Plasti·Fab®
EPS PRODUCT SOLUTIONS

Product Information Bulletin

BULLETIN NO.	255
ISSUED:	December 31, 2007
REPLACES:	February 26, 2007

Advantage ICF System - Effective Thermal Resistance

Thermal resistance values for above grade walls in the Alberta Building Code 2006, Ontario Building Code 2006 and the British Columbia Building Code 2006 represent the minimum thermal resistance of the insulation in wood frame construction for the portion of the wall that does not include framing or furring. "Effective thermal resistance" calculated as per Model National Energy Code for Houses (MNECH), Appendix C, is a measure of the overall thermal resistance of a building assembly when the effect of thermal bridges, such as wood framing, is included.

The Advantage Insulating Concrete Forming® (ICF) system is an energy efficient building system consisting of a monolithic layer of expanded polystyrene (EPS) insulation over the interior and exterior face of a concrete core. The effective RSI calculation for an above grade wall assembly built with the Advantage ICF System wall versus wood-frame alternates is illustrated in Table 1 below.

Table 1 - Effective Thermal Resistance – 152-mm Concrete Wall Using Advantage ICF System

Component	OBC 2006 Zone One or Two	
	RSI – m^2•°C/W	R-Value – ft^2•hr•°F/BTU
Outside Air Film (above grade)	0.03	0.17
Metal Siding	0.11	0.62
Sheathing Paper	0.01	0.06
Type 2 Expanded Polystyrene Insulation	1.87	10.61
152-mm Concrete Wall - Normal Density	0.06	0.35
ICF Cross-Tie - See note below	----	----
Type 2 Expanded Polystyrene Insulation	1.87	10.61
12.7-mm Gypsum Wall Board	0.08	0.45
Inside Air Film	0.12	0.68
Effective Thermal Resistance	**RSI 4.14**	**R 23.54**

Effective Thermal Resistance Calculation Note:
As per MNECH, Sentence 3.2.1.2.(3), ties and other minor structural members that must completely penetrate the building envelope to perform their intended function need not be taken into account in calculating the thermal resistance of an assembly provided that the insulation is installed tight against the outline of the penetration.

Table 2 on the following page provides a calculation of the effective thermal resistance of two wood frame wall alternates using the MNECH calculation method. The minimum thermal resistance requirements for above grade walls per the 2006 are used in this example.

Table 2 - Effective Thermal Resistance Calculations for Wood Frame Wall Alternates

Wood-Frame Wall c/w Insulating Sheathing Board	OBC 2006 Zone 1				OBC 2006 Zone 2			
	2 x 4 Stud Wall				2 x 6 Stud Wall			
	m^2•°C/W		ft^2•hr•°F/BTU		m^2•°C/W		ft^2•hr•°F/BTU	
	RSI_F	RSI_I	R_F	R_I	RSI_F	RSI_I	R_F	R_I
Outside Air Film (above grade)	0.03	0.03	0.17	0.17	0.03	0.03	0.17	0.17
Metal Siding	0.11	0.11	0.62	0.62	0.11	0.11	0.62	0.62
Sheathing Paper	0.01	0.01	0.06	0.06	0.01	0.01	0.06	0.06
Type 1 EPS Insulation	0.87	*0.87*[1]	4.94	*4.94*[1]	0.87	*0.87*[2]	4.94	*4.94*[2]
Stud Cavity Insulation	----	*2.47*[1]	----	*14.02*[1]	----	*3.35*[2]	----	*19.03*[2]
Wood Stud less than 500 mm o.c.	0.72	----	4.09	----	1.13	----	6.44	----
Polyethylene Vapour Barrier	----	----			----	----	----	----
12.7-mm Gypsum Wall Board	0.08	0.08	0.45	0.45	0.08	0.08	0.45	0.45
Inside Air Film	0.12	0.12	0.68	0.68	0.12	0.12	0.68	0.68
Total Thermal Resistance	**1.94**	**3.69**	**11.02**	**20.96**	**2.35**	**4.57**	**13.37**	**25.94**
Effective Thermal Resistance[3]	**RSI 3.15**		**R 17.89**		**RSI 3.88**		**R 22.03**	

Notes to Table:

1. Total thermal resistance for insulation components equal to RSI 3.34 (R 19.0) per OBC 2006 Zone 1 requirements.
2. Total thermal resistance for insulation components equal to RSI 4.22 (R 24.0) per OBC 2006 Zone 2 requirements.
3. Effective thermal resistance is calculated as per MNECH.

Conventional wood-frame construction methods have wood studs at 406 or 600 mm (16" or 24") on center which act as thermal bridges in the wall assembly. As can be seen, the effective RSI of the Advantage ICF System exceeds that of wood-frame wall assemblies even with a layer of insulating sheathing over the exterior of the wood-frame wall.