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# MASTERFORMAT™ SPECIFICATION

## Section 06 12 00

### Structural Insulated Panels (SIPs)

#### INTRODUCTION

In the 2004 edition of MasterFormat, the Construction Specification Institute (CSI) revised the specification number system from 16 Divisions with 5 identifying numbers to 50 Divisions with 6 identifying numbers and a three part arrangement (General, Products, and Installation).

This MasterFormat Specification is a manufacturer-specific proprietary product specification with descriptive requirements, reference standards and performance requirements. Specifiers should verify that inter-related products correspond with this and other specification requirements and are both available and suitable for the applications indicated and being built.

The MasterFormat Specification section number and title may be varied by the Specifier to suit specific projects. Structural Insulated Panels (SIPs) are generally specified under Division 06 - Wood, Plastics, and Composites, Section 06 12 00 which applies to the use of Structural Panels assembled and installed by others. It should be noted that SIPs may also be specified as "Section 06 12 16 – Stressed Skin Panels".

This MasterFormat Specification is intended to be a part of the overall project manual and is not intended to be a stand-alone specification or contractual document. It has been prepared for the Insulspan SIP System. It has not been prepared by ARCOM/MasterSpec® and no inference to ARCOM/ MasterSpec® is intended or implied.

END

## **SECTION 06 12 00**

### **STRUCTURAL INSULATED PANELS FOR ROOFS & WALLS**

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

- A. Section Includes: Structural Insulated Panels (SIPs) and sub section 06 12 16 – Stressed Skin Panels
- B. Related Sections: Section(s) related to this section include:
  - 1. Section 01 33 00 Submittal Procedures
  - 2. Section 01 61 00 Common Product Requirements
  - 3. Section 03 30 00 Cast-in Place Concrete
  - 4. Section 06 10 00 Rough Carpentry
  - 5. Section 06 09 00 Wood and Plastics Fastenings
  - 6. Section 07 21 13.13 Foam Board Insulation
  - 7. Section 07 60 00 Flashing and Sheet Metal
  - 8. Section 07 92 19 Joint Sealants: Caulking and Sealants

##### **1.02 SYSTEM DESCRIPTION**

- A. Structural Insulated Panels (SIPs) consist of performance-rated oriented strand board (OSB) structurally laminated to expanded polystyrene (EPS) rigid insulation core. A SIP system incorporates manufacturer-specific spline connectors, sealants and SIP screws.

##### **1.03 REFERENCES**

- A. American Society of Civil Engineers (ASCE) Publications
  - 1. ASCE 7 – Minimum Loads for Buildings and Other Structures.
- B. ASTM International Publications:
  - 1. ASTM C578 – Standard Specifications for Rigid, Cellular Polystyrene Thermal Insulation.
  - 2. ASTM D7446 – Standard Specification for Structural Insulated Panel (SIP) Adhesives for Laminating Oriented Strand Board (OSB) to Rigid Cellular Polystyrene Thermal Insulation Core Materials
  - 3. ASTM E72 – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
  - 4. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials
  - 5. ASTM E1803 – Standard Test Method for Determining Structural Capacities of Insulated Panels.
- C. Underwriters' Laboratories of Canada (ULC) Publications:
  - 1. CAN/ULC-S701 – Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
  - 2. CAN/ULC-S101 - Standard Methods of Fire Endurance Tests of Building Construction and Materials

- D. Canadian Construction Materials Centre (CCMC) Publications:
  - 1. CCMC Technical Guide – Stressed Skin Panels (with structural ribs) for Walls and Roofs.
- E. APA The Engineered Wood Association Publications:
  - 1. DOC PS2 – Performance Standard for Wood-Based Structural-Use Panels.
  - 2. APA PRP-108 – Performance Standards and Qualification Policy for Structural-Use Panels
- F. Canadian Standards Association (CSA) Publications
  - 1. CAN/CSA-O325.0 – Construction Sheathing
- G. ICC-ES Acceptance Criteria:
  - 1. ICC-ES AC04 – Acceptance Criteria for Sandwich Panels.
  - 2. ICC-ES AC05 – Acceptance Criteria for Sandwich Panel Adhesives.
  - 3. ICC ES AC12 – Acceptance Criteria for Foam Plastic Insulation.
- H. International Organization for Standardization (ISO) Publications:
  - 1. ISO 9001 – Quality Management Systems – Requirements
- I. International Code Council Publications
  - 1. International Building Code (IBC)
  - 2. International Residential Code (IRC)
- J. Canadian Commission on Building and Fire Codes/National Research Council of Canada
  - 1. National Building Code of Canada (NBC).

#### 1.04 DESIGN REQUIREMENTS

- A. Project design team shall review manufacturer installation guide and design manual. Copies can be obtained from [www.insulspan.com](http://www.insulspan.com) or by contacting INSULSPAN technical service at 1-800-726-3510 (East) or 1-866-848-8855 (West) or Plasti-Fab at 1-866-446-5377.
- B. Provide SIPs which have been manufactured, fabricated and installed to withstand specified loads as determined by design in accordance with the local building codes and to maintain performance criteria as stated by the SIP manufacturer without defects, damage or product failure.

#### 1.05 SUBMITTALS

- A. Product Data: Submit product data for specific products.
  - 1. SIP Code Compliance: Provide code report for SIP to demonstrate compliance with requirements for construction as per current applicable code. {Submit current ICC-ES evaluation report from showing compliance the International Building Code (IBC) and International Residential Code (IRC).} {Submit current CCMC evaluation report showing compliance with the National Building Code of Canada (NBC).}
  - 2. EPS Code compliance: Provide evaluation report for EPS insulation with evidence of compliance with current applicable code. {Submit current ICC-ES evaluation report showing compliance with the IBC and IRC.} {Submit CCMC evaluation listing showing conformance with the NBC.}

- B. Calculation: Provide structural calculation prepared by a design professional registered in the jurisdiction where the work is being performed when required.
- C. Shop drawings: Submit SIP shop drawings showing panel layout, elevations, SIP connection details, product components and accessories.
- D. Quality Assurance Submittals: Submit the following:
  - 1. Third-Party Quality Control: Provide proof of manufacturer participation in recognized third party certification program to assure conformance with Insulspan SIP System specified performance characteristics and physical properties in accordance with Section 01 33 00 - Submittal Procedures.
  - 2. Submit copy of third party certification label demonstrating that manufacture of panels complies with specified performance characteristics and physical properties.
  - 3. Submit manufacturer-specific installation instructions for SIP system.
- E. Fire Resistant Assemblies: Submit Intertek listed assembly or approved equal for testing to {ASTM E119} {CAN/CSA-S101} requirements to demonstrate required fire resistance rating.
- F. Warranty: Provide limited warranty documents as specified herein.

#### 1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Installer to have demonstrated experience acceptable to SIP Manufacturer for installation work similar in scope and size to this project. Manufacturer to confirm availability of site advisory service.
- B. Field Measurements: Request field measurements prior to completion of shop drawings and fabrication. Coordinate fabrication schedule with construction schedule to avoid delay of work. NOTE: Field fabrication is allowed to ensure proper fit after consultation with manufacturer, but must be kept to minimum with majority of SIP fabrication being done under controlled shop conditions.
- C. Source limitations: Obtain all SIPs through one source. All accessories to be furnished or recommended by the SIP manufacturer.

#### 1.07 REGULATORY REQUIREMENTS:

- A. SIPs shall be recognized for compliance with the applicable building code with {an ICC-ES evaluation report demonstrating compliance with the International Building Code (IBC) and International Residential Code (IRC)} {a CCMC evaluation report demonstrating compliance with the National Building Code of Canada (NBC)}.
- B. Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, foundation/structural system/substrate conditions, review SIP manufacturer installation instructions and requirements for SIP manufacturer warranty. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

#### 1.08 DELIVERY, STORAGE AND HANDLING

- A. Ordering: Comply with SIP manufacturer ordering instructions and lead time requirements to avoid construction delays.

- B. Delivery: Deliver materials from SIP manufacturer with identification labels or markings intact.
- C. Unloading: Off-load SIPs from delivery truck and handle using fork lift, crane or other means to prevent damage to SIPs.
- D. Storage: SIPs shall be fully supported in level storage and prevented from contact with the ground. Stack SIPs with a minimum of three supports for every eight feet of SIP length.
- E. Protection: SIPs shall be fully protected from the 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.

#### 1.09 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty conditions and provisions.
- B. SIP Manufacturer Warranty: Submit SIP manufacturer standard warranty document for execution by an authorized company official. SIP Manufacturer Limited Warranty is in addition to and not a limitation of other rights the Owner may have under Contract Documents.

### **PART 2 PRODUCTS**

#### 2.01 MANUFACTURERS/SUPPLIERS

- A. PFB Manufacturing, LLC (Insulspan SIP Plant):
  - 1. 9012 East US 233, Blissfield, MI, USA 49228-0026, Telephone 800-726-3510.
- B. Plasti-Fab Ltd. (Insulspan SIP Plant):
  - 1. 600 Chester Road, Annacis Business Park, Delta, BC, Canada V3M 5Y3, Telephone 866-848-8855
- C. Plasti-Fab Ltd.
  - 1. 300, 2891 Sunridge Way, N.E., Calgary, AB T1Y 7K7, Telephone 888-446-5377

#### 2.02 MATERIALS

- A. SIPs consist of the following:
  - 1. Expanded polystyrene (EPS) core –EPS insulation complying with {CAN/ULC-S701, Type 1} {ASTM C578, Type I} (other densities may be specified). Manufacturer to provideThird Party Certification to demonstrate compliance with applicable insulation specification.
  - 2. Oriented Strand Board (OSB) – a performance rating mark shall be identified on the OSB panel, with an Exposure 1 durability rating; minimum material properties shall be as described in DOC PS2, APA PRP-108 and CSA 0325.0. The minimum material properties for use in Insulspan SIP System shall be approved by Insulspan.

3. Laminating Adhesives – a structural grade laminating adhesive that has demonstrated compliance with ICC ES AC05 – Acceptance Criteria for Sandwich Panel adhesives, CCMC technical evaluation guide for SIPs and ASTM D7446.

## 2.03 ACCESSORIES

- A. Splines:
  1. OSB, dimensional lumber, engineered wood or I-beam for use in joining SIPs shall be supplied by the SIP manufacturer as specified on approved SIP shop drawings.
- B. Fasteners:
  1. Nails as per SIP manufacturer design requirements shall be used for spline and plate attachments following fastening requirements specified on approved SIP shop drawings. Nails for field installation of spline and plates to be supplied by the SIP installer.
  2. Panel Screws as per SIP manufacturer design requirements shall be used following fastening requirements specified on approved SIP shop drawings. Panel screws are to be supplied by the SIP manufacturer or approved equal supplied by the SIP installer.
- C. SIP Sealant:
  1. Sealants shall be specifically designed for use with SIPs. Sealant must be compatible with all components of the SIP. Sealant is to be supplied by the SIP manufacturer or approved equal supplied by the SIP installer.
- D. SIP Panel Seal Tape:
  1. Tape with an adhesive suitable for indoor use, minimum 6" (152 mm) wide for use on flat SIP joints and minimum 12" (304 mm) wide for use on opposing angled surfaces including ridge and roof-to-wall connections. SIP tape shall be supplied by the manufacturer.

## 2.04 FABRICATION

- A. Panel sizes shall be fabricated in accordance with approved shop drawings. Maximum panel size shall be 2440 mm x 7320 mm (8' X 24'). Fabrication tolerances shall comply with values in manufacturer product specification.
- B. Manufacturing Standards: SIPs shall be manufactured under a third party certification program monitored by an accredited agency and manufacturer shall maintain a quality management system in accordance with ISO 9001: 2000.
- C. SIP Thermal Resistance at a Mean Temperature of 75° F (24° C) for SIP only consisting of 7/16" (11 mm) OSB structurally laminated to both faces of EPS insulation core.  
**NOTE:** SIP thermal resistance values are for Insulspan SIPs with OSB surface spline or insulated block spline panel to panel connection type. Thermal resistance values do not include interior/exterior cladding or finish materials and air films. R-value (Inch-pound) units are (ft<sup>2</sup>•hr•°F)/BTU. RSI-value (SI System) units are (m<sup>2</sup>•°C)/W.
  1. 4 ½" (114 mm) thick SIP with R-15.0 (RSI-2.64).
  2. 6 ½" (165 mm) thick SIP with R-22.6 (RSI-3.98).
  3. 8 ¼" (210 mm) thick SIP with R-29.2 (RSI-5.15).
  4. 10 ¼" (260 mm) thick SIP with R-36.8 (RSI-6.49).
  5. 12 ¼" (311 mm) thick SIP with R-44.4 (RSI-7.83).

- D. Fire Performance Rating: Fabricate SIP in accordance with required Intertek or equal assembly listing for testing per {ASTM E119} {CAN/CSA-S101} to provide required fire resistance rating.

#### 2.05 PRODUCT SUBSTITUTIONS

- A. Substitutions: No substitutions permitted without fourteen day (14) prior approval.

#### 2.06 RELATED MATERIALS

- A. Related Material: refer to other sections for related materials as follows:
  1. Dimensional Lumber: SPF # 2 or better or pre-engineered equivalent: Refer to Division 06 carpentry Section.

#### 2.07 SOURCE QUALITY

- A. Source Quality Assurance: Each SIP component required shall be supplied by SIP manufacturer and shall be obtained from the selected SIP manufacturer of its approved supplier.
- B. Each SIP shall be labeled indicating Third Party Certification.
  1. Provide evidence of Third Party Certification and labeling of all insulation used in the manufacturing of SIPs.
  2. SIP manufacturer shall provide lamination, R-value (RSI-value) and warranty document for building owner acceptance and execution.
  3. Dimensional Tolerance – shall comply with values listed in the SIP manufacturer Quality Control Manual.
- C. Source Quality: Obtain SIPs from a single manufacturer.

### **PART 3 INSTALLATION**

#### 3.01 MANUFACTURER INSTRUCTIONS

- A. Compliance: Comply with SIP manufacturer {ICC-ES} {CCMC} evaluation reports, published Load Design Charts, Construction Assembly Drawings, Approved Shop Drawings and product data including Technical Bulletins and Product Information Bulletins for design and installation.
- B. Construction Documents and Shop drawings shall be reviewed by a qualified architect/engineer and shall be signed and sealed. Deviations from standard details or load design values shall be calculated for the specific use and the calculations and details shall be signed and sealed by a registered design professional and provided to the manufacturer.

#### 3.02 EXAMINATION

- A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other related sections) are acceptable for product installation in accordance with SIP manufacturer instructions and guidelines.

1. Verify conditions of foundation/structural system/substrate and other conditions which affect installation of SIPs. Any adverse conditions shall be reported in writing to the SIP manufacturer and the lead design professional. Do not proceed with installation until adverse conditions are corrected and documented.

### 3.03 INSTALLATION

#### A. SIP Installation:

1. SIP Support: 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 deck ½" (12.7 mm) to provide full bearing of both OSB skins. Provide adequate bracing of SIPs during panel erection. Remove debris from plate area prior to application of sealant and SIP placement.
2. Electrical: If required, provide 1 ½" (38 mm) diameter access holes in top and bottom plating to align with electrical wire chases in SIPs. Align all horizontal electrical chases in SIPs and maintain debris free electrical chases.
3. SIP Fastening: Connect SIPs using screws or nails as shown on approved shop drawings. Where manufacturer supplied SIP Screws are used, a minimum of 1 ½" (38 mm) of penetration is required into wood support.
4. SIP Sealant: Sealant must be installed in a continuous bead at all connections.
5. SIP Tape: Apply SIP tape at joints between roof SIPs, at the roof-to-wall connection and at the ridge. Tape shall only be installed after all spline connections are completed as per Manufacturer installation instructions.
6. Vapor Retarders: Provide vapor retarders as required by applicable building code.
7. Thermal Barriers: Interior surface of SIPs shall be finished with a minimum 15-minute thermal barrier, such as ½" (12.7 mm) gypsum wall board, nominal 1" (25 mm) solid wood paneling, or other approved materials. Apply approved thermal barrier according to requirements of applicable building code.
8. Restrictions: Do not install SIPs directly or in contact with concrete/dirt. Do not install plumbing in a SIP without consulting SIP manufacturer. Do not over-cut panel skins for approved field-cut openings. Do not cut skins to install electrical chases. Do not expose EPS core of SIPs to any solvents or solvent-based adhesives.
9. Remove and replace any SIP wall or roof panels which have become wet or damaged before proceeding with the installation of additional SIPs or other work that may cover a compromised SIP.

### 3.04 FIELD QUALITY REQUIREMENTS

- #### A. SIP Manufacturer Field Services: Field services as detailed in contract documents consisting of product use recommendations and site visits for site advisory service to ensure SIP installation in accordance with manufacturer requirements to be provided by the SIP Manufacturer.
1. Site Advisor Service: [Specify number of days of site advisory service required from the SIP manufacturer.]

### 3.05 PROTECTION

- #### A. Protection: Protect installed product from exposure and damage during construction.
1. Wall or Roof SIP Temporary Protection: Protect SIPs from weather with temporary protection at the end of each day or when rain or snow is imminent. Apply wall or roof sheathing membrane to exposed panel faces as soon as practical after installation.



2. After installation is complete, cover SIPs to prevent contact with excessive water on all exposed SIP edges and faces.
3. Wall or Roof SIP Cladding: Cladding design must include a second line of defense based upon the anticipated wind-driven rain, snow and ice condition for the geographical location, building code requirements and cladding manufacturer requirements.
4. Roof SIP: Roofing material must only be installed on a dry SIP roof with a moisture content of 17% or less.

**END OF SECTION 06 12 00**