

The table below provides thermal resistance values from the Ontario Building Code 2006 for above grade walls. These values represent the minimum thermal resistance of the insulation in wood frame construction for the portion of the wall that does not include framing or furring.

### OBC 2006 – Table 12.3.2.1. Thermal Resistance Requirements

Building Element Exposed to the Exterior or to Unheated Space	Zone 1 Less than 5000 degree-days		Zone 2 5000 or more degree-days	
	Minimum Insulation RSI Value Required			
	RSI	R-Value	RSI	R-Value
Wall other than foundation wall	3.34	19.0	4.22	24.0

“Effective thermal resistance” calculated as per Model National Energy Code for Houses (MNECH), Appendix C, is a measure of the overall thermal resistance of a building assembly when the effect of thermal bridges, such as wood framing, is included. The Insulspan<sup>®</sup> Structural Insulating Panel (SIP) 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 effective thermal resistance calculations for Insulspan SIP System alternates with wood framing at 1220-mm (48”) on centre versus wood frame wall alternates is illustrated below.

### Effective Thermal Resistance Calculations for Insulspan SIP System Alternates

Insulspan SIP System	OBC 2006 Zone 1 165-mm (6-1/2”) Thick SIP				OBC 2006 Zone 2 210-mm (8-1/4”) Thick SIP			
	m <sup>2</sup> ·°C/W		ft <sup>2</sup> ·hr·°F/BTU		m <sup>2</sup> ·°C/W		ft <sup>2</sup> ·hr·°F/BTU	
	RSI <sub>F</sub>	RSI <sub>I</sub>	R <sub>F</sub>	R <sub>I</sub>	RSI <sub>F</sub>	RSI <sub>I</sub>	R <sub>F</sub>	R <sub>I</sub>
Outside Air Film (above grade)	0.03	0.03	0.17	0.17	0.03	0.03	0.17	0.17
Metal Siding	0.11	0.11	0.62	0.62	0.11	0.11	0.62	0.62
Sheathing Paper	0.01	0.01	0.06	0.06	0.01	0.01	0.06	0.06
11.1 mm (7/16”) OSB Skin	0.12	0.12	0.69	0.69	0.12	0.12	0.69	0.69
Type 1 EPS Insulation <small>See Note 1</small>	----	3.71	----	21.09	----	4.87	----	27.67
Wood Stud @ 1220 mm o.c.	1.13	----	6.44		1.51	----	8.60	
11.1 mm (7/16”) OSB Skin	0.12	0.12	0.69	0.69	0.12	0.12	0.69	0.69
12.7-mm Gypsum Wall Board	0.08	0.08	0.45	0.45	0.08	0.08	0.45	0.45
Inside Air Film	0.12	0.12	0.68	0.68	0.12	0.12	0.68	0.68
<b>Total Thermal Resistance</b>	<b>1.73</b>	<b>4.31</b>	<b>9.60</b>	<b>24.02</b>	<b>2.11</b>	<b>5.46</b>	<b>11.96</b>	<b>31.03</b>
<b>Effective Thermal Resistance<sup>2</sup></b>	<b>RSI 3.75</b>		<b>R 21.28</b>		<b>RSI 4.71</b>		<b>R 26.76</b>	

**Note:**

1. EPS insulation core thicknesses are 143-mm (5-5/8”) and 187-mm (7-3/8”).

**Effective Thermal Resistance Calculations for Wood Frame Wall Alternates**

Wood-Frame Wall c/w Insulating Sheathing Board	OBC 2006 Zone 1				OBC 2006 Zone 2			
	2 x 4 Stud Wall				2 x 6 Stud Wall			
	m <sup>2</sup> ·°C/W		ft <sup>2</sup> ·hr·°F/BTU		m <sup>2</sup> ·°C/W		ft <sup>2</sup> ·hr·°F/BTU	
	RSI <sub>F</sub>	RSI <sub>I</sub>	R <sub>F</sub>	R <sub>I</sub>	RSI <sub>F</sub>	RSI <sub>I</sub>	R <sub>F</sub>	R <sub>I</sub>
Outside Air Film (above grade)	0.03	0.03	0.17	0.17	0.03	0.03	0.17	0.17
Metal Siding	0.11	0.11	0.62	0.62	0.11	0.11	0.62	0.62
Sheathing Paper	0.01	0.01	0.06	0.06	0.01	0.01	0.06	0.06
Type 1 EPS Insulation	0.87	0.87 <sup>1</sup>	4.94	4.94 <sup>1</sup>	0.87	0.87 <sup>2</sup>	4.94	4.94 <sup>2</sup>
Stud Cavity Insulation	----	2.47 <sup>1</sup>	----	14.02 <sup>1</sup>	----	3.35 <sup>2</sup>	----	19.03 <sup>2</sup>
Wood Stud less than 500 mm o.c.	0.72	----	4.09	----	1.13	----	6.44	----
Polyethylene Vapour Barrier	----	----			----	----	----	----
12.7-mm Gypsum Wall Board	0.08	0.08	0.45	0.45	0.08	0.08	0.45	0.45
Inside Air Film	0.12	0.12	0.68	0.68	0.12	0.12	0.68	0.68
<b>Total Thermal Resistance</b>	<b>1.94</b>	<b>3.69</b>	<b>11.02</b>	<b>20.96</b>	<b>2.35</b>	<b>4.57</b>	<b>13.37</b>	<b>25.94</b>
<b>Effective Thermal Resistance<sup>3</sup></b>	<b>RSI 3.15</b>		<b>R 17.89</b>		<b>RSI 3.88</b>		<b>R 22.03</b>	

**Notes to Table:**

1. Total thermal resistance for insulation components equal to RSI 3.34 (R 19.0) per OBC 2006 Zone 1 requirements.
2. Total thermal resistance for insulation components equal to RSI 4.22 (R 24.0) per OBC 2006 Zone 2 requirements.
3. Effective thermal resistance is calculated as per MNECH.

Walls built using conventional wood-frame construction methods have wood studs at 406 or 600 mm (16" or 24") on center which act as thermal bridges in the wall assembly. As can be seen, the effective RSI of the Insulspan SIP System exceeds that of a conventional wood-frame wall assembly even when a layer of insulating sheathing is added over the exterior of the conventional wood-frame wall.