



Ceco Insulated BattenLok® Metal Roof Panels

Insulated BattenLok (IBL) is one of Ceco's popular insulated standing seam metal roof panels. The IBL panel is ideal for architectural, commercial, industrial, institutional and cold storage applications. The exterior profile has a 2-inch-high standing seam with a Mesa or "planked" profile. The interior profile is also a stucco-embossed Mesa planked pattern. IBL is attached to the building structure with concealed clips to provide continuous insulation and eliminate thermal bridges. Ceco Insulated metal panels come in a wide array of color and applied finish offerings and are great for a multitude of building projects. Building and energy codes are 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 panels 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 special foam insulation of IMPs offers superior R-values that provide enhanced energy performance. A double tongue and groove interlock, coupled with vapor seal mastic in the mastic grooves, provides superior resistance to air and moisture intrusion, allowing for increased thermal performance of the building envelope.

IMPs offer many advantages for building owners, designers and contractors. They are typically able to span greater distances than single skin panels and are also fire, wind and hail, water, insect and rodent resistant. IMPs offer improved thermal performance, reduced building operational expenses, accelerated construction schedules, and earlier business starts. Ceco IMPs are widely used in architectural, commercial, industrial and institutional markets.

Ceco manufactures insulated metal panels with the most technologically advanced manufacturing lines in the United States. Ceco's insulated metal 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. Whether you're an architect looking for the best design solution, a contractor in need of efficient materials that are easy to install or a building owner looking to save money on energy and maintenance costs, our panels make the difference. Consult your local Ceco sales representative for design assistance. Visit www.cecobuildings.com for a list of Ceco office locations and contacts.

SECTION 07 41 13 - INSULATED METAL ROOF PANEL

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 Panels" for factory-formed metal wall [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 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 - 2. 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 C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
5. ASTM D 1621 – Compressive Properties of Rigid Cellular Plastics.
6. ASTM D 1622 – Apparent Density of Rigid Cellular Plastics.
7. ASTM C 518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
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 - Test Methods for Surface Burning Characteristics of Building Materials.
13. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof 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.

D. Cool Roof Rating Council (CRRC): www.coolroofs.org/productratingprogram.html:

1. CRRC-1-2008 – 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. Green Seal (GS) www.greenseal.org

1. GS-11 - Green Seal Standard for Paints and Coatings, 3rd Edition, January 1, 2010

G. Underwriters Laboratories, Inc. (UL): www.ul.com:

1. UL 580 - Tests for Uplift Resistance of Roof Assemblies

H. US Environmental Protection Agency: www.energystar.gov/index.cfm:

1. Energy Star Reflective Roof Products.

I. US Green Building Council (USGBC): www.usgbc.org:

1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

1.4 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal roof panel assembly 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 five years experience in manufacture of similar products in 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.
2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
3. Approved manufacturers must meet separate requirements of Submittals Article.

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

- C. Installer Qualifications: Experienced Installer [certified by metal panel manufacturer] 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.

- D. **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).

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, 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.

1.6 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:

EA Credit 2: On-Site Renewable Energy - Using solar array in conjunction with IBL roof panels as part of an on-site renewable energy system designed to provide the required percentage of the building's annual cost per ASHRAE/IESNA Standard 90.1-2004 or US DOE Commercial Buildings Energy Consumption Survey Database.

WE Credit 1 & 2: Water Efficient Landscaping and Innovative Wastewater technology – Using IMPs in conjunction with rainwater capture strategy to demonstrate reduction in irrigation water by 50% from calculated mid-summer base line case and/or reduction in potable used for building sewage conveyance.

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 Submittals:

1. Credit SS 7.2 Heat Island Effect - Roof: Provide product listing information in accordance with CRRC-1 demonstrating compliance with the Solar Reflective Index (SRI) requirements in this section.
2. EA Credit 1: Optimize Energy Performance
 - a. 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 4.1 and 4.2: 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.
 - b. 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.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: 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.
- D. **Buy American Certification:** Manufacturers' letters of compliance acceptable to authorities having jurisdiction, indicating that products comply with requirements.

Specifier: Retain paragraph below for Florida projects

- E. **Florida State Building Code Certificate:** 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 one (1) year warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.

1.8 CLOSEOUT SUBMITTALS

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

1.9 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 panel system 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 instruction. Provide wood collars for stacking and handling in the field.
 3. Shield foam insulated metal panels from direct sunlight until installation.

1.10 WARRANTY

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

- A. Special Manufacturer's Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail in materials and workmanship within [two] years from date of Substantial Completion.

- B. The installation contractor shall issue a separate one (1) year warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.

Specifier: Ceco's optional single source weathertight warranties below are available for projects installed by an Ceco-certified installer under inspection by an Ceco field technical representative. Ceco representative can provide warranty cost estimate for desired combination of cost limitation and period of warranty desired by owner.

- C. **Manufacturer's Weathertight Warranty:** On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panel assemblies that fail to remain weathertight, including leaks, [without monetary limitation] [up to cost limitation of \$20.00 per square foot of covered area] [up to cost limitation of \$10.00 per square foot of covered area] within [5] [10] [15] [20] years from date of Substantial Completion.
- D. **Special Panel Finish Warranty:** Submit Manufacturer's forty twenty-five (25) year limited warranty on the exterior paint finish for adhesion to the metal substrate and twenty-five (25) year limited warranty on the exterior paint finish for chalk and fade.

Specifier: Retain finish warranty paragraph that corresponds to selected metal panel finish system. Coordinate chalk and fade performance with applicable Ceco finish and color found at <http://www.mbc.com/finishwarranties.html>.

1. Fluoropolymer Two- Coat System:
 - a. Color fading in excess of [5] [10] Hunter units per ASTM D 2244.
 - b. Chalking in excess of No. [6] [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] [7] [10] Hunter units per ASTM D 2244.
 - b. Chalking in excess of No. [5] [6] [7] [8] rating per ASTM D 4214.
 - c. Failure of adhesion, peeling, checking, or cracking.

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

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 Ceco's standards.

- A. **Basis of Design Manufacturer:** **Ceco Metal Building Systems, Division of NCI Group, Inc.;** Rocky Mount, NC. Tel: (800)474-CECO; Web: www.cecobuildings.com.
1. Provide basis of design product , or comparable product approved by Architect prior to bid.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.

Specifier: Recycled Content paragraph below describes calculation utilized for LEED-NC Credit MR 4. Modify as required to meet project recycled content requirements, or delete if recycled content requirements are stipulated solely in Division 01 Section "Sustainable Design Requirements."

- B. Recycled Content: For Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

Specifier: Retain one or more radiative property performance subparagraphs below 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.

- C. Radiative Property Performance:

1. **Solar Reflectance Index:** 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.
2. **Energy Star Qualified:** Listed on USDoE ENERGY STAR Roof Products Qualified Product List.
3. **Energy Performance:** Listed in CRRC Rated Product Directory, with minimum properties as required by applicable Energy efficiency or High-Performance Green Building standard.

- D. 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 IES 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. Wind Uplift Testing: Certify capacity of metal panels by testing of proposed assembly per ASTM E 72 or ASTM E 1592.
 2. 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 [1/120] [1/180] [1/240] of the span with no evidence of failure.
 4. Seismic Performance: Comply with ASCE 7, Section 9, "Earthquake Loads."
- E. Wind Uplift Resistance: Comply with UL 580 for wind-uplift class [UL-30] [UL-60] [UL-90].

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.

- F. **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. Identify materials with FM Approvals markings.
1. Fire/Windstorm Classification: [Class 1A-60] [Class 1A-90] [Class 1A-105] [Class 1A-120] [Class 1A-135].
 2. Hail Resistance Rating: Class 1-SH.
- G. **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 panel per ANSI/FM 4880.
- H. **Air Infiltration, ASTM E 1680:**
1. Maximum 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
 2. Maximum 0.07 cfm/sq. ft. (0.36 L/s per sq. m) at static-air-pressure difference of 12 lbf/sq. ft. (575 Pa).
- I. **Water Penetration Static Pressure, ASTM E 1646:** No uncontrolled water penetration at a static pressure of 6.24 lbf/sq. ft. (300 Pa).
- J. **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 Ceco and described below conforms to industry standard testing and ASHRAE 90.1 requirements.

- K. **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.

2.3 INSULATED METAL ROOF PANELS

- A. **Mechanically Seamed, Concealed Fastener, Foamed-Insulation-Core Metal Roof Panels:** Structural metal roof panel consisting of ribbed exterior metal sheet and interior metal sheet, with factory foamed-in-place polyurethane core in thermally-separated profile, with tongue-and-groove panel edges, mechanically seamed, attached to supports using concealed clips and fasteners.
1. **Basis of Design: Ceco, Insulated BattenLok.**

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](#))**

- a. Exterior Face Sheet: **[24 gauge] [22 gauge]** with stucco embossed surface and planked pan profile.
 - 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].**
- b. Interior Face Sheet: **[26 gauge] [24 gauge] [22 gauge]** with stucco embossed surface and planked profile.
 - 1) Finish: **[Polyester two-coat system] [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].**
4. Panel Width: **[30 inches (762 mm)] [36 inches (914 mm)] [42 inches (1067 mm)]** [as shown on drawings].
5. 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 shown on drawings].
6. Insulating Core: Polyurethane with zero ozone depletion potential blowing agent
 - a. Closed Cell Content: 95% 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

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 Ceco literature and Paragraph 2.2 K above. Coordinate with information on drawings. Consult Ceco representative for details.

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

7. Heat Transfer Coefficient (U-factor): [insert corresponding value: Btu/hr * sq. ft. * deg. F (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 roof panel assembly 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 Clips: ASTM C 645, with ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating, two-piece, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating.
- E. Joint Sealers: Provide Tape Mastic Sealants, Concealed Joint Sealant, and Urethane [Joint Sealants](#) per Section 07 92 00, "[Joint Sealants](#)".

- F. Steel Sheet Miscellaneous Framing Components: ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.
- G. **Roof Accessories:** Approved by metal roof 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.
- H. **Snow Guards:** Approved by metal roof panel manufacturer. Refer to Section 07 72 53 "Snow Guards" for requirements for snow guards attached to metal roof panels.

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels 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. Modified 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: **Ceco, Signature 200.**

Specifier: [Ceco's 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: **Ceco, Signature 300.**

Specifier: Select interior face sheet finish from three options below; Igloo White color is standard unless otherwise indicated. Verify with Ceco; 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: **Ceco, Igloo White.**
2. Modified Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat.
 - a. Basis of Design: **Ceco, Signature 200.**
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: **Ceco, Signature 300.**

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 panel installation.
 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 insulated metal panels.
 2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to insulated metal panel system manufacturer but not greater than the following:
 - a. 1/8 inch (3 mm) in 5 foot (152 cm) in any direction.
 - b. 1/4 inch (6 mm) in 20 foot (610 cm) in any direction.
 - c. 1/2 inch (9 mm) over any single roof plane.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal roof panel system installation.

3.2 METAL PANEL INSTALLATION

- A. Mechanically-Seamed, Foamed-Insulation-Core Metal Roof Panels: Install insulated metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install insulated metal roof 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, screws, fasteners, sealants, and adhesives recommended by manufacturer and indicated on approved shop drawings.

1. Fasten metal panels to supports with concealed clips at each location indicated on approved shop drawings, with spacing and fasteners recommended by manufacturer.
 2. Provide weatherproof jacks for pipe and conduit penetrating metal panels.
 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 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 panels in accordance with insulated panel manufacturer's instructions, and project design drawings.

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

2. Seal panel joints utilizing tape sealer [and vapor seal bead of non-curing butyl]; 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 "[Joint Sealants](#)."

3.3 ACCESSORY INSTALLATION

- A. General: Install metal panel accessories with positive anchorage to building and weather tight mounting and 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. Provide concealed fasteners except where noted on approved shop drawings.
 4. 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.
- B. Water-Spray Test: After completing portion of metal roof panel assembly including accessories and trim, test 2-bay area selected by Architect for water penetration, according to AAMA 501.2.

3.5 CLEANING AND PROTECTION

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

END OF SECTION