Product Information Bulletin

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REPLACES: NEW

PlastiSpan® Insulation for Insulating Sheathing - 2014 ABC

PlastiSpan® insulation board is a moulded expanded polystyrene (EPS) insulation that meets or exceeds CAN/ULC-S701, ***Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering***. ***PlastiSpan*** insulating sheathing applied over the exterior of wood framed walls provide continuous insulation eliminating thermal bridges at wood stud locations.

Table 1 - *PlastiSpan* Insulation Material Properties

Material Property	ASTM Test Method[1]	Units	CAN/ULC-S701[2]
			Type 1
Thermal Resistance *Minimum per 25 mm (inch)*	C518	$m^2 \cdot {}^oC/W$ ($ft^2 \cdot h \cdot {}^oF/BTU$)	0.65 (3.75)
Compressive Resistance *Minimum @ 10% Deformation*	D1621	kPa (psi)	70 (10)
Flexural Strength *Minimum*	C203	kPa (psi)	170 (25)
Water Vapour Permeance[3] *Maximum*	E96	$ng/(Pa \cdot s \cdot m^2)$ (Perms)	300 (5.0)
Water Absorption[4] *Maximum*	D2842	% By volume	6.0
Dimensional Stability *Maximum, 7 Days @ 70 ± 2°C (158 ± 4°F)*	D2126	% Linear Change	1.5
Limiting Oxygen Index *Minimum*	D2863	%	24

This bulletin addresses use of ***PlastiSpan*** insulation as an exterior insulating sheathing applied to above grade walls in compliance with the 2014 Alberta Building Code (2014 ABC).

1. The test methods used to determine material properties in the above table provide a means of comparing different types of cellular plastic thermal insulation. They are intended for use in specifications, product evaluations and quality control. They do not predict end-use product performance.
2. ***PlastiSpan*** insulation properties are third party certified under a quality listing program administered by Intertek and are listed by the Canadian Construction Materials Centre (CCMC) under evaluation listing numbers 12424-L (Type 1).
3. WVP values quoted are maximum values for 25-mm thick samples with natural skins intact. Lower values will result for thicker materials.
4. The water absorption laboratory test method involves complete submersion under a head of water for 96 hours. The water absorption values above are applicable to specific end-use design requirements only to the extent that the end-use conditions are similar to test method requirements.

1. Air Barrier System Requirements

2014 ABC, Article 9.25.3.1. requires wall, ceiling and floor assemblies separating conditioned space from unconditioned space or from the ground to be constructed so as to include an air barrier system that will provide a continuous barrier to air leakage. ***PlastiSpan*** insulation may be used as one component in an air barrier system; however, air barrier system design must consider requirements for sealing of all penetrations of the air barrier system, such as those created by the installation of doors, windows, electrical wiring, electrical boxes, piping or ductwork

2. Vapour Barrier System Requirements

2014 ABC, Article 9.25.4.1. requires all thermally insulated wall, ceiling and floor assemblies to be constructed with a vapour barrier sufficient to prevent condensation. Dependent upon thickness, ***PlastiSpan*** insulation can have a vapour permeance less than 60 ng/(Pa•s•m^2) as per 2014 ABC, Sentence 9.25.4.2.(1); however, ***PlastiSpa***n insulating sheathing is not intended to provide the principal protection against vapour diffusion in an above grade wall application. See requirements related to low air- and vapour-permeance materials below.

3. Position and Properties of *PlastiSpan* Insulating Sheathing

2014 ABC, Subsection 9.25.5.1. addresses low air- and vapour-permeance materials and implications for moisture accumulation. Because ***PlastiSpan*** insulating sheathing may have an air leakage characteristic less than 0.1 L/(s•m^2) at 75 Pa and a vapour permeance characteristic less than 60 ng/(Pa•s•m^2), the provisions of 2014 ABC, Article 9.25.5 should be considered.

2014 ABC, Article 9.25.5.2 permits the use of insulating sheathing meeting the above criteria on the exterior of an insulated frame wall based upon the ***ratio of outboard to inboard thermal resistance*** for specific heating degree-day (HDD) ranges. Wall assemblies with ratio of outboard to inboard thermal resistance values greater than those given in 2014 ABC, Table 9.25.5.2 (see Table 2) ensure that the inner surface of the insulating sheathing is likely to be warm enough for most of the heating season such that no significant accumulation of moisture will occur. As well, the vapour barrier function has to be provided by a separate building element installed on the warm side of the assembly. For additional information on assumptions used in developing 2014 ABC, Table 9.25.5.2., refer to 2014 ABC, Appendix note A-9.25.5.2.

Table 2 - Minimum Ratio of Total Thermal Resistance Outboard to Thermal Resistance Inboard

Heating Degree-Days	Ratio	Heating Degree-Days	Ratio
up to 4999	0.20	9000 to 9999	0.55
5000 to 5999	0.30	10000 to 10999	0.60
6000 to 6999	0.35	11000 to 11999	0.65
7000 to 7999	0.40	12000 or higher	0.75
8000 to 8999	0.50		

4. Insulating Sheathing in lieu of Sheathing Membrane

2014 ABC, Subclause 9.27.3.4.(2)(b)(i) states that a separate sheathing membrane is not required over insulating sheathing where the joints between boards are sealed. Therefore, when the joints between ***PlastiSpan*** insulation boards are sealed, a separate sheathing membrane is not required. Refer to Product Information Bulletin No. 205 for additional information on installation requirements.

5. *Thermal Resistance* of Wall Assemblies with *PlastiSpan* Insulation

2014 ABC, Section 9.36 provides energy efficiency requirements for buildings 3 storeys or less in building height, having a building area not exceeding 600 m^2 and used for major occupancies classified as residential occupancies.

Effective thermal resistance **RSI_{eff} (R_{eff})** of building assemblies is calculated using the following formula which includes the thermal bridging effect due to repetitive structural members such as wood framing members in walls.

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

Table 3 provides ***minimum RSI$_{eff}$/R$_{eff}$*** requirements per 2014 ABC Tables 9.36.2.6.A. and 9.36.2.6.B. for above grade walls in buildings as noted.

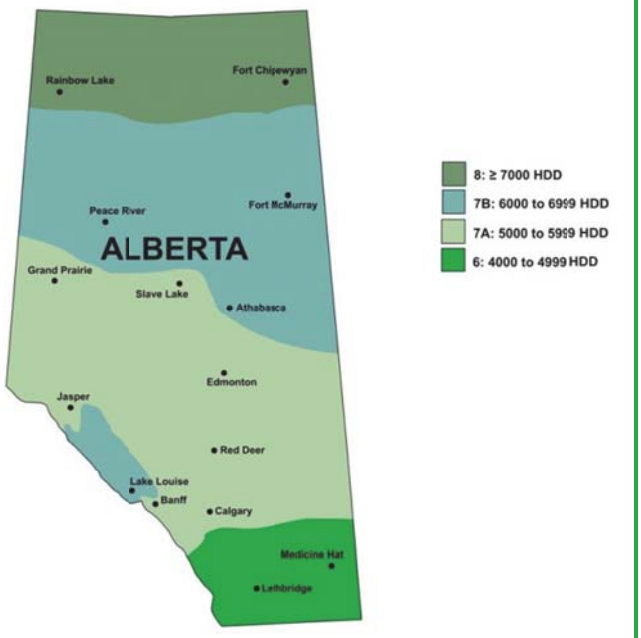
Table 3 - Minimum RSI$_{eff}$/R$_{eff}$ of Above-ground Opaque Wall Assemblies

2014 ABC Climate Zones	Zone 6	Zone 7A	Zone 7B	Zone 8
Heating Degree-Days (HDD) Celsius Degree-Days	4,000 to 4,999	5,000 to 5,999	6,000 to 6,999	≥ 7,000
Table 9.36.2.6.A. - Buildings Where a Heat Recovery Ventilator (HRV) is not Installed				
RSI$_{eff}$ – m^2•^{o}C/W	3.08	3.08	3.85	3.85
R$_{eff}$ – ft^2•hr•^{o}F/BTU	17.5	17.5	21.9	21.9
Table 9.36.2.6.B. - Buildings Where a Heat Recovery Ventilator (HRV) is Installed				
RSI$_{eff}$ – m^2•^{o}C/W	2.97	2.97	3.08	3.08
R$_{eff}$ – ft^2•hr•^{o}F/BTU	16.9	16.9	17.5	17.5

Table 4 provides annual heating degree days for some building locations in Climate Zones 6 to 8 as per 2014 ABC, Division B, Appendix C.

Table 4 - Annual HDD (Celsius Degree Days) for Building Locations

Climate Zone	Locations	HDD
6	Lethbridge	4500
	Medicine Hat	4540
	Brooks	4880
	High River	4900
	Okotoks	4920
7A	Calgary	5000
	Edmonton	5120
	Banff	5500
	Grande Prairie	5790
	Slave Lake	5850
7B	Athabasca	6000
	Peace River	6050
	Lac la Biche	6100
	Fort McMurray	6250
	Lake Louise	6500
8	Fort Chipewayan	7170
	Rainbow Lake	7200
	Embarras Portage	7100



Tables 5 provides ***RSI$_{eff}$/R$_{eff}$*** calculations for a wall assembly using ***PlastiSpan*** continuous insulating sheathing to meet requirements per 2014 ABC, Table 9.36.2.6.B. for buildings in Climate Zones 6 to 7A.

Table 5 - *RSI$_{eff}$/R$_{eff}$* of Typical Wall Assembly with *PlastiSpan* Insulating Sheathing

Wall Construction	Framed Portion		Continuous Layers
	RSI$_F$	RSI$_C$	
Outside Air Film	----	----	0.03
Vinyl Cladding	----	----	0.11
1-5/8" (41.3 mm) PlastiSpan Insulation	**----**	**----**	***1.07***
Stud Cavity Insulation	----	2.29	----
2 x 4 Wood Stud @ 16" (406 mm) o.c.	0.76	----	----
6 mil polyethylene vapour barrier	----	----	----
1/2" (12.7 mm) Gypsum Wall Board	----	----	0.08
Inside Air Film	----	----	0.12
RSI Sub-Totals	**0.76**	**2.29**	**1.41**
% Area of Each Component	**23%**	**77%**	**100%**
RSI$_{eff}$ (R$_{eff}$)	**RSI-2.97 (R-16.9)**		

Ratio of Outboard to Inboard Insulation Calculation			
Outboard Insulation Components	**RSI**	**Inboard Insulation Components**	**RSI**
Outside air film	0.03	Stud cavity insulation	2.29
Vinyl cladding	0.11	Gypsum board	0.08
1-5/8" (41.3 mm) PlastiSpan Insulation	***1.07***	Inside air film	0.12
Total Outboard RSI	**1.21**	**Total Inboard RSI**	**2.49**
Ratio of Outboard to Inboard RSI		**1.21/2.49**	**0.49**

Tables 6 provides ***RSI$_{eff}$/R$_{eff}$*** calculations for a wall assembly using ***PlastiSpan*** continuous insulating sheathing to meet requirements per 2014 ABC, Table 9.36.2.6.A. for buildings in Climate Zones 6 to 7A and Table 9.36.2.6.B. for buildings in Climate Zones 7B to 8.

Table 6 - *RSI$_{eff}$/R$_{eff}$* of Typical Wall Assembly with *PlastiSpan* (Type 1) Insulating Sheathing

Wall Construction	Framed Portion		Continuous Layers
	RSI$_F$	RSI$_C$	
Outside Air Film	----	----	0.03
Vinyl Cladding	----	----	0.11
2" (50.8 mm) PlastiSpan Insulation	----	----	**1.32**
Stud Cavity Insulation	----	2.29	----
2 x 4 Wood Stud @ 16" (406 mm) o.c.	0.76	----	----
6 mil polyethylene vapour barrier	----	----	----
1/2" (12.7 mm) Gypsum Wall Board	----	----	0.08
Inside Air Film	----	----	0.12
RSI Sub-Totals	**0.76**	**2.29**	**1.66**
% Area of Each Component	**23%**	**77%**	**100%**
RSI$_{eff}$ (R$_{eff}$)	**RSI-3.22 (R-18.3)**		

Ratio of Outboard to Inboard Insulation Calculation			
Outboard Insulation Components	**RSI**	**Inboard Insulation Components**	**RSI**
Outside air film	0.03	Stud cavity insulation	2.29
Vinyl cladding	0.11	Gypsum board	0.08
2" (51 mm) PlastiSpan Insulation	***1.32***	Inside air film	0.12
Total Outboard RSI	**1.46**	**Total Inboard RSI**	**2.49**
Ratio of Outboard to Inboard RSI		**1.46/2.49**	**0.59**