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Product Information Bulletin

Vancouver Building Code Bylaw No. 11748
EnerSpan & EnerSpan HD Insulation Options

This bulletin provides ***EnerSpan***® and ***EnerSpan***® ***HD*** insulation options for above grade wall, foundation wall and concrete slab insulation to meet energy efficiency requirements of Vancouver Building Code Bylaw No. 11748 effective March 1, 2018.

Table 1 – CAN/ULC-S701 Material Properties

Material Properties	Test Methods	Units	CAN/ULC-S701[1]	
			1	2
Thermal Resistance *Minimum per 25 mm (inch)*	ASTM C518	$m^2 \cdot {}^oC/W$ ($ft^2 \cdot h \cdot {}^oF/BTU$)	0.82 (4.7)	0.82 (4.7)
Compressive Resistance *Minimum @ 10% Deformation*	ASTM D1621	kPa (psi)	70 (10)	110 (16)
Flexural Strength *Minimum*	ASTM C203	kPa (psi)	170 (25)	240 (35)
Water Vapour Permeance *Maximum*	ASTM E96	ng/(Pa·s·m^2) (Perms)	300 (5.2)	200 (3.5)
Water Absorption[2] *Maximum*	ASTM D2842	% By volume	6.0	4.0
Dimensional Stability *Maximum, 7 Days @ 70 ± 2°C (158 ± 4°F)*	ASTM D2126	% Linear Change	1.5	1.5
Limiting Oxygen Index *Minimum*	ASTM D2863	%	24	24
Surface Burning Characteristics *Classification or Rating*	CAN/ULC S102.2	Flame Spread	290	
		Smoke Developed	Over 500	

Table Notes:

1. ***EnerSpan*** (Type 1) and ***EnerSpan HD*** (Type 2) insulation properties are third party certified to CAN/ULC-S701, ***Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering***, and are evaluated in Intertek Code Compliance Research Report CCRR-1033.
2. 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.

Vancouver Building Bylaw No. 11748 Changes effective March 1, 2018

Table 2 provides minimum thermal resistance from Vancouver Building Bylaw No. 11748, Table 10.2.2.6. for building assemblies in one and two family dwellings complying with Article 10.2.1.5.

Table 2 – Requirements for Frame Walls, Foundation Walls & Slabs on Ground

Building Assembly	RSI Value Required
Above-ground Wall Assemblies	
Frame Walls for one and two family dwellings - Effective rating	3.85
Walls and Floors Below or In Contact with Ground	
Foundation Walls for one and two family dwellings - Effective rating	3.85
Concrete Slabs on Ground at, above, or below grade	2.5

2012 British Columbia Building Code (BCBC) energy efficiency requirements are based upon minimum ***effective thermal resistance (RSI$_{eff}$/R$_{eff}$)*** of building assemblies which includes the effect of thermal bridging due to repetitive structural members such as wood framing members in wall or roof assemblies. 2012 BCBC, Subsection 9.36.2. provides the following formula for calculating ***RSI$_{eff}$/R$_{eff}$***.

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

Table 3 provides ***RSI$_{eff}$/R$_{eff}$*** calculations using ***EnerSpan*** continuous insulating sheathing to meet requirements per Table 2 as a component in a 2 x 4 above-ground frame wall assembly.

Table 3 - *RSI$_{eff}$/R$_{eff}$* of Typical Wall Assembly with *EnerSpan* (Type 1) Insulating Sheathing

Wall Construction	RSI$_{eff}$ Calculation		
	Framed Portion		Continuous Layers
	RSI$_F$	RSI$_C$	
Outside Air Film	----	----	0.03
Vinyl Cladding	----	----	0.11
64 mm (2.5") EnerSpan Insulation	----	----	**2.08**
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**	**2.42**
% Area of Each Component	**23%**	**77%**	**100%**
Effective Thermal Resistance - RSI$_{eff}$ (R$_{eff}$)	**RSI-3.98 (R-22.6)**		

Table 4 provides *RSI$_{eff}$/R$_{eff}$* calculations using ***EnerSpan*** continuous insulating sheathing to meet requirements per Table 2 as a component in a 2 x 6 above-ground frame wall.

Table 4 - *RSI$_{eff}$/R$_{eff}$* of Typical Wall Assembly with *EnerSpan* (Type 2) Insulating Sheathing

Wall Construction – Climate Zones 4 to 7a Heating Degree Days Less Than 6,000	RSI$_{eff}$ Calculation		
	Framed Portion		Continuous Layers
	RSI$_F$	RSI$_C$	
Outside Air Film	----	----	0.03
Vinyl Cladding	----	----	0.11
51 mm (2") EnerSpan Insulation	***----***	***----***	***1.67***
Stud Cavity Insulation	----	3.34	----
2 x 6 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**	**3.34**	**2.01**
% Area of Each Component	**23%**	**77%**	**100%**
Effective Thermal Resistance - RSI$_{eff}$ (R$_{eff}$)	**RSI-3.88 (R-22.0)**		

Table 5 provides foundation wall insulation options using exterior ***EnerSpan HD*** insulation or interior ***EnerSpan*** insulation on the foundation wall in combination with an interior wood frame wall with cavity insulation to meet minimum ***effective thermal resistance*** per Vancouver Building Bylaw No. 11748.

Table 5 – *Continuous* Exterior or Interior Foundation Wall Insulation

Option 1 – Exterior Foundation Wall Insulation with *EnerSpan HD* Insulation			
System Description	**RSI_F**	**RSI_C**	**Continuous Materials**
57 mm (2.25") EnerSpan HD Insulation	----	----	***1.87***
200 mm (8") Concrete Wall	----	----	0.08
2 x 4 Wood studs @ 600 mm (24") o.c.	0.76	----	----
Cavity Insulation	----	2.29	----
Vapour Barrier	----	----	----
13 mm (1/2") Gypsum Wall Board	----	----	0.08
Inside Air Film	----	----	0.12
Total	**0.76**	**2.29**	**2.15**
% Area of Each Component	**13%**	**87%**	**100%**
Effective Thermal Resistance - RSI_{eff} (R_{eff})	**RSI-3.97 (R22.5)**		
Option 2 – Interior Foundation Wall Insulation with *EnerSpan* Insulation			
System Description	**RSI_F**	**RSI_C**	**Continuous Materials**
200 mm (8") Concrete Wall	----	----	0.08
57 mm (2.25") EnerSpan Insulation	----	----	***1.87***
2 x 4 Wood studs @ 600 mm (24") o.c.	0.76	----	----
Cavity Insulation	----	2.29	----
Vapour Barrier	----	----	----
13 mm (1/2") Gypsum Wall Board	----	----	0.08
Inside Air Film	----	----	0.12
Total	**0.76**	**2.29**	**2.15**
% Area of Each Component	**13%**	**87%**	**100%**
Effective Thermal Resistance - RSI_{eff} (R_{eff})	**RSI-3.97 (R22.5)**		

Table 6 provides an example of basement slab insulation system using continuous ***EnerSpan HD*** insulation installed beneath the slab to ensure more uniform floor surface temperature. The ***effective thermal resistance*** with continuous insulation is calculated by adding up the thermal resistance values for each component.

Table 6 – RSI_{eff} (R_{eff}) Calculation for Concrete Slab with Continuous *EnerSpan HD* Insulation

Concrete Slabs on Ground at, above, or below grade		
System Description	**RSI**	**R**
Horizontal Air Film (above floor)	0.16	0.9
102 mm (4") Basement Slab	0.04	0.2
76 mm (3") EnerSpan HD Insulation	***2.48***	***14.1***
Polyethylene Moisture Barrier	----	----
Total Effective Thermal Resistance - RSI_{eff} (R_{eff})	**2.68**	**15.0**