



# METAL ROOFING

S y s t e m s , I n c

## MRS System 3000 Specification

## SECTION 07411 - MANUFACTURED ROOF PANELS

### MANUFACTURER

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### SECTION 07411 - MANUFACTURED ROOF PANELS

### PART I - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes the following:
  1. Site-formed or factory-formed roof panels.
  2. Factory-formed and field-assembled, metal wall panels.
  3. Metal soffit panels.
  4. Roof accessories as noted.
- B. Related Sections include the following:
  1. Division 5 Section "Steel Deck" for steel roof deck supporting metal roof panels.
  2. Division 5 Section "Cold-Formed Metal Framing" for secondary support framing supporting metal roof panels.
  3. Division 7 Section "Sheet Metal Flashing and Trim".
  4. Division 7 Section "Manufactured Roof Specialties" for assemblies that are not part of metal roof panel assemblies.
  5. Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

#### 1.3 DEFINITIONS

- A. **Metal Roof Assembly:** Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. **General:** Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing a manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.

## 1.4 PERFORMANCE REQUIREMENTS (Continued)

### B. PRODUCT PERFORMANCE

1. **Structural:** Uniform load capacity shall be determined by testing in strict accordance with the principles of ASTM-1592.
  - (7.1) Roof test specimens shall be representative of the main body of the roof, free from influence of perimeter conditions. The setup shall be continuous over one or more supports and contain at least five panel widths.
  - (7.1.2) No roof attachments are permitted at the sides other than the standard gable or rake condition. For uplift tests, at least one end seal shall be flexible and in no way restrain the crosswise distortion of panels. One end may simulate an eave condition if at least 12 feet away from the mid-roof clip under evaluation.
  - (7.2.1) Roofing panels and accessories are to be production material of the same type and thickness proposed for used on the project.
  - (10.1.1) Longitudinal seals or plastic film shall not span any crevice or cracks that may tend to separate under pressure (e.g. plastic films used to seal the chamber must be applied into the side seam of the panel so as to apply a uniform static pressure to the entire cross section of the panel).
2. UL 580 Class 90 certified
3. **Weathertightness** – When tested in accordance with the principles of ASTM-E-1680 Air Test and ASTM-E-1646 Water Test.
4. **Factory Color Finish:** The manufacturer shall have conducted tests on previously manufactured panels of the same type and finish as proposed for the project to assure conformance with these specifications. The term “appearance of base metal” refers to the aluminum under the organic coating. Panels shall pass the following tests:
  - a. **Salt Spray Test:** A sample of the panels shall withstand a salt spray test in accordance with ASTM-B-117, including the scribe requirement in the test. Duration shall be for a minimum of 3,000 hours for aluminum. Immediately upon removal of the panel from the test, the coating shall receive a field blisters rating of #10 (no blisters) in accordance with ASTM-D-714, and creepage for scribe of 1/16” maximum.
  - b. **Formability Test:** When subjected to a scored TBend using impact wedge bend apparatus in accordance with AST-D-3281, exterior coating film shall show no cracking and no pick off with Scotch 610 tape at 3-T Bend prior to fracture of base metal.
  - c. **Accelerated Weathering Test:** A sample of the panels shall withstand a minimum of 2,000 hours exposure in accordance with ASTM-D-822 with the following results: Chalk rating of 8 to 10 (no chalk) per ASTM-D-659. Color change no greater than 2 delta E units per ASTM-D-2244.
  - d. **Abrasion Resistance Test for Color Coating:** In the Falling Sand Test in accordance with ASTM-D-968, coefficient of abrasion shall be a minimum of 55 liters of sand per mil of coating thickness before appearance of base metal.
  - e. **Humidity Test:** When subjected to a humidity cabinet test in accordance with ASTM-D-2247 for 3,000 hours, panels shall show no field blisters and no change in pencil hardness after 24-hours.

## 1.5 SUBMITTALS

- A. **Product Data:** Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal roof panel and accessory.
- B. **Shop Drawings:** Show fabrication and installation of layouts of metal roof panels, metal wall panels, metal soffits; details of edge conditions, gutters, leaders, joints, expansion joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory and field assembled work.
- C. Shop Drawings must be scaled large enough to clearly show all layers. Include dimensions of fabricated work, reference dimensions to the structure, show type, size and spacing of fasteners, with material thickness and finishes.
- D. **Submit With the Drawings:** Copies of independent laboratory tests, mill certifications, certifying structural performance data on the panels, anchor clips, and fasteners to meet the structural testing and performance and materials requirements of this specification as indicated in Section 1.4.
  - 1. **Accessories:** Include details of the following items
    - a. Flashing and trim.
    - b. Gutters.
    - c. Downspouts.
    - d. Roof Curbs.
    - e. Fasteners.
- E. **Samples for Initial Selection:** For each type of metal roof panel indicated with factory-applied color finishes provide manufacturer's full range colors for initial selection.
- F. **Samples for Verification:** For each type of exposed finish required, prepare samples:
  - 1. **Metal Roof, Soffit and Wall Panels:** Include fasteners, clips, battens, closures, and other metal roof panel accessories.
  - 2. Trim and Closures
  - 3. Vapor Retarders.
  - 4. Accessories.
- G. **Qualification Data:** For installer.
- I. **Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:
  - 1. **Metal Roof:** Include reports for air infiltration, water penetration, thermal performance, and structural performance.
- J. **Warranties:** Special warranties specified in this Section.

## 1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** Installer approved by Manufacturer.
  - 1. Installer's Responsibilities include fabricating and installing metal roof panel assemblies..
  - 2. Engineering Responsibilities: Preparation of data for metal roof panels, including Shop Drawings.

## 1.6 QUALITY ASSURANCE (Continued)

- B. **Testing Agency Qualifications:** Qualified according to ASTM-E-329 for testing indicated, as documented according to ASTM-E-548.
- C. **Source Limitations:** Obtain each type of metal roof panels through one source from a single manufacturer.
- D. **Product Options:** Drawings indicate size, profiles, and dimensional requirements of metal roof panels and are based on the specific system indicated. Refer to Division 1 Section “Product Requirements”.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect’s approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. **Fire-Resistance Ratings:** Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM-E-119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
1. Combustion Characteristics: ASTM-E-136.
  2. Fire-Resistance Ratings: Indicated by design designations for UL’s “Fire Resistance Directory” or from the listings of another testing and inspecting agency.
  3. Metal roof panels shall be identified with appropriate markings of applicable testing and inspecting agency.
- F. **Surface-Burning Characteristics:** Provide insulated metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products per ASTM-E-84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Flame-Spread Index: 25 or less, unless otherwise indicated.
  2. Smoke-Developed Index: 450 or less, unless otherwise indicated.
- G. **Mock-Ups:** Build mock-ups to demonstrate aesthetic effects and qualities of materials and execution.
1. Build mock-up of typical roof eave, including fascia, and soffit as shown on Drawings; approximately 48 inches (1200 mm) square by full thickness, including insulation, underlayment, attachments, and accessories. (Provide at each roof type).
  2. Approval of mock-ups do not constitute approval of deviations from the Contract Documents contained in mock-ups unless such deviations are specifically approved by the Architect in writing.
  3. Approved mock-ups may become part of the completed Work if undisturbed at time of Substantial Completion.
  4. Notify Architect one week in advance of mock-up preparation.
- H. **Preinstallation Conference:** Conduct conference at Project site to comply with requirements in Division 1 Section “Project Management and Coordination”. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
1. Meet with Owner, Architect, Construction Manager, testing and inspecting agency representative, metal roof panel Installer, metal roof panel manufacturer’s representative, deck, truss and rafter Installer, and Installers whose work interfaces with or affects metal roof panels including Installers of roof accessories and roof mounted equipment.
  2. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
  3. Review methods and procedures related to metal roof panel installation, including Manufacturer’s written instructions.
  4. Examine deck, substrate, truss and rafter conditions for compliance with requirements, including flatness and attachment to structural members.
  5. Review structural loading limitations of deck, truss and rafters during and after roofing.  
Review flashings, special roof details, roof drainage, roof penetrations, equipment curbs and condition of other construction that will affect metal roof panels.

## **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
- B. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.
- E. Protect foam plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam plastic insulation materials to the Project site before installation time.
  - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## **1.8 PROJECT CONDITIONS**

- A. **Weather Limitations:** Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. **Field Measurements:** Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.
  - 1. **Established Dimensions:** Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal roof panels without field measurements, or allow for field-trimming of panels. Coordinate roof construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

## **1.9 COORDINATION**

- A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in Division 7 Section "Roof Accessories".
- B. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks, trusses and rafters, parapets, walls, lightning rods and other adjoining work to provide a leakproof, secure, and non-corrosive installation.

## **1.10 WARRANTY**

- A. **Special Warranty:** *Steel Only* – Manufacturer's standard from in which the Manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.
  - 1. **Warranty Period:** Twenty five years from date of Substantial Completion.

B.

**Special Warranty on Panel Finishes:** Manufacturer's standard from in which Manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within the specified warranty period.

1. **Ultra Cool Fluoropolymer Finish:** Deterioration includes, but is not limited to the following:
  - a. Color fading more than 5 Hunter units when tested according to ASTM-D-2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM-D-4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. **Finish Warranty Period:** Thirty years from date of Substantial Completion. Must meet Energy Star criteria for reflectance.

C. **Special Weathertightness Warranty:** Manufacturer's standard from in which Manufacturer agrees to repair or replace metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

1. **Weathertight Warranty Period:** (Choose 5, 10, 15, 20, 25 or 30 year)

## **PART II – PRODUCTS**

### **2.1 MANUFACTURERS**

A. In another part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Products: MRS System 3000 by Metal Roofing Systems, Inc.

### **2.2 MATERIALS – PANELS and SHEETS**

A. This is a performance specification. Manufacturers wishing to bid this project must comply with all performance aspects and pre-qualification criteria of this specification as well as pre-qualification criteria of this specification as well as prescriptive items such as seam height, machine seaming of panel side joinery, panel width, material gauges, etc. The basis for this specification is the MRS System 3000 and all specified performance criteria must be strictly adhered to.

A. **Felts:** ASTM-D-226, Type II (No. 30), asphalt-saturated organic felts.

B. **Self-Adhering, Polyethylene-Faced Sheet:** ASTM-D-1970, 40 mils (1.0 mm) thick minimum, hightemp non-abrasive, consisting of slip-resisting polyethylene-film reinforcing and top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.

1. Products (as approved by manufacturer):
  - A. Certainteed HT
  - B. Mid-States Asphalt Quik-Stick HT

- C. Panels shall be fabricated in full lengths from ridge to eave without end laps. Panels shall be 16” wide maximum with concealed anchors that resist wind uplift yet permit expansion and contraction with temperature changes. Standing ribs 3” high shall have a continuous groove capillary break. Ribs shall be securely locked over anchor clips with a field operated, electrically driven roll-forming tool. Individual panels shall be removable for replacement of damaged material.

Smooth, pre-painted Aluminum Alloy 3004, Embossed, H 35/36, H-274 temper **MINIMUM** in 0.040” thickness in accordance with ASTM-B-209. Softer alloys and tempers will **NOT** be acceptable.

- a. **High Performance Organic Finish:** AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers’ written instructions.
1. **Fluoropolymer Two-Coat System:** Manufacturer’s standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
  2. **Dry film thickness (exclusive of primer):** 0.8 mil. + minimum.

- D. Flashing and Trim shall be same material type and finish as the roof panel. Minimum thickness shall be the same as the roof panel.

E. **Panel Sealant:**

1. **Sealant Tape:** Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape ½ inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. **Joint Sealant:** ASTM-C-920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. **Butyl-Rubber-Based, Solvent-Release Sealant:** ASTM-C-1311.

**2.4 MISCELLANEOUS MATERIALS**

- A. **Anchor Clips:** Shall be System 3000 non-magnetic stainless steel or aluminum coated with nylon (no carbon coated steel components whatsoever) to minimize wear from thermal movement. Fasteners in supports and screws installed in clips shall be fully recessed so that no sharp edges come in contact with the roof material. Clips shall allow for expansion and contraction of the roof relative to the structure throughout the temperature range specified in performance criteria.

1. Exposed fasteners shall match the finish of the panel system and shall be aluminum or stainless steel. For weathertightness, screws shall have separate washers with hot bonded neoprene faces, and pop-rivets shall be set in wet sealant.

- B. Preformed steel closures at ridges and field cut closures at hips matching the finish of the roof flashing.

## 2.5

### METAL SOFFIT PANELS

- A. **General:** Provide factory-formed metal soffit panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. **Metal Soffit Panels:**
1. Finish: Match finish and color of metal roof panels.
  2. Sealant: Factory applied within interlocking joint.
- C. **Flush-Profile Metal Soffit Panels:** Lanced panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
1. **Basis-of-Design Product:** MRS Flush Seam or comparable product.

## 2.6

### WALL PANELS

- A. Wall panels shall be as indicated on the drawings and shall match. Panels shall be manufactured from the same materials and gauge as the roofing panels except temper may be reduced to facilitate forming operations if forming is required. Wall panels shall be supplied by the same manufacturer as the roof and shall be covered under the same specified warranties.

## 2.7

### ACCESSORIES

- A. **Roof Panel Accessories:** Provide components required for a complete metal roof panel assembly including trim, copings, fascia, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels, unless otherwise indicated.
- B. **Gutters:** Formed from 0.040 inch thick (unless otherwise noted), aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Match profile of gable trim, or profile indicated on drawings, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96 inch (2400 mm) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual".
- C. **Downspouts:** Formed from 0.040 inch thick, aluminum-zinc alloy-coated steel sheet prepainted with coil coating; in 10 foot (3 mm) long sections, complete with formed elbows and offsets. Finish downspouts to match metal roof panels, with paint finish being of same kind.
- D. **Snow Guards:** Prefabricated, non-corrosive units designed to be installed without penetrating metal roof panels, and complete with pre-drilled holes, clamps, or hooks for anchoring.

## 2.8

### FABRICATION

- A. **General:** Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Minimum inside bend radius on flashing shall be 3T, and all edges shall have an open hem for stiffness.
- C. Insofar as possible, attachment screws shall be eliminated in favor of concealed cleats or clips. (Note: In high wind areas these may not provide the structural rigidity to resist flutter. Check with roofing manufacturer).
- D. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.



- E. Where indicated, fabricate metal roof panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
- F. **Sheet Metal Accessories:** Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. **Seams for Aluminum:** Fabricate non-moving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  - 3. **Seams for Other Than Aluminum:** Fabricate non-moving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 4. **Sealed Joints:** Form non-expansion but moveable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
  - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal recommended by metal roof panel manufacturer.
    - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

## 2.9 FINISHES - GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

## PART III – EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements or installation tolerance, metal roof panel supports, and other conditions affecting performance of work.
  - 1. Examine primary and secondary roof framing to verify that rafters, trusses, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
  - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
  - 3. For the record, prepare written report, endorsed by Installer, listing condition detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. All work shall be installed in accordance with the approved shop details under direct supervision of an experienced sheet metal craftsman. Attachments and joints shall allow for expansion and contraction from temperature changes without distortion or elongation of fastener holes. Flashing shall be installed in strict accordance with the recommended practice in the AA, NRCA, and SMACNA architectural sheet metal manuals: without fasteners in end laps and isolated from dissimilar materials.

### 3.2 UNDERLAYMENT INSTALLATION

- A. **Felt Underlayment:** Install felt underlayment on roof sheathing under metal roof panels, unless otherwise recommended by metal roof panel manufacturer. Apply at locations indicated on Drawings, in shingle fashion to shed water, with lapped joints of not less than six inches (150 mm). Provide felt underlayment over plywood at all metal wall panel applications.
- B. **Self-Adhering Sheet Underlayment:** Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under metal roof panels. Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply at locations indicated below, and as indicated on Drawings, in shingle fashion to shed water, with end laps of not less than six inches (150 mm) staggered twenty four inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment in to gutter trough. Roll laps with roller. Cover underlayment within fourteen days.
1. Roof perimeter for a distance up from eaves of 36 inches beyond interior wall line.
  2. Valleys, form lowest point to highest point, for a distance on each side of 36 inches. Overlap ends of sheets not less than 6 inches (150 mm).
  3. Rake edges for a distance of 24 inches.
  4. Hips and ridges for a distance on each side of 24 inches.
  5. Roof to wall intersections for a distance form wall of 24 inches.

### 3.3 METAL ROOF PANEL INSTALLATION – GENERAL

- A. **General:** Provide metal roof panels of full length from eave to ridge. No transverse seams allowed. Anchor metal roof panels and other components of the Work securely in place with provisions for thermal and structural movement.
1. Field cutting of metal roof panels by torch is not permitted.
  2. Install panels perpendicular to purlins.
  3. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Pre-drill panels.
  4. Provide metal closure at peaks, rake edges, rake walls, and each side of ridge and hip caps.
  5. Flash and seal metal roof panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
  6. Locate and space fastenings in uniform vertical and horizontal alignment.
  7. Install ridge and hip caps as metal roof panel work proceeds.
  8. No end laps shall be allowed.
  9. Lap metal flashing over metal roof panels to allow moisture to run over and off the material.
- B. **Metal Protection:** Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- C. **Joint Sealers:** Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
- D. **Standing Seam Metal Roof Panels:** Fasten metal roof panels to supports with concealed clips at each standing seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
  2. **Seamed Joint:** Crimp standing seams with manufacturer-approved motorized seamer tool so clip, metal roof panel, and machine-applied sealant are completely engaged.

3. Completed work shall be plumb and true, free of scrapes and dents. Panel ribs shall be on the module indicated in the contract drawings within the tolerance allowed by the actual construction dimension. Excess sealant shall be removed and touch-up paint applied to any areas where paint scrapes occur. Any panels which are badly damaged and in the judgement of the architect cannot be repaired shall be removed and replaced.

- E. **Metal Soffit Panels:** Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
- F. **Fascia Panels:** Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fascia meet soffits, along lower panel edges, and at perimeter of all openings.

### 3.4 ACCESSORY INSTALLATION

- A. **General:** Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
  1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. **Flashing and Trim:** Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual". Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
  1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

### 3.5 FIELD QUALITY CONTROL

- A. **Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect completed metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touch-up or similar minor repair procedures.