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**SECTION 07 41 13
METAL ROOF PANELS**

Morin Metal Panels
Double Lock Standing Seam Metal Roof Panels

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Double lock standing seam, single element, metal roof panels.
- B. Accessories including concealed anchor clips, fasteners, perimeter flashing, trim and penetration treatments.

1.2 REFERENCES

A. ASTM International

1. ASTM A240; Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A653; Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A666; Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
4. ASTM A792 – Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
5. ASTM B117; Standard Practice for Operating Salt Spray(Fog) Apparatus.
6. ASTM B209; Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
7. ASTM B370; Standard Specification for Copper Sheet and Strip for Building Construction.
8. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
9. ASTM D522; Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
10. ASTM D523; Standard Test Method for Specular Gloss.
11. ASTM D714; Standard Test Method for Evaluating Degree of Blistering of Paints.
12. ASTM D968; Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
13. ASTM D1308; Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
14. ASTM D2244; Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

15. ASTM D2247; Standard Practice for Testing Water Resistnace of Coatings in 100% Relative Humidity.
16. ASTM D2794; Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
17. ASTM D3359; Standard Test Methods for Measuring Adhesion by Tape Test.
18. ASTM D3363; Standard Test Method for Film Hardness by Pencil Test.
19. ASTM D4145; Standard Test Method for Coating Flexibility of Prepainted Sheet.
20. ASTM D4214; Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
21. ASTM D5894; Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
22. ASTM E283; Standard Test Method for determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors under Specified Pressure Differences across the Specimen.
23. ASTM E331; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
24. ASTM E1592; Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
25. ASTM G153; Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
26. ASTM G154; Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

B. German Institute for Standardization (DIN)

1. DIN EN988; Specifications for zinc and zinc alloy rolled flat products for building.
2. DIN EN1179; Zinc and Zinc alloys – Primary Zinc.

C. Florida Building Code – current edition, product approvals.

D. Underwriters Laboratories (UL)

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

E. Factory Mutual (FM)

1. FM 4471; Approval Standard for Class 1 Panel Roofs

1.3 SUBMITTALS

- A. Refer to Section [01 33 00 Submittal Procedures] [Insert section number and title].

- B. Product Data: Submit manufacturer current technical literature for each type of product.
- C. Shop Drawings - Submit detailed drawings showing:
 - 1. Profile
 - 2. Gauge of panel
 - 3. Location, layout and dimensions of panels
 - 4. Location and type of fasteners
 - 5. Shape and method of attachment of all trim
 - 6. Locations and type of sealants
 - 7. Installation sequence.
 - 8. Other details as may be required for a weathertight installation
- D. Samples: Provide nominal 3 x 5 inch of each color indicated. **[Provide panel width by 10 inches long minimum] [Insert size]**.
- E. LEED Submittals:
 - 1. Sustainable Sites (SS)
 - a. Product Test Reports or current product listing on <http://www.energystar.gov> for Credit SS 7.2: For metal roof panels, indicating that panels comply with Solar Reflectance Index (SRI) requirement.
 - 2. Material and Resources (MR)
 - a. Product Certificates for Credit **[MR 4] [MR 4.1 [and Credit MR 4.2]]**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
- F. Quality Assurance Submittals
 - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
 - 2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.
- G. Closeout Submittals
 - 1. Refer to Section **[01 78 00 Closeout Submittals] [Insert section number and title]**.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to roof panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall have a minimum of ten (10) years experience in the production of metal roof panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
- B. Installer Qualifications: Installer shall be authorized by the manufacturer and the work shall be supervised by a person having successfully completed a manufacturer training seminar regarding proper installation of the specified product.
- C. Metal roof panel attachment shall meet the requirements of Factory Mutual 4771 – Class 1 Rating.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section [01 60 00 Product Requirements] [Insert section number and title].
- B. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.
- C. Store roof panel materials on dry, level, firm, and clean surface. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

- A. Refer to Section [01 78 36 Warranties] [Insert section number and title].
- B. Material Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance and finish performance.

- 1. Warranty Period: Two (2) years from date of Substantial Completion.

- C. Installers "Weather-tight" Warranty: The Manufacturer Certified Installer shall provide a "leak-free" roofing warranty in which the installer agrees to repair leaks discovered in the roofing system under the terms outlined by the roofing manufacturer within the specified warranty period.
 - 1. Warranty Period: Two (2) years from date Substantial Completion.
- D. Weather-tight Warranty: Provide manufacturer's limited weathertightness warranty in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.
- E. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance with ASTM D4214, Method A, and /or color fading in excess of 5 ΔE Hunter units on panels when tested in accordance with ASTM D2244.
 - 1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Morin - a Kingspan Group Company; 685 Middle Street, Bristol, Connecticut 06010; 1-800-640-9501 (Toll Free); (www.morincorp.com)
- B. Basis of Design: SLR "Double Lock Standing Seam Roof Panels".
- C. Substitution Limitations:
 - 1. Submit written request for approval of substitutions to the Architect [a minimum of [14] days prior to the date for receipt of bids] [Insert time period]. Include the following information:
 - a. Name of the materials and description of the proposed substitute.
 - b. Drawings, cut sheets, performance and test data.
 - c. List of projects similar scope and photographs of existing installations.
 - d. Other information necessary for evaluation.

2. After evaluation by Architect, approval will be issued via addendum. No verbal approval will be given.
3. Substitutions following award of contract are not allowed except as stipulated in Division 01 – General Requirements.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance:

1. Roof assembly shall be tested for structural performance under uniform static air pressure differences in accordance with ASTM E1592.
 - a. Uniform Pressure: [insert design pressure] [as indicated on drawings]; acting inward or outward.
2. Roof assembly shall be approved by the Florida Building Code (FBC) for impact resistance and uplift in accordance with Product Approval.
3. Snow Loads: [insert snow load]
4. Deflection: Panel shall be limited to [L/180] [L/240].

B. Metal roof panels shall be capable of withstanding a 250 pound concentrated load applied to a 4 square inch area in the middle of the panel. No noticeable buckling or permanent distortion of the panel shall occur.

C. Water Penetration under Static Pressure: Provide metal roof panel systems designed to resist penetration of water under static pressure. Testing shall be based on ASTM E331. Roof panels when tested shall have no water leakage at 40.0 pounds per square foot.

D. Air Infiltration: Provide metal roof panel assemblies designed to resist air infiltration. Testing shall be done based on ASTM E283 and E1680. Roof panels when tested shall have a maximum air leakage of 0.153 cfm per square feet of fixed roof area at a minimum static air-pressure differential of 40.0 foot pounds per square foot.

E. Wind Uplift Resistance:

1. Roof assembly shall comply with UL 580 for wind uplift resistance; class [UL 30] [UL 60] [UL 90]
2. FM Global Approvals; per FM Approval Standard 4471.
 - a. Metal roof panels attachment shall meet the requirements of FM Class 1A-120.
 - b. Hailstorm Rating: SH.

F. Energy Performance:

1. Energy Star Qualified: Metal panels shall meet the requirements of Energy Star Roofing Products for [low-slope] [steep slope].
2. Solar Reflectance Index: Panels shall have a solar reflectance Index of not less than [78 for low-sloped roofs] [29 for steep sloped roofs].

G. Finish Characteristics:

1. Gloss: 15 +/- 5 tested in accordance with ASTM D523
2. Pencil Hardness: HB – H tested in accordance with ASTM D3363
3. Flexibility, T-Bend: 1-2T bend tested in accordance with ASTM D4145
4. Flexibility, Mandrel: No cracking tested in accordance with ASTM D522
5. Adhesion: No adhesion loss tested in accordance with ASTM D3359
6. Reverse Impact: No cracking or adhesion loss tested in accordance with ASTM D2794
7. Abrasion Resistance: 65 +/- 10 liters tested in accordance with ASTM D968
8. Graffiti Resistance: Minimal effect
9. Acid Pollutant Resistance: No effect tested in accordance with ASTM D1308
10. Salt Fog Resistance: Passes 1000 hours tested in accordance with ASTM B117
11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours tested in accordance with ASTM D5894
12. Humidity Resistance: Passes 1500 hours when tested in accordance with ASTM D2247 and D714
13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154
14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A
15. Color Tolerances: Greater than 5ΔE units on panels when tested in accordance with ASTM D2244.

2.3 ROOF PANEL MATERIALS

A. Steel:

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792, Class AZ50 coating designation, Grade 40.
2. [Zinc-Coated (Galvanized) Steel Sheet: ASTM A653, G90 coating designation]
3. Gauge: [24] [22] [20]

B. Aluminum:

1. Coil Stock meeting ASTM B209; Alloy and temper as required for forming operations.
2. Gauge: [0.032] [0.040] inch.

C. Stainless Steel Sheet:

1. ASTM A240 or ASTM A666, [Type 304, dead soft, fully annealed] [Type 316, dead soft, fully annealed].
2. Gauge: [24]

D. Copper:

1. Sheet stock meeting ASTM B370, cold-rolled, H00 or H01 temper.
2. Thickness: [16] [20] ounce per square foot.

E. Rheinzink Pro Roofing Sheets:

1. Sheet stock meeting DIN EN1179, consisting of Zinc with copper and titanium additives in accordance with DIN EN988.
2. Gauge: [0.7] [0.8] mm

2.4 ROOF PANELS

A. Roof Panel Descriptions:

1. Panel Width: [12] [16] [18] inches
2. Profile: SLR
3. Seam Height: 2 inches
4. Texture: [Smooth] [Embossed]

2.5 INSULATION

- A. Refer to Section [07 21 00 - Thermal Insulation] [Insert section number and title].

2.6 ACCESSORIES

- A. Roof panel accessories: Provide accessories as required for a complete installation. Accessories shall be as indicated on approved shop drawings and per manufacturer's approved standard details. Match material and finish of metal roof panels.

1. Fasteners: Fasteners as recommended by manufacturer.
2. Concealed Anchor Clips: [One piece fixed clip] [Floating anchor clip, two piece].
3. Backing Plates: Provide metal backing plates at panel end splices fabricated from material recommended by manufacturer.
4. Closure Strips: Provide closed cell closure strips, minimum 1 inch thick matching metal roof panel profile.

B. Flashing and Trim:

1. Fabricate flashing and trim from same material as roof panels unless otherwise noted. Finish to match metal roof panels.
2. Locations include, but are not limited to the following: Drips, eave and rake edges, roof penetrations, hips, and valleys.
3. [Trim shall be provided under Section 07 62 00 - Sheet Metal Flashing and Trim".]

C. Panel Sealant:

1. Joint Sealant: ASTM C920 as recommended in writing by metal roof panel manufacturer.
2. Butyl Tape: Per panel manufacturer's recommendations for panel to panel and panel to trim seal.
3. Butyl Sealants: Non-skinning type per panels manufacturer's recommendations

D. Snow Guards:

1. Materials: Clamps, brackets and clips shall be fabricated from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85.
2. Clamp Model: As recommended by clamp manufacturer and as approved by metal roof panel manufacturer.
3. Fasteners: Stainless steel.
4. Color Strips: Same material and finish as metal roof panels.
5. Snow and Ice Clips: Aluminum, with rubber foot, minimum 3 inches wide.
6. Manufacturer: "S-5 ColorGard" by Metal Roof Innovations, Ltd.

2.7 FABRICATION

- A. Metal roof panels shall be formed to lap with edges of adjacent panels which are then mechanically attached to roof deck using fasteners and concealed anchor clips. Anchor clips are then machine seamed into standing seam.
- B. Fabricate metal roof panels with joints between panels designed to form weathertight seals.
- C. Curved roof panels: Panels shall be factory or field curved as approved by manufacturer.
- D. [Flashing and Trim Accessories: Fabricate steel trim accessories to comply with recommendations outlined in SMACNA's "Architectural Sheet Metal Manual".]

2.8 FINISHES

A. [Steel] [Aluminum]:

1. Finish and Color:

a. Color:

- 1) Exposed Surface: [Selected from current Morin Metal Roof Panel color chart] [Custom color as selected by Architect] [Color indicated].
- 2) Concealed Surface: [Manufacturer's standard primer] [Selected from current Morin Metal Roof Panel color chart] [Custom color as selected by Architect] [Color indicated].

b. Finish System:

- 1) [1.0 mil. Fluoropolymer (PVDF) Two Coat system: 0.2 mil primer with 0.8 mil Kynar 500 (70%) SOLID color coat.]
- 2) [1.0 mil. Fluoropolymer (PVDF) Two Coat system: 0.2 mil primer with 0.8 mil Kynar 500 (70%) MICA color coat.]
- 3) [1.5 mil. Fluoropolymer (PVDF) Three Coat system: 0.2 mil primer with 0.8 mil Kynar 500 (70%) METALLIC color coat and .5 mil clear coat.]
- 4) [2.4 mil. Fluoropolymer (PVDF) Three Coat system: 0.8 mil primer with 0.8 mil Kynar 500 (70%) SOLID color coat and 0.8 mil clear coat.]

B. Exposed Aluminum-Zinc Alloy-Coating: ASTM A792, Class AZ50 coating. "Galvalume" or "Zincalume" protective coating.

C. Aluminum: Mill finish

D. Stainless Steel: [2D (dull, cold rolled)] [2B (bright, cold rolled)] [4 (polished directional satin)]

E. Copper: Natural

F. Rheinzink Pro Roofing: ["Graphite-Gray"] ["Blue-Gray"]

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Provide field measurements to manufacturer as required to achieve proper fit of the metal roof panels to building envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.

- B. Supporting Steel: All structural supports required for installation of panels shall be by others. Support members shall be installed within the following tolerances:
 - 1. Plus or minus 1/8 inch in 5 feet in any direction along plane of framing.
 - 2. Plus or minus 1/4 inch cumulative in 20 feet in any direction along plane of framing.
 - 3. Plus or minus 1/2 inch from framing plane over entire roof.
- C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 PANEL INSTALLATION

- A. [Apply sealant to joints per manufacturer's recommendations and approved shop drawings.]
- B. Install panels level, and true-to-line to dimensions and layout indicated on approved shop drawings.
- C. Installation shall be in accordance with manufacturer's installation guidelines and recommendations. Roof panels shall be installed weathertight, without distortion, buckles or waves.
- D. Seaming of panels shall be done using an electric powered seaming machine as recommended by manufacturer.
- E. Cutting and fitting of panels shall be neat, square and true. Torch cutting is prohibited.
- F. Snow Guards: Install snow guards per manufacturers installation instructions and approved shop drawings. Attach to standing seams using aluminum clamp. Install color matched insert after snow guard installation is complete.

3.3 FLASHING AND TRIM INSTALLATION

- A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.
- B. Apply sealant at trim, per manufacturer's details and approved shop drawings, for weathertight installation.

3.4 CLEANING AND PROTECTION

- A. Remove protective film immediately after installation.
- B. Touch-up, repair or replace metal panels and trim that have been damaged.

- C. After metal roof panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION

DISCLAIMER:

Morin Metal Panels Guide Specifications have been written as an aid to the professionally qualified Specifier and Design Professional. The use of this Guideline Specification requires the sole professional judgment and expertise of the qualified Specifier and Design Professional to adapt the information to the specific needs for the Building Owner and the Project, to coordinate with their Construction Document Process, and to meet all the applicable building codes, regulations and laws. MORIN METAL PANELS EXPRESSLY DISCLAIMS ANY WARRANTY, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OF THIS PRODUCT FOR THE PROJECT.