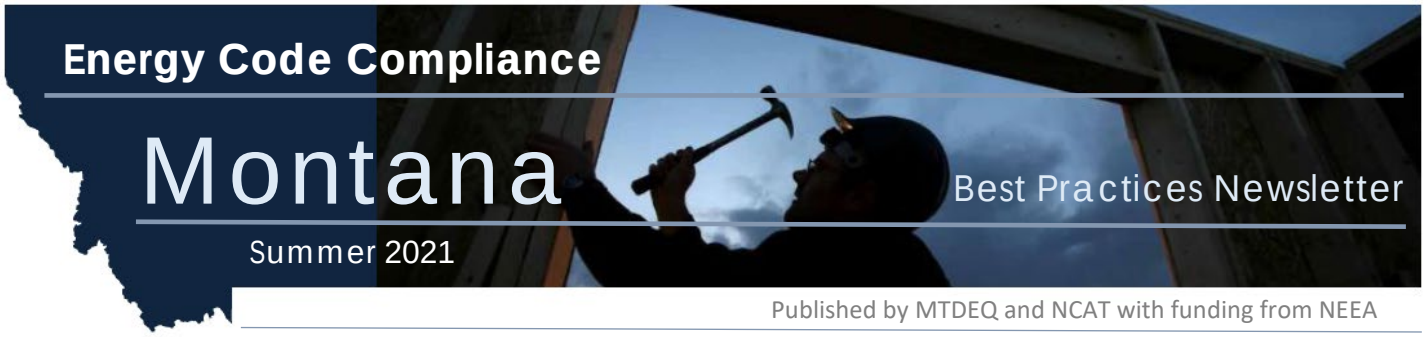

Energy Code Compliance

Montana

Best Practices Newsletter

Summer 2021

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Montana and the 2021 IECC

The Montana Department of Labor and Industry recently announced that they are starting the 2021 code adoption process, which will include the 2021 IECC. The department held a series of listening sessions, where they gathered public comment and suggestions for changes in the code that the state should adopt. The listening sessions were held online and in person, in Missoula and Billings. The target date for final adoption is February 2022. Any additional comments should be addressed in writing to Eric Copeland at the Montana Department of Labor and Industry by September.

Structural Insulated Panels

What are Structural Insulated Panels (SIPS)?

The Sructural Insulated Panel Association defines SIPS as, "…a high-performance building system for residential and light commercial construction. The panels consist of an insulating foam core sandwiched between two structural facings, 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 extremely strong, energy-efficient and cost-effective."

SIPS offer a number of benefits to the builder, including faster construction time, less labor, and excellent thermal performance. Window and door openings can be cut in the factory, saving installation time.

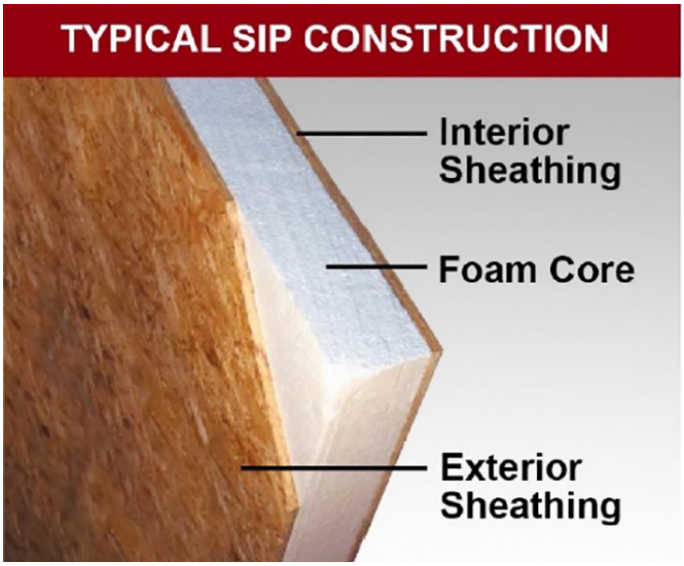


Photo courtesy of and with permission of Structural Insulated Panel Association

SIPs can be used for walls floors and roofs if properly designed. SIPs have a number of unique properties. First, because their cores are solid, air leaks, convection currents, and condensation within the walls are virtually impossible if they are constructed and sealed in accordance with the manufacturer's instructions. Thermal bridging is greatly reduced with SIPS leading to a greater effective R- value as compared to a studded wall assembly. According to the US Energy Department's Building America Solution Center, conventional framing comprises 25% of a stick-built wall, 14% of an advanced framed wall but only 8.7% of a SIP wall. Additionally, the three layers in SIPS are usually of equal vapor resistance creating a uniform vapor resistance to both sides of the assembly. Joseph Lstiburek in his book, *Builders Guide to Structural Insulated Panels* describes this as a "universal" assembly that can be used in any climate zone. (Lstiburek, 2015)

SIPS and the 2018 Codes

Structural Insulated Panels are not specifically mentioned in the 2018 IECC. The 2018 IECC requires an above grade framed wall to have R-21 insulation, or R-13+5 with R-13 in the stud bays and R-5 continuous insulation. In comparison, an equivalent thickness, typically 2x6, SIP assembly would be rated at R-25 just for the insulation. Additionally, because of the continuous insulation nature of a SIP assembly and reduced thermal bridging, SIPS maintain higher R values in real world performance.

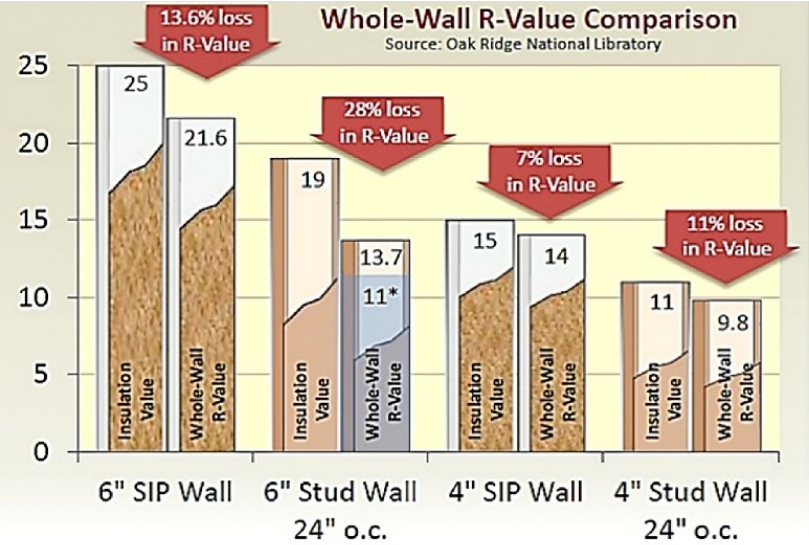


Illustration courtesy of and with permission of Structural Insulated Panel Association

Prescriptive requirements for SIPs wall assemblies, including load, attachments, seismic, and wind, are governed by Section R610 of the 2018 International Residential Code.

SIP Strength

SIPs are structurally self-sufficient in most cases. The structural characteristics of SIPs are similar to that of an I-beam. According to the Structural Insulated Panel Association, this creates an extremely strong assembly that eliminates the need for additional framing within the panel itself. Where loads require additional support, dimensional lumber or engineered wood splines are installed. Because of their strength characteristics, the use of SIPs in a building application can minimize the amount of structural support leading to reduced materials costs.

Electric and Plumbing

As with all energy efficient wall assemblies, builders should minimize the penetrations through the wall assembly. SIPs are no exception, and because integrity of the assembly is important in maintaining its strength, penetrations should be minimized and long cuts in panels, such as to embed wiring, should be avoided. Plumbing should never be run through a SIP panel, and electric chases are provided within the panels are an industry standard. Designers should take some time to design systems that minimize exterior wall penetrations.

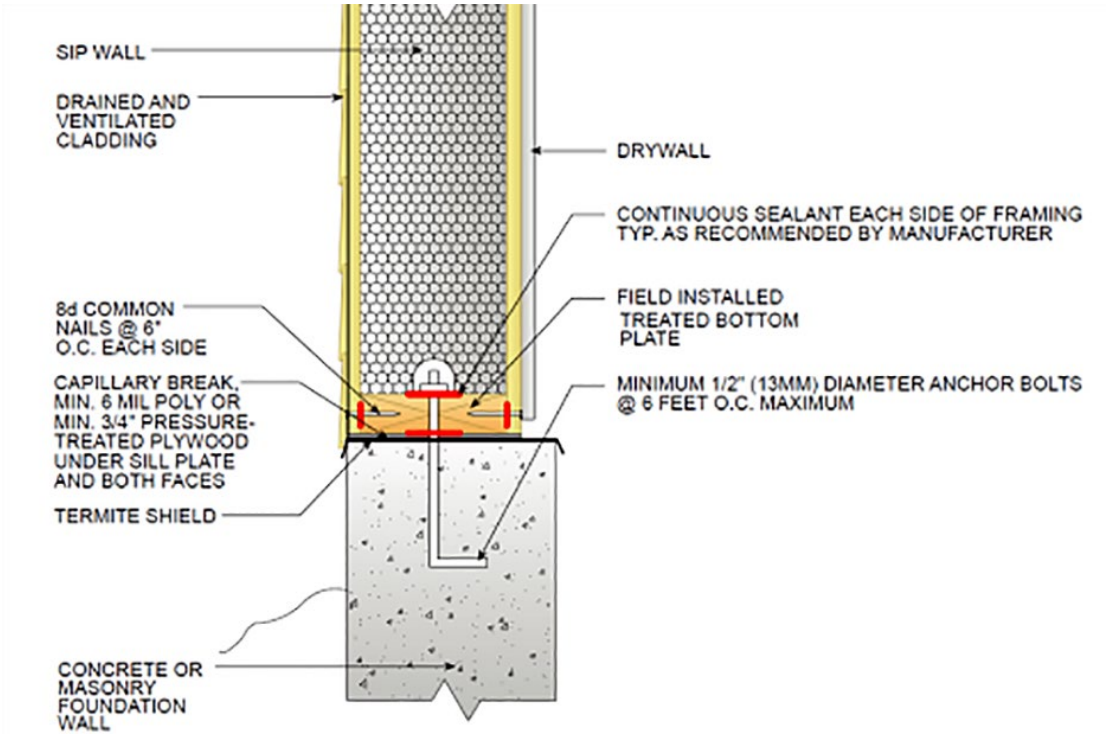
Assembly

One of the major advantages of building with SIPS is the ease and speed of construction. SIPS can be factory cut and prepared for assemble in sizes up to 8'x24'. SIP manufacturers begin the process by turning architectural drawings into SIP shop drawings. These shop drawing specify layout, assembly details and installation specifications. After these drawings are reviewed by the client, they are then used by the manufacturer to fabricate the SIPS for the project. Manufactures can also make SIPS available in blank form, prefabricated form (with window and door cutouts factory produced and the SIPS ready to receive internal lumber), and ready-to-assemble (RTA) packages that come with pre-installed internal lumber and connections.

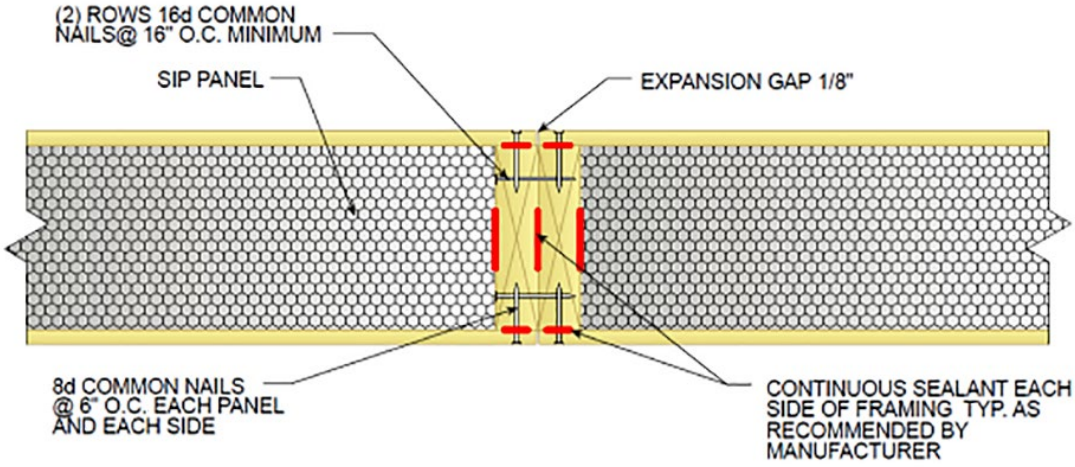
Photo Courtesy of and with permission of the Structural Insulated Panel Association.

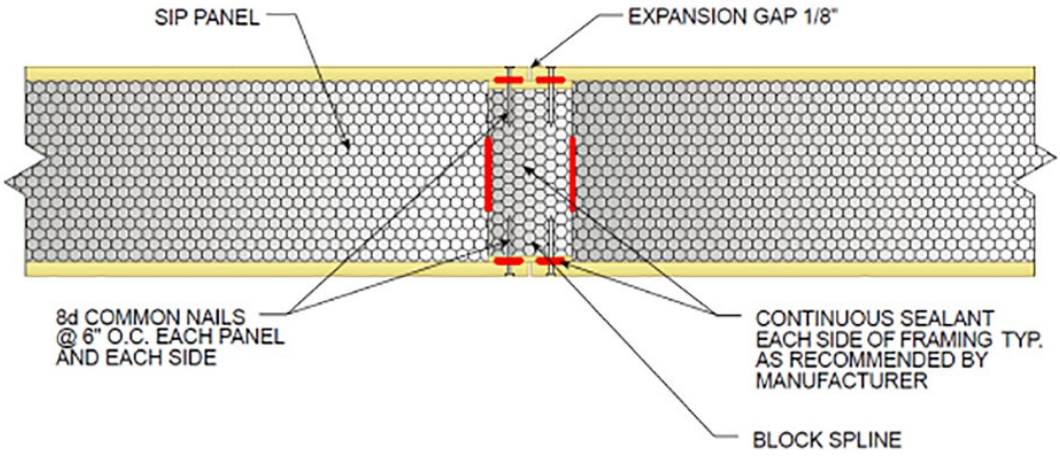
Typical SIP Connections

SIPS are connected to foundations, as is conventionally framed systems, starting with a properly anchored sill plate. The SIP is then placed on top of the sill plate in a void in the bottom of the SIP and fasted with nails every 6 inches. Also, SIPS can be place on top of floor joists and subflooring in a similar manner.

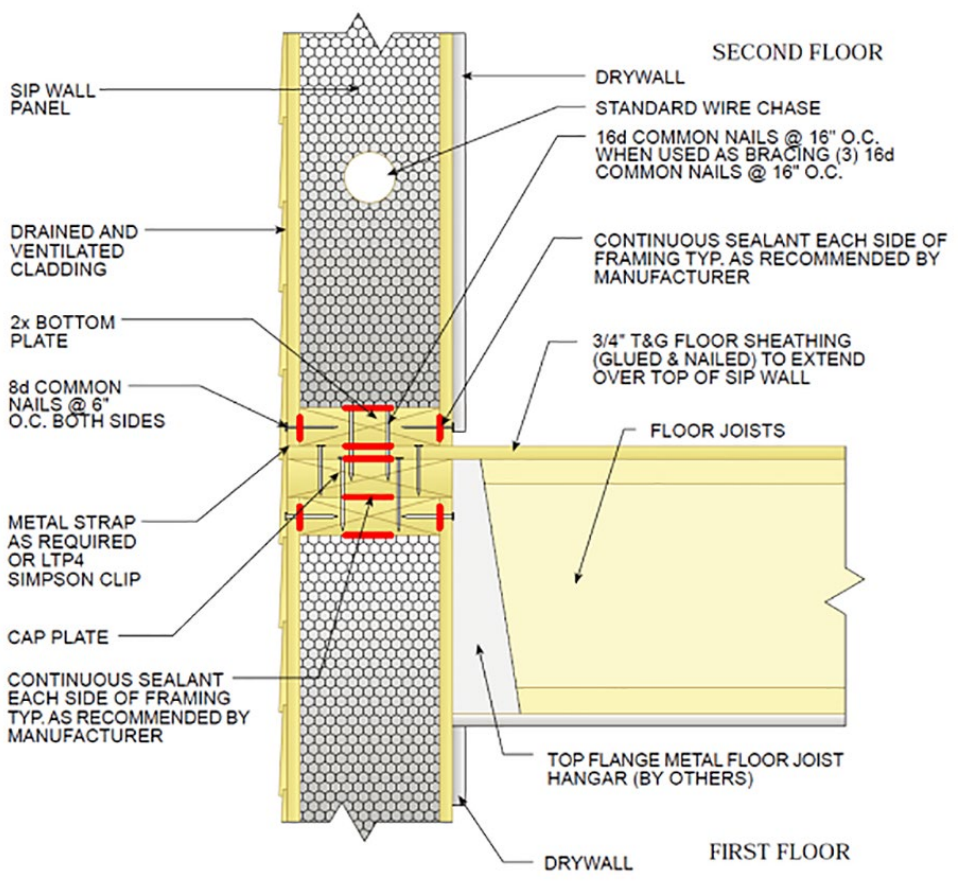


Panel to panel connections are made with vertical splines that can be either solid wood framing members, or insulated splines.

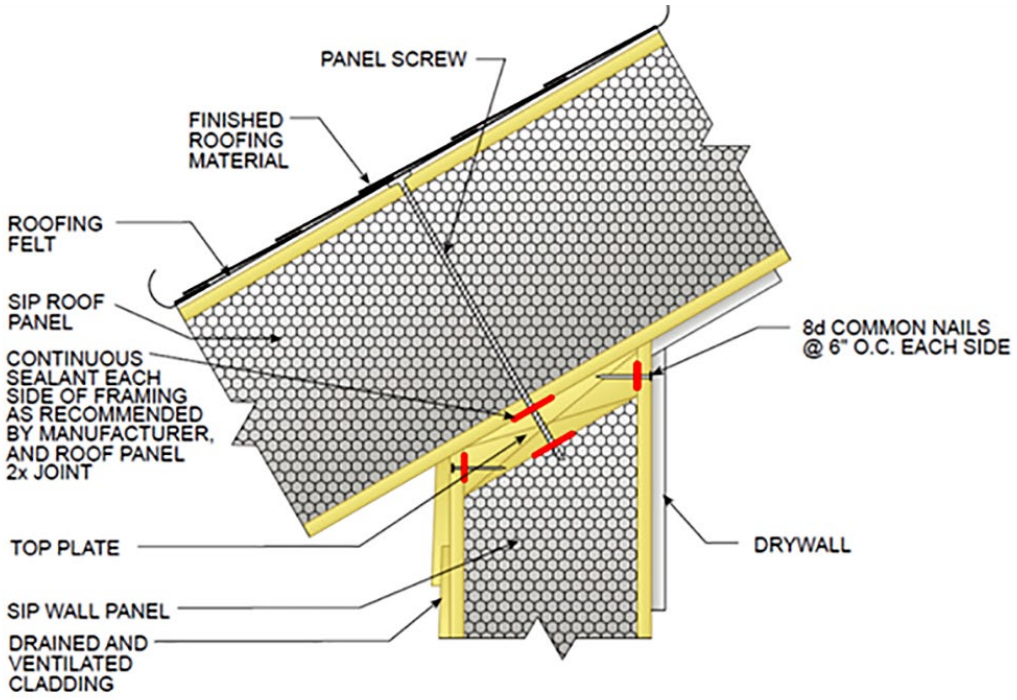




Second floor connections can be accomplished by placing SIPS on the second floor subfloor and joists, or the second floor subfloor can be incorporated into the SIPS themselves in conjunction with steel joist hangers, eliminating the often tricky detail of insulating between floor joists between the first and second floor.



Roof SIP panels are also available and can be a solution to building and properly insulating cathedral ceilings. Because the SIP panels intersect, with little excessive lumber to build the connection, the wall-to-roof connection offers superior air tightness characteristics. In the past, SIP roofs were prone to “roof panel rot.” This situation is caused when penetrations or poor sealing at the panel joints allow warm moist air to enter the roof assembly. This allows moisture to accumulate at the leaky panel joints causing the OSB paneling to deteriorate. This problem can be eliminated with scrupulous attention to detail at sealing all roof joints, and avoiding penetrations such as recessed lighting in interior roof panels.



Conclusion

The question often arises, if SIPS are so good, why aren’t they used in all residential construction? The answer is complicated in several respects. The initial cost of SIPS often seems high compared to a framing lumber package for a typical home. However, after taking into consideration labor prices, SIPS may be a viable alternative. Another factor is the inertia of the building industry itself. Even though SIPS have been around for a while, they are new compared to stick building systems. Learning new techniques is always in obstacle in any industry, and sticking with the tried and true reduces risk in many builder’s business decisions. However, with changes coming in more stringent energy codes and the push for continuous insulation to reduce thermal bridging, the SIP option may be one worth considering. Additionally, my conversations with home builders always ends up being about the shortage of labor.

References

Builders Guide to Structural Insulated Panels (SIPS) for all Climates, Joseph Lstiburek, 2015

The Structural Insulated Panel Association (SIPA) www.sips.org

Big Sky R-Control SIPS https://bigskyrcontrol.com/

All technical drawings courtesy of and with permission of the Structural Insulated Panel Association