INSTRUCTION GUIDELINES:
STRUCTURAL INSULATED PANELS (SIPs)

INSPECTION CODE: 111, 204, 216

SCOPE: RESIDENTIAL

CODES ENFORCED: 2016 CBC, CRC, CPC, CMC, CEC, CALGreen, CEnC, and PAMC

The information provided in this document is general and intended as a guide only. Each project is unique and additional requirements may be enforced as deemed appropriate.

IMPORTANT

☐ Due to the complexity of Structural Insulated Panels (SIPs) as an alternative method of construction, a Pre-Construction Meeting (Inspection Code 111) is mandatory for all SIPs projects in Palo Alto. The Pre-Construction Meeting will address:
  o The manufacturer’s fabrication drawings and installation manuals
  o Applicable ICC-ES report (or equivalent)
  o Required Special Inspections
  o Required engineer of record’s field observation reports
  o Manufacturer’s site representative contact information for clarification of field issues

☐ Please refer to the “Sequence of Inspections” checklist for a complete list of inspections required in Palo Alto. Please note that for SIPs, some inspections are critical. Below are some examples:
  o Inspection Code 111: Pre-Construction Meeting
    • The pre-construction meeting is mandatory for SIP projects.
  o Inspection Code 204: Foundation and Setbacks
    • SIP installation may require multiple foundation inspections to capture concealed anchorage and attachments to the foundation system. The fabrication plans and manufacturer’s installation manual are required for this inspection.
    • If applicable, foundations in flood zones require a joint inspection with the Public Works inspector. Contact PW inspector Denis Huegle @ 650-496-6962 and inform Denis of the building inspector’s name, date, and approximate time of inspection. The purpose of the joint inspection is to determine the correct location of the flood vents.
  o Inspection Code 216: Roof, Exterior Sheathing, and Structural Framing
    • The fabrication plans and manufacturer’s installation manual are required for this inspection.
SIP WALL CONSTRUCTION PER CRC R610

- Structural Insulated Panels shall be designed in accordance with the provision of CRC R610, and it shall be used to design:
  - SIP walls
  - Project drawings
  - Typical details
  - Specifications

- The aforementioned provisions shall not exempt construction documents from the requirement to be stamped by a California licensed architect or engineer. (CRC R610.1)

- Special inspections may be required by the ICC ES report (or equivalent), and the ICC ES report (or equivalent) shall be included with the design documents detailing minimum installation and inspection requirements. (CBC 17)

- The prescriptive method described in CRC R610.2 shall not apply to Palo Alto, because Palo Alto is either a D or E seismic design category. Therefore, an engineered design is required for all SIP construction proposed in Palo Alto. (CRC R610.2)

INSPECTION MATERIALS

CORE

- Core material shall be composed of foam plastic insulation meeting one of the following:
  - ASTM C578 and have a minimum density of 0.90 pounds per cubic feet
  - Polyurethane meeting the physical properties shown in Table R610.3.1
  - An approved alternative (must be shown in the drawings) (CRC R 610.3.1)

<table>
<thead>
<tr>
<th>TABLE R610.3.1</th>
<th>MINIMUM PROPERTIES FOR POLYURETHANE INSULATION USED AS SIPS CORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL PROPERTY</td>
<td>POLYURETHANE</td>
</tr>
<tr>
<td>Density, core nominal (ASTM D1622)</td>
<td>2.2 lb/ft²</td>
</tr>
<tr>
<td>Compressive resistance at yield or 10% deformation, whichever occurs first (ASTM D1621)</td>
<td>19 psi (perpendicular to rise)</td>
</tr>
<tr>
<td>Flexural strength, min. (ASTM C203)</td>
<td>30 psi</td>
</tr>
<tr>
<td>Tensile strength, min. (ASTM D1623)</td>
<td>35 psi</td>
</tr>
<tr>
<td>Shear strength, min. (ASTM C273)</td>
<td>25 psi</td>
</tr>
<tr>
<td>Substrate adhesion, min. (ASTM D1623)</td>
<td>22 psi</td>
</tr>
<tr>
<td>Water vapor permeance of 1.00-in. thickness, max. (ASTM E96)</td>
<td>2.3 perm</td>
</tr>
<tr>
<td>Water absorption by total immersion, max. (ASTM C272)</td>
<td>4.3% (volume)</td>
</tr>
<tr>
<td>Dimensional stability (change in dimensions), max.</td>
<td>2%</td>
</tr>
</tbody>
</table>

For SI: 1 pound per cubic foot = 16.02 kg/m³, 1 pound per square inch = 895 kPa, °C = [°F] - 32]1.8.

FACING

- The facing shall be wood structural panels conforming to DOC PS 1 or DOC PS 2, each having a minimum nominal thickness of 7/16". The facing shall be identified by a grade mark or certificate of inspection issued by an approved agency. (CRC R 610.3.2)
ADHESIVE
☐ Adhesives shall conform to ASTM D2559 or approved alternative intended for use as an adhesive used in the lamination of SIPs. Each container of adhesive shall bear a label with the adhesive manufacturer’s name, adhesive name and type and the name of the quality assurance agency. (CRC R 610.3.3)

LUMBER
☐ Verify that the lumber framing material is NLGA grade No. 2 Spruce-pine-fir. Substitutions shall meet or exceed the mechanical properties and specific gravity of No. 2 Spruce-pine-fir. (CRC R 610.3.4)

SCREWS
☐ Screws shall be made of steel, provided by the manufacturer, and shall be able to penetrate the assembly not less than 1”. The screws shall be corrosion resistant and shall have a minimum shank diameter of 0.188” and a minimum head diameter of 0.620”. (CRC R 610.3.4)

NAILS
☐ Nails shall be common or galvanized box unless otherwise noted. (CRC R 610.3.5)

WALL CONSTRUCTION
WALL PANELS
☐ Verify that the panels comply with Figure R610.4 or as shown in the city-approved drawings. The panels should be labeled or shall have a certificate of inspection issued by an approved agency. Each SIP shall be a stamp or label with the following information (CRC R 610.3.5):
  o Manufacturer name/logo
  o Identification of the assembly
  o Quality assurance agency
TOP PLATE CONNECTION

□ Verify that SIP walls are capped with a double top plate installed to provide overlapping at corner, intersections, and splines as shown in Figure R610.5.1. The top plate shall be the same width as the panel core and shall be recessed into the SIP below. (CRC R 610.5.1)

BOTTOM PLATE CONNECTION

□ Verify that the SIPs have full bearing on the sole plate, which should have a width equal to a foam core. When the SIPs are on a foundation, the wall shall be anchored as shown in Figure R610.5.2. (CRC R 610.5.2)
CONNECTIONS

- Verify that the SIPs are connected at vertical inplane joints as shown in Figure R610.8. (CRC R 610.8)

- Corner framing shall be constructed in accordance with Figure R610.9. (CRC R 610.9)
HEADERS

☐ Verify that SIP headers are a minimum of 11-7/8” deep and are a continuous section. Wood structural head panel box headers shall be permitted where SIP headers are not applicable. (CRC R610.10)

OTHER CONNECTIONS

☐ For connections between the SIP and a truss, follow Figure R610.5(3).

☐ For connections between SIPs at wall-to-wall and at balloon framing, follow Figures R610.5(4) and R610.5(5).
DRILLING AND NOTCHING

☐ Verify that the maximum vertical chase penetration in SIPs does not exceed 2” centered in the panel and that they are at least 24” on center. (CRC R610.7)

☐ A maximum of two horizontal chases are permitted in each wall panel—one at 14” (plus or minus 2”) from the bottom of the panel and one at 48” (plus or minus 2”) from the bottom edge of the SIPs panel. (CRC R610.7)

☐ Additional penetrations are permitted where justified by analysis. (CRC R610.7)

ICC-ES REPORT OR EQUIVALENT

☐ Provide the ICC-ES Report or equivalent to the inspector for additional installation requirements and special inspections required.