

Product Information Bulletin

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PlastiSpan® Insulation for Interior Basement Applications

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A Canada Mortgage and Housing Corporation (CMHC)/Canadian Home Builders Association (CHBA) report concluded that use of insulation partway down the interior of a basement wall, as is typical for many residential applications, actually increases heat loss to the adjacent soil because the upper zone insulation is appreciably short-circuited by the heat loss from below.

PlastiSpan® insulation is a moulded expanded polystyrene (EPS) insulation that meets the requirements of CAN/ULC-S701, **Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering**. It is an ideal solution to provide full-height interior basement wall insulation. Table 1 below provides material properties for PlastiSpan insulation material.

Table 1 – PlastiSpan Insulation Material Properties

Material Property ¹	ASTM Test Method	Units	PlastiSpan Insulation
Thermal Resistance <i>Minimum per 25 mm (inch)</i>	C518	m ² ·°C/W (ft ² ·h·°F/BTU)	0.65 (3.75)
Compressive Resistance <i>Minimum @ 10% Deformation</i>	D1621	kPa (psi)	70 (10)
Flexural Strength <i>Minimum</i>	C203	kPa (psi)	170 (25)
Water Vapour Permeance² <i>Maximum</i>	E96	ng/(Pa·s·m ²) (Perms)	300 (5.0)
Water Absorption³ <i>Maximum</i>	D2842	% By volume	6.0
Dimensional Stability <i>Maximum</i>	D2126	% Linear Change	1.5
Limiting Oxygen Index <i>Minimum</i>	D2863	%	24

This bulletin highlights some of the typical details that should be considered when using PlastiSpan insulation for this application.

1. PlastiSpan insulation properties are third party certified to CAN/ULC-S701, Type 1 under a quality listing program administered by Intertek Testing Services. PlastiSpan insulation is listed by the Canadian Construction Materials Centre (CCMC) under evaluation listing number 12424-L.
2. WVP values quoted are maximum values for 25-mm thick samples with natural skins intact. Lower values will result for thicker materials.
3. 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.

As indicated in Table 1, the vapour permeance value for PlastiSpan insulation is 300 ng/Pa·s·m² for a 25 mm (1") thickness. PlastiSpan insulation at a thickness of 125 mm (5") with joints taped or sealed complies with the vapour barrier requirement. A separate vapour barrier on the warm side of the insulation would be required in wall assemblies with PlastiSpan insulation at a thickness less than 125 mm (5").

NBC 2010 – Energy Efficiency Requirements

NBC 2010, Section 9.36 provides energy efficiency requirements for buildings 3 storeys or less in building height, having a building area not exceeding 600 m² and used for major occupancies classified as residential occupancies. Table 2 provides minimum **effective thermal resistance (RSI_{eff}/R_{eff})** requirements as per Table 9.36.2.8.B. of NBC 2010 for basement walls below grade or in contact with the ground in buildings where a heat recovery ventilator (HRV) is installed. **RSI_{eff}/R_{eff}** of building assemblies calculated using the formula below includes the effect of the thermal bridging effect due to repetitive structural members such as wood framing members in walls.

$$RSI_{eff} (R_{eff}) = \frac{100\%}{\frac{\% \text{ with Framing}}{RSI_F (R_F)} + \frac{\% \text{ Area W/o Framing}}{RSI_C (R_C)}}$$

Table 2 - Minimum RSI_{eff}/R_{eff} – Foundation Walls Below or In Contact with Ground

NBC 2010 Climate Zones	Zone 4	Zone 5	Zone 6	Zone 7a	Zone 7b	Zone 8
Heating Degree-Days (HDD) Celsius Degree-Days	< 3,000	3,000 to 3,999	4,000 to 4,999	5,000 to 5,999	6,000 to 6,999	≥ 7,000
RSI_{eff} - m²·°C/W	1.99	2.98	2.98	2.98	2.98	2.98
R_{eff} - ft²·hr·°F/BTU	11.3	16.9	16.9	16.9	16.9	16.9

Annual HDD for Building Locations Across Canada per NBC 2010, Division B, Appendix C

Province	Building Location	HDD (Celsius Degree Days)	Province	Building Location	HDD (Celsius Degree Days)
British Columbia	Victoria	2,650	Quebec	Montréal	4,200
	Vancouver	2,950		Trois-Rivières	4,900
	Kelowna	3,400		Québec	5,080
	Whistler	4,180		Gaspé	5,500
	Dawson Creek	5,900		Baie-Comeau	6,020
Alberta	Lethbridge	4,650	Schefferville	8,550	
	Calgary	5,000	New Brunswick	Campbellton	5,500
	Edmonton	5,400		Edmunston	5,400
	Fort McMurray	6,550		Fredericton	4,650
Saskatchewan	Moose Jaw	5,270	Nova Scotia	Digby	4,020
	Regina	5,600		Truro	4,650
	Saskatoon	5,700		Halifax	4,200
	Prince Albert	6,100	PEI	Charlottetown	4,600
	Uranium City	7,500	Newfoundland	St. John's	4,800
Manitoba	Winnipeg	5,670		Labrador City	7,900
	Flin Flon	6,440	NWT	Inuvik	10,050
	Thompson	7,600	Nunavut	Alert	13,200
	Churchill	8,950	Yukon	Dawson	8,400

Table 3 provides the **effective RSI/R-value** of a basement wall assembly using PlastiSpan insulation board to provide continuous insulation layer over the entire basement wall to meet requirements for NBC 2010 Climate Zone 4.

Table 3 – PlastiSpan Insulation Interior Basement Example – NBC 2010 Climate Zone 4

PlastiSpan Insulation over below grade basement wall with 2 x 3 framed wall in front	RSI _{eff} Calculation		R _{eff} Calculation		
	RSI _F Through Stud	RSI _C Through Cavity	R _F Through Stud	R _C Through Cavity	
203 mm (8") Basement wall	0.08	0.08	0.46	0.46	
64 mm (2.5") PlastiSpan Insulation	1.65	1.65	9.37	9.37	
Wood Stud @ 600 mm (24")	0.48	----	2.70	----	
13 mm (1/2") Gypsum wall board	0.08	0.08	0.45	0.45	
Inside Air Film	0.12	0.12	0.68	0.68	
Sub-totals	2.41	1.93	13.67	10.97	
% Area of Each Component	13%	87%	13%	87%	
RSI_{eff} =	100%				
	13%	+			87%
	2.41				1.93
R_{eff} =	100%				
	13%	+			87%
	13.67				10.97
			1.99		
			11.3		

Table 4 provides the **effective RSI/R-value** of a basement wall assembly using PlastiSpan insulation board to provide continuous insulation layer over the entire basement wall to meet requirements for NBC 2010 Climate Zones 5 to 8.

Table 4 – PlastiSpan Insulation Interior Basement Example – NBC 2010 Climate Zones 5 to 8

PlastiSpan Insulation over below grade basement wall with 2 x 3 framed wall in front	RSI _{eff} Calculation		R _{eff} Calculation		
	RSI _F Through Stud	RSI _C Through Cavity	R _F Through Stud	R _C Through Cavity	
203 mm (8") Basement wall	0.08	0.08	0.46	0.46	
102 mm (4") PlastiSpan Insulation	2.64	2.64	15.00	15.00	
Wood Stud @ 600 mm (24")	0.48	----	2.70	----	
13 mm (1/2") Gypsum wall board	0.08	0.08	0.45	0.45	
Inside Air Film	0.12	0.12	0.68	0.68	
Sub-totals	3.40	2.92	19.29	16.59	
% Area of Each Component	13%	87%	13%	87%	
RSI_{eff} =	100%				
	13%	+			87%
	3.40				2.92
R_{eff} =	100%				
	13%	+			87%
	19.29				16.59
			2.98		
			16.9		