INSULATED METAL ROOF PANELS

GENERAL SPECIFICATION FOR COMMERCIAL/INDUSTRIAL AND ARCHITECTURAL APPLICATIONS

1. GENERAL

1.1. Summary

The contract drawings indicate the extent and general details of the roofs. This section includes requirements for the factory-formed, pre-insulated, metal, roof panel cladding system and the corresponding metal flashings, sealants, fasteners, clips and other accessories.

1.2. References

1.2.1. AISC

Steel Construction Manual – 13th Edition

1.2.2. AISI

North American Specification for the Design of Cold-Formed Structural Members, 2007

1.2.3. ASCE 7

Minimum Design Loads for Buildings and Other Structures

1.2.4. ASTM

C518-10 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C1363-05 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

C273-07 Standard Test Method for Shear Properties of Sandwich Core Materials

D1621-10 Standard Test Method for Compressive Properties of Rigid Cellular Plastics

D1623-09 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics

D1622-08 Standard Test Method for Apparent Density of Rigid Cellular Plastics

D6226-10 Standard Test Method for Open Cell Content of Rigid Cellular Plastics

E72-10 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction

E84-10b Standard *Test* Method of Surface Burning Characteristics of Building Materials

E1680-11 Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems

E1646-95(2011) Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference

E1592-05 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

1.2.5. FM Global

4880 Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings and Exterior Wall Systems

4471 Approval Standard for Class 1 Panel Roofs

1.2.6. International Building Code, 2012

1.3. Submittals

1.3.1. Manufacturer's product literature.

1.3.2. Shop drawings showing elevations, panel layout and calling out panel profile, thickness, gauge, width, finish and texture. The drawings shall also illustrate product components including fasteners, clips, sealants, trims and any other necessary accessories.

1.3.3. Engineering package illustrating the panels will resist the code stipulated loads.

1.3.4. Color chip and/or chart.

1.3.5. Installation instructions.

1.3.6. Sample warranties (substrate and finish).

1.3.7. Letter of Certification stating that all parts of this specification were satisfied.

1.4. Quality Assurance

1.4.1. Manufacturer - Shall have a minimum of five (5) years' experience in the production of continuously, foamed-in-place, insulated metal panels.

1.4.2. Designer – Experienced in the design of insulated metal panels and a registered Professional Engineer.

1.4.3. Installer - Authorized by the manufacturer and having a minimum of (3) years' experience installing insulated metal wall panels.

1.5. Delivery, Storage and Handling

1.5.1. Deliver panels in the original manufacturer's weather-resistant, shrink-wrapped packaging with clearly marked, weather-resistant labeling.

1.5.2. Store the panels in a clean, level, protected and sufficiently compacted area. Provide ventilation if the bundles are exposed to moisture; further, elevate one end of the bundle to ensure adequate runoff. Do not stack more than two bundles high. Stack material to prevent twisting, bending, abrasion, scratching and denting.

1.5.3. Use proper care in unloading, storing and installing the wall panels. Handle panels in a fashion that will not bend, dent, scratch or otherwise damage the product.

1.5.4. Refer to the Green Span Profiles *Insulated Metal Panel Handling & Maintenance Guide* for more specific information regarding handling, storage, strippable film, steel debris, corrosion, cleaning and field painting.

1.6. Warranty

1.6.1. The manufacturer warrants the panels as free of defects in material and workmanship for a period of (2) years from the date of production. This excludes the material coatings and finishes which are covered under separate warranties.

1.6.2. The manufacturer warrants the GALVALUME® substrate for a period of 20-years subject to the terms and conditions set forth in the manufacturer's *GALVALUME® 20-Year Limited Warranty*.

1.6.3. The manufacturer warrants the Kynar 500® coating system for a period of 25-years subject to the terms and conditions set forth in the manufacturer's *Coating System Limited Warranty*.

1.6.4. The installer warrants the panels as free of defects in material installation and workmanship for a period of (2) years from the date of substantial completion.

1.7. Maintenance

1.7.1. Keep the interior and exterior panel surfaces clean. Immediately remove dust, dirt, mud, mortar, chalk, excess sealants or any other type of foreign substance from the panel surfaces.

1.7.2. Refer to the Green Span Profiles *Insulated Metal Panel Handling & Maintenance Guide* for more specific information regarding handling, storage, strippable film, steel debris, corrosion, cleaning and field painting.

2. PRODUCT

2.1. Manufacturer/Supplier
Green Span Profiles
21200 FM 362
Waller, TX 77484
281-807-7400
www.GreenSpanProfiles.com

2.2. Components
2.2.1. Panels
2.2.1.1. Type: "Insulated Metal Roof Panels" consisting of roll-formed interior and exterior profiles chemically bonded to a continuously, foamed-in-place, polyisocyanurate, insulating core.
2.2.1.2. Classification:
2.2.1.2.1. FM Global *4880* Approved Class 1 Fire Rated Insulated Wall/Ceiling System.
2.2.1.2.2. FM Global *4471* Approved Class 1 Panel Roofs.
2.2.1.2.3. State of Florida Approved Building Product
2.2.1.2.4. Miami Dade County Approved
2.2.1.3. *RidgeLine*
2.2.1.3.1. Exterior profile: RidgeLine (Standing Seam Roof).
2.2.1.3.2. Interior profile: MesaLine.
2.2.1.3.3. Exterior material gauge: 26, 24 or 22.
2.2.1.3.4. Interior material gauge: 26.
2.2.1.3.5. Substrate: Galvalume®, G90 galvanized or stainless steel.
2.2.1.3.6. Panel thickness: 2.5, 3, 4, 5 or 6-inch.
2.2.1.3.7. Panel width: 42-inch.
2.2.1.3.8. Exterior Texture: smooth.
2.2.1.3.9. Interior Texture: embossed or smooth.
2.2.2. Flashing
Match all flashings and trims with the adjacent panels in material gauge and finish. Install these trims per the panel manufacturer's details.
2.2.3. Accessories
2.2.3.1. Clips – 16-ga., 4" wide, 5-hole roof panel clip
2.2.3.2. Fasteners - ¼-14 x 2-¼", Self-Drilling, Hex Head, with Shoulder.
2.2.3.3. Batten – min. 24-ga.
2.2.4. Sealers
2.2.4.1. Sidelap – factory applied in batten
2.2.4.2. Tube Sealants
2.2.4.2.1. Non-skinning butyl
2.2.4.2.2. Polyurethane
2.2.4.3. Tape Sealants – Butyl

2.3. System Performance
2.3.1. Structural
2.3.1.1. Load Capacity - Determine positive and negative load resistance based on tests conducted in accordance with ASTM E 1592 and/or ASTM E 72.
2.3.1.2. Load Calculation – Dictated by ASCE 7 10 and the building dimensions
2.3.1.3. Deflection Limit – per code or L/180, whichever is greater.
2.3.1.4. Connection – Designed considering the load (psf), tributary area (sqft), ultimate fastener pullout/pullover (lbs.) and appropriate factor of safety.
2.3.1.5. Factor of Safety (panel): 2.0

2.3.1.6. Factor of Safety (fasteners)

2.3.1.6.1. Two fasteners into steel:	2.25
2.3.1.6.2. One fastener into steel or two fasteners into wood:	3.00
2.3.1.6.3. One fastener into wood:	4.00
2.3.1.6.4. One or two fastener into masonry:	4.00

2.3.1.7. Material Thickness – The delivered material thickness (steel) shall be within 95% of the design thickness.

2.3.2. Impact Resistance

2.3.2.1. Severe hail resistance when tested in accordance with FM Standard 4471.

2.3.2.2. Foot Traffic Resistance when tested in accordance with FM Standard 4471

2.3.2.3. Large Missile Impact tested in accordance with Miami Dade County TAS 201.

2.3.3. Water-tightness

2.3.3.1. Verify the panels allow no uncontrolled water penetration when subjected to a pressure differential of 12-psf when tested in accordance with ASTM E 1646.

2.3.3.2. Verify the panel endlaps and sidelaps allow no uncontrolled water penetration when tested in accordance with Factory Mutual 4471 Appendix G (6-inch water head for 7 days).

2.3.4. Air-tightness

Verify the panels allow no more than 0.001 cfm/sf at a pressure differential of 12-psf when tested in accordance with ASTM E 1680.

2.3.5. Metal Facing to Foam Core Bond Strength

2.3.5.1. Fatigue – Upon being subjected to two-million alternating cycles of L/180 deflection, the panels shall exhibit no evidence of delamination of the fascia or liner elements, cracking of the foam core, or permanent set.

2.3.5.2. Freeze/Heat Cycling – At the conclusion of twenty-one (21) eight-hour temperature cycles (-20° F to 180° F), the panels shall exhibit no evidence of delamination, blistering or permanent set.

2.3.5.3. Humidity – After enduring 1200 hours of 93% humidity at a temperature of 158° F, the panels shall exhibit no evidence of delamination, blistering or interface corrosion.

2.3.5.4. Autoclave – When exposed to 218°F and a pressure of 2-psig for 2-1/2 hours, the panels shall exhibit no delamination of the foam core from the metal skins.

2.3.6. Energy Efficiency

When tested in accordance with ASTM C 518 the panels provide a K-factor of: 0.139 Btu-in/hr-ft2-F° @ 75° F mean temperature (R-7.20) and 0.129 Btu-in/hr-ft2-F° @ 35° F mean temperature (R-7.75).

2.3.7. Fire Safety

2.3.7.1. The panels shall be classified for below deck combustibility according to FM Approval Standard 4880.

2.3.7.2. The panels shall be classified for above deck combustibility (Class A, severe exposure) according to FM Approval Standard 4471 (ASTM E 108 Fire Test of Roof Coverings).

2.3.8. Surface Burning Characteristics

Verify the panels have a maximum *Flame Spread* of 25 and maximum *Smoke Developed* of 450 when tested in accordance with ASTM E84.

2.3.9. Material Compatibility

Prevent galvanic action of dissimilar metals. This includes but is not limited to any direct contact of panels and/or trim with treated lumber or copper lightening attenuation equipment or indirect contact constituted by water runoff from HVAC drain-lines, etc.

2.3.10. Finish

2.3.10.1. Humidity

2.3.10.2. Salt Spray

2.3.10.3. Color Retention

2.3.10.4. Chalk Resistance

2.3.10.5. Gloss Retention

2.3.10.6. Dry Adhesion

2.3.10.7. Flexibility

3. EXECUTION

3.1. General

The Erector, upon entering into a contract to erect the Roof Panel System, claims itself competent in the erection of these systems and is responsible for complying with all applicable local federal and state construction and safety regulations, including OSHA regulations.

3.2. Preparation

Erector - Before roof panel installation begins, meticulously review and accept the shop drawings as correct.

3.3. Examination

3.3.1. Shipment - Immediately upon delivery of the roof panels and accessories, crosscheck the delivered materials against the shipper to insure a complete shipment.

3.3.2. Substrate – Before installation begins, inspect and accept the structure with regard to plumb, level and true. The maximum deviation of steel alignment shall be limited to 0 (+\-) 3/16" from the control with a 1/8" maximum change in deviation for any member of any 10-ft panel run. The erector shall not proceed with installation if the structural steel is not within the specified tolerances.

3.3.3. Panels – During installation, examine the individual panels. Immediately notify the manufacturer of any panel defects. Do not install defective panels.

3.4. Installation

3.4.1. Panels

Install in accordance with the manufacturer's recommended procedures, details and the construction drawings. Install the panels plumb, level and true. If necessary, make panel cuts with a "metal cutting" circular saw.

3.4.2. Fasteners

Install fasteners in the locations shown on the construction drawings. Take care not to overdrive fasteners. Replace stripped fasteners by installing a new fastener in a different location.

3.4.3. Trim

Install the flashing true-to-line and level or plumb and in accordance with the manufacture's details and the construction drawings.

3.4.4. Sealants

Before sealants are applied, clean and prime the surfaces according to the sealant manufacturer's guidelines. Locate the sealants per the manufacturer's details and the shop drawings without skips or voids.

3.4.5. Manual

Refer to the Green Span Profiles *Installation Guide* for specific information regarding accountability, conditions, heavy equipment, verification of structure, alignment, side-joints, vapor barrier, sealants, field applied insulation, threaded fasteners, strippable film, field cutting, appearance, general installation sequence and details.

3.5. Protection

Remove any and all strippable films either prior to or directly following installation. Take measures to avoid exposure of the film to direct sunlight for more than 24 hours.

3.6. Cleaning

3.6.1. Touch Up – "Touch up" minor damage to factory applied finishes using factory approved, matching coatings provided by the manufacturer.

3.6.2. Soap - If necessary, clean panel surfaces with a combination of water and a light detergent.

END OF SECTION