

Evaluation Report CCMC 12070-R

MASTERFORMAT: 07 21 19.03
Issued: 1990-01-16
Re-evaluated: 2010-05-25
Re-evaluation due: 2012-08-30

ICYNENE LD-C-50™

(formerly Gold Seal®)

1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “ICYNENE LD-C-50™” when used as an insulation material in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code 2005:

- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
 - Clause 9.25.2.2.(1)(g) Insulation Materials

This opinion is based on CCMC's evaluation of the technical evidence in Section 4.1 provided by the Report Holder.

Ruling No. 02-01-88 (12070-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2002-09-06 (revised on 2009-04-09) pursuant to s.29 of the Building Code Act, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

2. Description

The product is a spray-in-place, low-density, semi-flexible plastic foam that has an open-cell structure. The foaming system consists of two components, “Base Seal®” isocyanate and “ICYNENE LD-C-50™” resin, which are mixed on site by a qualified installer with fixed-ratio positive displacement equipment.

Once the product has expanded, the open cells contain air. The chemical reaction that occurs while the product is being installed takes place in seconds, with less than 15 minutes needed for curing. After curing, the product remains semi-flexible.

The final cured product is yellow and has a density of 8.47 kg/m^3 . At 25.4 mm thick, the design thermal resistance is $0.66 \text{ m}^2\cdot\text{K/W}$.

3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the "ICYNENE LD-C-50™" being used in accordance with the conditions and limitations set out below.

- As specified by the manufacturer, the product must be manufactured on site by qualified installers trained and approved by Icynene Inc. ITS is the third-party certification organization specified by Icynene Inc. to conduct random follow-up field inspections of qualified installers who are trained to spray semi-flexible urethane-based foam insulation in accordance with the product's Installer's Manual.
- The product can be installed in new or retrofit constructions. In either case, the product must be installed in open cavities in the following locations in a wood-frame construction that meets the requirements of the NBC 2005:
 - exterior walls including perimeter joists;
 - cathedral ceilings with a vented air space as required by the NBC 2005;
 - floors separating living spaces from a garage;
 - cantilever overhang floors; and
 - interior below-grade foundation walls.

The above application locations are illustrated in Figure 1.

- The building envelope in which this product is installed must conform to the requirements of the NBC 2005 for vapour barrier, air barrier and dampproofing (interior below-grade walls).
- For retrofit applications, the qualified installers must ensure that the spraying area is isolated and negatively pressurized by using an exfiltration rate of 0.3 air changes per hour for at least one (1) day. An independent toxicological assessment determined that this ventilation rate must also be in effect for one (1) day before occupancy is permitted in the newly insulated suite.
- The sprayed material should completely cover the surfaces between the studs, joists and other framing members. The surfaces to be covered should be clean, dry, and not covered in frost, oil, grease, dust or other unsuitable material. As required in Article 9.25.2.3., Installation of Thermal Insulation, of Division B of the NBC 2005, the insulation must be installed so that there is a reasonably uniform insulating value over the entire face of the insulated area.
- The interior side of the applied semi-flexible polyurethane insulation must be covered with an approved thermal barrier as per Article 9.10.17.10., Protection of Foamed Plastics, of Division B of the NBC 2005.
- The insulation should be kept away from heat-emitting devices, such as recessed light fixtures and chimneys at the minimum distance required by building regulations and safety codes.
- The maximum in-service temperature of the insulation must not exceed 70°C.
- This product may not be used where it may come in contact with water and must not be installed after its expiry date of six (6) months from the date of manufacture.
- The components, "Base Seal®" isocyanate and "ICYNENE LD-C-50™" resin, must have their respective containers (i.e. drums) identified by the phrase "CCMC 12070-R."
- The installation must be done in accordance with the manufacturer's instruction manual, which must be available at the job site at all times during the installation for review by the building official.

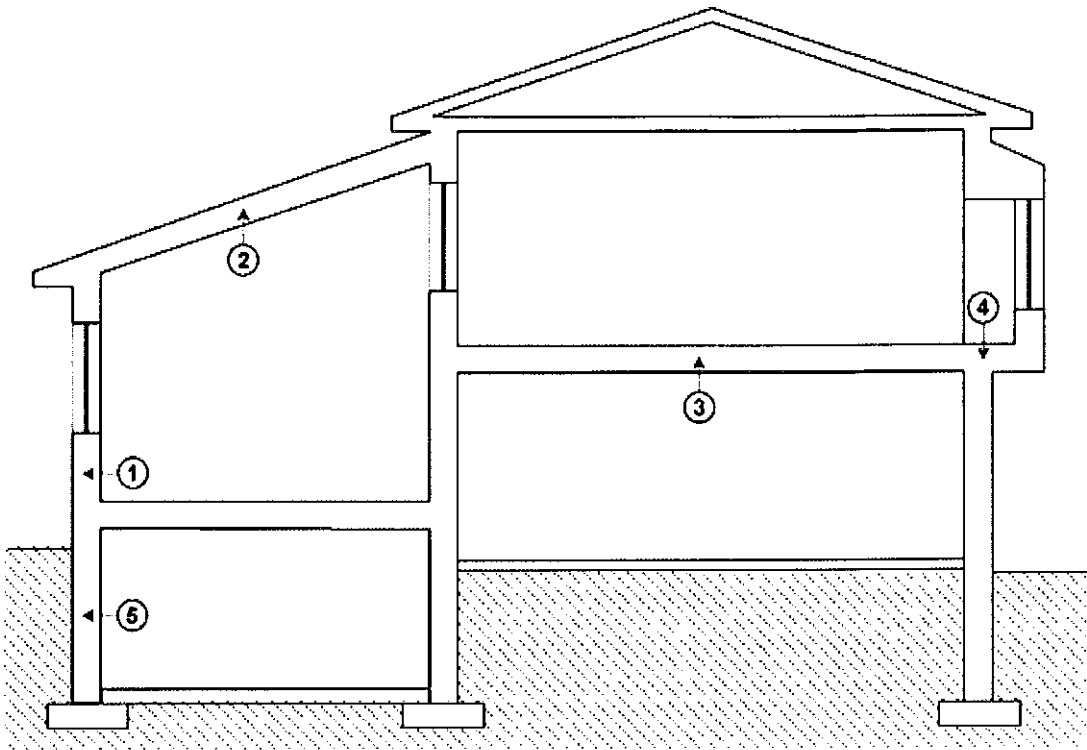


Figure 1. Application locations in open cavities of wood-frame construction:

- 1) above-grade wall
- 2) cathedral ceiling (vented)
- 3) floor above garage
- 4) cantilever floor
- 5) interior foundation wall

4. Technical Evidence

CCMC's Technical Guide for "ICYNENE LD-C-50™" sets out the nature of the technical evidence required by CCMC to enable it to evaluate a product as an acceptable or alternative solution in compliance with the NBC 2005. The Report Holder has submitted test results for CCMC's evaluation. Testing was conducted at independent laboratories recognized by CCMC. The corresponding test results for "ICYNENE LD-C-50™" are summarized below.

4.1 NBC 2005 Compliance Data for "ICYNENE LD-C-50™" on which CCMC Based its Opinion in Section 1

4.1.1 Material Requirements

Table 4.1.1 Density test results for "Icynene LD-C-50™"

Property	Unit	Requirement	Result
Density	kg/m ³	≥6.8	8.47

4.1.2 Performance Requirements

Table 4.1.2 Performance test results for “Icynene LD-C-50™”

Property	Unit	Requirement	Result
Thermal resistance (thickness = 25 mm)	m ² ·°K/W	Report value	0.65 ⁽¹⁾
Water vapour permeance (thickness = 25 mm)	ng/Pa·s·m ²	≥800	1 218
Water absorption by volume	%	< 5	4.2
Dimensional changes: <ul style="list-style-type: none"> • 28 days at 80°C and ambient RH • 28 days at 70°C and 95% RH • 28 days at -29°C and ambient RH 	% volumetric	Min. Max.	-2.2 0.0 + 2.4
		- 15 + 10	
		- 15 + 14	
Emissions (time-to-occupancy)	-	(2)	Pass ⁽²⁾

Notes to Table 4.1.2:

(1) At 25.4 mm thick, the design thermal resistance is 0.66 m²·K/W.

(2) The Volatile Organic Compound (VOC) emissions were measured with an assumed room ventilation rate of 0.3 air changes per hour as per the NBC 2005 requirements for new constructions. The determination of emissions and room concentration calculations were done by the Saskatchewan Research Council. An independent toxicologist report recommends a residential time-to-occupancy of one (1) day. Reported results from emission tests indicate that the product would be unlikely to cause major adverse health problems. While the testing and evaluation represent the current state-of-the-art in toxicological evaluation, such tests and their results do not purport to be conclusive with respect to the impact on health.

4.2 Additional Performance Data Requested by the Report Holder

Data in this section does not form part of CCMC's opinion in Section 1.

4.2.1 Fire Requirements

Table 4.2.1 Fire test results for “Icynene LD-C-50™”⁽¹⁾

Property	Unit	Requirement	Result
Surface flame-spread ⁽²⁾	--	Report value	450
Smoke development	--	Report value	275

Notes to Table 4.2.1:

(1) The samples tested were not cut as per Sentence 9.10.3.2.(2) of Division B of the NBC 2005.

(2) Contact Icynene for a flame-spread rating when required for Code-compliance.

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