

Product Information Bulletin

NBC 2010 - Manitoba Plasti-Fab EPS Product Solution

National Building Code of Canada 2010 (NBC 2010), Section 9.36., **Energy Efficiency**, provides energy efficiency requirements for buildings 3 storeys or less in building height, having a building area not exceeding 600 m² and used for major occupancies classified as residential occupancies. This bulletin summarizes Plasti-Fab® expanded polystyrene (EPS) product solutions for use in building assemblies complying with NBC 2010, Section 9.36.2. as modified for Manitoba by The Buildings and Mobile Homes Act.

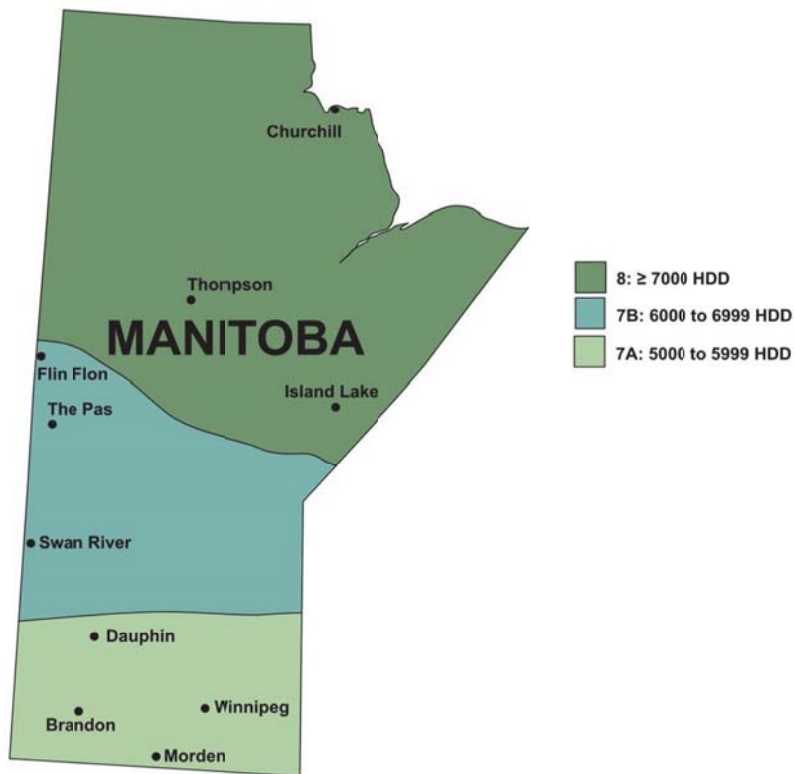


Figure 1: Manitoba Climate Zone Map

Table 1 – NBC 2010, Division B, Appendix C, Heating Degree Days (HDD) for Building Locations

Zone 7a		Zone 7b		Zone 8	
Location	HDD	Location	HDD	Location	HDD
Morden	5400	Swan River	6100	Thompson	7600
Winnipeg	5670	Flin Flon	6440	Lynn Lake	7770
Steinbach	5700	The Pas	6480	Split Lake	7900
Brandon	5760	Island Lake	6900	Churchill	8950

Effective thermal resistance (RSI_{eff}/R_{eff}) of building assemblies calculated using the formula below includes the effect of thermal bridging due to repetitive structural members such as wood framing members in walls.

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

Table 2 provides minimum RSI_{eff} (R_{eff}) from NBC 2010 as modified by Manitoba regulation for above grade wall applications.

Table 2 – NBC 2010 RSI_{eff} (R_{eff}) for Above Grade Walls

Climate Zone	Table 9.36.2.6.A. – Without HRV		Table 9.36.2.6.B. – With HRV	
	RSI_{eff}	R_{eff}	RSI_{eff}	R_{eff}
7a	3.08	17.5	2.80	15.9
7b	3.85	21.9	2.80	15.9
8	3.85	21.9	3.08	17.5

Table 3 provides examples of Plasti-Fab EPS product solutions that can be used to meet NBC 2010 minimum RSI_{eff} (R_{eff}) requirements for above grade wall applications.

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

Plasti-Fab Wall Option Description	NBC 2010 Climate Zone	Minimum RSI_{eff} (R_{eff})	Base Wall RSI_{eff} (R_{eff}) ¹	RSI (R) Plasti-Fab Solution
Wall Options with Plasti-Fab Continuous EPS Insulating Sheathing²				
Option A – without HRV Base wall - 2 x 4 wood studs @ 406 mm (16") on center with RSI-2.29 (R-13) cavity insulation	7a	3.08 (17.5)	1.90 (10.8)	1.18 (6.7)
	7b to 8	3.85 (21.9)		1.95 (11.1)
Option B – With HRV Base wall as per Option A	7a to 7b	2.80 (15.9)	1.90 (10.8)	0.90 (5.1)
	8	3.08 (17.5)		1.18 (6.7)
Option C – Without HRV Base wall - 2 x 6 wood studs @ 406 mm (16") on center with RSI-3.34 (R-19) cavity insulation	7b to 8	3.85 (21.9)	2.68 (15.2)	1.17 (6.7) ³
Wall Options with Plasti-Fab Building Systems				
Option E: With or Without HRV Advantage ICF System [®] wall – see Advantage ICF System PIB 222 for RSI_{eff}/R_{eff} calculated per note 4	7a to 8	3.85 (21.9)	NA	4.14 (23.5)
Option F: With or Without HRV Insulspan [®] SIP System (6 1/2" SIP) – see Insulspan SIP System PIB 209 for RSI_{eff}/R_{eff} calculated per note 4	7a to 8	3.08 (17.5)	NA	3.42 (19.4)
Option G: Without HRV Insulspan [®] SIP System (8 1/4" SIP) – see Insulspan SIP System PIB 209 for RSI_{eff}/R_{eff} calculated per note 4	7b to 8	3.85 (21.9)	NA	4.32 (24.5)

1. Base wall RSI_{eff} (R_{eff}) calculations include the contribution from wood studs with cavity insulation plus continuous elements other than Plasti-Fab EPS insulation – i.e., outside air film, cladding, gypsum board and inside air film.
2. Determine Plasti-Fab EPS insulation thickness based upon RSI/R -values for Plasti-Fab EPS options in Table 6.
3. DuroFoam and DuroFoam Plus insulations are manufactured with a laminated film on each face and have a vapour permeance characteristic less than 60 ng/Pa•s•m². When applied as exterior insulating sheathing in Climate Zone 8, the minimum RSI (R) for these insulation options would be RSI-1.28 (R-7.3) to meet the minimum ratio of outboard to inboard insulation per NBC 2010, Article 9.25.5.2.
4. RSI(R) in table 3 is RSI_{eff}/R_{eff} for wall systems built with Plasti-Fab building system noted.

Table 4 provides minimum RSI_{eff} (R_{eff}) from NBC 2010, as modified by Manitoba regulation, for below grade wall applications.

Table 4 – RSI_{eff} (R_{eff}) of Below-Grade Foundation Walls

Climate Zone	Table 9.36.2.8.A. – Without HRV		Table 9.36.2.8.B. – With HRV	
	RSI_{eff}	R_{eff}	RSI_{eff}	R_{eff}
7a	3.46	19.7	2.80	15.9
7b	3.46	19.7	2.80	15.9
8	3.97	22.5	2.80	15.9

Table 5 provides examples of Plasti-Fab EPS product solutions that can be used to meet NBC 2010 minimum RSI_{eff} (R_{eff}) requirements for below-grade wall applications.

Table 5 - Plasti-Fab EPS Product Solutions for Foundation Below-Grade Walls

Plasti-Fab Wall Option Description	NBC 2010 Climate Zone	Minimum RSI_{eff} (R_{eff})	Base Wall RSI_{eff} (R_{eff}) ¹	RSI (R) Plasti-Fab Solution
Wall Options with Plasti-Fab Continuous EPS Interior or Exterior Insulation²				
Option A – Without HRV Base wall – 2 x 3 wood studs @ 610 mm (24") on center	7a to 7b	3.46 (19.6)	0.35 (2.0)	3.11 (17.6)
	8	3.97 (22.5)		3.62 (20.5)
Option B – Without HRV Base wall – 2 x 4 wood studs @ 610 mm (24") on center with RSI-2.11 (R-12) cavity insulation	7a to 7b	3.46 (19.6)	1.99 (11.3)	1.47 (8.3)
	8	3.97 (22.5)		1.98 (11.2)
Option C – Without HRV Base wall – 2 x 6 wood studs @ 610 mm (24") on center with RSI-3.34 (R-19) cavity insulation	7a to 7b	3.46 (19.6)	2.97 (16.9)	0.49 (2.7)
	8	3.97 (22.5)		1.00 (5.6)
Option D – With HRV Base wall – 2 x 3 wood studs @ 610 mm (24") on center	7a to 8	2.80 (15.9)	0.35 (2.0)	2.45 (13.9)
Option E: With HRV Base wall – 2 x 4 wood studs @ 610 mm (24") on center with RSI-2.11 (R-12) cavity insulation	7a to 8	2.80 (15.9)	1.99 (11.3)	0.81 (4.6)
Wall Option with Plasti-Fab Building System				
Option F: With or Without HRV Advantage ICF System [®] wall – see Advantage ICF System PIB 222 for RSI_{eff}/R_{eff} calculated per note 3	7a to 8	3.97 (22.5)	NA	4.00 (22.7)

1. Base wall RSI_{eff} (R_{eff}) calculations include the contribution from framed portion of wall plus continuous elements other than Plasti-Fab EPS insulation – i.e., concrete foundation wall, gypsum board and inside air film.
2. Determine Plasti-Fab EPS insulation thickness based upon RSI/R-values for Plasti-Fab EPS options in Table 6.
3. RSI(R) in table 5 is RSI_{eff}/R_{eff} for wall system built with Advantage ICF System.

Table 6 – RSI (R-value) Plasti-Fab Continuous EPS Insulation Options

Plasti-Fab Continuous EPS Insulation Option	RSI (R) Unit of Thickness
PlastiSpan [®] or DuroFoam [®] insulation	RSI-0.65 per 25 mm (R-3.75 per inch)
PlastiSpan HD or DuroFoam Plus insulation	RSI-0.70 per 25 mm (R-4.04 per inch)
EnerSpan [®] insulation	RSI-0.82 per 25 mm (R-4.7 per inch)

Table 7 provides minimum RSI_{eff} (R_{eff}) from NBC 2010 for floors in contact with the ground.

Table 7 – NBC 2010 RSI_{eff} (R_{eff}) for Floors in Contact with the Ground

Climate Zones	Zone 7a	Zone 7b	Zone 8
Heating Degree-Days (HDD) Celsius Degree-Days	5,000 to 5,999	6,000 to 6,999	≥ 7,000
	Minimum $RSI_{eff} - m^2 \cdot ^\circ C/W$ ($R_{eff} - ft^2 \cdot hr \cdot ^\circ F/ BTU$)		
Unheated Floors above frost Line	1.96 (11.1)	1.96 (11.1)	1.96 (11.1)
Heated Floors	2.84 (16.1)	2.84 (16.1)	2.84 (16.1)

Table 8 provides Plasti-Fab EPS product solutions that can be used to meet NBC 2010 minimum RSI_{eff} (R_{eff}) requirements for floor slab applications.

Table 8 - Plasti-Fab EPS Product Solutions for Floors in Contact with the Ground

Plasti-Fab Option Description	2014 ABC Climate Zone	Minimum RSI_{eff} (R_{eff}) ¹	Plasti-Fab EPS Insulation Min. RSI (R) ²
Options with Plasti-Fab EPS Insulation			
Option A – Unheated Slab Above Frost Line³ Plasti-Fab EPS insulation between 2 x 3 wood nailers @ 610 mm (24") on center above slab	7a to 8	1.96 (11.1)	1.83 (10.4)
Option B – Unheated Slab Above Frost Line⁴ Plasti-Fab EPS insulation below slab	7a to 8	1.96 (11.1)	1.76 (10.0)
Option C – Heated Slab⁵ Plasti-Fab continuous EPS insulation below slab	7a to 8	2.84 (16.1)	2.64 (15.0)

- RSI_{eff} (R_{eff}) calculations include:
 - Contribution from wood nailers with Plasti-Fab EPS insulation for above slab option plus continuous elements in assembly – i.e., concrete floor slab, floor sheathing and inside air film.
 - Contribution from continuous Plasti-Fab EPS insulation below slab plus other continuous elements in assembly – i.e., concrete floor slab and inside air film.
- Determine Plasti-Fab EPS insulation thickness based upon RSI/R-values for Plasti-Fab EPS options in Table 9.
- Unheated slabs above the frost line shall be insulated within the wooden sleepers below the floor for a distance not less than 1.2 m (4 ft) horizontally from the perimeter of the slab
- Unheated slabs above the frost line shall be insulated beneath the slab for a distance not less than 1.2 m (4 ft) horizontally from the perimeter of the slab with a thermal break along the edge of the slab.
- Floors-on-ground with embedded heating ducts, cables or pipes (heated slabs) shall be insulated to the effective thermal resistance under their full bottom surface including the edges.

Table 9 – RSI (R-value) Plasti-Fab EPS Insulation Options

Plasti-Fab EPS Insulation Option	RSI (R) Unit of Thickness
PlastiSpan® or DuroFoam® insulation	RSI-0.65 per 25 mm (R-3.75 per inch)
PlastiSpan HD or DuroFoam Plus insulation	RSI-0.70 per 25 mm (R-4.04 per inch)
EnerSpan® insulation	RSI-0.82 per 25 mm (R-4.7 per inch)
Radon Guard™ insulation ¹	RSI-0.70 per 25 mm (R-4.04 per inch)

- Note Radon Guard insulation applicable for below slab insulation options. In addition to providing required thermal insulation, Radon Guard insulation is used as a component in a Radon mitigation system – for additional information see Plasti-Fab Product Information Bulletin 294.