ADVANTAGE ICF SYSTEM®
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Product Information Bulletin

British Columbia Building Code 2006
Effective Thermal Resistance Calculation

The Advantage ICF System® is an insulating concrete forming system used in energy efficient building design. It provides a monolithic layer of expanded polystyrene (EPS) insulation over the interior and exterior face of a solid concrete core.

The minimum thermal resistance (R-value) for above grade walls in the British Columbia Building Code 2006 represents the minimum R-value for the insulation component in the portion of the wood frame 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 effects of thermal bridges, such as wood framing, are included.

The ***effective*** RSI calculation for an above grade wall assembly built with the Advantage ICF System wall is illustrated in Table 1 below.

Table 1 – Effective Thermal Resistance – Advantage ICF System 152-mm (6") Concrete Wall

Component	BCBC 2006 All Zones	
	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 for the effective thermal resistance of a wood frame wall alternate using the MNECH calculation method.

Table 2 – Effective Thermal Resistance Calculation for Wood Frame Wall Alternate

Wood-Frame (2 x 6 Stud) Wall c/w	2006 BCBC All Zones			
	m^2•°C/W		ft^2•hr•°F/BTU	
	RSI_F	RSI_I	R_F	R_I
Outside Air Film (above grade)	0.03	0.03	0.17	0.17
Metal Siding	0.11	0.11	0.62	0.62
Sheathing Paper	0.01	0.01	0.06	0.06
11.1 mm (7/16") Structural OSB Facing	0.12	0.12	0.69	0.69
Cavity Insulation[1]	***----***	***3.50***	***----***	***19.88***
Wood Stud at less than 400 mm (16") o.c.	1.13	----	6.44	----
Gypsum Wall Board , 13 mm (1/2")	0.08	0.08	0.45	0.45
Inside Air Film	0.12	0.12	0.68	0.68
Total Thermal Resistance	**1.60**	**3.97**	**9.11**	**22.55**
Effective Thermal Resistance[2]	**RSI-3.10**		**R-17.62**	

Notes to Table:

1. Total thermal resistance for insulation components equal to RSI 3.50 (R 20) per Table 10.2.1.1A of 2006 BCBC.
2. 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.