

Foam Laminates

of Vermont

Installation Guide for Structural Insulated Panel Homes



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Introduction

Foam Laminates of Vermont has been manufacturing SIPS for over 30 years. The building industry has changed dramatically over the years. We are building more complicated structures, on an accelerated schedule, in all seasons and weather, with a greater variety of materials and a greater number on contractors. Adding into the mix an intense focus on energy efficiency and even the best of new building systems will require a thoughtful application and installation.

This manual gives you the information you need to match the quality of the installation to the quality of the system. Our SIP systems are energy efficient, engineered for strength, with designer flexibility, and lasting excellence.

We believe the way to build a high performance buildings that are safe, comfortable, durable and efficient- is to manage the flow of air and moisture in, around and through the building. Structurally insulated panels installed correctly and a properly sized and installed HRV system will achieve this.

Following the steps in this manual will help to assure a high performance home to enjoy for years to come.

We also have an experienced installation crew that can travel to your site. We can send one of our install techs if you have a local crew that is unfamiliar with SIPS.

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Panel Delivery

Our SIPS are almost always delivered by tractor trailer truck. The panels are stacked on a flatbed trailer with tarps over them. Typically the panels are unloaded with an all-terrain fork lift. This fork lift is the responsibility on the home owner. The truck driver allows for 2 hours unloading. Anything after 2 hours is billed at \$80 per hour.

This truck is 70 feet long so site access is important. If you know this truck will not fit in your site you will need to make special arrangements ahead of time. Sometimes we can deliver with a smaller truck. Most times home owners find a different spot to unload and the SIPS are shuttled to the job site.

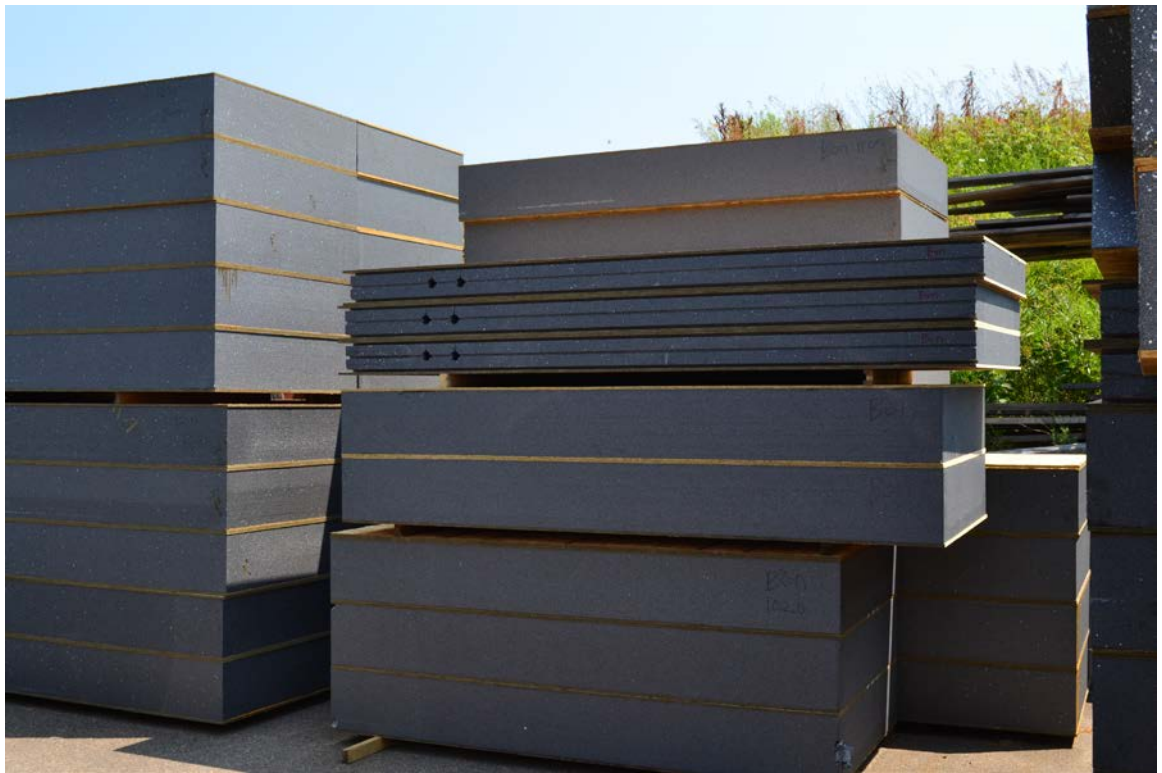


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Panel Storage

It is important that your SIPS stay dry when they are stored on site. We recommend that SIPS be stacked at least 3” off the ground. They should be covered with tarps or plastic if it is going to rain. OSB can swell when it gets wet. This can make installation more difficult at times. Make sure your splines, spray foam, fasteners, and tools are in a dry place as well.



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SIP Tools

All Structural Insulated Panel quotes from Foam Laminates of Vermont include tools to help ease SIP installation. These are the tools we provide:

Panel Saw

Our panel saw is an attachment made by Prazi USA. It is essentially a chain saw bar and a gear box that mounts to a circular saw. This kit fits 7-1/4" circular saws manufactured by Skil, Bosch, Dewalt, Craftsman, Black & Decker, Rigid, Milwaukee, Porter Cable, Hitachi, and Makita. (Excluding Front Plate Adjustable Saws)

We can also get a kit for worm drive saws. Please tell us when making your order if you want the worm drive kit.

This kit is used to cut your SIPS. This will be used to cut panels to length and width. It will also be used to cut window and door openings.

If you elected to purchase a full pre-cut from Foam Laminates of Vermont this tool won't be necessary.



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Hot Knife

The hot knife is a hot iron used to recess foam for 2x lumber. This tool has an adjustable bar for depth. Caution should be used with this tool. It gets very hot.



Foam Gun

The foam gun is to be used in conjunction with the cans of spray foam that we send with your SIPS. It is very important to foam all your panel joints after all the SIPS are installed. Always leave a can of foam on the foam gun! If you remove the can and leave the gun the foam inside will harden which will ruin the gun.





Building a Structural Insulated Panel Home

A structural house by definition utilizes the SIPs for both the walls and the roof. Typically there are a few structural members present to help support the roof panels. There is no timber frame in a structural house.

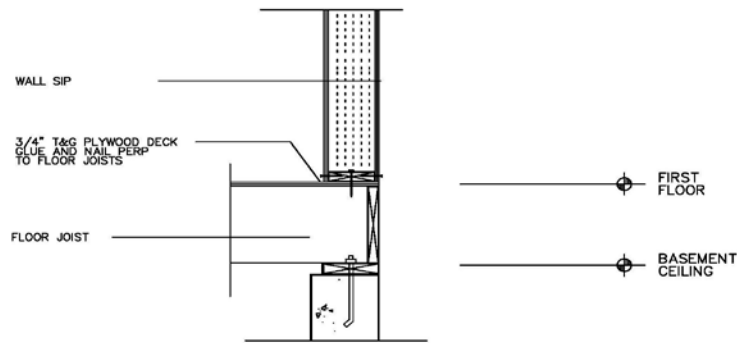
First Floor Deck

Typically the first floor wall SIP sits directly on top of the first floor deck. The outside face of the SIP is flush with the outside of the deck. The deck will be insulated by a separate contractor. Spray foam is the most popular choice for this area.

The first step is to check the deck to make sure it is square. This is important because the rest of your house will depend on a square deck. Square up the deck if necessary. Once the deck is square you will need to chalk lines for the sill plates. You can chalk lines 7/16" from the edge of the deck. This will represent the edge of the 2x6 sill plate. The next step is to lay down sill sealer. This

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material will ensure a tight air seal between the plate and the deck. Now it is time to lay down plates.



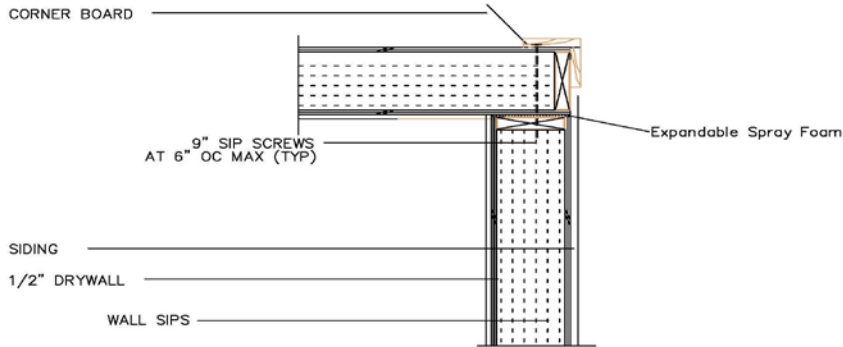
STRUCTURAL SIP WALL DETAIL
SCALE: 1"=1'-0"

A SIP corner is made by running one panel by the other. (See Detail 1) This is important to remember when laying plates. You need to have a 1/2" gap between plates at all corners. This allows the inside skin of OSB to slide between the plates.

2x6 plates are typically fastened with galvanized ring shank nails or screws. Nails are typically faster with modern pneumatic nail guns. Once all your plates are down you can move on to installing

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your first floor wall SIPS.



DETAIL #01

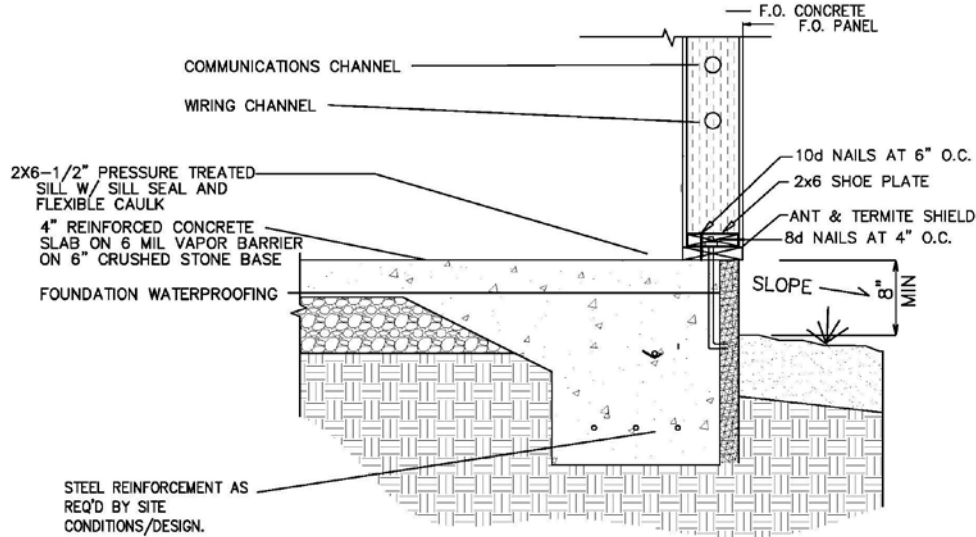
Slab Detail

There are several different ways to apply SIPS to a slab. We typically like to see a concrete curb around the perimeter to the slab. The SIPS would sit on top of this curb. The detail keeps the bottom of the panel elevated and away from moisture. Panels can be applied directly to a slab if you do not have a curb. The process is the same for both details.

First you will need to lay down a sill plate. This is always pressure treated material. It needs to be the same width as your wall panels. Typically a 2x8 is ripped to 6-1/2" for a standard wall panel. This sill plate will be bolted to your slab or curb. Make sure sill seal is used between this plates and the concrete.

Add another layer of sill seal to the 2x PT plate. Apply a 2x6 plate in the center of the PT sill plate. This will act as your shoe plate for your wall SIPS. See the detail below for illustration.

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FLOATING SLAB DETAIL

SCALE: NTS

First Floor Wall SIPS

The first step is to apply triple expanding spray foam on top of the 2x6 plate. This will need to be done right before applying each SIP. Concussion collapses this spray foam so caution must be taken when applying SIPS. Typically all your first floor SIPS will be recessed on the bottom to accept a plate.

Openings

Window and door openings should be laid out on the plates if they require a header. Panel joints usually land on the edge of these openings so 2x lumber can be added to support headers. Headers should be pre-built and ready for installation. Each panel joint will have 2 studs on each side of the header. One will extend from the bottom plate to the top plate. The other will extend from the bottom plate to the bottom of the header. You will need to frame these openings as the panels are installed. A panel will be provided to slide over the header. This panel will be run horizontally.

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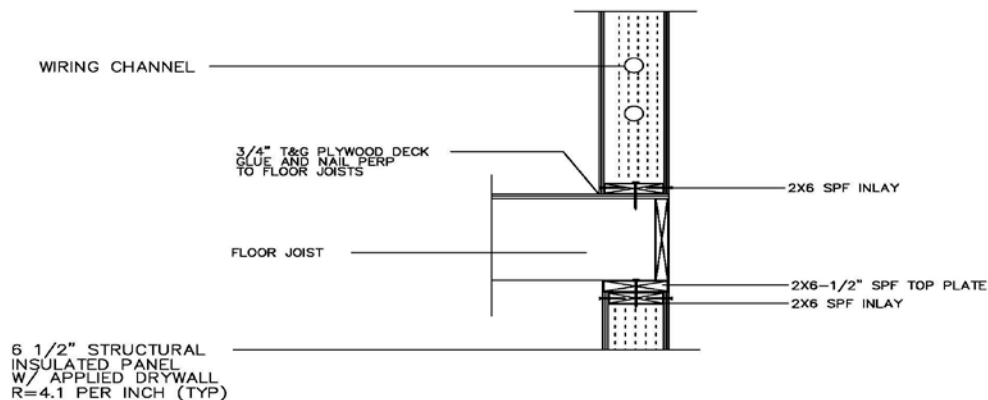
Small openings without headers will be cut out of the SIPS after they are installed. This will be done with the Prazi saw and your hot knife. These openings can be laid out on the inside of the panel.

Starting Panel Installation

We recommend starting panel installation at a corner. Creating the corner will help the panels stand on their own. You will need to install a 2x6 in the side of the inside corner panel (See Detail 1). This is necessary to fasten the corner together. Holes should be drilled in this 2x6 at all electrical chases. Make sure the corner is square and plumb before fastening the whole corner.

The next step is to install more wall panels. Typically panels are stood up next to one another. 3" OSB splines are dropped into the spline channels from the top. Splines are fastened with 8d Galv. Ring shank nails. Do not fasten all splines until the wall panels are plumb. Wall sections should be braced.

All walls should be plumb, square, and straight before top plates are installed. Top plates consist of a 2x6 SPF plate inlaid into the top of the SIP with a 2x8 ripped to 6-1/2" acting as the double top plate. Plates should lap at corners to add rigidity to the wall sections. See the detail below.



TOP PLATE DETAIL

Once the walls have plates the second floor deck can be framed. Typically the second floor is framed directly over the SIP, much like it would be with standard platform framing. This can be seen in the detail above. All first floor interior partitions should be framed at this time as well.

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Second Floor Walls

Framing second story walls with SIPS is the same process as the first floor. All the same steps can be applied. Gable panels will need to be cut to size. The top should be recessed 1-5/8" with your hot knife to accept a 2x6 plate. Walls should be braced, plumb, square, and straight before proceeding to the roof.



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Roof Options

Structural insulated panel homes have two typical roof systems. The first is conventional trusses over the SIP walls. The second is using SIPS to create your roof with support beams or TJI splines.

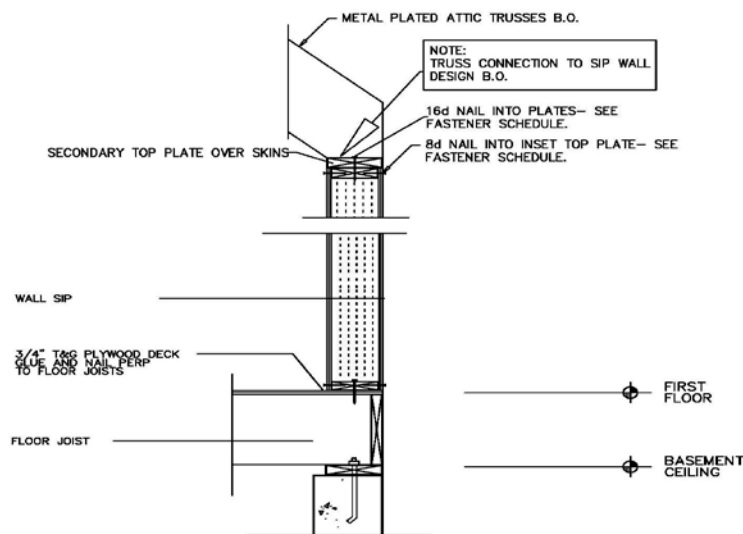
Trusses

Conventional trusses are probably the most popular method for creating a roof over SIP walls. These trusses can be insulated with blown in cellulose to create an R value of up to 100. This method coupled with the high performance nature of the SIPS will create a very tight home.

Flat ceiling trusses will get framed over all the wall SIPS including the gables. This will ensure that the insulation covers the top of the walls to create a tight seal. In this case all of you wall SIPS would be framed to the same height. The double top plate will need to be in place before the trusses are set.

Sloped ceiling trusses (Scissor Trusses) will mean the wall SIPS will need to be framed different. With sloped trusses the gable SIPS will extend all the way to the top of the roof line. This means the panels insulate the gable ends.

Trusses will need to be set with a competent crew and a crane. Bracing should be readily available to keep the trusses upright. See the detail below.



STRUCTURAL SIP WALL DETAIL
SCALE: 1"=1'-0"

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Structural Insulated Panel Roof

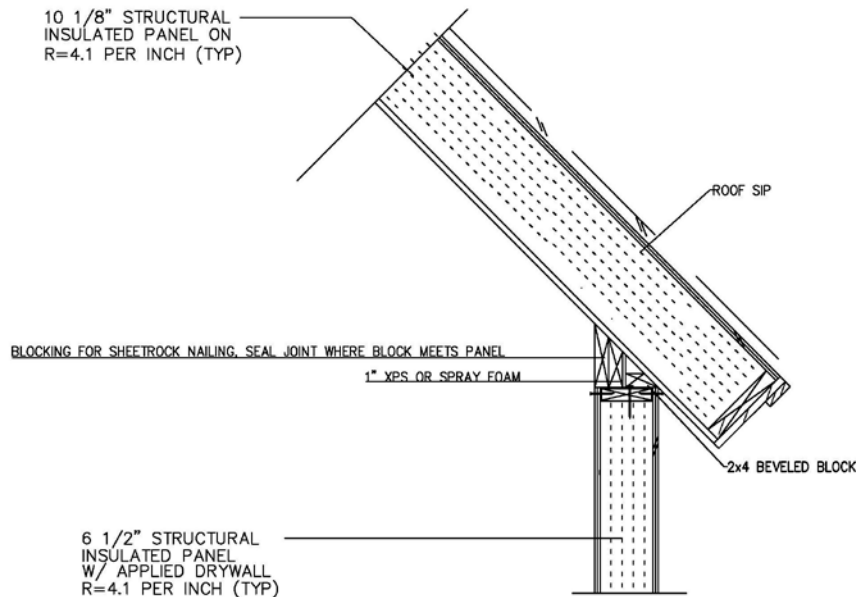
Our structural insulated roof panels can span 10'-12' before they need structural support. Structural support is usually added with 3 different methods.

TJI Splines w/ Ridge Beam

You will need a structural ridge beam to support the roof SIPS. This can either be a free span ridge or a ridge with a post. You will need to cut beam pockets in the gable end SIPS to accept this ridge beam. Beam pockets need to have 2x6 lumber inlaid around the pocket. If you bought pre-cut SIPS this beam pocket will already be in place.

Your ridge beam should be lifted into place with a crane. The top of it should be pre-beveled the same angle as the roof slope.

Your eave wall panels will need a beveled block on top of the secondary top plate. This block should be cut to the same slope as the roof. This block is added so that the SIP can be fastened to the top of the wall using SIP screws.

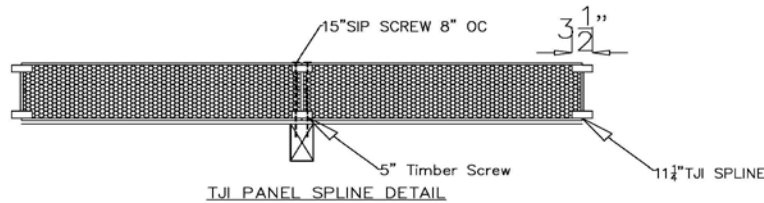


Beveled Block Detail

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TJI splines can be placed between each SIP to add strength to the assembly. Your roof SIPS will come pre-routed to accept this TJI if they are ordered that way. Installing TJI's is as simple as adding them between each panel during installation. These splines should be nailed top and bottom through the OSB skin of the SIP. We also recommend applying a bead of spray foam to each TJI before it is installed.

Use the SIP screws provided with your kit to fasten all roof SIPS to both the walls and the ridge beam.



Structural Ridge Beam w/ Purlins

Your eave wall panels will need a beveled block on top of the secondary top plate. This block should be cut to the same slope as the roof. This block is added so that the SIP can be fastened to the top of the wall using SIP screws.

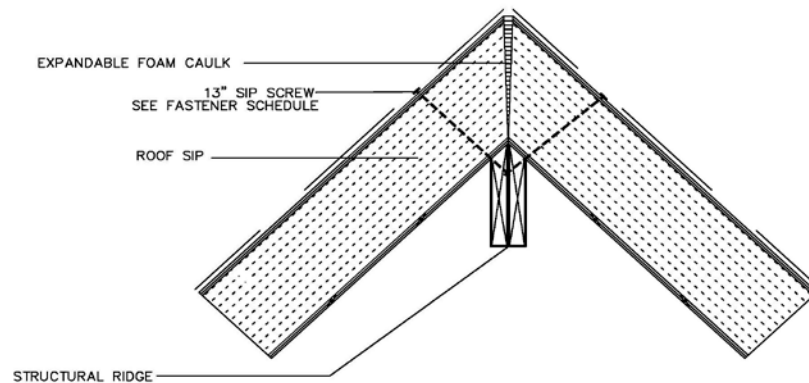
You will need a structural ridge beam and structural purlin to support the roof SIPS. These can either be a free span or a beam with a post. You will need to cut beam pockets in the gable end SIPS to accept these beams. Beam pockets need to have 2x6 lumber inlaid around the pocket. If you bought pre-cut SIPS this beam pocket will already be in place.

Once the beam pockets are cut and framed you can lift the beams into place with a crane. The top of the beams should be pre-beveled the same angle as the roof slope. Once the beams are in place you can start applying roof SIPS.

SIPS will be applied in a vertical orientation with a single 3" spline on the top and the bottom. The 3" splines will need to be applied as the panels are put together. Splines should be

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fastened with 8d galv. Ring shank nails. Panels need to be fastened to the walls, purlins, and ridge beam with the SIP screws applied in your kit.



RIDGE DETAIL

Load Bearing Interior Partitions

Roof SIPS can be supported by interior partitions. These partitions will need to be framed after the wall panels are installed and before the roof SIPS go on. Partitions should either be beveled on top or square with an added beveled block.

Your eave wall panels will need a beveled block on top of the secondary top plate. This block should be cut to the same slope as the roof. This block is added so that the SIP can be fastened to the top of the wall using SIP screws.

SIPS will be applied in a vertical orientation with a single 3" spline on the top and the bottom. The 3" splines will need to be applied as the panels are put together. Splines should be fastened with 8d galv. Ring shank nails. Panels need to be fastened to all interior and exterior walls with the SIP screws applied in your kit.

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After Installation

Once wall and roof SIPS are installed you can move on to finishing SIP related items. These items include, cutting windows, nailing off splines, foaming, installing 2x lumber, and wrapping your SIPS with water proof membrane.

Roof Foaming

All of the SIP joints in your roof should be foamed immediately after installation. All roof splines should be nailed off before foaming starts.

We like to use a drill and fill method. A drill with a 3/8" bit will be needed for this. Wrap tape around the bit to set your depth to the foam channel in the center of the panel. Start at the ridge drilling holes every 8"-10" in all the panel seams. Once all the holes are drilled you can start foaming. Start at the ridge and work your way down. Spend 3-4 seconds per hole foaming. You should start to see foam creeping into the next hole.

FLV recommends foaming in temperatures above 40 degree Fahrenheit. Spray foam expands much better in these temperature ranges which will provide a better seal. If foaming must be done in colder temperatures you will need to water mist the foam which will help expansion.



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Cold roof

Many of our customers ask whether or not we recommend venting the roof with strapping and another layer of sheathing. This is a pretty common procedure when using roof SIPS. This is achieved by running strapping over your roof SIPS and adding an extra layer of sheathing. This will create an air space over your SIPS which will let them dry out if moisture escapes.

We feel a cold roof is not necessary if your roof SIPS are sealed properly. The cold roof can prevent rotting if you have heat escaping through your SIP joints. However, if your SIPS are installed correctly there will be no heat loss.

Many shingle manufacturers will not warranty their shingles over an unvented roof. It is worth looking into if you plan on applying asphalt shingles on your roof.

Metal roofing is commonly used over roof SIPS. This can be applied directly to the SIP or over a cold roof. We do not recommend an air space between the metal and the SIP. This can cause condensation under the metal which may cause rusting.

Roof Paper

We recommend 30# felt because it works great for protecting your SIPS. Builders have been using this for years. Often times roofing is tore off 10-15 years down the road for additions and the OSB still looks brand new. The same cannot be said for synthetic products. Many times builders find rotten plywood with these products. Asphalt felt has a permeance rating of only 5 perms when dry, but a much higher rating of 60 perms when wet. The felt can soak up water that gets behind it and gradually dry to the exterior. Plastic house wraps are non-absorbent. Any water trapped behind them can only pass through to the exterior as vapor.

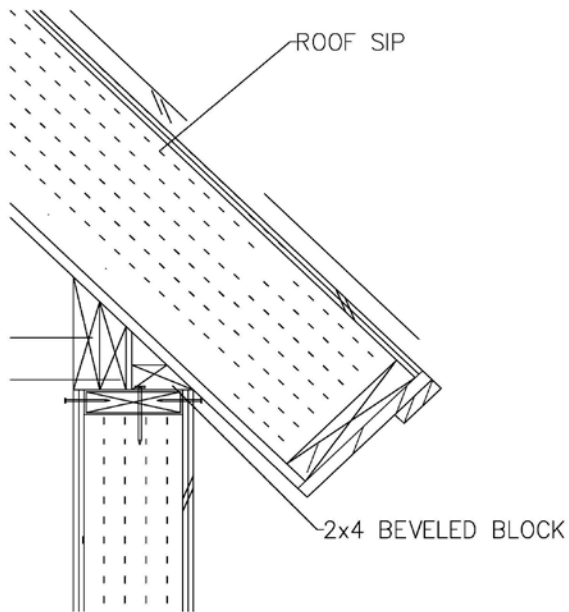


This paper should be applied to the roof as soon as the spray foam is cured. This will keep your SIPS dry in inclement weather.

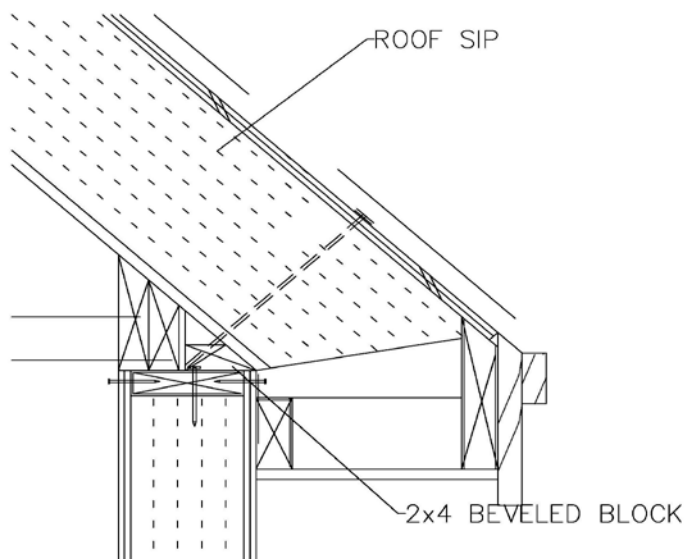
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Sub Fascia

Sub Fascia should be installed along the roof before roofing is applied. If you went with a square detail this will be as simple as routing out the edges of the panels with your hot knife and adding 2x lumber to the edges. The 2x lumber should be fastened to the OSB skins using 8d galv ring shank nails.



If you went with a flat soffit detail you will need to build ladders on the ground and put them into place.



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Window Cut outs

Any window cut outs that were not framed during wall panel installation should be cut at this time. This will be done with the Prazi saw and your hot knife. These openings can be laid out on the inside for the panel. Lines should be chalked to represent the edges of the opening.

After the opening is cut you will use the hot knife in your kit to rout the edges to accept a 2x6. Once all foam is routed you can install the window lumber. Apply a bead of foam to all 2x6 lumber before installation. Tap the lumber into place lightly so you don't collapse the foam. Lumber should be fastened through the OSB skin with 8d galv. Ring shank nails.

Wall Foaming

Do not foam your walls until all wiring is done, window cut outs are finished, and splines are nailed off. Wall foaming should be done before windows and doors are installed. This will ensure that you do not get spray foam on your windows and doors.

Wall foaming is done much like the roof. You need to drill holes in all panel seams 8"-10' apart. Make sure you chalk lines where all electrical chases are located so you do not drill into the wiring. Once all holes are drilled you can start foaming. We recommend starting at the top of each seam and working towards the bottom. 3-4 seconds for each hole should suffice.

FLV recommends foaming in temperatures above 40 degree Fahrenheit. Spray foam expands much better in these temperature ranges which will provide a better seal. If foaming must be done in colder temperatures you will need to water mist the foam which will help expansion.

Wall Covering

We recommend 30# felt because it works great for protecting your SIPS. Builders have been using this for years. Often times siding is tore off 10-15 years down the road for additions and the OSB still looks brand new. The same cannot be said for products like Tyvek and Typar. Many times builders find rotten plywood with these products. Asphalt felt has a permeance rating of only 5 perms when dry, but a much higher rating of 60 perms when wet. The felt can soak up water that gets behind it and gradually dry to the exterior. Plastic house wraps are non-absorbent. Any water trapped behind them can only pass through to the exterior as vapor.

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Home Slicker®:

Home Slicker® is a product that creates an air space between your siding and your felt paper/SIP. This product will ensure that the SIP and your siding will dry out in the event that water gets behind the siding. This product is not needed for Vinyl siding. The air space created by this product will reduce the forces that draw water into your siding assembly. Water that does migrate into this area will drain away from the wall and allow the cavity to dry quickly.



Siding Options

Shiplap: We recommend adding furring strips to your SIPS for shiplap siding. This will increase the fasteners holding power. We recommend ring shank nails for application. Adding furring strips negates the need for Home Slicker because this will create an air space behind the siding.

Vinyl Siding: Home Slicker is not needed for this product. Vinyl is applied with roofing nails. See manufacturers' recommendation for fastening intervals.

HardiePlank®: HardiePlank is a very popular siding choice by many of our customers. We recommend installing this product over Home Slicker®. Please see the following link for fastening requirements.

<http://www.jameshardie.com/pdf/technical-bulletins/12-installation-over-sips.pdf>

Clapboards/Shakes: We recommend installing these products over Home Slicker®. Typical installation is done with galvanized ring shank nails.

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In summary, your SIP installation should be done in the following order:

1. Square up the deck
2. Lay 2x plates
3. Stand up wall SIPS
4. Add top plates/bevel blocks to top of wall SIPS
5. Install structural members for roof
6. Install roof SIPS
7. Foam Roof
8. Add 30# felt to roof
9. Install Sub-Fasica
10. Run Electrical
11. Cut left over openings
12. Nail off wall splines
13. Foam Walls
14. Paper walls

If you have taken the steps in this manual during your SIP installation you will have a high performance wall and roof system that will be reliable for years to come. If you have any questions about your SIP installation, please do not hesitate to contact Foam Laminates of Vermont.