

Policy On Structural Insulated Panel Roofs

Structural Insulated Panels (SIP) are premanufactured construction materials used in place of standard “stick-built” construction techniques for walls and roofs of buildings. Recent reports from engineers and observation by building inspectors indicate that these panels, when used as roofing materials, have exhibited a very high failure rate in Juneau.

These costly and potentially dangerous failures are generally appearing in the top layer of the panels which have rotted and sometimes deteriorated to an oatmeal consistency as well as in the rotting of the wooden joint materials.

The top and bottom layers of structural insulated panels usually consist of oriented strand board (OSB) which is similar to plywood but with smaller pieces of wood veneer heated and pressed into sheets with resin adhesives. In the panels, bonded between the OSB layers is a layer of foam insulation. The edges of the panels usually contain wooden splines that slip together to join the panels.

The most significant factors contributing to the panel failures in Juneau are the cool temperatures along with the elevated relative humidity in Juneau as compared to other locations. The extra moisture inside and outside our buildings makes the proper installation of the panels more critical in our environment. The specific reasons for the failures appear to be:

- 1) Lack of continuous vapor retarders (usually plastic sheathing often called “visqueen”) on the warm side of the panels thus allowing moisture from the interior of the building into panel voids and joints,
- 2) Failure of sealants in the panel joints to adhere to the wood and foam (wet surfaces) and thus failure to stop moisture from travelling through the joints to the top layer of OSB
- 3) Lack of ventilation at the top layer of the panels to dispel the moisture.

In order to avoid future problems with Structural Insulated Panels used as roofs, the City and Borough of Juneau Building Division has adopted the following requirements on the reverse side of this sheet for the use and repair of structural insulated panels in roofs.

REQUIREMENTS FOR INSTALLATION AND REPAIR OF STRUCTURAL INSULATED PANEL ROOFS

Installation or repair of Structural Insulated Panels used in roofs in the City and Borough of Juneau shall meet the following requirements:

1. **Vapor Retarder.** The installation or repair of Structural Insulated Panels in roofs shall include a properly installed and sealed vapor retarder on the warm side of the SIP. The vapor retarder shall be rated at no more than one tenth (0.10) perm by a recognized testing agency.
2. **Roof Ventilation.** Structural Insulated Panels used as roofs shall have a "cold roof" installed over the panels that provides not less than 1½ inches of air space above the top skin of the panel. Such air space shall be continuous from top to bottom and open to the atmosphere at the top and bottom. Other designs will be reviewed and may be approved on a case by case basis.
3. **Sealants.** All voids and interfaces in SIPs, including at joints, shall be completely filled with approved adhesive sealant. Such sealant shall be firmly bonded to the panel materials.
4. **Special Inspection.** Structural Insulated Panels shall be repaired or installed under an approved Special Inspection Program as defined in the building code. The Special Inspection shall cover the following areas:
 - A. Proper installation and sealing of the vapor retarder including continuous installation across support elements.
 - B. All material surfaces that receive sealants and adhesives shall be dry or meet the manufacturer's specifications.
 - C. All sealants and adhesives shall be applied within the temperature ranges specified by the sealant or adhesive manufacturer.
 - D. All surfaces to be adhered or sealed shall be in contact with the sealant within the reaction time of the sealant. Surface skinning of the sealant shall not be allowed before the panels are in their final position.
 - E. All voids in the panel structure, including voids in connections, shall be completely filled with adhesive sealant.
 - F. All penetrations of the vapor retarder shall be properly sealed upon completion of the work requiring the penetration.
 - G. All connections to the structure shall be completed in accordance with the manufacturer's instructions and the approved plans for the structure.