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SECTION 07 41 00

ROOF PANELS

Kingspan Insulated Panels

KingSeam Pre-Insulated Standing Seam Metal Roof Panels

Part 1 GENERAL

1.1.1 SECTION INCLUDES

- A. Steel faced, polyisocyanurate foamed-in-place insulated roof panels
- B. Accessories including fasteners, perimeter trim and penetration treatments

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA)
 - 1. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
- B. American Society of Civil Engineers (ASCE)
 - 1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International
 - 1. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - 2. ASTM A755: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Pre-painted by the Coil-Coating Process for Exterior Exposed Building Products
 - 3. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
 - 4. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - 5. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
 - 6. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
 - 7. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics

8. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
9. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
10. ASTM E72; Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
11. ASTM E84; Standard Test Method for Surface Burning Characteristics of Building Materials
12. 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
13. ASTM E1646; Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
14. ASTM E1680; Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
15. ASTM G153; Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
16. ASTM G154; Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

D. Underwriters Laboratories

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

E. International Building Code (IBC): current edition

F. UL Canada (ULC) Approvals:

1. ULC-S102: Standard Method of Test for Surface Building Characteristics of Building Materials and Assemblies
2. ULC-S138: Standard Method of Test for Fire Growth of Insulated Building Panels in Full-Scale Room Configuration

G. Factory Mutual

1. FM 4880: Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings, and Exterior Wall Systems
2. 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. Installation sequence
 - 8. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
 - 9. Other details as may be required for a weathertight installation
- D. Panel Analysis: Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding L/180 (wall) and L/240 (roof). Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.
- E. Samples: Each color indicated. [6 inches by 6 inches minimum] [Insert size].
- F. Quality Assurance Submittals
 - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
 - 2. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to insulated roof and wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.5 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.

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.

1.6 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 roof and wall panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

- A. Panel Finish Warranty: Submit Manufacturer's limited warranty on the exterior paint finish for adhesion to the metal substrate and limited warranty on the exterior paint finish for chalk and fade.
- 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: Thirty (30) years from date of Substantial Completion, or 30 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, Inc., 726 Summerhill Drive, Deland, FL 32724 (888-882-5862); 2000 Morgan Road, Modesto, CA 95358 (800-377-5110) (www.kingspanpanels.us)

B. Kingspan Insulated Panels Ltd. 12557 Coleraine Drive, Caledon, ON L7E 3B5 (866-442-3594); 5202-272nd Street, Langley, B.C. V4W 1S3 (866-442-3594) (www.kingspanpanels.ca).

C. Basis of Design: Kingspan KingSeam roof panels.

D. 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. Design Criteria – Roof Panels:

1. Uplift Rating
 - a. Design Uplift Load: [Insert loads] psf per ASCE 7.
 - b. Design criteria shall be L/240 for roof.
 - c. Units shall be rated and carry the following listings:
 - d. Factory Mutual 1-60 uplift rating for 5 foot spans with minimum 16 gauge purlins
 - e. Factory Mutual 4471 – Class 1 Approval
2. Fire Classifications
 - a. Factory Mutual Class 1A Approval when installed at a maximum roof slope of 5:12.

B. Performance Criteria – Wall and Roof Panels:

1. Structural Test: Structural performance shall be verifiable by witnessed structural testing for simulated wind loads in accordance with ASTM E72 and/or ASTM E1592.

2. Water Penetration: There shall be no uncontrolled water penetration through the panel joints at a pressure differential of 20 psf, when tested in accordance with ASTM E1646.
 3. Air Infiltration: Air infiltration through the panel shall not exceed 0.036 cfm/sf at 20 psf air pressure differential when tested in accordance with ASTM E1680.
 4. Thermal Properties: The panel shall provide a nominal R-value of 7.1 [hr·ft²·°F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 75°F mean temperature and 8.1 [hr·ft²·°F/Btu] per inch thickness when tested in accordance with ASTM C 518 at 35°F mean temperature
 5. Hailstorm Rating for roof panels: Factory Mutual 1 SH hailstorm rating
 6. Flame Spread and Smoke Developed Tests on exposed Insulating Core:
 - a. Flame Spread: Less than 25
 - b. Smoke Developed: Less than 450
 - c. Tests performed in accordance with [ULC-S102] [ASTM E84]
 7. Fire Test Response Characteristics for panels: Steel-faced panels with polyisocyanurate (ISO) core shall fully comply with Chapter 26 of International Building Code regarding the use of Foam Plastic.
 - a. FM 4880: Class I rated per FM Global, panels are approved for use without a thermal barrier and do not create a requirement for automatic sprinkler protection.
 - b. ASTM D1929 Minimum Flash and Self Ignition; established for foam core.
 - c. NFPA 259 Potential Heat Content; established for foam core.
 - d. S102, S126 UL Canada fire test standards; successfully passed.
- C. Panel Assembly Description:
1. Panel thickness: [3.25 inches][4 inches][5 inches][6 inches] thick.
 2. Panel width: 40 inches.
 3. Panel length: [Minimum 8 feet, maximum 50 feet] [Indicate length] [As indicated on drawings.]
 4. The side joint shall consist of a 2 inch vertical sidelap, mechanically seamed, with fasteners and attachment clip completely concealed within the side joint.

5. Exterior Face of Panel:

- a. Material: AZ50/Galvalume/Zincalume per ASTM A 792. Minimum Grade 33
- b. Profile: Shallow "mesa" rib
- c. Texture: [Smooth (non-embossed)] [Non-directional stucco embossed]
- d. Gauge: [26 gauge][24 gauge][22 gauge]
- e. Exterior Finish: [PVDF finish, dry film thickness of 1.0 mil including primer]
- f. Color: [Selected from current Kingspan Insulated Panels [standard] [premium] color chart] [Custom color as selected by Architect] [Color indicated].
- g. SRI: Minimum of [78] [29].

6. Interior Face of Panel:

- a. Material: [AZ50/Galvalume/Zincalume per ASTM A792] [G90 galvanized steel in accordance with ASTM A653] minimum Grade 33
- b. Profile: Shallow "lightly planked mesa ribs on 2.22" centers
- c. Texture: [Non-directional Stucco embossed] [Smooth (non-embossed)]
- d. Gauge: [26 gauge] [24 gauge] [22 gauge]
- e. Interior Finish: [modified polyester, dry film thickness of 1.0 mil including primer.] [PVDF finish, dry film thickness of 1.0 mil including primer]
- f. Color: [Selected from the current Kingspan Insulated Panels stock color chart] [Custom color as selected by Architect] [Color indicated].

7. Insulating Core: Minimum 91 percent closed cell structure (per ASTM D6226) urethane modified isocyanurate core with the following minimum physical properties:

- a. Density Nominal: 2.0-2.5 pcf per ASTM C1622
- b. Shear Strength: 14 psi per ASTM C273
- c. Tensile Adhesion: 8.25 psi per ASTM C1623
- d. Compressive Strength: 14 psi per ASTM D1621
- e. Dimensional Stability: 14 day aged (ASTM D 2126) -20 degree F < 1% chg, dry heat 158 degree F < 1.5% chg, Humid Heat 158 degree F < 4.5% chg
- f. Surface burning characteristics when tested in accordance with ASTM E84:
- g. Flame Spread: less than 25
- h. Smoke Developed: less than 450

2.3 ACCESSORIES

A. Fasteners:

1. Self drilling fasteners shall be corrosion resistant plated steel, designed to resist maximum negative pull-off loads and hold the face sheet mechanically to the structural support.
 2. Panel attachment clip shall be one piece and fully concealed within the panel sidejoint. Top clip shall be a minimum 20 gauge stainless steel with an integral thermal break.
- 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 $\leq 3/16$ inches outward, 0 inches inward with a $1/8''$ maximum change in deviation for any member of any 10'-0" run of panel.
 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.

3.4 SEALANT INSTALLATION FOR EXPOSED JOINTS AT ROOF PANELS

- A. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.

- B. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application temperature range, size and type of backer rod, and compatibility of materials for adhesion
- C. Direct contact between butyl and silicone sealants shall not be permitted.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: General Contractor shall engage an independent testing and inspection agency acceptable to the architect to perform field tests and inspections and to prepare reports of findings.

3.6 CLEANING AND PROTECTION

- A. Remove protective film immediately after installation.
- B. Touch-up, repair or replace metal panels and trim that have been damaged.
- C. After metal roof and wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- D. Clean finished surfaces as recommended by metal panel manufacturer.
- E. Repair or replace any damaged or defective panels after determination of responsibility.

END OF SECTION

DISCLAIMER:

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