



# EPS SIPs Outperform Conventional Framed Walls

	Conventional Framed Walls	EPS Structural Insulated Panels
<b>Wall System Description</b>	2x6 wall framed at 16" o.c. installed with R-19 fiberglass insulation.	Structural insulated panels (SIPs) are high performance building panels used in floors, walls, and roofs for residential and light commercial buildings. The panels are typically made by sandwiching a core of closed-cell rigid foam plastic insulation between two structural skins of oriented strand board (OSB). Depending on the size and needs of the structure, the thickness of the foam is adjusted to increase R-value.
<b>R-Value Performance</b>	R-Value of 13.7	R-Value of 24.7. Depending on the size and needs of the structure, the thickness of the foam is adjusted to increase R-value.
<b>Thermal Breaks</b>	Each stud location represents a thermal short circuit in the insulating barrier, allowing moisture-filled air to pass. When wood 2x6 framing is used, an average 33% of the wall surface is comprised of 2x6 framing that is R-6.	EPS SIPs join high performance closed-cell rigid foam insulation to oriented strand board (OSB) or plywood. It averages only 7% of the lumber used in the shell of a building.
<b>Moisture Effect on R-Value</b>	Fiberglass can lose as much as 80% of its R-value when exposed to even low moisture levels, which are common below grade. Moisture leads to wood decay.	When exposed to moisture, the R-value SIPs remains constant and will shed liquid water.
<b>Temperature Effect</b>	Fiberglass insulation loses as much as 40% of its insulating capacity when temperatures fall below 20°F and over half its R-value below 0°F.	The thermal performance of SIPs are not affected by changes in temperature. In fact, studies have shown R-values to improve as temperatures decrease.
<b>Compression Effect</b>	Fiberglass must be fully expanded to work properly. If it is stuffed into openings or compressed by plumbing or electrical wires, it loses most of its R-value.	Electrical wire chases are internal in an EPS panel system.
<b>Mold and Mildew</b>	Organic wood studs absorb moisture and support mold growth. Fiberglass insulation also absorbs moisture and promotes mold growth.	An airtight SIP building envelope forms the basis of a successful mold control strategy. The extremely low levels of air infiltration in SIP buildings allow for incoming air to be provided in controlled amounts by air handling equipment. Proper dehumidification of incoming air following ASHRAE standards will create an environment where mold physically cannot grow. In addition to creating an airtight structure, SIPs are solid and free of any cavities in the wall where moisture can condense and cause unseen mold growth.

<b>Indoor Air Quality</b>	Wood building materials and fiberglass insulation are often treated with preservatives and formaldehyde. Mold and airborne toxins contaminate the indoor air quality.	The tightness of the SIP building envelope prevents air from gaining access to the interior of the home except in controlled amounts. A controlled indoor environment is both healthy and comfortable. Humidity can be controlled more easily in a SIP home resulting in a home that is more comfortable for occupants and less prone to mold growth and dust mites. SIP panels have no offgassing and use no formaldehyde.
<b>Strength &amp; Stability</b>	Wood frame construction exceeds strength requirements but degrades over time. Wood framing members warp and twist as moisture levels vary. Nail “pops” are common.	The structural characteristics of SIPs are similar to that of a steel I-Beam. The OSB skins act as the flange of the I-beam, while the rigid foam core provides the web. This design gives SIPs an advantage at handling in plane compressive loads. SIPs can be engineered for most applications.
<b>Vapor Control</b>	Basement walls must be able to dry. For walls built below grade, drying typically means towards the interior. Adding vapor barriers to control the moisture actually keeps the moisture from being able to dry properly. If placed directly against the masonry wall, an impermeable barrier keeps moisture from being able to dry towards the interior. If installed over the wood frame moisture is trapped inside the wall cavity causing wood to rot and mold to grow.	Air barriers or vapor barriers are not required in SIP buildings because properly sealed SIPs create a code compliant air barrier with a permeability rating of less than 1.0 perm. In addition, the foam core of SIPs is solid and continuous throughout the wall, eliminating the convection and condensation issues that can occur in cavity walls above and below grade.
<b>Installing Insulation</b>	The performance of the thermal barrier is dependent in part upon the quality of workmanship. For fiberglass insulation to work effectively, it must be in continuous contact with its surrounding surfaces on all six sides. It is virtually impossible for installers to achieve this on a job site. Even the smallest gap allows air circulation which kills the insulation value.	Because SIPs are prefabricated, the amount of additional framing required is minimal. SIPs are always straight and true, there are far fewer callbacks, no culling studs, or need to straighten walls. SIPs also provide a uniform nailing surface for both interior and exterior finishing.
<b>Environmental Impact</b>	Wood framing members are produced from trees and treated with preservatives. Fiberglass insulation is often produced with formaldehyde.	Since SIPs are prefabricated in the factory, there is less jobsite waste that needs to be landfilled. Factory fabrication is done using optimization software EPS recycles factory scrap to make other foam products. Structural insulated panels are one of the most environmentally responsible building systems available. A SIP building envelope provides high levels of insulation and is extremely airtight, meaning the amount of energy used to heat and cool a home can be cut by up to 50 percent.
<b>Durability</b>	Wood frame walls attract moisture, mold, and insects which eventually leads to wood rot and deterioration. When real world factors such as air infiltration, extreme temperatures and thermal bridging are present, field-installed fiberglass insulation can lose more than half its R-value.	Research has repeatedly shown that SIPs provide continuous insulation that will maintain its stated R-value for the life of the home and outperform fiberglass insulation every time.