



## Title 24 And High Performance Structural Insulated Panel Systems (SIPS)

# What are SIPS? Structural Insulated Panels

- OSB skins laminated with a structural adhesive to an **insulated core**
- Serve as **structural framing** (roofs, walls & floors)
- Structurally stronger than 2"x6" construction which it replaces
- Large panels install like a jigsaw puzzle
- Up to 8'x24' panels joined with splines **reduce connections** for simplified air sealing and **reduced thermal bridging**
- **Incorporated air barrier** (OSB)
- Made in a factory for engineered accuracy to **eliminate variations** found in conventional lumber
- Shipped to the site ready to install



# Simply Stated, SIPS Are...

- The only non-concrete based enclosure (roof, walls & floors) product accepted to meet Title 24 thermal enclosure requirements
- SIPS enclosures increase energy efficiency and reduce the demand for cooling/heating resources by up to 58% over stick framed construction (*ORNL Independent DOE Study*)



# SIPS & Title 24

**Controlling air exchanges is critical to gaining energy efficiency. This is recognized within Title 24 and as such, SIPS are deemed to comply and are the only approved non-concrete building method:**

B. Assemblies of materials and components that have an average air leakage not exceeding  $0.04 \text{ cfm/ft}^2$  under a pressure differential of 0.3 in. w.g (1.57 psf) ( $0.2 \text{ L/m}^2$  at 75 pa), when tested in accordance with ASTM E2357, ASTM E1677, ASTM E1680, or ASTM E2855.

**EXCEPTION to Section 140.3(a)9B:** The following materials shall be deemed to comply with Section 140.3(a)9B if all joints are sealed and all of the materials are installed as air barriers in accordance with the manufacturer's instructions:

- i. Concrete masonry walls that have at least two coatings of paint or at least two coatings of sealer coating.
  - ii. Concrete masonry walls with integral rigid board insulation.
  - iii. Structurally Insulated Panels.
- Portland cement or Portland sand plaster, or stucco, or a gypsum plaster, each with min. 1/2 inches thickness.

C. The entire building has an air leakage rate not exceeding  $0.40 \text{ cfm/ft}^2$  at a pressure differential of 0.3 in w.g. (1.57 psf) ( $2.0 \text{ L/m}^2$  at 75 pa), when the entire building is tested, after completion of construction, in accordance with ASTM E779 or another test method approved by the Commission.

**EXCEPTION to Section 140.3(a)9:** Relocatable Public School Buildings.

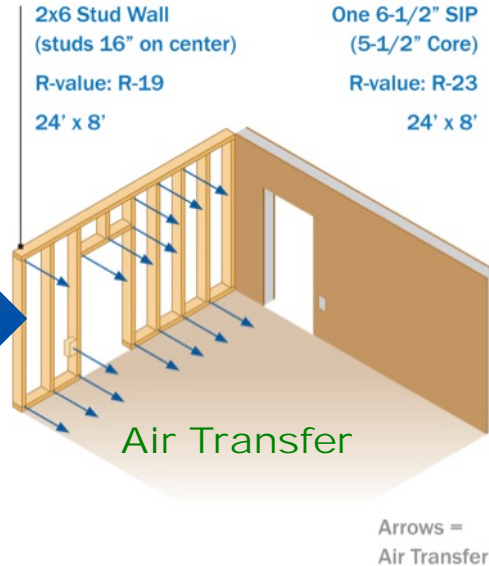
SIPS are 1 of 4 Title 24 approved assemblies offering minimal air leakage

Air leakage not to exceed  $0.04 \text{ cfm/ft}^2$

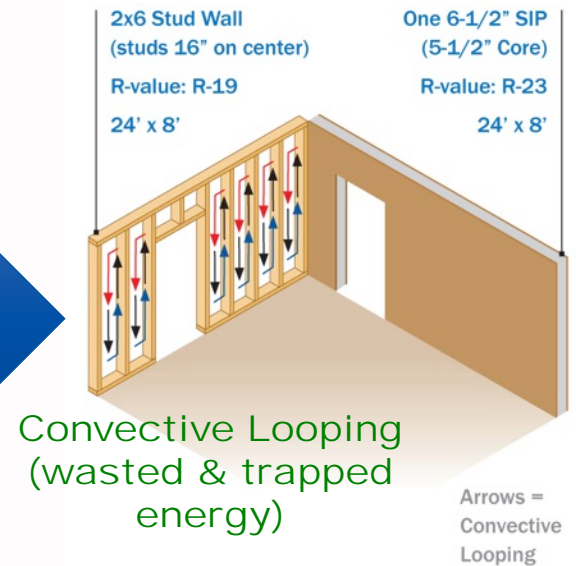
# SIPS Basics: Extreme Efficiency

As Title 24 recognizes, the key to constructing an energy efficient enclosure is to minimize air transfer (hot and cold air). There are two ways heat moves where we don't want it to...

HEAT LOSS  
CULPRIT #1



HEAT LOSS  
CULPRIT #2





# SIPS Offer Extreme Efficiency

**A SIP system eliminates most thermal breaks through reduction in dimensional lumber and increases thermal resistance by eliminating air movement.**



2"x6"  
Stick Framed  
Construction



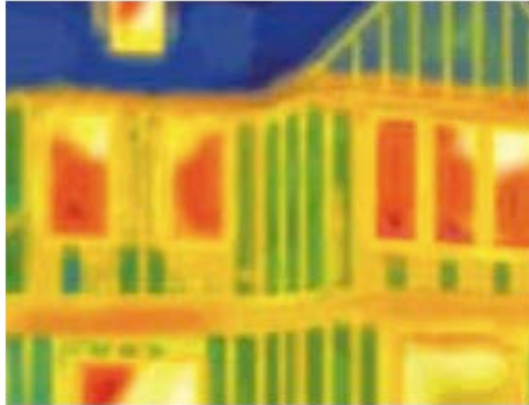
SIPS  
Framed  
Construction

15 Times More  
Airtight

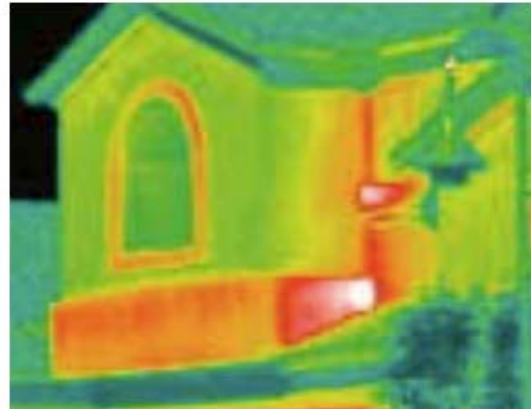
# SIPS Basics: Extreme Efficiency

## Thermal Bridging

Stick walls transfer heat/cold through studs  
RE: yellow lines



SIPS dramatically reduce thermal Bridging  
RE: solid green walls



# SIPS: Proven Efficiency & Code Approvals

- SIPS have more than 40 years of in-situ testing showing exceptional HERS ratings well below IECC required air exchanges and leakage.
- As a result, the DOE (through Energy Star) recognizes how consistently air tight and efficient SIPS are and has waived the requirement for blower door tests nationwide.
- Other Code Approvals\*: ICC and NTA, LARR approved, Seismic Zones D,E & F approved....

\* Not all SIP manufacturers have all approvals





# SIPS Install Faster: RS Means & BASF Study



- RS Means is the industry standard for labor studies
- Evaluated two comparable homes, SIPS vs Stick
- This 2500 FT2 project reduced installation time by 130 labor hours – 55% faster than conventional framing



# SIPS Simplify Standards: Twin Mountain Home



- SIPS Walls & Roof
- 2012 IECC requires  $\leq 3$  ACH, SIPS structures easily surpass this and often reach Passive Home standards
- This home exceeds passive house standards (0.60 ACH50), testing at 0.37 ACH50
- Impressive HERS Rating of 32
  - A “Great” score according to ResNet (70 being “Admirable”)

HERS rating of 100 reflects minimum 2006 IRC thermal compliance

STRUCTURAL INSULATED PANELS

# SIPS & Passive: Menlo Park, CA Home

90% Reduced  
Energy Consumption



- Passive home by Clarum Homes
- SIPS Walls & Roof
- Reduces energy consumption over standard construction by 90%
- Similar passive projects by Clarum in Palo Alto, and Los Gatos

# SIPS: Bellingham Power House

## NET ZERO ENERGY



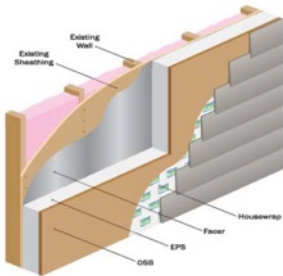
- 2,700 FT<sup>2</sup> residence
- Won Annual Housing Innovation award by the US DOE
- HERS rating of 15
- Blower door test: 0.64 ACH
- Received \$10,500 federal energy tax credit
- Provides surplus energy to power the owner's car for about 10,000 miles per year.

# SIPS Simplify Energy Requirements

## Why Use 7 Steps

### STICK FRAMING

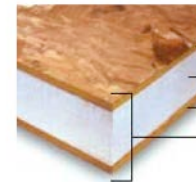
1. Stick framed wall
2. Exterior wall sheathing
3. Insulate wall cavity
4. Continuous insulation
5. Sheathing or furring for siding attachment
6. Weather resistive barrier
7. Siding



## When 3 Work?

### SIPS

1. SIP = Exterior wall sheathing, continuous cavity insulation, sheathing for siding attachment
2. Weather resistive barrier
3. Siding



- Oriented Strand Board (OSB)
- Expanded Polystyrene (EPS)
- Oriented Strand Board (OSB)
- Structurally Laminated



# SIPS in Attics

**The principals that apply to walls, also apply to roofs:**

- Up to 20' spans
- Large panels for fast installation
- Proven structural capacities result in elimination of trusses

