

Specifiers: Click on the ¶ icon in the WORD toolbar to reveal detailed instructions

SECTION 07 41 00

ROOF PANELS

Kingspan Insulated Panels
KingZip Pre-Insulated Standing Seam Metal Roof Panels

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Steel faced factory insulated roof panels
- B. Accessories including fasteners, perimeter trim and penetration treatments

1.2 REFERENCES

- A. ASTM International
 - 1. ASTM A792; Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
 - 2. ASTM B117; Standard Practice for Operating Salt Spray (Fog) Apparatus
 - 3. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - 4. ASTM D523; Standard Test Method for Specular Gloss
 - 5. ASTM D522; Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
 - 6. ASTM D714; Standard Test Method for Evaluating Degree of Blistering of Paints
 - 7. ASTM D968; Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
 - 8. ASTM D1308; Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
 - 9. ASTM D2244; Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
 - 10. ASTM D2247; Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity
 - 11. ASTM D2794; Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
 - 12. ASTM D3359; Standard Test Methods for Measuring Adhesion by Tape Test
 - 13. ASTM D3363; Standard Test Method for Film Hardness by Pencil Test
 - 14. ASTM D4145; Standard Test Method for Coating Flexibility of Prepainted Sheet

15. ASTM D4214; Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
16. ASTM E72; Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
17. ASTM E84; Standard Test Method for Surface Burning Characteristics of Building Materials
18. ASTM E283; Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
19. ASTM E331; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
20. ASTM E1646; Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
21. ASTM E1680; Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
22. ASTM G153; Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
23. ASTM G154; Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

B. Underwriters Laboratories

1. UL 580; Tests for Uplift Resistance of Roof Assemblies

C. Factory Mutual

1. FM 4471; Approval Standard for Class 1 Panel Roofs

1.3 SUBMITTALS

- A. Refer to Section **[01 33 00 Submittal Procedures]** **[insert section number and title]**.
- B. Product Data: Submit manufacturer current technical literature for each type of product.
- C. Shop Drawings: Submit detailed drawings and panel analysis showing:
 1. Profile
 2. Gauge of both exterior and interior sheet
 3. Location, layout and dimensions of panels on roof structure
 4. Location and type of fasteners
 5. Shape and method of attachment of all trim
 6. Locations and type of sealants
 7. Other details as may be required for a weathertight installation

- D. Panel Analysis: Provide panel calculations to indicate compliance with max deflection of L/240 for the indicated design loads. Include effects of thermal differential between the exterior and interior panel facings.
- E. Samples: Each color indicated. [6 inches by 6 inches minimum] [Insert size].
- F. LEED Submittals:
 - 1. Sustainable Sites (SS)
 - a. Product Test Reports or current product listing on <http://www.energystar.gov> for Credit SS 7.2: For insulated metal roof panels, indicating that panels comply with Solar Reflectance Index (SRI) requirement.
 - 2. Energy and Atmosphere (EA)
 - a. Energy Analysis for Credit EA 1: Demonstrating percentage of performance improvement compared with the baseline building performance rating.
 - 3. Material and Resources (MR)
 - a. Product Certificates for Credit [MR 4] [MR 4.1[and Credit MR 4.2]]: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - b. Product Certificates for Credit [MR 5] [MR 5.1[and Credit MR 5.2]]: For products and materials required to comply with requirements for regionally manufactured materials. Include statement indicating cost, location of manufacturer, and distance to Project for each regionally manufactured material.
 - 4. Indoor Environmental Quality (IEQ)
 - a. Product Data for Credit [IEQ 4.1] [EQ 4.1]: For sealants, including printed statement of VOC content
 - b. Product Data for Credit [IEQ 4.2] [EQ 4.2]: For paints and coatings, including printed statement of VOC content
 - 5. Innovation in Design (ID)
 - a. [Documentation for Credit [ID 1] [ID 1.1]: [Include specific requirements related to documenting credit.]
 - 6. Pilot Credit 61: Certified Products
 - a. Material Disclosure and Assessment

G. Miscellaneous Certifications:

1. Submit documentation that products have been certified in accordance with ISO 14025.

H. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have a minimum of five (5) years experience in the production of insulated metal standing seam roof panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
2. Manufacturer to be registered with a Program Operator with a Certified, Environmental Product Declaration, in conformance with ISO 14025, for Insulated Metal Panels.

B. Installer Qualifications:

1. Installer shall be authorized by the panel manufacturer and the work shall be supervised by a person having a minimum of five (5) years experience installing insulated metal standing seam roof panels on similar type and size projects.
2. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.

C. Wind and Uplift Rating

1. Design Uplift Load: **[Insert load]** psf
2. Units shall be rated and carry the following listings:
 - a. Factory Mutual 1-105 uplift rating for 5 foot spans with minimum 14 gauge purlins
 - b. Factory Mutual 4771 – Class 1 Approval
 - c. UL 580, Class 90 uplift ratings for 5 foot spans with a minimum 14 gauge purlins
 - d. UL 580, Class 90 uplift rating for panels attached to 20 gauge decking with fastening, 3 foot on center.

D. Fire Classifications

1. Factory Mutual Class 1A Approval when installed at a maximum roof slope of 5:12.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Refer to Section [01 60 00 Product Requirements] [insert section number and title].
- B. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.
- C. Store roofing panel materials on dry, level, firm, and clean surface using the three inch factory provide foam supports under the panels. Use of wood substitute is not acceptable. Stack no more than two bundles high. Elevate and ventilate to allow air to circulate and moisture to escape.

1.6 WARRANTY

- A. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance and finish performance.
 1. Warranty Period: Two (2) years from date of Substantial Completion, or 2 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.
- B. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess, and /or color fading.
 1. Warranty Period: Twenty (20) years from date of Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Kingspan Insulated Panels; 726 Summerhill Drive, Deland, FL 32724; 386-626-6789; or 2000 Morgan Road, Modesto, CA 95358; 209-531-9091; (www.kingspanpanels.us)
- B. Basis of Design: KingZip

C. Substitution Limitations:

1. Submit written request for approval of substitutions to the Architect [a minimum of [14] days prior to the date for receipt of bids] [Insert time period]. Include the following information:
 - a. Name of the materials and description of the proposed substitute.
 - b. Drawings, cutsheets, performance and test data.
 - c. List of projects similar scope and photographs of existing installations.
 - d. Other information necessary for evaluation.
2. After evaluation by Architect, approval will be issued via addendum. No verbal approval will be given.

2.2 STANDING SEAM ROOF PANELS

A. Panel Description:

1. Panel thickness: [2 inches][3 inches][4 inches][5 inches][6 inches] thick.
2. Panel width: 42 inch wide
3. Panel length: [Indicate length] [As indicated on drawings.]
4. The side joint shall consist of a 2 inch vertical sidelap, mechanically seamed, with fasteners and thermally broken attachment clip completely concealed within the side joint.
5. Exterior Face of Panel:
 - a. Material: AZ50/Galvalume/Zincalume per ASTM A 792
 - b. Profile: Shallow "minor rib"
 - c. Texture: Stucco embossed
 - d. Gauge: [24 gauge][22 gauge]
 - e. Yield: 33 ksi minimum
 - f. Exterior Finish: [Valspar Fluropon PVDF finish, dry film thickness of 1.0 mil including primer] [Valspar Fluropon "high build" paint finish up to 2.4mil].
 - 1) Color: [Selected from current Kingspan Insulated Panels [standard] [premium] color chart] [Custom color as selected by Architect] [Color indicated].
 - 2) SRI: Minimum of [78] [29].
6. Interior Face of Panel:
 - a. Material: AZ50/Galvalume/Zincalume per ASTM A792
 - b. Profile: Shallow "minor rib"
 - c. Texture: Stucco embossed

- d. Gauge: [26 gauge][24 gauge] [22 gauge]
 - e. Yield: 33 ksi minimum
 - f. Interior Finish: Valspar Dynapon modified polyester finish with a total minimum dry film thickness of 1.0 mil including primer.
 - 1) Color: [Selected from the current Kingspan Insulated Panels stock color chart] [Custom color as selected by Architect] [Color indicated].
7. Insulating Core: Minimum 88 percent closed cell structure urethane modified isocyanurate core with the following minimum physical properties:
- a. Density Nominal: 2.4 pcf
 - b. Shear Strength: 15 psi (to rise)
 - c. Tensile Strength: 29 psi
 - d. Compressive Strength: 14-22 psi
 - e. Surface burning characteristics when tested in accordance with ASTM E84:
 - 1) Flame Spread: less than 25
 - 2) Smoke Developed: less than 450

B. Physical Characteristics:

- 1. Structural Test: Design shall be verified by representative structural test for wind loads in accordance with ASTM E72. The deflection criteria shall be L/240.
- 2. Thermal Properties: The panel shall provide a nominal R-value of 7.5 per inch thickness when tested in accordance with ASTM C518 at a mean temperature of 75 deg. F.
- 3. Fatigue Test: There shall be no evidence of metal/insulation interface delamination when the panel is tested by simulated wind loads of 20 psf (positive and negative loads), when applied for two million alternate cycles.
- 4. Bond Strength: No metal primer interface corrosion and/or delamination shall occur after 1000 hours at 140 deg. F and 100 percent relative humidity. No delamination shall occur after 2-1/2 hours in a 2 psi 212 deg. F autoclave.
- 5. Water Penetration: There shall be no uncontrolled water leakage at pressures of up to 20 psf when tested in accordance with ASTM E331 and ASTM E1646. Tested assembly must include endlap and sidelap conditions.
- 6. Air Infiltration: Air infiltration through the roof shall not exceed 0.003 cfm/sf at 6.24 psf air pressure differential when tested in accordance with ASTM E283 and ASTM E1680. Tested assembly must include endlap and sidelap conditions.
- 7. Hailstorm Rating: Factory Mutual 1 SH hailstorm rating.

C. Finish Characteristics:

- 1. Gloss: 15 ± 5 tested in accordance with ASTM D523

2. Pencil Hardness: HB – H tested in accordance with ASTM D3363
3. Flexibility, T-Bend: 1-2T bend tested in accordance with ASTM D4145
4. Flexibility, Mandrel: No cracking tested in accordance with ASTM D522
5. Adhesion: No adhesion loss tested in accordance with ASTM D3359
6. Reverse Impact: No cracking or adhesion loss tested in accordance with ASTM D2794
7. Abrasion Resistance: 65 ± 10 liters tested in accordance with ASTM D968
8. Graffiti Resistance: Minimal effect
9. Acid Pollutant Resistance: No effect tested in accordance with ASTM D1308
10. Salt Fog Resistance: Passes 1000 hours tested in accordance with ASTM B117
11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours tested in accordance with ASTM B5894
12. Humidity Resistance: Passes 1500 hours when tested in accordance with ASTM D2247 and D714
13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154
14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A
15. Color Tolerances: Greater than 5ΔE units on panels when tested in accordance with ASTM D224.

2.3 ACCESSORIES

A. Fasteners:

1. Self drilling fasteners shall be cadmium plated steel, designed to resist maximum negative pulloff loads and hold the face sheet mechanically to the structural support.
2. Panel attachment clip shall be two pieces and fully concealed within the panel sidejoint. Base clip shall be a minimum 14 gauge galvanized, and top clip shall be a minimum 20 gauge stainless steel with an integral thermal break.
3. Vibration resistant type (anti-backout threads) fasteners. Self-drilling flathead screws with sealing washers and square drives, designed to resist back out by increasing thread friction as screw loosens.

B. Perimeter Trim and Penetration Treatments: All required trim and metal flashing with same coating, color, and gauge as the exterior face of the insulated metal roof panel.

C. Butyl Tape: Per panel manufacturer's recommendations for panel to panel and panel to trim seal.

D. Butyl Sealants: Non-skinning type per panels manufacturer's recommendations

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine alignment of the structure and supports prior to installing the insulated metal roof panels.
 - 1. Structure Tolerance: In the plane of the roof 0 inches inward, plus 1/2 inch outward
 - 2. All deviations from structural tolerances shall be corrected by the responsible party prior to installation of the panels.
- B. Examine individual panels upon removing from the bundle; both edges should be visually examined and any slight overfill of insulation should be carefully removed.

3.2 PANEL INSTALLATION

- A. Remove protective film before installation, or immediately thereafter to prevent sunlight damage.
- B. Cut panels, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blades or a band saw prior to installation. Ventilate area where polyurethane dust is generated. Personnel should wear respiratory and eye protection devices.
- C. Apply butyl sealant vapor seal around interior perimeter of roof assembly per panel manufacturer's instructions.
- D. Apply butyl tape on panel sidelaps and clip assemblies per panel manufacturer's instructions.
- E. Secure units to the steel supports with manufacturer's recommended fastener.
- F. Place panel fasteners through predrilled top clip and base clip, concealed within the side joint of the panel.
 - 1. Heads of concealed fasteners shall be insulated from the exterior environment to prevent condensation and "ice balling" from occurring on the fastener shaft.
- G. Apply endlap sealing tape and butyl to panel surface to be lapped per manufacturer's instructions.
- H. Endlap panel stitch fasteners to be vibration resistant type.
- I. As each panel is installed, crimp hidden clip assembly prior to placement of next panel.

- J. Repair or replace metal panels and trim that have been damaged.

3.3 TRIM INSTALLATION

- A. Place trim to determine the location of the closure strips, sealant and ridge closure trims.
- B. Apply butyl tape above and below the foam closure strip and seat the closure strip firmly in the tape to ensure a continuous seal. If any voids exist add butyl caulking and reseal the closure.
- C. Place a continuous layer of butyl tape on top of the metal ridge closure trims for the length of the building.
- D. Fasten the exterior ridge trim to the metal ridge closure trims, per manufacturer's recommendations, on center with 1/4 inch by 7/8 inch low profile vibration resistant stitch fasteners.

END OF SECTION

DISCLAIMER:

Kingspan Insulated Panels Guide Specifications have been written as an aid to the professionally qualified Specifier and Design Professional. The use of this Guideline Specification requires the sole professional judgment and expertise of the qualified Specifier and Design Professional to adapt the information to the specific needs for the Building Owner and the Project, to coordinate with their Construction Document Process, and to meet all the applicable building codes, regulations and laws. KINGSPAN INSULATED PANELS EXPRESSLY DISCLAIMS ANY WARRANTY, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE OF THIS PRODUCT FOR THE PROJECT.