SECTION 9:
SIP Design BP 7: SIP Installation

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SIPA
Structural Insulated Panel Association

SIP DESIGN-BP 7:

SIP Installation

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 *Design 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

7. SIP Installation

7.1. Training programs are available to installers, ensuring that an educated installer understands the importance of proper installing and sealing of the SIP package. Programs include:

7.1.1. SIPA online training course

7.1.2. SIPA Registered Master Builder & Designer programs

7.1.3. SIPschool hands-on field training

7.1.4. Carpenters International Training Fund (CITF) for SIPs

7.1.5. SIP manufacturer in-house training programs

7.2. Home energy raters verify building air leakage performance with blower door tests and can be found through the RESNET website at www.resnet.us.

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

SIP DESIGN-BP 7:

SIP Installation

SIP DESIGN-BP 7.1:

Training programs are available to installers, ensuring that an educated installer understands the importance of proper installing and sealing of the SIP package.

SIPA has numerous programs in place to train installers to make sure SIPs are installed according to their architectural plans and the manufacturers' subsequent shop drawings.

7.1.1.

SIPA online training courses

A variety of online training resources for both commercial and residential applications are available for both designers (https://www.sips.org/resources/architect-education) and builders (https://www.sips.org/resources/builder-education). Many of these are officially credentialed and approved for continuing education credits from American Institute of Architects (AIA) and other organizations. The on-demand video sessions can be watched, and separate ten-question tests taken online, after which certificates will be automatically emailed immediately after passing.

7.1.2.

SIPA Registered Master Builder & Designer programs

A guided curriculum of ten courses called ***Building Education with SIPs Training*** or the ***BEST*** program has been developed to orient those new to SIPs. The self-standing educational units each have a narrated video, study guide, and an optional accompanying quiz to test comprehension. An overview is available at: https://www.sips.org/resources/bestprogram

Lesson 1 – Introduction to SIPs

Lesson 2 – Basic SIP Design and Engineering

Lesson 3 – SIP Order Process

Lesson 4 – SIP Building Science

Lesson 5 – SIP Layout Drawings

Lesson 6 – SIP Site Planning and Coordination

Lesson 7 – SIP Layout and Panel Installation

Lesson 8 – Integrating Mechanical Systems with SIPs

Lesson 9 – SIP Finish Materials and Detailing

Lesson 10 – Common Objections for SIP Designs

Once completing the set of ten courses, individuals interested can receive a $50 discount for first-year membership to join SIPA as a builder or design professional member. SIPA members are eligible to enter a two-step program. The first step is to become a *Registered SIP Builder* or *Registered SIP Designer*. Individuals desiring to take the second step toward the prestigious *Master SIP Builder* or *Master SIP Designer* credential must then fulfill the further requirements illustrating mastery of SIPs by:

Master SIP Builder Program Requirements

- Completing at least ten (10) SIP structures or having worked with SIPs for a minimum of five (5) years and
- Passing the Registered SIP Builder/ Designer test of 100 questions with a score of 80% or better and
- Submitting a blower door test result conducted by a RESNET-certified energy rater from a recently completed SIP project with a result not to exceed 2.0 ACH50 and
- Completing the SIPA Master Builder Checklist on the blower door tested project

Master SIP Designer Program Requirements

- Completing at least ten (10) SIP structures or having worked with SIPs for a minimum of five (5) years and
- Passing the Registered SIP Builder/ Designer test of 100 questions with a score of 80% or better

Master SIP Builders and Master SIP Designers are distinguished by unique profiles on the SIPA website (https://www.sips.org/sip-experts/master-builder-profiles) and also receive special designations and filtering included as part of the SIPA member directory. Special promotional mentions in SIPA newsletters and social media channels are additional benefits of achieving the *Master SIP* designation. Members holding this highest SIP designation enjoy elevated business traffic.

IMAGE 7.1
SIPA BADGES

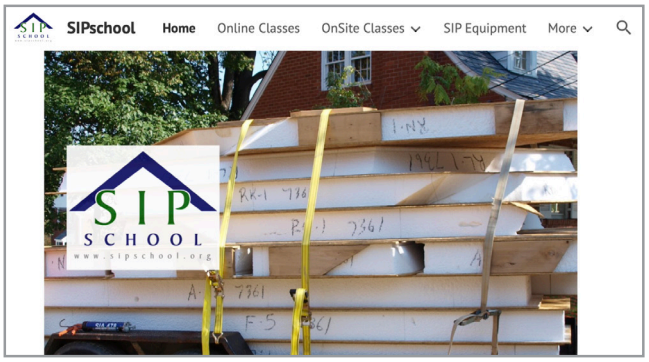
7.1.3.

SIPschool hands-on field training

SIPschool (www.sipschool.org) was established in 2006 by industry veteran Al Cobb to provide training and consulting in SIP manufacturing, design and construction for a fee. For those considering building with and/or installing SIPs in a hands-on or supervisory role, in-person ***SIPschool*** training can give you the knowledge to help ensure your successful SIP installation. Instructors address the details used within the SIP industry, across all SIP manufacturers. Regardless of which structural insulated panel system you're using, the building science to SIP installation is universal. Find out more at: https://www.sipschool.org/OnSiteClasses

IMAGE 7.2

SIPSCHOOL HOME PAGE



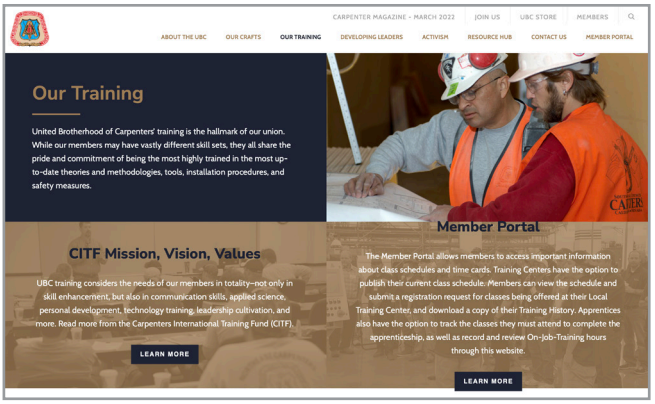
7.1.4.

Carpenters International Training Fund (CITF) for SIPs

SIPA collaborated with the United Brotherhood of Carpenters (UBC) trade union, which focuses primarily on commercial construction, in the creation of a detailed 'train the trainer' program curriculum. Contact the national training headquarters in Las Vegas, Nevada or the local union to conduct this training. More information can be found at: https://www.carpenters.org/citf-training/.

IMAGE 7.3

CITF WEBSITE



7.1.5.

SIP manufacturer in-house training programs

SIP manufacturers offer a variety of training programs to help designers, builders and owners become familiar with the design, use and installation of SIPs. These training programs may consist of the following, to name a few:

- On-site training
- Training at the manufacturer's facility
- AIA accredited training sessions
- Live webinars
- Recorded training sessions
- YouTube videos
- Construction/installation guides

Check with the various SIP manufacturers you are working with for the training programs that are offered. Visit online at https://www.sips.org/resources/architect-education for help in scheduling face-to-face educational presentations.

SIP DESIGN-BP 7.2:

Home energy raters verify building air leakage performance with blower door tests and can be found through the RESNET website at www.resnet.us.

Blower door air leakage tests are conducted by creating a pressure difference of 50 pascals between the inside and outside of the structure being tested. The leakage rate is often referred to as air changes per hour at 50 pascals of pressure or ACH50 which represents a 20-mph wind on the exterior of a structure. Properly installed SIP structures regularly achieve leakage rates below 2.0 air changes per hour at a pressure of 50 pascals (ACH50), to as low as 0.3 ACH50 which is below the Passive House standard of 0.6 ACH50.

IMAGE 7.4

BLOWER DOOR TEST ASSEMBLY

IMAGE 7.5

BLOWER DOOR TEST DATA ACQUISITION

The blower door tests demonstrate that SIPs outperform most envelope systems due to their low air leakage, stable R-values, and low framing factor (about 3 percent[1]) by eliminating embedded dimensional lumber, thus reducing thermal bridging. When lowering the air leakage rate, less outside air needs to be conditioned. Refer to the information on designing HVAC Systems with SIPs as part of the SIP Best Practices series at SIPs.org (https://www.sips.org/resources/design), ***SIP DESIGN-BP 2.4: HVAC Systems with SIPs***, for typical SIP air leakage rates and associated information.

IMAGE 7.6

SIP DESIGN-BP 2: HVAC SYSTEMS WITH SIPS

[1]See *SIP DESIGN BP-1: High-Performance SIP Building Envelope*, Appendix 1.2 on page 21, showing framing factor (weighting %) for a 4' x 8' wall panel.

Glossary of Terms

ACH50: the abbreviation for air changes per hour at 50 pascals (Pa) pressure differential and one of the most important metrics used to determine the energy efficiency of a house. It is the measurement of the rate of air leakage: the number of times the air volume in a building exchanges per hour at 50 Pa of pressure from a blower door test. It is considered equal to wind of approximately 25 miles per hour blowing on the outside of a building.

Dimensional lumber: lumber that is cut to pre-defined, standard sizes (e.g., 1-inch x 4-inch, 2-inch x 4-inch, etc.).

Framing factor: the ratio of the area of all wood structural members in contact with both the interior and exterior facers of the panels (e.g., studs and top and bottom plates) to the total surface area of the panel being considered.

HERS: Home Energy Rating System. The HERS index measures energy consumption from heating, cooling, water heating, lights, and some appliances. The lower the index, the less energy a building is consuming. A HERS rating of zero signifies a net-zero energy building.

HVAC: heating, ventilation and air conditioning.

R-value (thermal resistance): the inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area (h*ft2*0F/Btu).

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.

SIPschool: SIPschool (www.sipschool.org) was established in 2006 by industry veteran Al Cobb to provide training and consulting in SIP manufacturing, design and construction for a fee.

Thermal bridging: the movement of heat across an object that is more conductive than the materials around it. The conductive material creates a path of least resistance for heat. Thermal bridging can be a major source of energy loss in homes and buildings.

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