

**SECTION 07 40 00
ROOFING AND SIDING PANELS**

SPEC WRITER NOTES:

1. Use this section only for NCA projects.
2. Delete between //____// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies concealed-clip-fastened metal wall and roof panel products factory-fabricated and field-assembled.

1.2 RELATED WORK

- A. Sealant: Section 07 92 00, JOINT SEALANTS.
B. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 DESIGN REQUIREMENTS

- A. Panels and accessories must be from same source.
- B. Thermal Expansion and Contraction:
1. Completed installation must be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling or reduction in performance.
 2. Interface between panel and clip must provide for unlimited thermal movement in each direction along the longitudinal direction.
- C. Wind Load Design Analysis:
1. Wind design analysis must include wall plan delineating dimensions and attachment patterns for each zone.
 2. Wind design analysis must be prepared and sealed by Licensed Project Engineer in the geographic area where the construction will take place.
 3. Wind load requirements in accordance with FM Wind Design Guide and ASCE 7.
- D. Wall Panels:
1. Maximum calculated fiber stress must not exceed the allowable value in the AISI or AA manuals; a one third overstress for wind is allowed.
 2. Midspan deflection under maximum design loads is limited to L/180.
 3. Provide metal wall panel assemblies complying with the load and stress requirements in accordance with ASTM E1592; wind Load force due to wind action governs the design for panels.

4. Wall systems and attachments are to resist the wind loads as determined by ASTM E72 and ASCE 7 in the geographic area where the construction will take place.
5. Air leakage must conform to the limits through the wall assembly area when tested according to ASTM E283.
6. No water penetration when tested according to ASTM E331.

E. Roof Panels:

1. Wind-Uplift Resistance: Provide roof panel assemblies that comply with the requirements of the roof systems and attachments in accordance with ASTM E1592 and UL 580; uplifting force due to wind action governs the design for panels.
2. Provide metal roof panel assemblies complying with the load and stress requirements in accordance with ASTM E1592.

1.4 MANUFACTURER'S QUALIFICATIONS

- A. Metal wall and roof panels must be products of a manufacturer regularly engaged in the fabrication and erection of metal panels of the type and design shown and specified.
- B. Manufacturer must provide a field technical representative with authority to approve field changes and be thoroughly familiar with the products and installations in the geographical area where construction will take place.

1.5 INSTALLER QUALIFICATIONS

- A. The installation contractor must be approved and certified by the metal panel manufacturer prior to beginning the installation.

1.6 SUSTAINABILITY REQUIREMENTS

- A. Materials in this section may contribute towards contract compliance with sustainability requirements. See Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS, for project // local/regional materials, // low-emitting materials, // recycled content, // _____// requirements.

1.7 REGULATORY REQUIREMENTS FOR RECYCLED CONTENT

- A. Products and Materials with Post-Consumer Content and Recovered Materials Content:
 1. Contractor is obligated by contract to satisfy Federal mandates for procurement of products and materials meeting recommendations for post-consumer content and recovered materials content; the list of designated product categories with recommendations has been compiled by the EPA - refer to <http://www.epa.gov/wastes/conserves/tools/cpg/products/>.

2. Materials or products specified by this section may be obligated to satisfy this Federal mandate and Comprehensive Procurement Guidelines program.
 3. The EPA website also provides tools such as a Product Supplier Directory search engine and product resource guides.
- B. Fulfillment of regulatory requirements does not relieve the Contractor of satisfying sustainability requirements stipulated by Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS, as it relates to recycled content; additional product and material selections with recycled content may be required, as determined by Contractor's Sustainability Action Plan.

1.8 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Metal panel, 150 mm (6 inch) square, showing finish, each color and texture.
- C. Shop Drawings: Wall and roof panels, showing details of construction and installation; steel framing, thickness and kind of material, closures, flashing, fastenings and related components and accessories.
 1. Shop drawings must be prepared under the review of professional engineer responsible for wind load design analysis.
 2. Include copy of wind load design analysis as informational submittal.
 3. Include documentation of professional engineer's qualifications.
- D. Manufacturer's Literature and Data: Wall and roof panels, including structural performance testing reports.

1.9 PRE-INSTALLATION CONFERENCE

- A. Convene a meeting on site, after submittals are received and approved but before any work, to review drawings and specifications, submittals, schedule, manufacturer instructions, site logistics and pertinent matters of coordination, temporary protection, governing regulations, tests and inspections; participants to include RE/COR and all parties whose work is effected or related to the work of this section.

1.10 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by the basic

designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

SPEC WRITER NOTES:

1. Remove reference citations that do not remain in Part 2 or Part 3 of edited specification.
2. Verify and make dates indicated for remaining citations the most current at date of submittal; determine changes from date indicated on the TIL download of the section and modify requirements impacted by the changes.

B. American Iron and Steel Institute (AISI).

C. American Society of Civil Engineers (ASCE):

ASCE-7-22 Minimum Design Loads for Buildings and Other Structures

D. American Society for Testing and Materials (ASTM):

A463/A463M-15(2020)e1 Steel Sheet, Cold-Rolled, Aluminum-Coated, by the Hot-Dip Process

ASTM A653/A653M-22 Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

A924/A924M-22a Steel Sheet, Metallic Coated by the Hot-Dip Process

A1008/A1008M-21a Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy

B209/B209M-21a Aluminum and Aluminum Alloy Sheet and Plate
E72-22 Conducting Strength Tests of Panels for Building Construction

E283/E283M-19 Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Difference Across the Specimen

E331-00(2016) Water Penetration of Exterior Windows, Curtain Walls, and Doors by the Uniform Static Air Pressure Difference

E1592-05(2017) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

E. Underwriters Laboratory (UL):

UL 580, 2006 Edition Tests for Uplift Resistance of Roof Assemblies

PART 2 - PRODUCTS

SPEC WRITER NOTES:

1. Make material requirements agree with applicable requirements specified in the referenced Applicable Publications. Update and specify only that which applies to the project.

2.1 SHEET STEEL

- A. Steel, Sheet, Galvanized: ASTM A653/A653M, Structural.
 1. Grade 40, galvanized coating conforming to ASTM A924/A924M, Class Z 275 (G-90).
- B. Steel, Sheet, Commercial: ASTM A1008, Type C.
- C. Steel, Sheet, Aluminized: ASTM A463. Coat steel on both sides with 0.5 ounce of aluminum per square foot (0.15 Kg/sm).

2.2 ALUMINUM PLATE AND SHEET

- A. ASTM B209/209M.

2.3 FASTENERS

- A. //Fasteners for steel panels must be galvanized or cadmium plated steel.//
- B. //Fasteners for aluminum panels must be aluminum or stainless steel. //
- C. //Provide fasteners of size, type and holding strength as recommended by manufacturer. //

2.4 FABRICATION

- A. Produce metal wall and roof panels from single sheets, of approximate overall depth and configuration shown on drawings. Make connection between panels by interlocking joints factory-filled with sealant.
- B. Furnish wall panels in one continuous length for full height with no horizontal joints, except at openings.
 1. // 0.8 // 1.0 // mm (// 0.032 // 0.040 // inch) thick aluminum.
 2. // 1.3 // 1.0 // 0.85 // 0.7 // mm (// 0.0516 // 0.0396 // 0.0336 // 0.0276 // inch) thick galvanized steel.
 3. // 1.2 // 0.9 // 0.6 // mm (// 0.0478 // 0.0359 // 0.0229 // inch) thick uncoated steel.
 4. // 0.8 // 1.0 // mm (// 0.032 // 0.040 // inch) thick aluminized steel.
 5. Profile: Panel profile must be // flush face // square ribbed // box rib // batten seam // and with stiffening ribs in the flat of the panel; lap side seam design for concealed fastening.
 6. Profile Height: // 2.54 // 4.45 // 5.08 // 6.35 // cm // 1 // 1-3/4 // 2 // 2-1/2 // inch.

7. Profile Spacing: // _____ //.
8. Overall Panel Width: // _____ //.
- C. Furnish roof panels in one continuous length of roof span and provide cut-outs as required for passage of pipes, conduits, vents and the like.
1. // 0.8 // 1.0 // mm (// 0.032 // 0.040 // inch) thick aluminum.
 2. // 1.3 // 1.0 // 0.85 // 0.7 // mm (// 0.0516 // 0.0396 // 0.0336 // 0.0276 // inch) thick galvanized steel.
 3. // 1.2 // 0.9 // 0.6 // 0.5 // mm (// 0.0478 // 0.0359 // 0.0229 // 0.0239 // inch) thick uncoated steel.
 4. // 0.8 // 1.25 // mm (// 0.032 // 0.050 // inch) thick aluminized steel.
5. Profile: Panel profile must be // flush face // square ribbed // box rib // batten seam // and with stiffening ribs in the flat of the panel; lap side seam design for concealed fastening.
6. Profile Height: // 2.54 // 4.45 // 5.08 // 6.35 // cm // 1 // 1-3/4 // 2 // 2-1/2 // inch.
7. Profile Spacing: // _____ //.
8. Overall Panel Width: // _____ //.
- D. Accessories and flashing must be the same material as the panels. Comply to thickness and installation of accessories and flashing as recommended by the panel manufacturer.

2.5 FINISH

SPEC WRITER NOTES:

1. On small projects, delete numerical aluminum finish designation and use descriptive designation.
- A. //Aluminum: Fluoropolymer enamel finish, consisting of a chemical pre-treatment of the base aluminum; then applying a primer coat of 0.1 to 0.4 mil dry film thickness; a polyvinylidene fluoride resin finish coat of 0.8 mil minimum dry film thickness on one side, and a wash coat of 0.3 to 0.4 mil minimum dry film thickness applied to reverse side. //
- B. Steel:
1. //Silicone polyester finish, consisting of a chemical pre-treatment of the galvanized steel // or uncoated steel //, then applying an epoxy prime coat of 0.2 mil minimum dry film thickness; then a silicone polyester finish coat of 0.8 mil minimum dry film thickness on one side and polyester prime coat of 0.5 mil minimum dry film thickness applied to reverse side. //

2. //Fluorocarbon finish, consisting of a prime coat and a polyvinylidene fluoride finish coat of 1.0 mil minimum dry film thickness on one side, and a wash coat of 0.5 mil minimum dry film thickness applied to reverse side. //
- C. Color as specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- D. //Color for sheet aluminum cannot deviate more than the colors of extrusion samples.//

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install panels in accordance with the manufacturer's approved erection instructions and diagrams
- B. Panels must be in full and firm contact with supports and with each other at side and end laps.
- C. Where panels are cut in the field, or where any of the factory applied coverings or coatings are abraded or damaged in handling or installation, receive approval of RE/COR prior to installation and after the necessary repairs have been made with material of the same type and color as the weather coating; completely seal all cut ends and edges, including those at openings through the sheets.
- D. Replace defects or errors in the materials immediately and at no cost.
- E. Provide molded closure strips where indicated and whenever sheets terminate with open ends after installation.
- F. Wall Panels:
 1. Install panels with the configuration in a vertical position.
 2. Install panels with end laps occurring only at structural members, full heights from base to eave with no horizontal joints except at the junctions of door frames, window frames, louver panels, and similar locations.
 3. Seal side and end laps.
 4. Flash and seal walls at the base, at the top, around windows, door frames, framed louvers, and other similar openings.
 5. Install closure strips, flashings, and sealing material in an approved manner that will assure complete weather tightness.
 6. Flashing will not be required where approved "self-flashing" panels are used.
- G. Roof Panels:
 1. Apply roofing panels with the configurations parallel to the slope of the roof.

2. Install roofing panels with end laps occurring only at structural members, full lengths from ridge (or ridge panel) to eaves // top to eaves on shed roofs, // with no transverse joints except at the junction of ventilators, curbs, skylights, chimneys and similar openings //.
 3. Lay all side laps away from the prevailing wind, and seal side and end laps with joint sealing material.
 4. Flash and seal the roof at the ridge, at eaves and rakes, at projections through the roof, and elsewhere as necessary.
 5. Install closure strips, flashing, and sealing material in an approved manner that will assure complete weather tightness.
- H. Flashing: Provide flashing and related closures and accessories in connection with the preformed metal panels as indicated and as necessary to provide a complete watertight installation; allow for expansion and contraction of flashing.
- I. Details of installation, which are not indicated, to be in accordance with the panel manufacturer's printed instruction and details, or the shop drawings.
- J. Fasteners:
1. Fastener spacing in accordance with the manufacturer's recommendations, and as necessary to withstand the design loads indicated.
 2. Install fasteners in valleys or crowns as recommended by the manufacturer of the sheet being used.
 3. Drive exposed penetrating type fasteners normal to the surface, and to a uniform depth to seat gasketed washers properly and drive so as not to damage factory applied coating.
 4. Exercise extreme care in drilling pilot holes for fastenings to keep drills perpendicular and centered in valleys, or crowns, as applicable.
 5. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers.
 6. Torque used in applying fasteners must not exceed that recommended by the manufacturer.
 7. Remove panels deformed or otherwise damaged by over-torqued fastenings and provide new panels.
 8. Remove metal shavings and filings from roofs on completion to prevent rusting and discoloration of the panels.

3.2 ISOLATION OF ALUMINUM

- A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze, or other metal compatible with aluminum by one of the following:
 - 1. Painting the dissimilar metal with a prime coat of Zinc-Molybdate followed by two coats of aluminum paint.
 - 2. Placing a non-abrasive tape or gasket between the aluminum and the dissimilar metal.

3.3 PROTECTION AND CLEANING

- A. Protect panels and other components from damage during and after erection, and until project is accepted by the Government.
- B. After completion of work, leave exposed finished surfaces of panels cleaned of soil, and free of discoloration and disfiguration; touch-up minor abrasions surfaces of panels at the discretion of the RE/COR, otherwise replace damaged panels at no additional cost.

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