

Chapter 7: SIP Layout and Panel Installation

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Introduction

This chapter covers hands-on tips and techniques for an efficient SIP installation. Prefabricated SIPs can save builders a tremendous amount of time and labor costs over site-built construction, but those time savings depend on a well-organized jobsite and an efficient SIP installation. Simple actions such as reviewing SIP layout drawings, marking panel locations on the floor deck, and making the most out of rented material handling equipment all contribute to a smooth and efficient SIP installation.

Although SIPs can be installed quickly, they also need to be installed correctly. The key to an energy-efficient and durable SIP building enclosure is properly sealing the panels as they are installed. SIP installers need to educate their crew and any subcontractors on the importance of sealing all panel joints and penetrations against air infiltration.

Definitions

SIP mastic:	Specialty caulking designed specifically for SIP construction
Expanding foam:	Polyurethane sealant that expands as the result of a chemical reaction to fill gaps or seal between SIP joints
SIP tape:	Vapor impermeable peel-and-stick tape used to seal SIP joints

Panel Prep

SIP installation begins with reviewing the SIP layout drawings provided with the SIP package. Verify that the labeling system in the drawings matches the panels onsite and nothing is missing. If blank panels were ordered, the drawings will serve as a guide for cutting the panels onsite.

Preparing panels before setting them in place helps installers maximize the efficiency of their installation crew and any equipment that is being rented. It is safer and easier to work on the ground than on rooftops or intermediate floors. Ideally, the crew will do as much work as possible on the ground. This includes installing dimensional lumber or splines, predrilling screws, drilling for electrical, and even preassembly of multiple roof panels. If panels can be joined together on the ground it results in fewer lifts, less rental time for equipment, and greater safety for the crew involved.

Preparing panels on the ground also gives the installer an opportunity to verify panel dimensions and identify any errors in panel fabrication before attempting to place the panel.

Wall Panels

Wall panel installation should start in a corner so that it self-braces the wall system. If using equipment to set panels, consider line of sight and accessibility issues when choosing which part of the building to install first.

SIP wall systems typically require less wall bracing than conventional wood framing, but are more susceptible to the effects of high winds. If windy conditions are expected, make sure the walls are adequately braced.

Rigging

Rigging Methods

Worker safety is the top priority when lifting panels with a crane or forklift. The SIP manufacturer should supply installers with an approved methodology for rigging SIPs. Some SIP providers supply rigging hardware as well.

In addition to the rigging hardware specified by the SIP manufacturer, SIP wall panels can be rigged by looping straps through window and door openings. This should only be done after placing dimensional lumber blocking in the panel recesses to protect the panel edges from strap damage.

Another option is to place straps under a temporary top plate or through holes drilled in the panels. After straps or rigging hardware has been removed, mark the holes so they can be easily located and sealed with expanding foam.

Roof Pitch

On pitched roofs, it is best to rig panels off-center so they will match the pitch of the roof as they are being placed. However, panels rigged at a pitch can spin during windy conditions. If wind is present, it is safer to rig panels without a pitch. A tag line should always be used to help control panels while they are in the air.

Additional Hardware

Another consideration when setting roof panels is maneuvering them into their correct location. Consider adding additional hardware or blocking to the panel on the ground that crew members can use to handle the panel on the roof and get it into place using ratchet straps.

Coordinating Subtrades

SIPs fundamentally change the traditional order of residential construction. Normally, the jobs of insulating and air sealing take place after electrical, plumbing, and HVAC are installed. With SIPs, the insulation and air barrier are installed with the framing system. This creates an opportunity for subcontractors to potentially compromise the thermal integrity of the building envelope.

SIP builders should arrange a preconstruction meeting to educate subcontractors on how their work will interact with the SIP building enclosure. This gives them the opportunity to identify any potential issues with plumbing or electrical routing before the SIP package is ordered.

The SIP installer is also responsible for returning to the jobsite after plumbing, electric and HVAC have been installed to verify that all penetrations through the building envelope have been properly sealed and protected against bulk water. Any gaps in the air barrier can be a source of condensation, leading to mold growth and a costly callback.

Lastly, subcontracted SIP installers need to communicate to the general contractor that no other trades should be on the jobsite during SIP installation so that they can maximize their efficiency. It is commonplace for SIP installers to frame intermediate floors and any load bearing interior partitions to keep the SIP installation on track.

Sealing

Air sealing is the single most important part of SIP construction. It is airtightness that allows SIP homes to achieve such high levels of energy efficiency, occupant comfort and indoor air quality. Failing to properly seal joints in an airtight home can lead to significant liability issues if moisture infiltrates panel joints and causes the OSB facings to rot.

There are many different techniques for sealing the joints between SIPs and other components of the building enclosure. Refer to the connection details on the SIP layout drawings to determine the appropriate sealing method. The four sealing methods used in SIP construction are SIP mastic, expanding foam, SIP tape, and a seal gasket.

SIP Mastic

SIP mastic is a specialty caulking designed specifically for SIP construction. Unlike conventional caulking, it remains pliable, allowing it to maintain an air seal as building components shift or shrink over time.

Mastic is typically used in a three bead system, with one bead on each side of the panel and a third bead down the center of the foam core. Mastic is supplied by most SIP providers. If additional sealant is needed while a SIP installation is in progress, choose a foam-friendly sealant that will not react with the foam core of the SIP.

Expanding Foam

Expanding foam is available in single-component and two-component formulas. Single-component expanding foam comes in an aerosol can and is used to seal between panels or fill gaps of 1 inch or less. For larger voids, two-component foam is required. Before using two-component expanding foam, read the directions and test to make sure the components are mixing properly.

Gaskets

Foam gaskets can also be used to seal the joints between panels. Gaskets are made of closed cell foam and are similar to products such as Sill Sealer, which is commonly used between concrete foundations and sill plates. Gaskets are also useful when attempting to slightly lengthen a SIP wall or roof system by adding width to the joints between panels.

SIP Tape

SIP tape is a vapor impermeable peel-and-stick tape applied over SIP joints. It is often used in conjunction with other sealing methods as an added layer of protection against moisture intrusion in critical areas of a building, such as the roof ridge. Many SIP providers supply SIP tape along with directions for its use.

As discussed in Chapter 4, local climate conditions determine whether SIP tape should be applied to the interior or exterior of a SIP joint. A vapor barrier should never be applied to both sides of a SIP joint because it prohibits drying and can trap moisture inside panel joints. It can be dangerous to apply SIP tape to the interior of roof joints if the SIP roof panels are wet or have a chance of being exposed to bulk water. Ideally, SIP tape should be applied after roofing underlayment or when the roof is completed.

Maximizing Efficiency

There are a number of techniques that experienced SIP installers employ to keep installation moving smoothly:

- **Staging** – organize panels in the order they will be set

- **Line of sight** – think about the order of assembly so walls do not block the crane operator’s view or load path
- **Plumbing and straightening walls** – check walls for plumb before securing them to the bottom plate. Trying to straighten walls while attached to bottom plate can create openings for air leakage. Verify walls are plumb and straight before installing the intermediate floors.
- **Avoid sealing too soon** – verify as much as possible before sealing panels. Mark panel locations and rough openings on the floor deck so crews can catch any errors as panels are assembled.
- **Beware of joint growth** – long walls or a series of dimensional lumber splines can lead to slight gaps at panel joints. These gaps combine to add length to a wall or roof plane that requires cutting the last panel to fit.
- **Labeling** – label where top or bottom plates have been drilled for electrical access, as well as any voids that need to be sealed after installation is complete, such as holes created by rigging hardware.

Summary

Assembling prefabricated SIPs is much faster than site-built construction, but builders can further increase jobsite efficiency through jobsite organization, planning, and panel preparation. Carefully reviewing shop drawings and marking panel locations on the floor deck will help catch any errors as panels are being installed. When working with SIP roofs or multistory buildings, as much work as possible should be done on the ground, such as predrilling panel screws, installing splines or blocking, and even preassembling sections of panels. Preparing panels on the ground saves time, improves jobsite safety and minimizes equipment rental time.

Equally important as speed of installation is properly sealing SIPs as they are installed. Sealing is crucial for energy efficiency and long term durability. SIP builders must also take on the task of working with subcontractors that may be unfamiliar with the importance of maintaining a well-sealed SIP building enclosure. It is recommended that SIP builders organize a preconstruction meeting with subcontractors and verify that all penetrations through the building envelope have been properly sealed.