

SECTION 07 41 43
INSULATED METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Insulated metal roof panels.
- B. Flashing and trim integral to insulated panels.
- C. Clips, anchoring devices, fasteners, and accessories for installation of panel system.

1.2 RELATED SECTIONS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim.
- B. Section 07 71 13 - Manufactured Copings.
- C. Section 07 90 00 - Joint Protection.

1.3 REFERENCES

- A. ASTM International (ASTM):
 1. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 2. ASTM A 755 - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 3. ASTM A 792 - Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated Steel by the Hot-Dip Process.
 4. ASTM C 518 - Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 5. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus.
 6. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics
 7. ASTM D 1622 - Apparent Density of Rigid Cellular Plastics
 8. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 9. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 10. ASTM D 6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
 11. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 12. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 13. ASTM E 1592 - Structural Performance of Metal Roofing and Siding Systems by Uniform Static Air Pressure Difference.
 14. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 15. ASTM E 1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
 16. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

- B. American Society of Civil Engineers (ASCE):
 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. Cool Roof Rating Council (CRRC):
 1. CRRC-1-2016 - CRRC Product Rating Program.
- D. FM Global (FM):
 1. ANSI/FM 4471 - Approval Standard for Class 1 Panel Roofs.
 2. FM 4880 - Evaluating Insulated Wall or Wall and Roof/Ceiling Assemblies, Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, and Interior or Exterior Finish Systems.
- E. Green Seal (GS):
 1. GS-11 - Green Seal Standard for Paints and Coatings, Edition 3.2, October 26, 2015,
- F. US Green Building Council (USGBC):
 1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
 1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Material type, metal thickness and finish.
 4. Installation methods.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.
 1. Include data indicating compliance with performance requirements.
 2. Indicate points of supporting structure that must coordinate with metal panel system installation.
 3. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Panel Sample: Submit 1 foot (305 mm) high by full width sample panel for each profile specified indicating the metal, texture, color and finish.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing factory foamed in place insulated metal panels with a minimum documented experience of ten years.
- B. Installer Qualifications: Company specializing in installation of the products specified for projects of similar size and scope with minimum five years documented experience.
 1. Certified by metal panel manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in accordance with Manufacturer's written instructions. Store under cover in

manufacturer's unopened packaging with labels intact until ready for installation.

- B. Shield foam insulated metal roof panels from direct sunlight until installation.
- C. Store products off the ground, with panels sloped for drainage and covered to protect factory finishes from damage.
- D. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

1.7 WARRANTY

- A. Special Manufacturer's Warranty: Submit Manufacturer's two (2) year limited warranty providing panels to be free from defects in materials and workmanship, beginning from the date of substantial completion excluding coil coatings (paint finishes) that are covered under a separate warranty.
- B. The installation contractor shall issue a separate warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation good for at least two years.
- C. Special Panel Finish Warranty: Submit Manufacturer's limited warranty on the exterior paint finish for adhesion to the metal substrate and limited warranty on the exterior paint finish for chalk and fade.
 - 1. Fluoropolymer Two-Coat System:
 - a. Color fading in excess of 5 for copper, silver metallic and bright red; Hunter units per ASTM D 2244.
 - b. Color fading in excess of 10 for copper, silver metallic and bright red; Hunter units per ASTM D 2244.
 - c. Chalking in excess of 6 for copper, silver metallic and bright red or 8 rating per ASTM D 4214.
 - d. Failure of adhesion, peeling, checking, or cracking.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: MBCI or MetalSpan
- B. Requests for substitutions will be considered in accordance with provisions of Appendix E 6.8.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
- B. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, as determined by ASTM E 72 or ASTM E 1592 applied in accordance with ICC AC 04, Section 4, Panel Load Test Option or Section 5, Panel Analysis Option:
 - 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 - a. Roof Panel Wind Uplift Testing: Certify capacity of metal panels by testing of proposed assembly per ASTM E 72 or ASTM E 1592.
 - 2. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/180 of the

span with no evidence of failure.

- C. Fire Performance Characteristics: Provide metal panel systems with the following fire-test characteristics determined by indicated test standard as applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: Provide metal panel systems with the following characteristics when tested per ASTM E 84. The core shall have:
 - a. Flame spread index: 25 or less.
 - b. Smoke developed index: 450 or less.
 - 2. Fire Performance of Insulated Roof: Class 1 roof and wall panel per ANSI/FM 4880.
- D. Roof Panel Air Infiltration, ASTM E 1680: Maximum 0.023 cfm/sq. ft. (0.115 L/s per sq. m) at static-air-pressure difference of 12 lbf/sq. ft. (575 Pa).
- E. Roof Panel Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of 20 lbf/sq. ft. (958 Pa).
- F. Test procedure for susceptibility to leakage of discontinuous roof systems protocol TAS 114: Water applied to a depth of 6" above the lowest section of roof profile. No water infiltration observed during the seven-day test period.
- G. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.
- H. Thermal Performance: When tested in accordance with ASTM C 518, the panels shall provide a K-factor of 0.14 btu/sf/hr./deg F at a 75 degree F (23 degree C) mean temperature, or 0.126 btu/sf/hr/deg F at a 40 degree F (4 degree C) mean temperature.

2.3 INSULATED METAL ROOF PANELS

- A. Standing Seam, Foamed-Insulation-Core Metal Roof Panels: Structural metal panels consisting of an exterior standing seam with an interior tongue and groove joint, coupled with a vapor seal in the standing seam, and provides superior resistance to air and moisture intrusion. Attached with concealed fasteners to the structure.
 - 1. Basis of Design: MBCI, CFR Insulated Metal Panel.
 - 2. Material: G-90 galvanized coated steel conforming to ASTM A 653 or AZ-50 aluminum-zinc alloy coated steel, conforming to ASTM A 792, minimum grade 33, prepainted by the coil-coating process per ASTM A 755 or Aluminum-Zinc Alloy-Coated Steel Sheet, ASTM A792, structural quality, Grade 50, Coating Class AZ50 prepainted by the coil-coating process per ASTM A 755.
 - 3. Exterior Face:
 - a. Thickness: 24 gauge.
 - b. Surface Texture: Stucco embossed with Mesa profile.
 - c. Finish: Fluoropolymer two-coat system.
 - d. Color: As selected by Owner's Representative from manufacturers' standard colors.
 - 4. Interior Faces:
 - a. Thickness: 26 gauge.
 - b. Surface Texture: Stucco embossed with Mesa profile.
 - c. Finish: Fluoropolymer two-coat system.
 - d. Color: As selected by Owner's Representative from manufacturers' standard colors.
 - 5. Endlaps: Provide full length panels without factory endlaps where panel lengths permit.
 - 6. Low Eave Treatment: Provide cutback for trim installation.

7. Panel Width: 36 inches (914 mm) to 42 inches (1067 mm) as required to meet performance requirements.
8. Panel Thickness: 3 inch (76 mm) or as required to meet performance requirements.
9. Insulating Core: Polyurethane with zero ozone depletion potential blowing agent:
 - a. Closed Cell Content, ASTM D 6226: Minimum 90 percent.
 - b. Compressive Strength, ASTM D 1621: As required to meet structural performance requirements and with a minimum of 22 psi.
 - c. Shear Strength, ASTM C 273: As required to meet structural performance requirements and with a minimum of 36 psi.
 - d. Tensile Strength, ASTM D 1623: As required to meet structural performance requirements and with a minimum of 41 psi.
 - e. Minimum Density: 2.0 pcf (32 kg/m³) as determined by ASTM D 1622.
 - f. Thermal Resistance, R-Value: 24± value as determined by ASTM C 518 at 75 degrees Fahrenheit mean temperature.

2.4 ACCESSORIES

- A. General: Provide complete metal panel assemblies incorporating trim, copings, fascia and miscellaneous flashings. Provide required fasteners, closure strips, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panels.
- C. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer. Provide corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating, with weathertight resilient washers.
- D. Sealant: Sealant as recommended by panel manufacturer.
- E. Snow Guards: Compatible with standing seam roof and approved by metal panel manufacturer.

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels, trim, and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept sealant tape providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings.

2.6 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 1. Fluoropolymer Two-Coat System: 0.20 - 0.3 mil (0.005 - 0.008 mm) primer with 0.7 - 0.8 mil (0.018 - 0.020 mm) 70 percent PVDF fluoropolymer color coat.
- B. Interior Face Sheet Coil-Coated Finish System:
 1. Fluoropolymer Two-Coat System: 0.20 mil (0.005 mm) primer with 0.7 - 0.8 mil (0.018 - 0.020 mm) 70 percent PVDF fluoropolymer color coat.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine metal panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panels.
 - 1. Inspect framing that will support insulated metal panels to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to metal panel manufacturer and installer. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal panels.
 - 2. Panel Support Tolerances: Confirm that metal panel supports are within tolerances acceptable to metal panel manufacturer but not greater than the following:
 - a. Maximum 1/4 inch (6 mm) in 20 foot (6100 mm) in any direction.
 - b. Maximum 3/8 inch (9 mm) over any single roof plane.
 - c. Purlin Spacing of 7 feet (2133 mm) or less: 1/8 inch (3 mm) out only.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal panel installation.

3.2 INSTALLATION

- A. Standing Seamed, Concealed-Fastener Insulated Metal Panels: Install metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal panels in orientation, sizes, and locations indicated. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to metal framing using screws, fasteners, sealants, and adhesives recommended for application by metal panel manufacturer.
 - 1. Fasten metal panels to supports with fasteners at each location indicated on approved shop drawings, at spacing and with fasteners recommended by manufacturer.
 - 2. Cut panels in field where required using manufacturer's recommended methods.
 - 3. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by metal panel manufacturer.
- C. Attach panel flashing trim pieces to supports using recommended fasteners and joint sealers.
- D. Joint Sealers: Install sealants where indicated and where required for weatherproof performance of metal panel assemblies.
 - 1. Seal panel base assembly, openings, panel head joints, and perimeter joints using sealants indicated in manufacturer's instructions.
 - 2. Seal wall panel joints; apply continuously without gaps in accordance with manufacturer's written instructions, approved shop drawings, and project drawings.
 - 3. Prepare joints and apply sealants per requirements of Division 07 Section.
- E. Accessories: Install metal panel accessories with positive anchorage to building and weather tight mounting; provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
 - 2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 - 3. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.
 - 4. No penetrations should be made through roof. All building penetrations to be routed through side walls.

3.3 FIELD QUALITY CONTROL

- A. Primary installation QC is responsibility of contractor.
- B. Contractor to coordinate with owner's representative to be on-site during installation of roof to verify implementation of quality control.

3.4 CLEANING

- A. Remove temporary protective films immediately in accordance with metal panel manufacturer's instructions. Clean finished surfaces as recommended by metal panel manufacturer.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION