

SECTION 13 34 00 ENGINEERED SIP STRUCTURES

This Section includes notes to assist the user in editing the Section to suit project requirements. These notes are included as hidden text and can be revealed or hidden by one of the following methods:

Click the Show/Hide icon  on the Standard toolbar.

Keyboard shortcut Ctrl+Shift+8.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

EDIT NOTE: ROOF SYSTEMS FOR THIS TYPE OF STRUCTURE CAN BE ROOF TRUSSES WITH METAL ROOF PANELS, OR SIPS IN LIEU OF TRUSSES. IF SIPS ARE USED AS ROOF STRUCTURE, THEY MAY BE FINISHES WITH METAL ROOF PANELS, SHINGLES, OR OTHER COMMON ROOFING MATERIALS. CONSULT WITH EPS ON PROPOSED ROOFING MATERIALS.

1. Engineered structural insulated panel (SIP) structures consisting of the following components:
 - a. Factory-engineered building system accessories including doors and windows.

EDIT NOTE: DELETE THE FOLLOWING SUBPARAGRAPH IF NO ROOF TRUSSES AND METAL ROOF PANELS ON PROJECT.

- b. Structural insulated panels (SIP) for roof applications.

EDIT NOTE: DELETE THE FOLLOWING SUBPARAGRAPH IF NO ROOF TRUSSES ON PROJECT.

- c. Factory-engineered roof truss.

EDIT NOTE: DELETE THE FOLLOWING THREE SUBPARAGRAPHS IF NO METAL ROOF PANELS ON PROJECT.

- d. Factory-engineered metal roof panels.
 - e. Prefinished metal trim items.
 - f. Prefinished ridge vents and soffits.

1.2 REFERENCES

A. Reference Standards:

EDIT NOTE: ADD OR DELETE SECTIONS PER PROJECT REQUIREMENTS.

1. ASTM International (ASTM):
 - a. C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 - b. D2559 – Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
 - c. E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. Lumber grading rules and wood species:
 - a. National Design Specifications for Wood Construction, current edition.
 - b. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
 - c. Southern Pine Inspection Bureau (SPIB): Southern Pine.
 - d. West Coast Lumber Inspection Bureau (WCLIB): Douglas Fir.
 - e. Western Wood Products Association (WWPA): Douglas Fir and Ponderosa Pine.
3. MSR Lumber Producers Council (MSR) for machine stress rated lumber.

EDIT NOTE: DELETE THE FOLLOWING REFERENCE IF NO ROOF TRUSSES ON PROJECT.

4. National Design Standard for Metal Plate Connected Wood Truss Construction (TPI).

5. National Institute of Standards and Technology (NIST):
 - a. Voluntary Product Standard PS 1-09 – Structural Plywood. [5/10. Supersedes PS 1-95](#)
 - b. Voluntary Product Standard PS 2-10 – Performance Standards for Wood-Based Structural Use Panels. [6/11. Supersedes PS 2-04](#)
 - c. Voluntary Product Standard PS 20-10 – American Softwood Lumber Standard. [6/10. Supersedes PS 20-05](#)
6. NTA, Inc.:
 - a. NTA IM14 Structural Insulated Panel Evaluation.
 - b. NTA IM36 Quality System Requirements.
7. Preservative Treated Lumber:
 - a. American Wood Preservers Association (AWPA).
8. Western Wood Products Association (WWPA): Western Lumber Grading Rules (G-5).

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-engineered product. Indicate component materials, dimensions, profiles, and construction and installation details.
 1. Include information for panel construction, performance data, and fire ratings.
 2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 3. Instructions: SIP manufacturer's instructions including design calculations.
 4. Include information for specialty accessory products specified for this Project.
- B. Shop Drawings: Include plans, elevations, sections, details, SIP layout, size of openings, and attachments to other work.
 1. Submit Shop Drawings that have been engineered and certified by professional engineer licensed in the State in which Project is located. Include seal and signature of professional engineer on Shop Drawings.
 2. Sizes, stress grades, and species of lumber.
 3. Anchor-bolt layout.

EDIT NOTE: DELETE THE FOLLOWING PARAGRAPHS IF NO ROOF TRUSSES ON PROJECT.

4. Structural Framing Drawings: Show complete fabrication of primary and secondary framing. Include provisions for openings and the following information:
 - a. Slope or depth, span, and spacing of truss.
 - b. Heel bearing height.
 - c. Design loading to include:
 - 1) Top chord live load.
 - 2) Top chord dead load.
 - 3) Bottom chord dead load.
 - 4) Concentrated loads and their points.
 - d. Adjustments to lumber and plate design values for conditions of use.
 - e. Plate type, thickness of gauge, and size.
 - f. Lumber size, species and grade for each member.

EDIT NOTE: RETAIN OPTIONS IN SUBPARAGRAPH BELOW AS REQUIRED FOR PROJECT. DELETE OPTIONS NOT REQUIRED FOR PROJECT.

5. Metal **[Roof] [and] [Wall]** Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Indicate the following components:
 - a. Roof mounted items.
 - b. Wall mounted items.
6. Submit Shop Drawings that have been engineered and certified by professional engineer licensed in the State in which Project is located. Include seal and signature of professional engineer on Shop Drawings.

- C. Design Data: Truss engineering calculations for loading and stresses, bearing seal and signature of professional engineer licensed in the State in which Project is located. Include the following calculations:
1. Minimum design shall meet design standards of latest edition of International Building Code unless other, more stringent requirements are in force in Project location.
 2. Submit design calculations that have been engineered and certified by professional engineer licensed in the State in which Project is located. Include seal and signature of professional engineer on calculations

EDIT NOTE: DELETE DESIGN DATA PARAGRAPHS IF NO ROOF TRUSSES ON PROJECT.

3. Bending moments and axial forces for each member.
 4. Basic plate design values.
 5. Design analysis for each joint indicating that proper plates have been used.
 6. Provide design calculations for exterior walls, canopies, soffit systems, and lateral bracing walls. Design wind loads and lateral bracing loads are indicated on structural Drawings.
- D. Samples for Initial Selection: For units with factory-applied color finish, color chart of manufacturer's standard colors.
- E. Test and Evaluation Reports:
1. SIP Code Compliance: NTA, Inc. listing report, or comparable independent code report acceptable to local building authority, for SIPs indicating evidence of compliance with building code requirements as an alternate method of construction. Submit current compliance report number indicating conformance to IBC. Include compliance with ICC ES AC04 (Sandwich Panels).
 2. EPS Insulation Code Compliance: NTA, Inc. listing report, or comparable independent code report acceptable to local building authority, for EPS insulation indicating evidence of compliance with building code. Submit current compliance report number indicating conformance to IBC and IRC. Include compliance with ICC ES AC12 (Foam Plastic) and ICC ES AC239 (Termite Resistance).
 3. Diaphragm Assembly Test: Indicating compliance with ASTM E455 as tested by NTA, Inc.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
- B. Quality Control Submittals:
1. Test Reports: Certified test reports showing compliance with specified performance characteristics.
 2. Certification: Manufacturer's certification that Products furnished meet specified design and performance criteria.
- C. Submit written proof of third party inspection program in force for manufacturer used on Project.
- D. Certifications: Certify that specified roof and wind load requirements are met.
- E. Sustainable Design Submittals:
1. Regional products.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with minimum 5 years' documented experience that participates in recognized quality-assurance program that complies with quality-control procedures and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
1. Manufacturer is a member of the Structural Insulated Panel Association (SIPA).
 2. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

3. Manufacturer shall have engineering department.
 4. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by qualified professional engineer.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

EDIT NOTE: DELETE OPTION BELOW IF NO METAL ROOF PANELS ON PROJECT.

- C. Source Limitations: Obtain engineered SIP building components, including primary and secondary framing[**and metal panel assemblies**], from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery structural insulated panels to Project site with documentation indicating the following:
1. Manufacturer.
 2. Product standard and type.
 3. Flame spread and smoke developed ratings.
 4. Identification of quality assurance agency.
- B. Handle and store structural insulated panels per manufacturer's recommendations.
1. Store panels flat, off of ground, and adequately supported to prevent lateral bending.
 2. Protect panels from moisture and sunlight by covering with waterproof sheeting, securely anchored.
 3. Provide for air circulation around stacks and under coverings.
 4. Use support panels with straps or I-bolts when lifting panels with crane.

EDIT NOTE: DELETE PARAGRAPH AND SUBPARAGRAPHS BELOW IF NO ROOF TRUSSES ON PROJECT.

- C. Handle and store trusses to comply with recommendations in TPI BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 3. Provide for air circulation around stacks and under coverings.
 4. Store trusses to avoid contact with other materials that could create staining or discoloration.

EDIT NOTE: DELETE PARAGRAPH BELOW IF NO ROOF TRUSSES ON PROJECT.

- D. Inspect trusses upon deliver to Project site and notify manufacturer immediately if members have damage from handling or show discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.7 WARRANTY

- A. Manufacturer's Special SIPs Warranty: Manufacturer agrees to repair, restore, or replace material that fails in materials within specified warranty period.
1. Warranty Period: 20 years from date of Substantial Completion.

EDIT NOTE: DELETE THE FOLLOWING PARAGRAPHS IF NO METAL ROOF PANELS ON PROJECT.

- B. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees 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 the following:
 - a. Color fading more than 5 Hunter units when tested per ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested per ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: From date of Substantial Completion, 40 years on chalk; 30 years on color change:
3. Warranty Exclusions: Manufacturer will not warrant metal panel finishes damaged due to exposure to atmospheric pollutants including animal waste or other corrosive conditions. Manufacturer will not warrant labor by others.
4. Manufacturer shall repair painted steel roofing or siding panels if the paint peels, cracks, checks, flakes or blisters to an extent that is apparent by ordinary outdoor visual observation when exposed to normal weather and atmospheric conditions. If manufacturer is not able to repair steel panels to satisfaction of Architect and Owner, manufacturer shall replace damaged steel panels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from the following manufacturer:
Energy Panel Structures, Inc.
102 East Industrial Park
Graettinger, IA 51342
Toll Free: 800.967.2130
Fax: 712.859.3275
Email: sales@epsbuildings.com
Website: www.epsbuildings.com

2.2 PERFORMANCE CRITERIA

- A. Design Requirements:
 1. SIP system design performed by or under direct supervision of professional Structural Engineer with experience in work of this Section.
 2. Include unbalanced roof loads required by ASCE-7, current edition.

EDIT NOTE: DELETE THE FOLLOWING TWO SUBPARAGRAPHS IF NO ROOF TRUSSES ON PROJECT.

3. Design wood truss members per formulas published in National Design Specifications (NDS) for Wood Construction.
4. Design light meta-toothed connector plates and joint design in compliance with Truss Plate Institute's (TPI) National Design Standard for Metal Plate Connected Wood Truss Construction.
- B. Performance Requirements; Design panel system to withstand:
 1. Live and Dead Loads, Maximum Deflection under Loading: Comply with applicable building codes.
 2. Movement caused by an ambient temperature range of 120 degrees F (49 degrees C).and a surface temperature range of 160 degrees F (71 degrees C).

2.3 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

EDIT NOTE: RETAIN SUBPARAGRAPH BELOW FOR EXPOSED FRAMING IF CONSIDERED NECESSARY.

2. For exposed items indicated to receive stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

- B. Maximum moisture content of 19 percent or per appropriate grading rules. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of inspection agency approved by ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Hold down blocks.

2.4 MATERIALS – WOOD

EDIT NOTE: DELETE THE FOLLOWING WOOD TRUSS PARAGRAPHS IF NO TRUSSES ON PROJECT.

- A. Wood Trusses: Factory-fabricated of surfaced lumber.
 - 1. Lumber:
 - a. Top and Bottoms Chords: No. 1 or better Southern yellow pine or comparable Spruce-pine-fir.
 - b. Webs: No. 2 or better Southern yellow pine or SPF.
 - 2. Metal Connector Plates: Fabricated from ASTM A653; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A); G60 (Z180) hot-dip galvanizing coating designation.
 - a. Plate Thicknesses: 0.036 inch (0.9 mm 20 ga.) and 0.0556 inch (1.4 mm 16 ga.) thick.

EDIT NOTE: DELETE THE FOLLOWING PARAGRAPH IF NO TRUSSES ON PROJECT.

- B. Purlins and Truss Ties: 2 inch (51 mm) by 4 inch (102 mm) laid on edge, MSR SPF 1650.
 - 1. Purlins may be installed over top chord of truss, flat, or in purling hangers. Where purlins and truss ties are set in hangers, provide 2 inch (51 mm) by 6 inch (152 mm) laid on edge, MSR SPF 1650 or No. 1 or better Southern yellow pine.
- C. Overhang Framing: Fabricated rafter frames.
 - 1. Provide factory beveled fascia boards, 2 inch (51 mm) by 6 inch (152 mm) Spruce-pine-fir, No. 2.
- D. Wind Bracing:
 - 1. 2 inch (51 mm) by 6 inch (152 mm), No. 2 or better Spruce-pine-fir from end wall column to first truss back.
 - 2. 2 inch (51 mm) by 4 inch (102 mm) diagonal in roofline bracing as required by design.
- E. Framing Around Openings:
 - 1. Provide 2 inch (51 mm) by 6 inch (152 mm)/2 inch (51 mm) by 4 inch (102 mm) No. 2 around door, window, and overhead sectional door openings.
- F. Headers: Provide built-up No. 1 or better Southern yellow pine headers as required to meet loading designs.
- G. Incidental Framing: No.2 or better 2 inch (51 mm) by 4 inch (102 mm).

2.5 MATERIALS – STRUCTURAL INSULATED PANELS (SIPS)

- A. Molded-Polystyrene Board Insulation: ASTM C578.
 - 1. Surface Burning Characteristics per ASTM E84:
 - a. Flame Spread: 75.
 - b. Smoke Developed: <450.
 - 2. Type I, 10 psi (69 kPa).
- B. Lumber Framing:
 - 1. Species: Spruce-Pine-fir or equivalent.
 - 2. Grade: WWPA No. 2.
- C. Facings: Provide one of the following types of SIP facings, bearing inspecting agency's trademark or certification. Products shall contain no urea formaldehyde.

EDIT NOTE: OSB IS MANUFACTURER'S STANDARD SIP FACING. PLYWOOD IS AVAILABLE. WORK WITH MANUFACTURER'S REPRESENTATIVE IF PLYWOOD IS REQUIRED FOR PROJECT.

1. Oriented-Strand-Board (OSB): Exposure 1 sheathing, conforming to 2009 IRC and Voluntary Product Standard PS 2-10.
 - a. Span Rating: Not less than 24/16.
 - b. Nominal Thickness: Not less than 7/16 inch (11 mm).
2. Plywood: Exterior, Exposure 1 sheathing.
 - a. Span Rating: Not less than 24/0.
 - b. Nominal Thickness: Not less than 1/2 inch (13 mm).

EDIT NOTE: DELETE PANEL FINISHES BELOW NOT REQUIRED FOR PROJECT. IF MORE THAN ONE FINISH IS USED, IDENTIFY EACH ON DRAWINGS.

- D. Panel Finish: Provide SIPs with the following exposed finish material:
 1. Aluminum-siliconized polyester coating system composed of polyester resin modified by copolymerization with functional silicone resin.
 - a. Exterior Finish: Manufacturer's standard embossed stucco texture.
 - b. Thickness: 0.011 inch.(0.28 mm).
 - c. Color: White.
 2. Glass-fiber reinforced plastic (FRP) panels with gelcoat-finish, complying with ASTM D5319.
 - a. Surface-Burning Characteristics: As follows when tested by a qualified testing agency per ASTM E84.
 - 1) Flame-Spread Index: [25 (Class A)] [200 (Class C)] or less.
 - 2) Smoke-Developed Index: 450 or less.
 - b. Thickness: 0.030 inch (0.76 mm) to 0.090 inch (2.3 mm).
 - c. Surface: Embossed stucco texture.
 - d. Color: White.

2.6 MATERIALS – PREFINISHED MATERIALS

EDIT NOTE: METAL ROOF PANELS MAY BE USED OVER ROOF TRUSSES AND SIPs. DELETE THIS ARTICLE IF NO METAL ROOF OR WALL PANELS ON PROJECT.

- A. General: Factory-formed metal panels, roll-formed in manufacturer's facility, designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Metal Panels: Exposed-fastener metal [roof] [and] [wall] panels, formed with raised ribs and recesses.
 1. Material: Zinc-coated (galvanized) steel sheet, 0.0125 inch (0.32 mm – 29 ga.) nominal thickness.
 - a. Exterior Finish: Siliconized polyester.
 - b. Color: Selected by Architect from manufacturer's full range.
 2. Rib Spacing: 2 major ribs at 9 inches (229 mm) on center. 2 minor ribs at 3 inches (76 mm) on center between major ribs.
 3. Panel Coverage: 36 inches (914 mm).
 4. Panel Height: 3/4 inch (19 mm).
- C. Wainscoting: 36 inch (914 mm) high accent feature from at base of building, consisting of the following material:

EDIT NOTE: RETAIN SUBPARAGRAPH BELOW FOR WAINSCOT MATERIAL AND DELETE TYPES NOT REQUIRED FOR PROJECT.

1. Steel panel matching specified wall panels.
2. Concrete Siding Units: Provide concrete wainscot manufacturer's recommended materials for a complete wainscot system.
 - a. Basis-of-Design Product:
 - 1) Alliance Concrete Concepts: Moderra Block Wainscot.

3. Mortarless Concrete Brick Units: Provide concrete wainscot manufacturer's recommended materials for a complete wainscot system.
 - a. Basis-of-Design Product:
 - 1) Nova Brik MidAmerica: Novabrik Mortarless Brick Siding.
- D. Metal Trim: Match material and color of metal panels. Provide trim for corners, ridge lines, rakes, eaves, and panel bases.
 1. Lengths: Minimum 10 feet (4.9 m).
 2. Trim, overhang facias, track covers, and slide door jambs available in building panel covers.
 3. Overhead Sectional Door and Slide Door Jamb Trim: Fabricated from 1 piece up to 10 feet (4.9 m) in length.
- E. Soffits: Aluminum or steel, vented as required. Colors shall match roof and wall panel colors.
- F. Ridge Vent: Manufacturer's standard pre-engineered ridge cap or ridgelite, flashings, and eave and gable trim. Field-fabricate minor flashings as indicated on approved Shop Drawings.

EDIT NOTE: RETAIN OPTIONS IN SUBPARAGRAPH BELOW AS REQUIRED FOR PROJECT. DELETE OPTIONS NOT REQUIRED FOR PROJECT.

1. Provide manufacturer's [standard ridge vents] [profile vent] [cupola] as indicated on Drawings

Continuous Vented Ridge 12 square inches per lineal foot (7742 sq. mm/ 0.3048 m)

Cupola	Total Vent Area
24 inch (610 mm)	250 square inches (1613 cm)
36 inch (914 mm)	560 square inches (3613 cm)
48 inch (1219 mm)	990 square inches (6387 cm)

2.7 RELATED MATERIALS

- A. Glass-Fiber Loose-Fill Insulation: ASTM C764, Type I for pneumatic application.
 1. Surface Burning Characteristics per ASTM E84:
 - a. Flame Spread: 5.
 - b. Smoke Developed: 5.
- B. Walk Doors: Where indicated on Drawings, provide the following type of doors:
 1. Steel or extruded aluminum frame and sash with electrostatically coated enamel paint finish and window manufacturer's standard single pane glass or insulated glass unit, and locking options based on Project requirements.
 - a. Acceptable Product:

EDIT NOTE: 7100 SERIES DOOR TYPE IS INSULATED.

- 1) AJ Manufacturing: 7100 Series Commercial Post Frame Entry / Walk Doors.

- C. Windows: Where indicated on Drawings, provide the following type of windows:

EDIT NOTE: THE FOLLOWING WINDOW TYPE IS AN ALUMINUM FRAME AND SASH.

1. Thermally insulated extruded aluminum frame and sash with electrostatically coated enamel paint finish and window manufacturer's standard insulated glass units, weatherstripping, and hardware.
 - a. Acceptable Product:
 - 1) AJ Manufacturing: Series 900 Window with EZ Fit Trim.

EDIT NOTE: THE FOLLOWING WINDOW TYPE IS A PROPRIETARY COMPOSITE MATERIAL FRAME AND SASH.

2. Thermally insulated units fabricated with from window manufacturer's proprietary Fibrex composite material frame and sash with integral color finish and window manufacturer's standard insulated glass units, weatherstripping, and hardware.
 - a. Acceptable Product:

- 1) Andersen Corporation: Andersen 100 Series Gliding Windows.

EDIT NOTE: THE FOLLOWING WINDOW TYPE IS A VINYL PVC FRAME AND SASH.

3. Thermally insulated units fabricated with from window manufacturer's impact-resistant, UV-stabilized PVC frame and sash with integral color finish and window manufacturer's standard insulated glass units, weatherstripping, and hardware.
 - a. Acceptable Product:
 - 1) SilverLine Windows-Doors: Series 2390 Sliding Window.

EDIT NOTE: RETAIN CLOSURE STRIPS IF METAL PANELS ARE USED ON PROJECT.

- D. Closure Strips: Closed cell, 2 psf (9.58 mPa) density polyethylene foam, premolded to match configuration of panels.

2.8 ACCESSORIES

EDIT NOTE: THE FOLLOWING ACCESSORIES ARE ASSOCIATED WITH THE SIPS.

- A. Thermal Barrier: Provide material acceptable to applicable building code to provide 15 minute thermal barrier.
- B. Laminating Adhesive: SIP manufacturer's standard laminating adhesive.
- C. Panel Sealant: Type recommended by SIP manufacturer.
 1. VOC Content of Sealants: Provide sealants the following limits for VOC content when calculated per 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - a. Architectural Sealants: 250 g/L.
- D. SIP Tape: Type recommended by SIP manufacturer.

2.9 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 1. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153.
 2. Exposed Fastener Heads: Match color of steel panel.
 3. Where steel panels or trim is attached to preservative-treated lumber, provide fasteners of unpainted Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F1667.
 1. Framing Lumber: 10d, 16d and 60d ring shank nails.
 2. Machine Bolts: Minimum grade 1, A307.
 3. Metal Panels: Minimum 1-1/2 inch (38 mm) No. 10 screw fasteners with EPDM sealing washers bearing on weather side of metal panels.
 - a. Match color of metal panels.
- C. SIP Fasteners: Galvanized or corrosion resistant coated; types and sizes as recommended by SIP manufacturer.

2.10 FABRICATION

- A. Structural Insulated Panel Fabrication: Fabricate panels with specified facings of thickness to meet design criteria, pressure laminated to insulation core with laminating adhesive.
 1. Exterior Finish: Apply specified finish material to exterior [and interior] of panels.
 2. Panel Thickness: Nominal [4-1/2 inches (114 mm)] [6-1/2 inches (165 mm)] [8-1/2 inches (216 mm)].
 3. Thermal-Resistance Value (R-Value): ASTM C1363, minimum of R-values as follows:

EDIT NOTE: MANUFACTURER'S STANDARD R-VALUE IS R-18. DELETE R-VALUES NOT REQUIRED FOR PROJECT.

- a. Wall Panels: R-18 [R-26] [R-33] [R-40].
- b. Roof Panels: R-18 [R-26] [R-33] [R-40].

EDIT NOTE: DELETE THE FOLLOWING PARAGRAPHS IF NO WOOD TRUSSES ON PROJECT.

- B. Wood Truss Fabrication:
 - 1. Shop-fabricate wood trusses in TPI inspected plant.
 - 2. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
 - 3. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
 - 4. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - a. Fabricate wood trusses within manufacturing tolerances in TPI 1.
 - 5. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
 - 1. Engage land surveyor to perform surveying.
- C. Verify that mechanical and electrical utilities are in correct position.
- D. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent framing, connections, and bracing are in place unless indicated otherwise.

3.3 ERECTION OF FRAMING

EDIT NOTE: DELETE THIS ARTICLE IF NO TRUSSES ON PROJECT.

- A. General: Do not use materials that are unsound, warped, improperly finished, or with defective surfaces, sizes, or patterns.
 - 1. Comply with frame manufacturer's approved Shop Drawings for details and building erection.
- B. Trusses:
 - 1. Set trusses in place in center of column using lifting methods as approved by manufacturer.
 - 2. When trusses are properly positioned, install 1/2 inch (13 mm) by 5-1/2 inch (140 mm) machine bolt and manufacturer recommended 20d ring shank nails through 2 of column laminates and truss heel.
 - 3. Brace trusses per WTCA guidelines and BCSI Manual
- C. Purlins: Install purlins with fasteners and at spacings per approved Shop Drawings.

- D. Truss Ties: Install truss ties at locations recommended by structure manufacture and per approved Shop Drawings
 - 1. Run truss ties from end wall to end wall.
- E. Incidental Framing: Install 2 inch (51 mm) by 4 inch (102 mm) or 2 inch (51 mm) by 6 inch (152 mm) blocking as required per structure manufacturers recommendations.

3.4 SIP INSTALLATION

- A. Install panel system per SIP manufacturer's instructions and approved Shop Drawings.
- B. Install continuous bottom plate.
 - 1. Attach bottom plates at exterior walls to concrete foundation with anchor bolts spaced maximum 4 feet (1.22 m) on center and within 6 inches (152 mm) of ends of pieces, with minimum of 2 anchors per piece, or with foundation anchor straps.
 - 2. Attach interior bottom plates to concrete foundation with approved anchors.
- C. Install continuous top plates. Overlap plates at corners, intersections, and splines.
- D. Drill 1-1/2 inch (38 mm) diameter access holes in splines to align with electrical chases.
- E. Apply sealant in continuous beads to wood-to-wood, wood-to-insulation, and insulation-to-insulation joints per manufacturer's recommendations.
- F. Fasten panels to framing through both facing surfaces unless otherwise indicated.
- G. Provide temporary bracing during erection and until final connections are complete.
- H. Do not install panels directly on concrete; use double plate sill detail or place sill sealer under panels.
- I. Do not place plumbing in panels without approval of panel manufacturer.
- J. Do not cut panel skins for electrical chases. Cut for electrical boxes as needed, but do not cut through to panel edges.
- K. Install SIP tape or sealant at interior joints between roof SIPs and at intersections of roof to wall SIPs.
- L. Install thermal barrier over interior surfaces of SIPs per applicable building code and SIP manufacturer's recommendations.

3.5 METAL PANEL INSTALLATION

EDIT NOTE: DELETE THIS ARTICLE IF NO METAL PANELS ON PROJECT.

- A. Install metal panels per manufacturer's established construction procedures.
- B. Install metal panels and components plumb, square, straight, and true to lines, and to assure freedom from rattles.
- C. Take care when cutting prefinished materials to ensure cuttings do not remain on finished surface.
- D. Properly install fasteners taking care to not under- or overdrive.
- E. Roofing Panels: Install panels perpendicular to supports aligned straight with end fascias and fasten to purlins. Anchor with fasteners at spacings recommended by manufacturer and design loads.

EDIT NOTE: DELETE THE FOLLOWING PARAGRAPH IF VENTS ARE NOT REQUIRED ON PROJECT.

- F. Vented Ridges: Fasten vented ridges to structure as indicated on Drawings, maintaining manufacturer's minimum clear throat opening.
- G. Soffits: Install soffits to interlock with trim items at top of steel siding and at fascias.

1. Solid or optional vented soffit shall be used at end overhang.
 2. A combination of solid and perforated soffits shall be provided for balanced ventilation at side overhangs.
- H. Trim Items: Install trim items at base, wainscot transitions, corners, top of steel siding, fascia, gables, and ridges using no less than 1 inch (38 mm) screw fasteners.
1. Trim items shall be installed at the base, at any wainscot transition, corners, top of steel siding, fascias, gables and ridge using appropriate 1" screw fasteners.
- I. Closure Strips: Provide closure strips at top and bottom of roofing panels.
- 3.6 ADJUSTING
- A. Remove SIPs which have been damaged or have become wet and replace with new SIPs prior to proceeding with SIP installation or other Work associated with SIP installation.
- 3.7 PROTECTION
- A. Cover wall panels with moisture barrier or final wall cladding as soon as practical after erection.
- B. Cover roof panels with water-resistant paper or roofing underlayment immediately after erection.

END OF SECTION