



**Structural Insulated
Panel Association**

**Structural Insulated
Panel Association (SIPA)**

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Residential Design with Structural Insulated Panels

Credit for this course
is 1 AIA/CES HSW
CE Hour

Course number
SIPS101R

**Structural Insulated Panel Association (SIPA)
An AIA Continuing Education Program
Credit for this course is 1 AIA HSW CE Hour**

The Structural Insulated Panel Association (SIPA) is a nonprofit association representing manufacturers, suppliers, dealer/distributors, design professionals and builders committed to providing quality structural insulated panels (SIPs) for all segments of the construction industry.



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AN AMERICAN INSTITUTE OF ARCHITECTS CONTINUING EDUCATION PROGRAM

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AN AMERICAN INSTITUTE OF ARCHITECTS CONTINUING EDUCATION PROGRAM

- Course Format: This is a structured, live, instructor-led course
- Course Credit: 1 Health Safety & Welfare (HSW) CE Hour
- Completion Certificate: A copy is sent to you by email upon request. When you fill out the Course Attendance, please indicate if you need one. Also please ensure the information you provide is legible. Send email requests to info@sips.org



*Design professionals: **Certificates of Completion
are sent to your email address***

Course Description

- This course will explain the benefits of designing with structural insulated panels (SIPs) for residential applications.
- The design professional will gain a better understanding of application, assembly and detailing in order to properly utilize SIPs for optimum energy efficiency and durability.
- Through case studies and design strategies, attendees will better understand designing for current industry standards with SIPs.

LEARNING OBJECTIVES

By completing this course, the design professional will be able to:

1. Describe and define SIPs & their residential applications
2. Explain energy-efficiency design strategies utilizing SIPs
3. Illustrate SIP design and engineering methods
4. List and describe current industry assembly standards

COURSE OUTLINE

- SIP basics
- SIP applications
- Energy efficiency and green building with SIPs
- Designing with SIPs
- Engineering for SIPs
- SIP manufacturing
- SIP construction

WHAT IS A SIP?



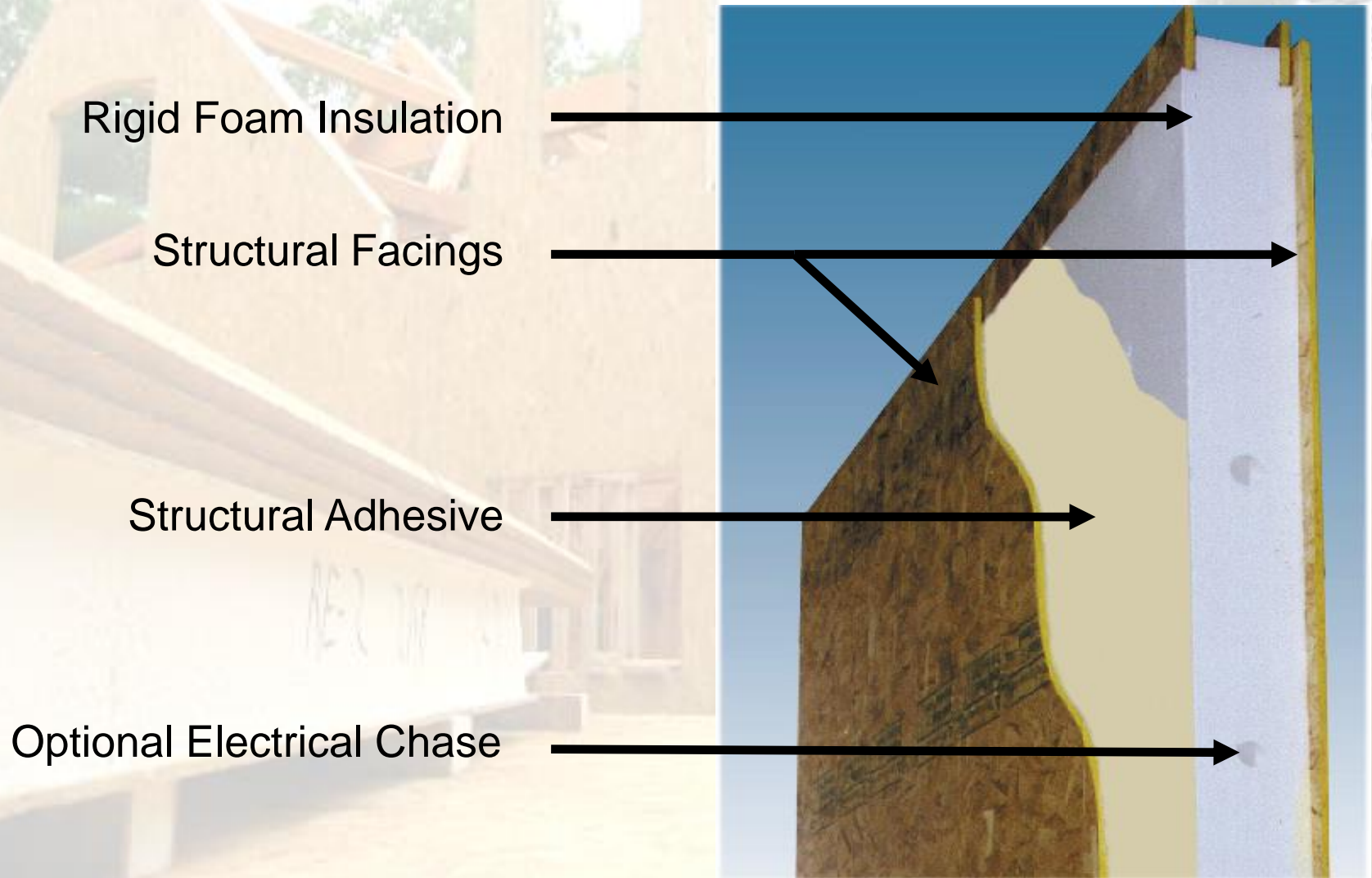
S = Structural

I = Insulated

P = Panel

- Composite structural panel
- Rigid foam core of EPS/GPS, XPS or PU
- Structural facings - usually 7/16" OSB
- Structural adhesive

WHAT ARE SIPs?

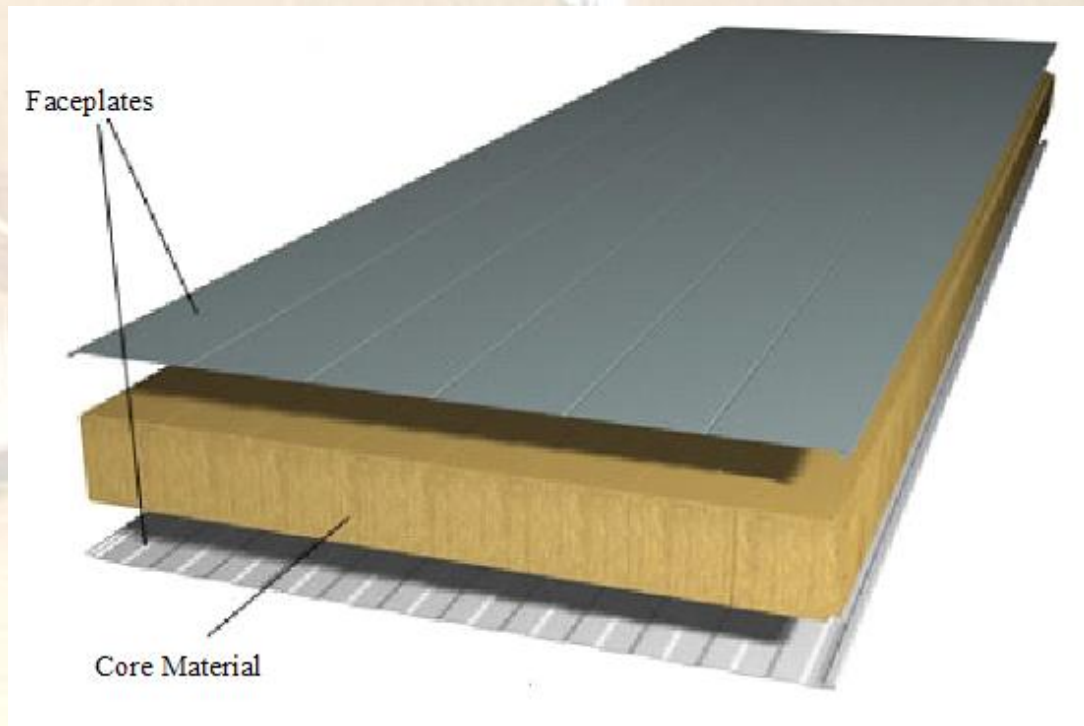


BACKGROUND of SIPs

- Developed as “stressed-skin” panels in 1930’s
- Foam cores introduced in 1969 forming modern structural insulated panels
- Minimize framing by using panel facers (skins) to carry loads. SIPs replace traditional wall studs to provide a better R-value over the entire wall surface (whole-wall R-value)
- OSB is the load bearing element, instead of studs. SIP bearing area equivalent to 2x10 studs @ 16”oc

TYPES OF SIPs

Insulated metal wall panels - **not structural load bearing**



TYPES OF SIPs

Also available
with cementitious
skins - these are
heavier than SIPs
with OSB skins.



Note: Pre-fabricated, pre-insulated stud wall panels are not SIPs

WHY SIPs?

1

A *simple*, energy-efficient, insulating framing system.

2

Exceed code requirements, while delivering more *comfortable*, durable buildings minimizing time, money and labor.

3

Future-proofs a legacy to meet more demanding, upcoming standards with a third-party verified & engineered *sustainable* solution.

SIP SPECIFICATION



**Structural Insulated
Panel Association**

STRUCTURAL INSULATED PANELS Guide Specification

Structural insulated panels (SIPs) are a high-performance building system for residential and commercial Type V construction. SIPs consist of an insulating foam core sandwiched between two typically oriented strand board (OSB). SIPs are manufactured under factory-controlled conditions and can be fabricated to fit nearly any building design. The result is a building system that is energy efficient, and cost effective. Building with SIPs will save you time, money, and labor.

A SIP home or commercial building allows for better control over indoor air quality because of the low air leakage through the building envelope.

The components used to make SIPs (foam, OSB, and adhesive) meet some of the most stringent standards for indoor air quality.

SIP homes have qualified under the American Lung Association's Health House® indoor air quality program and the Institute for Business and Home Safety Fortified Program for resilient storm-resistant buildings.

The Structural Insulated Panel Association (SIPA) is a non-profit trade association representing manufacturers, suppliers, dealer/distributors, design professionals, and builders committed to the use of structural insulated panels for all segments of the construction industry. SIPA has been founded in 1990 and has made tremendous progress in advancing energy-efficient construction with SIPs.

Access SIPA's extensive technical library and manufacturer directory at www.SIPs.org. For more information, contact SIPA at (253) 858-7472; info@sips.org.

This document was created by the Structural Insulated Panel Association using best available information for use by design professionals developing project specifications with SIPs.

SECTION 06 12 00 - STRUCTURAL INSULATED PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Structural Insulated Panels (SIPs) and accessories.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for requirements for miscellaneous framing, blocking, and nailers associated with installation of SIPs.
 - 2. Division 07 water resistive barrier section for application on SIP walls.
 - 3. Division 07 roofing section for underlayment application over SIP roofs.
 - 4. Division 09 flooring section for separation layer application over SIP floors.
 - 5. Division 23 Heating, Ventilation, and Air Conditioning (HVAC)

1.2 SYSTEM DESCRIPTION

- A. Structural Insulated Panels (SIPs) consist of oriented strand board (OSB) laminated with a structural adhesive to an expanded polystyrene insulation core and SIP manufacturer-supplied accessories.
- B. SIP manufacturer-supplied accessories.

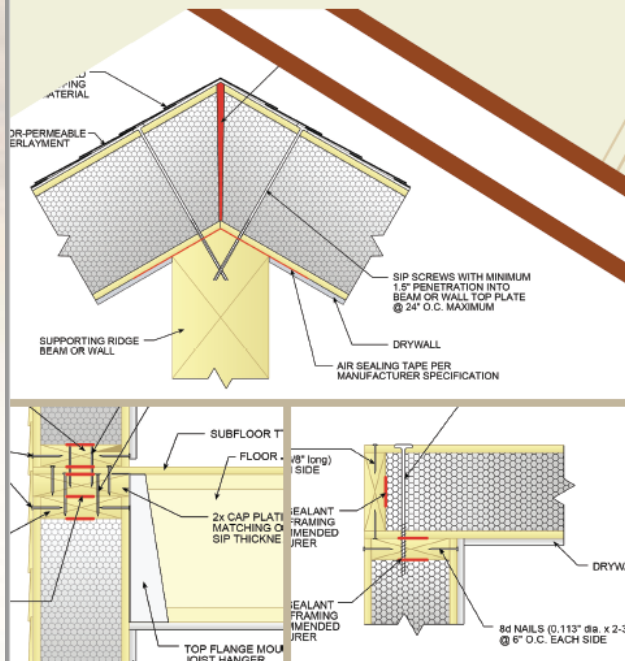
1.3 REFERENCES

- A. ANSI/APA PRS 610.1- Standard for Performance Rated Structural Insulated Panels in Wall Applications.
- B. ASTM C578- Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- C. ASTM D7446- Standard Specification for Structural Insulated Panel (SIP) Adhesives for Laminating Oriented Strand Board (OSB) to Rigid Cellular Polystyrene Thermal Insulation Core Materials.
- D. DOC PS 2- Performance Standard for Wood-Based Structural-Use Panels.
- E. ICC-ES AC05- Acceptance Criteria for Sandwich Panel Adhesives.

1.4 PREINSTALLATION MEETINGS

SIP DETAILS

Structural Insulated Panels (SIPs) BASIC CONNECTION DETAILS



Structural Insulated
Panel Association

Basic Connection Details for SIPs

- Fig. 1 Wall-to-Wall Panel Connections: Corner Wall Connection
- Fig. 2 Foundation Connections: SIP-Wrapped Floor System
- Fig. 3 Foundation Connections: SIP Rim Panel
- Fig. 4 Foundation Connections: SIP Wall on Foundation
- Fig. 5 Foundation Connections: Platform-Framed Floor System (Wall Perpendicular to Joists)
- Fig. 6 Foundation Connections: Platform-Framed Floor System (Wall Parallel to Joists)
- Fig. 7 Surface Spline Connection
- Fig. 8 Box/Block Spline Connection
- Fig. 9 Lumber Spline Connection
- Fig. 10 Window Header and Knee Wall Detail
- Fig. 11 Door and Window Framing for Cut-Outs
- Fig. 12 Rough Opening and Insulated Header
- Fig. 13 2nd Floor Connection Details: Hanging Floor Joist System (Wall Perpendicular to Joists)
- Fig. 14 2nd Floor Connection Details: Hanging Floor Joist System (Wall Parallel to Joists)
- Fig. 15 2nd Floor Connection Details: Platform Framing with Rim Board (Wall Perpendicular to Joists)
- Fig. 16 2nd Floor Connection Details: Platform Framing with Rim Board (Wall Parallel to Joists)
- Fig. 17 Upper Wall to Roof Connection
- Fig. 18 Roof-to-Roof Panel Connections: Beveled SIP Ridge
- Fig. 18a Roof-to-Roof Panel Connections: SIP with Ridge Vent
- Fig. 19 Structural Hip Panel Connection
- Fig. 20 Roof Valley Connection with Valley Support: Valley Detail
- Fig. 21 Roof-to-Wall Panel Connections: Beveled SIP Wall
- Fig. 22 Roof-to-Wall Panel Connections: Beveled Blocking
- Fig. 23 Eave Detailing: Sloped Overhang with Square Fascia
- Fig. 24 Eave Detailing: Framed Level Soffit with Square Cut Roof SIP
- Fig. 25 Eave Detailing: Framed Level Soffit with Plumb Cut Roof SIP
- Fig. 26 Eave Detailing: Fully Framed Overhang
- Fig. 27 Vented Cold Roof Generic Detail

SIP DETAILS - Walls

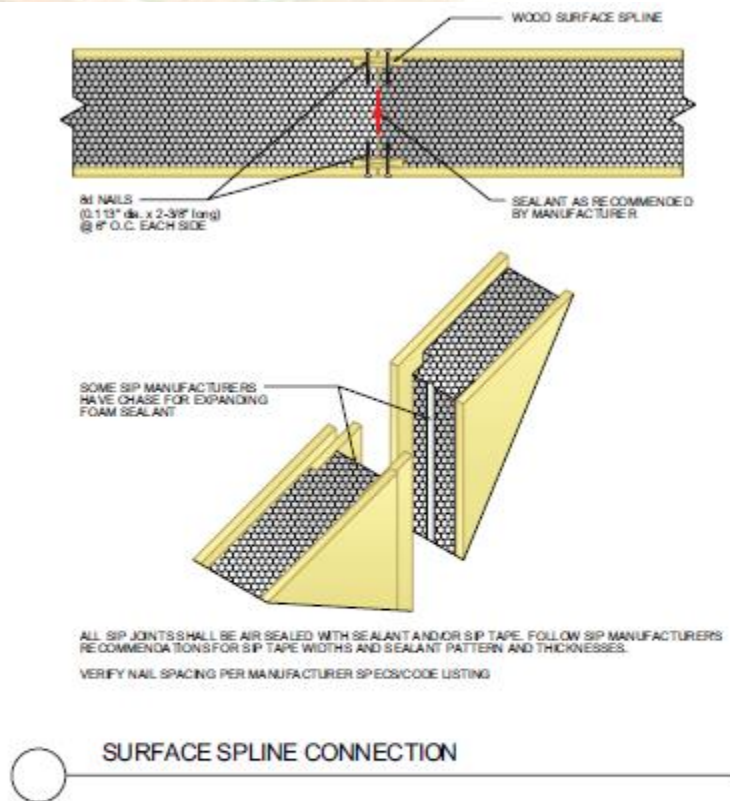
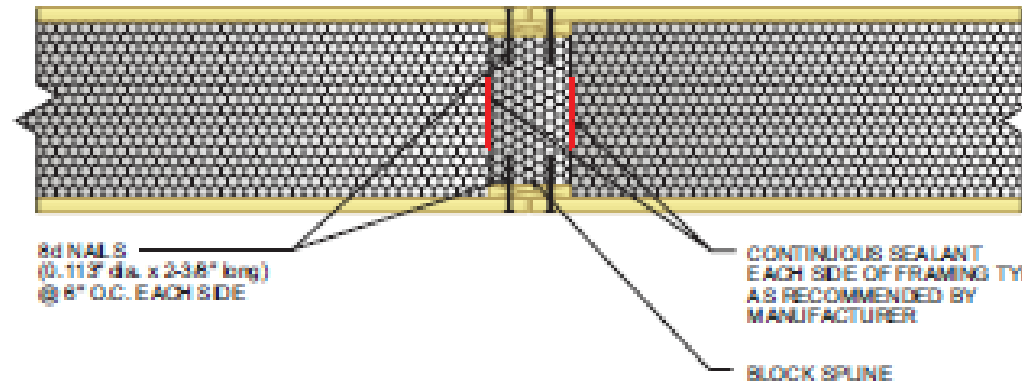


Fig. 7

SIP DETAILS - Walls



ALL SIP JOINTS SHALL BE AIR SEALED WITH SEALANT AND/OR SIP TAPE. FOLLOW SIP MANUFACTURERS RECOMMENDATIONS FOR SIP TAPE WIDTHS AND SEALANT PATTERN AND THICKNESSES.

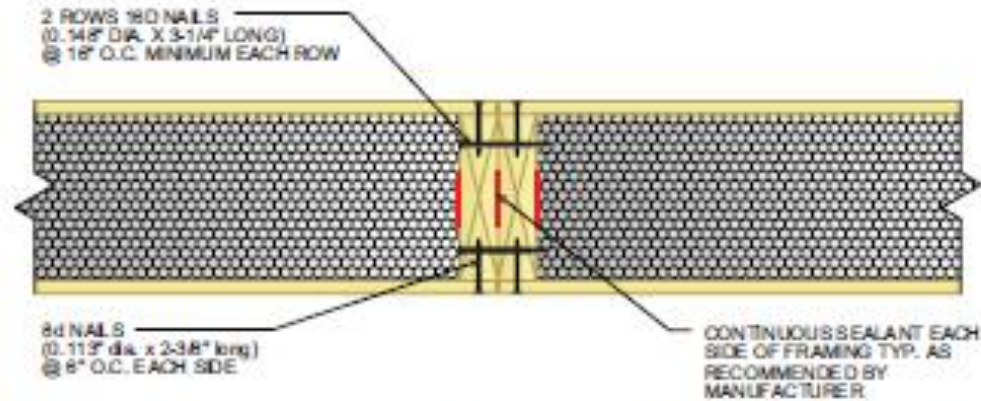
VERIFY NAIL SPACING PER MANUFACTURER SPECS/CODE LISTING



BOX/BLOCK SPLINE CONNECTION

Fig. 8

SIP DETAILS - Walls



ALL SIP JOINTS SHALL BE AIR SEALED WITH SEALANT AND/OR SIP TAPE. FOLLOW SIP MANUFACTURERS RECOMMENDATIONS FOR SIP TAPE WIDTHS AND SEALANT PATTERN AND THICKNESSES.

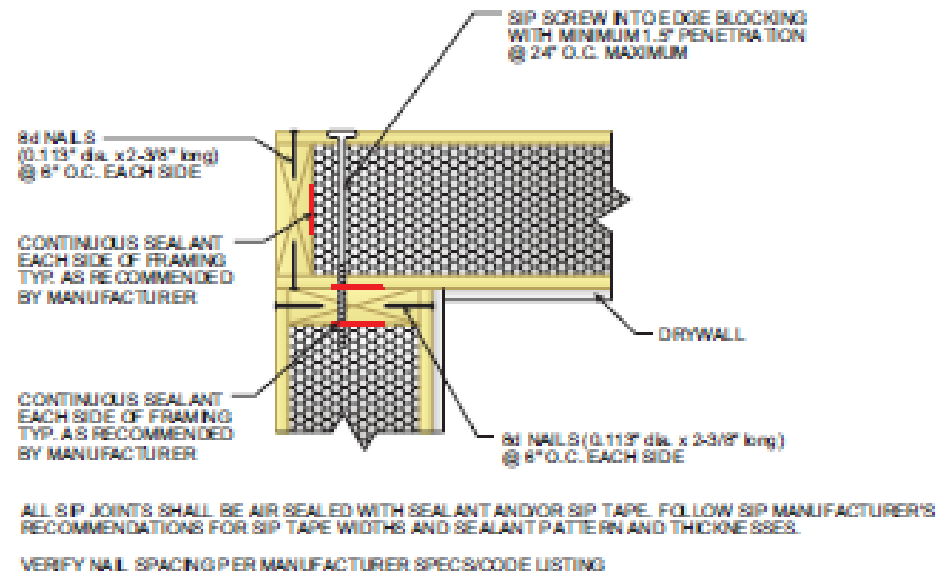
VERIFY NAIL SPACING PER MANUFACTURER SPECS/CODE LISTING



LUMBER SPLINE CONNECTION

Fig. 9

SIP DETAILS - Walls



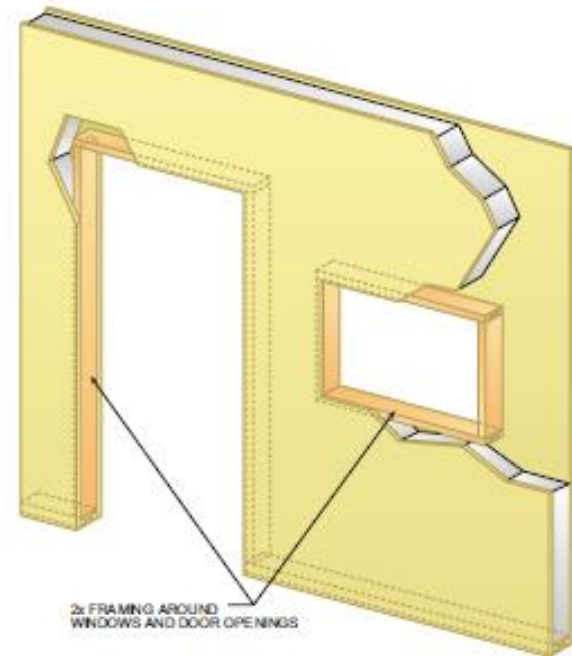
WALL-TO-WALL PANEL CONNECTIONS

CORNER WALL CONNECTION

Fig. 1

SIP DETAILS - Walls

- Openings can be cut within panels, at panel edges, etc.
- The foam core is recessed 1½" at the edges of openings to accept 2x framing
- SIP can serve as the header in many cases. Structural headers can also be added when necessary



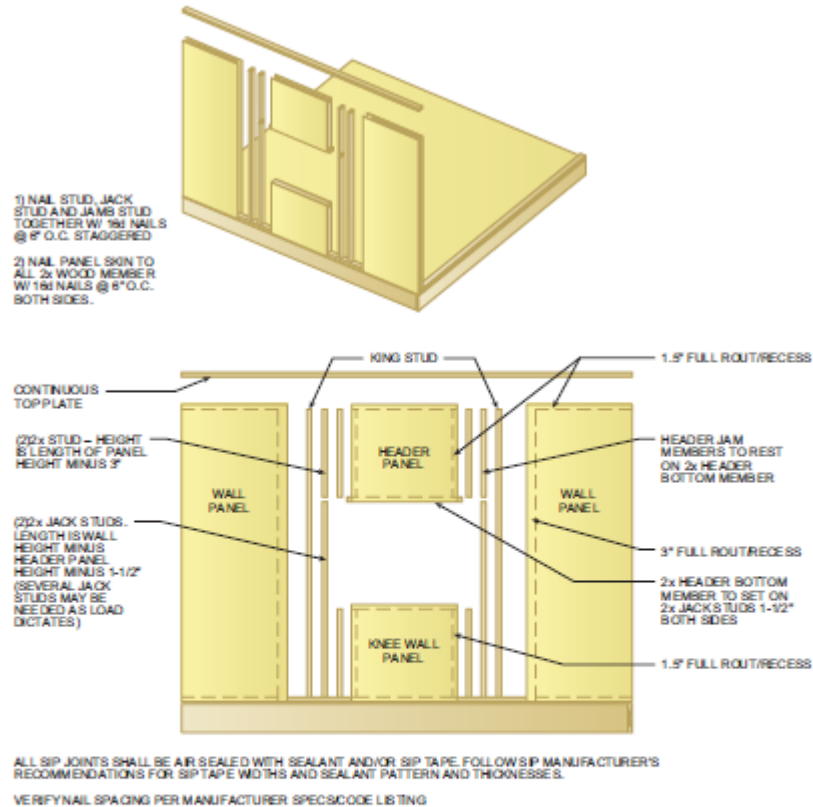
ALL SIP JOINTS SHALL BE AIR SEALED WITH SEALANT AND/OR SIP TAPE. FOLLOW SIP MANUFACTURERS RECOMMENDATIONS FOR SIP TAPE WIDTHS AND SEALANT PATTERN AND THICKNESSES.
VERIFY NAIL SPACING PER MANUFACTURER SPEC/ CODE LISTING



DOOR AND WINDOW FRAMING FOR CUT-OUTS

Fig. 11

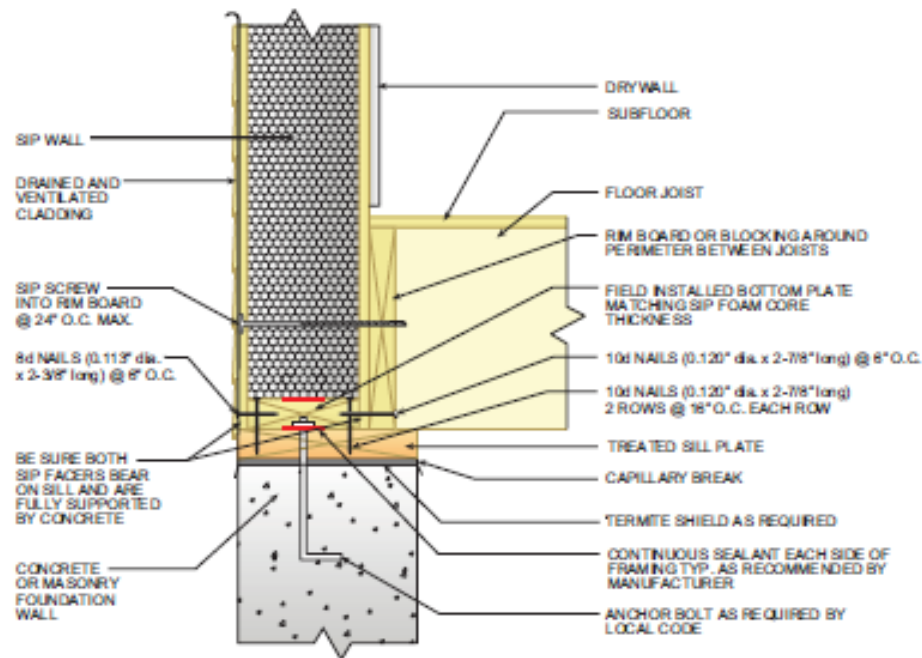
SIP DETAILS - Walls



WINDOW HEADER AND KNEE WALL DETAIL

Fig. 10

SIP DETAILS - Flooring



ALL SIP JOINTS SHALL BE AIR SEALED WITH SEALANT AND/OR SIP TAPE. FOLLOW SIP MANUFACTURER'S RECOMMENDATIONS FOR SIP TAPE WIDTHS AND SEALANT PATTERN AND THICKNESSES.

VERIFY NAIL SPACING PER MANUFACTURER SPEC/SCHEDULE LISTING

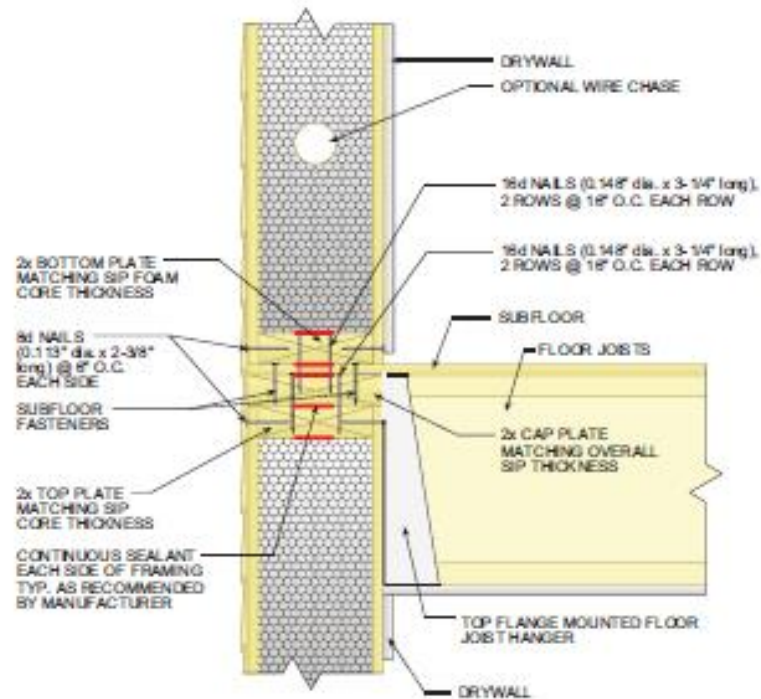


FOUNDATION CONNECTIONS

SIP-WRAPPED FLOOR SYSTEM

Fig. 2

SIP DETAILS – Flooring



ALL SIP JOINTS SHALL BE AIR SEALED WITH SEALANT AND/OR SIP TAPE. FOLLOW SIP MANUFACTURER'S RECOMMENDATIONS FOR SIP TAPE WIDTHS AND SEALANT PATTERN AND THICKNESSES.

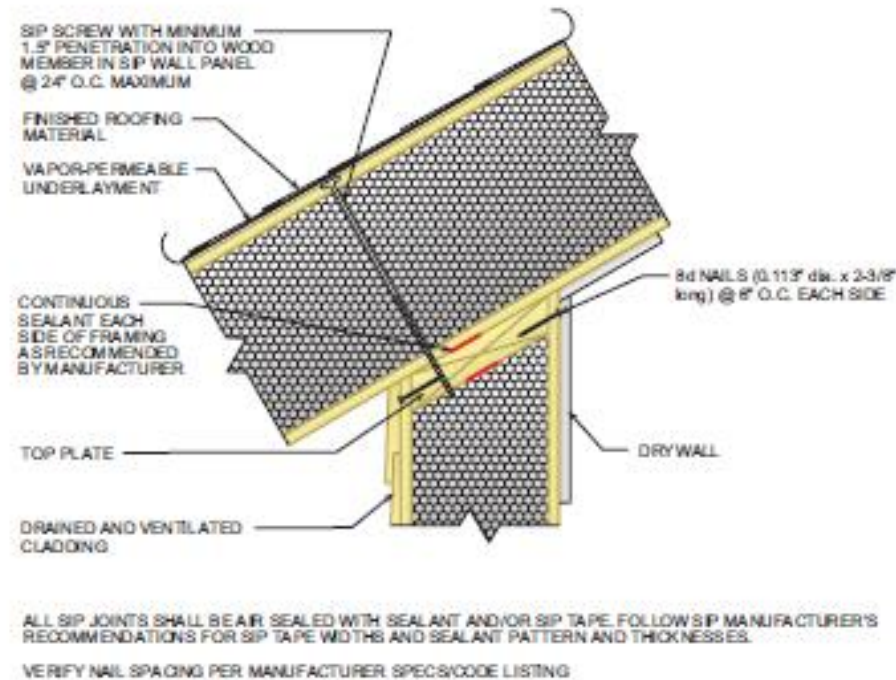
VERIFY NAIL SPACING PER MANUFACTURER SPEC/COODE LISTING

2ND FLOOR CONNECTION DETAILS

HANGING FLOOR JOIST SYSTEM

Fig. 13

SIP DETAILS - Roofing

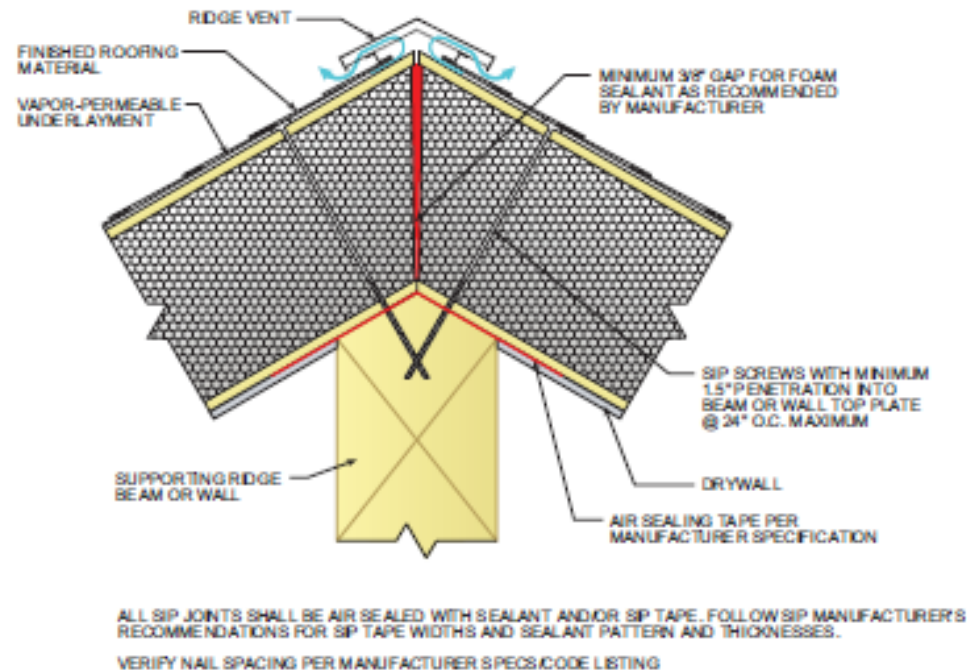


ROOF-TO-WALL PANEL CONNECTIONS

BEVELED SIP WALL

Fig. 21

SIP DETAILS - Roofing

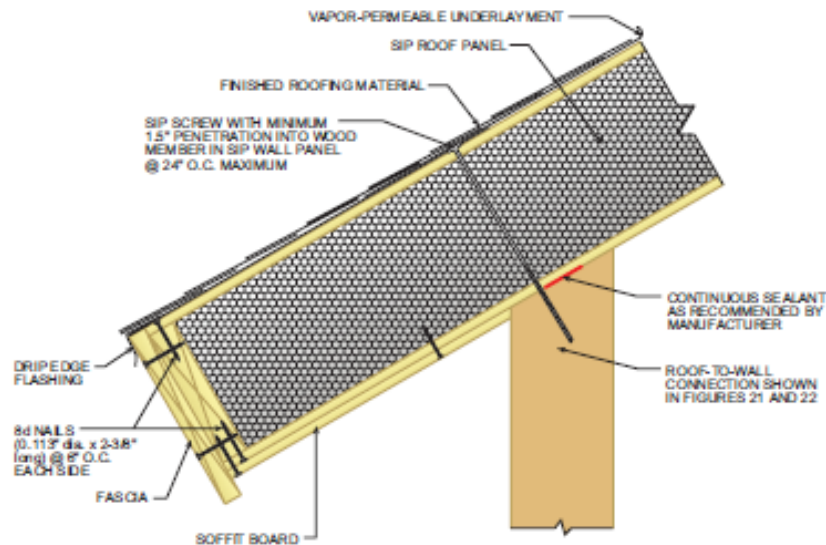


ROOF-TO-ROOF PANEL CONNECTIONS

SIP WITH RIDGE VENT

Fig. 18a

SIP DETAILS - Roofing



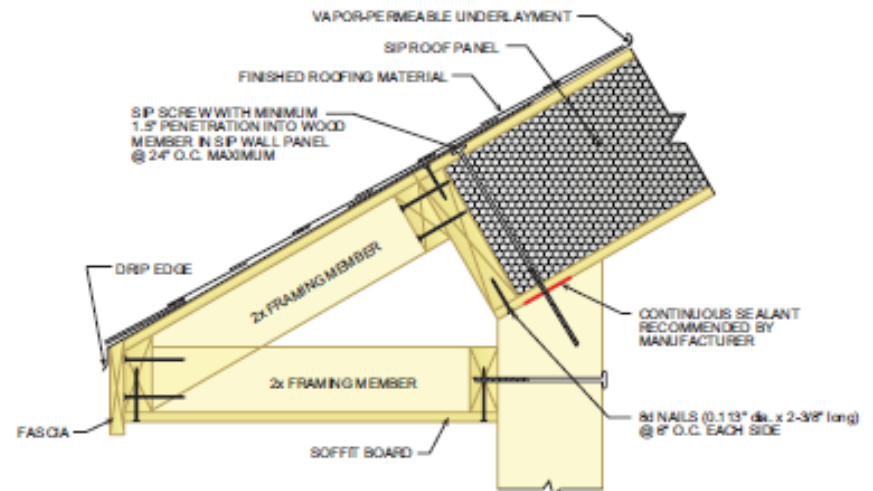
ALL SIP JOINTS SHALL BE AIR SEALED WITH SEALANT AND/OR SIP TAPE. FOLLOW SIP MANUFACTURER'S RECOMMENDATIONS FOR SIP TAPE WIDTHS AND SEALANT PATTERN AND THICKNESSES.

VERIFY NAIL SPACING PER MANUFACTURER SPEC/S/CODE LISTING

EAVE DETAILING

SLOPED OVERHANG WITH SQUARE FASCIA

Fig. 23



ALL SIP JOINTS SHALL BE AIR SEALED WITH SEALANT AND/OR SIP TAPE. FOLLOW SIP MANUFACTURER'S RECOMMENDATIONS FOR SIP TAPE WIDTHS AND SEALANT PATTERN AND THICKNESSES.

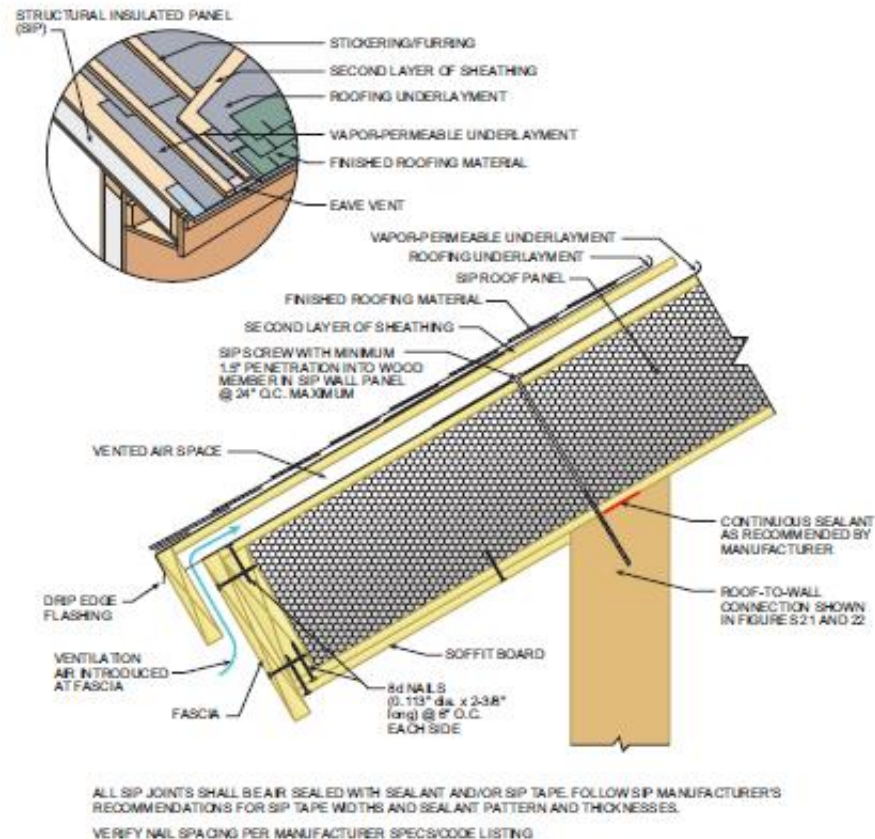
VERIFY NAIL SPACING PER MANUFACTURER SPEC/S/CODE LISTING

EAVE DETAILING

FULLY FRAMED OVERHANG

Fig. 26

SIP DETAILS - Roofing



VENTED COLD ROOF GENERIC DETAIL

Fig. 27

SIP FASTENERS



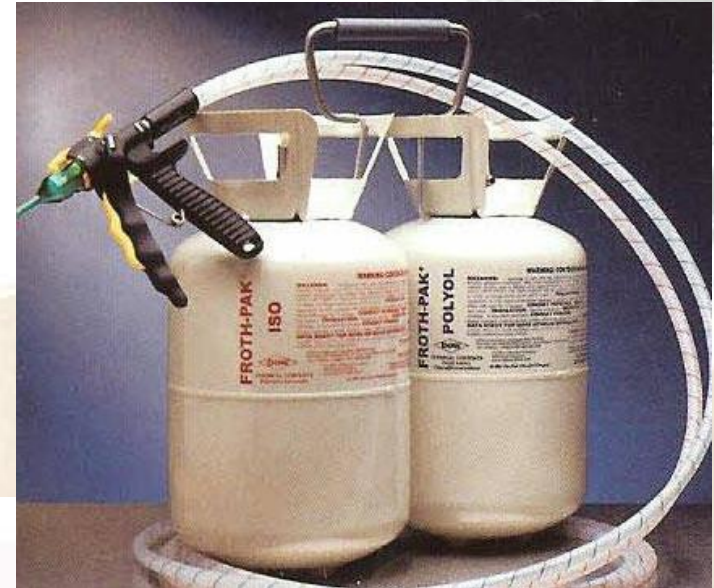
- SIP screws go through the SIPs into structure
- Thread point for wood
- Light drill point for metal/light gauge
- Heavy drill point for steel/iron



SIP DETAILS - Sealing

Foam Everything

- Panel joints
- Windows and doors
- Plumbing stacks
- Chimneys

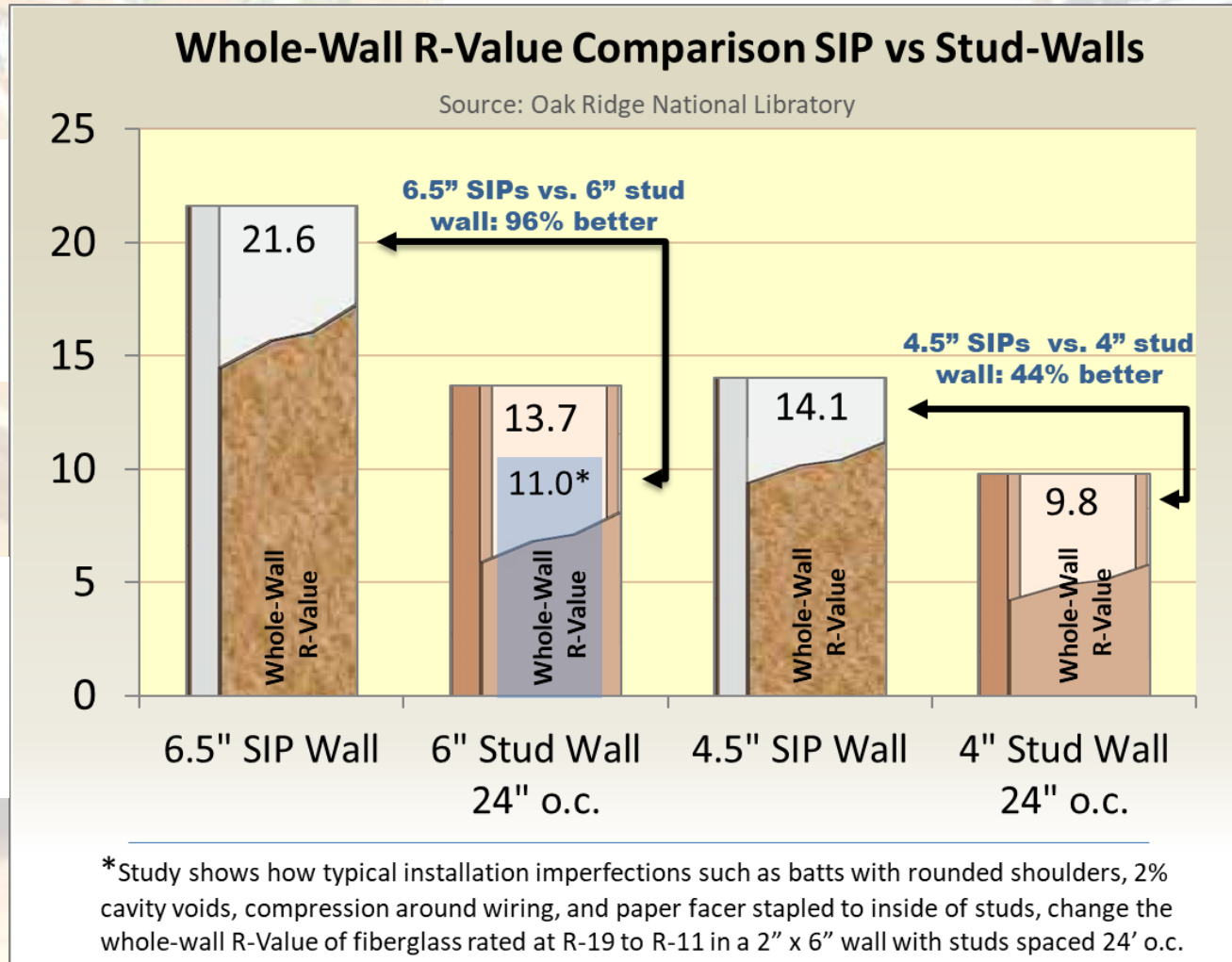


SIP INSULATION BETTER

Oak Ridge National Laboratory Studies

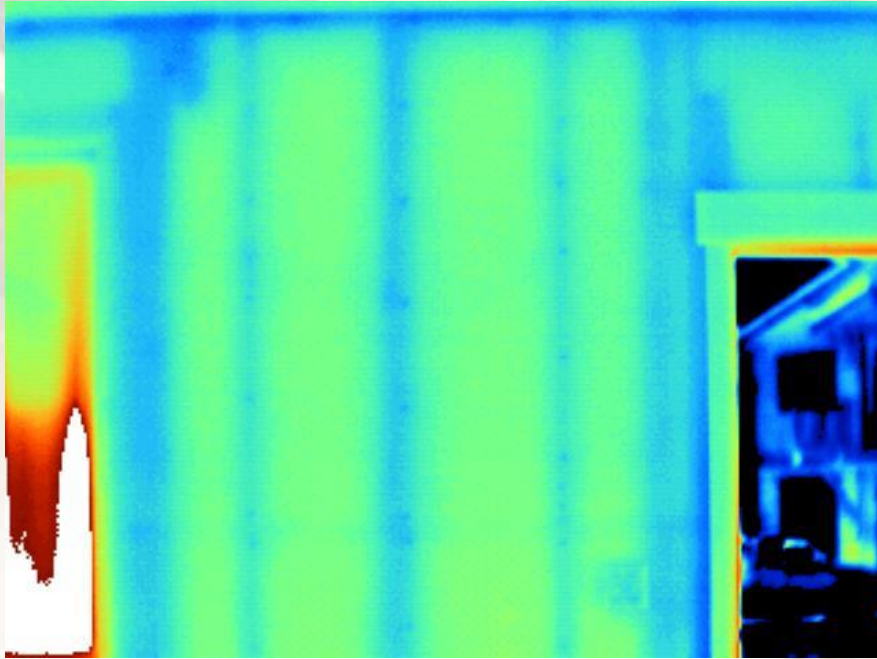
**4.5" SIP wall
outperforms 2"x 6"
stud wall with R-19**

**6.5" SIP wall
96% better than
2"x 6" with R-19**



CHARACTERISTICS OF SIPs

Thermal Bridging



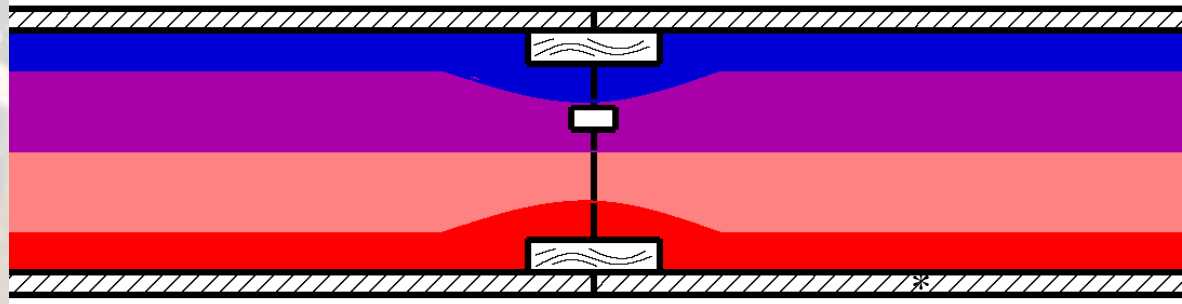
Wood framing



SIPs

CHARACTERISTICS OF SIPs

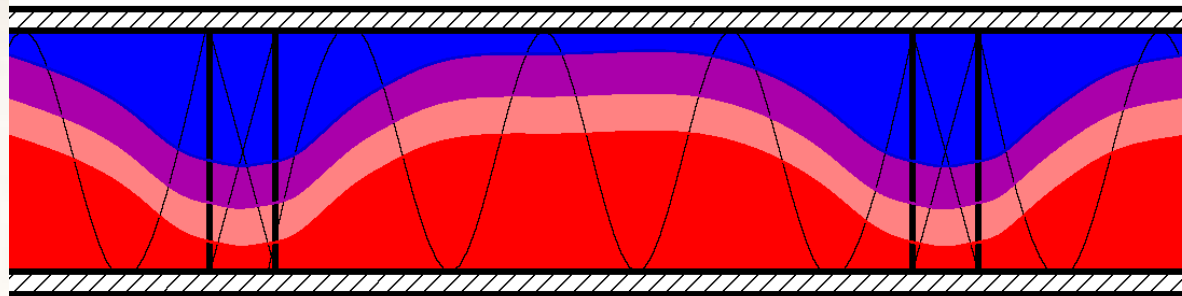
A more consistent, symmetric R-value



SIP with surface spline

Framing factor*:

- Optimum value framing: 16%
- Stick framing: 23-25%
- SIPs: 6-8.5%**



Wood frame with fiberglass

* Straube and Smegal. *Building America Special Research Project: High-R Walls Case Study Analysis*. March, 2009.

** Oak Ridge National Laboratory ZEBRAAlliance research project

CHARACTERISTICS OF SIPs

Air Tightness

SIPs can make homes tight enough to meet the Passive House air tightness standard (0.6 ACH50), which is one of the highest in the industry

Date of Test:
Test File:

Technician:

Customer:

Building Address:

Test Results

- Airflow at 50 Pascals:
(50 Pa = 0.2 w.c.)
327 CFM (+/- 0.5 %)
0.53 ACH
0.07 CFM per ft2 floor area
- Leakage Areas:
38.9 in2 (+/- 3.7 %) Canadian EqlA @ 10 Pa
22.4 in2 (+/- 5.8 %) LBL ELA @ 4 Pa
- Minneapolis Leakage Ratio: 0.04 CFM50 per ft2 surface area
- Building Leakage Curve:
Flow Coefficient (C) = 36.2 (+/- 9.0 %)
Exponent (n) = 0.563 (+/- 0.023)
Correlation Coefficient = 0.99571
- Test Settings:
Test Standard: = CUSTOM
Test Mode: = Depressurization
Equipment = Model 3 Minneapolis Blower Door

Infiltration Estimates

- Estimated Average Annual Infiltration Rate:
21.8 CFM
0.04 ACH
5.5 CFM per person
(using bedrooms + 1)
- Estimated Design Infiltration Rate:
Winter: 31.6 CFM
0.05 ACH
Summer: 17.1 CFM
0.03 ACH
- Recommended Whole Building Mechanical
Ventilation Rate: (based on ASHRAE 62.2) 73.8 CFM

CHARACTERISTICS OF SIPs

More than 40% of a home's total envelope loss is due to infiltration!

SIPs have:

- Very few gaps
- Industry standard sealing details
- Superior indoor air quality



ENERGY STAR & PASSIVE

- SIPs recognized by ENERGY STAR as method to reduce thermal bridging
- Passive House include SIPs in prescriptive path
- Makes qualifying easier and more affordable

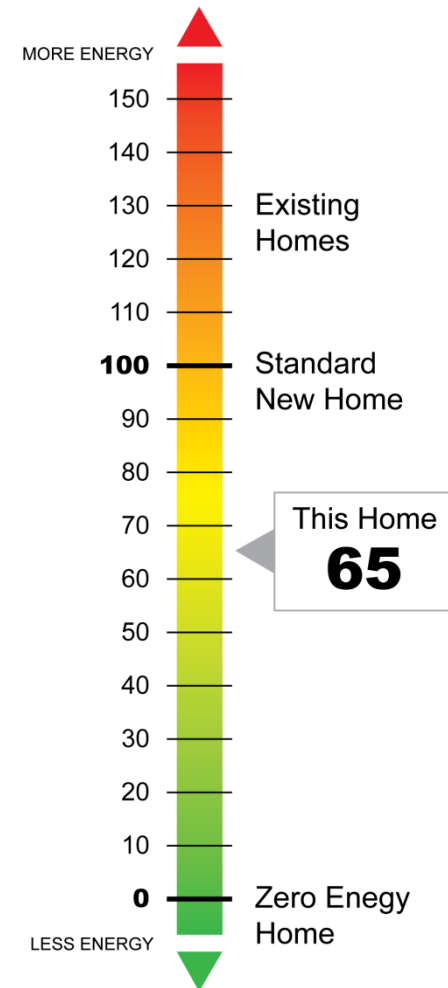


HERS Index

- The HERS (Home Energy Rating Score) Index is a scoring system established by the Residential Energy Services Network (RESNET)
- HERS Reference Home built to the 2006 IECC and has a HERS Index of 100
- Net zero energy homes score a HERS Index of 0
- Each 1-point decrease in HERS Index corresponds to 1% reduced energy consumption vs HERS Reference Home
- HERS 80 = 20% more energy efficient

See 90 SIP projects with HERS < 45 @
<https://www.sips.org/projects-by-state>

HERS® Index



CHARACTERISTICS OF SIPS

SIP R-Values

SIP Panel Thickness	4 ½"	6 ½"	8 ¼"	10 ¼"	12 ¼"
EPS	14.4	21.6	27.9	35.1	45.9
XPS	19.5	29.5	38.3	48.3	58.3
Polyurethane	21.7	32.9	N/A	N/A	N/A

- Consult panel manufacturer to verify R-values. R-values can vary between manufacturers.
- Calculated R-Values include 7/16" OSB on each side. EPS is Type I per ASTM C578-07
- XPS is TYPE IV per ASTM C578-06. Polyurethane information is derived from the range of products offered by SIPA member manufacturers.
- R-Values are at mean temperature of 75 degrees F

CHARACTERISTICS OF SIPs

Sustainable Building Program Applications

SIPs can help you achieve the highest levels in all green building programs such as LEED for Homes, the NAHB Green Building Program, EarthCraft, Passive and other state green building programs.

- SIPs cut down on job site waste
- Low HERS index helps you achieve more points in most green building programs
- Resource efficiency for engineered wood products

LEED v4 FOR HOMES

EA - Energy and Atmosphere		
	<u>EA1 Credit</u> : Annual Energy Use	Max 29 pts
	<u>EA7 Credit</u> : Air Infiltration	Max 2 pts
	<u>EA8 Credit</u> : Envelope Insulation	Max 2 pts
MR – Materials and Resources		
	<u>MR2 Credit</u> : Environmentally Preferable Products (sheathing) for FSC certified OSB & 100-mile radius	Max 4 pts
	<u>MR3 Credit</u> : Construction Waste Management	Max 3 pts
	<u>MR4 Credit</u> : Material-Efficient Framing	Max 2 pts
EQ – Environmental Quality		
	<u>EQ Credit</u> : Low-Emitting Products	1.5 pts

See more detailed LEED-NC info @ <https://www.sips.org/resources/sips-and-leed>

CHARACTERISTICS OF SIPs

SIPs Life Cycle Assessment & Foam EPDs

- Average energy savings over 50 years is 9.9 times the energy invested when using SIPs compared to traditional stick frame construction in American homes
- Provides reduction in global warming potential 13.2 times equivalent of the CO₂ emissions produced
- Energy payback period of 5.1 years
- Recapture of greenhouse gas emissions in 3.8 years

Source: *Life Cycle Benefits of SIPs*, EPS Industry Alliance:
<https://www.sips.org/resources/sustainability>

SIPs in CODE

Residential Code Compliance since – 2009, 2012, 2015, 2018 and 2021 & IECC

- ☐ Avoid prescriptive requirements for exterior insulation
- ☐ Total UA Alternative method using ResCheck

- OR -

- ☐ Performance method (HERS rating in 2015/18/21 IECC)

Note: Compliance details in SIP Design Best Practice 1: High-Performance SIP Building Envelopes
at: <https://www.sips.org/resources/design#section414>

SIP DESIGN

Fire, Hurricane, Seismic & Structural Compliance - Code Reports & Standards

ES ICC EVALUATION SERVICE™
ICC-ES Evaluation Report  **ESR-4689**
Reissued April 2023
This report is subject to renewal April 2024.
www.icc-es.org | (800) 423-6587 | (562) 699-0543 A Subsidiary of the International Code Council®

DIVISION: 06 00 00—WOOD, PLASTICS, AND COMPOSITES
Section: 06 12 00—Structural

REPORT HOLDER:
STRUCTURAL INSULATED (SIPA)

ADDITIONAL LISTEES:
ACME PANEL COMPANY
ENERCEPT
ENERGY PANEL STRUCTU
FISCHERSIPS
FOARD PANEL, INC.
THE MURUS COMPANY, IN
PORTERCORP
URBAN INDUSTRIES, INC.

EVALUATION SUBJECT:
STRUCTURAL INSULATED

1.0 EVALUATION SCOPE
Compliance with the follow
■ 2018 and 2015 International
■ 2018 and 2015 International

Property evaluated:
Structural

2.0 USES

2.1 General:



www.icc-es.org | (800) 423-6587 | (562) 699-0543

ICC-ES Evaluation Report
ESR-4524

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 12 00—Structural Panels

REPORT HOLDER:
PREMIER BUILDING SYSTEMS, LLC

EVALUATION SUBJECT:
PREMIER STRUCTURAL INSULATED PANELS

ADDITIONAL LISTEES:

BIG SKY INSULATION, INC.

EXTREME PANEL TECHNOLOGIES

1.0 EVALUATION SCOPE
Compliance with the following codes:
■ 2021, 2018 and 2015 International Building Code (IBC)
■ 2021, 2018 and 2015 International Residential Code (IRC)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety, see [ESR-4524 LABC and LARC Supplement](#).
Properties evaluated:



AMERICAN NATIONAL STANDARD

ANSI/APA PRS 610.1-2023
Standard for Performance-Rated
Structural Insulated Panels
in Wall Applications



Reference over 20
Company Industry
Code reports at:

[https://www.sips.org/
resources/building-
codes](https://www.sips.org/resources/building-codes)

SIP DESIGN

SIP Roof & Wall Compliance 2018/ 2021 IRC

TABLE 1.1

MINIMUM SIP THICKNESSES* TO MEET RESIDENTIAL 2018 IECC TABLE R402.1.5

Climate Zone**	Roof/Ceiling		Wall	
	Roof/Ceiling U-factor	Minimum SIP thickness*	Frame Wall U-factor	Minimum SIP thickness*
1	0.035	10-1/4-in.	0.084	4-1/2-in.
2	0.030	10-1/4-in.	0.084	4-1/2-in.
3	0.030	10-1/4-in.	0.060	6-1/2-in.
4 except Marine	0.026	12-1/4-in.	0.060	6-1/2-in.
5 and Marine 4	0.024	12-1/4-in.	0.045	6-1/2-in.
6	0.024	12-1/4-in.	0.045	6-1/2-in.
7 and 8	0.024	12-1/4-in.	0.045	6-1/2-in.

TABLE 1.1.1

MINIMUM SIP THICKNESSES* TO MEET RESIDENTIAL 2021 IECC TABLE R402.1.2

*Assumes standard Type I EPS
 **See Figure 1.1|

Climate Zone**	Roof/Ceiling		Wall	
	Roof/Ceiling U-factor	Minimum SIP thickness*	Frame Wall U-factor	Minimum SIP thickness*
0 and 1	0.035	10-1/4-in.	0.084	4-1/2-in.
2	0.026	10-1/4-in.	0.084	4-1/2-in.
3	0.026	10-1/4-in.	0.060	6-1/2-in.
4 except Marine	0.024	12-1/4-in.	0.045	6-1/2-in.
5 and Marine 4	0.024	12-1/4-in.	0.045	6-1/2-in.
6	0.024	12-1/4-in.	0.045	6-1/2-in.
7 and 8	0.024	12-1/4-in.	0.045	6-1/2-in.

*Assumes standard Type I EPS foam cores; alternative foam type information available by consulting manufacturers. SIP thicknesses are nominal inches.

**See Figure 1.1.1

SIP DESIGN

SIP Roof & Wall Meet 2018 / 2021 Commercial IECC

TABLE 1.2

MINIMUM SIP THICKNESSES* TO MEET COMMERCIAL 2018 IECC TABLE C402.1.4

	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above roof deck	U=0.048	U=0.039	U=0.039	U=0.039	U=0.039	U=0.039	U=0.032	U=0.032	U=0.032	U=0.032	U=0.032	U=0.032	U=0.028	U=0.028	U=0.028	U=0.028
Minimum SIP thickness	6-1/2"	8-1/4"	8-1/4"	8-1/4"	8-1/4"	8-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"

TABLE 1.1.2

MINIMUM SIP THICKNESSES* TO MEET COMMERCIAL 2021 IECC TABLE C402.1.4

	0 and 1		2		3		4 except marine		5 and marine 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs																
Insulation entirely above roof deck	U=0.048	U=0.039	U=0.039	U=0.039	U=0.039	U=0.039	U=0.032	U=0.032	U=0.032	U=0.032	U=0.032	U=0.032	U=0.028	U=0.028	U=0.028	U=0.028
Minimum SIP thickness	6-1/2"	8-1/4"	8-1/4"	8-1/4"	8-1/4"	8-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"	10-1/4"
Walls, above grade																
Wood framed and other	U=0.064	U=0.064	U=0.064	U=0.064	U=0.064	U=0.064	U=0.064	U=0.064	U=0.051	U=0.051	U=0.051	U=0.051	U=0.051	U=0.051	U=0.032	U=0.032
Minimum SIP thickness	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	6-1/2"	6-1/2"	6-1/2"	6-1/2"	6-1/2"	6-1/2"	10-1/4"	10-1/4"

*Assumes standard Type I EPS fo

**See Figure 1.1

SIP APPLICATIONS

- SIP walls and roof
- SIP walls with truss roof
- SIPs over timber frame
- SIPs and ICF
- Hybrid construction of any kind



SIP APPLICATIONS

Affordable, Effective Renovation Applications



Historic home built in 1872 - 4,467 sqft conditioned space including basement, 1st and 2nd floors. SIPs ready to assemble with all window and door openings precut made for smooth installation.

Beineke Residence, Marion, OH

SIP APPLICATIONS

Affordable, sustainable, cost-effective housing



South Chicago Work Force housing, Chicago, IL

SIP APPLICATIONS

Affordable, Disaster-resistant, LEED Certified Housing (twice as strong as conv. 2x4)



Make it Right, New Orleans, LA

(also approved for Florida High Velocity Hurricane Zones)

SIP APPLICATIONS

Modern, Sustainable Designs



Evoked Quadrant Model Home, Issaquah, WA



Ellmann Residence, Grand Haven, MI

SIP APPLICATIONS

Timber Frame



Christensen Residence, Clarkfield, MN



Twin Mountain Home, Carroll, NH
HERS 32; 0.37 ACH

SIP APPLICATIONS

Engineering Possibilities



Ward Home, Sioux Falls, SD



C Sharp, Oak Island, NC

SIP APPLICATIONS

Craftsman Design



Kenilworth Bungalow,
Minneapolis, MN

Passive Design



Washington, DC;
HERS 37, 0.6 ACH50

SIP APPLICATIONS

Roof Design



SIP APPLICATIONS

Long Roof Spans



SIP APPLICATIONS

Air Sealing and Header-free Windows



SIP APPLICATIONS

Complex Designs Simplified



COURSE SUMMARY

Now the design professional will be able to:

- Describe and define SIPs and their applications
- Explain SIP energy strategies
- Illustrate SIP design and engineering methods
- List, describe current industry assembly standards and resources

QUESTIONS?

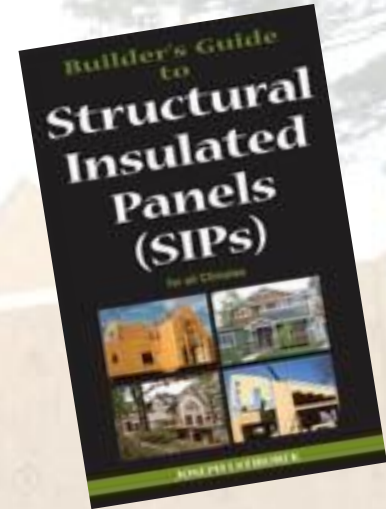
The next 10 minutes will be focused on discussing the course material



SIP RESOURCES

www.SIPs.org

- Free online *Builder Education with SIPs Training* (BEST) 10 videos (or YouTube)
- SIPA Master Builder Program
- *SIPschool* hands on training events
- *Builder's Guide to SIPs* by Joe Lstiburek
- AIA & GBCI Continuing Education courses
- Find a supplier in your area
- Case studies /tech briefs /project maps
- *Builder Need to Know* guide & checklists
- In depth *Best Practices* and *Connection Details*



SIP RESOURCES

Building with SIPs - Need to Know

BUILDING CONSIDERATIONS

High-performance building envelopes use SIPs

SIP performance is based on more than its stated R-value

HVAC system rightsizing reduces costs and enhances comfort and performance

SIP structural capabilities cater well to virtually any design

SIPs are typically factory cut for accuracy, quality and reduced onsite labor

SIPs are manufactured using "SIP shop (or panelized) drawings"

SIPs are customized to varying levels depending on client needs

Roof and wall assemblies

Factory cut electrical chases reduce electrician time in the field

Design plumbing into interior walls

Resource to better understand the science of building with SIPs

CHECKLIST

High-Performance Building Envelope

HVAC Systems

Structural Capabilities

SIP Sizes

Shop Drawings

SIP Fabrication

SIP Installation

Roof and Wall Assemblies

Electrical

Plumbing

**Free copies available here
At SIPA table!**

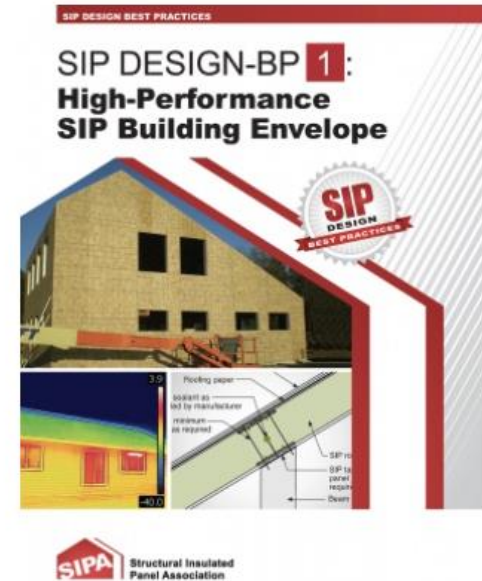


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SIP DESIGN Best Practices Series

SIPA is publishing a series of “deeper-dive” explorations of the core topics summarized in DESIGN CONSIDERATIONS. The SIP DESIGN BEST PRACTICES series provides the engineering analysis and explanation behind the essential aspects of SIP design.

- SIP DESIGN BP-1: High-Performance SIP Building Envelope
- SIP DESIGN BP-2: HVAC Systems with SIPs
- SIP DESIGN BP-3: SIP Structural Capabilities
- SIP DESIGN BP-4: SIP Sizes
- SIP DESIGN BP-5: SIP Shop Drawings
- SIP DESIGN BP-6: Fabrication/Manufacturing
- SIP DESIGN BP-7: SIP Installation
- SIP DESIGN BP-8: SIP Roof and Wall Assemblies
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<https://www.sips.org/resources/design#section414>

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Lesson 7 - [SIP Layout and Panel Installation](#)

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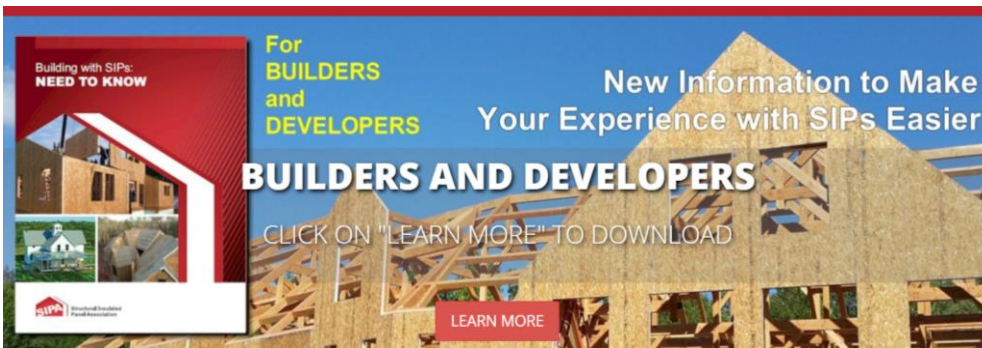


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