

Product Information Bulletin

261

Advantage ICF System - OBC 2006 Thermal Design Requirements for Residential Buildings

Product Information Bulletin

Advantage ICF System - 2012 OBC MMA Supplementary Standard SB-12

Page 1 of 4

The Advantage ICF System[®] is an energy efficient insulating concrete forming (ICF) system consisting of a continuous layer of expanded polystyrene (EPS) insulation over the interior and exterior face of a concrete core. This bulletin summarizes energy efficiency design applicable to buildings with residential occupancy required to comply with 2012 Ontario Building Code, Division B, Part 12, **Resource Conservation and Environmental Integrity**.

2012 OBC, Article 12.2.1.2. Energy Efficiency Design After December 31, 2016:

- 1) This Article applies to construction for which a permit has been applied for after December 31, 2016.
- 2) Except as provided in Sentences (3) and (4), the energy efficiency of all buildings shall
 - a) be designed to exceed by not less than 13% the energy efficiency levels required by Sentence 12.2.1.1.(2), or
 - b) conform to Division 1 and Division 3 or 5 of MMA Supplementary Standard SB-10, "Energy Efficiency Requirements".
- 3) Except as provided in Sentence (4), the energy efficiency of a *building* or part of a *building of residential occupancy* that is within the scope of Part 9 and is intended for occupancy on a continuing basis during the winter months shall,
 - a) be designed to exceed by not less than 15% the energy efficiency levels required by Sentence 12.2.1.1.(3), or
 - b) conform to Chapters 1 and 3 of MMA Supplementary Standard SB-12, "Energy Efficiency of Housing".
- 4) This article does not apply to,
 - a) A *farm building*,
 - b) a *building* that does not use electrical power or fossil fuel,
 - c) a manufactured *building* described in Article 9.1.1.9., or
 - d) a seasonal recreational *building* described in Section 9.36. or 9.38.

MMA Supplementary Standard SB-10, **Energy Efficiency Requirements** applies to energy efficiency design of all buildings **except** buildings with residential occupancy required to comply with 2012 OBC, Division B, Sentence 12.2.1.1.(3). **For additional information on Plasti-Fab EPS solutions available to meet requirements of MMA SB-10, refer to Plasti-Fab Product Information Bulletin No. 290.**

Buildings with residential occupancy required to comply with 2012 OBC, Division B, Part 9 must meet the requirements of 2012 OBC, Sentence 12.2.1.2.(3) using one of the three compliance options in MMA SB-12, Chapter 3 to achieve energy efficiency:

1. Conformance with one of the prescriptive compliance packages in Subsection 3.1.1.
2. Comply with the performance compliance method in Subsection 3.1.2. or
3. Compliance with Energy Star or R2000 requirements as specified in Subsection 3.1.3. of SB-12 is intended to achieve, on a systemic basis, an energy efficiency performance level that exceeds the energy efficiency requirements of Sentence 12.2.1.1.(3) of Division B of the Building Code by 15%.

Note: SB-12 compliance options 2 and 3 require detailed design of all aspects of the energy efficiency design of buildings using recognized simulation software to calculate annual energy use.

2012 OBC, MMA Supplementary Standard SB-12, Chapter 3 provides prescriptive compliance packages which include requirements for the minimum thermal performance and energy efficiency of building envelope and space heating equipment, domestic hot water heating equipment and heat recovery ventilator equipment. Compliance packages are presented in table format in SB-12, Chapter 3 as follows:

- a) Zone 1 Building Locations – Tables 3.1.1.2.A (SI), 3.1.1.2.A (IP), 3.1.1.2.B (SI), and 3.1.1.2.B (IP).
- b) Zone 2 Building Locations – Tables 3.1.1.3.A (SI), 3.1.1.3.A (IP), 3.1.1.3.B (SI), and 3.1.1.3.B (IP).

NOTE: Thermal performance for wall and ceiling components listed in the tables are either **minimum nominal RSI (R)-value for the thermal insulation component only, minimum effective RSI (R) for entire wall or roof assembly** – expressed in SI units of (m²•K)/W or IP units of (ft²•hr•°F)/BTU – or **maximum U-value** (overall thermal transmittance) **for the entire wall or roof assembly** – expressed in SI units of W/(m²•K) or IP units of BTU/(ft²•hr•°F).

Climate Zones 1 and 2 are illustrated in Figure 1. Heating degree days (HDD) extracted from climatic data in 2012 OBC, Supplementary Standards SB-1 for some building locations are provided in Table 1.

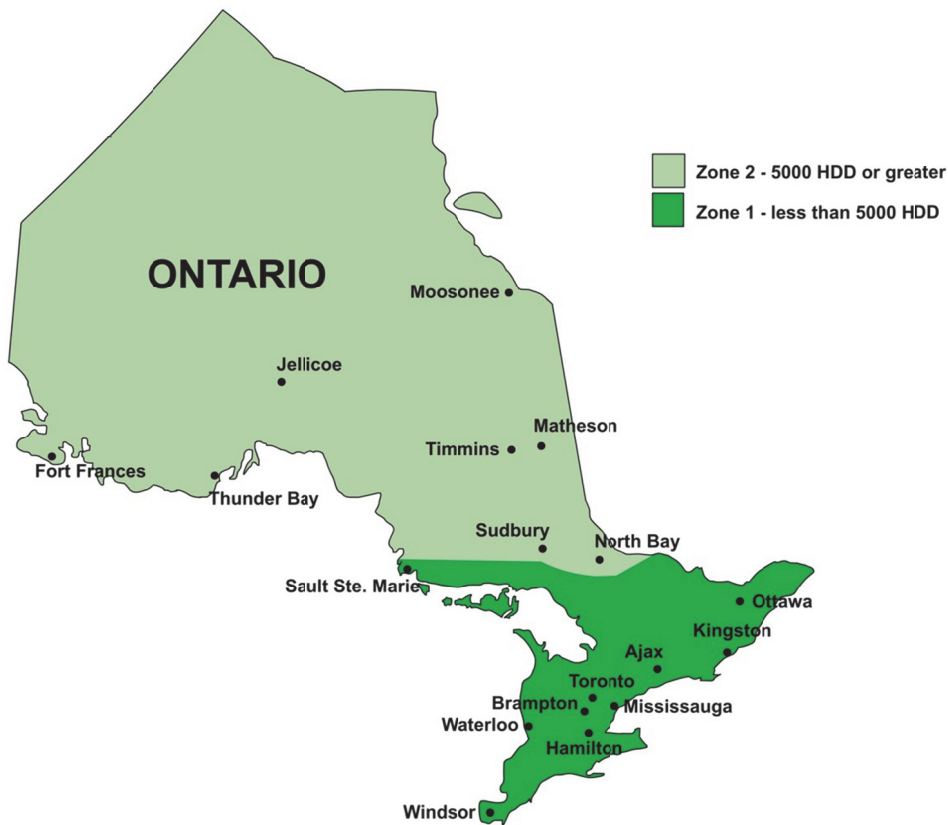


Figure 1 – Ontario Climate Zone Map

Table 1 - Climate Zone Locations: 2012 OBC, SB-1

Zone 1 – Less than 5,000 Heating Degree Days				Zone 2 – 5,000 Heating Degree Days or Greater			
Location	HDD	Location	HDD	Location	HDD	Location	HDD
Windsor	3400	Kingston	4000	North Bay	5150	Timmins	5940
Hamilton	3460	Brampton	4100	Sudbury	5180	Matheson	6080
Toronto	3520	Waterloo	4200	Fort Frances	5440	Jellicoe	6400
Ajax	3820	Ottawa	4440	Thunder Bay	5650	Nakina	6500
Mississauga	3880	Sault Ste. Marie	4960	Dryden	5850	Moosonee	6800

Table 2 provides Advantage ICF System wall options that meet minimum RSI (R-value) per 2012 OBC, MMAH Supplementary Standard SB-12, Chapter 2 for various compliance packages.

Table 2 - Advantage ICF System Options for Above-Grade Wall Applications

MMA SB-12 Compliance Package	MMA SB-12 Effective RSI (R) ¹	152 mm (6") Advantage ICF System ² Wall with 2 panels @ 2 5/8" = 5 1/4" CAN/ULC-S701, Type 2 EPS Insulation RSI _{eff} (R _{eff}) = 4.14 (23.5)
Zone 1 – Table 3.1.1.2.A – Space Heating Equipment with AFUE ≥ 92%		
A1	3.00 (17.0)	
A2, A5	3.58 (20.3)	
A3	3.28 (18.6)	
A4, A6	3.77 (21.4)	
Zone 1 – Table 3.1.1.2.B – Space Heating Equipment with AFUE ≥ 90%		
B1, B2	3.77 (21.4)	
Zone 2 – Table 3.1.1.3.A – Space Heating Equipment with AFUE ≥ 94%		
A1	3.58 (20.3)	
A3	3.77 (21.4)	

Table 1 Notes:

1. The effective RSI/R values for all compliance packages include the entire exposed above grade wall assembly components, from interior air film to exterior air film.
2. The Advantage ICF System is permitted to be used in lieu of any assembly where the effective RSI value of the Advantage ICF wall assembly is the same or better than the effective RSI/R value required for a wall assembly for any of the compliance packages. See Table 4 for examples of effective RSI/R for Advantage ICF wall assemblies.

Table 3 provides examples of Advantage ICF System wall options that can be used to meet minimum effective RSI/R value per OBC 2012, MMA SB-12, Chapter 3 for basement wall (below grade foundation) applications.

Table 3 – Advantage ICF System Options for Below Grade Walls

MMA SB-12 Compliance Package	MMA SB-12 Effective RSI (R) ¹	152 mm (6") Advantage ICF System ² Wall with 2 panels @ 2 5/8" = 5 1/4" CAN/ULC-S701, Type 2 EPS Insulation RSI _{eff} (R _{eff}) = 4.14 (23.5)
Zone 1 – Table 3.1.1.2.A – Space Heating Equipment with AFUE ≥ 92%		
A1, A3, A4, A6	3.72 (21.1)	
A2	3.67 (20.8)	
A5	2.81 (16.0)	
Zone 1 – Table 3.1.1.2.B – Space Heating Equipment with 84% ≤ AFUE < 92%		
B1, B3, B5, B6	3.72 (21.1)	
B2, B4	3.67 (20.8)	
Zone 2 – Table 3.1.1.3.A – Space Heating Equipment with AFUE ≥ 92%		
A1 to A6	3.72 (21.1)	
Zone 2 – Table 3.1.1.3.B – Space Heating Equipment with 84% ≥ 90%		
B1	3.72 (21.1)	
B2	3.67 (20.8)	
B3, B4	4.43 (25.2)	
B5, B6	4.70 (26.7)	

Table 2 Notes:

1. The effective RSI/R values for all compliance packages include the entire exposed above grade wall assembly components, from interior air film to exterior air film.

2. The Advantage ICF System is permitted to be used in lieu of any assembly where the effective RSI value of the Advantage ICF wall assembly is the same or better than the effective RSI/R value required for a wall assembly for any of the compliance packages. See Table 4 for examples of effective RSI/R for Advantage ICF wall assemblies.

Space heating equipment operating efficiency is regulated by minimum AFUE (Annual Fuel Utilization Efficiency) with higher the AFUE %, indicating more efficient equipment. AFUE % estimates seasonal efficiency, averaging peak and part-load situations accounting for start-up, cool-down, and other operating losses that occur in real operating conditions including an estimate of electricity used by the air handler, inducer fan, and controls.

Since the Advantage ICF System does not contain any framing members, the *effective thermal resistance* for Advantage ICF wall assemblies is calculated using the isothermal planes method as the sum of the thermal resistance values for continuous components in the wall assembly. Typical calculations for above grade and basement wall assemblies are provided in Table 2 below.

Table 3 – Typical Effective Thermal Resistance Calculation

Advantage ICF System Wall Components	Advantage ICF System			
	Above Grade Wall		Basement Wall	
	RSI	R	RSI	R
Outside Air Film (above grade)	0.03	0.17	NA	NA
Metal Siding	0.11	0.62	NA	NA
EPS Thermal Insulation	1.87	10.62	1.87	10.62
152 mm (6") Concrete Wall	0.06	0.35	0.06	0.35
EPS Thermal Insulation	1.87	10.62	1.87	10.62
Gypsum Wall Board, 13 mm (1/2")	0.08	0.45	0.08	0.45
Inside Air Film	0.12	0.68	0.12	0.68
Advantage ICF Wall RSI_{eff} (R_{eff})	4.14	23.5	4.00	22.7