



Product Information Bulletin

Advantage ICF System®

OBC 2006 Thermal Design Requirements for Residential Buildings

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The purpose of this bulletin is to clarify Advantage ICF System® compliance with Ontario Building Code 2006, Subsection 12.3.3. – *Thermal Design for Buildings of Residential Occupancy Within the Scope of Part 9.*

The following tables provide effective thermal resistance calculations for above-grade wall assemblies built with the Advantage ICF System wall versus wood-frame walls built with minimum thermal resistance as per OBC 2006, Table 12.3.3.3. "*Effective thermal resistance*" is calculated per the Model National Energy Code for Houses (MNECH) using the formula below.

$$\text{Effective Thermal Resistance (RSI)} = \frac{\% \text{ Area with Framing}}{\text{RSI Framed Portion}} + \frac{100\%}{\text{RSI Insulated Portion}}$$

Effective RSI is a measure of the overall thermal resistance of a building assembly when the effect of thermal bridges, such as wood studs at 406 mm (16") on center in wood-frame construction, is included. The wood studs act as thermal bridges reducing the overall effective thermal resistance of a wall assembly.

Effective Thermal Resistance – OBC 2006 Zone 1 Above-Grade Wall Assembly

Advantage ICF System		2 x 6 Stud Wall		
Component	RSI	Component	RSI Framed Portion	RSI Insulated Portion
Above Grade Air Film	0.03	Above Grade Air Film	0.03	0.03
Metal Siding	0.11	Metal Siding	0.11	0.11
Sheathing Paper	0.01	Sheathing Paper	0.01	0.01
Type 2 EPS Insulation	1.87	Stud Cavity Insulation	----	3.52
152-mm Concrete Wall	0.06	Wood Stud @ 406 mm o.c.	1.13	----
ICF Cross-Tie	----	12.7-mm Gypsum Board	0.08	0.08
Type 2 EPS Insulation	1.87	Inside Air Film	0.12	0.12
12.7-mm Gypsum Board	0.08			
Inside Air Film	0.12	RSI-Sub-Totals	1.07	3.87
RSI-Total	4.14	% Area of Wall	19%	81%
Effective Thermal Resistance		Effective Thermal Resistance		
RSI-4.14 m²·°C/W (R-23.5 ft²·hr·°F/BTU)		RSI-2.58 m²·°C/W (R-14.7 ft²·hr·°F/BTU)		

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.

Effective Thermal Resistance – OBC 2006 Zone 2 Above-Grade Wall Assembly

Advantage ICF System		2 x 6 Stud Wall c/w EPS Insulating Sheathing		
Component	RSI	Component	RSI Framing	RSI Insulation
Above Grade Air Film	0.03	Above Grade Air Film	0.03	0.03
Metal Siding	0.11	Metal Siding	0.11	0.11
Sheathing Paper	0.01	Sheathing Paper	0.01	0.01
Type 2 EPS Insulation	1.87	32-mm Type 1 EPS Insulation	0.80	0.80
152-mm Concrete Wall	0.06	Stud Cavity Insulation	----	3.52
ICF Cross-Tie	----	Wood Stud @ 406 mm o.c.	1.13	----
Type 2 EPS Insulation	1.87	12.7-mm Gypsum Board	0.08	0.08
12.7-mm Gypsum Board	0.08	Inside Air Film	0.12	0.12
Inside Air Film	0.12	RSI-Sub-Totals	2.28	4.67
RSI-Total	4.14	% Area of Wall	19%	81%
Effective Thermal Resistance		Effective Thermal Resistance		
RSI-4.14 m²·°C/W (R-23.5 ft²·hr·°F/BTU)		RSI-3.90 m²·°C/W (R-22.1 ft²·hr·°F/BTU)		

OBC 2006 Zone 1 and 2 Compliance:

The table below provides requirements for minimum thermal resistance of the insulated portion of an above grade wall assembly as per OBC 2006, Table 12.3.3.3.

Minimum Thermal Resistance of Building Assemblies

Building Element Exposed to the Exterior or to Unheated Space	Zone 1 Less than 5000 degree-days		Zone 2 5000 or more degree-days	
	RSI	R-Value	RSI	R-Value
	Wall other than foundation wall	3.80	21.6	4.67

The thermal resistance of an Advantage ICF System wall exceeds the OBC 2006, Table 12.3.3.3. minimum requirements for Zone 1. In fact, the effective thermal resistance of an Advantage ICF wall assembly is significantly greater than a wood-frame wall with studs at 406 mm (16") on center and minimum thermal resistance meeting Table 12.3.3.3.

Article 12.3.3.6. of the OBC 2006 permits the thermal resistance of the insulated portion of a building assembly to be reduced by not more than 20 per cent from that required in Table 12.3.3.3. This reduction in thermal resistance is permitted where it can be shown that the total calculated heat loss from the building enclosure does not exceed the heat loss that would result if the enclosure were constructed in conformance with the minimum thermal resistance requirements in Table 12.3.3.3.

The thermal resistance of an Advantage ICF System wall is 12% below the OBC 2006, Table 12.3.3.3. Zone 2 minimum requirements for the insulated portion of a wall. However, the Advantage 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 so the **effective thermal resistance** of the wall assembly is greater than that of a wood-frame wall. In addition, the monolithic layer of insulation provided by the Advantage ICF System significantly decreases air leakage and associated heat loss versus typical wood-frame construction.

Based upon the higher effective thermal resistance and reduced heat loss provided by the Advantage ICF System wall assembly in comparison to a wood-frame wall assembly complying with Table 12.3.3.3., Zone 2, the Advantage ICF System complies with the requirements of OBC 2006, Article 12.3.3.6.