

Amendments to the Nova Scotia Building Code

The Minister of Labour and Workforce Development recently prescribed the following the following amendments will come into force in the Nova Scotia Building Code on September 1,2010.

The attached replacement pages may be substituted into your copy of the Code.

For clarity as amendments are normally marked with vertical bar in the margin these amendments are shown in **bold text** as well.

By printing the attached as double sided copies you can replace the corresponding pages in the Nova Scotia Building Code Regulation dated December 31, 2009.

(4) Except as permitted in Articles 10.3.2.3., 10.3.2.4., 10.3.2.6., 10.3.2.7., 10.3.2.8. and 10.3.2.9., the minimum thermal resistance of insulation shall conform to Table 10.3.2.1.

**Table 10.3.2.1.
Minimum Thermal Resistance of Insulation to be Installed
Forming Part of Sentence 10.3.2.1.(4)**

Building Element Exposed to the Exterior or to Unheated Space		Minimum RSI [R] Values Required ₃
1	Ceiling below attic or roof space	7.00 [40]
2	Roof assembly without attic or roof space	5.46 [31]
3	Wall other than foundation wall [including walls between heated and unheated spaces]	4.23 [24]
4	Walls other than foundation wall [including walls between heated and unheated spaces, and #9] insulated with a spray foam insulation providing an air seal₄	3.63 [20.6]
5	ICF wall above grade ₁ .	3.63 [20.6]
6	ICF wall below grade enclosing heated space [full height insulation],	3.63 [20.6]
7	Foundation walls enclosing heated space [full height insulation]	3.52 [20]
8	Floors over unheated spaces including Overhanging [cantilevered] Floors	5.46 [31]
9	Floor joist header space [except as per #4 and #5]	4.23 [24]
10	Frost Wall (with slab-on-ground) ₂	1.76 [10]
11	Slab-on-ground perimeter insulation (see Sentence 10.3.3.8.(1)) ₂	1.76 [10]
12	Under Slab-on-ground containing heating pipes, tubes, ducts or cables ₂	1.76 [10]
13	Under Slab-on-ground not containing heating pipes, tubes, ducts or cables ₂	1.76 [10]
14	Basement floor slabs located not more than 1 m below grade ₂	1.76 [10]
15	Basement floor slabs located more than 1 m below grade	nil

1. ICF walls provide an effective insulating value. Walls of this construction have inherently effective air barriers and minimal thermal bridging characteristics.
2. This value may be reduced to R 4 at the thermal break between the slab and wall.
3. "Insulation values" shown are for the insulation only.
4. **Spray foam insulation products provide an effective insulating value. This type of insulation product has inherently an effective air barrier characteristics. [See Table A-9.25.1.2.(B)]**

10.3.2.2. Elements Acting as a Thermal Bridge

(1) Except for a foundation wall, the insulated portion of a wall that incorporates wood stud framing elements that have a thermal resistance of less than RSI 0.90 shall be insulated to restrict heat flow through the studs by a material providing a thermal resistance at least equal to 25 per cent of the thermal resistance required for the insulated portion of the assembly in Sentence 10.3.2.1.(4).

(2) Except as provided in Sentence (3), the thermal resistance of the insulated portion of a *building* assembly in Sentence 10.3.2.1.(4) that incorporates metal framing elements, such as steel studs and steel joists, that act as thermal bridges to facilitate heat flow through the assembly, shall be 20 per cent greater than the values shown in Table 10.3.2.1., unless it can be shown that the heat flow is not greater than the heat flow through a wood frame assembly of the same thickness.

(3) Sentence (2) does not apply to *building* assemblies incorporating thermal bridges where the thermal bridges are insulated to restrict heat flow through the thermal bridges by a material providing a thermal resistance at least equal to 25 per cent of the thermal resistance required for the insulated portion of the assembly in Sentence 10.3.2.1.(4).

10.3.2.3. Thermal Resistance Values for Roof and Ceiling Assemblies

(1) The thermal resistance values in Table 10.3.2.1. for exposed roofs or ceilings may be reduced near eaves to the extent made necessary by the roof slope and required ventilation clearances.

10.3.2.4. Insulation of Foundation Walls

(1) Foundation walls enclosing heated space shall be insulated from the underside of the subfloor of the floor above, down to the finished floor slab.

(2) The insulation required by Sentence (1) may be provided by a system installed,

- (a) on the interior of the foundation wall,
- (b) on the exterior face of the foundation wall, or
- (c) partially on the interior and partially on the exterior, provided the thermal performance of the system is equivalent to that permitted in Clause (a) or (b).

(3) Insulation applied to the exterior of a slab-on-ground floor shall extend down at least 600 mm below the adjacent exterior ground level or shall extend down and outward from the floor or wall for a total distance of at least 600 mm. (See Appendix Note A-10.3.3.8. NSBCR)

10.3.3.3. Thermal Resistance

(1) Except as provided in Articles 10.3.3.4. to 10.3.3.8., and except for doors, windows, skylights and other closures, the thermal resistance of each *building* assembly through any portion that does not include framing or furring shall conform to Table 10.3.3.3.

**Table 10.3.3.3.
Minimum Thermal Resistance of *Building* Assemblies
Forming Part of Sentence 10.3.3.3.(1)**

Building Element Exposed to the Exterior or to Unheated Space		Minimum RSI [R]
1	Ceiling below attic or roof space	7.00 [40]
2	Roof assembly without attic or roof space	5.46 [31]
3	Wall other than foundation wall [including walls between heated and unheated spaces]	4.23 [24]
4	Walls other than foundation wall [including walls between heated and unheated spaces, and #9] insulated with a spray foam insulation conforming providing an air seal ₃	3.63 [20.6]
5	ICF wall above grade ₁ .	3.63 [20.6]]
6	ICF wall below grade enclosing heated space [full height insulation], ₁	3.63 [20.6]]
7	Foundation walls enclosing heated space [full height insulation]	3.52 [20]
8	Floors over unheated spaces including Overhanging [cantilevered] Floors	5.46 [31]
9	Floor joist header space [except as per #4 and #5]	4.23 [24]
10	Frost Wall (with slab-on-ground) ₂ .	1.76 [10]
11	Slab-on-ground perimeter insulation (see Sentence 10.3.3.8.(1)) ₂ .	1.76 [10]
12	Under Slab-on-ground containing heating pipes, tubes, ducts or cables ₂ .	1.76 [10]
13	Under Slab-on-ground not containing heating pipes, tubes, ducts or cables ₂ .	1.76 [10]
14	<i>Basement</i> floor slabs located not more than 1 m below grade ₂ .	1.76 [10]
15	<i>Basement</i> floor slabs located more than 1 m below grade	nil

1. ICF walls and walls with cavities filled with low density open cell spray foam insulation provide an effective insulating value. Walls of this construction have inherently effective air barriers and minimal thermal bridging characteristics.
2. This value may be reduced to R 4 at the thermal break between the slab and wall.
3. **Spray foam insulation products provide an effective insulating value. This type of insulation product has inherently an effective air barrier characteristics. [See Table A-9.25.1.2.(B)]**

10.3.3.4. Metal Framing Elements Acting as Thermal Bridge

(1) Except as provided in Article 10.3.3.5., the thermal resistance of the insulated portion of a *building* assembly that incorporates metal framing elements, such as steel studs and steel joists, that act as thermal bridges to facilitate heat flow through the assembly, shall be 20 per cent greater than the values shown in Table 10.3.3.3., unless it can be shown that the heat flow is not greater than the heat flow through a wood frame assembly of the same thickness.

10.3.3.5. Insulated Thermal Bridges

(1) Article 10.3.3.4. does not apply for *building* assemblies incorporating thermal bridges where the thermal bridges are insulated to restrict heat flow through the thermal bridges by a material providing a thermal resistance at least equal to 25 per cent of the thermal resistance required for the insulated portion of the assembly in Article 10.3.3.3.

10.3.3.6. Reduction of Thermal Resistance

(1) The thermal resistance of a *building* assembly may be reduced by not more than 20 per cent from that required in Articles 10.3.3.3. and 10.3.3.4., and the amount of glazing may be increased to more than permitted in Sentence 10.3.3.10.(2), 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 Articles 10.3.3.3. and 10.3.3.4. and with the maximum amount of glazing permitted in Sentence 10.3.3.10.(2), provided no allowance is made for solar heat gains or for the orientation of the glazing as described in Sentence 10.3.3.10.(4).

10.3.3.7. Thermal Resistance Values for Roof and Ceiling Assemblies

(1) The thermal resistance values in Articles 10.3.3.3. and 10.3.3.4. for roof or ceiling assemblies that separate heated space from unheated space or the exterior may be reduced near the eaves to the extent made necessary by the roof slope and required ventilation clearances, except that the thermal resistance at the location directly above the inner surface of the exterior wall shall be at least $2.1 \text{ m}^2\text{C/W}$.

10.3.3.8. Foundation Wall Insulation

(1) Insulation applied to the exterior of a slab-on-ground floor shall extend down at least 600 mm below the adjacent exterior ground level or shall extend down and outward from the floor or wall for a total distance of at least 600 mm. (See Appendix Note A-10.3.3.8. NSBCR)

10.3.3.9. Enclosed Unheated Space

(1) Where an enclosed unheated space, such as a sun porch, enclosed verandah or vestibule, is separated from a heated space by glazing, the unheated enclosure may be considered to provide thermal resistance of $0.16 \text{ m}^2\text{C/W}$, or the equivalent of one layer of glazing.

Additional Conversion Factors

To Convert	To	Multiply by	Notes
°C	°F	1.8 and add 32	
m ² ·C/W (RSI)	h·ft ² ·°F/Btu (R)	5.678	
W	Btu/h	3.413	
W/m ²	Btu/h·ft ²	0.317	
W/m ² ·°C	Btu/h·ft ² ·°F	0.17612	U value
W/m·°C (per metre thickness)	Btu·ft/ h·ft ² ·°F or Btu·in/h·ft ² ·°F	0.5777 6.9444	Conductivity (per foot) Conductivity (per inch)
W/L	Btu/h·US gal	12.916	

A-9.25.1.2.(B) As per reference to Table 10.3.2.1. and Table 10.3.3.3.

Table A-9.25.1.2.(B)
Air and Vapour Permeance Values(1)

Material	Air Leakage Characteristic, L/(s·m ²) at 75 Pa (Air Permeance)	Water Vapour Permeance, (Dry Cup) ng/(Pa·s·m ²)
Sheet and panel-type materials		
12.7-mm gypsum board	0.02	2600
– painted (1 coat primer) negligible	negligible	1300
– painted (1 coat primer + 2 coats latex paint)	negligible	180
12.7-mm foil-backed gypsum board	negligible	negligible
12.7-mm gypsum board sheathing	0.0091	1373
6.4-mm plywood	0.0084	23 – 74
11-mm oriented strandboard	0.0108	44 (range)
12.5-mm cement board	0.147	590
Plywood (from 9.5 mm to 18 mm)	negligible – 0.01	40 – 57
Fibreboard sheathing	0.012 – 1.91	100 – 2900
17-mm wood sheathing	high – depends on no. of joints	982
Insulation		
27-mm foil-faced polyisocyanurate	negligible	4.3
27-mm paper-faced polyisocyanurate	negligible	61.1
25-mm extruded polystyrene	negligible	23 – 92
25-mm expanded polystyrene (Type 2)	0.0214	86 – 160
Fibrous insulations	very high	very high
25-mm polyurethane spray foam – low density	0.011	894 -3791
25-mm polyurethane spray foam – medium density	negligible	96 ⁽²⁾

Table A-9.25.1.2.(B)
Air and Vapour Permeance Values(1)
(continued)

Material	Air Leakage Characteristic, L/(s·m ²) at 75 Pa (Air Permeance)	Water Vapour Permeance, (Dry Cup) ng/(Pa·s·m ²)
Membrane materials		
Metal	negligible	negligible
Asphalt impregnated paper as 10 min paper	0.0673	370
Asphalt impregnated paper as 30 min paper	0.4	650
Asphalt impregnated paper as 60 min paper	0.44	1800
Water-resistive barriers (9 materials)	negligible - 4.3	30 – 1200
0.15-mm polyethylene	negligible	1.6 – 5.8
Modified bituminous membrane (#15 felt)	0.153	290
building paper	0.2706	170 – 1400
spun bonded polyolefin film (expanded)	0.9593	3646
Other materials		
Brick (6 materials)	negligible	102 – 602
Mortar mixes (4 materials)	negligible	13 – 690
Stucco	negligible	75 – 240
50-mm reinforced concrete (density: 2330 kg/m ³)	negligible	23

Notes to Table Table A-9.25.1.2.(B)

(1) Air leakage and vapour permeance values derived from:

- Bombaru, D., Jutras, R. and Patenaude, A. Air Permeance of Building Materials. Summary Report prepared by AIR-INS Inc. for Canada Mortgage and Housing Corporation, Ottawa, 1988. Values indicate properties of tested materials only; values for specific products may vary significantly.
- Details of Air Barrier Systems for Houses. Ontario New Home Warranty Program, Toronto, 1993.
- Kumaran, M.K., et al., ASHRAE Research Report 1018 RP, "A Thermal and Moisture Transport Property Database for Common Building and Insulating Materials."
- Kumaran, M.K., Lackey, J., Normandin, N., van Reenen, D., Tariku, F., "Summary Report from Task 3 of MEWS Project at the Institute for Research in Construction-Hygrothermal Properties of Several Building Materials," IRC-RR-110, March 2002.
- Mukhopadhyaya, P., Kumaran, M.K., et al., "Hygrothermal Properties of Exterior Claddings, Sheathings Boards, Membranes and Insulation Materials for Building Envelope Design," Proceedings of Thermal Performance of the Exterior Envelopes of Whole Building X, Clearwater, Florida, Dec 2-7, 2007, pp 1-16 (NRCC-50287).

(2) This water vapour permeance value represents 25-mm thick core layer of medium density polyurethane foam. When installed in the field, a low permeance resin layer is being formed at the boundary with the substrate. The water vapour permeance of the installed foam, with skins, is therefore likely to be lower than the value listed in the table.

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September 1, 2010