Advantage ICF System®
Product Information Bulletin

Plasti-Fab
EPS PRODUCT SOLUTIONS
Better building ideas from PFB™

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Quebec Construction Code - Advantage ICF System Above Grade Wall

Plasti-Fab® manufactures expanded polystyrene (EPS) product solutions that meet energy efficiency requirements required by Quebec Construction Code, Chapter I – Building, and National Building Code of Canada 2010 (amended). This bulletin summarizes the Advantage ICF System® for above-grade wall applications as an option for use in building assemblies that would comply with buildings with residential occupancy per Quebec Construction Code, Part 11.

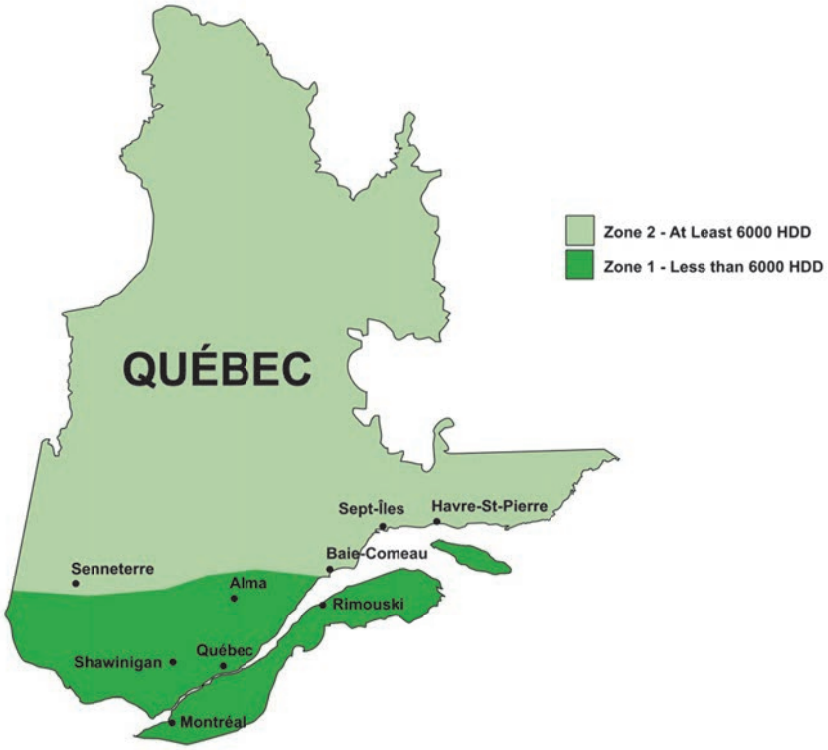

Figure 1: 2012 Quebec Climate Zone Map

Table 1 – Quebec Construction Code, Division B, Appendix C, Climate Data

Less Than 6,000 Heating Degree Days (HDD)				At Least 6,000 Heating Degree Days (HDDs)			
Location	**HDD**	**Location**	**HDD**	**Location**	**HDD**	**Location**	**HDD**
Montréal	4,200	Rivière-du-Loup	5,380	Rouyn	6,050	Sept-Îles	6,200
Shawinigan	5,050	Gaspé	5,500	Baie-Comeau	6,020	Val-d'Or	6,180
Québec	5,080	Alma	5,800	Dolbeau	6,250	Amos	6,160
Rimouski	5,300	Roberval	5,750	Havre-St-Pierre	6,100	Senneterre	6,180

Table 2 provides minimum total thermal resistance – RSI_T (R_T) – from the Quebec Construction Code for above grade wall applications. RSI_T (R_T) of a separation is defined in Article 1.4.1.2. of the Quebec Construction Code as the sum of the thermal resistance of all material layers in a component along a line crossing the insulated portion of the separation (including the interior and exterior surface air film of the envelope).

Table 2 – Quebec Construction Code – RSI_T (R_T) for Above Grade Walls

Reference Table	Climate Zone	RSI_T	R_T
Table 11.2.2.1.A.	Less Than 6,000 HDD (<6,000 HDD)	4.31	24.5
Table 11.2.2.1.B.	At Least 6,000 HDD (≥6,000 HDD)	5.11	29.0

In addition, Quebec Construction Code, Sentence 11.2.3.1.(1) requires that wood framing members spaced less than 600 mm (24") on center in building components constituting a thermal bridge shall be covered with insulating material having a thermal resistance of at least RSI-0.7 (R-4.0). Table 3 below provides Plasti-Fab EPS product solutions to meet Quebec Construction Code requirements for above grade wall applications.

Table 3 - Plasti-Fab Product EPS Solutions for Above Grade Walls

Plasti-Fab Wall Option Description	Climate Zone	Required RSI_T (R_T)	Base Wall RSI (R)[1]	RSI (R) Continuous Insulation
Wood Frame Wall Options with Plasti-Fab Continuous EPS Insulating Sheathing				
Wood Stud Wall - 2 x 6 wood studs @ 406 mm on center with RSI-3.34 (R-19) cavity insulation (See Tables 4 and 5 for RSI_{eff}/R_{eff} calculation)	<6,000 HDD	4.31 (24.5)	3.69 (21.0)	0.70 (4.0)
	≥6,000 HDD	5.11 (29.0)	4.22 (24.0)	0.89 (5.0)
Wall Options with Plasti-Fab Building Systems				
Advantage ICF System insulating concrete form above grade wall (See Tables 4 and 5 Advantage ICF System RSI_{eff}/R_{eff} calculation)	<6,000 HDD or ≥6,000 HDD	4.31 (24.5)	NA	4.14 (23.5)

1. Base wall RSI_T (R_T) the sum of the thermal resistance for cavity insulation plus continuous elements other than Plasti-Fab EPS insulation – i.e., outside air film, cladding, gypsum board and inside air film.

RSI_{eff} calculations in Table 4 illustrate an ***Advantage ICF System*** wall system that provides a higher RSI_{eff} than a typical wood stud wall with minimum RSI_T as per the Quebec Construction Code for a building located in climate zone <6,000 HDD.

Table 4 – Effective Thermal Resistance for Above-Grade Wall Assemblies <6,000 HDD Zone

Advantage ICF System		2 x 6 Stud Frame Wall			
Component	RSI	Component	RSI_F Framing	RSI_C Cavity Insulation	Continuous Materials
Outside Air Film	0.03	Outside Air Film	----	----	0.03
Metal Siding	0.11	Metal Siding	----	----	0.11
Sheathing Paper	0.01	Sheathing Paper	----	----	0.01
Type 2 EPS Insulation	1.87	Cavity Insulation	----	3.34	
152-mm Concrete Wall	0.06	Continuous Insulation	----	----	0.70
Type 2 EPS Insulation	1.87	Wood Stud @ 610 mm	1.13	----	
13-mm Gypsum Board	0.08	13-mm Gypsum Board	----	----	0.08
Inside Air Film	0.12	Inside Air Film	----	----	0.12
		RSI-Sub-Totals	**1.13**	**3.34**	**1.05**
RSI-Total	**4.14**	% Area of Wall	20%	80%	100%
Effective Thermal Resistance		**Effective Thermal Resistance**			
RSI_{eff} = 4.14 m^2•°C/W		**RSI_{eff} =2.58 m^2•°C/W (Note: RSI_T = 3.34 + 1.05 = 4.39)**			

RSI_{eff} calculations in Table 5 illustrate an ***Advantage ICF System*** wall system that provides a higher RSI_{eff} than a typical wood stud wall with minimum RSI_T as per the Quebec Construction Code for a building located in climate zone ≥6,000 HDD.

Table 5 – Effective Thermal Resistance for Above-Grade Wall Assemblies ≥6,000 HDD Zone

Advantage ICF System		2 x 6 Stud Frame Wall			
Component	**RSI**	**Component**	**RSI_F Framing**	**RSI_C Cavity Insulation**	**Continuous Materials**
Outside Air Film	0.03	Outside Air Film	----	----	0.03
Metal Siding	0.11	Metal Siding	----	----	0.11
Sheathing Paper	0.01	Sheathing Paper	----	----	0.01
Type 2 EPS Insulation	1.87	Cavity Insulation	----	3.87	----
152-mm Concrete Wall	0.06	Continuous Insulation	----	----	0.89
Type 2 EPS Insulation	1.87	Wood Stud @ 610 mm	1.13	----	----
13-mm Gypsum Board	0.08	13-mm Gypsum Board	----	----	0.08
Inside Air Film	0.12	Inside Air Film	----	----	0.12
		RSI-Sub-Totals	**1.13**	**3.87**	**1.24**
RSI-Total	**4.14**	% Area of Wall	20%	80%	100%
Effective Thermal Resistance		**Effective Thermal Resistance**			
RSI_{eff} = 4.14 m^2•°C/W		**RSI_{eff} = 3.85 m^2•°C/W (Note: RSI_T = 3.87 + 1.24 = 5.11)**			

RSI_{eff}/R_{eff} (effective thermal resistance) of building assemblies is calculated as per NBC 2010, section 9.36.2 using the formula below which includes the effect of thermal bridging due to repetitive structural members such as wood framing members in walls.

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