the prefabricated modular system, but VELUX supplies the critical dimensions needed for accurate fit.

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 in the markets where they are sold. Our test procedures include such aspects as load capacity, air and water tightness in a test chamber and a weather simulator, mechanical reliability, impact resistance, durability, U-factor, solar heat gain, burn brand resistance and surface quality.

Contact **VELUX America LLC**, Greenwood, SC 29648; [www.VELUXusa.com](http://www.VELUXusa.com); (888) 878-3589.

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SECTION 08 63 00 – METAL-FRAMED SKYLIGHTS

1. GENERAL
   * + 1. SECTION INCLUDES
          1. Aluminum-clad composite polymer-framed skylight daylighting assemblies.
       2. RELATED REQUIREMENTS

Specifier: If retaining optional "RELATED REQUIREMENTS" article, edit to include sections applicable to project.

* + - * 1. Division 07 roofing section for roofing terminations at skylight flashings.
        2. Section 086200 "Unit Skylights" for unit skylights without reflective tubes.
        3. Section 112429 "Facility Fall Protection" for fixed fall protection units for skylights.
        4. Division 26 electrical sections for conduit and wiring for skylight actuator controls and electrically-operated roller shades.
      1. REFERENCE STANDARDS

Specifier: If retaining optional "REFERENCE STANDARDS" article, edit to include only standards cited in edited section.

* + - * 1. 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.
        2. American Architectural Manufacturers Association ([www.aamanet.org](http://www.aamanet.org)), Window & Door Manufacturers Association ([www.wdma.com](http://www.wdma.com)) Canadian Standards Association, ([www.csagroup.org/us/en/services](http://www.csagroup.org/us/en/services)):

AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/ Specification for Windows, Doors, and Skylights (NAFS)

* + - * 1. ASTM International: [www.astm.org](http://www.astm.org):

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

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

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

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

ASTM E 547 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference

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

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

* + - * 1. Illuminating Engineering Society of North America (IESNA): [www.ies.org](http://www.ies.org):

IESNA – The Lighting Handbook

* + - * 1. Code of Federal Regulations:

29 CFR 1910.29 (e)  - Occupational Safety and Health Administration Standard: Fall protection systems and falling object protection – criteria and practices

* + - * 1. National Fenestration Rating Council: [www.nfrc.org](http://www.nfrc.org):

NFRC 100 - Procedure for Determining Fenestration Product U-factors

NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

* + - * 1. National Fire Protection Association: [www.nfpa.org](http://www.nfpa.org):

NFPA 70 - National Electrical Code

* + - 1. COORDINATION
         1. Coordinate dimensions, locations and details of skylight curbs and sub-construction [specified in Section 061053 “Miscellaneous Carpentry”] [specified in Section 077200 “Roof Assemblies”] with approved shop drawings.
      2. PREINSTALLATION MEETINGS
         1. Preinstallation Conference: Conduct conference at project site prior to delivery of skylights and installation of roof deck and curbs.
      3. ACTION SUBMITTALS
         1. Product Data: For skylights. Include standard construction details, product performance characteristics, and material descriptions, dimensions of individual components and profiles, and finishes, and sub-construction interface requirements.

Include test reports of qualified independent testing agency or third party certificates verifying compliance with performance requirements.

* + - * 1. Shop Drawings: For skylight assemblies. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.

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 venting units or roller blinds are required for project.

Wiring Diagrams: For power and control wiring for [venting unit actuators] [and] [roller blinds].

* + - 1. INFORMATIONAL SUBMITTALS
         1. Qualifications: For manufacturer and Installer.
         2. Test reports of qualified independent testing agency or third party certificates verifying compliance with performance requirements.
         3. Warranty: Sample of manufacturer warranty.
         4. End Reactions: Manufacturer provides reaction loads to be accommodated by the subconstruction provided by others, based on uniform and concentrated design loads specified by the purchasing entity.
      2. CLOSEOUT SUBMITTALS
         1. Operation and Maintenance Data for skylights [roller shades] [and] [controller units].
      3. 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.

* + - * 1. Manufacturer Qualifications: A qualified manufacturer listed in this section, producing specified products in ISO 9001- and ISO 14001- certified facilities, with minimum 30 years' experience in the US manufacturing similar products in successful use on similar projects and able to provide skylights meeting requirements.

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

Approval of Manufacturers and Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

Completed and signed Substitution Request form.

Product data, including photometric data and independent test data indicating compliance with requirements.

Sample product warranty.

* + - * 1. Installer Qualifications: Experienced installer equipped and trained by manufacturer for installation and maintenance of units required for this project.
      1. WARRANTY
         1. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of skylights that fail in materials or workmanship under normal use within specified warranty period.

Failures include, but are not limited to, the following:

Deterioration of metals, metal finishes and other materials beyond normal weathering.

Water infiltration through skylight assembly.

Warranty Period:

Skylight Assembly: 10 years from completion of work.

1. PRODUCTS
   * + 1. MANUFACTURERS
          1. Basis-of-Design Product: Subject to compliance with requirements, provide products of **VELUX America LLC**, Greenwood, SC 29648; [www.VELUXusa.com](http://www.VELUXusa.com); (800) 888‑3589, [specifications@veluxusa.com](mailto:specifications@veluxusa.com).

Specifier: Retain "Substitutions" paragraph and select one of two options based upon project requirements.

* + - * 1. Substitutions: [None allowed by Owner] [As permitted under Instructions to Bidders and Section 012500 "Substitution Procedures"].
        2. Source Limitations: Obtain skylights through single source from basis-of-design manufacturer.
      1. ALUMINUM-CLAD COMPOSITE POLYMER-FRAMED SKYLIGHTS
         1. System Description: Modular skylight daylighting assemblies with composite polymer structural frames, formed aluminum exterior cladding, and prefinished interior surfaces, factory-assembled and factory-glazed with insulating glass units, with mounting hardware, prefabricated prefinished modular flashing, and accessories as required to meet installation and performance requirements indicated.

Specifier: Retain one or both options in "Basis of Design" paragraph below corresponding to fixed (HFC) and venting (HVC) units.

Retain one or more of three configuration subparagraphs a, b and c, based upon Project requirements.

Basis of Design: **VELUX America LLC, Model [HFC Fixed] [and] [HVC Venting] Velux Modular Skylights** in sizes indicated on the drawings in the following configuration:

[Pitched Installation: 5 to 30 degree slope: **VELUX Longlight**.]

[Roof Monitor Installation: 25 to 90 degree slope: **VELUX Northlight**.]

[Gabled Ridge Installation: 25 to 40 degree slope: **VELUX Ridgelight**.]

[Vertical Wall-mounted installation: 5 to 45 degree slope: **VELUX Wall-mounted Longlight.**]

* + - * 1. Unit Frames and Sash: Pultruded glass-fiber and polyurethane composite frames, with interior factory-finished with white polyurethane coating.
        2. Weatherproofing Gaskets: Manufacturer's standard dual-seal EPDM rubber and PVC perimeter gaskets.
        3. Mounting Hardware: Manufacturer's standard mill-galvanized steel brackets, factory- supplied with flashing kits.
        4. Exterior Cladding: Manufacturer's standard factory-formed 0.06 inch (1.5 mm) thick extruded aluminum, powder-coated in manufacturer standard grey and supplied with flashing kits.

Specifier: VELUX will supply Type ELC, ENC, or ERC flashing kits as required for Longlight, Wall Mounted-Longlight, Northlight, or Ridgelight multiple skylight unit configurations shown on drawings.

* + - * 1. Flashings: Manufacturer's standard factory-formed minimum 0.03 inch ( 0.8 mm) thick roll-formed aluminum sheet, with integrated mineral wool insulation and snow stop, of type required by skylight unit configuration indicated on drawings, powder-coated in manufacturer standard grey.
      1. GLAZING
         1. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace.

Sealing System: Dual seal, with polyisobutylene and silicone primary and secondary sealants.

Spacer: Manufacturer's standard stainless steel non-conductive spacer.

Desiccant: Molecular sieve or silica gel, or a blend of both.

Edge Deletion: Delete low-E coating prior to fabrication of insulating units according to coated glass manufacturer’s instructions.

Installation Sealants: Compatible with one another and with other materials they contact, based on testing and field experience of sealant manufacturer.

Outer lite extends beyond the spacer at the bottom for condensation control.

Specifier: Select one of four glazing unit descriptions below based upon project requirements. Larger modules are produced with “T” variants of the glazings below. “T” variants are comprised of thicker panes.

* + - * 1. [Clear Insulating Laminated Glazing Unit:

Basis of Design Product: **VELUX, Type 10L Low Energy Dual Pane**.

Outdoor lite: Clear toughened glass with no coatings.

Thickness of Outdoor Glass Lite: 0.24 inch (6 mm).

Interspace: 0.87 inch (22 mm) thick, argon-filled.

Indoor lite: Two plies of float glass.

Thickness of each glass ply: 0.19 inch (3 mm).

Minimum thickness of interlayer: 0.03 inch (0.76 mm).

Coating: SILVERSTAR EN2plus low emissivity coating on third surface]

* + - * 1. [High-Performance Low-E Insulating Laminated Glazing Unit:

Basis of Design Product: **VELUX, Type 11L Low Energy with** **Solar Protection Dual Pane**.

Outdoor lite: Fully hardened glass.

Thickness of outdoor glass lite: 0.24 inch (6 mm).

Coating: Sun protection coating referenced as Sun 1 (SunGuard SN 51 HT) on second surface.

Interspace: 0.87 inch (22 mm) thick, argon-filled.

Indoor lite: Two plies of float glass.

Minimum thickness of each glass ply: 0.19 inch (3 mm).

Minimum thickness of interlayer: 0.03 inch (0.76 mm).]

* + - * 1. [High-Performance Low-E Triple Insulating Glazing Unit:

Basis of Design Product: **VELUX, Type 16L Super Low Energy Triple Pane**.

Outdoor lite: Fully hardened glass.

Thickness of outdoor glass lite: 0.24 inch (6 mm).

Coating: SILVERSTAR EN2plus low emissivity coating on second surface.

Interspace: 0.55 inch (14 mm) thick, argon-filled.

Center lite: clear heat strengthened with no coatings.

Thickness of center lite: 0.24 inch (6 mm).

Interspace: 0.55 inch (14 mm) thick, argon-filled.

Indoor lite: Two plies of float glass.

Minimum thickness of each glass ply: 0.19 inch (3 mm).

Minimum thickness of interlayer: 0.03 inch (0.76 mm).

Coating: SILVERSTAR EN2plus low emissivity coating on surface 5]

* + - * 1. [High-Performance Sun 1 Triple Insulating Glazing Unit:

Basis of Design Product: **VELUX, Type 17L Super Low Energy with Solar Protection Triple Pane**.

Outdoor lite: Fully hardened glass.

Thickness of outdoor glass lite: 0.24 inch (6 mm).

Coating: Sun protection coating referenced as Sun 1 (SunGuard SN 51 HT) on second surface. Interspace: 0.55 inch (14 mm) thick, argon-filled.

Center lite: clear heat strengthened with no coatings.

Thickness of center lite: 0.24 inch (6 mm).

Interspace: 0.55 inch (14 mm) thick, argon-filled.

Indoor lite: Two plies of float glass.

Minimum thickness of each glass ply: 0.19 inch (3 mm).

Minimum thickness of interlayer: 0.030 inch (0.76 mm).

Coating: SILVERSTAR EN2plus low emissivity coating on surface 5]

* + - * 1. [Hurricane Impact Clear Laminated Glazing Unit:

Basis of Design Product: **VELUX, Type 10T Impact Low Energy Dual Pane**.

Outdoor lite: Clear toughened glass with no coatings.

Thickness of outdoor glass lite: 0.31 inch (8 mm).

Interspace: 0.87 inch (22 mm) thick, argon-filled.

Indoor lite: Two piles of float glass.

Thickness of each glass ply: 0.19 inch (3 mm).

Minimum thickness of interlayer: 0.03 inch (0.76 mm)

Coating: SILVERSTAR EN2plus low emissivity coating on third surface.]

* + - 1. ACCESSORIES
         1. Roller blind, Electrically-operated: Factory-assembled and installed shade-operator systems, with manufacturer's standard 24 VDC electric motors and pre-adjusted limit switches interlocked with motor controls.

Rollers: Single roller stainless steel tubes with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of blinds for service.

Blind bottom bar: Anodized aluminum.

Blind pulley cables: Stainless steel wire.

Blind material: Manufacturer's standard light-filtering woven polyester material, color [grey] [black] [white] [white flame resistant].

Specifier: The VELUX controller can control venting modular skylights directly and may also be integrated with common building automation field bus systems, including KNX, BACnet, LON, and Modbus.

* + - * 1. Controller for [Venting Units] [and] [Roller Shades]: wall-mounted control module with wall mounted switch, 24 VDC, [allowing integration with building automation system] [and] [incorporating combined rain and wind sensor].

Specifier: Retain "Curbs" paragraph below when required for Project and select option to identify section specifying curb construction. Curbs are not furnished by VELUX.

* + - * 1. Curbs: Refer to [Section 033000 "Cast-in-Place Concrete" for cast-in-place concrete curbs] [Section 077200 "Roof Accessories" for manufactured metal curbs] [Section 061000 "Exterior Carpentry" for site-constructed wood curbs].
      1. PERFORMANCE REQUIREMENTS
         1. Unit Skylight Standard: AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS-edition 2017):

Design Pressure (DP): [HFC fixed module 39.37 inches (1000 mm) x 118.11 inches (3000mm) design pressure of +60 psf and negative design pressure of -100 psf.] [and] [HVC venting module 39.37 inches (1000 mm) x 118.11 inches (3000mm) design pressure of 95 psf and negative design pressure of 50 psf.] [Ridgelight assembly with three HFC fixed modules 39.37 inches (1000 mm) x 94.5 inches (2400 mm) and one HVC venting module 39.37 inches (1000 mm) x 94.5 inches (2400 mm) on both sides with a total assembly design pressure of 70 psf and negative design pressure of 50 psf.]

Water Test Pressure: In accordance with ASTM E547 a minimum of 15 psf with no leakage at 5 gallons per minute spray rate.

Air Leakage Rate: 0.01 cfm/sq. ft. as determined according to ASTM E 283 at a static pressure differential of 1.57 lbf/ sq. ft.

* + - * 1. [Windborne-Debris Resistance:

[HFC fixed module 39.37 inches (1000 mm) x 118.11 inches (3000mm) with special order impact glazing] [and] [HVC venting module 39.37 inches (1000 mm) x 94.5 inches (2400 mm) with special order impact glazing]: Tested and certified in accordance with ASTM E 1886 and ASTM E 1996, cycle pressure +/-50, Missile level C, Wind Zone 3.]

* + - * 1. Surface-Burning Characteristics of Frames: Provide frames 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.

Self-Ignition Temperature: 950 deg F (510 deg C) or more with thickness indicated when tested per ASTM D 1929.

Flash-Ignition Temperature: 806 deg F (430 deg C) or more with thickness indicated when tested per ASTM D 1929.

Smoke Density: 70 or less when tested per ASTM D 2843.

Burning Characteristics: Tested and labeled in accordance with ASTM D 635: Class CC1.

* + - * 1. Fire Ratings for Roof Assemblies with Fire Classifications: Skylight module tested in accordance with ASTM E 108 and listed as passing Burning Brand test with target classification of Class B
        2. Energy Performance

Specifier: Retain only the glazing unit type configurations (Type 10L, 11L, 16L or 17L) below needed to meet Project requirements for thermal transmittance, solar heat-gain coefficient (SHGC), and visible transmittance (VT). When using Northlight modules, 90-degree values are provided since most applications are vertical and near-vertical.

Thermal Transmittance: NFRC 100 maximum U-factor:

[[Longlight] [and] [Ridgelight] modular units:]

[Glazing unit Type 10L Low Energy Dual Pane:

Fixed (HFC): 0.37 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.37 Btu/sq. ft. x h x deg F.]

[Glazing unit Type 11L Low Energy with Solar Protection Dual Pane:

Fixed (HFC): 0.38 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.36 Btu/sq. ft. x h x deg F.]

[Glazing unit Type 16L Super Low Energy Triple Pane:

Fixed (HFC): 0.23 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.23 Btu/sq. ft. x h x deg F.]

[Glazing unit Type 17L Super Low Energy with Solar Protection Triple Pane:

Fixed (HFC): 0.25 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.24 Btu/sq. ft. x h x deg F.]

[Northlight modular units:]

[Glazing unit Type 10L Low Energy Dual Pane:

Fixed (HFC): 0.32 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.34 Btu/sq. ft. x h x deg F.]

[Glazing unit Type 11L Low Energy with Solar Protection Dual Pane:

Fixed (HFC): 0.32 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.33 Btu/sq. ft. x h x deg F.]

[Glazing unit Type 16L Super Low Energy Triple Pane:

Fixed (HFC): 0.19 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.21 Btu/sq. ft. x h x deg F.]

[Glazing unit Type 17L Super Low Energy with Solar Protection Triple Pane:

Fixed (HFC): 0.19 Btu/sq. ft. x h x deg F.

Venting (HVC): 0.21 Btu/sq. ft. x h x deg F.]

Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-unit SHGC:

[[Longlight] [and] [Ridgelight] modular units:]

[Glazing unit Type 10L Low Energy Dual Pane:

Fixed (HFC): 0.50

Venting (HVC): 0.50]

[Glazing unit Type 11L Low Energy with Solar Protection Dual Pane:

Fixed (HFC): 0.22

Venting (HVC): 0.22]

[Glazing unit Type 16L Super Low Energy Triple Pane:

Fixed (HFC): 0.41

Venting (HVC): 0.41]

[Glazing unit Type 17L Super Low Energy with Solar Protection Triple Pane:

Fixed (HFC): 0.19

Venting (HVC): 0.20]

[Northlight modular units:]

[Glazing unit Type 10L Low Energy Dual Pane:

Fixed (HFC): 0.51

Venting (HVC): 0.47]

[Glazing unit Type 11L Low Energy with Solar Protection Dual Pane:

Fixed (HFC): 0.22

Venting (HVC): 0.20]

[Glazing unit Type 16L Super Low Energy Triple Pane:

Fixed (HFC): 0.41

Venting (HVC): 0.38]

[Glazing unit Type 17L Super Low Energy with Solar Protection Triple Pane:

Fixed (HFC): 0.20

Venting (HVC): 0.18]

Visible Transmittance (VT):

[[Longlight] [and] [Ridgelight] modular units:]

[Glazing unit Type 10L Low Energy Dual Pane:

Fixed (HFC): 0.67

Venting (HVC): 0.67]

[Glazing unit Type 11L Low Energy with Solar Protection Dual Pane:

Fixed (HFC): 0.42

Venting (HVC): 0.42]

[Glazing unit Type 16L Super Low Energy Triple Pane:

Fixed (HFC): 0.60

Venting (HVC): 0.60]

[Glazing unit Type 17L Super Low Energy with Solar Protection Triple Pane:

Fixed (HFC): 0.38

Venting (HVC): 0.38]

[Northlight modular units:]

[Glazing unit Type 10L Low Energy Dual Pane:

Fixed (HFC): 0.68

Venting (HVC): 0.63]

[Glazing unit Type 11L Low Energy with Solar Protection Dual Pane:

Fixed (HFC): 0.43

Venting (HVC): 0.40]

[Glazing unit Type 16L Super Low Energy Triple Pane:

Fixed (HFC): 0.61

Venting (HVC): 0.56]

[Glazing unit Type 17L Super Low Energy with Solar Protection Triple Pane:

Fixed (HFC): 0.39

Venting (HVC): 0.36]

* + - * 1. Fall Protection Standard Compliance: 29 CFR 1910.29(e):

[HFC fixed module 39.37 inches (1000 mm) x 118.11 inches (3000mm):

Static load: 400 pounds placed on center of glass with no damage.

Dynamic load: 100 pounds dropped from 20 feet (2000 lbf-ft) with no damage.]

[HVC venting module 39.37 inches (1000 mm) x 94.5 inches (2400 mm):

Static load: 400 pounds placed on center of glass with not damage.

Dynamic load: 100 pounds dropped from 20 feet (2000 lbf-ft) with no damage.]

* + - * 1. 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.
        2. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
      1. MATERIALS
         1. Composite Polymer: 80 percent glass fiber and 20 percent two-component polyurethane resin formulated for use as pultruded structural composite.
         2. Joint Sealants: As specified in Section 079200 "Joint Sealants."
      2. FABRICATION
         1. Provide manufactured modular skylight units completely factory-assembled including frames, sash, insulating glass units, flashings, and indicated accessories. Factory glaze units utilizing silicone-based exterior seal.
         2. Fabricate frame components to tolerances utilized on units tested to meet performance requirements, accommodating installation and movement of sash and dynamic movement of perimeter weather gasketing.
         3. Incorporate permanent external drainage channels to manage water flow and drain to the exterior. Provide internal drainage of glazing spaces to exterior through gasketing.
         4. Factory-glaze units with glazing selection specified.
      3. FINISHES
         1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
         2. 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.
         3. Aluminum Finishes

Pretreatment: Mechanically clean and chemically pretreat fabricated items in accordance with coating manufacturer's requirements and AAMA requirements for finish indicated.

Application: Apply powder coating in accordance with coating manufacturer's requirements and AAMA requirements for finish indicated.

Powder Coatings, High Performance Coating Finish Process: One-coat dry system with modified polyester resin, meeting performance requirements of AAMA 2604 and the following:

Product: AkzoNobel Coatings, Inc., Interpon D2000 Series Super Polyester Powder Coating, or comparable product acceptable to Architect.

Color: [Manufacturer's standard grey] [Match custom sample].

Dry Film Thickness, ASTM D 1400: Not less than 60 microns.

Specular Gloss: 10 percent, plus or minus 5 percent.

Surface: Rough texture, matte surface.

1. EXECUTION
   * + 1. EXAMINATION
          1. 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.
          2. Proceed with skylight installation only after unsatisfactory conditions have been corrected.
       2. INSTALLATION
          1. Install 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 weather tight.

Install skylights true to line and without distortion.

Anchor skylights securely to supporting substrates.

* + - * 1. Where metal surfaces of 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 skylight manufacturer.
      1. CLEANING AND PROTECTION
         1. Clean exposed skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
         2. Replace glazing that has been damaged during construction period.
         3. Protect skylight surfaces from contact with contaminating substances resulting from construction operations.

END OF SECTION