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Product Information Bulletin

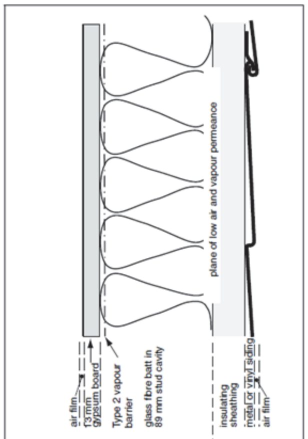
2012 OBC Requirements
Low Permeance Insulating Sheathing

This bulletin highlights 2012 Ontario Building Code (2012 OBC) requirements that must be considered when using low permeance materials as continuous exterior insulating sheathing. The 2012 OBC requirements were adopted from the National Building Code of Canada 2010 (2012 OBC), an objective-based National Model Code that may be adopted by provincial and territorial government code authorities in Canada.

2012 OBC, Section 9.25.5. addresses the position and properties of materials in the building envelope and implications for moisture accumulation as follows:

9.25.5. Properties and Position of Materials in the Building Envelope
9.25.5.1. General (See Appendix A.)
1) Sheet and panel-type materials incorporated into assemblies described in Article 9.25.1.1. shall conform to Article 9.25.5.2., where
- a) the material has
  - i) an air leakage characteristic less than 0.1 L/(s·m^2) at 75 Pa, and
  - ii) a water vapour permeance less than 60 ng/(Pa·s·m^2) when measured in accordance with ASTM E 96/E 96M, “Water Vapor Transmission of Materials,” using the desiccant method (dry cup), and
- b) the intended use of the interior space where the materials are installed will not result in high moisture generation.
(See Appendix A.)

2) Where the intended use of the interior space will result in high moisture generation, the assembly shall be designed according to Part 5.
3) Wood-based sheathing materials not more than 12.5 mm thick and complying with Article 9.23.17.2. need not comply with Sentence (1).



	Inboard			Outboard		
RSI value	0.12	0.08	2.11	0.87	0.12	0.03
Total RSI value	2.31			1.02		
Ratio	$\frac{1.02}{2.31} = 0.44$					

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9.25.5.2. Position of Low Permeance Materials (See Appendix A.)
(1) Sheet and panel-type materials described in Article 9.25.5.1. shall be installed,
- (a) on the warm face of the assembly,
- (b) at a location where the ratio between the total thermal resistance of all materials outboard of its innermost impermeable surface and the total thermal resistance of all materials inboard of that surface is not less than that required by Table 9.25.5.2., or
- (c) outboard of an air space that is vented to the outdoors.

(2) For walls, the air space described in Clause (1)(c) shall be drained and ventilated and shall be not less than 10 mm deep behind the cladding, over the full height and width of the wall.

__Note:__ The figure to the left illustrates the requirements described in Clause 9.25.5.2.(1)(c) related to the position of outboard and inboard materials.

The remainder of this bulletin reviews specific requirements for low permeance continuous insulating sheathing addressed in 2012 OBC, Article 9.25.5.2.

Position and Properties of Low Permeance Continuous Insulating Sheathing

DuroFoam, ***DuroFoam Plus***, ***DuroSpan GPS*** and ***ENERGREEN*** insulation which incorporate a laminated film are examples of low permeance insulation which would have an air leakage characteristic less than 0.1 L/(s•m^2) at 75 Pa and a vapour permeance characteristic less than 60 ng/(Pa•s•m^2); therefore, the provisions of Article 9.25.5.2. related to position of low permeance materials must be considered.

As indicated in 2012 OBC, Clause 9.25.5.2.(2)(c), the use of low permeance continuous insulating sheathing is permitted on the exterior of an insulated frame wall based upon the ***ratio of outboard to inboard thermal resistance*** for specific heating degree-day (HDD) ranges. Wall assemblies with a ratio of outboard to inboard thermal resistance value ***greater*** than those given in 2012 OBC, Table 9.25.5.2. (see Table 1 below) ensure that the inner surface of the continuous insulating sheathing is likely to be warm enough for most of the heating season such that no significant accumulation of moisture will occur.

Table 1 - Ratio of Outboard to Inboard Thermal Resistance

Heating Degree Days of Building Location(1), Celsius Degree-Days	Minimum Ratio, Total Thermal Resistance Outboard of Material's Inner Surface to Total Thermal Resistance Inboard of Material's Inner Surface
Notes to 2012 OBC, Table 9.25.5.2.: (1) See MMAH Supplementary Standard SB-1, "Climatic and Seismic Data".	
up to 4999	0.20
5000 to 5999	0.30
6000 to 6999	0.35
7000 to 7999	0.40

Table 1 Note: Energy consumption required to keep the interior of a small building at 21°C when the outside air temperature is below 18°C is roughly proportional to the difference between 18°C and the outside temperature. This relationship holds true for average conditions of wind, radiation, exposure, and internal sources. A heating degree-day (HDD) is defined as the number of degrees the mean temperature (average of high and low temperature) for a given day is below 18°C. The sum of all the daily HDD contributions results in the annual HDD for a location.

The basic assumptions followed in developing the design values given in Table 9.25.5.2. are as follows:

1. The building includes a mechanical ventilation system (between 0.3 and 0.5 air changes per hour), a 60 ng/Pa·s·m^2 vapour barrier, and an air barrier (values between 0.024 and 0.1 L/sm^2 through the assembly were used).
2. The moisture generated by occupants and their use of bathrooms, cleaning, laundry and kitchen appliances was assumed to fall between 7.5 and 11.5 L per day.

Based upon these assumptions, 2012 OBC, Appendix Note A-9.25.5.2. confirms:

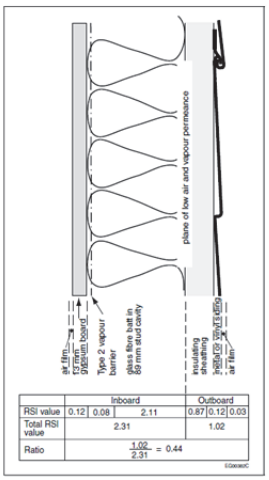
> ***"It has been demonstrated through modeling under these conditions that assemblies constructed according to the requirements in Table 9.25.5.2. do not lead to moisture accumulation levels that may lead to deterioration as long as the average monthly vapour pressure difference between the exterior and interior sides over the heating season does not increase above 750 Pa, which would translate into an interior relative humidity of 35% in colder climates and 60% in mild climates."***

2012 OBC, Appendix Note A-9.25.5.2. provides additional background information regarding assumptions followed in developing Table 9.25.5.2.

Calculating Ratio of Outboard to Inboard Thermal Resistance Per Table 1

Table 2 below provides examples of ratio of outboard to inboard thermal resistance calculations for above-grade wall assemblies using continuous insulating sheathing in combination with various cavity insulation options.

Table 2 – Sample Above-Grade Wall Ratio of Outboard to Inboard RSI Calculations



Wall Assembly RSI_{eff} (R_{eff})	RSI_{eff} - m^2•°C/W (R_{eff} - ft^2•hr•°F/BTU)	3.77 (21.4)	4.23 (24.0)	4.04 (23.0)	4.46 (25.3)	3.31 (18.8)
	Outboard Components	**RSI**	**RSI**	**RSI**	**RSI**	**RSI**
	Outside Air Film	0.03	0.03	0.03	0.03	0.03
	Cladding	0.11	0.11	0.11	0.11	0.11
	Continuous Insulating Sheathing	***0.88***	**1.35**	***1.35***	***1.76***	***1.35***
	Total Outboard RSI	**1.02**	**1.49**	**1.49**	**1.90**	**1.49**
	Inboard Components	**RSI**	**RSI**	**RSI**	**RSI**	**RSI**
	Stud cavity insulation	3.87	3.87	3.34	3.34	2.46
	Gypsum board	0.08	0.08	0.08	0.08	0.08
	Inside air film	0.12	0.12	0.12	0.12	0.12
	Total Inboard RSI	**4.07**	**4.07**	**3.54**	**3.54**	**2.66**
	Ratio Outboard to Inboard RSI	**0.25**	**0.36**	**0.42**	**0.54**	**0.56**
	Permitted HDD Climate Range from Table 2	**up to 4999**	**up to 7999**	**up to 7999**	**up to 7999**	**up to 7999**
	Ontario Climate Zone Compliance	**Climate Zone 1**	**Climate Zone 1 or 2 Up to HDD As Indicated**			

As indicated by the above calculations, low permeance continuous insulation can be used in combination with cavity insulation to achieve required effective thermal resistance (RSI_{eff}/R_{eff}) for a variety of wall assembly in a range of climate zones.