



SECTION 07410

METAL ROOF AND WALL PANELS

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Curved metal wall panels.
- B. Curved metal roof panels.
- C. Straight metal wall panels.
- D. Straight metal roof panels.
- E. Metal soffit panels.

1.2 RELATED SECTIONS

- A. Section 05120 - Structural Steel: Tolerances for primary and secondary building structure supporting framework.
- B. Section 05300 - Structural Metal Roof and Floor Decking: Roof decking material and installation.
- C. Section 05400 - Structural Steel Stud Framing: Exterior wall framing.
- D. Section 06100 - Rough Carpentry: Blocking and miscellaneous framing.
- E. Section 06125 - Wood Decking: Wood deck material and installation.
- F. Section 07210 - Building Insulation: Rigid insulation at insulated walls and roof decks.
- G. Section 07620 - Sheet Metal Flashing and Trim: Installation requirements.
- H. Section 07710 - Gutters and Downspouts: Roof edge coordination and attachment provisions.
- I. Section 07900 - Joint Sealants: Installation requirements.

1.3 REFERENCES

- A. Building Design Codes:
 - 1. Basic Building Code (BBC), Building Officials and Code Administrators, International (BOCA).
 - 2. International Conference of Building Officials (ICBO), Uniform Building Code (UBC).

3. National Building Code (NBC), National Conference of States on Building Codes and Standards, Inc.
 4. The Southern Standard Building Code (SBCC).
- B. American Iron and Steel Institute (AISI) - North American Specification for the Design of Cold-Formed Steel Structural Members.
 - C. American Institute of Steel Construction (AISC) Manual of Steel Construction.
 - D. ASTM A 446 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality (Withdrawn 1994. Replace with ASTM A653 / A653M - 08 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process).
 - E. ASTM A525 - Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process (Withdrawn 1994. Replaced with ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process).
 - F. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - G. ASTM A 792: Standard Specification for Steel Sheet, Aluminum-Zinc Alloy Coated (Galvalume or Acrylume) by the Hot Dip Process
 - H. ASTM B 209: Standard Specification for Steel Sheet, Aluminum and Aluminum Alloy Sheet and Plate.
 - I. Metal Building Manufacturers Association (MBMA) - Metal Roofing Systems Design Manual.

1.4 PERFORMANCE REQUIREMENTS FOR ROOF SYSTEMS

- A. Design Requirements:
 1. The metal roof system shall be designed by the manufacturer as a complete system. All components of the system shall be supplied by the same manufacturer.
 2. Roof Panels: Steel panels shall be designed in accordance with the AISI Cold-Formed Steel 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 (98 kg/sq m)).
 4. Accessories and Fasteners: Accessories and 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.
 5. Design Loads: Design load application shall be in accordance with local building code.
 6. Dead Loads: The dead load shall be the weight of the metal roof system.
 - a. Collateral Loads shall not be applied to the roof panels.
 7. Live Loads: The panels and fasteners shall be capable of supporting a minimum uniform live load of 20 psf (98 kg/sq m).
 8. Snow Loads: The design ground snow loads shall be as defined on the Contract Documents.
 9. Wind Loads: The design wind loads shall be based on the wind criteria defined in the Contract Documents.

10. Thermal Effects: 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.
11. Rainfall Intensity: Exterior gutters and downspouts shall be designed for rainfall intensity based upon a 5-year recurrence interval for a five minute duration. Interior gutters, valleys and downspouts shall be designed for rainfall intensity based upon a 25-year recurrence interval based on a five minute duration.

1.5 PERFORMANCE REQUIREMENTS FOR WALL SYSTEMS

- A. Design Requirements for Wall Systems:
 1. System Design: Metal wall system shall be designed by the manufacturer as a complete system. All components of the system shall be supplied by the same manufacturer.
 2. Wall Panels: Steel panels shall be designed in accordance with the AISI Cold-Formed Steel Design Manual.
 3. Design Loads: Design load application shall be in accordance with local building code.
 4. Wind Loads: The design wind loads shall be based on the wind criteria defined in the Contract Documents.
 5. Deflection: Deflection requirements shall be in accordance with the applicable building code, or as a minimum, $L/180$ for wind load (but not less than 10 psf (49 kg/sq m)).
 6. Accessories and Fasteners: Accessories and fasteners shall be capable of resisting the specified design wind suction forces.
- B. Framing Members Supporting the Metal Panel System:
 1. Any additions/revisions to framing members supporting the metal panel system 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.
 2. Framing members and their connections shall be designed in accordance with AISC, AISI, and LGSI design specifications as applicable. 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 Considerations for Low-Rise-Buildings.

1.6 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including preparation recommendations, storage and handling requirements, and installation methods.
- C. Shop Drawings: Submit shop Drawings showing 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 panel system manufacturer, and proposed identification of component parts and their finishes. Do not proceed with fabrication prior to approval of shop Drawings.
- D. Selection Samples:
 1. Submit samples and color chips for all proposed finishes.
 2. Submit two 3 inch by 5 inch (76 mm by 127 mm) color chip samples of available colors for selection

1.7 QUALITY ASSURANCE

- A. **Manufacturer Qualifications:** Manufacturer shall have a minimum of fifteen years experience in manufacturing metal roof and wall systems.
 - 1. Panels specified in this section shall be produced in a permanent factory environment with fixed-base roll-forming equipment. Roll forming of the profiled panels, curving of all panels, factory mitering of corners, and fabricating of all curved flashings shall be performed by the manufacturer.
 - 2. Manufacturer shall submit names and addresses of five previous projects of equal size and scope.
 - 3. Specified system shall have been in use in the United States for a minimum of ten years.
- B. **Installer Qualifications:** Installer shall have completed five projects of similar scope and magnitude that have been in service for a minimum of five years with satisfactory performance of the panel system. Installer's foreman shall be trained in the proper installation of the specified system, and present at all times when material is being installed.
 - 1. Installer shall submit names and addresses of five previous projects of equal size and scope.
- C. **Regulatory Requirements:** Comply with specified performance and local building code requirements. In the event of conflict, comply with the higher performing or more restrictive requirement.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Inspect materials for damage upon arrival at job site.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store all material and accessories in clean, dry area out of direct contact with the ground, under cover, out of sunlight to prevent U.V. damage to any protective film, and sloped for drainage. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel or trim/flushing component.
- D. Protect material from damage.
- E. Protect material from contamination by corrosive or staining agents.

1.9 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

- A. **Finish Warranty:** Manufacturer warrants that under normal outdoor atmospheric conditions the roof and wall panels will meet the following requirements:
 - 1. **Fluorocarbon (PVDF):**
 - a. The paint film will not crack, flake, chip or peel for a period of 20 years.
 - b. The paint will not chalk in excess of number 8 rating for a period of 20 years.
 - c. The paint will not fade in excess of 5 NBS Units for a period of 20 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Floline Architectural Systems, LLC, 25523 Ruff Street, Plainfield, Illinois 60585. ASD Telephone: (630) 922-7879. Fax (630) 922-0880. Web: www.flolinesystems.com.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MATERIALS

- A. Galvanized Steel: Zinc coated hot dipped G-90 galvanized steel, minimum spangle, extra smooth, Grade 33 min (33 KSI yield) conforming to ASTM A653 and ASTM A525.
- B. Galvalume Steel: Aluminum-zinc coated steel conforming to ASTM A792 SQ Grade 50B with AZ50 or AZ55 coating.
- C. Aluminum: 3003-H14 Alloy or equivalent conforming to ASTM B209.
- D. Stainless Steel: Type 304 steel conforming to ASTM A240.

2.3 SYSTEMS

- A. Application: Curved wall panels.
- B. Application: Curved wall roof panels.
- C. Application: Straight wall panels.
- D. Application: Straight roof panels.
- E. Application: Soffit panels.
- F. Profile: Provide the following profile:
 - 1. Floline 900: 1-1/2 inch (38 mm) deep with ribs spaced 5.9 inches (150 mm) on center; nominal cover width of 35.4 inches (900 mm); side lap occurs at top of high ribs.
 - 2. Floline 900R: 1-1/2 inch (38 mm) deep with ribs spaced 5.9 inches (150 mm) on center; nominal cover width of 35.4 inches (900 mm); side lap occurs in valley of the low rib.
 - 3. Floline 940: 1-1/2 inch (38 mm) deep with ribs spaced 7.2 inches (183 mm) on center; nominal cover width of 36 inches (914 mm); side lap occurs at top of high rib.
 - 4. Floline 940R: 1-1/2 inch (38 mm) deep with ribs spaced 7.2 inches (183 mm) on center; nominal cover width of 36 inches (914 mm); side lap occurs in valley of the low rib.
 - 5. Floline 990: 1-1/2 inch (38 mm) deep with ribs spaced 11.8 inches (300 mm) on center; nominal cover width of 35.4 inches (900 mm); side lap occurs at top of high ribs.
 - 6. Floline 990R: 1-1/2 inch (38 mm) deep with ribs spaced 11.8 inches (300 mm) on center; nominal cover width of 35.4 inches (900 mm); side lap occurs in valley of the low rib.
- G. Minimum Thickness:
 - 1. 24 gauge.

2. 22 gauge.
 3. 20 gauge.
 4. 18 gauge.
- H. Curved Panels: Form to configuration and radii as indicated on the Drawings.
- I. Mitered Corners: Fabricate as follows:
1. Straight mitered.
 2. Curved mitered.
 3. As indicated on Drawings.
- J. Finish: Full Strength Kynar 500®/Hylar 5000 (contains a minimum 70% Kynar/Hylar polyvinylidene fluoride (PVDF) resins) premium fluoropolymer coating system of 1.0 (± 0.1) mil total dry film thickness. For additional protection a wash coat of 0.3 -0.4 mil dry film thickness is applied to the reverse side.
1. Color: Dark Bronze
 2. Color: Extra Dark Bronze
 3. Color: Mansard Brown
 4. Color: Medium Bronze
 5. Color: Matte Black
 6. Color: Charcoal Gray
 7. Color: Cityscape.
 8. Color: Slate Gray
 9. Color: Stone White
 10. Color: Bone White
 11. Color: Almond
 12. Color: Sierra Tan
 13. Color: Sandstone
 14. Color: Tropical Patina
 15. Color: Sherwood Green
 16. Color: Hartford Green
 17. Color: Hemlock Green
 18. Color: Patina Green
 19. Color: Dark Ivy
 20. Color: Teal
 21. Color: Regal Blue
 22. Color: Electric Blue
 23. Color: Award Blue
 24. Color: Sky Blue
 25. Color: Brandywine
 26. Color: Regal Red
 27. Color: Colonial Red
 28. Color: Terra Cotta
 29. Color: Silver Metallic
 30. Color: Classic Copper
 31. Color: Champagne Metallic
 32. Color: Custom: _____

2.4 ACCESSORIES

- A. Metal Components:
1. Provide accessories and other items essential to completeness of roof installation including trim, flashing, fascia, metal closure strips, caps, gutters, downspouts, roof curbs, column covers, soffits and similar metal component.
 2. Form components from same gauge and finish as metal panels, unless otherwise noted.

- B. Flashing:
 - 1. Curved Flashing: Factory curve and fabricate in smooth arc and in one continuous piece, where possible. Exposed side edges shall be hemmed. Flashing ends shall be butt jointed with concealed splice plates.
 - a. Cut and tucked or segmented and overlapped flashing is not acceptable.
 - 2. Metal Closures: Shall be of same material, gauge, finish and color as panels.
- C. Fasteners:
 - 1. Exposed fasteners shall be hex head self-drilling screws with bonded washers and color finished to match panels. Screws may be either plated carbon steel or stainless steel as noted on the drawings.
 - 2. Concealed Fasteners: Zinc-coated steel or stainless steel.
 - 3. Exposed rivets shall match color finish of panel.
- D. Closure Strips: Closed-cell or solid-cell synthetic EPDM rubber or polyethylene pre-molded to match configuration of the covering and shall not absorb or retain water.
- E. Sealants:
 - 1. Exposed Sealants: Shall be one component polyurethane based as recommended by panel manufacturer; field applied.
 - 2. Concealed Sealants: Non-curing, non-skinning butyl, polyisobutylene or polybutane tape as recommended by panel manufacturer; field applied.

2.5 FABRICATION

- A. Form and fabricate components of the system to the profiles, patterns, and drainage arrangements as determined by Architect, with minimal oil canning or panel distortion.
 - 1. Fabricate exposed items of prefinished sheet metal, color to match panels.
- B. Unless otherwise shown on Drawings or specified herein, panels shall be full length. Fabricate flashings and accessories in longest practical lengths.
- C. Metal panels shall be factory formed on a stationary industrial type rolling mill. Field formed panels are not acceptable.
- D. Panel Orientation: Panels with metallic finish are directional and shall be oriented so as to produce a consistent visual effect as directed by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. The Contractor shall verify installed work of other trades that such work is complete to a point where the metal panel system installation may commence.
- C. Verify that the substructure installation is in accordance with the approved shop drawings and metal panel system manufacturer's requirements.
- D. This specifically includes verifying that secondary structural members and/or decking are installed to meet performance requirements.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 INSTALLATION

- A. Install the metal panel system plumb, true and in correct alignment with support, in accordance with manufacturer's instructions and approved installation drawings.
- B. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.
- C. Abrasive devices shall not be used to cut on or near panel system.
- D. Apply sealant tape or caulking as necessary at flashing and panel joints to prevent water penetration.
- E. Remove any strippable film immediately upon installation.
- F. Locate and space all exposed fasteners in accordance with the metal panel system manufacturer's recommendations.
- G. Do not allow panels or trim to come into contact with dissimilar materials.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Remove filings, grease, stains, marks, or excess sealants from panel system to prevent staining.

END OF SECTION