

SECTION 07 41 13
METAL ROOF PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Standing-seam roof panels.
- B. Metal roofing accessories.

1.2 RELATED SECTIONS

- A. Section 07 62 00 - Sheet Metal Flashing.
- B. Section 07 72 00 - Roof Accessories.

1.3 REFERENCES

- A. American Society of Civil Engineers: ASCE -7 - Minimum Design Loads for Buildings and Other Structures, version adopted by local Building Code authority having jurisdiction.
- B. ASTM A792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- C. ASTM E1592-01 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding System by Uniform Static Air Pressure Difference
- D. ASTM E1680-95 (Reapproved for 2003) - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
- E. ASTM E1646-95 (Reapproved for 2003) Standard Test Method for Rate of Water Penetration Through Exterior Metal Roof Panel Systems By Uniform Static Air Pressure Difference.
- F. Factory Mutual 4471 Approval Standard for Class 1 Panel Roofs:
 - 1. Section 4.1 Combustibility-From Below Roof Assembly
 - 2. Section 4.2 Combustibility-From Above Roof Assembly
 - 3. Section 4.3 Wind Uplift Resistance
 - 4. Section 4.4 Foot Traffic Resistance
 - 5. Section 4.5 Hail Damage Resistance
 - 6. Appendix G- Susceptibility to Leakage Test Procedure for Class 1 Panel Roofs.
- G. ASTM E2140- Standard Test method for water penetration of metal roof panel systems by static water pressure head.

- H. Building Code – as approved by local authority having jurisdiction.
- I. SMACNA - Architectural Sheet Metal Manual, Latest Edition.
- J. Underwriter’s Laboratories:
 - 1. UL 580 - Tests for Uplift Resistance of Roof Assemblies.
 - 2. UL 1897 - Uplift Tests for Roof Covering Systems, latest Edition.

1.4 SUBMITTALS

- A. Product Data: Manufacturer literature indicating product specifications, installation instructions, and standard construction details.
- B. Shop Drawings: To be prepared by metal roof system manufacturer.
 - 1. Submit roof plan showing panel layout, gutters and downspouts as applicable.
 - 2. Provide metal roof flashing, gutter and downspout shop drawings.
 - a) Indicate gage and finish of materials.
 - b) Indicate fastener type, finish and spacing.
 - c) Indicate locations of field applied sealant.
 - d) Indicate location size and gauge of all back up plates.
 - 3. Roof Panel Attachment:
 - a) Roof plan with wind uplift pressure calculations at field, corner and perimeter areas according to version of ASCE-7 referenced by locally-adopted Building Code and the authority having jurisdiction.
 - b) Roof plan indication roof clip spacing pattern at field, corner, perimeters and where panels are to be fixed from thermal movement.
 - c) Roof panel attachment plan must be stamped by licensed engineer in State in which project is constructed, certifying roof attachment meets local Building Code requirements for wind uplift.
- C. Engineering Calculations: Submit wind uplift pressure calculations according to ASCE 7 Wind Speed for project location with respect to appropriate Importance Factor, Exposure category and Safety Factor. Calculations shall be sealed by a professional engineer licensed to practice structural engineering in the state in which project is located.
- D. Samples:
 - 1. Submit two samples, 12" long, full width panel, showing metal gage, seam and required finish.

2. Two samples each for roof panel clip, bearing plate and clip fastener.
 3. Submit color samples for Architect's selection.
 4. Submit sample warranties:
 - a) Coating Warranty.
 - b) Manufacturer Water Tightness Warranty complying with this Specification.
 - c) Installer Warranty.
- E. Certification:
1. Submit roof panel manufacturer's certification that fasteners, clips, backup plates, closures, roof panels and finishes meet specification requirements, wind uplift requirements.
 2. Submit roof panel manufacturer's certification that installer meets requirements to install roof system and is qualified to obtain required warranties.
 3. Test Reports –Certified test results that indicate roof system meets or exceeds design and performance criteria. Testing to include:
 - a) Uplift Testing
 - (1) Underwriters Laboratory: Submit documentation that panel System has been tested for uplift in accordance with Underwriters Laboratories UL-580 and UL 1897 and has been tested to failure.
 - (2) Test reports prepared by independent test laboratory and stamped by a professional engineer substantiating that roof system will meet the allowable wind pressures with a safety factor of 2.0.
 - b) Static Water Testing Certification:
 - (1) The panel system shall be tested in accordance with FM4471 Appendix G, and pass with no leakage. The test specimen must successfully withstand being submerged under 6" of water for a minimum period of 7 days.
 - c) Air and Water Testing Certification
 - (1) ASTM E1680 – Manufacturer's test data for air infiltration rates up to 20 pounds per square inch differential pressure.
 - (2) ASTM E1646- Manufacturer's test data for water infiltration rates up to 20 pounds per square inch differential pressure.
 - d) Impact Resistance

- (1) Submit documentation that panel system has been tested at Factory Mutual per FM 4471 Section 4.5 and is currently rated for "Severe Hail"

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver panels to jobsite properly packaged to provide protection against transportation damage.
- B. Exercise care in unloading, storing and erecting panels to prevent bending, warping, twisting, and surface damage.
- C. Store all material and accessories above ground on well skidded platforms. Store under waterproof covering. Provide proper ventilation to panels to prevent condensation build-up between each panel.
- D. Remove from site panels which are damaged, or become water-stained during storage and handling. Remove, and replace materials, which are installed damage, or stained.

1.6 WARRANTIES

- A. Panel Coating: Furnish manufacturer's 20-year warranty panel coating warranty covering checking, crazing, peeling, chalking, fading, and adhesion.
- B. Metal Roof Warranty:
 1. Manufacturer's 20 year No Dollar Limit Weather Tightness Warranty.
 - a) Warranties supplied by Metal Roof Installer or 3rd Party Warranties are not acceptable.
 2. Coverage includes roof panels, roof flashing, roof penetrations and roof curbs.

1.7 DESIGN AND PERFORMANCE CRITERIA

- A. Thermal Movement: Metal Roofing system, including flashing, shall accommodate unlimited thermal movement without buckling or excess stress on the structure.
- B. Roof panel and trim attachments will be designed to satisfy the requirements of the roof design (shown in shop drawings).
- C. Maximum wind uplift capacity of roof system shall be determined using certified results from UL 1897-98, Uplift Tests for Roof Covering Systems. Testing of the entire roof assembly shall be conducted in a UL-580 test chamber.
- D. Panel system installation shall be in accordance with ASCE 7 Wind Speeds for project location with respect to appropriate Exposure category, Building Importance Factor and a Safety Factor of 2.0.

1.8 COORDINATION

- A. Coordinate Work, with installation of other associated Work, to ensure quality application.

- B. Coordinate Work with installation of associated metal flashings and building walls.
- C. Coordinate Work to minimize foot traffic and construction activity on installed finished surfaces.
- D. Coordinate location of pipe penetrations to allow centering of pipe in panel.
- E. Coordinate location of roof curbs, to allow proper integration with roof panel seams.

1.9 PRE-ROOFING CONFERENCE

- A. Schedule meeting to discuss roof Work before start of work onsite.
- B. Comply with requirements of roof Specification Section(s).
- C. Required attendees: Contractor, metal deck & roof installer, metal roof system manufacturer's representative, and any other subcontractors who have equipment penetrating the roof or Work that requires roof access or traffic.

1.10 QUALITY ASSURANCE

- A. **Manufacturer:** Manufacturer's facility and equipment must undergo an annual quality assurance audit by Factory Mutual. This assures that manufacturers equipment, procedures and quality program are maintained to insure a uniform product consistent with that which was tested and FM Approved.
- B. **Installer Qualifications:** Installer ("roofer") to perform the Work of this Section, which firm has no fewer than 5 years of successful experience with installation metal roof systems similar to those required for this Project, and is qualified by the roof panel manufacturer, for installation of manufacturer-warranted systems.
- C. **Field Measurements:** Prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units, where final dimensions cannot be established prior to fabrication.
- D. Install a 30 foot wide, quality control area of metal roofing, for review by the Architect, to establish the quality of installation for the roof, and have approved prior to installing additional metal panels.

PART 2 - PRODUCTS

2.1 ROOF PANEL SYSTEM

- A. **Basis of Design:** 138T by Architectural Building Components, Houston, TX , or approved substitute, meeting the following requirements.
 - 1. Requests for approval must be submitted in writing at least ten (10) days prior to bid date, and are accompanied by all related test reports and design calculations listed in Reference section 1.3 and Design and Performance criteria Section 1.7.

2. Substitute manufactures will be approved written addendum to all bidders. Voluntary alternates will not be considered. Substitutions will not be permitted after the bid date of this project.
3. Factory-formed panel, width of 16 inches. Panels shall be symmetrical in design and shall be mechanically seamed with a field operated electric seaming machine provided by the manufacturer.
4. Minimum seam height 1 3/8 inches. Integral seam, double lock and snap together type panels are not acceptable
5. Panel system shall utilize both continuous and individual clips in order to maximize wind uplift resistance in edge and corner zones.
6. Clips used to attach panel to substrate shall provide minimum 3/8" air space between panel and roof deck to reduce heat transfer into the building envelope.
7. Seam cap matching panel finish with two rows of integral factory hot applied sealant.
8. Galvalume coated sheet steel, Type AZ-50, Grade 50 as described in ASTM A792; 24 gauge.
9. Finish: Two coat coil applied, baked-on full-strength (70% resin, PVF2) fluorocarbon coating consisting of a nominal of .25 mil dry film thickness primer, nominal dry film thickness of .75 mil color coat. Finish to be selected from manufacturer's standard color selection. The back side of the material should be .25 mil. Primer and 0.25 polyester wash coat.
10. Roof panel system must allow individual roof panel removal and replacement from any point on the roof without damage to adjacent roof panel(s).
11. Panels must be furnished and installed in continuous lengths from ridge to eave with no overlaps. Panels too long to ship will be manufactured on site using manufacturers employees and equipment.
12. Panel surface characteristics to be chosen by Architect for roof panel manufacturer's available types.
 - a) Smooth.
 - b) Striations.
 - c) Stiffener ribs
 - d) Plank
13. Manufacturer watertightness warranty, meeting requirements of this Section.
14. Roof panels proposed for substitution shall fully comply with specified requirements in appearance, assembly, and performance. Substitution request must comply with Division 1 requirements for submission.

2.2 FASTENERS AND ACCESSORIES

- A. Panel Clip Screw - screw required in wind uplift rating requirements for application, with corrosion-resistant coating, in length necessary to penetrate metal deck minimum 3/4 inch., as supplied by roof panel manufacturer.
- B. Roof Panels Clip:
 - 1. Intermittent Clip: 24 gauge grade 50 coated steel, 2 piece fixed clips minimum 8" long, designed to allow unlimited roof panel thermal movement and not contact roof panel cap, as supplied by roof panel manufacturer, marking meeting wind uplift requirements of this Section.
 - 2. Intermittent Clip Bearing Plate: in gage, size and finish as supplied by and approved by roof panel manufacturer for use in roof panel manufacturer's full assembly warranted systems.
 - 3. Fiber Reinforced Polycarbonate Shim Plate: used in lieu of bearing plates in areas where deck is uneven to insure level finished panel surface.
 - 4. Multi Span-Continuous Clip: as provided by roof panel manufacturer in edge and corner zones to maximize wind uplift performance and for full assembly warranted systems.
- C. Trim and flashing will be of the same gage and finish unless approved otherwise by the metal roof system manufacturer.
 - 1. All sheet metal valleys will be supplied in continuous lengths up to 32'
 - 2. Ridge closures, consisting of metal channel surrounding factory precut closed cell foam, will not be secured through the field of the panel.
 - 3. Trim will be installed specifically as displayed in the manufacturer provided shop drawings. Proposed changes must be approved in writing by the metal roof system manufacturer.
- D. Concealed supports, angles, plates, accessories and brackets: in gage and finish as recommended, and furnished by manufacturer.
- E. Accessory Screw: Size and screw type as provided by panel manufacturer for each use, with prefinished hex washer head in color to match panels where exposed to view.
- F. Rivets: full stainless steel, including mandrel, in size to match application.
- G. Field Sealant: Color coordinated primerless silicone, or high grade, non-drying butyl, as supplied by panel manufacturer.
- H. Sealant Tape: non-drying, 100 percent solids, high grade butyl tape, as supplied by panel manufacturer, in sizes to match application.
- I. Pipe Penetration Flashings: flexible boot type, with stainless steel compression ring, and stainless steel pipe strap, Dektite by Buildex, or approved substitute. Use silicone type at hot pipes.

- J. Metal Roof Curbs: welded aluminum, or stainless steel, factory-insulated, with integral cricket, and designed to fit roof panel module, sized to meet application, by L.M. Curbs, or approved substitute.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Ensure surfaces are ready for panel application.
- B. Inspect and ensure surfaces are free from objectionable warp, wave, and buckle before proceeding with installation of pre-formed metal roofing.
- C. Ensure substrate is ready to receive metal roofing. Report items for correction and do not proceed with metal roof panel system installation until resolved.

3.2 INSTALLATION OF ROOF PANELS

- A. Comply with and install roofing and flashings in accordance with all details shown on manufacturer's approved shop drawings and manufacturer's product data and instructions, within specified erection tolerances.
- B. Install field panels in continuous lengths, without endlaps. Remove and replace panels with endlaps.
- C. Do not install panels damaged by shipment or handling.
- D. Install intermittent clips with bearing plates and continuous clips according to pattern in wind uplift rating at field, corners and perimeter roof areas.
- E. Fix panels at location depicted on reviewed shop drawing(s).
- F. Breadpan roof panel at ridge, hip and headwalls.
- G. Allow for 1 inch panel clearance at penetrations.
- H. Install concealed supports, angles and brackets as furnished by manufacturer to form complete assemblies.
- I. Remove roof panel and flashing protective film prior to extended exposure to sunlight, heat, and other weather elements.
- J. Field-apply sealant tape and gun-grade sealant according to reviewed shop drawings and manufacturer's requirements for airtight, waterproof installation.
- K. Ensure sealant beads and tape are applied prior to sheet metal installation to achieve a concealed bead. Neatly trim exposed portions of sealant without damaging roof panel or flashing finish.

- L. Align pipe penetrations to occur at center of roof panel. Report and have corrected improperly-placed penetrations before proceeding with panel installation. Remove and replace roof panels which have improperly-placed penetration flashings.
- M. Align roof curbs to fit roof panel module and overlap standing seam(s). Allow for proper drainage on both sides of curb.
- N. Install sheet metal flashings according to manufacturer's recommendations, reviewed shop drawings and in accordance with provision of Section 07 62 00.

3.3 CLEANING

- A. Clean exposed surfaces of Work promptly after completion of installation.
- B. Clean mud, dirt, and construction-related debris from panels before panels are scratched or marred.

3.4 PROTECTION

- A. Protect Work as required to ensure roofing will be without damage at time of final completion.
- B. Do not allow excessive foot traffic over finished surfaces.
- C. Do not track mud, dirt, or construction-related debris onto panel surfaces.
- D. Replace damaged Work before final completion.

END OF SECTION