

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

**PART 1 - GENERAL**

**1.1 DESCRIPTION:**

- A. This section specifies uninsulated metal wall and roof panels as shown on contract documents.

**1.2 RELATED WORK:**

- A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE CONSTRUCTION REQUIREMENTS.
- B. Sealant: Section 07 92 00, JOINT SEALANTS.
- C. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 QUALITY ASSURANCE:**

- A. Manufacturer's Qualifications: Provide metal wall and roof panels products of a manufacturer regularly engaged for not less than five (5) years in the fabrication of metal panels of the type and design indicated.
- B. Installer: A firm with three (3) years of successful experience with installation of roofing and siding panels of type and scope equivalent to Work of this Section. Submit installer qualifications.

**1.4 FIRE RATING:**

- A. Not Required.

**1.5 SUBMITTALS:**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Sustainable Design Submittals, as described below:
  - 1. Postconsumer recycled content as specified in PART 2 - PRODUCTS.
- C. Samples: Metal panel, 152 mm (6 inch) square, showing finish, each color and texture.
- D. Shop Drawings: Wall and roof panels, showing details of construction and installation. Collateral steel framing, U value, thickness and kind of material, closures, flashing, fastenings and related components and accessories. Show interfaces and relationships to work at other trades and continuity with adjacent thermal, weather, air and vapor barriers.
- E. Manufacturer's Literature and Data: Wall and roof panels.
- F. Fire Test Report: Report of fire test by recognized testing laboratory for fire rating specified, showing details of construction.

- G. Manufacturer's Certificates: Indicating manufacturer's qualifications specified.
- H. Installer qualifications.
- I. Manufacturer warranty.

**1.6 QUALITY ASSURANCE:**

- A. Approval by Contracting Officer Representative (COR) is required of products of proposed manufacturer.
- B. Certify manufacturer has five (5) years continuous documented experience in fabrication of metal roofing and siding panels.
- C. Source: For each material type required for work of this section, provide primary materials, which are products of one manufacturer. Provide secondary or accessory materials, which are acceptable to manufacturers of primary materials.
- D. Installer: A firm with a minimum of three (3) years' experience in type of work required by this section and which is acceptable to manufacturers of primary materials.

**1.7 WARRANTY:**

- A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".
- B. Manufacturer Warranty: Manufacturer shall warranty their metal roofing and wall panels for a minimum of ten (10) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.
- C. Warranty on Panel Finishes: Manufacturer's shall warrant their roofing and wall panel finish and provide standard agreement to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when testing according to ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of installation and final acceptance by the COR.

**1.8 APPLICABLE PUBLICATIONS:**

- A. The publications listed below form a part of this specification to the extend referenced. The publications are referenced in the text by the basic designation only.
- B. American Architecture Manufacturers Association (AAMA):
  - 611-14..... Anodized Architectural Aluminum
  - 621-02..... Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates
  - 2605-13..... Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels
- C. American Iron and Steel Institute (AISI):
  - SG03-02..... Cold-Formed Steel Design Manual
- D. ASTM International (ASTM):
  - A463/A463M-10..... Steel Sheet, Cold-Rolled, Aluminum-Coated, by the Hot-Dip Process
  - A653/A653M-13..... Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - A924/A924M-14..... Steel Sheet, Metallic Coated by the Hot-Dip Process
  - A1008/A1008M-10..... Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy
  - B209-14..... Aluminum and Aluminum Alloy Sheet and Plate
  - B209M-14..... Aluminum and Aluminum Alloy Sheet and Plate (Metric)
  - C553-13..... Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
  - C591-13..... Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation

- C612-14..... Mineral Fiber Block and Board Thermal  
Insulation
- C1396/C1396M..... Gypsum Board
- D2244-14..... Calculation of Color Tolerances and Color  
Differences from Instrumentally Measured Color  
Coordinates
- D4214-07..... Test Methods for Evaluating the Degree of  
Chalking of Exterior Paint Films
- E119-14..... Fire Test of Building Construction and  
Materials
- E283-04(R2012)..... Test Method for Determining Rate of Air Leakage  
Through Exterior Windows, Curtain Walls, and  
Doors Under Specified Pressure Differences  
Across the Specimen
- E331-00(R2009)..... Test Method for Water Penetration of Exterior  
Windows, Skylight, Doors, and Curtain Walls by  
Uniform Static Air Pressure Difference
- E1592-10..... Terminology Relating to Occupational Health and  
Safety
- E1646-95(R2011)..... Test Method for Water Penetration of Exterior  
Metal Roof Panel Systems by Uniform Static Air  
Pressure Difference
- E1680-11..... Test Method for Rate of Air Leakage Through  
Exterior Metal Roof Panel Systems
- E1980-11..... Calculating Solar Reflectance Index of  
Horizontal and Low-Sloped Opaque Surfaces
- E2140-01(R2009)..... Test Method for Water Penetration of Metal Roof  
Panel Systems by Static Water Pressure Head
- E. Cool Roof Rating Council (CRRC):  
1 Standard-14
- F. FM Global:  
4471-10..... Class 1 Panel Roofs
- G. Underwriters Laboratories (UL):  
580-05(R2013)..... Tests for Uplift Resistance of Roof Assemblies  
Fire Resistance Directory

**PART 2 - PRODUCTS**

**2.1 PERFORMANCE REQUIREMENTS ROOF PANELS:**

- A. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
  - 1. Three-year, aged solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
  - 2. Three-year, aged Solar Reflectance Index (SRI) of not less than 64 when calculated according to ASTM E1980.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592.
  - 1. Wind Loads: 120mph.
  - 2. Other Design Loads: 20 psf roof live load, 30 PSF ground snow load.
  - 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- C. Air Infiltration: Air leakage of not more than 0.3 L/s per sq. m (0.06 cfm/sq. ft.) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 300 Pa (6.24 lbf/sq. ft.).
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 300 Pa (6.24 lbf/sq. ft.).
- E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
  - 1. Uplift Rating: UL 90.
- G. FM Global Listing: Provide metal roof panels and composite component materials that comply with requirements FM Global 4771 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
  - 1. Fire/Windstorm Classification: Class 1A- 120.
  - 2. Hail Resistance: SH.

H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joints sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 67 degrees C (120 degrees F), ambient; 100 degrees C (180 degrees F), material surfaces.

## **2.2 PERFORMANCE REQUIREMENTS FOR WALL PANELS:**

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592.

1. Wind Loads: 120MPH.
2. Other Design Loads: Wind Category 4, Wind Exposure C, Internal Pressure Coefficient +/- 0.18.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.3 L/s per sq. m (0.06 cfm/sq. ft.) when tested according to ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 300 Pa (6.24 lbf/sq. ft.).

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 300 Pa (6.24 lbf/sq. ft.).

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joints sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 67 degrees C (120 degrees F), ambient; 100 degrees C (180 degrees F), material surfaces.

E. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's Fire Directory or from the listings of another qualified testing agency.

### **2.3 SHEET STEEL:**

- A. Minimum 0.8 mm (0.31 inch) thick for wall and roof panels.
- B. Steel, Sheet, Galvanized: ASTM A653/A653M and AISI SG03-3, Structural.
  1. Grade 40, galvanized coating conforming to ASTM A924/A924M, Class Z 275 G-90.
- C. Steel, Sheet, Commercial: ASTM A1008, Type C.
- D. Steel, Sheet, Aluminized: ASTM A463/A463M and AISI SG03-3. Steel to be coated on both sides with 0.15 Kg/sq. m (0.5 ounce of aluminum per square foot).
- E. Recycled Content of Steel Products: Postconsumer recycled content not less than 30 percent.

### **2.4 ALUMINUM PLATE AND SHEET:**

- A. ASTM B209M (B209).

### **2.5 FASTENERS:**

- A. Fasteners for Steel Panels: Galvanized or cadmium plated steel.
- B. Fasteners of size, type and holding strength as recommended by panel manufacturer.

### **2.6 GYPSUM BACKING BOARD:**

- A. ASTM C1396/C1396M, Type X, Plain face, Square edge.

### **2.7 THERMAL INSULATING MATERIALS:**

- A. Urethane or Isocyanurate Board: ASTM C591, Type I.
- B. Mineral Fiber Blankets: ASTM C553, Type I.
- C. Mineral Fiber Board: ASTM C612, Class I.

### **2.8 FABRICATION:**

- A. General:
  1. Furnish panels in one continuous length for full height, or at least one story height for wall panels with no horizontal joints, except at cut-outs or openings as required for the passage of pipes, conduits, vents and the like.
  2. Construct panels by pressing members together to form a structural unit with closed ends.

3. Overall thickness of panels is shown of the contract documents.
  4. Provide connection between panels by interlocking male and female joints. Seal joints between related components as required to make the work water-tight. Refer to Section 07 92 00, JOINT SEALANTS for sealing compounds.
  5. Provide collateral steel framing, metal and bituminous closures, fastenings, flashing, clip, caulking, panel reinforcements for support of mechanical and electrical work as shown on the contract documents, and related components and accessories.
    - a. Sub-girts: 1.0 mm (0.0396 inches) thick galvanized steel hat channels deigned to receive panel fasteners or clips.
    - b. Accessories, fastenings, and flashings to be the same material and finish as the panels. Thickness and installation of accessories and flashing to be as recommended by the panel manufacturer.
- C. Composite Metal Wall Systems:
1. Panels consisting of an exterior face sheet, sub-girts, cementitious board panels, insulation, and interior metal liner sheet.
  2. Panel Composition:
    - a. Exterior face sheet of 0.9 mm (0.0359 inch) thick sheet steel of indicated configuration and pattern.
    - b. Cementitious board used for wall panels to be of the same type for each layer.
    - c. Interior liner sheet of 0.7 mm (0.0276 inch) thick galvanized sheet steel of flush pattern, interior face painted.
    - d. Insulation to be mineral fiber blankets installed on interior face of liner sheet.
- D. Fabricate wall louvers and frames used in conjunction with walls panels to be of same material, thickness and finish as exterior face sheets of wall system. Louver assembly to be designed and installed to prevent infiltration of water into structure.

**2.9 FINISH:**

- A. For insulated and uninsulated wall and roof panels and composite wall panels, provide finishes as follows for face sheets. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- B. Energy Performance: Provide roof panels with solar reflectance index not less than 29 on steep slope roofs and not less than 78 on low slope roofs when calculated according to ASTM E1980 based on testing identical products by a qualified testing agency.
- C. Provide finishes for steel face sheets as follows. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
  - 2. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish coating not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
  - 3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 3 mm (0.5 mil).

**PART 3 - EXECUTION**

**3.1 INSTALLATION:**

- A. General: Install panels in accordance with the manufacturer's approved erection instructions and diagrams, except as specified otherwise.
- B. Install panels 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 factory applied coverings or coatings are abraded or damaged in handling or installation, make finish repairs with material of the same type and color as the weather coating, before being installed.
- D. Seal cut ends and edges, including those at openings through the sheets.
- E. Correct defects or errors in the materials in a manner approved by the COR.
- F. Replace defective materials which cannot be corrected with nondefective material.
- G. Provide molded closure strips where indicated and whenever sheets terminate with open ends after installation.
- H. Wall Panels:
  - 1. Apply panels with the configuration in a vertical position.

2. Provide panels in 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 with joint sealing material.
4. Flash and seal walls at the base, at the top, around windows, door frames, framed louvers, and other similar openings. Install closure strips, flashings, and sealing material in an approved manner that will assure complete weather tightness.
5. Flashing is not required where approved "self-flashing" panels are used.

I. Roof Panels:

1. Apply roofing panels with the configurations parallel to the slope of the roof. Provide roofing panels in full lengths from ridge (or ridge panel) to eaves and top to eaves on shed roofs, with no transverse joints except at the junction of ventilators, curbs, skylights, chimneys and similar openings.
2. Lay side laps away from the prevailing wind, and seal side and end laps with joint sealing material.
3. Flash and seal the roof at the ridge, at eaves and rakes, at projections through the roof, and elsewhere as necessary.
4. Install closure strips, flashing, and sealing material in a manner that will assure complete weather tightness.

J. Flashing:

1. Provide flashing and related closures and accessories in connection with the preformed metal panels as indicated and as necessary to provide a watertight installation.
2. Install details of installation, which are not indicated, in accordance with the panel manufacturer's printed instruction and details, or the approved shop drawings.
3. Allow for expansion and contraction of flashing.

K. Fasteners:

1. Space fasteners 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 panel being used.

3. Install fasteners in straight lines within a tolerance of 13 mm (1/2-inch) in the length of a bay.
4. 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.
5. Exercise care in drilling pilot holes for fastenings to keep drills perpendicular and centered in valleys, or crowns, as applicable. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Do not torque fasteners to exceed values recommended by the manufacturer.
6. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.
7. 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.
- B. Paint aluminum in contact with, or built into mortar, concrete, plaster, or other masonry materials with a coat of alkali-resistant bituminous paint.
- C. Paint aluminum in contact with wood or other absorptive materials that may become repeatedly wet, with two coats of bituminous paint, or two coats of aluminum paint. Seal joints with caulking material.

### **3.3 PROTECTION AND CLEANING:**

- A. Protect panels and other components from damage during and after erection, and until project is accepted by the COR.
- B. After completion of work, all exposed finished surfaces of panels are to be cleaned of soil, discoloration and disfiguration. Touch-up abraded surfaces of panels.

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