

SECTION 084523 - FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes assemblies incorporating fiberglass sandwich panels and aluminum frame systems as follows:
 - 1. Skylight assemblies.
- B. Related Sections include the following:
 - 1. Division 05 Section "Structural Steel Framing" for steel framing that supports skin-system assemblies.
 - 2. Division 07 Section "Metal Roof Panels" for metal roof assemblies installed contiguous to fiberglass sandwich panel skylight assemblies.
 - 3. Division 07 Section "Sheet Metal Flashing and Trim" for custom-fabricated metal flashings installed at perimeters of assemblies.
 - 4. Division 07 Section "Joint Sealants" for sealants installed at perimeters of assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide fiberglass-sandwich panel skylight assemblies assemblies, including anchorage, capable of withstanding, without failure, the effects of the following:
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure.
 - 4. Dimensional tolerances of building frame and other adjacent construction.
- B. Failure includes the following:
 - 1. Deflection exceeding specified limits.
 - 2. Water leakage.
 - 3. Thermal stresses transferred to building structure.
 - 4. Noise or vibration created by wind and thermal and structural movements.
 - 5. Loosening or weakening of fasteners, attachments, and other components.
 - 6. Delamination of fiberglass-sandwich-panel faces from panel cores.

- C. Delegated Design: Design fiberglass-sandwich panel skylight assemblies using performance requirements and design criteria indicated.
1. Provide product data and test reports demonstrating ability of metal roof panel assembly to achieve performance standards indicated for actual project conditions.
- D. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
1. Test-Pressure Difference: 20 percent of positive design wind pressure, but not less than 6.24 lbf/sq. ft. (300 Pa) and not more than 12.0 lbf/sq. ft. (575 Pa).
 2. Positive Preload Test-Pressure Difference: Greater than or equal to 15.0 lbf/sq. ft. (720 Pa) and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 3. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
- E. Structural Performance.
1. Provide fiberglass-sandwich panel skylight assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592.
 2. Snow Loads: Determine applicable snow loads using Project's roof snow load criteria provided below and snow load provisions of ASCE/SEI Standard 7-05.
 - a. Ground Snow Load, $P_G = 30$ psf
 - b. Snow Exposure Factor, $C_e = 1.0$
 - c. Snow Load Importance Factor, $I = 1.0$
 - d. Thermal Factor, $C_t = 1.0$
 - e. Flat-roof Snow Load, $P_f = 20$ psf
 3. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated and that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.
 - a. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-kPa lbf sq. ft. (1.44-kPa) outward force.
 4. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
 - a. Fire/Windstorm Classification: Class 1A-90.
 - b. Hail Resistance: MH.

5. Concentrated Live Loads on Overhead Assemblies: 300 lbf (1334 N) applied to assemblies at locations that will produce greatest stress or deflection.
 6. Load Combinations: Calculate according to the applicable provisions of - ASCE/SEI Standard 7-05.
 7. Deflection of Assemblies:
 - a. Overhead Assemblies: Limited to 1/90 of clear span for each assembly component.
- F. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C).
- G. Roof Assemblies: Class A per ASTM E 108 or UL 790.

1.4 PERFORMANCE TESTING

- A. Provide assemblies that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified independent testing agency.
- B. Air-Infiltration Test: ASTM E 283.
 1. Minimum Static-Air-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
 2. Maximum Air Leakage: 0.06 cfm/sq. ft. (0.30 L/s per sq. m).
- C. Test for Water Penetration under Static Pressure: ASTM E 331.
 1. Minimum Static-Air-Pressure Difference: 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft. (479 Pa).
 2. Water Leakage: None.
- D. Test for Water Penetration under Dynamic Pressure: AAMA 501.1.
 1. Dynamic Pressure: 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft. (718 Pa).
 2. Water Leakage: None, as defined by AAMA 501.1. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.
- E. Water-Penetration, Wind-Driven-Rain Test: Wind-driven-rain test in ICBO ES AC07, "Special Roofing Systems."
 1. Water Leakage: None.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for assemblies.
- B. Shop Drawings: For assemblies. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each frame system intersection of assemblies, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Fiberglass sandwich panels.
 - 5. Flashing and drainage.
- F. Field quality-control test reports.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for assemblies.
- H. Preconstruction Testing Program: For assemblies, developed specifically for Project. Include plans, elevations, sections, and details of laboratory mockup.
- I. Preconstruction Test Reports: For assemblies.
- J. Maintenance Data: For assemblies to include in maintenance manuals.
- K. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Entity capable of assuming engineering responsibility, including preparation of Shop Drawings, and performing work of this Section and who is acceptable to manufacturer.
- B. Manufacturer Qualifications: For fiberglass sandwich panels, a qualified manufacturer whose facilities, processes, and products are monitored by an independent, accredited quality-control agency for compliance with applicable requirements in ICBO ES AC04, "Sandwich Panels."

- C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for assemblies' 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.
- E. Fire-Test-Response Characteristics: Where fire-test-response characteristics are indicated for assemblies and components, provide products identical to those tested per test method indicated by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- F. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
- G. NFRC Certification: Provide fiberglass sandwich panels that are certified for U-factors indicated according to NFRC 100 and listed in its "National Fenestration Council Incorporated - Certified Products Directory."
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

- A. Field Measurements: Indicate measurements on Shop Drawings.

1.8 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of assemblies 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. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - c. Water leakage.
 - 2. Warranty Period: Two years from date of Substantial Completion.

- B. Special Fiberglass-Sandwich-Panel Warranty: Manufacturer's standard form in which manufacturer agrees to replace panels that exhibit defects in materials or workmanship.
 - 1. Defects include, but are not limited to, the following:
 - a. Fiberbloom.
 - b. Delamination of coating, if any, from exterior face sheet.
 - c. Discoloration of exterior face sheet of more than 8.0 units Delta E when measured according ASTM D 2244.
 - d. Delamination of panel face sheets from panel cores.
 - 2. Warranty Period: 10 years from date of Substantial Completion.
- C. Special Aluminum-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 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for assemblies is based on Exterior Structural Roof Panels by Kalwall Corporation. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - 1. Major Industries, Inc.
 - 2. Skywall Translucent Systems; Vistawall Group (The).
 - 3. Structures Unlimited, Inc.

2.2 ALUMINUM FRAME 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 (ASTM B 209M).
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
- B. Components: Manufacturer's standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: One-piece extruded-aluminum components.

- C. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than 0.040 inch (1.016 mm) thick.
- D. Frame-System Gaskets: Manufacturer's standard.
- E. Frame-System Sealants: As recommended in writing by manufacturer and as specified in Division 07 Section "Joint Sealants."
- F. Anchors, Fasteners, and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding; compatible with adjacent materials.
 - 1. At closures, retaining caps, or battens, use ASTM A 193/A 193M, 300 series stainless-steel screws.
 - 2. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - 3. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.
- G. 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.
- H. Anchor Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), hot-dip zinc coating, ASTM A 153/A 153M, Class C.
- I. Frame System Fabrication:
 - 1. Fabricate components before finishing.
 - 2. Fabricate components that, when assembled, have the following characteristics:
 - a. Profiles that are sharp, straight, and free of defects or deformations.
 - b. Accurately fitted joints with ends coped or mitered.
 - c. Internal guttering systems or other means to drain water passing joints, condensation occurring within components, and moisture migrating within the assembly to exterior.
 - 3. Fabricate sill closures with weep holes and for installation as continuous component.
 - 4. Reinforce components as required to receive fastener threads.
 - 5. Weld 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.

2.3 FIBERGLASS SANDWICH PANELS

- A. Panel Construction: Assembly of uniformly colored, translucent, thermoset, fiberglass-reinforced-polymer face sheets bonded to both sides of a grid core and complying with requirements applicable to panel materials in ICBO ES AC04, "Sandwich Panels."

1. Face-Sheet, Self-Ignition Temperature: 650 deg F (343 deg C) or more per ASTM D 1929.
 2. Face-Sheet Burning Extent: 1 inch (25 mm) or less per ASTM D 635.
 3. Face-Sheet, Smoke-Developed Index: 450 or less per ASTM E 84.
 4. Interior Face-Sheet, Flame-Spread Index: Not more than 25 per ASTM E 84.
 5. Roof-Covering Class: Class A per ASTM E 108 or UL 790.
- B. Panel Thickness: 2-3/4 inches (70 mm).
- C. Panel Size: 48 inches (122 cm) by 72 inches (183 cm).
- D. Panel Strength Characteristics:
1. Maximum Panel Deflection: 3-1/2 inches (89 mm) when a 4-by-12-foot (1.2-by-3.6-m) panel is tested according to ASTM E 72 at 34 lbf/ sq. ft. (1.6 kPa), with a maximum 0.090-inch (2.3-mm) set deflection after 5 minutes.
 2. Panel Support Strength: Capable of supporting, without failure, a 300-lbf (1334 N) concentrated load when applied to a 3-inch- (76-mm-) diameter disk according to ASTM E 661.
- E. Grid Core: Mechanically interlocked extruded-aluminum I-beams, with a minimum flange width of 7/16 inch (11.1 mm).
1. Extruded Aluminum: ASTM B 221 (ASTM B 221M), in alloy and temper recommended in writing by manufacturer.
 2. I-Beam Construction: One-piece extruded-aluminum components.
 3. Grid Pattern: Inline rectangle, nominal 12 by 24 inches (305 by 610 mm).
- F. Exterior Face Sheet:
1. Thickness: 0.060 inches (1.524 mm).
 2. Color: White.
 3. Color Stability: Not more than 4.0 units Delta E when measured according to ASTM D 2244 after outdoor weathering in southern Florida according to procedures in ASTM D 1435 with panels mounted facing south and as follows:
 - a. Panel Mounting Angle: Not more than 5 degrees from horizontal.
 - b. Exposure Period: 30 months for components of Class A roof assemblies.
 4. Erosion Protection: Integral, embedded glass erosion barrier.
- G. Interior Face Sheet:
1. Thickness: 0.045 inch (1.143 mm).
 2. Color: White.
- H. Fiberglass-Sandwich-Panel Adhesive: ASTM D 2559.
1. Compatible with facing and core materials.

2. Tensile and shear bond strength of aged adhesive ensures permanent adhesion of facings to cores, as evidenced by testing according to ASTM C 297 and ASTM D 1002 after accelerated aging procedures that comply with aging requirements for adhesives with high resistance to moisture in ICBO ES AC05, "Sandwich Panel Adhesives."

I. Panel Fabrication: Factory assemble and seal panels.

1. Laminate face sheets to grid core under a controlled process using heat and pressure to produce straight adhesive bonding lines that cover width of core members and that have sharp edges.
 - a. White spots indicating lack of bond at intersections of grid-core members are limited in number to 4 for every 40 sq. ft. (3.7 sq. m) of panel and limited in diameter to 3/64 inch (1.2 mm).
2. Fabricate with grid pattern that is symmetrical about centerlines of each panel.
3. Fabricate panel to allow condensation within panel to escape.
4. Reinforce panel corners.

2.4 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.5 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.
 1. Color and Gloss: To match metal roof panels.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 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.
 - 6. Weld aluminum 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 components will contact dissimilar materials, protect against galvanic action by painting contact surfaces with bituminous paint 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 weep holes at rafters.
- D. Install components to drain water passing joints, condensation occurring within aluminum members and panels, and moisture migrating within assembly to exterior.
- E. Install components plumb and true in alignment with established lines and elevations.
- F. Install insulation materials as specified in Division 07 Section "Thermal Insulation."
- G. Erection Tolerances: Install assemblies to comply with the following maximum tolerances:
 - 1. Alignment: Limit offset from true alignment to 1/32 inch (0.8 mm) 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 (76 mm); otherwise, limit offset to 1/8 inch (3.2 mm).

2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3.2 mm in 3.7 m); 1/2 inch (13 mm) over total length.

3.3 FIELD QUALITY CONTROL

- A. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 084523