



EM CFR Insulated Metal Roof Panel

EXCEPTIONAL® Metals' EM CFR Insulated Metal Roof Panels offer versatility for roof applications for a wide range of cold storage, architectural, commercial and industrial applications. Energy-efficient EXCEPTIONAL Metals' EM CFR Panels provide continuous insulation and eliminate thermal bridges. The exterior and interior metal skin of the EXCEPTIONAL Metals' EM CFR Panel is roll formed with EXCEPTIONAL Metals' standard stucco-embossed Mesa profile. EXCEPTIONAL Metals' panels come in a wide array of color and applied finish offerings and are suitable for a multitude of building applications. With building and energy codes becoming increasingly more stringent, insulated metal panels are an ideal choice for thermally efficient building envelopes.

Insulated metal panels (IMPs) consist of two single-skin metal facings and a foamed-in-place core. The foam insulation is made of non-chlorofluorocarbon (non-CFC) polyurethane foam. IMPs are sealed to each other at the side laps and to the substructure at all perimeter boundaries, which make them the ideal choice for applications where a continuous air barrier is required. The foam insulation of IMPs offers superior R-values that provide enhanced energy performance for buildings utilizing these panels. An exterior standing seam with an interior tongue-and-groove joint, coupled with vapor seal in the standing seam, provides superior resistance to air and moisture intrusion, allowing for increased thermal performance of the building envelope.

IMPs are able to span greater distances than single skin panels. As well as, offer better in-place building efficiency than typical cavity or field assembled roof products.

IMPs offer many advantages for building owners, designers and contractors. Some of these benefits include reduced building operational expenses, accelerated construction schedules, earlier business starts and much more. EXCEPTIONAL Metals' insulated metal panels are ideal for many applications, including cold storage, architectural, commercial, industrial and institutional markets.

EXCEPTIONAL Metals, partnered with MBCI® to manufacture metal panels with the most technologically advanced manufacturing line in the United States. EXCEPTIONAL Metals insulated panels are available in six different wall profiles and two roof profiles. Our insulated metal panel color and applied finish offerings allow for a multitude of design opportunities.

SECTION 07 41 13 - INSULATED METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Foamed-insulation-core standing seam metal roof panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

Specifier: If retaining this optional article, edit list below to correspond to Project.

- A. Division 01 Section "Sustainable Design Requirements" for related LEED general requirements.
- B. Division 05 Section "Structural Steel Framing" for steel framing supporting metal panels.
- C. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.
- D. Division 07 Section "Metal Wall and Roof Panels" for factory-formed metal wall, roof, and soffit panels.
- E. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal copings, flashings, reglets and roof drainage items in addition to items specified in this Section.
- F. Division 07 Section "Manufactured Roof Specialties" for manufactured copings, reglets, and roof drainage items in addition to items specified in this Section.
- G. Division 07 Section "Roof Accessories" for roof hatches, smoke vents, equipment curbs, and equipment supports.
- H. Division 07 Section "[Joint Sealants](#)" for field-applied [Joint Sealants](#).
- I. Division 13 Section "Metal Building Systems" for steel framing supporting metal panels.

1.3 REFERENCES

Specifier: If retaining this optional article, edit list below to correspond to Project.

- A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:
 - 1. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
- B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - 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, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

4. ASTM A 924 – General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 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 6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics
 9. ASTM C 518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 10. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 11. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 12. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 13. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.
 14. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 15. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 16. ASTM E 1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
 17. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. Cool Roof Rating Council (CRRC): www.coolroofs.org/productratingprogram.html:
1. CRRC-1-2016 – CRRC Product Rating Program.
- E. FM Global (FM): www.fmglobal.com:
1. ANSI/FM 4471 - Approval Standard for Class 1 Panel Roofs.
 2. ANSI/FM 4880 - American National Standard for Evaluating Insulated Wall and Roof/Ceiling Assemblies.
- F. Canadian Standards Association (CSA)
1. CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 2. CAN/ULC S107 – Method of fire test of roof coverings.
 3. CAN/ULC S126 – Fire spread under roof-deck assemblies.
- G. Green Seal (GS) www.greenseal.org
1. GS-11 – Green Seal Standard for Paints and Coatings, Edition 3.2, October 26, 2015.
US Green Building Council (USGBC): www.usgbc.org:
- H. Leadership in Energy and Environmental Design (LEED) Green Building Rating System
- 1.4 QUALITY ASSURANCE
- A. Manufacturer/Source: Provide metal panel assemblies and accessories from a single manufacturer approved under an accredited third-party quality control program
 - B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum ten years' experience in the manufacturing of similar products and successful use in similar applications.



Specifier: Retain paragraph below if Owner allows substitutions but requires strict control over qualifying of substituted manufacturers.

1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations not less than five years old, with Owner and Architect contact information.
 - e. Sample warranty.
 - f. Certificate from an accredited third-party Quality Control Program.

1.5 Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements

1.6 Approved manufacturers must meet separate requirements of Submittals Article.

Specifier: Review of manufacturers' qualifying of installers is recommended for larger projects. EXCEPTIONAL Metals' requires Installer and supervisor certification when project requirements include extended warranty.

- A. Installer Qualifications: Experienced Installer with minimum of five years' experience with successfully completed projects of a similar nature and scope.
 1. Installer's Field Supervisor: Experienced mechanic [certified by metal panel manufacturer] supervising work on site whenever work is underway.

Specifier: Retain paragraph below and edit as appropriate for Federal projects and for public works projects utilizing Federal funds; consult with project Contracting Officer. Coordinate with Submittals Article.

- B. **Buy American Compliance:** Materials provided under work of this Section shall comply with the following requirements:
 1. Buy American Act of 1933 BAA-41 U.S.C §§ 10a – 10d.
 2. Buy American provisions of Section 1605 of the American Recovery and Reinvestment Act of 2009 (ARRA).

1.7 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, metal panel installer, metal panel manufacturer's technical representative, inspection agency, and related trade contractors.
 1. Coordinate building framing in relation to metal panel system.
 2. Coordinate openings and penetrations of metal panel system.
 3. Coordinate work of Division 07 Sections "Roof Specialties" and "Roof Accessories" and openings and penetrations and manufacturer's accessories with installation of metal panels.

1.8 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.

Specifier: Retain and edit below to comply with Project requirements for LEED or other sustainable design requirements. LEED Credits for which Insulated metal panels can help but would be represented in other sections are:

MR Credit 6: Rapidly Renewable Materials - The foam core in the wall panels contains a component that contributes to one point for using rapidly renewable buildings materials and products for 2.5% of the total value of all building materials and products used in the project (based on cost.)

- B. LEED Version 3.0 Submittals:
1. Credit SS 7.2 Heat Island Effect - Roof: Provide manufacturer's documentation demonstrating the Solar Reflective Index (SRI).
 2. EA Credit 1: Optimize Energy Performance - Provide testing or modeling results demonstrating U-values provided in accordance with this section are in compliance with ASHRAE 90.1, including Appendix G.
 3. MR Credit 4: Recycled Content. Provide documentation of the following:
 - a. Material costs for each product having recycled content.
 - b. Percentages by weight of post-consumer and pre-consumer recycled content for each item.
 - c. Total weight and cost of products provided.
 4. IEQ Credit 4.1: Low-Emitting Materials - Adhesives and Sealants. Provide documentation of the following:
 - a. Product data for adhesives and sealants demonstrating compliance with standards of South Coast Air Quality Management District Rule #1168.
 5. IEQ Credit 4.2: Low-Emitting Materials – Paints and Coatings. Provide documentation of the following:
 - a. Product data for paint and coatings demonstrating compliance with the VOC limits as established in Green Seal Standard GS-11
- C. 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, curbs, vents, snow guards, lightning arresting equipment, 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.
- D. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- E. Samples for Verification::
1. Provide 12-inch- (305 mm-) long section of each metal panel profile.
 2. Provide color chip verifying color selection.



1.9 INFORMATIONAL SUBMITTALS

- A. Product Test Results: Indicating compliance of products with requirements.

Specifier: Retain option in paragraph below if Project requirements include delegated design by Contractor

- B. Qualification Information: For Installer firm and Installer's field supervisor.
- C. Accreditation Certificate: Indicating that manufacturer is accredited under an accredited third-party quality control program, including IAS AC472 and based upon chapter 17 of the International Building Code (IBC).
- D. Buy American Certification: Manufacturers' letters of compliance acceptable to authorities having jurisdiction, indicating that products comply with requirements.
- E. Florida State Building Code Compliance: Indicating that products comply with requirements of Florida State Building Code. www.floridabuilding.org/pr/pr_app_srch.aspx
- F. Warranty:
 - 1. Submit manufacturer's written 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.
 - 2. 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.

1.10 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's warranty.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components, or other damage. Protect panels and trim bundles during shipping. Protect painted surfaces with a protective covering before shipping.
 - 1. Deliver, unload, store, and erect metal panels and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
 - 2. Store in accordance with Manufacturer's written instructions. Provide wood collars for stacking and handling in the field.
 - 3. Shield foam insulated metal panels from direct sunlight until installation.

1.12 WARRANTY

Specifier: Warranty terms below are available from EXCEPTIONAL Metals. Verify that other allowable manufacturers furnish warranty meeting requirements.

- 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.
- 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.

Specifier: No warranty is offered for the interior painted surface of the panel.

Specifier: Retain finish warranty paragraph that corresponds to selected metal panel finish system. Coordinate chalk and fade performance with applicable EXCEPTIONAL Metals finish and color found at www.exceptionalmetals.com.

- 1. Fluoropolymer Two-Coat System:
 - a. Color fading in excess of [5] or [10] for copper, silver metallic and bright red; Hunter units per ASTM D 2244.
 - b. Chalking in excess of [6] for copper, silver metallic and bright red or [8] rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.
- 2. Modified Silicone-Polyester Two-Coat System:
 - a. Color fading in excess of [5] or [7] for crimson red; Hunter units per ASTM D 2244.
 - b. Chalking in excess of [7] for crimson red or [8] rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.
- 3. Other finish options available; additional information can be found at exceptionalmetals.com or 800.248.0280.

PART 2 - PRODUCTS

2.1 MANUFACTURER

Specifier: Retain basis of design manufacturer and products listed in this Article where allowed. If inserting comparable manufacturers, carefully review products and engineering capabilities in relation to requirements of this Section, to ensure that other approved manufacturers offer products meeting EXCEPTIONAL Metals' standards.

- A. Basis of Design Manufacturer: **EXCEPTIONAL Metals' Metal Roof and Wall Systems, Division of Duro-Last[®], Inc. Exceptional Metals, Saginaw, (800) 248-0280** Email: info@EXCEPTIONALMETALS.com; Web: www.exceptionalmetals.com.

- 1. Provide basis of design product [, or comparable product approved by Architect prior to bid].

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.

Specifier: Retain one or more radiative property performance subparagraphs below for metal roof panels, based on project requirements. Retain Solar Reflectance Index for LEED projects. Retain Energy Star reference for projects seeking Energy Star rating; products must be listed on EPA Energy Star website. Retain CRRC compliance for projects required to comply with CEC requirements. Verify values with manufacturer for selected panel finishes.

Confirm that Energy Code requirements are also met by below.

- B. Roof Panel Radiative Property Performance:
1. **Solar Reflectance Index:**
 - a. **LEED v3.0:** Minimum 78 for roof slopes of 2:12 or less and 29 for roof slopes greater than 2:12 under medium wind conditions, per ASTM E 1980.
 - b. **LEED v4.0:** Minimum SRI requirements per Sustainable Sites Credit, Heat Island Reduction, Table 1:
 - i.) Minimum 82 **initial** SRI for roof slopes of 2:12 or less and 39 **initial** SRI for roof slopes greater than 2:12.
 - ii.) Minimum 64 **aged** SRI for roof slopes of 2:12 or less and 32 **aged** SRI for roof slopes greater than 2:12.
 2. **Energy Star Qualified:** Listed on USDOE ENERGY STAR Roof Products Qualified Product List.
 3. **Cool Roof Rating Council:** Listed in CRRC Rated Product Directory, with minimum properties as required by applicable Energy efficiency or High-Performance Green Building standard.
- C. 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:

Specifier: Consult structural engineer and edit below as required by local codes. Insert structural data below if not indicated on drawings. Select applicable deflection limit.

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. Roof Panel Snow Loads: [25 lbf/sq. ft. (1197 Pa)].
3. 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.

Specifier: Retain FM Approvals' listing requirement for FM Global-insured projects or where FM Global requirements are used as minimum design standard. Select required windstorm classification based upon calculation method in FM Global Loss Prevention Sheet 1-28; note that FM Approvals' windstorm classification does not correlate directly to design wind speed. Consult EXCEPTIONAL Metals for details.

- D. **Roof Panels FM Approvals Listing:** Comply with FM Approvals 4471 as part of a panel roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 construction.
1. Fire/Windstorm Classification: [Class 1A-60] [Class 1A-75] [Class 1A-90] [Class 1A-105] [Class 1A-120] [Class 1A-135].
 2. Hail Resistance Rating: SH.

- E. 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.
- F. 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).
- G. Roof Panel Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of 20 lbf/sq. ft. (958 Pa).
- H. 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.
- I. 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.

Specifier: The specific configuration of thermal performance testing has a significant impact on the published results. The thermal performance testing performed by EXCEPTIONAL Metals and described below conforms to industry standard testing and ASHRAE 90.1 requirements.

- J. Thermal Performance: When tested in accordance with ASTM C 518, Measurement of Steady State thermal Transmission, the panels shall provide a k factor of 0.14 btu/sf/hr/deg F at a 75° F (24° C) mean temperature, as required by code, or 0.126 btu/sf/hr/deg F at a 40° F (4° 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: **EM CFR Insulated Metal Panel.**

Specifier: Second paragraph below describes Galvalume Plus with clear acrylic coating for use as exposed metallic finish.

- 2. **G-90 Galvanized Coated Steel:** ASTM A 653 or **Aluminum-Zinc Alloy-Coated Steel:** ASTM A 792/A 792M, structural quality, **Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150),** prepainted by the coil-coating process per ASTM A 755/A 755M.

3. **Aluminum-Zinc Alloy-Coated Steel Sheet:** ASTM A 792/A 792M, structural quality, **Grade 50, Coating Class AZ55** (Grade 340, Coating Class AZM165) unpainted Galvalume Plus coating.

Specifier: Prior to selecting metal thickness and panel thickness below, consult manufacturer's span tables and review selection against panel thickness requirements and span condition. Select appropriate panel configuration to meet requirements of design wind pressure. **Important: Consult this document when specifying gauge with the intent that it meet a prescriptive decimal thickness requirement in addition to strength performance requirements. (Click Here To View)**

4. Exterior Face Sheet: **[24 gauge]** **[22 gauge]** coated thickness, with stucco embossed] surface.
- 1) Finish: **[Modified silicone-polyester two-coat system]** **[Fluoropolymer two-coat system]** **[Fluoropolymer two-coat metallic color system]** **[Exposed Galvalume Plus coating]**.
 - 2) Color: **[As indicated]** **[As selected by Architect from manufacturer's standard colors]** **[Match Architect's custom color]**.
5. Interior Face Sheet: **[26 gauge]** **[24 gauge]** **[22 gauge]** coated thickness, with stucco embossed surface and planked profile.
- 1) Finish: **[Polyester two-coat system]** **[Modified silicone-polyester two-coat system]** **[Fluoropolymer two-coat system]** **[Vinyl plastisol two-coat system]** **[304 Stainless Steel]** **[316 Stainless Steel]**.
 - 2) Color: **[As indicated]** **[As selected by Architect from manufacturer's standard colors]** **[Match Architect's custom color]**.
6. Endlaps: Provide panels with factory endlaps, notching, swedging and backer plates; where panel lengths permit.
7. Low Eave Treatment: Provide cutback for trim/gutter installation; where panel lengths permit.
8. Panel Width: **[30 inches (762 mm)]** **[36 inches (914 mm)]** **[42 inches (1067 mm)]** [as shown on drawings].
6. Panel Thickness: **[2 inch (51 mm)]** **[2.5 inch (64 mm)]** **[3 inch (76 mm)]** **[4 inch (102 mm)]** **[5 inch (127 mm)]** **[6 inch (152 mm)]** [As required to meet performance requirements] [as shown on drawings].
7. Insulating Core: Polyurethane with zero ozone depletion potential blowing agent
- a. Closed Cell Content: 90% or more as determined by ASTM D 6226
 - b. Compressive Strength: As required to meet structural performance requirements and with a minimum of 15 psi as determined by ASTM D 1621
 - c. Minimum Density: **2.0 pcf (32 kg/m3)** as determined by ASTM D 1622

PART 2 - Specifier: Insert corresponding panel thickness R-value below if using IMP as continuous insulation or U-factor if treating as an assembly for code compliance purposes. Refer to EXCEPTIONAL Metals' literature and Paragraph 2.2 K above. Coordinate with information on drawings. Consult EXCEPTIONAL Metals for details.

- d. **Thermal Resistance (R-Value):** [insert corresponding value **deg. F * hr * sq. ft./Btu (K * sq. m/W)**] as determined by ASTM C 518 at **75 degrees Fahrenheit** mean temperature.
8. Heat Transfer Coefficient (U-factor): [insert corresponding value **Btu/hr * sq. ft. * deg. F** insert corresponding value **(W/K * sq. m)**] as determined by ASTM C 1363 at 75 degrees

Fahrenheit mean temperature. Tested specimen must include at least two engaged side joints.

2.4 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal panel assemblies incorporating trim, copings, fasciae, gutters and downspouts, 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 panel face sheet.
- 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. Joint Sealers: Provide Tape Mastic Sealants and Concealed [Joint Sealants](#) per Section 07 92 00, "[Joint Sealants](#)".
- E. **Roof Accessories:** Approved by metal panel manufacturer. Refer to Section 07 72 00 "Roof Accessories" for requirements for curbs, equipment supports, roof hatches, heat and smoke vents, ventilators, and preformed flashing sleeves.
- F. **Snow Guards:** Compatible with standing seam roof and approved by metal panel manufacturer. Refer to Section 07 72 53 "Snow Guards" for requirements for snow guards attached to metal roof panels.
- G. **Roof Curbs:** Compatible with standing seam roof and approved by metal panel manufacture. Refer to Section 07 72 10 "Roof Curbs" for requirements for roof curbs attached to metal roof panels.

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 manufacturers' written instructions.
- B. Exterior Face Sheet Coil-Coated Finish System
 - 1. Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat, [meeting solar reflectance index requirements].
 - a. Basis of Design: EXCEPTIONAL Metals, Silicone Polyester.

Specifier: [EXCEPTIONAL Metals' fluoropolymer coatings are based on Arkema, Inc. Kynar 500 and Solvay Solexis Hylar 500 PVF2 resins.](#)

- 2. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, AAMA 621, [meeting solar reflectance index requirements].



- a. Basis of Design: EXCEPTIONAL Metals, Fluoropolymer.

Specifier: Select interior face sheet finish from three options below; Igloo White color is standard unless otherwise indicated. Verify with EXCEPTIONAL Metals; not all finishes are available on all products.

- C. Interior Face Sheet Coil-Coated Finish System:
 - 1. Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat
 - a. Basis of Design: EXCEPTIONAL Metals, Igloo White
 - 2. Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat
 - a. Basis of Design: EXCEPTIONAL Metals, Silicone Polyester
 - 3. Fluoropolymer Two-Coat System: 0.2-mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat
 - a. Basis of Design: EXCEPTIONAL Metals, Fluoropolymer
 - 4. Vinyl Plastisol Two-Coat System: 0.2 mil primer with 4 mil high solids plastisol finished with PVC technology.
 - a. Basis of Design: EXCEPTIONAL Metals, Vinyl
 - 5. 304 and 316 Stainless Steel: 2B 304 or 2B 316 Stainless Steel.
 - a. Basis of Design: EXCEPTIONAL Metals, Stainless Steel

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. 1/4 inch (6 mm) in 20 foot (6100 mm) in any direction.
 - b. 3/8 inch (9 mm) over any single roof plane.
 - c. At Purlin Spacing 7 feet (2133 mm) or less: 1/8 inches (3 mm), out only.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal panel installation.

3.2 METAL PANEL 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 clips, fasteners, and sealants 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. Provide weatherproof jacks for pipe and conduit penetrating metal panels.
 4. 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 tape sealers and liquid sealants where indicated and where required for weatherproof performance of metal panel assemblies.
1. Seal panel side and perimeter joints using joint sealers indicated in manufacturer's instructions.

Specifier: Retain optional panel vapor seal bead below when recommended based upon architect's water vapor transmission analysis.

2. Seal roof panel joints utilizing tape sealer and vapor seal bead of non-curing butyl.
3. Prepare joints and apply sealants per requirements of Division 07 Section "[Joint Sealants](#)."

3.3 ACCESSORY INSTALLATION

- A. General: Install metal panel accessories with positive anchorage to building and weathertight 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.

3.4 FIELD QUALITY CONTROL

Specifier: Retain one or both paragraphs below and edit options when scope and complexity of metal roof panel installation justifies independent inspection and testing provisions.

- A. Testing Agency: [\[Owner will engage\]](#) [\[Engage\]](#) an independent testing and inspecting agency acceptable to Architect to perform field tests and inspections and to prepare test reports.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective films immediately in accordance with metal panel manufacturer's instructions. Clean finished surfaces as recommended by metal panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION