

MANUFACTURER

Firestone Metal Products / UNACLAD

1001 Lund Boulevard

Anoka, MN 55303-1089

Telephone: (800) 426-7737 or (763) 576-9595

FAX: (763) 576-9596

SECTION 07610- SHEET METAL ROOFING

PART 1 – GENERAL

1.01 DESCRIPTION

A. General

1. Furnish all labor, material, tools, equipment, and services for all preformed roofing as indicated, in accord with the provisions of the Contract Documents. The Metal Roofing Manufacturer will provide all components required for a complete metal roofing system to include panels, panel clips, trim/flashing, fascias, ridge, closures, sealants, fillers and any other required items.
2. Completely coordinate with work of all other trades.
3. See Division 1 for General Requirements.

B. Related work specified elsewhere:

1. Section 05100 - Structural Steel
2. Section 05200 or 05400 - Steel Joists
3. Section 07600 - Flashing and Sheet Metal

1.02 REFERENCES

A. Aluminum Association (AA)

1. AA-C22-A41: Clear Coatings
2. AA-C22-A42: Integral Color Coatings
3. AA-C22-A44: Color In Process

B. American Society for Testing and Materials (ASTM)

1. ASTM A653: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanized) by the Hot-Dip Process
2. ASTM B137: Test Method for Measurement of Coating Mass Per Unit Area of Anodically Coated Aluminum
3. ASTM B209: Specification for Aluminum and Aluminum-Alloy Sheet and Plate
4. ASTM B370: Specification for Copper Sheet and Strip for Building Construction

C. Copper Development Association (CDA)

1. CDA 110: General Requirements

D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

1. Architectural Sheet Metal Manual

1.03 QUALITY ASSURANCE

A. Applicable standards:

1. 1996 Low Rise Building Systems Manual, Metal Building Manufacturers Association, Inc., Cleveland, OH, 1996.
2. AISI CF00-01, "A Design Guide for Standing Seam Roof Panels," American Iron and Steel Institute, 2000.
3. AISI CF97-01, "A Guide for Designing with Standing Seam Roof Panels," American Iron and Steel Institute, 1997.
4. Aluminum Design Manual — 2000 Edition, Aluminum Association, Washington, D.C., 2000.

5. ASTM A653, "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," American Society for Testing and Materials, 1998.
 6. ASTM E1592, "Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference," American Society for Testing and Materials, 1995.
 7. ASTM E1646, "Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference," American Society for Testing and Materials, 1995.
 8. ASTM E1680, "Test Method for Rate of Air Leakage through Exterior Metal Roof Panels Systems," American Society for Testing and Materials, 1995.
 9. Cold-Formed Steel Design Manual, American Iron and Steel Institute, Washington, D.C., 1996.
 10. Metal Roofing Systems Design Manual — First Edition, Metal Building Manufacturers Association, Inc., Cleveland, OH, 2000.
 11. UL 580, "Tests for Uplift Resistance of Roof Assemblies," Underwriter's Laboratories, Inc., 1994.
- B. Manufacturer's qualifications:
1. Manufacturer shall have a minimum of three years experience in manufacturing metal roofing systems. Panels specified in this section shall be produced in a permanent factory environment with fixed-base roll-forming equipment. A letter certifying the manufacturer's qualifications shall accompany the product material submittals.
- C. The Installer shall meet the following minimum criteria:
1. The Project foreman shall be certified by the manufacturer in the proper installation of the specified system and will be present to supervise whenever material is being installed.
 2. Have installed five projects of similar scope and magnitude that have been in service for a minimum of two years with satisfactory performance of the roof system.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Performance testing:
1. Metal roofing panel shall be tested in accordance with Underwriters Laboratories, Inc. (UL) Test Method 580 "Tests for Uplift Resistance of Roof Assemblies," Class 90 rating.
 2. Metal roof panel shall be tested in accordance with ASTM E1592-95 for negative loading. Capacity for gauge, span, or loading other than those tested may be determined by interpolating between test values only.
 3. Metal roof panel shall have a maximum air infiltration rate of 0.007 cfm/ft² at a pressure differential of 6.24 psf. when tested in accordance with ASTM E1680-95.
 4. Metal roof panel shall have no uncontrollable water leakage at a pressure differential of 6.24 psf. when tested in accordance with ASTM E1646-95.
 5. Metal roof panel shall be tested in accordance with Underwriters Laboratories (UL) test method for impact resistance. Materials shall meet or exceed Class 4.
 6. Metal roof panel shall be tested in accordance with Underwriters Laboratories (UL) test method for fire resistance. Materials shall meet or exceed Class A.

1.05 DESIGN REQUIREMENTS

- A. General:
1. The metal roof system shall be designed by the Manufacturer as a complete system. Members and connections not indicated on the drawings shall be the responsibility of the Contractor. All components of the system shall be supplied or specified by the same manufacturer with a minimum roof slope of 3" to 12".
- B. Design loads:
1. Design load application shall be in accordance with [IBC] [MBMA] [SBCCI] [UBC] [ASCE-7] [applicable national or local building code].
 2. Dead loads:
 - a. The dead load shall be the weight of the panel. Collateral loads shall be as shown on the contract drawings. Collateral loads shall not be applied to the roof panels.
 3. Live loads:

- a. The panels and concealed anchor clips shall be capable of supporting a minimum uniform live load of 20 psf.
- 4. Snow loads:
 - a. The design ground snow loads shall be as defined on the contract drawings.
- 5. Wind loads:
 - a. The design wind speed for the metal roofing system shall be as defined on the contract documents.
- 6. Thermal effects:
 - a. Roof panels shall be free to move in response to the expansion and contraction forces resulting from temperature variation, as specified in the MBMA Metal Roofing Systems Design Manual.
- 7. Rainfall intensity:
 - a. All exterior gutters and downspouts shall be designed for rainfall intensity based upon a 5-year recurrence interval for a five-minute duration. All interior gutters, valleys, and downspouts shall be designed for rainfall intensity based upon a 25-year recurrence interval based on a five-minute duration.
- C. Framing members supporting the panel.
 - 1. Any additions/revisions to framing members supporting the panel to accommodate the manufacturer/fabricator's design shall be the Contractor's responsibility, and shall be submitted for review and approval by the Engineer of Record. New or revised framing members and their connections shall be designed in accordance with [AISC] [AISI] [SJI] design specifications. Deflection requirements shall be in accordance with the applicable building code, or as a minimum, the provisions of the AISC Steel Design Guide Series 3 — Serviceability Design Consideration for Low-Rise Buildings.
- D. Roof panels:
 - 1. Steel panels shall be designed in accordance with the AISI Cold-Formed Steel Design Manual.
 - 2. Aluminum panels shall be designed in accordance with the Aluminum Design Manual.
 - 3. Deflection requirements shall be in accordance with the applicable building code, or as a minimum, L/180 for roof snow load (but not less than 20/psf).
- E. Accessories and their fasteners
 - 1. Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the roof panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces, except at designed points of roof panel fixity.

1.06 SUBMITTALS

- A. Installation drawings:
 - 1. Submit completed installation drawings and installation details by the manufacturer, to the architect (owner) for review. Do not proceed with manufacture prior to review and architectural approval of installation drawings. Do not use drawings prepared by the architect (owner) for installation drawings.
 - 2. Installation drawings shall show methods of installation, elevations, and plans of roof and wall panels, sections and details, specified loads, flashings, roof curbs, vents, sealants, interfaces with all materials not supplied by the metal roofing system manufacturer, and proposed identification of component parts and their finishes.
- B. Physical samples:
 - 1. Submit samples and color chips for all proposed finishes.
 - a. Submit one 12-inch long sample of panel, including clips.
 - b. Submit two 3-inch x 5-inch color chip samples in color selected by the architect (owner).
- C. Test reports:
 - 1. Submit test report showing that metal panels have been tested in accordance with ASTM E1592-95.
 - 2. Submit test report showing that metal panels have been tested in accordance with ASTM E1646-95.
 - 3. Submit test report showing that metal panels have been tested in accordance with ASTM E1680-95.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver metal roofing system to job site properly packaged to provide protection against transportation damage.

B. Handling:

1. Exercise extreme care in unloading, storing, and installing metal roofing system to prevent bending, warping, twisting, and surface damage.

A. Storage:

1. Store all material and accessories above ground on well supported platforms that provide a minimum of 3" to 12" of slope. Store under waterproof covering. Provide proper ventilation of metal roofing system to prevent condensation build-up between each panel or trim/flashing component.

1.08 WARRANTY REQUIREMENTS

- A. The Contractor shall warrant the materials to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be extended by paint manufacturer's standard multi-year warranty. The warranty shall be in writing and shall be signed by the manufacturer.

B.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Firestone Metal Products / UNACLAD

- B. Other manufacturers seeking approval of their products must comply with requirements of the Instructions to Bidders (AIA Document A701), Paragraph 3.3 prior to bidding.

- B. Other manufacturers seeking approval of their products must comply with requirements of Section 01600 [Other] during construction.

2.02 ROOFING TYPE

- A. UNA-CLAD UC-3 Double-Lock Standing Seam Roofing, roll formed [aluminum] [steel] [copper] [RHEINZINK] roofing panels.

2.03 PANEL MATERIALS AND FABRICATION

- A. Aluminum Panels: ASTM B209, Aluminum Association specification sheet [3003-H14/3105-H14 for painted finish][5005-H34AQ for anodized finish].

1. Thickness: 0.032 inch.

- A. Steel Panels: ASTM A653M-02, G90 (lock-forming quality), extra smooth, tension-leveled, galvanized steel, minimum spangle.

1. Thickness: [22][24][26] gauge.

- A. Copper Panels: ASTM B370

1. Thickness: [16][20] ounce.

- A. RHEINZINK Panels: EURO – Norm Standard – DIN EN 988 (formally DIN 17770)

1. Thickness: [.7 mm/24 ga.][.8 mm/22 ga]

- B. Form roofing panels in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects.

1. Seam Height: Minimum of 1-1/2 inches.
2. Seam Spacing: [12][20] inches (alternative seam spacing available).
3. Seams shall be mechanically locked in the field with a mechanical seamer.

- C. Fabricate 2-piece clips of stainless steel, interlockable with sheet.

D. Seams shall have a factory applied integral seam sealant in leg of panel.

2.04 FINISHES

A. Coil-Coated or Spray-Applied Fluorocarbon Resin

1. Color: Selected by Architect/Engineer from manufacturer's standard colors.
2. Number of Coats: [2-coat][3-coat][4-coat].
3. Provide factory applied strippable plastic film for protection during fabrication and installation.

A. Coil Anodized Finish

A. Batch Anodized Finish

1. Color: Selected by Architect/Engineer from manufacturer's standard colors.
2. Film Thickness: Test Method ASTM B137; by weight.
 - a. Class I, 0.7 mils (minimum).
 - a. Class II, 0.25 (minimum) to 0.7 mils.
3. Provide factory applied strippable plastic film for protection during fabrication and installation.

A. Pre-Weathered

2.05 ACCESSORIES

- A. Installation Clips: Manufacturer's standard clips for concealed securement of panels.
- B. Clip Fasteners: Non-corrosive, 5/8 inch self-tapping screws for plywood or metal substrate.
- C. Underlayments
 1. Non-asphaltic fiberglass-based underlayment meeting ASTM D146, D1922 and D4869.
 2. Waterproof Membrane: ASTM D1970, self-adhering rubberized sheet membrane.

2.06 MISCELLANEOUS MATERIALS

A. Fasteners:

1. Fasteners for steel roof panels shall be zinc-coated steel, aluminum, corrosion resisting steel, or nylon-capped steel, type and size specified below, or as otherwise, approved for the applicable requirements. Fasteners for aluminum roof panels shall be aluminum or corrosion resisting steel. Fasteners for structural connections shall provide both tensile and shear ultimate strengths of not less than 750 pounds per fastener. Fasteners for accessories shall be the manufacturer's standard. Exposed roof fasteners shall be sealed or have sealed washers on the exterior side of the covering to waterproof the fastener penetration. Washer material shall be compatible with the screw head; have a minimum diameter of 3/8-inch for structural connections; and gasket portion of fasteners or washers shall be neoprene or other equally durable elastomeric material.

B. Components:

1. Components shall be compatible with the roof panel furnished. Flashing, trim, metal closure strips, caps, gutters, downspouts, roof curbs, and similar metal components shall not be less than the minimum thickness specified by the panel Manufacturer. Exposed metal components shall be finished to match the panels or trim, as furnished. Molded closure strips shall be closed-cell or solid-cell synthetic rubber or neoprene, or polyvinyl chlorided or metal pre-molded to match configuration of the covering and shall not absorb or retain water.

C. Sealants:

1. All tape sealant is to be a pressure sensitive, 100 percent solid, sealing tape with a release paper backing. Provide permanently elastic, non-sagging, non-toxic, non-staining tape sealant approved by the panel Manufacturer.
2. The panel Manufacturer shall approve all joint sealant that will come into contact with the panel.

2.07 FABRICATION

- A. Panels shall be produced by a Manufacturer meeting the requirements of section 1.02B.
- B. Fabricate trim, flashing, and accessories to Manufacturer's specified profiles.

2.08 PREFABRICATED CURBS AND EQUIPMENT SUPPORTS

- A. General
 - 1. Provide the Manufacturer with the dimensions, weights, and model number of the units to be supported by the curb(s).
- B. Fabricate curbs of structural quality aluminum, Acrylume®, or hot-dipped galvanized sheet. Curbs shall have welded joints unless a two-piece curb is required. Provide integral base plates and water diverters/crickets. Front base plate shall be extended up-slope from the beginning of the water diverter. Curbs shall be designed for a compatible installation with the panel system.
- C. Curbs shall be constructed to match the roof slope and provide a mounting surface as required by the rooftop unit manufacturer.
- D. Submit roof curb manufacturer's shop drawings to panel Manufacturer for approval before fabrication of curbs.
- E. Any curb structural support system shall allow proper thermal movement of the curb with the roofing system.

2.09 PREFABRICATED PIPE FLASHINGS

- A. Pipe flashings shall provide a weathertight joint at projections through the roof, taking into account the thermal movement of the roof and the service temperature of the projection. Pipe flashings shall have an aluminum-flanged base ring.

B.

PART 3 – EXECUTION

3.01 SURFACE CONDITIONS

- A. Examination:
 - 1. The Contractor shall verify installed work of other trades that such work is complete to a point where the roofing system installation may commence.
 - 2. Verify that the substructure installation is in accordance with the approved shop drawings and panel Manufacturer's requirements. This specifically includes verifying that secondary structural members and/or decking are installed to meet performance requirements. Coordinate with panel Manufacturer to ensure that the substructure is installed to accommodate the appropriate clip spacing.
- B. Discrepancies:
 - 1. In event of discrepancy, notify the architect (owner).
 - 2. Do not proceed with installation until discrepancies have been resolved.
- C. Verify that roof openings, curbs, pipes, sleeves, ducts, vents, and other penetrations through roof substrate are complete.

3.02 INSTALLATION

- A. Install the panel in accordance with Manufacturer's instructions and approved installation drawings.
- B. Install the panel so that it is weathertight and allows for thermal movements.
- C. Locate and space all exposed fasteners in accordance with the panel Manufacturer's recommendations. Use proper torque settings to obtain controlled uniform compression for a positive seal without rupturing the neoprene washer.
- D. Avoid placing pipe penetrations through the panel seams.

- E. Do not allow panels or trim to come into contact with dissimilar materials (i.e. copper, lead, graphite, treated lumber, mortar, etc). Water run-off from these materials is also prohibited.
- F. Comply with the panel Manufacturer's approved installation drawings and instructions.
- G. Field cutting of panels, trim, and/or flashing shall be accomplished by hand or electric shears. At no time shall a hot saw be used.

3.03 ADJUSTING AND CLEANING

- A. Repair panels with minor damage.
- B. Remove panels damaged beyond repair and replace with new panels to match adjacent undamaged panels.
- C. Clean exposed panel surfaces promptly after installation in accordance with recommendations of panel and coating manufacturers.
- D. Remove protective film immediately after installation.

END OF SECTION