SECTION 086200 - UNIT SKYLIGHTS

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Unit skylights.

Tubular daylighting devices.

* + - * 1. Related Requirements:

Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section but are specified in other Sections.

Section 084513 "Structured-Polycarbonate-Panel Assemblies" for metal-framed skylights glazed with translucent insulating panels.

Section 084523 "Fiberglass-Sandwich-Panel Assemblies" for metal-framed skylights glazed with translucent insulating panels.

Section 086100 "Roof Windows" for flat, insulating-glass fenestration units installed in sloped ceiling areas and intended for in-reach operation.

Section 086300 "Metal-Framed Skylights" glass-glazed, site-erected, metal-framed skylights.

* + - 1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" Paragraphparagraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at [Project site] <**Insert location**>.

If needed, insert list of conference participants not mentioned in Section 013100 "Project Management and Coordination."

* + - 1. ACTION SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified, except as noted below, and tabbed (for combined submittals).

Submit Product Test Reports [**and** ][**Evaluation Reports** ]as specified in Quality Control Submittals first.

* + - * 1. Product Data: For each type of product.

Include product dimensions, construction details, material descriptions, dimensions and profiles of components, and finishes.

Include manufacturer’s installation instructions.

Retain subparagraph below for products with electronic components.

Include power requirements, ratings, characteristics, and mounting requirements for electrical components.

* + - * 1. Shop Drawings:

Include plans, elevations, sections, mounting, and attachment details and methods of structural support.

Retain subparagraph below for units with electronic components.

Include diagrams for power, signal, and control wiring.

Retain "Samples" Paragraphparagraph below for single-stage Samples, with a subordinate list if applicable. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs for two-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and finish specified.
				2. Samples for Initial Selection: For each type of glazing and exposed factory-applied finish.

Include Samples of accessories involving color and finish selection.

* + - * 1. Samples for Verification: For each product, as follows:

Glazing: [**In manufacturer's standard size**] [**12 inches (305 mm) square**] <**Insert requirements**> and of same thickness indicated for the final Work.

Finishes: For each type and color of factory-applied exposed finish required, in manufacturer's standard size.

Interior Diffuser Lens for Tubular Daylighting Device: [**Full size**] <**Insert requirements**>.

Retain "Product Schedule" Paragraphparagraph below if required.

* + - * 1. Product Schedule: For each type of product specified.[**Use same designations indicated on Drawings.**]
			1. INFORMATIONAL SUBMITTALS
				1. Quality Control Submittals:

Retain "Product Test Reports" Paragraphparagraph below if labeling in accordance with AAMA/WDMA/CSA 101/1.S.2/A440 is insufficient or if authorities having jurisdiction will accept test reports instead of labeling.

Product Test Reports: For each type and size of product, for tests performed by a qualified testing agency on specimens equal to or greater than sizes required for Project.

Retain "Evaluation Reports" Paragraphparagraph below if reports from ICC-ESECCNYS are required, or if compliance with requirements of authorities having jurisdiction in high-wind locations, such as Florida's Miami-Dade County, are needed.

Evaluation Reports: **[Indicating product compliance with code requirements of authorities having jurisdiction] <Insert requirements>.**

Retain "Field quality-control reports" Paragraph below if Contractor is responsible for field quality-control testing and inspecting.

Field quality-control reports.

Sample Warranty: For special warranties.

* + - * 1. Contract Closeout Submittals:

Maintenance Data: For products and accessories to include in maintenance manuals.

* + - 1. WARRANTY

When warranties are required, verify with Owner's Director’s counsel Representative that warranties stated in this article are not less than remedies available to Owner the Facility under prevailing local laws.

* + - * 1. Special Warranty: Manufacturer agrees to repair or replace components of products that fail in materials or workmanship within specified warranty period.

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

Failure to meet performance requirements.

Water leakage not controlled by drainage features.

Deterioration of materials and finishes beyond normal weathering.

Retain applicable subparagraphs below for glazing types specified, and revise to suit Project.

Yellowing of acrylic glazing.

Breakage of polycarbonate glazing.

Deterioration of insulating-glass units including failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating-glass units contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

Verify available warranties for units and components.

Warranty Period:

Products and Accessories: [**Five**] <**Insert number**> years from date of Substantial Completion.

Insulating-Glass Units: [**10**] [**20**] <**Insert number**> years from date of Substantial Completion.

Retain "Special Aluminum Finish Warranty" Paragraphparagraph below if required for unit skylights with factory-painted or anodized aluminum finishes.

* + - * 1. Special Aluminum Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of finish deterioration within specified warranty period.

Deterioration includes, but is not limited to, the following:

Coordinate color fading and chalking limits in first three subparagraphs below with finishes retained in Part 2.

Color fading more than 5 Delta E units when tested according to ASTM D2244.

Chalking in excess of a No. 8 rating when tested according to ASTM D4214.

Cracking, peeling, checking, or chipping.

Coordinate "Warranty Period" Subparagraphsubparagraph below with aluminum finishes specified for unit skylights in Part 2. AAMA 2604 is intended to provide a high-performance organic finish with at least five years of performance; AAMA 2605 is intended to provide at least 10 years of performance. Some manufacturers also offer a 20-year warranty. Five years is standard warranty period for Class I anodized finishes, although a few manufacturers offer 10- or 20-year warranties. Class II anodized finishes often carry less than a five-year warranty. Verify available warranty periods for finishes specified. If more than one type of finish is specified for unit skylights, revise subparagraph to indicate warranty period for each type.

Warranty Period: [**Five**] [**10**] [**20**] <**Insert number**> years from date of Substantial Completion.

1. PRODUCTS

Manufacturers and products listed in SpecAgent and MasterWorks Paragraph Builder are neither recommended nor endorsed by the AIA or Deltek. Before inserting names, verify that manufacturers and products listed there comply with requirements retained or revised in descriptions and are both available and suitable for the intended applications. For definitions of terms and requirements for Contractor's product selection, see Section 016000 "Product Requirements."

* + - 1. PERFORMANCE REQUIREMENTS

"Performance Standard" Paragraphparagraph below is based on the International Building Code (IBC)BCNYS and the International Residential Code (IRC) RCNYS requirements for testing unit skylights and tubular daylighting devices in accordance with AAMA/WDMA/CSA 101/1.S.2/A440.

* + - * 1. Performance Standard: Comply with AAMA/WDMA/CSA 101/1.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

Revise "Minimum Performance Grade" Subparagraphsubparagraph below to suit Project. AAMA/WDMA/CSA 101/1.S.2/A440 establishes a gateway performance grade (PG) of 30. The performance grade is the minimum design pressure and establishes test pressures for structural-performance and water-resistance tests.

Minimum Performance Grade: PG [**30**] [**50**] [**70**] [**90**] [**125**] [**165**] <**Insert requirements**>.

"Label Requirements" Subparagraphsubparagraph below is based on the IBC BCNYS and the IRC RCNYS requirements for product labels indicating compliance with AAMA/WDMA/CSA 101/1.S.2/A440.

Label Requirements: Label each product with names of manufacturer and labeling agency and AAMA/WDMA/CSA 101/1.S.2/A440 product designation, performance grade, and test specimen size equal to or greater than the size of the product.

Retain "Certification Requirements" Subparagraphsubparagraph below if AAMA, WDMA, or other certification is required. Manufacturers that test products in accordance with AAMA/WDMA/CSA 101/1.S.2/A440 requirements do not necessarily participate in AAMA or WDMA third-party certification programs for listing and labeling windows.

Certification Requirements: Provide [**AAMA**] [**or**] [**WDMA**] <**Insert requirements**> certified products, with label attached to each.

Retain "Thermal Transmittance" Paragraphparagraph below if required to comply with requirements of authorities having jurisdiction. Options are based on ENERGY STAR and ICCECCNYS/ASHRAE 700 requirements. Requirements vary by climate zone.

* + - * 1. Thermal Transmittance: NFRC 100 maximum U-factor of [**0.42 Btu/sq. ft. x h x deg F (2.38 W/sq. m x K)**] [**0.45 Btu/sq. ft. x h x deg F (2.56 W/sq. m x K)**] [**0.46 Btu/sq. ft. x h x deg F (2.61 W/sq. m x K)**] [**0.48 Btu/sq. ft. x h x deg F (2.73 W/sq. m x K)**] [**0.50 Btu/sq. ft. x h x deg F (2.84 W/sq. m x K)**] [**0.53 Btu/sq. ft. x h x deg F (3.01 W/sq. m x K)**] [**0.55 Btu/sq. ft. x h x deg F (3.12 W/sq. m x K)**] [**0.60 Btu/sq. ft. x h x deg F (3.41 W/sq. m x K)**] <**Insert value**>.

Options in "Solar Heat-Gain Coefficient (SHGC)" Paragraphparagraph below are based on ENERGY STAR and ICCUniform Code/ASHRAE 700 requirements. Requirements vary by climate zone.

Design Consultant to review code references and verify that the referenced sections/tables are current. Note that code references shall be based on the current version of the Uniform Code.

* + - * 1. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum SHGC of [**0.40**] [**0.35**] [**0.28**] <**Insert value**>.

Retain "Windborne-Debris Impact Resistance" Paragraphparagraph below to suit Project. The IBC BCNYS and the IRC RCNYS establish criteria for buildings in hurricane-prone locations. In paragraph, "enhanced" option applies to essential facilities and has additional requirements. Verify requirements of authorities having jurisdiction. Verify which manufacturers have tested products and can demonstrate compliance. New York State is located in Wind Zone 2 and in a hurricane susceptible region.

* + - * 1. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone [**1**] [2] [**3**] [**4**] for [**basic**] [**enhanced**] protection.

Insert increased heights if different from those in "Large-Missile Test" and "Small-Missile Test" subparagraphs below. See "Windborne-Debris Impact-Resistance Testing" Article in the Evaluations for further information.

Large-Missile Test: For glazing located within [**30 feet (9.1 m)**] <**Insert dimension**> of grade.

Small-Missile Test: For glazing located between 30 feet (9.1 m) and [**60 feet (18.3 m)**] <**Insert dimension**> above grade.

Retain "Plastic Glazing" Paragraphparagraph below if acrylic, polycarbonate, or fiberglass-sandwich-panel glazing is required. Requirements are based on IBC BCNYS criteria for light transmitting plastics.

* + - * 1. Plastic Glazing:

Self-Ignition Temperature: 650 deg F (343 deg C) or more for plastic sheets in thickness indicated when tested in accordance with ASTM D1929.

Smoke-Production Characteristics: Smoke-developed index of 450 or less when tested in accordance with ASTM E84, and smoke density of 75 or less when tested in accordance with ASTM D2843.

Generally, retain "Combustibility Characteristics" Subparagraphsubparagraph below to indicate testing requirements. Classifications vary by plastic composition. Specific classification requirements are specified with various plastic glazing components in other Part 2 articles

Combustibility Characteristics: Tested in accordance with ASTM D635 and classified for burning rate of nominal thickness of 0.060 inch (1.5 mm) or thickness of plastic glazing indicated for use as follows:

Class CC1: Burning rate of 1 inch (25 mm) per minute or less.

Class CC2: Burning rate of 2-1/2 inches (64 mm) per minute or less.

Retain "Exterior Fire-Test Exposure" Paragraphparagraph below for products installed in Class B roof assemblies. Verify requirements of authorities having jurisdiction.

* + - * 1. Exterior Fire-Test Exposure: Provide products identical to those of assemblies tested for Class B fire resistance in accordance with ASTM E108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction.

Retain "Electrical Components, Devices, and Accessories" Paragraphparagraph below for products with electronic components.

* + - * 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

Retain "Fall-Protection Performance" Paragraphparagraph below and revise to suit Project. Option is based on California Code of Regulations, Title 8, Section 3212 "Floor Openings, Floor Holes, Skylights and Roofs." See "Fall Protection" Article in the Evaluations.

* + - * 1. Fall-Protection Performance: [**Installed assemblies are capable of safely supporting the greater of 400 lbs (181.4 kg) or twice the weight of employees, equipment, and materials that may be imposed on any 1 sq. foot (0.09 sq. m) of the assembly at any time**] <**Insert requirements**>.
			1. UNIT SKYLIGHTS

<Insert drawing designation>

Copy this article and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

* + - * 1. Factory-Assembled Skylight: Unit that includes glazing, extruded-aluminum glazing retainers, gaskets, and inner frame.

Generally, retain "Product Type" Paragraphparagraph below. The IBC BCNYS and the IRC RCNYS require testing and labeling in accordance with AAMA/WDMA/CSA 101/1.S.2/A440.

* + - * 1. Product Type: AAMA/WDMA/CSA 101/1.S.2/A440 [**SKG, unit skylight - glass glazed**] [**SKP, unit skylight - plastic glazed**].

Provide [**fixed (nonoperable)**] [**venting (operable)**] units.

Retain "Outside-Inside Transmission Class (OITC)" Paragraphparagraph below after verifying availability of test data for specified products. OITC is a noise-reduction rating based on a sound-frequency range representative of conditions to which the building envelope is subject, such as road, rail, and airplane traffic noise.

* + - * 1. Outside-Inside Transmission Class (OITC): Rated for not less than [**22**] [**26**] [**30**] <**Insert value**> OITC when tested for laboratory sound transmission loss in accordance with ASTM E90 and determined by ASTM E1332.
				2. Unit Shape and Size: [**As indicated**] [**Square, 40-by-40-inch (1016-by-1016-mm) inside curb**] [**Rectangular, 40-by-48-inch (1016-by-1219-mm) inside curb**] [**Circular, 40-inch- (1016-mm-) diameter inside curb**] <**Insert requirements**>.

Retain "Acrylic Glazing," "Polycarbonate Glazing," "Insulating Glass," "Polycarbonate-Insulating-Panel Glazing," or "Fiberglass-Sandwich-Panel Glazing" Paragraphparagraph below to suit Project.

* + - * 1. Acrylic Glazing: ASTM D4802, thermoformable, monolithic sheet, category as standard with manufacturer, Finish 1 (smooth or polished), Type UVF (formulated with UV absorber); and Class CC2 based on testing in accordance with ASTM D635.

Single-Glazing Profile: [**Dome, 25 percent rise**] [**Pyramid, 30-degree slope**] <**Insert requirements**>.

Thickness: [**As indicated**] [**Not less than thickness required to meet specified requirements**] <**Insert requirements**>.

Color: [**Colorless, transparent**] [**White, translucent**] [**Bronze tinted, transparent**] [**Gray tinted, transparent**] <**Insert requirements**>.

Double-Glazing Profile: [**Dome, 25 percent rise**] [**Pyramid, 30-degree slope**] <**Insert requirements**>.

Thicknesses of Each Glazing Layer: [**As indicated**] [**Not less than thicknesses required to meet specified requirements**] <**Insert requirements**>.

Outer Glazing Color: [**Colorless, transparent**] [**White, translucent**] [**Bronze tinted, transparent**] [**Gray tinted, transparent**] <**Insert requirements**>.

Inner Glazing Color: [**Colorless, transparent**] [**White, translucent**] [**Bronze tinted, transparent**] [**Gray tinted, transparent**] <**Insert requirements**>.

* + - * 1. Polycarbonate Glazing: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated in accordance with UL 972; with average impact strength of 12 to 16 ft-lb/in. (640 to 854 J/m) of width when tested in accordance with ASTM D256, Test Method A (Izod); and Class CC1 based on testing in accordance with ASTM D635.

Single-Glazing Profile: [**Dome, 25 percent rise**] [**Pyramid, 30-degree slope**] <**Insert requirements**>.

Thickness: [**As indicated**] [**Not less than thickness required to meet specified requirements**] <**Insert requirements**>.

Color: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert requirements**>.

Double-Glazing Profile: [**Dome, 25 percent rise**] [**Pyramid, 30-degree slope**] <**Insert requirements**>.

Thicknesses of Each Glazing Layer: [**As indicated**] [**Not less than thicknesses required to meet specified requirements**] <**Insert requirements**>.

Inner Glazing Color: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert requirements**>.

Outer Glazing Color: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's stand colors**] <**Insert requirements**>.

* + - * 1. Insulating Glass: Sealed units that comply with Section 088000 "Glazing," in manufacturer's standard overall thickness.

Exterior Lite: [**6-mm, tinted, fully tempered**] [**6-mm, clear, heat-strengthened**] <**Insert requirements**> glass.

Interior Lite: [**Laminated glass; two plies of 3-mm clear heat-strengthened glass with 0.030-inch (0.76-mm) clear polyvinyl butyral interlayer**] <**Insert requirements**>.

Interspace Content: [**Air**] [**Argon**].

Low-Emissivity Coating: [**Manufacturer's standard**] <**Insert requirements**>.

If retaining "Polycarbonate-Insulating-Panel Glazing" Paragraphparagraph below, insert color stability and additional criteria if required.

* + - * 1. Polycarbonate-Insulating-Panel Glazing: Manufacturer's standard polycarbonate sheet with cellular cross section that provides isolated airspaces, coextruded with a UV-protective layer, and Class CC2 based on testing in accordance with ASTM D635.

Thickness: [**As indicated**] [**Not less than thickness required to meet specified requirements**] <**Insert requirements**>.

Color: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert requirements**>.

If retaining "Fiberglass-Sandwich-Panel Glazing" Paragraphparagraph below, insert color stability and additional criteria if required.

* + - * 1. Fiberglass-Sandwich-Panel Glazing: Manufacturer's standard with uniformly colored, translucent, fiberglass-reinforced-polymer face sheets permanently adhered to a grid core; [**Class CC1**] [**Class CC2**] based on testing in accordance with ASTM D635.

Thickness: [**As indicated**] [**Not less than thickness required to meet specified requirements**] <**Insert thickness**>.

Color: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert requirements**>.

* + - * 1. Glazing Gaskets: [**Manufacturer's standard**] [**EPDM, neoprene, partially vulcanized butyl tape, or liquid-applied elastomeric sealant**] <**Insert requirements**>.

Retain "Integral Curb" Paragraphparagraph below for unit skylights with integral curbs. Insert provisions for ventilation through curbs using louvers, fans, or other means to suit Project. Retain one option or revise to suit Project. Most manufacturers offer unit skylights with integral curbs fabricated from extruded aluminum.

* + - * 1. Integral Curb: [**Extruded-aluminum, ASTM B221 (ASTM B221M), alloy and temper to suit structural and finish requirements but with not less than the strength and durability of Alloy 6063-T52**] [**Manufacturer's standard vinyl profile**] [**Manufacturer's standard reinforced-thermoset-fiberglass profile**] <**Insert requirements**>, self-flashing type.

Height: [**As indicated on Drawings**] [**8 inches (203 mm)**] [**9 inches (229 mm)**] [**12 inches (305 mm)**] <**Insert height**>.

Construction: [**Single**] [**Double**] wall.

Retain "Insulation" Subparagraphsubparagraph below for insulated curbs.

Insulation: [**Manufacturer's standard rigid or semirigid type**] <**Insert material**>.

Exposed Insulation: Cover face of insulation exposed to interior of building with [**aluminum**] [**vinyl**] liner.

Retain "Prefabricated Curb" Paragraphparagraph below for unit skylights installed with separate, prefabricated curbs or revise to suit Project.

* + - * 1. Prefabricated Curb: As specified in Section 077200 "Roof Accessories."

Usually retain "Condensation Control" Paragraphparagraph below; however, paragraph may not be required for units with double or triple glazing. Revise if gutters that hold condensation until it evaporates are acceptable.

* + - * 1. Condensation Control: Fabricate unit skylights with integral internal gutters and nonclogging weeps to collect and drain condensation to the exterior.
				2. Thermal Break: Fabricate unit skylights with thermal break separating exterior and interior metal framing.

Retain "Operator" Paragraphparagraph below for venting units.

* + - * 1. Operator: Equip operable unit skylights with manufacturer's standard hinges, chain-driven operating hardware, and weather-sealing gaskets.

Retain "Manual Operator" or "Motor Operator" Subparagraphsubparagraph below to suit Project.

Manual Operator: Manufacturer's standard, rotary-crank extension device.

Pole Operator: [**Manual, 60 inches (1524 mm) long**] [**Manual, telescoping to 144 inches (3658 mm)**] [**Rechargeable-motor, power-driven type, telescoping to 144 inches (3658 mm)**] <**Insert requirements**>.

Motor Operator: Manufacturer's standard electronic control, including switch, transformer, low-voltage motor, cover, mounting hardware, and other components required for a complete installation.

Provide motor of size and capacity recommended by unit skylight manufacturer to suit unit skylight indicated.

Before retaining "Rain Sensors" or "Remote Control" Subparagraphsubparagraph below, verify availability for products specified.

Rain Sensors: Provide rain sensor that automatically closes operable unit when water is detected.

Remote Control: Provide motor operator with portable remote-control device.

* + - * 1. Accessories:

Retain "Security Grille" Subparagraphsubparagraph below if required; revise to suit Project.

Security Grille: 1/2-inch- (13-mm-) diameter, hardened steel bars spaced not more than [**5 inches (127 mm) o.c. in one direction and 16 inches (406 mm) o.c. in other direction**] [**5 inches (127 mm) o.c. in both directions**] <**Insert requirements**>.

Retain "Protective Screen" Subparagraphsubparagraph below if required; revise to suit Project. Protective-screen types vary among manufacturers.

Protective Screen: Manufacturer's standard to protect against [**falling glass**] [**hail**].

Manual Blackout Shade: [**Manufacturer's standard sized to fit unit-skylight opening**] <**Insert requirements**>.

<**Insert accessory**>.

* + - * 1. Aluminum Finishes:

Retain finishes in subparagraphs below to suit Project.

Retain "Mill Finish" Subparagraphsubparagraph below if mill finish is acceptable for aluminum components.

Mill Finish: Manufacturer's standard.

Retain one of two options in "Clear Anodic Finish" Subparagraphsubparagraph below. Class II finish is standard with many manufacturers; Class I finish is heavy anodized. Verify availability with manufacturers.

Clear Anodic Finish: AAMA 611, [**AA-M12C22A41, Class I, 0.018 mm**] [**AA-M12C22A31, Class II, 0.010 mm**] or thicker.

Retain one of two options in "Color Anodic Finish" Subparagraphsubparagraph below. Verify availability with manufacturers.

Color Anodic Finish: AAMA 611, [**AA-M12C22A42/A44, Class I, 0.018 mm**] [**AA-M12C22A32/A34, Class II, 0.010 mm**] or thicker.

Color: [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from full range of industry colors and color densities**] [**Light bronze**] [**Medium bronze**] [**Dark bronze**] [**Black**] [**Champagne**] <**Insert color**>.

Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

"Baked-Enamel or Powder-Coat Finish" Subparagraphsubparagraph below references AAMA standard for pigmented organic coating on extrusions and panels.

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.

Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

Retain "High-Performance Organic Finish, Two-Coat," "High-Performance Organic Finish, Three-Coat," or "High-Performance Organic Finish, Four-Coat" Subparagraphsubparagraph below for high-performance organic finish; if more than one is required, indicate location of each system on Drawings, in schedules, or by inserts. Retain AAMA 2604 or AAMA 2605 option in first subparagraph below for high- or superior-performance organic coatings, respectively, on extrusions and panels. If specific products are required, name coating manufacturers and products.

High-Performance Organic Finish, Two-Coat: Fluoropolymer finish complying with [**AAMA 2604**] [**AAMA 2605**] and containing not less than [**50**] [**70**] percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

High-Performance Organic Finish, Three-Coat: Fluoropolymer finish complying with AAMA 2605 and containing not less than [**50**] [**70**] percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

High-Performance Organic Finish, Four-Coat: Fluoropolymer finish complying with AAMA 2605 and containing not less than [**50**] [**70**] percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Color and Gloss: [**As indicated by manufacturer's designations**] [**Match Architect Director’s Representative's sample**] [**As selected by Architect Director’s Representative from manufacturer's full range**] <**Insert color and gloss**>.

* + - 1. TUBULAR DAYLIGHTING DEVICES <**Insert drawing designation**>

Copy this article and re-edit for each product.

Insert drawing designation. Use these designations on Drawings to identify each product.

* + - * 1. Tubular Daylighting Device: Complete with exterior glazed opening, glazing retainers and gaskets, exterior flashing assembly, reflective tube, interior diffuser assembly, and components and accessories required to provide a complete installation.

Generally, retain "Product Type" Paragraphparagraph below. The IBC BCNYS and the IRC RCNYS require testing and labeling in accordance with AAMA/WDMA/CSA 101/1.S.2/A440.

* + - * 1. Product Type: AAMA/WDMA/CSA 101/1.S.2/A440 [**TDDCC, tubular daylighting device - closed ceiling**] [**TDDOC, tubular daylighting device - open ceiling**].
				2. Nominal Reflective Tube Diameter: [**5-1/2 inches (140 mm)**] [**8 inches ((203 mm))**] [**10 inches ((254 mm))**] [**13 inches ((330 mm))**] [**14 inches (356 mm)**] [**21 inches (533 mm)**] [**22 inches (559 mm)**] [**29 inches (737 mm)**] <**Insert dimension**>.
				3. Exterior Glazing: Manufacturer's standard [**single dome**] [**double dome**] [**collector dome and cylinder**] <**Insert requirements**>.

Size: [**As required to coordinate with reflective tube**] <**Insert requirements**>.

Material:

Retain "Acrylic" or "Polycarbonate" Subparagraphsubparagraph below or revise to suit Project.

Acrylic: ASTM D4802, thermoformable, monolithic sheet, category as standard with manufacturer, Finish 1 (smooth or polished), Type UVF (formulated with UV absorber); and Class CC2 based on testing in accordance with ASTM D635.

Polycarbonate: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated in accordance with UL 972; with average impact strength of 12 to 16 ft-lb/in. (640 to 854 J/m) of width when tested in accordance with ASTM D256, Test Method A (Izod); and Class CC1 based on testing in accordance with ASTM D635.

Minimum Thickness: [**0.125 inch (3.18 mm)**] [**As required to meet specified requirements**] <**Insert requirements**>.

Seal: [**Manufacturer's standard**] [**Adhesive-backed foam weatherstripping**] <**Insert requirements**>.

Exterior Glazing Accessories:

Retain "Fire-Protection Band" Subparagraphsubparagraph below if units will be installed in fire-resistance-classified roof assembly. Where classified roof coverings are required, the IBC requires mounting light-transmitting plastic skylights on curbs not less the 4 inches (102 mm) above the roof plane unless the occupancy is Group R-3 and the roof slope is 3:12 or greater.

Fire-Protection Band: Dome edge-protection band matching flashing material and finish. Domes installed with fire-protection band pass Class B burning brand tests when tested in accordance with ASTM E108.

Secondary Diffuser: [**Manufacturer's standard ASTM D4802 acrylic, Class CC2 based on testing in accordance with ASTM D635**] <**Insert requirements**>.

Retail "Security Bar," "Security Grille," or "Security Kit" Subparagraphsubparagraph below if required; revise to suit Project.

Security Bar: [**Manufacturer's standard ASTM A240/A240M Type 304 stainless steel bar across flashing diameter opening**] <**Insert requirements**>.

Security Grille: Manufacturer's standard [**powder-coated steel**] [**stainless steel**] <**Insert requirements**> 1/8-inch- (3.2-mm-) diameter rods formed into guard with maximum 8-inch (203-mm) opening and fastened to curb-cap assembly.

Security Kit: [**Manufacturer' standard rivets with nylon spacers to replace dome screws**] <**Insert requirements**>.

<**Insert accessory**>.

* + - * 1. Exterior Flashing: Manufacturer's standard [**one-piece, self-mounted**] [**two-piece, self-mounted**] [**one-piece, curb-cap**] <**Insert requirements**> type.

Size: [**As required to coordinate with exterior glazing and reflective tube**] <**Insert requirements**>.

Retain "Base Pitch" and "Base Height" subparagraphs below for self-mounted bases.

Base Pitch: [**None, flat**] [**22.5-degree slope from horizontal**] <**Insert requirements**>.

Base Height: [**Manufacturer's standard low-profile**] [**4 inches (102 mm)**] [**8 inches (203 mm)**] [**11 inches (279 mm)**] <**Insert dimension**>.

Retain "Prefabricated Curb" Subparagraphsubparagraph below for tubular daylighting devices with one-piece curb caps installed on prefabricated curbs or revise to suit Project.

Prefabricated Curb: As specified in Section 077200 "Roof Accessories."

Material: [**Manufacturer's standard corrosion-resistant metal and finish**] [**ASTM A 653/A 653M commercial steel or forming steel with G90 (Z275) hot-dip galvanized coating, 0.023 inches (0.58 mm) thick, finished with grey powder coat**] <**Insert requirements**>.

Tube Attachment: Manufacturer's standard receiver attached to top of roof flashing and serving as mounting base for dome assembly; provides thermal break between flashing and reflective tube; configured to channel condensed moisture to the exterior.

Seal: [**Manufacturer's standard**] <**Insert requirements**> that provides weathertight seal with roof flashing.

Flashing Accessories:

Flashing Insulation: [**Manufacturer's standard thermal isolation material**] <**Insert requirements**>.

Retain "Turret Extension" Subparagraphsubparagraph below if required to extend height of self-mounting flashing or curb cap above the roof plan.

Turret Extension: Manufacturer's standard extension tube in length [**indicated on Drawings**] <**Insert dimension**>.

Retain "Roof-Membrane Counterflashing" Subparagraphsubparagraph below if required for membrane roofing. Verify availability with specified manufacturers.

Roof-Membrane Counterflashing: [**Manufacturer's standard corrosion-resistant aluminum**] <**Insert requirements**>.

<**Insert accessory**>.

* + - * 1. Reflective Tube:

Retain "Flexible Tube" or "Rigid Tube" Subparagraphsubparagraph below.

Flexible Tube: Reflective, metalized polyester, fiberglass scrim, and steel-wire spring tube.

Length: [**As required to accommodate installation area**] [**8 foot (2.4 m)**] <**Insert requirements**>.

Tube Extensions: Provide manufacturer's standard components as required to accommodate installation areas indicated.

Rigid Tube: Light shaft formed from aluminum sheet, ASTM B209 (ASTM B209M), with [**manufacturer's standard specular interior finish**] <**Insert requirements**>.

Thickness: [**Manufacturer's standard**] [**0.016 inch (0.41 mm)**] [**0.018 inch (0.46 mm)**] <**Insert dimension**>.

Length and Configuration: [**As indicated on Drawings**] <**Insert requirements**>.

Tube Extensions: [**Provide manufacturer's standard components as required to accommodate installation areas indicated**] <**Insert requirements**>.

Retain "Tube Elbows" and "Rotating Couplers" subparagraphs below if required, or revise to suit Project. Verify availability with manufacturers.

Tube Elbows: Provide angle adaptors adjustable to [**45**] [**30**] [**90**] <**Insert number**> degrees as required to accommodate installation areas indicated.

Rotating Couplers: Rotating adaptors allowing coupling of two elbows to create 90-degree transition of tube.

If retaining "Color Rendition" Subparagraphsubparagraph below, verify availability of color rendition testing results with manufacturers and revise to suit Project. ASTM E308 describes a practice for computing the colors of objects using the CIE L\*a\*b\* (CIELAB) system developed by the International Commission on Illumination (usually abbreviated CIE for its French name, Commission internationale de l'eclairage). L\* axis is from black (0) to white (100), a\* is axis from green (-) to red (+), and b\* axis is from blue (-) to yellow (+).

Color Rendition: When tested in accordance with ASTM E308, minimum L\* axis value of 99 and a\* (green to red) and b\* (blue to yellow) axes values not more than [**1**] [**2**] <**Insert number**> or less than minus [**1**] [**2**] <**Insert number**> in accordance with CIELAB results.

Fastening System: [**Manufacturer's standard**] <**Insert requirements**> that provides tight mating of interconnecting tube component pieces.

Tube Accessories:

Suspension Wire: [**Manufacturer's standard to provide bracing of tube to structure as required for a fully supported installation**] <**Insert requirements**>.

Extension Tube with Thermal Insulation Panel: [**Manufacturer's standard extension-tube assembly containing two light-transmitting, acrylic discs with an airspace between them and secured together by a plastic band to prevent conductive and convective heat transfer. Plastics are Class CC2 based on testing in accordance with ASTM D635**] <**Insert requirements**>.

Retain "Ceiling Trim" Subparagraphsubparagraph below for closed ceiling applications if required.

Ceiling Trim: [**Manufacturer's standard trim for ceiling opening**] <**Insert requirements**>.

Retain "Trim Ring" Subparagraphsubparagraph below for open-ceiling application if required to provide a finished appearance on the underside of the roof deck.

Trim Ring: [**Manufacturer's standard trim that covers the cut edge of the roof deck penetration**] <**Insert requirements**>.

<**Insert accessory**>.

Generally, retain option in "Interior Diffuser" Paragraphparagraph below for closed-ceiling installations where the reflective tube passes through unconditioned space, or revise to suit Project.

* + - * 1. Interior Diffuser: Assembly attached to bottom of reflective tube, with high-visible-light-transmittance lens[**separated by airtight seals providing insulating airspace**] <**Insert requirements**>.

Size: [**As required to coordinate with reflective tube**] <**Insert requirements**>.

Options in "Lens Type" Subparagraphsubparagraph below are examples only. Available lenses vary among manufacturers; revise to suit Project.

Lens Type: [**Round, prismatic lens, acrylic Class CC2 based on testing in accordance with ASTM D635**] [**Round, Fresnel lens, acrylic Class CC2 based on testing in accordance with ASTM D635**] [**Round, prismatic lens, polycarbonate Class CC1 based on testing in accordance with ASTM D635**] [**Translucent white glass globe with metal trim ring**] <**Insert requirements**>.

Retain "Metal Finish Trim" Subparagraphsubparagraph below if required.

Metal Trim Finish: [**White**] [**Brushed nickel**] [**Polished brass**] [**Oil-rubbed bronze**] <**Insert requirements**>.

* + - * 1. Accessories:

Options in "Daylight Dimmer," "Light Kit," "Exhaust Fan," and "Manual Blackout Shade" subparagraphs below are examples only. Accessories vary among manufacturers; revise to suit Project.

Daylight Dimmer: Manufacturer's standard dimmer baffle, [**electro-mechanical, and complete with power supply, switch, and daylight valve that adjusts daylight output when actuated**] [**low-voltage, programmable, and complete with 12 V DC dimming control switch and 20 W low-voltage transformer**] <**Insert requirements**>.

Light Kit: [**Supplemental electrical light fixture kit with fluorescent GU24 lamp base, 120 V AC, 60 Hz, maximum 26 W lamp**] [**Light fixture kit for use with one 23 W LED lamp**] <**Insert requirements**>.

Exhaust Fan: [**Manufacturer's standard 110 cfm (52 L/s) exhaust-fan assembly complete with separate exhaust duct, air-intake trim, exhaust vent cap, and permanently lubricated in-line fan motor**] <**Insert requirements**>.

Manual Blackout Shade: [**Manufacturer's standard sized to fit ceiling diffuser opening**] <**Insert requirements**>.

<**Insert accessory**>.

* + - 1. ACCESSORY MATERIALS
				1. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal that is compatible with the materials being fastened and as recommended in writing by manufacturer. Finish exposed fasteners to match material being fastened.

Retain subparagraph below if security is an issue.

Where removal of exterior exposed fasteners might allow access to building, provide nonremovable fastener heads.

* + - * 1. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat.
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 installation only after unsatisfactory conditions have been corrected.
			2. INSTALLATION
				1. Coordinate installation of products and accessories with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
				2. Install products and accessories to comply with recommendations in AAMA 1607 and with manufacturer's written installation instructions.
				3. Install products true to line and without distortion.
				4. Anchor products securely to supporting substrates.
				5. Where metal surfaces of products will contact other metal or corrosive substrates, such as preservative-treated wood, apply bituminous coating on concealed metal surfaces or provide other approved permanent separation recommended in writing by manufacturer.

Insert requirements for continuous vaults and multiple unit-skylight assemblies if required. These unit skylights are often delivered as factory-assembled modules that require partial field assembly. Consult manufacturers for recommendations.

* + - 1. FIELD QUALITY CONTROL

Retain "Testing Agency" Paragraphparagraph below to identify who shall perform tests and inspections. If retaining second option, retain "Field quality-control reports" Paragraph in "Informational Submittals" Article.

* + - * 1. Testing Agency: [**Owner will engage**] [Engage] a qualified testing agency to perform tests and inspections.
				2. After completion of installation and nominal curing of sealant and glazing compounds, but before installation of interior finishes, test for water leaks in accordance with AAMA 501.2.
				3. Perform test for total area of each installed product.

See Section 014000 "Quality Requirements" for retesting and reinspecting requirements and Section 017000 "Execution" for requirements for correcting the Work.

* + - * 1. Work will be considered defective if it does not pass tests and inspections.
				2. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
				3. Prepare test and inspection reports.
			1. CLEANING AND ADJUSTING
				1. Clean exposed product surfaces in accordance with manufacturer's written instructions. Touch up damaged metal coatings and finishes.
				2. Remove excess sealants, glazing materials, dirt, and other substances.
				3. Remove and replace glazing that has been broken, chipped, cracked, abraded, or damaged during construction period.
				4. Protect product surfaces from contact with contaminating substances resulting from construction operations.

Retain "Unit-Skylight Operating System" Paragraphparagraph below if electric motor operators are required for operable unit skylights.

* + - * 1. Unit-Skylight Operating System: Clean and lubricate joints and hardware. Adjust for proper operation.

Retain "Daylight Dimmer Assemblies" Paragraphparagraph below if required for tubular daylighting devices.

* + - * 1. Daylight Dimmer Assemblies: Test and adjust dimmer assemblies in tubular daylighting devices for proper operation.
			1. DEMONSTRATION

Retain this article if electric motor operators are required for operable unit skylights or daylight dimmer assemblies are required for tubular daylighting devices.

* + - * 1. [**Engage a Company Service Advisor** **factory-authorized service representative to train**] [**Train**] Owner's Facility maintenance personnel to adjust, operate, and maintain the following:

Operating systems for unit skylights.

Daylight dimmer assemblies for tubular daylighting devices.

Consider using a schedule if Project includes more than one size of each type of unit skylight or tubular daylighting device specified. A schedule or other method of identifying different sizes can be shown on Drawings or inserted below.

* + - 1. <**INSERT PRODUCT SCHEDULE**>

END OF SECTION 086200