

Insulspan SIPs PIB 210

Insulspan SIP System

**2012 OBC, SB-12
Part 9 Residential**

Product Information Bulletin

2012 OBC, MMA Supplementary Standard SB-12 Part 9 Residential Occupancy Requirements

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The **Insulspan® SIP System** is an energy efficient structural insulating panel (SIP) system. Each Insulspan SIP consists of a monolithic core of expanded polystyrene (EPS) insulation with SIP grade oriented strand board (OSB) structurally laminated to both faces. This bulletin summarizes **Insulspan SIP System** solutions to meet requirements for buildings complying with residential occupancy per 2012 Ontario Building Code (2012 OBC), Division B, Parts 9 & 12.

2012 OBC, Division B, Article 12.2.1.2. Energy Efficiency Design After December 31, 2016:

1. This Article applies to construction for which a permit has been applied for after December 31, 2016.
2. Except as provided in Sentences (3) and (4), the energy efficiency of all buildings shall
 - a) be designed to exceed by not less than 13% the energy efficiency levels required by Sentence 12.2.1.1.(2), or
 - b) conform to Division 1 and Division 3 or 5 of MMA Supplementary Standard SB-10, "Energy Efficiency Requirements".
3. Except as provided in Sentence (4), the energy efficiency of a *building* or part of a *building of residential occupancy* that is within the scope of Part 9 and is intended for occupancy on a continuing basis during the winter months shall,
 - a) be designed to exceed by not less than 15% the energy efficiency levels required by Sentence 12.2.1.1.(3), or
 - b) conform to Chapters 1 and 3 of MMA Supplementary Standard SB-12, "Energy Efficiency of Housing".
4. This article does not apply to,
 - a) A *farm building*,
 - b) a *building* that does not use electrical power or fossil fuel,
 - c) a manufactured *building* described in Article 9.1.1.9., or
 - d) a seasonal recreational *building* described in Section 9.36. or 9.38.

MMA Supplementary Standard SB-10, **Energy Efficiency Requirements** applies to energy efficiency design of all buildings **except** buildings with residential occupancy required to comply with 2012 OBC, Division B, Sentence 12.2.1.1.(3). **For additional information on Plasti-Fab EPS solutions available to meet requirements of MMA SB-10, refer to Plasti-Fab Product Information Bulletin No. 290.**

2012 OBC, Division B, Sentence 12.2.1.2.(3) refers to MMA SB-12, Chapter 3 which provides three compliance options to achieve energy efficiency for Part 9 buildings with residential occupancy:

1. Conformance with one of the prescriptive compliance packages in Subsection 3.1.1.
2. Comply with the performance compliance method in Subsection 3.1.2. or
3. Compliance with Energy Star or R2000 requirements as specified in Subsection 3.1.3. of SB-12 which is intended to achieve, on a systemic basis, an energy efficiency performance level that exceeds the energy efficiency requirements of Sentence 12.2.1.1.(3) of Division B of the Building Code by 15%.

This bulletin provides options for constructing above grade wall and roof without attic assemblies that comply with minimum thermal performance required for 2012 OBC, MMA SB-12, Chapter 3 prescriptive compliance packages that include required space heating equipment, domestic hot water heating equipment and heat recovery ventilator equipment to achieve energy efficiency of the building envelope.

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Compliance packages are presented in table format in SB-12, Chapter 3 with requirements for Zone 1 Building Locations in Tables 3.1.1.2.A (SI), 3.1.1.2.A (IP), 3.1.1.2.B (SI), and 3.1.1.2.B (IP) and Zone 2 Building Locations in Tables 3.1.1.3.A (SI), 3.1.1.3.A (IP), 3.1.1.3.B (SI), and 3.1.1.3.B (IP).

NOTE: Thermal performance for wall and ceiling components listed in the tables are either minimum nominal RSI (R)-value for the thermal insulation component only, minimum effective RSI (R) for entire wall or roof assembly – expressed in SI units of (m²•K)/W or IP units of (ft²•hr•°F)/BTU – or maximum U-value (overall thermal transmittance) for the entire wall or roof assembly) – expressed in SI units of W/(m²•K) or IP units of BTU/(ft²•hr•°F).

Approximate limits of Climate Zones 1 and 2 are illustrated in Figure 1. Heating degree days (HDD) extracted from climatic data in 2012 OBC, MMA Supplementary Standard SB-1 for some building locations are provided in Table 1.

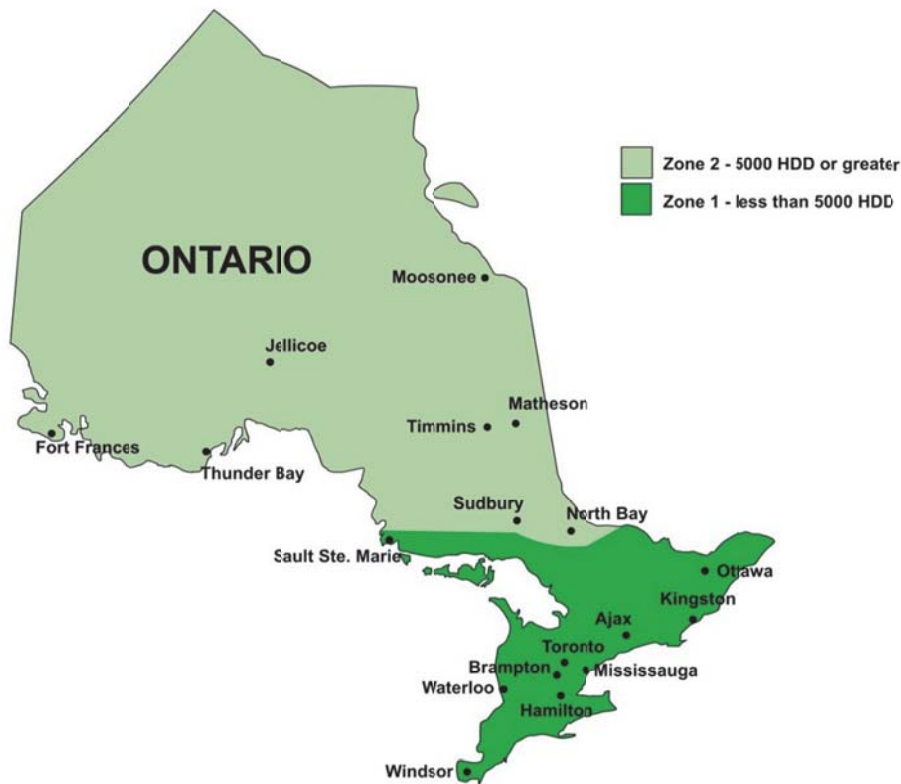


Figure 1 – Ontario Climate Zone Map

Table 1 – HDD for Climate Zone Locations: 2012 OBC, SB-1

Zone 1 – Less than 5,000 Heating Degree Days				Zone 2 – 5,000 Heating Degree Days or Greater			
Location	HDD	Location	HDD	Location	HDD	Location	HDD
Windsor	3400	Kingston	4000	North Bay	5150	Timmins	5940
Hamilton	3460	Brampton	4100	Sudbury	5180	Matheson	6080
Toronto	3520	Waterloo	4200	Fort Frances	5440	Jellicoe	6400
Ajax	3820	Ottawa	4440	Thunder Bay	5650	Nakina	6500
Mississauga	3880	Sault Ste. Marie	4960	Dryden	5850	Moosonee	6800

Insulspan SIP System wall and roof assemblies are constructed with wood framing at 1,220 mm (48") on center versus typical wood frame assemblies which are constructed with wood framing at 406 mm (16") to 610 mm (24") on center. **Effective thermal resistance (RSI_{eff}/R_{eff})** calculations for building assemblies includes the effect of thermal bridging due to repetitive structural members such as wood framing members in wall or roof assemblies.

RSI_{eff}/R_{eff} building assemblies is calculated using the formula below as per sentence 1.3.2.1.(2) of 2012 OBC, MMA SB-12, Appendix A.

$$RSI_{eff} (R_{eff}) = \frac{100\%}{\frac{\% \text{ Area of Framing}}{RSI_F(R_F)} + \frac{\% \text{ Area of Cavity}}{RSI_C(R_C)}} + RSI(R) \text{ Continuous Material Layers}$$

Framing percentages used in sample calculations provided in Tables 3, 4 and 6 are as per National Building Code of Canada 2010, Table A-9.36.2.4.(1)A.

Table 2 provides examples of **Insulspan SIP System** solutions that can be used to meet minimum **effective RSI/R value** per OBC 2012, MMA SB-12, Chapter 3 for above grade wall applications.

Table 2 – Insulspan SIP System Solutions for Above Grade Walls

Option Description	MMA SB-12 Compliance Package	MMA SB-12 Effective RSI (R) ¹	Insulspan Effective RSI (R)	Reference Calculation
Zone 1 – Table 3.1.1.2.A – Space Heating Equipment with AFUE ≥ 92%				
6 ½" Insulspan SIP System	A1	3.00 (17.0)	3.42 (19.4)	Table 3
	A3	3.28 (18.6)		
8 ¼" Insulspan SIP System	A2, A5	3.58 (20.3)	4.32 (24.5)	Table 3
	A4, A6	3.77 (21.4)		
6 ½" Insulspan R-Plus SIP System	A1 to A6	Max. 3.77 (21.4)	3.86 (21.9)	Table 4
Zone 1 – Table 3.1.1.2.B – Space Heating Equipment with 84% ≤ AFUE < 92%				
8 ¼" Insulspan SIP System	B1, B2	3.77 (21.4)	4.32 (24.5)	Table 3
6 ½" Insulspan R-Plus SIP System	B1, B2	3.77 (21.4)	3.86 (21.9)	Table 4
8 ¼" Insulspan R-Plus SIP System	B3, B4	4.21 (23.9)	4.90 (27.8)	Table 4
	B5, B6	4.46 (25.3)		
Zone 2 – Table 3.1.1.3.A – Space Heating Equipment with AFUE ≥ 92%				
8 ¼" Insulspan SIP System	A1	3.58 (20.3)	4.32 (24.5)	Table 3
	A3	3.77 (21.4)		
	A4, A6	4.21 (23.9)		
6 ½" Insulspan R-Plus SIP System	A1	3.58 (20.3)	3.86 (21.9)	Table 4
	A3	3.78 (21.4)		
8 ¼" Insulspan R-Plus SIP System	A2, A5	4.46 (25.3)	4.90 (27.8)	Table 4
	A4, A6	4.21 (23.9)		
Zone 2 – Table 3.1.1.3.B – Space Heating Equipment with 84% ≤ AFUE < 92%				
8 ¼" Insulspan R-Plus SIP System	B1, B2	4.21 (23.9)	4.90 (27.8)	Table 5
	B3, B4, B5, B6	4.65 (26.4)		

Table 3 provides sample RSI_{eff}/R_{eff} calculations for **Insulspan SIP System** wall assemblies with effective thermal resistance complying with 2012 OBC, SB-12 minimum requirements as per Table 2.

Table 3 - RSI_{eff}/R_{eff} Calculations for Insulspan SIP System Wall Assemblies

Insulspan SIP System Wall Assembly	6-1/2" Insulspan SIP Wall			8-1/4" Insulspan SIP Wall		
	Framed Portion		Continuous Materials	Framed Portion		Continuous Materials
	RSI_F	RSI_C		RSI_F	RSI_C	
Outside Air Film	----	----	0.03	----	----	0.03
Cladding	----	----	0.11	----	----	0.11
11.1 mm OSB Skin	----	----	0.11	----	----	0.11
PlastiSpan Insulation Core¹	----	3.71	----	----	4.87	----
Wood Stud @ 1220 mm	1.19	----	----	1.57	----	----
11.1 mm OSB Skin	----	----	0.11	----	----	0.11
12.7-mm Gypsum Wall Board	----	----	0.08	----	----	0.08
Inside Air Film	----	----	0.12	----	----	0.12
Sub-Total RSI	1.19	3.71	0.56	1.57	4.87	0.56
Framing Percentages²	14%	86%	100%	14%	86%	100%
$RSI_{eff} (R_{eff})$	RSI-3.42 (R-19.4)			RSI-4.32 (R 24.5)		

Note:

1. **Insulspan SIP System** incorporates **PlastiSpan®** insulation core meeting CAN/ULC-S701, Type 1.

Table 4 provides sample RSI_{eff}/R_{eff} calculations for **Insulspan R-Plus SIP System** wall assemblies with effective thermal resistance complying with 2012 OBC, SB-12 minimum requirements as noted in Table 2.

Table 4 - RSI_{eff}/R_{eff} Calculations for Insulspan R-Plus SIP System Wall Assemblies

Insulspan SIP System Wall Assembly	6-1/2" Insulspan R-Plus SIP Wall			8-1/4" Insulspan R-Plus SIP Wall		
	Framed Portion		Continuous Materials	Framed Portion		Continuous Materials
	RSI_F	RSI_C		RSI_F	RSI_C	
Outside Air Film	----	----	0.03	----	----	0.03
Cladding	----	----	0.11	----	----	0.11
11.1 mm OSB Skin	----	----	0.11	----	----	0.11
EnerSpan Insulation Core¹	----	4.66	----	----	6.10	----
Wood Stud @ 1220 mm	1.19	----	----	1.57	----	----
11.1 mm OSB Skin	----	----	0.11	----	----	0.11
12.7-mm Gypsum Board	----	----	0.08	----	----	0.08
Inside Air Film	----	----	0.12	----	----	0.12
Sub-Total RSI	1.19	4.66	0.56	1.57	6.10	0.56
Framing Percentages	14%	86%	100%	14%	86%	100%
$RSI_{eff} (R_{eff})$	RSI-3.86 (R-21.9)			RSI-4.90 (R 27.8)		

Note:

1. **Insulspan R-Plus SIP System** wall incorporates **EnerSpan®** insulation core with a thermal resistance of RSI-0.82 per 25 mm (R-4.7 per inch) which exceeds CAN/ULC-S701, Type 1 requirements. **EnerSpan** insulation is an EPS insulation with a silver-grey colour manufactured using **Neopor® F5300 Plus** provided by **BASF**. **Neopor F5300 Plus** is a graphite-enhanced expandable polystyrene (GPS) raw material that reduces radiation heat transfer resulting in EPS insulation with a higher thermal resistance compared to standard white EPS insulation.

Table 5 – Insulspan SIP System Solutions for Ceiling without Attic

Option Description	MMA SB-12 Compliance Package	MMA SB-12 Effective RSI (R) ¹	Insulspan Effective RSI (R)	Reference Calculation
Zone 1 – Table 3.1.1.2.A – Space Heating Equipment with AFUE ≥ 92%				
10 ¼" Insulspan SIP System	A1 to A6	4.87 (27.6)	5.76 (32.7)	Table 6
8 ¼" Insulspan R-Plus SIP System	A1 to A6	4.87 (27.6)	5.40 (30.6)	Table 6
Zone 1 – Table 3.1.1.2.B – Space Heating Equipment with 84% ≤ AFUE < 92%				
10 ¼" Insulspan SIP System	B1 to B6	4.87 (27.6)	5.76 (32.7)	Table 6
8 ¼" Insulspan R-Plus SIP System	B1 to B6	4.87 (27.6)	5.40 (30.6)	Table 6
Zone 2 – Table 3.1.1.3.A – Space Heating Equipment with AFUE ≥ 92%				
6 ½" Insulspan R-Plus SIP System	A1 to A6	4.87 (27.6)	5.76 (32.7)	Table 6
8 ¼" Insulspan R-Plus SIP System	A1 to A6	4.87 (27.6)	5.40 (30.6)	Table 6
Zone 2 – Table 3.1.1.3.B – Space Heating Equipment with 84% ≤ AFUE < 92%				
6 ½" Insulspan R-Plus SIP System	B1 to B6	4.87 (27.6)	5.76 (32.7)	Table 6
8 ¼" Insulspan R-Plus SIP System	B1 to B6	4.87 (27.6)	5.40 (30.6)	Table 6

Table 6 provides sample RSI_{eff}/R_{eff} calculations for **Insulspan SIP System** roof assemblies with effective thermal resistance exceeding with 2012 OBC, SB-12 minimum requirements as noted in Table 5.

Table 6 - RSI_{eff}/R_{eff} Calculations for Insulspan SIP System Roof Assembly

Insulspan SIP System Roof Assembly	8 ¼" Insulspan R-Plus SIP Roof ¹			10 ¼" Insulspan SIP Roof ²		
	Framed Portion		Continuous Materials	Framed Portion		Continuous Materials
	RSI_F	RSI_C		RSI_F	RSI_C	
Outside air film	----	----	0.03	----	----	0.03
Asphalt shingles	----	----	0.11	----	----	0.11
11.1 mm OSB skin	----	----	0.11	----	----	0.11
EPS Insulation core	----	6.10	----	----	6.19	----
Wood Stud @ 1220 mm	1.57	----	----	2.00	----	----
11.1 mm OSB skin	----	----	0.11	----	----	0.11
12.7-mm Gypsum board	----	----	0.08	----	----	0.08
Inside air film	----	----	0.12	----	----	0.12
Sub-Total RSI	1.57	5.62	0.56	2.00	6.19	0.56
Framing Percentages	9%	91%	100%	9%	91%	100%
$RSI_{eff} (R_{eff})$	RSI-5.40 (R-30.6)			RSI-5.76 (R-32.7)		

Notes:

1. The 8 ¼" **Insulspan R-Plus SIP System** roof incorporates an **EnerSpan** insulation core with a thermal resistance of RSI-0.82 per 25 mm (R-4.7 per inch).
2. The 10 ¼" **Insulspan SIP System** roof is manufactured with a **PlastiSpan** insulation core meeting CAN/ULC-S701, Type 1.