Structural Insulated Panels in Alaska

Structural Insulated Panels, or SIPs, are prefabricated building materials that combine structural elements, insulation, and sheathing into one panel. They can be used for the walls, roof, and floor of a building in place of more traditional construction methods, such as stick-framing. A SIP typically consists of an EPS foam core sandwiched between two OSB panels, although the insulating core and the outer structural elements can be made of different materials.

Building a SIP home begins at the design phase. Builders must work with SIP manufacturers since panels are tailored to a specific building design. Once the plans are complete, the SIPs are made and shipped to the job site. They are labeled so builders know exactly where each panel goes in the building.

Panels must be joined together according to manufacturer specifications as they are erected. For instance, many panels are joined with splines that are secured with screws. Then, the joint between panels is sealed using agents such as caulk, adhesive, mastic, spray foam, or tape. An airtight seal is important to prevent moisture from entering the panel, which can lead to rot. In some buildings, an additional vapor barrier is installed over the SIPs.

Finally, an electrician will install electrical fixtures into pre-drilled cores and pre-cut boxes in the panels. Then finishes can be applied on the interior and exterior. For example, wall SIPS would be covered in dry wall or finishing lumber on the interior and siding on the exterior.

Benefits and Concerns

There are several potential benefits to building with SIPs. For one, the lack of a wall cavity prevents convective heat loss. Also, large panels can have fewer studs than a framed wall, reducing the amount of conductive heat loss through studs (called thermal bridging). Buildings made with SIPs can be erected quickly with a trained crew, a big advantage in a climate with a short building season. Finally, SIPs can provide a uniformly insulated, airtight envelope when correctly installed.

On the other hand, proper assembly and sealing are critical to prevent moisture leakage problems. There is little to no room for on-site flexibility, since panels come pre-cut. An experienced builder who knows how to evaluate the design with the manufacturer and does not cut corners with sealing panel joints is a necessity. SIPs can be either cost-effective or cost-prohibitive, depending on the situation. The design services and shipping costs will cause the price of SIPs to rise above conventional framing materials. However, this can pay off in reduced labor costs if a trained crew erects a building quickly, or if several buildings of the same design are being erected.

Juneau SIPs Failures

Many Alaskans have heard that homes in Juneau experienced SIP roof failures in the early 2000s. A Structural Insulated Panel Association (SIPA) investigation showed that the panel damage was concentrated at the panel seams near the roof ridges and was due to poor workmanship. Some panel joints had no or poorly applied sealant, and sealant had failed to adhere to other panels. The failed roofs were repaired, and the City and Borough of Juneau has taken steps to ensure such failures will not occur again, by requiring a vapor barrier, roof ventilation, and inspection of SIP roofs.

Are SIPs right for your building project?

SIPs are used throughout Alaska by custom home builders, housing authorities, and commercial contractors. Currently, there are two SIPs manufacturers located in the state producing Alaskan-made panels for building projects.

Are you or your contractor familiar with SIPs and how to use them?

First, safety! SIPs are large and heavy compared to stand-alone construction materials, and thus require extra safety considerations, especially when large equipment, such as a crane or forklift, is necessary to move them around on the job site.

Does the job site have access for SIP delivery and storage? Larger size panels may require a flatbed truck for delivery. At the job site, the SIPs should be on a level surface or blocks that are wide enough to support them – not on the ground. They must be kept dry so they don't warp or swell. Planning and organization during delivery and storage will contribute to efficient construction.

Efficient building with SIPs often comes with training and experience, because builders can incorporate SIPs and their potential advantages from the design phase through construction. Many manufacturers provide training, and independent organizations such as the Structural Insulated Panel Association (www.sips.org) and the SIP School (www.thesipschool.com) provide certification classes for working with SIPs.

How will the panels be sealed together?

SIP walls are only as good as the seal between panels. Manufacturers will provide instructions and sometimes materials on how to seal panels together. Many manufacturers will also train builders to ensure the seals are completed properly. Seals can be tested by a blower door test or can be redundantly sealed using tape over the joint to ensure that there are no leaks.

What are the additional shipping costs that come from using SIPs? Are these balanced by labor or efficiency savings?

Builders must consider the advantages to using SIPs at the job site against any added shipping costs. Also, they must consider if the project timeline can accomodate the time required for the panels to be manufactured and delivered to the job site. If the additional shipping costs are not balanced out later in the building process by savings on labor costs or enhanced energy performance of the building, then it is worth considering another building method.

What are the local building policies regarding SIPs?

Local building departments have differing policies regarding the use of SIPs. They range from requiring an engineer's stamp on the plans to more stringent policies such as dictating certain sealant techniques. If you're thinking of building with SIPs, call your local building code office to speak with an inspector about building requirements.

Are you hoping to certify your home with the BEES or Home Energy Rebate Program?

Are you participating in a state rating program, such as the Building Energy Efficiency Standards (BEES), or trying to achieve a certain energy rating with the Home Energy Rebate Program? SIPs can be used to meet these standards. However, to meet all the requirements of these programs you need to consider not just the building envelope but also heating, lighting, and other house characteristics. For more information, visit the Alaska Housing Finance Corporation's webpage www.ahfc.us.

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