

Product Information Bulletin

Insulspan SIP System - 2009 Michigan Uniform Energy Code

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The Insulspan® SIP (Structural Insulating Panel) System is an energy efficient building system that consists of a core of expanded polystyrene (EPS) insulation with oriented strand board (OSB) structurally laminated to the interior and exterior faces.

The Insulspan SIP System meets or exceeds the energy efficiency requirements adopted in the 2009 Michigan Uniform Energy Code (MUEC) which are based upon the 2009 International Energy Conservation Code (IECC). The 2009 MUEC provides two methods of establishing building envelope component compliance.

1. MUEC provides minimum thermal resistance (R-value) for the insulation component in building components. Minimum insulation R-values per Table 402.1.1, INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT for wood frame wall and ceiling components are provided below.

Table 1 - Minimum Insulation R-value for Wall and Roof Components		
Climate Zone	Wood Frame Wall R-value	Ceiling R-value
5A	20	38
6A	20	49
7	21	49

2. MUEC provides an alternate method to demonstrate energy efficiency compliance based upon **maximum equivalent U-factors**. **U-factor** (thermal transmittance) is defined as the coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h·ft²·°F) [W/(m²·K)]. U-factor is the inverse of the **Overall R-value** of a building assembly calculated as per the **ASHRAE Handbook of Fundamentals**. MUEC Table 402.1.3 maximum equivalent U-factors for wood frame wall and ceiling components are provided below.

Table 2 - Maximum Equivalent U-Factors for Wall and Roof Components		
Climate Zone	Frame Wall U-factor	Ceiling U-factor
5A	0.057	0.030
6A	0.057	0.026
7	0.057	0.026

Another key consideration in the design of energy efficiency structures is air leakage characteristics of the structure. Air leakage rates vary widely for different types of house construction. Typical energy efficient structures provide an air leakage rate of 1.5 acph (air changes per hour). Typical homes built with the Insulspan SIP System combining other energy-efficient building components provide significant reduction in air leakage with values of less than 1.0 acph achievable.

On the following page examples of Insulspan SIP wall and roof assemblies meeting MEUC requirements are provided. These are intended to be examples of typical assemblies only. Consult your Insulspan sales representative for a detailed review of appropriate wall and roof construction for your application.

Wall Assemblies

The table below provides a comparison of the equivalent U-factor for a 6 ½" Insulspan SIP with wood framing at 48" on center versus a wood framed with 2 x 6 studs at 16" on center with minimum insulation per Table 402.1.1, Zone 7. Both wall assembly types meet MUEC requirements for Tables 402.1.1.1 and 402.1.3 for Zone 5A, 6A and 7; however, the Insulspan SIP wall provides approximately 20% higher overall thermal resistance than the 2 x 6 wood framed wall assembly.

Table 3 - Typical Wall Assemblies				
Wall Assembly Components	6 ½" Insulspan SIP System		2 x 6 Wood Framed Wall	
	R-value Framed Area	R-value Opaque Area	R-value Framed Area	R-value Opaque Area
Outside Air Film	0.2	0.2	0.2	0.2
Metal Siding	0.6	0.6	0.6	0.6
Sheathing Paper	0.1	0.1	0.1	0.1
7/16" OSB Facing or sheathing	0.7	0.7	0.7	0.7
EPS Insulation Core or Cavity	----	21.7	----	21.0
Wood Stud Framing	6.4	----	6.4	----
7/16" OSB Facing	0.7	0.7	----	----
½" Gypsum Board	0.4	0.4	0.4	0.4
Inside Air Film	0.7	0.7	0.7	0.7
Total	9.8	25.1	9.1	23.7
Overall R-value (ft²•hr•°F/BTU)	R-22.3		R-18.2	
U-Factor (BTU/ft²•hr•°F)	0.045		0.055	
Compliance	Zones 5A , 6A and 7		Zone 5A, 6A and 7	

Roof Assemblies

The table below provides examples of roof assemblies constructed with the Insulspan SIP System that would meet MUEC Table 402.1.3 maximum equivalent U-factors for Zones 5A, 6A and 7.

Table 4 - Typical Roof Assemblies				
SIP Roof Assembly Components	8 ¼" Insulspan SIP System		10 ¼" Insulspan SIP System	
	R-value Framed Area	R-value Opaque Area	R-value Framed Area	R-value Opaque Area
Outside Air Film (above roof)	0.2	0.2	0.2	0.2
Asphalt Shingle	0.5	0.5	0.5	0.5
Sheathing Paper	0.1	0.1	0.1	0.1
OSB Facing	0.5	0.5	0.5	0.5
EPS Insulation Core¹	----	30.6	----	36.2
SIP Insulspline Joint Connection	28.0	----	33.4	----
OSB Facing	0.5	0.5	0.5	0.5
Gypsum Wall Board, 1/2"	0.4	0.4	0.4	0.4
Inside Air Film	0.6	0.6	0.6	0.6
Total	30.9	33.4	36.3	39.0
Overall R-value (ft²•hr•°F/BTU)	R-33.2		38.7	
U-Factor (BTU/ft²•hr•°F)	0.030		0.026	
Compliance	Zones 5A		Zone 6A and 7	

1. EPS insulation core for roof SIPs meet ASTM C578, Type II for 8 ¼" SIP and Type 1 for 10 ¼" SIP.