

SECTION 08 63 00

METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes skylight styles with metal framing. **<SELECT SHAPE – DELETE OTHERS>**,
 - 1. Single Sloped
 - 2. Ridge
 - 3. Ridge with hipped ends
 - 4. Pyramid
 - 5. Polygonal
 - 6. Vaulted
 - 7. Domed
 - 8. Circular
 - 9. Walkway
 - 10. Custom
- B. Related Sections:
 - 1. Section 01 81 13: Sustainable Design Requirements
 - 2. Section 05 12 00: Structural Steel Framing
 - 3. Section 05 50 00: Metal Fabrications
 - 4. Section 07 60 00: Flashing & Sheet Metal
 - 5. Section 08 80 00: Glazing
 - 6. Section 08 44 33: Sloped Glazing Assemblies
 - 7. Section 08 45 13: Structured-Polycarbonate-Panel Assemblies
 - 8. Section 08 62 00: Unit Skylights

1.03 REFERENCES

- A. AA: Aluminum Association
- B. AAMA: American Architectural Manufacturers Association
- C. ASTM: American Society for Testing and Materials

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal-framed skylights.
- B. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture within the assembly to the exterior.
 - 2. Include half-size isometric details of each vertical-to-horizontal intersection of assembly, showing the following:
 - a. Joinery including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
- C. Structural calculations prepared in accordance with the Aluminum Association's Specification for Aluminum Structures by a professional engineer qualified in the design of metal-framed skylights in the state where the skylight is to be installed.
- D. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available
- E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed on manufacturers current system at a pitch equal to or less than the pitch required for this project by a qualified testing agency. Report to include air, water and structural test data.
- G. Installer Certificates: If required, certifying that installers qualifications have been reviewed by manufacturer and approved for installation of metal-framed skylights required for this project.
- H. Compatibility and Adhesion Test Reports: For structural-sealant-glazed skylights, test reports from sealant manufacturer indicating that joint sealants have been tested for each material that will come in contact with sealants.
- I. Field quality-control reports by installer following skylight installation.

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for skylights' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including testing conducted by an independent testing agency and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- C. Structural-Sealant Glazing: Comply with recommendations in ASTM C 1401, "Guide for Structural Sealant Glazing," for joint design.
 1. Perform manufacturer's standard tests for compatibility and adhesion of sealants with each material that will come in contact with sealants.
- D. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination"

1.06 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-framed skylights that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage.
 2. Warranty Period: **<Two, Five, Ten>** years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 1. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
 2. Warranty Period: **<Five, Ten>** years from date of Substantial Completion. (10 years for fluoropolymer paint; 2 year for anodized finishes.)

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by Skyline Sky-Lites, 2925 Delta Drive, Colorado Springs, CO 80910 PH (866)625-1330, FX (719)392-4685, email info@skylites.com
- B. Substitutions may be considered only if a pre-qualification submittal has been received no less than (10) days prior to bid containing the following information:
 1. Proposed manufacturer has been manufacturing metal-framed skylights for no less than Ten (10) years
 2. List of similar projects completed within the last five (5) years
 3. Proof of financial capability
 4. Complete details of proposed system adapted to the requirements set forth in the contract drawings
 5. Complete test report proving compliance with the performance requirements set forth in the contract documents.

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6. Structural calculations proving compliance with the performance requirements set forth in the contract documents.

2.02 PERFORMANCE REQUIREMENTS

- A. General: Metal-framed skylights shall withstand the effects of the following without failure due to defective manufacture, fabrication, installation, or other defects in construction:
 1. Structural loads.
 2. Thermal movements.
 3. Movements of supporting structure.
 4. Dimensional tolerances of support system and other adjacent construction.
 5. Failure includes, but is not limited to, the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Glazing-to-glazing contact.
 - e. Noise or vibration created by wind and by thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
- B. Structural Loads: Reference Structural Drawings
- C. Structural Members: Of sufficient sizes to support:
 1. Design loads
 2. A concentrated downward load of 250 lbs. anywhere on the surface without metal or glass failure. If prevailing Code requires greater loads, such greater loads shall comply.
- D. Deflection of Framing Members: When tested in accordance with ASTM E 3330, as follows:
 1. Deflection Normal to Glazing Plane shall be limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans more than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
- E. Lateral Bracing of Framing Members: Compression flanges of flexural members are laterally braced by cross members with minimum depth equal to 50 percent of flexural member that is braced. Glazing does not provide lateral support.
- F. Structural Sealant: Capable of withstanding tensile and shear stresses imposed without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
- G. Structural-Test Performance: Provide metal-framed skylights tested according to ASTM E 330, as follows:
 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

- H. Air Infiltration: Provide metal-framed skylights with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. per square foot area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.
- I. Water Penetration - Static: Water Penetration under Static Pressure: Provide metal-framed skylights that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.
 - 1. Maximum Water Leakage: No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.
- J. Water Penetration - Dynamic: Water Penetration under Dynamic Pressure: Provide metal-framed skylights that do not evidence water penetration through fixed glazing and framing areas when tested according to AAMA 501 at a minimum wind load pressure equivalent of 15.0 psf (76.5 mph wind speed), with a water application of (5) gallons per hour per square foot of skylight area for a duration of (15) minutes.
 - 1. Maximum Water Leakage: No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.
- K. Thermal Movements: Provide metal-framed skylights that allow for thermal movements resulting from the following maximum change (range) in ambient and exterior surface temperatures. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): +/- 50 deg F for heated spaces, +/-80 deg F for unheated spaces.,
- L. Condensation Resistance: Provide metal-framed skylights with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 59 when tested according to AAMA 1503 with 1" clear insulated, laminated glass unit with no special glass coatings or gas fill.

2.03 FRAMING SYSTEMS

- A. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - 4. Structural Profiles: ASTM B 308/B 308M.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
 - 1. Include snap-on aluminum trim that conceals fasteners.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.
- D. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

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1. At pressure caps, use ASTM A 193/A 193M stainless-steel screws.
 2. Use Nylock nuts where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 3. Reinforce members as required to receive fastener threads.
 4. Use exposed fasteners with minimal visible profile fabricated from Series 300 stainless steel.
- E. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- F. Anchor Bolts: ASTM A 307, Grade A, galvanized steel.
- G. Concealed Flashing: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- H. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than 0.040 inch thick.
- I. Framing Gaskets: Santoprene gaskets that are silicone compatible.
- J. Framing Sealants: As recommended in writing by manufacturer.
1. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.04 GLAZING

Glazing: As specified in Section 08 80 00 "Glazing."

2.05 FABRICATION

- A. Where practical, fit and assemble metal-framed skylights in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Fabricate aluminum components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Internal guttering systems to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
 4. Physical and thermal isolation of glazing from framing members.
 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
- C. Fabricate aluminum sill closures with 1/4" diameter weep holes and for installation as continuous component.
- D. Reinforce aluminum components as required to receive fastener threads.
- E. Weld aluminum components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

- F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.06 ALUMINUM FINISHES <SELECT ONLY ONE PARAGRAPH>

- A. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31
- B. Color Anodic Finish: AAMA 611, [AA-M12C22A42/A44, Class I, 0.018 mm] [AA-M12C22A32/A34, Class II, 0.010 mm] or thicker.
 - 1. Color: [Light bronze] [Medium bronze] [Dark bronze] [Champagne] [Black] <Insert color>.
 - 2. Color: [Match Architect's sample] [As selected by Architect from full range of industry colors and color densities].
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: As indicated by manufacturer's designations.
- D. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 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.
 - 1. Color and Gloss: [Match Architect's sample] OR [As selected by Architect from manufacturer's full range] <Insert color and gloss>.
- E. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 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.
 - 1. Color and Gloss: [Match Architect's sample] OR [As selected by Architect from manufacturer's full range] <Insert color and gloss>.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

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6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 7. Seal joints watertight unless otherwise indicated.
- B. Metal Protection: Where aluminum will contact dissimilar materials, protect against galvanic action by painting contact surfaces with protective coating or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
- C. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate two 1/4" diameter weep holes at the low end of all rafters.
- D. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
- E. Install components plumb and true in alignment with established lines and elevations.
- F. Install glazing as specified in Section 08 80 00 "Glazing."
- G. Erection Tolerances: Install metal-framed skylights to comply with the following maximum tolerances:
1. Alignment: Limit offset from true alignment to 1/32 inch where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches; otherwise, limit offset to 1/8 inch.
 2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet but no greater than 1/2 inch over total length.

3.03 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.
1. Water-Spray Test: Before installation of interior finishes has begun, skylights shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- B. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

END OF SECTION