EM Double-Lok® Metal Roof Panel

EXCEPTIONAL® Metals' EM Double-Lok® is a field-seamed, trapezoidal leg standing seam metal roof panel. EM Double-Lok® panels are available in 18" and 24" widths, for application on roofs with a minimum slope of ¼". They are ideal for industrial, commercial and architectural applications with fixed and sliding concealed-clip systems. Steel sheet panels are available in smooth and embossed surfaces, in two-coat silicone polyester, fluoropolymer, and metallic fluoropolymer finishes, plus Galvalume Plus® exposed metal finish.

EXCEPTIONAL Metals, partnered with MBCI® to manufacture metal panels with the most technologically advanced manufacturing line in the United States. Our metal panel colors and applied finishes allow for a multitude of design opportunities. EXCEPTIONAL Metals offers a full array of accessories, including ventilators, light transmitting panels, louvers, fasteners, touch-up paint and more. In addition, we have a large selection of coils and flat sheets in various widths and gauges. EXCEPTIONAL Metals offers a wide array of standard trim and flashings for each of its metal roof and wall panel systems. Trim and flashings are available in the same gauge and finish as the metal roof and wall panels, also EXCEPTIONAL Metals has the capability to make most custom trim profiles required for special design conditions.

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 EXCEPTIONAL Metals sales representative for design assistance. Visit www.exceptionalmetals.com for a list of EXCEPTIONAL Metals office locations and contacts.

SECTION 07 41 13 - METAL ROOF PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Trapezoidal-rib, seamed joint, standing seam metal roof panels, with related metal trim and accessories.

B. The system shall be inclusive of the Standing Seam Roof, the Single Ply Roof, associated trims, and flashings and in compliance with ES-1 and warranted by a single source manufacturer of the system.

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 structural steel framing supporting metal panels.

C. Division 05 Section "Steel Decking" for continuous metal decking supporting metal panels.

D. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.

E. Division 05 Section "Cold-Formed Metal Trusses" for cold-formed metal trusses supporting metal panels.

F. Division 06 Section "Sheathing" for sheathing substrate for metal roof panels.

G. Division 07 Section **[**"Thermal Insulation"**]** **[**"Roof Insulation"**]** for thermal insulation installed under metal panels.

H. Division 07 Section "Air Barriers" for air barriers within roof assembly and adjacent to roof assembly.

I. Division 07 Section "Metal Wall Panels" for factory-formed metal wall **[**and soffit**]** panels.

J. Division 07 Section "Sheet Metal Flashing and Trim" for formed sheet metal copings, flashings, reglets, and roof drainage items in addition to items specified in this Section.

K. Division 07 Section "Manufactured Roof Specialties" for manufactured copings, reglets, and roof drainage items in addition to items specified in this Section.

L. Division 07 Section "Joint Sealants" for field-applied Joint Sealants.

M. 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.
2. AAMA 809.2 - Voluntary Specification Non-Drying Sealants.

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 Pre-painted by the Coil-Coating Process for Exterior Exposed Building Products.
3. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
4. ASTM A 980 - Standard Specification for Steel, Sheet, Carbon, Ultra High Strength Cold Rolled.
5. ASTM C 645 - Specification for Nonstructural Steel Framing Members.
6. ASTM C 920 - Specification for Elastomeric Joint Sealants.
7. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent 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 E 1514 - Standard Specification for Structural Standing Seam Steel Roof Panel Systems.
11. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
12. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
13. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
14. 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.

F. International Accreditation Service (IAS):

1. IAS AC 472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems, Part B.

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. LEED® - Leadership in Energy and Environmental Design (LEED®) Green Building Rating Systems.

1.4 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.

1.5 QUALITY ASSURANCE

A. Manufacturer/Source: Provide metal roof panel assembly and accessories from a single manufacturer providing fixed-base roll forming, and accredited under IAS AC 472 Part B.

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. IAS AC 472 certificate.

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 installers is recommended for larger projects. EXCEPTIONAL Metals 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).

1.6 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.

B. LEED® Submittals:

1. Credit SS 7.2 Heat Island Effect - Roof: Product data indicating compliance with solar reflectance index requirement.
2. Credit MR 4 Recycled Content: Product data indicating 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 of products provided.

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 ½" per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, lightning arresting equipment, and special details. Make distinctions between factory and field assembled work.

1. Indicate points of supporting structure that must coordinate with metal panel system installation.
2. Include data indicating compliance with performance requirements.
3. Include structural data indicating compliance with requirements of 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: Provide 12" (305 mm-) long section of each metal panel profile. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Indicating compliance of products with requirements, witnessed by a professional engineer.

B. Qualification Information: For installer's firm and field supervisor.

C. IAS Accreditation Certificate: Indicating that manufacturer is accredited under provisions of IAS AC 472.

Specifier: Retain one or more of three paragraphs below when required for project.

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

E. **Florida State Building Code Certificate**.

F. Manufacturer's Warranty: Sample copy of manufacturer's standard warranty.

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.

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 instructions. Provide wood collars for stacking and handling in the field.

1.10 COORDINATION

A. Coordinate sizes, profiles, and locations of roof curbs and other roof-mounted equipment and roof penetrations, based upon sizes of actual selected equipment.

1.11 WARRANTY

Specifier: Warranty terms below are available from EXCEPTIONAL Metals 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 one year from date of ssubstantial ccompletion.

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

B. **Special Weathertightness 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 seven dollars ($7.00) per square foot of covered area] [up to cost limitation of fourteen dollars ($14.00) per square foot of covered area] within [5] [10] [15] [20] years from date of Substantial Completion.

Specifier: Confirm warranted values below for custom colors. Color fading for EXCEPTIONAL Metals Brite Red is warranted at 10 Hunter units, and chalking at No. 6 rating.

C. Special Panel Finish Warranty: On manufacturer's standard form, in which manufacturer agrees to repair or replace metal panels that evidence deterioration of factory-applied finish within [25] years from date of Substantial Completion, including:

1. Fluoropolymer Two-Coat System:

Specifier: Confirm warranted performance values below for custom colors. Second options in subparagraphs below are for EXCEPTIONAL Metals Brite Red.

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

2. Modified Silicone-Polyester Two-Coat System:

Specifier: Confirm warranted performance values below for custom colors. Second options in subparagraphs below are for EXCEPTIONAL Metals Brite Red. EXCEPTIONAL Metals Polar White Polyester does not carry a warranty against chalking.

a. Color fading in excess of [5] [7] Hunter units per ASTM D 2244, for vertical applications.
b. Color fading in excess of [7] [10] Hunter units per ASTM D 2244, for non-vertical applications.
c. Chalking in excess of No. [8] [7] rating per ASTM D 4214, for vertical applications.
d. Chalking in excess of No. [6] [5] rating per ASTM D 4214, for non-vertical applications.
e. Failure of adhesion, peeling, checking, or cracking.

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 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. System Performance: Comply with ASTM E 1514 and requirements of this Section.

E. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:

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 actual testing of proposed assembly per ASTM E 1592.

2. Snow Loads: [__ lbf/sq. ft. (___ Pa)] [As indicated].

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."

F. 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 Data Sheet 1-28; note that FM Approvals' windstorm classification does not correlate directly to design wind speed.

G. **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-75] [Class 1A-90] [Class 1A-105].
2. Hail Resistance Rating: SH.

H. **Florida State Building Code Compliance**: Comply with requirements of Florida State Building Code. www.floridabuilding.org/pr/pr_app_srch.aspx

I. Air Infiltration, ASTM E 1680: Maximum 0.07 cfm/sq. ft. (0.36 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

J. Water Penetration Static Pressure, ASTM E 1646: No uncontrolled water penetration at a static pressure of 12 lbf/sq. ft. (575 Pa).

K. 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.

2.3 METAL ROOF PANELS

A. Mechanically Seamed, Concealed Fastener, Trapezoidal Seam Metal Roof Panels: Structural metal roof panel consisting of formed metal sheet with raised trapezoidal ribs at panel edges, installed by lapping and mechanically interconnecting edges of adjacent panels, and attaching panels to supports using concealed clips and fasteners in a weathertight installation.

1. Basis of Design: **EM Double-Lok®,** www.ExceptionalMetals.com

Specifier: Material description below corresponds to BIEC International, Inc. http://galvalume.com/ Galvalume® substrate, available Pre-painted from EXCEPTIONAL Metals. Second paragraph below describes Galvalume Plus® with clear acrylic coating for use as exposed metallic finish.

2. **Aluminum-Zinc Alloy-Coated Steel Sheet**: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), pre-painted 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.** Metal panels do not provide diaphragm strength for building stability.

a. Nominal Thickness: [26 gauge] [24 gauge] [22 gauge] coated thickness.
b. Panel Surface: [Smooth with minor ribs in pan] [Stucco embossed with striations in pan].
c. Exterior Finish: [Modified silicone-polyester two-coat system] [Fluoropolymer two-coat system] [Fluoropolymer two-coat metallic color system] [Exposed Galvalume Plus® coating].
d. Color: [As indicated] [As selected by architect from manufacturer's standard colors] [Match architect's custom color].

4. Panel Width: [18" (457 mm)] [24" (610 mm)].
5. Panel Seam Height: 3" (76 mm).
6. Joint Type: Double folded.

METAL ROOF PANEL ACCESSORIES

B. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in [manufacturer's standard profiles] [profiles as indicated]. Provide required fasteners, closure strips, splice plates, support plates, and sealants as indicated in manufacturer's written instructions.

C. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.

D. Two Piece Floating Clips: ASTM C 645, with ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.

E. Panel Fasteners: Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, and heads matching color of metal panels by means of factory-applied coating.

F. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:

1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.
2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.

Specifier: Retain one or more of the following four optional paragraphs as required by project.

G. **Steel Sheet Miscellaneous Framing Components**: ASTM C 645, with ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized zinc coating.

H. **Light Transmitting Panel**: Manufacturer's standard UV-resistant translucent panel, 24" (610 mm) wide, white, with haze value of not less than 90 percent when measured per ASTM D 1003.

I. **Roof Accessories**: Approved by metal roof panel manufacturer. Refer to Section 07 72 00 "Roof Accessories" for requirements for roof accessories.

J. **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.

2.4 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 factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.

C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate and finish.

2.5 FINISHES

A. Finishes General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Specifier: Retain one or more of the following three finish paragraphs as applicable to the project. Coordinate with warranty article in Part 1.

B. 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].

1. Basis of Design: **EXCEPTIONAL Metals, Signature® 200**.

Specifier: EXCEPTIONAL Metals' fluoropolymer coatings are based on Arkema, Inc. Kynar 500® and Solvay Solexis Hylar 5000® PVF2 resins.

A. 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].

1. Basis of Design: **EXCEPTIONAL Metals, Signature® 300**.

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

1. Basis of Design: **EXCEPTIONAL Metals, Signature® 300 Metallic**.

C. Interior Finish: 0.5 mil total dry film thickness consisting of primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine metal panel system substrate and supports with installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panel installation.

1. Inspect metal panel support substrate to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable supports at recommended spacing to match installation requirements of metal panels.
2. Panel Support Tolerances: Confirm that panel supports are within tolerances acceptable to metal panel system manufacturer but not greater than the following:

a. ¼" (6 mm) in 20' (6.1 m) in any direction.
b. 3/8" (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 PREPARATION

A. **Miscellaneous Supports**: Install subframing, girts, furring, and other miscellaneous panel support members according to ASTM C 754 and manufacturer's written instructions.

B. Flashings: Provide flashings as required to complete metal roof panel system. Install in accordance with Section 07 62 00 "Sheet Metal Flashing and Trim" and approved shop drawings.

3.3 METAL PANEL INSTALLATION

A. Mechanically-Seamed, Trapezoidal Standing Seam Metal Roof Panels: Install weathertight metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes, and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.

B. Attach panels to supports using clips, screws, fasteners, and sealants 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. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
3. Provide weatherproof jacks for pipe and conduit penetrating metal panels of types recommended by manufacturer.
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 manufacturer.

3.4 ACCESSORY INSTALLATION

A. General: Install metal panel trim, flashing, and accessories using recommended fasteners and joint sealers, with positive anchorage to building, and with 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. 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.

B. Joint Sealers: Install joint sealers where indicated and where required for weathertight performance of metal panel assemblies, in accordance with manufacturer's written instructions.

1. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.5 FIELD QUALITY CONTROL

Specifier: Retain paragraph 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.

3.6 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