

Product Information Bulletin

2012 BCBC - PlastiSpan® HD Insulation for Heated Basement Floors

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PlastiSpan® HD insulation is a rigid closed cell, expanded polystyrene (EPS) insulation. Continuous **PlastiSpan HD** insulation used as a component beneath a heated floor system minimizes heat loss, allows uniform heat distribution to the floor area and ensures the floor area will be warmed faster.

Table 1 – PlastiSpan HD Insulation – CAN/ULC-S701, Type 2 Material Properties

Material Property	ASTM Test Method	Units	Values ¹
Thermal Resistance <i>Minimum RSI per 25 mm (R per inch)</i>	C518	m ² •°C/W (ft ² •h•°F/BTU)	0.70 (4.04)
Compressive Resistance <i>Minimum @ 10% Deformation</i>	D1621	kPa (psi)	110 (16)
Flexural Strength <i>Minimum</i>	C203	kPa (psi)	240 (35)
Water Vapour Permeance² <i>Maximum</i>	E96	ng/(Pa•s•m ²) (Perms)	200 (3.5)
Water Absorption³ <i>Maximum</i>	D2842	% By volume	4.0
Dimensional Stability <i>Maximum, 7 Days @ 70 ± 2°C (158 ± 4°F)</i>	D2126	% Linear Change	1.5
Limiting Oxygen Index <i>Minimum</i>	D2863	%	24

2012 BCBC – Energy Efficiency Requirements

2012 British Columbia Building Code (2012 BCBC), 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. **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.

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

- PlastiSpan HD** insulation properties are third party certified to CAN/ULC-S701, **Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering**, under a certification program administered by Intertek and are listed by the Canadian Construction Materials Centre (CCMC) under evaluation listing number 12425-L.
- WVP values quoted are maximum values for 25-mm thick samples with natural skins intact. Lower values will result for thicker materials.
- The water absorption laboratory test method involves complete submersion under a head of water for 96 hours. The water absorption value above is applicable to specific end-use design requirements only to the extent that the end-use conditions are similar to test method requirements.

Table 2 provides minimum **effective thermal resistance** (RSI_{eff}/R_{eff}) requirements as per 2012 BCBC, Tables 9.36.2.8.A. and 9.36.2.8.B. for heated floors below grade or in contact with the ground.

Table 2 – Minimum RSI_{eff}/R_{eff} for Below-Grade Heated Floors in Contact with Ground

2012 BCBC 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 - $m^2 \cdot ^\circ C/W$	2.32	2.32	2.32	2.84	2.84	2.84
R-value - $ft^2 \cdot hr \cdot ^\circ F/ BTU$	13.2	13.2	13.2	16.1	16.1	16.1

Table 3 provides annual heating degree days for some building locations in Climate Zones 4 to 7a as per 2012 BCBC, Division B, Appendix C.

Table 3 - Annual HDD (Celsius Degree Days) for Building Locations

Climate Zone 4		Climate Zone 5		Climate Zone 6		Climate Zone 7a	
Locations	HDD	Locations	HDD	Location	HDD	Locations	HDD
Duncan	2980	Hope	3000	Cranbrook	4400	100 Mile House	5030
Victoria	2650	Nanaimo	3000	Golden	4750	Smithers	5040
West Vancouver	2950	Burnaby	3100	Terrace	4150	Dawson Creek	5900
Abbotsford	2860	Kamloops	3450	Whistler	4180	Mackenzie	5550
Chilliwack	2780	Kelowna	3400	Prince George	4720	Glacier	5800

Heat loss through an un-insulated basement slab can be a significant source of energy loss in a heated basement. Table 4 provides examples of basement slab construction using **PlastiSpan HD** insulation installed as a continuous insulation to reduce heat loss and ensures more uniform floor surface temperature. The **effective thermal resistance** of a fully insulated floor slab containing only continuous insulation materials is calculated by simply adding up the RSI (R-values) for each component in the heated basement slab system.

Table 4 – RSI_{eff} (R_{eff}) Calculation per 2012 BCBC Appendix Note A-9.36.2.4.(1)

2012 BCBC Climate Zones 4, 5 and 6		
System Description	RSI_{eff}	R_{eff}
Horizontal Air Film (above floor)	0.16	0.9
102 mm (4") Basement Slab	0.04	0.2
76 mm (3") PlastiSpan HD Insulation	2.13	12.1
Polyethylene Moisture Barrier	----	----
Total Effective Thermal Resistance	2.33	13.2
2012 BCBC Climate Zones 7a, 7b and 8		
Horizontal Air Film (above floor)	0.16	0.9
102 mm (4") Basement Slab	0.04	0.2
102 mm (4") PlastiSpan HD Insulation	2.84	16.2
Polyethylene Moisture Barrier	----	----
Total Effective Thermal Resistance	3.04	17.3

Note: The above calculations do not include the additional RSI (R-value) that would be provided by floor finish materials applied above the basement slab.