

SECTION 8: SIP Design BP 6: SIP Fabrication/ Manufacturing



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Structural Insulated
Panel Association

SIP DESIGN-BP 6:

SIP Fabrication/Manufacturing¹

This document is created specifically for design professionals by the manufacturing members of the Structural Insulated Panel Association (SIPA). It dives deeper and provides more background into each of the summarized topics presented in the [Designing with SIPs: DESIGN CONSIDERATIONS](#) overview which highlights important considerations during the design phase of a Structural Insulated Panel (SIP) structure. Decades of combined knowledge from SIPA manufacturers will help reduce the learning curve and leverage SIPs' exceptional qualities to achieve the high-performance results owners expect when building with SIPs. The considerations of how and why the best practices were developed as the common industry platform for SIP design are explored here.

The index below outlines ten topical areas, listed in sequence to match the order of design considerations and construction. The details in each chapter provide a deeper understanding of the subject matter to facilitate successful SIP design and later implementation. The current chapter is highlighted in blue.

1. High-Performance SIP Building Envelope
2. HVAC Systems with SIPs
3. SIP Structural Capabilities
4. SIP Sizes
5. SIP Shop Drawings

6. SIP Fabrication/Manufacturing

- 6.1. Blank SIPs are the least expensive, but limit your speed of installation advantage, create additional onsite waste, and require a higher degree of installation skill as all cutting is performed onsite.**
- 6.2. Prefabricated SIPs are designed and cut in the factory to increase speed of installation and improved fit and finish on the jobsite.**
- 6.3. An RTA package includes internal lumber and headers provided and preinstalled in the factory to maximize speed and efficiency onsite.**

7. SIP Installation
8. SIP Roof and Wall Assemblies
9. SIP Electrical
10. SIP Plumbing

¹This updated title replaces "SIP Fabrication" in the checklist on page 15 of the earlier document [Designing with SIPs: DESIGN CONSIDERATIONS](#).

SIP DESIGN-BP 6:

SIP Fabrication/Manufacturing

SIPA manufacturers offer differing levels of SIP fabrication. They include blank SIPs, prefabricated SIPs and ready-to-assemble (RTA) packages.

BLANK SIPs require the most amount of onsite preparation.

PREFABRICATED SIPs require an intermediate amount of jobsite preparation.

RTA SIP packages require the least amount of onsite preparation.

SIPA manufacturers can provide details concerning benefits of each option.²

SIP DESIGN-BP 6.1:

Blank SIPs are the least expensive³, but limit your speed of installation advantage, create additional onsite waste, and require a higher degree of installation skill as all cutting is performed onsite.

The definition of a “blank” SIP will vary by manufacturer but is generally considered the most basic of SIPs. Minimum requirements are met, as referenced in the manufacturer’s code report – which defines physical characteristics and materials (OSB facers, structural adhesives and a rigid foam core) – and as described in the manufacturer’s quality manual which defines lamination procedures. Each blank SIP will carry a

certification stamp on the face of the SIP, confirming the SIP has been laminated to these standards.

A blank SIP is typically laminated as either a 4’ x 8’ or up to an 8’ x 24’ with core insulation flush with the two facers. These blank SIPs may be referred to as “stock” sizes as they do not call for cutting down to specific dimensions.

Manufacturers may also add a standard foam recess around the perimeter of the SIP, typically 1½ inches in depth, produced for the purposes of joining the SIP to another component, such as another SIP, a base or top plate. A standard configuration of electrical chases may also be included in the “blank” SIP.

Blank SIPs are the least common type of SIP produced by manufacturers. One of the greatest advantages of building with SIPs is the fact that much of the production can be done offsite, which not only lessens the burden for labor in the field, but also ensures the quality of fabrication which is typically done by specialized equipment and finished by experienced fabricators. Reasons SIPs may be purchased as blanks include:

- The contractor or owner may be working from an incomplete set of drawings, and openings and span distances are not finalized.

² See the *SIP Design Best Practices Overview – Designing with SIPs: DESIGN CONSIDERATIONS*.

³ in upfront material costs; when balanced by labor, waste and other aspects in the field, total installed cost of blank SIPs could be more expensive than prefabricated or RTA SIP packages.

- Urgency to receive the SIPs and avoid manufacturer lead times and value-added steps taken by the manufacturer once the SIP has moved beyond lamination.
- Supplying to an experienced SIP fabricator who creates SIP shop drawings as discussed in [SIP Design-BP 5: SIP Shop Drawings](#).

If the blank SIPs are fabricated onsite, contractors should consider the following:

- Does the contractor have proper tools to cut, bevel and recess SIPs?
- Is there adequate room to lay out up to 8' x 24' SIPs to fabricate?
- Does the contractor have the required accessories, including fasteners, tape and sealant?

- Are the headers being sized properly and span charts being followed adequately, according to structural details as developed by a code report, design professional or manufacturer instructions?
- How will waste be managed?
- Something else to keep in mind: when cutting on site, flakes and fragments of foam will cause what is often referred to as a “snowstorm”.

Unless there is a unique circumstance concerning the design, a manufacturer will likely encourage clients to cut and recess SIPs in the factory. Unlike materials such as dimensional lumber, SIPs are precision-fabricated by use of specialized cutting equipment and factory-calibrated recessing equipment. This is why prefabricated SIPs, as opposed to blank panels, reduce both installation issues and time in the field.

IMAGE 6.1

EIGHT-FOOT-WIDE BLANK SIPs



SIP DESIGN-BP 6.2:

Prefabricated SIPs are designed and cut in the factory to increase speed of installation and improved fit and finish on the jobsite.

Prefabricated SIP packages are designed and cut according to the SIP shop drawings⁴ in a controlled factory environment, typically utilizing specialized cutting equipment. SIPs can have standard or custom electrical

chases and foam recesses fabricated, according to the SIP shop drawings for each project. One of the features of a prefabricated SIP package is that the lumber and the splines are not preinstalled, which allows electricians to access electrical chases at doors and windows, facilitating the installation of multiple gang boxes. This also allows builders to efficiently use lumber and minimize lumber waste onsite by utilizing the material for window and door bucking.

IMAGE 6.2

PREFABRICATED SIPs



⁴ See [SIP Design-BP 5: SIP Shop Drawings](#)

Prefabricated SIPs utilize the factory environment to have the SIPs cut precisely. Each SIP is numbered according to the SIP shop drawings⁵ and marked with a quality control stamp. While lumber and splines will still be required to be installed onsite, prefabricated SIPs eliminate onsite fabricating (i.e., cutting and shaping) and complicated layout of panel shapes and sizes. A prefabricated SIP package helps to speed dry-in time of the envelope. Another benefit of prefabricated SIPs is they greatly reduce the amount of waste on the construction site.

A prefabricated SIP package may include:

- lumber material (sill and top plate)
- SIP spline material according to the SIP shop drawings
- sealant and tape for all joints, with application gun
- screws, nails and long SIP screws for connecting SIPs
- structural components such as beam packages for structural support
- weatherization package

SIP DESIGN-BP 6.3:

An RTA package includes internal lumber and headers provided and preinstalled in the factory to maximize speed and efficiency onsite.

RTA (Ready-to-Assemble) SIP packages are ready to install (other than sealants and taping) when they arrive at the jobsite, eliminating the time needed to perform the

individual jobsite operations required for blank SIPs or prefabricated SIPs.

RTA packages include internal lumber and headers provided and pre-installed in the factory to maximize speed and efficiency onsite. With a fully customized RTA package, all the rough openings will be factory cut and bucked out, ready to receive doors and windows. Wiring chases and beam pockets are also factory installed. The RTA package may include plate material, house wrap, seam tape, sealant and application gun, SIP screws, SIP shop drawings, and support beam packages as needed.

Not all SIP manufacturers may provide an RTA package. Check with specific manufacturers.

IMAGE 6.3

RTA (READY-TO-ASSEMBLE) SIP PACKAGES

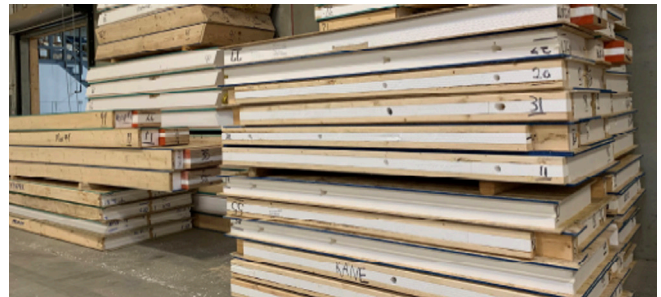


IMAGE 6.4

RTA (READY-TO-ASSEMBLE) SIP PACKAGES



⁵ See [SIP Design-BP 5: SIP Shop Drawings](#)

Glossary of Terms

Blank SIPs: require the most amount of onsite preparation. A blank SIP is the most basic SIP with typically no cutting or fabrication, thus limiting the possible offsite construction installation speed advantage, creating additional jobsite waste, and requiring a higher degree of installation skill as all cutting is performed onsite.

Dimensional lumber: lumber that is cut to pre-defined, standard sizes (2x, 3x, 4x). Note that the NDS (National Design Specification) defines 1x sizes as boards.

OSB: oriented strand board, a wood structural panel.

Prefabricated SIPs: require an intermediate amount of jobsite preparation. Prefabricated SIPs are designed and cut in the factory to increase site installation speed, improving fit and finish.

RTA SIP packages: require the least amount of onsite preparation. RTA (Ready-to-Assemble) SIP packages include factory preinstalled internal lumber and headers.

SIP fabrication: the process of cutting/shaping to specific dimensions as specified on the SIP shop drawings – all in a controlled environment at the SIP manufacturing facility under expert supervision. The SIPs are numbered for ease of installation. Door/window openings, top plates, splines, embedded lumber, sealants and many other options are included and delivered to the jobsite as a “Prefabricated SIP.”

SIP installation: the onsite process of assembling a SIP package by connecting, fastening and sealing according to the SIP shop drawings.

SIP lamination: the process of adhering a foam core (typically expanded polystyrene EPS) to the two external facers (typically OSB) according to stringent quality standards at an audited/code approved manufacturing facility to create a structural insulated panel (SIP).

SIP shop drawings: drawings showing more detail than the architectural/construction documents regarding the SIPs. The SIP shop drawing explains the fabrication and/or installation of the SIPs to the SIP manufacturer’s production crew and the contractor installation crews. Refer to [SIP Design Best Practices 5: SIP Shop Drawings](#).

SIPA: Structural Insulated Panel Association (www.sips.org), a non-profit trade association representing manufacturers, suppliers, dealer/distributors, design professionals and builders committed to providing quality structural insulated panels for all segments of the construction industry.

SIPs: Structural Insulated Panels, a high-performance building component for residential and light commercial construction.

Top plate: a horizontal member positioned between the SIP facers above the foam. Sits under the cap plate. For illustration, refer to Details 3.1 and 3.2 in [SIP Design Best Practices 3: SIP Structural Capabilities](#).

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