



NSAI
Agrément

**IRISH AGREEMENT BOARD
CERTIFICATE NO. 09/0333**

Icynene Inc., 6747 Campobello Road,
Mississauga, Ontario L5N 2L7, Canada.
Tel: 00 1 905 363 4040
Fax: 00 1 905 363 0102
Email: info@icynene.com

**ICYNENE LD-C-50™
(formerly The Icynene Insulation System®)**

**Isolation
Wärmedämmung**

NSAI Agrément (Irish Agrément Board) is designated by Government to issue European Technical Approvals.

NSAI Agrément Certificates establish proof that the certified products are '**proper materials**' suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2008**.



PRODUCT DESCRIPTION:

This Certificate relates to ICYNENE LD-C-50™ (formerly The Icynene Insulation System® - Spray Formula), a spray-applied, low density, open cell soft insulation foam, for use in new and existing buildings.

This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2008.

This Certificate is substantially based on BBA Certificate No. 08/4598 issued by the British Board of Agrément, PO Box 195, Bucknalls Lane, Garston, Watford WD25 9BA.

USE:

The product is used for the thermal insulation, and contributes to the air-tightness and acoustic performance of:

- Timber frame walls
- Masonry walls (drylining)
- Pitched roof constructions with breathable roof underlay and where a ventilation space exists under roof tiles as provided by timber battens
- The top side of attic floors where the attic space is non-habitable
- Suspended timber ground floors where loading is not applied to the product

Further information can be found in Section 2.3.

MANUFACTURE AND MARKETING:

The product is manufactured and marketed by:

Icynene Inc.,
6747 Campobello Road,
Mississauga,
Ontario L5N 2L7,
Canada.
Tel: 00 1 905 363 4040
Fax: 00 1 905 363 0102
Email: info@icynene.com
Website: www.icynene.com

1.1 ASSESSMENT

In the opinion of NSAI Agrément, ICYNENE LD-C-50™, if used in accordance with this Certificate, meets the requirements of the Building Regulations 1997 - 2008 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997 to 2008

REQUIREMENT:

Part D – Materials and Workmanship

D3 – ICYNENE LD-C-50™, as certified in this Certificate, is comprised of proper materials fit for their intended use (See Part 4 of this Certificate).

D1 – ICYNENE LD-C-50™, as certified in this Certificate, meets the requirements of the building regulations for workmanship.

Part B – Fire Safety

B3 – Internal Fire Spread (Structure)

Walls using ICYNENE LD-C-50™ meet the requirement, provided the completed walls comply with the conditions described in Section 4.1 of this Certificate.

B4 – External Fire Spread

ICYNENE LD-C-50™ will not affect the external fire rating of any building construction in which it is incorporated.

Part C – Site Preparation and Resistance to Moisture **C4 – Resistance to Weather and Ground Moisture**

ICYNENE LD-C-50™ meets the requirements of this regulation when installed as indicated in Section 2.3, in walls, floors and pitched roofs constructed in compliance with Part 3 of this Certificate.

Part F – Ventilation

F2 – Ventilation in Roofs

ICYNENE LD-C-50™ meets the requirements of this regulation, when designed and installed in accordance with Section 2.3 and Part 3 of this Certificate.

Part J – Heat Producing Appliances

J3 – Protection of Building

ICYNENE LD-C-50™, if used in accordance with this Certificate, meets the requirements of the Building Regulations 1997 to 2008.

Part L – Conservation of Fuel and Energy

L1 - Conservation of fuel and energy

Based on the measured thermal conductivity 0.039W/mK, walls, pitched roofs, suspended ground floors and attic floors incorporating ICYNENE LD-C-50™ can meet current 'U-value' requirements (see Section 4.4 of this Certificate).

2.1 PRODUCT DESCRIPTION

ICYNENE LD-C-50™ is a spray-applied, low density (typically 7kg/m³), open cell soft insulation foam. The foam is prepared from two liquid components: Base Seal (isocyanate) and ICYNENE LD-C-50™ Resin, which are mixed within the nozzle of the spray gun during the application process.

On-site quality control checks include density and appearance.

2.2 DELIVERY, STORAGE AND MARKING

The two components, Base Seal and ICYNENE LD-C-50™ Resin, are delivered to site in drums of up to 250kg net capacity, bearing the product name, batch number and NSAI Agrément identification mark incorporating the NSAI Agrément Certificate number.

Drums should be stored in a well-ventilated area, away from possible ignition sources. The drums must be protected from frost and conditioned at temperatures of between 15°C and 32°C prior to use. It is recommended that the drums remain factory-sealed with gaskets in place until they are to be used, in order to reduce the chance of contamination of the chemicals and spillage of the chemicals while moving the drums. Protective clothing must always be worn when handling and moving the drums. ICYNENE LD-C-50™ Resin should be used within 6 months of the date of manufacture.

Drums must be completely empty of liquid components before disposal. Liquid residue inside drums can be decanted into the next drum by tipping it upside down over the new drum. Drums must not be re-used once emptied.

Isocyanate and polyol are classified at 'harmful' and 'irritant', and the packaging bears the appropriate hazard warning labels. When fully reacted and cured, Icynene does not constitute a hazard.

2.3 INSTALLATION

2.3.1 Precautions

To comply with the requirements of the Safety, Health and Welfare at Work Act 2005, it is essential that there is an exchange of information between the client and the installer before spray operations commence on any site. Existing health hazards at the premises and those likely to be brought into the client's environment by the installer should be discussed and measures agreed to deal with them effectively.

The process for the installation of ICYNENE LD-C-50™ requires worker controls for exposure to vapours. Applicators must wear full personal protection equipment when working with the product, including full-face fresh-air supplied respirators, protective clothing and gloves. Other trades and personnel must be kept at least 4m away from the applicator while spraying is taking place.

Vapours given off by certain components of the system, e.g. 4,4' diphenylmethane diisocyanate (MDI), are generally heavier than air and will tend to move to lower parts of the dwelling. These parts should be ventilated by opening windows and doors to prevent the build-up of toxic vapours. A 24 hour waiting period is recommended for buildings that are already occupied. Certain applications, e.g. confined roofs, require the use of extractor fans as recommended by the Certificate holder.

Care should be taken to minimise the degree of overspray generated whilst spraying. This is in the form of a fine mist of particles that can travel considerable distances and will adhere strongly to surfaces they land on.

To prevent the product from entering the occupied space, during installation in the loft area, the loft hatch must be kept closed during the spraying process. Protective covers must be placed over water tanks to prevent contamination during application, and should not be removed until sufficient time has elapsed for potentially harmful vapours to be ventilated from the roof space.

2.3.2 General

Installation of ICYNENE LD-C-50™ must be carried out by installers who have been approved and trained by the Certificate holder, and are also NSAI Agrément registered Icynene spray foam applicators. The requirements of the Icynene Installer Training Manual must be followed at all times.

The product forms a strong bond with clean and dry substrates.

2.3.3 Procedure

Building elements to be insulated must be assessed for suitability and any necessary repairs carried out. The positioning and access to services should also be considered. Areas that are not to be sprayed with ICYNENE LD-C-50™ must be masked off by taping plastic sheeting in place, as overspray will stick to most surfaces and cannot be removed without damaging that surface.

The product should be spray applied to clean and dry substrates, and built-up in layers of up to 300mm in thickness.

The product contains no organic blowing agents. The polyol component contains water which vaporises due to the exothermic reaction to create the cell structure. The resulting solid foam is fully reacted (cured) in seconds and contains no residual water.

Once cured the product is trimmed flat using a saw and covered with lining board.

Timber Frame Walls

The product is sprayed into the cavity formed by the studs and the sheathing board. When cured, excess foam is trimmed flush with the studs and the lining board is installed.

Masonry Walls (Drylining)

Timber battens should be installed on the internal side of masonry walls at typically 600mm centres and the product sprayed into the cavity formed by the battens and the wall. When cured, the excess foam is trimmed flush with the battens and the lining board is installed.

Pitched Roof Constructions

The product is sprayed into the cavity formed by the rafters and the timber sarking board. When cured, the excess foam is trimmed flush with the rafters and the lining board is installed.

Alternatively, the product may be sprayed onto breathable roof underlays where the space beneath the roof tiles is ventilated by means of timber battens.

To satisfy the requirements of ICP 2:2002 and BS 5250:2002, a vapour control layer must be installed behind the plasterboard lining, unless an assessment shows it to be unnecessary.

Where there is no provision made for ventilation of the roof space, care should be taken to ensure that ingress of moisture vapour from the dwelling space below is restricted as follows:

- providing the means to remove it at source
- providing a well-sealed ceiling in accordance with BS 5250:2002
- installing an effective sealed vapour control layer
- covering of water tanks in the loft space

Attic Floors

The product is sprayed into the cavity formed by the joists and the attic floor (lining board).

Where recessed lights exist, or are to be used, particularly recessed down-lighters, guards should be fitted to keep the insulation at least 75mm from the heat source. Where used with down-lighters and recessed light fittings, the guard should be open-topped or ventilated by drilling holes in the top of the guard. Guards should be made of rigid boards, light gauge non-magnetic metal; terracotta plant pots can also be used, providing they are of appropriate diameter (i.e. keep insulation 75mm away from heat source).

Suspended Timber Ground Floors

A barrier, such as thin plywood or a vapour permeable membrane, must be fixed to the underside of the joists to contain the foam. The product is then sprayed from above into the cavity formed by this barrier and the joists. When cured, the excess foam is trimmed flush with the joists and the flooring board installed.

An air gap of at least 150mm must be left between the joists and the ground to allow for sub-floor ventilation.

3.1 GENERAL

ICYNENE LD-C-50™ is satisfactory for use in reducing the U-value and contributing to the airtightness and acoustic performance of walls, pitched roofs, and suspended ground floors of dwellings when used in accordance with the relevant requirements of BS 5250:2002 *Code of practice for control of condensation in buildings*. The product can be used

- between the studs of conventional timber frame wall constructions;
- for internal new and remedial work on masonry walls utilising timber battens and dry-lining boards;
- between timber rafters in pitched roofs constructed in accordance with ICP 2:2002 *Code of practice for slating and tiling*, with a breathable roof underlay where the space beneath the roof tiles is ventilated by means of timber battens, or where the rafters have been covered by a timber sarking board (i.e. roof underlay is fully supported).
- Between attic floor joists onto existing drylined ceiling of room below (where attic is non-habitable).
- between joists in suspended timber ground floors provided these situations are non-loadbearing.

In all situations, the product must be covered by suitable internal lining boards. In the case where the product has been applied between rafters in a non-habitable roof space, the covering will be deemed to be provided by the lining board of the ceiling below.

It is essential that elements are designed and constructed to incorporate normal precautions against moisture ingress before the application of ICYNENE LD-C-50™. Acceptable construction details should be followed for limitation of thermal bridging (see Section 1.3.3.2 of TGD to Part L of the Building Regulations 1997 to 2008).

New constructions must be designed in accordance with the relevant requirements of BS 5268-6.1:1996 *Structural use of timber – Code of practice for timber frame walls – Dwellings not exceeding seven storeys*, BS 5268-3:1998 *Structural use of timber – Code of practice for trussed rafter roofs*, BS 8103-3:1996 *Structural design of low-rise buildings – Code of practice for timber floors and roofs for housing*, IS 325-1:1996 *Use of masonry – Structural use of unreinforced masonry*, BS 5628-3:2005 *Code of practice for use of masonry – Materials and components, design and workmanship*, BS 5628-2:2005 *Code of practice for use of masonry – Structural use of reinforced and prestressed masonry*, and BS 5250:2002. The relevant recommendations of Section 3 of BS 5390:1976 *Code of practice for stone masonry* should be followed where the wall incorporates stone or cast stone. Roofs subject to the relevant requirements of the Building Regulations 1997 to 2008 should be constructed in accordance with ICP 2:2002.

Roof tile underlays must be the subject of a current NSAI Agrément Certificate for such use. Underlays should be

installed in accordance with, and within the limits of, that Certificate.

Existing buildings must be in a good state of repair with no evidence of rain penetration or damp. Defects must be made good prior to installation of ICYNENE LD-C-50™.

3.2 FLOOR LOADING

The design loadings for self contained single family dwelling units as defined in BS 6399-1:1996 *Loading for buildings – code of practice for dead and imposed loads*, are:

- Uniformly distributed load 1.5 kPa
- Concentrated load 1.4 kN

Where ICYNENE LD-C-50™ is used in a suspended timber ground floor, resistance to concentrated and distributed loads is a function of the floor specification.

3.3 UNDERFLOOR HEATING SYSTEMS

The maximum continuous working temperature of the insulation is 70°C. Where underfloor heating systems are to be used, the advice of the Certificate holder should be sought.

4.1 BEHAVIOUR IN FIRE

Although ICYNENE LD-C-50™ is not classified as non-combustible and must be protected from naked flames and other ignition sources during and after installation, when used in the context of this Certificate the increase in fire loads in the building consequent to its use is negligible.

The product achieved a rating of B-s1, d0 when tested to IS EN 13823:2002 *Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item* in a construction consisting of timber boxes 100mm deep, filled with spray-applied Icynene foam and faced with 12mm thick gypsum plasterboard class A2 and density $800 \pm 100 \text{ kg/m}^3$.

Once installed, the product must be contained by a suitable lining board, e.g. 12.5mm plasterboard, with joints fully sealed and supported by rafters or studs. Therefore, it will not contribute to the development stages of a fire or present a smoke or toxic hazard until the lining is compromised.

Care must be taken to ensure continuity of fire resistance at junctions with fire-resisting elements, in accordance with the relevant provisions of the Building Regulations 1997 to 2008.

Elements must incorporate cavity barriers at edges, around openings, at junctions with fire-resisting elements and in extensive cavities in accordance with the relevant provisions of the Building Regulations 1997 to 2008. The design and installation of cavity barriers must take into account any anticipated differential movement.

4.1.1 Walls

The product can be added to the void between studwork, or used as a substitute for glass mineral wool or combustible insulation material, in any load-bearing, timber frame inner leaf to a double leaf wall system providing that:

- the outer leaf is masonry, and
- the existing inner leaf system has been shown to satisfy the load-bearing capacity performance criteria of BS 476-21:1987 *Fire tests on building materials and structures – Methods for determination of the fire resistance of load-bearing elements of construction* or IS EN 1365-1:2000 *Fire resistance tests for load-bearing elements - Walls* for the required resistance period.

The suitability of constructions other than those described above should be demonstrated by appropriate test or assessment.

4.1.2 Roofs

The use of the product in a tiled pitched roof will not affect its external rating when evaluated by assessment or test to BS 476-3:2004 *Fire tests on building materials*

and structures – Classification and method of test for external fire exposure to roofs.

The product must not be applied over junctions between roofs and walls required to provide a minimum period of fire resistance.

4.1.1 J3 – Protection of Building

Combustible wall insulation material shall generally be separated by solid non combustible material not less than 200mm thick, from any heating appliance or from any flue pipe or opening to a heating appliance. Particular details are given in Diagrams 2 - 8 of the TGD Part J Building Regulations 1997 to 2008. It should also be separated by 40mm from the external surface of a masonry chimney. For chimneys covered by BS 4543-1:1990 *Factory made insulated chimneys – Methods of test* separation between this product and the external surface of the chimney shall be determined in accordance with clause 2.17, Part J Building Regulations 1997 to 2008.

4.2 WATER VAPOUR PENETRATION AND CONDENSATION RISK

A vapour control layer is required on the warm side of ICYNENE LD-C-50™, unless an assessment to BS 5250:2002 indicates that it is not necessary for a particular construction. ICYNENE LD-C-50™ will not contribute to minimising the risk of surface condensation and interstitial condensation driven by convection, but has a low “ μ ” value. ICYNENE LD-C-50™ has an average vapour resistivity value of 3.3 when tested to IS EN 12086:1998 *Thermal insulating products for building applications – Determination of water vapour transmission properties.*

Care should be taken to provide adequate ventilation, particularly in rooms expected to experience high humidities, and to ensure the integrity of vapour control layers and linings against vapour ingress.

When insulating buildings, the recommendations of BS 5250:2002 should be followed to minimise the risk of condensation within the building elements and structures.

Walls, floors and roofs will adequately limit the risk of surface condensation where the thermal transmittance (U-value) does not exceed $0.7 \text{ W/m}^2\text{K}$ for walls and floors, and $0.35 \text{ W/m}^2\text{K}$ for roofs at any point, and openings and junctions with other elements are designed in accordance with the DoEHLG publication *Limiting Thermal Bridging & Air Infiltration – Acceptable Construction Details.*

Walls, floors and roofs will adequately limit the risk of surface condensation where the thermal transmittance (U-value) does not exceed $1.2 \text{ W/m}^2\text{K}$ at any point and the design is in accordance with the relevant requirements of Section 8 of BS 5250:2002. Openings and junctions with other elements designed in

accordance with the DoEHLG publication *Limiting Thermal Bridging & Air Infiltration – Acceptable Construction Details* are acceptable.

4.3 THERMAL INSULATION

Calculations of the thermal transmittance (U-value) of specific constructions should be carried out in accordance with IS EN ISO 6946:2007 *Building components and building elements – Thermal resistance and thermal transmittance – Calculation method*, using a thermal conductivity (λ value) of 0.039W/mK for ICYNENE LD-C-50™.

The U-value of a construction will depend on the materials used and the design. Examples of U-values for pitched roofs, walls and floors are given in Tables 1 to 3.

The product can contribute to maintaining continuity of thermal insulation at junctions between elements and around openings. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in the DoEHLG publication *Limiting Thermal Bridging & Air Infiltration – Acceptable Construction Details*.

Thickness of Insulation (mm)	U-Value (W/m ² K)
100	0.39
150	0.28
200	0.21

Note:
These values are based on the following construction (external to internal):
OSB – 18mm
Foam insulation (91%)/timber rafters (9%)
Plasterboard – 12.5mm

Table 1: Typical U Values – Pitched Roofs

Thickness of Insulation (mm)	U-Value (W/m ² K)
89	0.41
115	0.34
140	0.29
200	0.22

Note:
These values are based on the following construction (external to internal):
Brick outer leaf – 102mm
Unventilated air cavity – 50mm
OSB – 15mm
Foam insulation (85%)/timber framing (15%)
Plasterboard – 12.5mm

Table 2: Typical U Values – Timber Frame Walls

P/A (Perimeter/Area)	U-Value (W/m ² K)
0.2	0.17
0.4	0.20
0.6	0.22
0.8	0.23
1.0	0.23

Note:
These values are based on the following construction (external to internal):
Foam insulation (89%)/timber joists (11%) – 150mm
Chipboard – 22mm

Table 3: Typical U Values – Suspended Timber Floors

4.4 MATERIALS IN CONTACT WITH ELECTRICAL WIRING

The product is compatible with materials in contact. Building elements to be insulated must be assessed for suitability and any necessary repairs carried out. The positioning and access to services should also be considered.

Electrical installations should be in accordance with the ETCI publication ET 207: 2003 *Guide to the National Rules for Electrical Installations as Applicable to Domestic Installations*. In relation to recessed spotlights and other luminaires, ET 207 requires they be not less than the minimum distances from combustible materials as specified in clause 559.3.2 of the TCI National rules of the Electro Technical Council of Ireland (ET 101).

4.5 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

- Adhesion to timber substrate after heat ageing and water immersion
- Density
- Water vapour resistivity
- Dimensional stability
- Thermal conductivity

4.6 OTHER INVESTIGATIONS

- Existing data on product properties in relation to fire, toxicity, thermal conductivity and dimensional stability were assessed.
- The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.
- Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.
- A theoretical analysis of the hygrothermal behaviour of various constructions incorporating the product was carried out.

5.1 National Standards Authority of Ireland ("NSAI") following consultation with NSAI Agrément has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for five years from date of issue so long as:

- (a) the specification of the product is unchanged.
- (b) the Building Regulations 1997 to 2008 and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
- (d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.
- (f) the registration and/or surveillance fees due to NSAI Agrément are paid.

5.2 The NSAI Agrément mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the NSAI Agrément mark and certification number and must remove them from the products already marked.

5.3 In granting Certification, the NSAI makes no representation as to;

- (a) the absence or presence of patent rights subsisting in the product/process; or
- (b) the legal right of the Certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

5.4 This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act 2005, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

5.6 The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

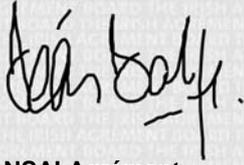
5.7 Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

NSAI Agrément

This Certificate No. **09/0333** is accordingly granted by the NSAI to **lcynene Inc.** on behalf of NSAI Agrément.

Date of Issue: **April 2009**

Signed



Seán Balfe
Director of NSAI Agrément

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément , NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. www.nσαι.ie