

PART 1- GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to the Section.

1.2 SUMMARY

- A. This section includes the following:
 - 1. Structural Insulated Panels (SIPS)

1.3 SYSTEM DESCRIPTION

- A. Structural Insulated Panels (SIPS) consist of oriented strand board (OSB) laminated with structural adhesives to an EPS insulation core, and SIP manufacturer supplied Laminated Insulated Posts, 2x, LVL or Insulated I-Joist connectors, sealants, SIP tape and SIP screws.

1.4 REFERENCES

- A. ACSE 7 – Minimum Loads for Buildings and other Structures.
- B. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- C. ASTM E1803 – Standard Test Method for Determining Structural Capacities of Insulated Panels.
- D. DOC PS2 – Performance Standard for Wood-based Structural-Use Panels.
- E. ICC ES AC04 – Acceptance Criteria for Sandwich Panels.
- F. ICC ES AC05 – Acceptance Criteria for Sandwich Panels Adhesives.
- G. ICC ES AC12 – Acceptance Criteria for Foam Plastic Insulation.
- H. AWWA E12 – Standard Method of Determining Corrosion of Metal in Contact with Treated Wood.
- I. EPA – Registered products listing.

1.5 SUBMITTALS

- A. Product Data: Submit product data for specified products.
 - 1. SIP Code Compliance: Provide ICC ES code report for SIP with evidence of compliance with code requirements as an alternate method of construction. Submit current compliance report number from ICC ES showing conformance to the International Building Code (IBC) and International Residential Code (IRC). Code report shall include

compliance with ICC ES AC04. Factory mark each piece of lumber with grade stamp of grading agency.

2. EPS Code Compliance: Provide ICC ES code report for EPS foam with evidence of compliance with code. Submit current compliance report numbers from ICC ES with conformance to the International Building Code (IBC) and International Residential Code (IRC). Code report shall include compliance with ICC ES AC12.
 3. Manufacturer's Instructions: SIP Manufacturer's construction detail book and load design charts.
- B. Shop Drawings: Submit shop drawings for SIPs showing layout, elevations, product components and accessories.
- C. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis including structural calculations shall be prepared by a qualified professional engineer registered in the state of South Dakota and qualified to perform such work.
- D. Quality Assurance Submittals: Submit the following:
1. Certificate: Product certificate showing compliance the Third Party Quality Control program of Underwriters Laboratories, Inc.
- E. Warranty: Warranty documents specified herein.

1.6 QUALITY ASSURANCE

- A. Structural Insulation Panel Manufacturer Qualifications: A manufacturer that complies with ICC ES code for SIP.
1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis including structural calculations shall be prepared by a qualified professional engineer registered by the state of South Dakota and qualified to perform such work.
- B. Source Limitations: Obtain all SIPs through one manufacturer. All accessories to be furnished or recommended by one SIP manufacturer.
- C. Comply with applicable requirements and recommendations of authorities having jurisdictions.

- D. Structural Design Standard: ASTM E1803 – Standard Test Method for Determining Structural Capacities of Insulated Panels.
- E. Installer Qualifications: Installer should be experienced in performing work of this section and should be specialized in installation of work similar to that required for this project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials from SIP manufacturer with identification labels or markings intact.
- B. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- C. SIPs shall be fully supported in storage and prevented from contact with the ground. Stack SIPs on pallets or on supports at maximum of four feet on center.
- D. SIPS shall be fully protected from weather. Protect against exposure to rain, water, dirt, mud, and other residue that may affect SIP performance. Cover stored SIPs with breathable protective wraps. SIPs shall be stored in a protected area.

1.8 REGULATORY REQUIREMENTS

- A. SIPS shall be recognized for compliance in a current ICC ES evaluation report.
- B. Pre-Installation Conference: Conduct conference at Project site. Comply with requirements in Division 01 Section “Project Management and Coordination.” Review methods and procedures related to SIP panel including, but not limited to, the following:
 - 1. Meet with Owner; Architect; Owner’s insurer if applicable; testing and inspection agency representative; Installer; SIP panel manufacturer’s representative and installers whose work interfaces with or affects SIP panel, including installers of interior finishes, roofing, and roof-mounted equipment.
 - 2. Review methods and procedures related to SIP panel installation, including manufacturer’s written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Verify foundation/ structural system/substrate conditions and finishes for compliance with requirements, including flatness and fastening.

5. Review structural loading limitations.
6. Review base flashing, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect SIP panel system.
7. Review governing regulations and requirements for insurance and certificates, if applicable.
8. Review temporary protection requirements for SIP panel system during and after installation
9. Review SIP panel observation and repair procedures after SIP panel installation.

1.9 WARRANTY

- A. Manufacturer's Warranty: Submit SIP manufacturer's standard warranty document, SIP Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner's may have under Contract Documents.
 1. Warranty Period: Limited Residential Panel Warranty is good for the entire time you own your home and extends to the next home-owner for 10 years from date of purchase.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. SIPs consisting of the following:
 1. UL certified EPS core with a minimum of 0.95 pcf complying with ASTM C578 Type I. Insulation manufacturer shall provide Third Party UL certification. The thermally insulated connection post shall consist of 2x material hem-fir #2 or better with a UL certified EPA core with a minimum of 1.95 pcf complying with ASTM C578 Type I. The foam for the insulated connecting posts shall be mechanically fastened and laminated to the 2x material. All electrical chases shall be factory installed and clearly noted on the interior side of the panel with marker. All window and door rough openings shall be factory made and headers preinstalled in the panel for on-site assembly where practical. Sip Wall Panels shall include the sill (treated if below grade or on concrete) plate and double top plate as well as the EPS Foam Blocking and 2x material cut to pitch for the wall to roof transition. All below grade panels shall

be treated plywood on the exterior and treated studs 12” on center with a treated sill plate and OSB on the interior sheet. All roof panels shall have a factory installed connector with factory installed insulation (EPS Foam) on both sides of the I-Joist if that connection is used. All SIP panels shall be clearly marked with consecutive numbering on the inside of the panel to correspond with the SIP Panel drawings for exact location.

2. OSB identified with APA or PFS performance mark with Exposure I durability rating and performance in accordance with DOC PS-2 span rating 24/16 or greater.
3. Adhesives shall be in conformance with ICC ES AC05 – Acceptance Criteria for Sandwich Panel Adhesives.
4. Sip panels shall be in a nominal width of 4 feet and to be designed to be an integral part of the building structure to complete a thermally insulated envelope and a structural envelope. The wall heights and roof lengths of the SIP Panels are to be determined by the actual building dimensions.

2.2 ACCESSORIES

- A. Laminated Thermally Insulated Posts, LVL, 2x or Insulated I-Joist Connectors for use in joining SIPs shall be factory installed by the SIPs manufacturer.
- B. Fasteners: Corrosion resistant SIP screws compatible with SIP system shall be provided by the SIPs manufacturer.
 1. Wood Screws for attachment to wood.
 2. Heavy Duty Metal Screws for attachment to metal members (16 gauge to 1/4”)
 3. Light Duty Metal Screws for attachment to metal decks (18 gauge or thinner)
- C. SIP Sealant: Shall be specifically designed for use with SIPs. Sealant must be compatible with all components of the SIP. Sealant shall be provided by the SIP manufacturer.
- D. Dimensional Lumber: SPF, #2 or better, or engineered equivalent unless otherwise required by structural drawings.

- E. Vapor Retarder SIP Tape: Tape with an adhesive suitable for indoor use, minimum 4 inch wide for use on SIP joints. SIP Tape shall be supplied by the SIP manufacturer.

2.3 Fabrication

- A. SIPs shall be fabricated in accordance with approved Shop Drawings.

- B. Thermal Resistance, R-Value:

1. Nominal 6 ½” SIP (5 ½” core) with R-Value of 22.68 at 75° F
2. Nominal 8 ¼” SIP (7 ¼” core) with R-Value of 29.41 at 75° F
3. Nominal 10 ¼” SIP (9 ¼” core) with R-Value of 37.11 at 75° F
4. Nominal 10 ¾” SIP (9 ½” core) with R-Value of 38.08 at 75° F
5. Nominal 12 ¼” SIP (11 ¼” core) with R-Value of 44.81 at 75° F
6. Nominal 12 ¾” SIP (11 7/8” core) with R-Value of 47.22 at 75° F

2.4 SOURCE QUALITY

- A. Source Quality Assurance: Each SIP component required shall be supplied by SIP manufacturer and shall be obtained from selected SIP manufacturer or its approved supplier.

1. Provide evidence of UL Third Party inspection and labeling of all insulation used in manufacture of SIPs.
2. SIP Manufacturer shall provide Lamination, R-value and warranty documents for building owner acceptance and execution. Manufacturer’s standard forms will be submitted.

- B. Source Quality: Obtain SIPs from a single manufacturer.

PART 3 – EXECUTION

3.1 MANUFACTURER’S INSTRUCTIONS

- A. Compliance: Comply with manufacturer’s ICC ES report, Load design Charts, Detail Book, Shop Drawings, and product data, including product technical bulletins, for installation.

3.2 INSTALLATION

- A. SIP Installation

1. SIP Supports: Provide level and square foundation/ structural system/ substrate that support wall and/or roof SIPs. For wall SIPs, hold sill plate back from edge of rim board ½” (12mm) to allow exterior sheathing to line up with outside of rim board. Provide 1 ½” (38mm) diameter access holes in plating to align with electrical wire chases in SIPs. Provide adequate bracing of SIPs during erection. Remove debris from plate area prior to SIP placement.
2. SIP Fastening: Connect SIPs by nail as shown on drawings or per manufacturer’s requirements. Screws of equal strength may be substituted for nails as specified by engineer. SIP sealant must be used together with each fastening technique. Where SIP Screw Fasteners are used, provide a minimum of 1” (25.4mm) penetration into support. Join SIPs using plates and thermally insulated connecting posts. Secure attachment with nails or screws, and SIP sealant. Apply SIP sealant per SIP manufacturer recommendations.
3. SIP Tape: Provide SIP Tape at joints between SIP wall panels, roof panels, and at the intersection of SIP roof and wall panels.
4. Vapor Retarders: Provide vapor retarders mandated by building code.
5. Thermal Barriers: Interior surfaces of SIPs shall be finished with a minimum of 15-minute thermal barriers, such as gypsum wallboard, nominal 1” (25mm) wood paneling, or other approved materials. Apply code approved thermal barriers according to SIP manufacturer’s recommendations.
6. Restrictions: Do not install SIPs directly onto concrete. Do not put plumbing in SIPs without consulting SIP manufacturer. Do not over cut skins for field-cut openings and do not cut skins for electric chases. SIPs shall be protected from exposure to solvents and their vapors that damage the EPS foam core.
7. Remove and replace insulated wall or roof SIPs which have become excessively wet or damaged before proceeding with installation of additional SIPs or other work.

3.3 FIELD QUALITY REQUIREMENTS

A. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

- B. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

3.4 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction.
 - 1. Roof SIPs: Protect roof SIPs from weather by roofing materials to provide temporary protection at the end of the day or when rain or snow is imminent.
 - 2. After installation, cover SIPs to prevent contact with water on exposed SIP edges and faces.