SIPs and ENERGY STAR v3

The ENERGY STAR for New Homes program by the Environmental Protection Agency offers guidelines and verification methods for new homes that exceed the energy efficiency standards set by the 2004 International Energy Conservation Code (IECC) by at least 15 percent.

Since 2012, adherence to the ENERGY STAR Version 3 guidelines has been mandatory for all new homes. These updated guidelines incorporate higher insulation levels and an expanded thermal enclosure checklist. Utilizing structural insulated panels (SIPs) enables builders to achieve compliance more efficiently compared to traditional wood framing. SIPs facilitate the creation of a well-insulated and airtight building enclosure in a single step.

Builders can choose to construct a home according to the prescriptive requirements outlined in the ENERGY STAR Reference Design. Alternatively, they can demonstrate that their home achieves equivalent performance to the Reference Design through energy modeling. Both approaches necessitate inspection by a RESNET certified home energy rater.

Prescriptive Path

Insulation: Ensuring compliance with the 2009 IECC, the building enclosure must be properly insulated. ENERGY STAR offers builders the flexibility to demonstrate compliance by employing an alternative equivalent UA calculation, which acknowledges the absence of thermal bridging in continuous insulation assemblies such as SIPs.

Air Infiltration: Under ENERGY STAR guidelines, qualified homes undergo a blower door test to quantify air infiltration. SIPs consistently exhibit exceptional performance, often testing below 2 ACH50, with experienced SIP crews routinely achieving levels between 0.5 and 1 ACH50. By adhering to the manufacturer's specifications during installation, SIPs effortlessly fulfill ENERGY STAR's air infiltration requirements, eliminating the need for additional air sealing measures typically required for wood frame constructions.

Air Infiltration Rates

Climate Zone	Air infiltration Rate
1,2	6 ACH50
3,4	5 ACH50
5-7	4 ACH50
8	3 ACH50

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Ductwork in Conditioned Space: By locating ductwork within the conditioned attic space formed by a SIP roof, builders bypass the ENERGY STAR mandate for insulating ductwork. In warmer climates, the Prescriptive Path necessitates a radiant barrier if ductwork spans more than 10 feet in an unconditioned attic. When both the ductwork and air handler reside in conditioned space, duct leakage testing may be waived.

Thermal Enclosure Checklist:

Every ENERGY STAR home undergoes a thorough visual inspection of its building enclosure, conducted in accordance with the Thermal Enclosure Checklist, which meticulously examines common areas for thermal bypasses and air leakage. Achieving compliance becomes nearly effortless with a complete SIP building envelope.

Insulation: Compliance dictates that all insulation meets RESNET Grade I standards, ensuring cavity insulation fully occupies the entire cavity without significant gaps or compression. Homes with insulated sheathing may qualify under Grade II. SIPs consistently provide Grade I insulation without reliance on subcontractors.

Fully-Aligned Air Barriers: The checklist specifies numerous locations necessitating complete air barrier installation aligned with the insulation, including attic knee walls, skylight shaft walls, and attic eaves with wind baffles. SIPs feature an insulating foam core fully encased in a code-compliant air barrier of oriented strand board (OSB), eliminating the need for additional effort to meet this requirement.

Air Sealing: ENERGY STAR mandates various air sealing measures for wood framing, such as sealing top and bottom plates, caulking sheetrock to top plates at attic-to-wall interfaces, and sealing wiring penetrations. SIPs require sealing measures per manufacturer's specifications; however, their construction in large sections (up to 8' x 24') minimizes the number of gaps requiring sealing.

Reduced Thermal Bridging: Builders employing wood framing must adopt several advanced framing techniques to minimize thermal bridging. Traditional framing methods necessitate insulated headers, insulation at corners, and minimized window and door framing, as stipulated by the checklist. Alternatively, builders can opt for insulated sheathing, employ double wall construction, or utilize SIPs for enhanced thermal performance.