

## SIP DESIGN-BP 9:

### SIP Electrical

This document is created specifically for builders 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 Building with SIPs: NEED TO KNOW overview which highlights important considerations during the construction 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 construction 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
7. SIP Installation
8. SIP Roof and Wall Assemblies

#### 9. SIP Electrical

- 9.1. Vertical and horizontal chases are provided in SIP walls assisting with wiring at outlet and switch heights.
- 9.2. Wall and roof chases can be added or removed, prior to SIP manufacture.
- 9.3. Shop drawings will confirm all chase locations to avoid cutting SIPs in the field unnecessarily. Pre-planning for installation and special chase locations is critical.
- 9.4. Electrical chases should be sealed after electrical rough-in inspection to maximize airtightness.
- 9.5. An experienced SIP installer helps your electrical rough-in go smoothly.
- 9.6. Recessed lights are not recommended for installation in SIP roofs. Use of surface mounted LED lighting is recommended.
10. SIP Plumbing

## SIP BUILDER-BP 9.1:

**Vertical and horizontal chases are provided in SIP walls assisting with wiring at outlet and switch heights.**

SIP manufacturers may provide electrical wiring chases in wall panels. The chases are approximately 1-1/4" in diameter and are located in the foam insulation core of the SIP. Horizontal chases in the wall panels are located at switch and outlet heights, approximately 14" and 48" from the bottom of the panel. Vertical chases are located approximately 4' on center in the wall panels. Additional chases may be added. Consult the manufacturer that you are working with.

The sill plates, top plates, cap plates and lumber splines need to be drilled with an approximate 1-1/2" diameter drill bit when the panels are being installed by the installation crew at the vertical or horizontal chase locations. These holes facilitate the installation of the electrical wires during the electrical wiring process.

To gain access to chase intersections, use a 4" hole saw. Alternatively, jigs can be used to cut/router the rectangle box. Use a flat blade screwdriver to pry out the plug. Save the plug for reinstallation. After pulling your wires, reinsert the plug using panel sealant or expanding foam. See Images 9.1, 9.2 and 9.3.

Refer to your SIP manufacturer's SIP shop drawings (also known as layout drawings) for electrical chase placement. Placement or location of electrical chases may vary by manufacturer.

IMAGE 9.1

**INSTALLED LIGHT SWITCHES AND OUTLET BOXES WITH ACCESS PLUGS ON FLOOR.**



Note: sealant/expanding foam not shown. See section SIP BUILDER-BP 9.4 on page 7 for details regarding sealant/expanding foam.

IMAGE 9.2

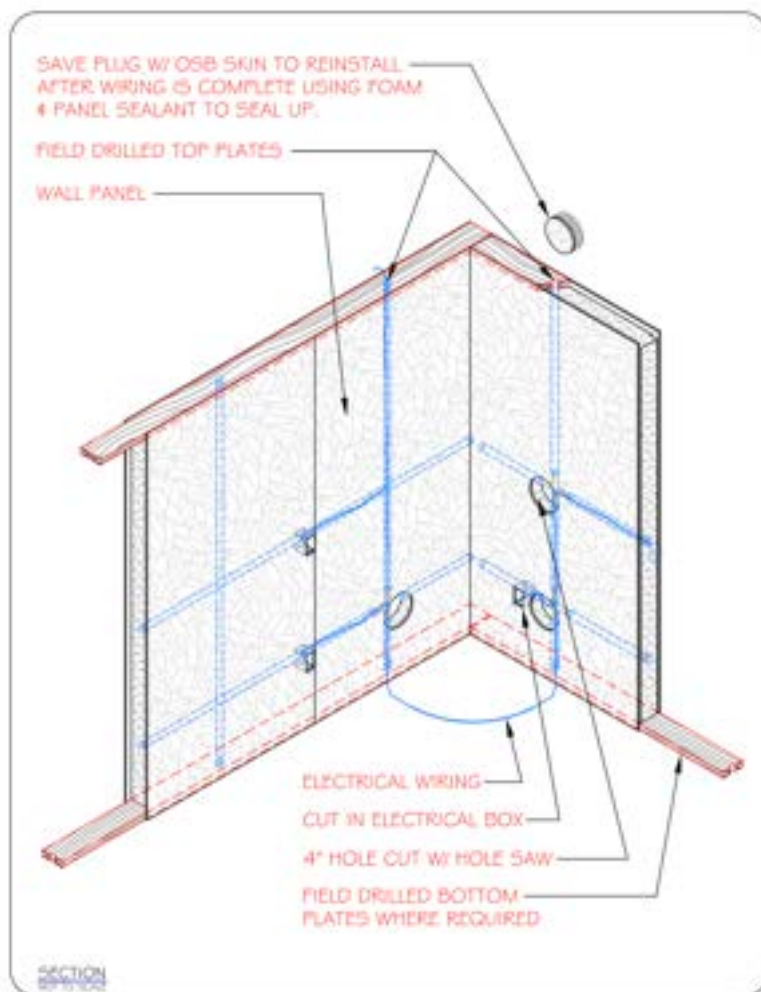
## VARIOUS ELECTRICAL BOX INSTALLATIONS IN SIP WALLS



Note: sealant/expanding foam not shown. See section SIP BUILDER-BP 9.4 on page 7 for details regarding sealant/expanding foam.

IMAGE 9.3

## DIAGRAMMATIC REPRESENTATION OF ELECTRICAL CHASES



IMAGES 9.4A AND 9.4B

## STACKED SIP WALLS WITH ELECTRICAL WIRING CHASES



IMAGES 9.5

## SILL PLATE DRILLED FOR ELECTRICAL CHASE



IMAGE 9.6

## CEILING BOX INSTALLATION IN SIP ROOF



Note: shows installation in process, prior to addition of fasteners and sealant/expanding foam.

IMAGE 9.7

## WALL FRAMED OUT TO ACCOMMODATE ELECTRICAL BOX AND WIRING

Note: sealant/expanding foam not shown. See section **SIP BUILDER-BP 9.4** on page 7 for details regarding sealant/expanding foam.



SIP BUILDER-BP 9.2 and 9.3:

**Wall and roof chases can be added or removed, prior to SIP manufacture. Shop drawings confirm all chase locations to avoid unnecessary cutting of SIPs in the field. Pre-planning for installation and special chase locations is critical.**

Electrical chases are cut prior to adhering facers to the SIP's core. Therefore, it is important that proper chase locations be confirmed prior to project entering production.

Aside from "standard" chases, referenced in section SIP BUILDER-BP 9.1 on page 3, it is possible to add additional chases. Consideration must be given to the number and location of chases. It is important to remember that a SIP functions as a composite, with each material acting together to create a structural component far greater than any of the materials tested independently. Should electrical chases need to be added at a later date, consult the manufacturer for guidance.

Typically, the standard factory electrical chases are sufficient to provide adequate access for electrical runs; however, it would be best for the builder and electrician to review the SIP shop drawings<sup>1</sup>. Let your SIP manufacturer know if you would like to add any additional electrical chases within the SIPs.

While field modifications are possible, images 9.8 and 9.9 illustrate what should NEVER be done. Never cut grooves/channels in the facer of a panel. Grooves or channels in the facer can seriously compromise the structural integrity of your panels. Consult your SIP manufacturer with any questions.

IMAGE 9.8 AND 9.9

**WHAT NEVER TO DO: CUT GROOVES/CHANNELS IN THE SIP FACER FOR ELECTRICAL OR PLUMBING**



## SIP BUILDER-BP 9.4:

### **Electrical chases should be sealed after electrical rough-in inspection to maximize airtightness.**

All penetrations made in the SIP facers need to be sealed with expanding foam to minimize air flow through the chases. This is important to do after the electrical rough-in and inspection is complete around all electrical box locations. It is important that both the general and electrical contractors decide who is responsible for the sealing process to avoid handoff confusion.

The process can be done simply by using expanding foam similar to what is used around windows and doors. Placing a small amount of expanding foam behind the box, where it intersects with the horizontal or vertical electrical chases in the foam insulation core, will minimize air movement.

It is important to use this same process to seal off holes that were drilled through sill and top plate locations in SIP walls and in SIP roof overhang locations.

## SIP BUILDER-BP 9.5:

### **An experienced SIP installer helps your electrical rough-in go smoothly.**

The SIP installer should drill approximately 1-1/2" diameter holes in the vertical splines, top plate, cap plate of the walls, as well as the sill plate in multilevel construction for the vertical chases, and in the splines connecting the panels for horizontal chases. See Image 9.5.

If these holes are not drilled at these locations in the wall SIPs, the electrical rough-in will be very difficult. An experienced SIP installer helps ensure this necessary step.

RSMMeans studies have shown that electrical installation with SIPs is equivalent to standard stick- frame construction and does not require extra time. See this short video about Electrical & SIPs in the SIPA series **Selling SIPs: Benefits and Common Objections.**

## SIP BUILDER-BP 9.6:

### **Recessed lights (e.g., cans) are not recommended for installation in SIP roofs. Use of surface mounted LED lighting is recommended.**

There are limitations on the type of lighting that can be used in SIP roof or ceiling applications. Recessed or can lights that are intended to be recessed into a finished ceiling are not recommended for application in SIP roofs.

There are two primary considerations with using recessed lighting in SIP roofs. First, the OSB facers

of the SIPs are a key component of the structural integrity of the panel. Secondly, the heat created by the lighting and the reduction of the insulation in the SIP can lead to hot spots on the roof and possible condensation issues. The heat generated from the recessed light fixture may damage the SIP core.

The lighting choices can be resolved in the design stage. Some of the options include the use of track lighting or surface mounted LED lighting. Furring down below the interior roof SIP facer is an alternative for installing recessed lighting. See Images 9.10 and 9.11.

IMAGE 9.10

## FURRING AT RIDGE BEAM OF VAULTED SPACE TO ACCOMMODATE CAN LIGHTING



IMAGE 9.11

## ALTERNATIVE FURRED-DOWN CEILING FOR WIRING AND THIN PROFILE LIGHTING



IMAGE 9.12

## THIN PROFILE LED LIGHT



## Glossary of Terms

**Cap Plate:** Lumber ripped to the width of the SIP wall that bears on the top of both facers of the SIP below. For illustration, refer to Details 3.1 and 3.2 in SIP Design Best Practices 3: SIP Structural Capabilities.

**Channel:** A cut into the OSB facer of a SIP. See Images 9.8 and 9.9.

**Electrical Chase:** A channel in a wall to allow electricians to run their cables in.

**Electrical Cut-out:** An opening in the facer to recess an electrical box.

**Expanding Foam:** Any number of expansion foams or spray foams that are canned-based polyurethane thermal insulation also used for air sealing.

**Groove:** A cut into the OSB facer of a SIP. See Images 9.8 and 9.9.

**Layout Drawings:** See SIP shop drawings.

**Sealant:** A substance used to block the passage of fluid (including air) through materials; a type of mechanical seal. Sometimes called caulk or mastic.

**Sill Plate (SIP wall) (also known as sole plate):** The horizontal pieces of treated wood on a concrete or block foundation on which the OSB facers bear.

**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.

**SIP Tape:** An all-weather vapor-tight joint sealing tape developed for SIPs and other high-performance building envelopes.

**SIPA:** Structural Insulated Panel Association ([www.sips.org](http://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.

**Spline:** Connection system used to connect two panels together at vertical, in-plane joints. Many different spline systems are available including box/block, surface, I-joist, dimensional lumber, and engineered lumber.

**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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