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BAR-17-010-P-A-UK
BDA Agrément®
Icynene H_2FoamLite (LD-C-50)
Spray Foam Roof Insulation

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SCOPE

This Agrément relates to H_2FoamLite, sold as LD-C-50 (hereinafter the ''Product''), an in-situ spray-applied thermal insulation for application to the underside of roofs with a pitch more than 15° and a roof tile underlay, the underside of flat roofs and in the lofts of new and existing domestic dwellings or similar buildings.

DESCRIPTION

The Product is a spray-applied open cell, water blown, low density polyurethane foam insulation. The Product is prepared from two raw material liquid components, isocyanate (BaseSeal) and resin (H_2FoamLite), and is off-white cream/yellowish in colour. The Product is applied in layers with a fixed ratio (1:1) volumetric placement pump until the final required design thickness (not exceeding 400 mm) is achieved. Once applied the foam cures almost instantaneously.

PRODUCT ILLUSTRATION

THIRD-PARTY ACCEPTANCE

Not required.

STATEMENT

It is the opinion of Kiwa Ltd. that the Product is fit for its' intended use, provided it is specified, installed and used in accordance with this Agrément.

Paul Oakley, BSc

Technical Manager, Building Products

Mark Crowther, M.A. (Oxon)

Kiwa Ltd. Technical Director

SUMMARY OF AGRÉMENT

This document provides independent information to specifiers, building control personnel, contractors, installers and other construction industry professionals considering the fitness for the intended use of the Product. This Agrément covers the following:

- Conditions of use;
- Initial Factory Production Control, Quality Management System and the Annual Verification procedure;
- Points of attention for the Specifier and installation examples;
- Installation procedure;
- Independently assessed Product characteristics;
- Compliance with national Building Regulations, other regulatory requirements and Third-Party acceptance;
- Sources, including codes of practice, test and calculation reports.

MAJOR POINTS OF ASSESSMENT

Thermal performance - The Product has a declared thermal conductivity (λ_D) of 0.038 $W \cdot m^{-1} \cdot K^{-1}$ * (see sections 2.1.7 and 2.1.8).

Condensation risk - The Product has a water vapour resistance factor (μ) of 3.3 *. The risk of interstitial and surface condensation will depend on the roof construction and should, therefore, be assessed for each project (see section 2.1.9).

Durability - The Product will have a life equivalent to that of the structure in which it is incorporated (see section 2.1.11).

Reaction to fire - The Product is classified as Euroclass E * according to BS EN 13501-1. (see section 2.1.10).

CE marking - The Agrément holder has taken responsibility for CE marking the Product. An asterisk (*) appearing in this Agrément indicates that data shown is given in the manufacturer's Declaration of Performance.

CONTENTS

CHAPTER 1 - GENERAL CONSIDERATIONS

1.1 - CONDITIONS OF USE

1.1.1 Design considerations
See section 2.1.

1.1.2 Application
The assessment of the Product relates to its' use in accordance with this Agrément and the Agrément holder's requirements.

1.1.3 Assessment
Kiwa Ltd. has assessed the Product in combination with its' relevant Declaration of Performance and factory and site visits. Factory Production Control has been assessed.

1.1.4 Installation supervision
It is recommended that the quality of installation and workmanship is controlled by (a) competent person(s). Such person(s) shall be either a qualified employee of the Consulting Engineer or an employee of the installing contractor. The Product shall be installed strictly in accordance with this Agrément and with the Agrément holder's requirements.

1.1.5 Geographical scope
The validity of this document is limited to England, Wales, Scotland, Northern Ireland and Ireland, with due regard to chapter 3 of this Agrément (CDM, national Building Regulations and Third-Party Acceptance).

1.1.6 Validity
The purpose of this BDA Agrément® is to provide for well-founded confidence to apply the Product within the Scope described. The validity of this Agrément is three years after the issue date, and as published on www.kiwa.co.uk/bda. After this, the validity of the Agrément can be extended every three years after a positive review.

1.2 - INITIAL FACTORY PRODUCTION CONTROL (FPC)

- Kiwa Ltd. has determined that the Agrément holder has fulfilled all provisions of the specifications described in this Agrément in respect of the Product.
- The initial FPC audit demonstrated that the Agrément holder has a satisfactory Quality Management System (QMS) and is committed to continuously improving their FPC operations.
- A detailed Production Quality Specification (PQS) has been compiled to ensure traceability and compliance under the terms of this Agrément.

1.3 - QUALITY MANAGEMENT SYSTEM (QMS)

- The Agrément holder:
    - has an effective and well maintained QMS in operation which covers the necessary clauses required for BDA Agrément®.
    - is committed to continually improving their FPC, QMS and associated procedures.
- Document control and production line procedures were deemed satisfactory, with sufficient evidence provided in support of BDA Agrément® requirements.

1.4 - ANNUAL VERIFICATION PROCEDURE - CONTINUOUS SURVEILLANCE

In order to demonstrate that the FPC is in conformity with the requirements of the technical specification described in this Agrément, the continuous surveillance, assessment and approval of the FPC will be done at a frequency of not less than once per year by Kiwa Ltd.

CHAPTER 2 - TECHNICAL ASSESSMENT

2.1 - POINTS OF ATTENTION TO THE SPECIFIER

2.1.1 Delivery, storage and site handling
The Product components are delivered to site in drums of up to 250 kg capacity, bearing the Product name, batch number, and marked with the BDA Agrément® logo incorporating the number of this Agrément.

Sealed drums should be stored between 15 ºC to 32 ºC, in a well-ventilated area and out of direct sunlight.

The Product components are classified under the Classification, Labelling and Packaging of Substances and Mixtures (CLP Regulation) 2009, and the Agrément holder has the responsibility for the packaging to show the appropriate hazard warning label(s).

2.1.2 Permitted applications
Only applications designed according to the specifications as given in this Agrément are allowed under this Agrément, in each case the Specifier will have to co-operate closely with the Agrément holder.

The Product can be installed:
- Between, or between and under, timber rafters in a habitable warm pitched roof (room in roof); insulation at rafter level only, with or without counter battens;
- Between, or between and under, timber rafters in a non-habitable warm pitched roof (loft space); insulation at rafter level only, with or without counter battens;
- Between, or between and over, timber ceiling joists in a ventilated non-habitable cold pitched roof (loft space); insulation at ceiling level only;
- Between timber joists to the underside of a roof deck in flat timber roofs;
- Between, or between and under, timber rafters, where the purlin and ridge may be steel (including open web steel sections).

2.1.3 Design Responsibility
- Design Responsibility for each project specific design rests solely with Icynene. Some Icynene Trained and Approved Contractors are permitted to undertake design on pitched roof applications where a breather membrane is present;
- Trained & Approved Contractors are regularly monitored and formally inspected each year;
- A U-value calculation is performed for each compliant project specific design (see section 2.1.7);
- A Condensation Risk Analysis (CRA) is undertaken for each project specific design (see section 2.1.9);
- Each CRA is verified by a competent Icynene specialist with due consideration to the provisions of BS 5250, BS EN ISO 13788, and BS EN ISO 13370 as appropriate;
- Each project specific design is tested using software compliant with BR443, BS EN ISO 6946, BS EN ISO 13788 and BS EN ISO 13370.

2.1.4 General Design Considerations
The Product is satisfactory for use in improving the thermal transmittance (U-value) of roofs and the lofts of domestic dwellings or similar buildings.

The Product must be covered by a suitably taped and jointed plasterboard lining supported by rafters, noggings or battens at the plasterboard joints; except when used in any non-habitable loft space (including conditioned roof spaces for mechanical heat recovery equipment, warm roof storage spaces etc.)

A project specific design must also give due consideration to:
- BS 5534
- BS 8000-0
- BS 8103-3
- BS EN 351-1
- BS EN 1995-1-1

Prior to application of the Product, it is essential that construction elements are designed and constructed to incorporate normal precautions against moisture ingress.

Existing constructions must be in a good state of repair with no evidence of rain penetration or damp. Defects must be made good prior to installation.

Installation of the Product must not be carried out until the moisture content of any roof timber framing is less than 20 %.

The Product forms a strong bond with clean, dry substrates. This should be considered when specifying the Product or anticipating future alterations.

In tiled or slated pitched roofs in accordance with BS 5534 the Product can be spray-applied directly to the underside of reinforced bitumen membranes, breathable roof tile underlays and timber sarking boards, between rafters. Due care must be taken to ensure the integrity of the roof tile underlay when spraying the Product.

2.1.5 Electrical wiring
Once applied the Product can restrict the air flow around electrical cables and recessed lighting. Consider re-routing, re-laying in conduit or de-rating electrical cables. Replace existing recessed lighting with ventilated fittings which incorporate a protective hood.

2.1.6 Chimneys, flues and heat-emitting appliances
The Product must not be installed within 50 mm of chimneys, flues and heat-emitting devices where the temperature is in excess of 93 ºC.

2.1.7 Thermal performance
Project specific design calculations of the thermal transmittance (U-value) of a roof should be carried out in accordance with BS EN ISO 6946 and BRE Report BR 443, using the declared thermal conductivity (λ_D) - see section 2.4.

The U-value of a completed roof will depend on the insulation thickness, the roof structure and its' internal finish.

2.1.8 Thermal bridging at junctions and around openings
Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Guidance on linear thermal transmittance, heat flows and surface temperatures can be found in the documents supporting the national Building Regulations and BS EN ISO 10211, BRE Information Paper IP 1/06, BRE Report 262, BRE Report 497 and PAS 2030 - Building Fabric Measures (BFM).

2.1.9 Condensation risk
A CRA shall be completed at project specific design stage (see section 2.1.3). Roofs incorporating the Product will adequately limit the risk of interstitial and surface condensation when properly designed in accordance with BS 5250, BRE Report 262 and BRE Digest 369. Make suitable provision for adequate permanent ventilation proportionate to the extent of the work being undertaken, with due consideration to different warm/cold roof conditions.

2.1.10 Reaction to fire
The Product is classified as Euroclass E * according to BS EN 13501-1. The Product must be protected from naked flames and other ignition sources during and after application.

In certain conditions the installed Product is contained by a suitably taped and jointed plasterboard lining supported by rafters, noggings or battens at the plasterboard joints. Consequently, in these conditions, the Product will not contribute to the development stages of a fire.

Normal fire design precautions shall apply including the incorporation of cavity barriers at edges, around openings and at junctions with fire-resisting elements.

2.1.11 Durability
The Product will have a service life durability equivalent to that of the structure into which it is incorporated.

2.1.12 Maintenance and repair
The Product, once installed, does not require any regular maintenance and has a suitable durability provided that the waterproof layers of the roof are maintained in a weathertight condition. For advice in respect of repair and maintenance concerns, consult the Agrément holder.

2.2 - INSTALLATION EXAMPLES

Figure 1 - Product installed between rafters prior to dressing back

Figure 2 - Dressed back Product prior to the application of the plasterboard lining

2.3 - INSTALLATION

2.3.1 Installers
The Product shall only be applied by installers who have been Trained and Approved by the Agrément holder. The Product shall be installed strictly in accordance with the instructions of the Agrément holder and the requirements of this Agrément.

2.3.2 Delivery and site handling
The Product components are delivered to site in drums of up to 250 kg capacity, bearing the Product name, batch number, and marked with the BDA Agrément® logo incorporating the number of this Agrément.

Sealed drums should be stored between 15 ºC to 32 ºC, in a well-ventilated area and out of direct sunlight.

2.3.3 Preparation
Application of the Product may produce a build-up of harmful vapours. Installers must wear personal protection equipment (PPE) when working with the Product, including a NIOSH-approved full-face fresh air supply respirator, protective clothing (including boots) and chemical-resistant gloves. Similarly protected other trades and other personnel must be kept at least 8 m away from the application process whilst spraying is in-process. Un-protected other trades and other personnel must be kept at least 15 m away from the application process whilst spraying is in-process

Vapours given off by certain Product component chemicals are heavier than air and will tend to move to lower parts of the building compartment. These areas should be suitably ventilated. In certain conditions (for example application in a confined roof space) the use of extractor fans is recommended by the Agrément holder.

Appropriate measurement and monitoring of vapour levels should be undertaken as required.

Where no provision is made for ventilation of a compartment, care should be taken to ensure that ingress of moisture vapour from the rest of the domestic dwelling is restricted.

Care should be taken to minimise the degree of overspray generated whilst spraying. Protect surfaces not to be sprayed.

To prevent the Product from entering an occupied or habitable compartment, any loft hatch or other opening must be kept covered during the application process. Protective covers must be placed over water tanks to prevent contamination and blockage during application, and should not be removed until sufficient time has elapsed for potentially harmful vapours to be ventilated from the treated compartment.

2.3.4 General Procedure
Building elements to be insulated must be assessed for suitability and any necessary repairs carried out prior to application. Elements must be weathertight before application of the Product.

The position of and access to services should be taken into consideration. Any necessary access measures and task lighting should be positioned in the compartment to be treated prior to the commencement of work.

The Product should be spray-applied to clean and dry substrates and built up in layers up to 300 mm thick in each pass, until the final design thickness (not exceeding 400 mm) is achieved.

Once cured, if required, the Product is trimmed flat using a hand-saw and covered with a plasterboard lining except when used in a non-habitable loft space.

Pitched roof application - between rafters
The Product is sprayed into the cavity formed by the rafters, or rafters and counter battens. When cured, if the roof slope is to be lined, the excess foam is trimmed flush with the rafters prior to the installation of the plasterboard lining.

When spraying to breathable or non-breathable roof tile underlays without counter battens the Product must be applied in accordance with the Agrément holder's installation instructions to ensure the integrity of the roof tile underlay.

Loft application
All loose obstructions should first be removed from any loft space and any holes in the ceiling, such as around pipes etc. are to be sealed. Water tanks should be covered and any sources of moisture (for example vent pipes for central heating etc.) should be so arranged as to avoid water vapour entering the loft space.

During installation it is essential that all eaves ventilation, for example eaves gaps and air bricks at gable ends, are kept clear so that the ventilation airflow is maintained.

The Product should be installed from inside the roof space, after tiling or slating is completed.

Flat roof application
The Product is sprayed into the cavity formed by the flat roof joists directly to the underside of the flat roof sarking board to the depth required.

When cured, any excess foam is trimmed flush with the joists, and the plasterboard lining is installed. In all flat roof constructions, a VCL incorporating lapped and sealed joints is required.

2.4 - INDEPENDENTLY ASSESSED PRODUCT CHARACTERISTICS

Thermal performance - The Product has a declared thermal conductivity (λ_D) of 0.038 $W \cdot m^{-1} \cdot K^{-1}$ *.

Condensation risk - The Product has a water vapour resistance factor (μ) of 3.3 *.

Durability - The Product will have a life equivalent to that of the structure in which it is incorporated.

Reaction to Fire - The Product is classified as Euroclass E * according to BS EN 13501-1.

Water absorption - 0.3 kg/m^2

Tensile strength parallel to faces - 7.4 kPa

Tensile strength perpendicular to faces (delamination strength) - 17 kPa.

2.5 - ANCILLARY ITEMS

Note:
Ancillary items detailed in this section may be used in conjunction with the Product but fall outside the scope of this Agrément:

- Non-breathable and breathable roof underlays;
- Vapour control layers (VCLs);
- Plasterboard for linings;
- Timber battens;
- Spray application equipment.

CHAPTER 3 - CDM, NATIONAL BUILDING REGULATIONS AND THIRD-PARTY ACCEPTANCE

3.1 - THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS 2015 AND THE CONSTRUCTION (DESIGN AND MANAGEMENT) REGULATIONS (NORTHERN IRELAND) 2016

Information in this Agrément may assist the client, Principal Designer/CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

3.2 - NATIONAL BUILDING REGULATIONS

In the opinion of Kiwa Ltd., the Product, if installed and used in accordance with Chapter 2 of this Agrément, can satisfy or contribute to satisfying the relevant requirements of the following national Building Regulations.

3.2.1 - ENGLAND
REQUIREMENTS: THE BUILDING REGULATIONS 2010 AND SUBSEQUENT AMENDMENTS

- C2(c) Resistance to moisture - the Product can contribute to satisfying this requirement.
- L1(a)(i) Conservation of fuel and power - the Product can contribute to satisfying this requirement.
- J4 Protection of the building - the Product can contribute to satisfying this requirement.
- Regulation 7 Materials and workmanship - the Product is manufactured from suitably safe and durable materials for the application and can be installed to give a satisfactory performance.
- Regulation 26 - CO_2 emission rates for new buildings - the Product can contribute to satisfying this Requirement.
- Regulation 26A - Fabric energy efficiency rates - the Product can contribute to satisfying this Requirement.

3.2.2 - WALES
REQUIREMENTS: THE BUILDING REGULATIONS 2010 AND SUBSEQUENT AMENDMENTS

- C2(c) Resistance to moisture - the Product can contribute to satisfying this requirement.
- L1(a)(i) Conservation of fuel and power - the Product can contribute to satisfying this Requirement.
- J4 Protection of the building - the Product can contribute to satisfying this requirement.
- Regulation 7 Materials and workmanship - the Product is manufactured from suitably safe and durable materials for the application and can be installed to give a satisfactory performance.
- Regulation 26 - CO_2 emission rates for new buildings - the Product can contribute to satisfying this Requirement.
- Regulation 26A - Primary energy consumption rates for new buildings - the Product can contribute to satisfying this Regulation.
- Regulation 26B - Fabric performance values for new dwellings - the Product can contribute to satisfying this Requirement.

3.2.3 - SCOTLAND
REQUIREMENTS: THE BUILDING (SCOTLAND) REGULATIONS 2004 AND SUBSEQUENT AMENDMENTS

3.2.3.1 Regulations 8 (1)(2) Durability of materials and workmanship

- The Product is manufactured from acceptable materials and is adequately resistant to deterioration and wear under normal service conditions, provided they are installed in accordance with the requirements of this Agrément.

3.2.3.2 Regulation 9 Building Standards - Construction

- 3.15 Condensation - the Product will contribute to limiting the risk of surface and interstitial condensation.
- 3.19 Combustion appliances - relationship to combustible materials - the Product will contribute to satisfying this Requirement.
- 6.1(b) Carbon dioxide emissions - the Product will contribute to satisfying this Requirement.
- 6.2 Building insulation envelope - the Product will contribute to satisfying the requirements of this Requirement.
- 7.1(a)(b) Statement of sustainability - the Product can contribute to satisfying the relevant Requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard; in addition, the Product can contribute to a construction meeting a higher level of sustainability as defined in this Standard.

3.2.3.3 Regulation 12 Building Standards - Conversions

- All comments given for the Product under Regulation 9 also apply to this Regulation, with reference to clause 0.12 and Schedule 6 of this Standard.

3.2.4 - NORTHERN IRELAND
REQUIREMENTS: THE BUILDING REGULATIONS (NORTHERN IRELAND) 2012 AND SUBSEQUENT AMENDMENTS

- 23(a)(I)(iii)(b) Fitness of materials and workmanship - the Product uses materials which are suitably safe and acceptable for use as thermal insulation as described in this Agrément.
- 29 Condensation - the Product will contribute to limiting the risk of surface and interstitial condensation.
- 39(a)(I) Conservation measures - the Product will contribute to satisfying the requirement of this Standard.
- 40(2) Target carbon dioxide emission rate - the Product will contribute to satisfying the requirement of this Standard.
- 73 Protection of people and buildings - the Product can contribute to satisfying the requirement of this Standard.

3.2.5 - IRELAND
REQUIREMENTS: BUILDING REGULATIONS 1997 AND SUBSEQUENT AMENDMENTS

In order to demonstrate compliance with Irish Building Regulations the BDA Agrément® certifies that the Product complies with the requirements of a recognized document and indicates it is suitable for its' intended purpose and use:

- B7 internal fire spread linings - the Product, when installed in accordance with this Agrément, can contribute to meeting the relevant requirements of this Regulation; the Product must be protected from naked flames and other ignition sources.
- B8 internal fire spread structure - the Product, when installed in accordance with this Agrément, can contribute to meeting the relevant requirements of this Regulation; the Product must be protected from naked flames and other ignition sources.
- C4 Resistance to weather and ground moisture - the Product, when installed in accordance with this Agrément, can meet the relevant requirements of this Regulation.
- D (D3/D1) Materials and workmanship - the Product is manufactured from suitably safe and durable materials for the application and can be installed to give a satisfactory performance.
- F1 Means of ventilation - the Product, if used in accordance with this Agrément can meet the requirements of this Regulation.
- J3 Protection of building - the Product, if used in accordance with this Agrément can meet the requirements of this Regulation.
- L1 Conservation of fuel and energy - the insulation of roofs can be designed and constructed to meet current 'U-value' requirements using the Product.

3.3 - THIRD-PARTY ACCEPTANCE

Not required.

CHAPTER 4 - SOURCES

- BS EN ISO 6946:2017 Building components and building elements - Thermal resistance and thermal transmittance - Calculation method
- BS EN ISO 10211:2017 Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations
- BS EN ISO 13370:2017 Thermal performance of buildings - Heat transfer via the ground - Calculation methods
- BS EN ISO 13788:2012 Hygrothermal performance of building components and building elements - Internal surface temperature to avoid critical surface humidity and interstitial condensation - Calculation methods
- BS EN 351-1:2007 Durability of wood and wood-based products - Preservative-treated solid wood - Classification of preservative penetration and retention
- BS EN 1995-1-1:2004+A2:2014 Eurocode 5: Design of timber structures - General - Common rules and rules for buildings
- NA to BS EN 1995-1-1:2004+A1:2008 UK National Annex to Eurocode 5: Design of timber structures - General - Common rules and rules for buildings
- BS EN 13501-1:2007+A1:2009 Fire classification of construction products and building elements - Classification using test data from reaction to fire tests
- BS 5250:2011+A1:2016 Code of practice for control of condensation in buildings
- BS 5534:2014+A2:2018 Slating and tiling for pitched roofs and vertical cladding - Code of practice
- BS 8000-0:2014 Workmanship on construction sites- part 0: Introduction and general principles
- BS 8103-3:2009 Structural design of low-rise buildings - Code of practice for timber floors and roofs for housing
- BRE Report (BR 262:2002) Thermal insulation: avoiding risks
- BRE Report (BR 443:2006) Conventions for U-value calculations
- BRE Report (BR 497: 2016) Conventions for calculating linear thermal transmittance and temperature factors
- BRE Digest 369:1992 Interstitial condensation and fabric degradation
- BRE Information Paper IP 1/06 Assessing the effects of thermal bridging at junctions and around openings
- PAS 2030:2017 Specification for the installation of energy efficiency measures (EEM) in existing buildings

Remark: apart from these sources confidential reports may also have been assessed; any relevant reports are in the possession of Kiwa Ltd. and kept in the Technical Assessment File of this Agrément; the Installation Guides are current at the time of publication and may be subject to change, the Agrément holder should be contacted for clarification of revision.

CHAPTER 5 - AMENDMENT HISTORY

Revision	Amendment Description	Amended By	Approved By	Date
-	Draft for Client review	E. Tsarouchas	C. Forshaw	March 2018
A	Issued without the need for NHBC acceptance	C. Forshaw	C. Forshaw	March 2018
B	Maximum spray depth corrected	C. Forshaw	C. Forshaw	May 2018
C	Design responsibility clarified	C. Forshaw	P. Oakley	July 2018
D	Format refreshed	C. Forshaw	P. Oakley	August 2018