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Agrément Certificate  
**11/4819**  
Product Sheet 3

## LOW-E FOIL INSULATION FOR PITCHED ROOFS, DRY LININGS AND FLOORS

## LOW-E FOIL INSULATION FOR USE IN FLOOR APPLICATIONS

### PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Low-E Foil Insulation for use in Floor Applications. The product is for use over the joists of suspended timber floors with or without battens and an airspace on both sides in new and existing dwellings.

#### AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



#### KEY FACTORS ASSESSED

**Thermal performance** — when combined with other types of insulation, the product contributes to the U value requirement for a floor (see section 5).

**Condensation risk** — the product has a water vapour resistance of  $2000 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$  (see section 6).

**Air leakage** — the product can be used as a vapour control layer (VCL) and air barrier (see section 9).

**Durability** — the durability of the product is satisfactory and will have a life equivalent to that of the structure in which it is incorporated (see section 11).

The BBA has awarded this Agrément Certificate to the company named above for the product described herein. The product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Simon Wroe  
Head of Approvals — Physics

Greg Cooper  
Chief Executive

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*The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)*

*Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.*

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## Regulations

In the opinion of the BBA, Low-E Foil Insulation for use in Floor Applications, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



### The Building Regulations 2010 (England and Wales)

Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to floor meeting this Requirement. See sections 6.1 and 6.4 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to a building meeting this requirement. See section 5.3 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



### The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building Standards – construction
Standard:	3.15	Condensation
Comment:		Floors incorporating the product can satisfy this Standard, with reference to clauses 3.15.1 <sup>(1)</sup> , 3.15.4 <sup>(1)</sup> and 3.15.5 <sup>(1)</sup> . See sections 6.1 and 6.5 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying clauses, or parts of, 6.1.2 <sup>(1)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.6 <sup>(1)</sup> , 6.2.7 <sup>(1)</sup> to 6.2.11 <sup>(1)</sup> and 6.2.13 <sup>(1)</sup> of these Standards. See section 5.3 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for the product under Regulation 9, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)</sup> and Schedule 6 <sup>(1)</sup> . (1) Technical Handbook (Domestic).



### The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	C5	Condensation
Comment:		Floors incorporating the product can satisfy this Regulation. See section 6.1 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Regulation:	F3(2)	Target carbon dioxide Emissions Rate
Comment:		The product can contribute to a new dwelling satisfying its Target Emission Rate. See section 5.3 of this Certificate.

### Construction (Design and Management) Regulations 2007

### Construction (Design and Management) Regulations (Northern Ireland) 2007

In the opinion of the BBA, there is no information in this Certificate which relates to the obligations of the client, CDM co-ordinator, designer or contractors under these Regulations.

## Non-regulatory Information

### NHBC Standards 2011

NHBC accepts the use of Low-E Foil Insulation for use in Floor Applications, when installed and used in accordance with this Certificate, in relation to *NHBC Standards, Chapter 5.2, Suspended ground floors*.

# Technical Specification

## 1 Description

1.1 Low-E Foil Insulation for use in Floor Applications, consists of a polyethylene foam core manufactured with a coated aluminium foil lining on both sides and with self-adhesive tape which is factory bonded to the edge of the product.

1.2 The product can contribute to improving the thermal performance of a floor when installed as detailed within the application instructions.

1.3 The nominal characteristics of the product are given in Table 1.

Length (m)	Width (m)	Thickness (mm)	Area covered (m <sup>2</sup> )	Mass per unit area (g·m <sup>-2</sup> )
16.6	1.2	5	20	150
33.3	1.2	5	40	150
38.0	1.2	5	46	150

1.4 The product is manufactured by Environmentally Safe Products, USA. All components are subject to routine factory quality control.

1.5 The product may be stapled into position using staples in accordance with the Certificate holders installation procedures.

1.6 Ancillary items for use with this product but outside the scope of this Certificate are:

- timber joists and battens
- damp-proof membrane (dpm)
- staples
- self adhesive tape
- additional insulation.

## 2 Delivery and site handling

2.1 The product is delivered to site in rolls and incorporates a label bearing the manufacturer's name, product description, characteristics, and the BBA identification mark incorporating the number of this Certificate.

2.2 The product must be protected from prolonged exposure to sunlight and must be stored either under cover or protected with opaque polythene. Where possible, packs should be stored inside. If stored outside, the product should be raised above ground level, not in contact with ground moisture.

2.3 The product must not be exposed to open flame or other ignition sources.

# Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Low-E Foil Insulation for use in Floor Applications.

## Design Considerations

### 3 General

3.1 Low-E Foil Insulation for use in Floor Applications is suitable for use and effective in reducing the U value (thermal transmittance) of new or existing suspended timber floors of dwellings.

3.2 Suspended timber ground floors incorporating the product must include a dpm or suitable ventilation of the sub-floor as appropriate, laid in accordance with CP 102 : 1973 (see section 8 of this Certificate).

3.3 The overlay to the product should be wood-based floor, eg tongue-and-groove, flooring grade particle board (Type P5 or P7) to BS EN 312 : 2003 or oriented strand board of type OSB/3 or OSB/4 to BS EN 300 : 2006, 18 mm thick (minimum), installed in accordance with DD CEN/TS 12872 : 2007.

3.4 The product cannot be used as a gas barrier from the ground.

3.5 Care must be taken to ensure the product does not come into contact with heat sources greater than 80°C.

### 4 Practicability of installation

The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

## 5 Thermal performance

5.1 Calculations of the thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007, BS EN ISO 13370 : 2007 and BRE Report (BR 443 : 2006) *Conventions for U-value calculations* using the following values:

- $0.15 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$  thermal resistance of insulation (nominal thickness 5 mm) with no air spaces either side
- 0.06 emissivity of outer layers
- $1.74 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$  air cavity<sup>(1)</sup> resistance of thickness 102.5 mm
- $0.00 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$   $R^{(2)}$  value of product when compressed between battens and joists
- 30%/70% percentage of Low-E thickness in joist and floor finish-batten cavities, respectively.

(1) Unventilated cavity with a width and length at least 10 times the thickness and one high emissivity surface.

(2) For guidance on U value calculations refer to the BBA Information Bulletin No 3 *Reflective foil insulation — Conventions for U value calculations*.

5.2 The U value of a floor will depend on the thickness of additional insulation used, the extent and arrangement of timber bridging and the insulating value of other floor components/layers. Example U values of floors incorporating the product are shown in Table 2.

P/A ratio	U value (timber suspended floor) ( $\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ )
0.2	0.17
0.4	0.19
0.6	0.21
0.8	0.21
1.0	0.22

**Note: example construction**

External (sheltered) boundary resistance,  $R_{se} = 0.17 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$   
 170 mm (11% – based on 170 mm by 44 mm joist at 400 mm centres) timber joist,  
 $\lambda = 0.13 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$  and (89%) insulation (held in insulation tray), Low-E laid over joist,  
 leaving a 22.5 mm gap ( $R = 0.705 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$ ) above the foil and 102.5 mm  
 ( $R = 1.741 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$ ) gap below it, enclosed by 40 mm of foil faced phenolic foam,  
 $\lambda_p = 0.021 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ , assume  $\mu = 0$ .  
 18 mm Particleboard,  $\lambda = 0.18 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$  ( $\rho = 900 \text{ kg}\cdot\text{m}^{-3}$ ),  $\mu = 50$   
 Internal boundary resistance,  $R_{si} = 0.17 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$ .

 5.3 The product can contribute to maintaining continuity of thermal insulation at junctions between elements. For Accredited Construction Details the corresponding psi values in BRE Information Paper IP1/06 *Assessing the effects of thermal bridging at junctions and around openings*, Table 3 may be used in carbon emission calculations in Scotland and Northern Ireland. Detailed guidance for other junctions and on limiting heat loss by air infiltration can be found in:

**England and Wales** — Approved Documents to Part L and for new thermal elements to existing buildings, Accredited Construction Details (version 1.0). See also SAP 2009 Appendix K and the *iSBEM User Manual* for new-build

**Scotland** — Accredited Construction Details (Scotland)

**Northern Ireland** — Accredited Construction Details (version 1.0).

## 6 Condensation risk

### Interstitial condensation

 6.1 Floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2002, Section 8.5 and Appendix D.

6.2 The risk of interstitial condensation is greatest when the building is drying out after construction. Guidance on preventing condensation from this and other sources is given in BRE Digest 369 *Interstitial condensation and fabric degradation* and BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*.

6.3 The product has a water vapour resistance exceeding  $2000 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$ .

### Surface condensation

 6.4 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point, and the junctions with walls are designed in accordance with the relevant requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002 or BRE Information Paper IPO1/06.

 6.5 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point and and designed in accordance with BS 5250 : 2002, section 8. Further guidance may be obtained from BRE Report (BR 262 : 2002).

## 7 Behaviour in relation to fire

7.1 The product has a fire rating of Class 1 surface spread of flame in accordance with BS 476-7 : 1997 and does not prejudice the fire resistance properties of the floor.

7.2 When properly installed, the product will not add to any existing fire hazard. The product will be contained within the floor by the overlay until the overlay itself is destroyed. Therefore, the product will not contribute to the development stages of a fire or present a smoke or toxic hazard. Electrical cables should be run below the product and not in contact with the product.

7.3 When installed with other additional insulation materials, the fire properties of these materials must be taken into consideration.

7.4 The product will melt and shrink away from heat, but will burn in the presence of a naked flame.

7.5 Electric cables should be enclosed in suitable conduits and not allowed to be in contact with the product.

## 8 Moisture penetration

8.1 The product must be used above the dpm and must not be used where it may come into contact with moisture from the ground.

8.2 For floors subject to national Building Regulations, construction should be as detailed or designed in accordance with:

**England and Wales** — Approved Document C, Section 4

**Scotland** — Mandatory Standard 3.4, clauses 3.4.2<sup>(1)</sup> to 3.4.4<sup>(1)</sup> and 3.4.6<sup>(1)</sup>

<sup>(1)</sup> Technical Handbook (Domestic).

**Northern Ireland** — Technical Booklet C, Section 1.

## 9 Air leakage

9.1 The product was tested to BS EN 12114 : 2000, with positive pressure of approximately 600 Pa. The net leakage rate was 0 m<sup>3</sup>·hr<sup>-1</sup>·m<sup>-2</sup>.

9.2 The product must be suitably sealed at the perimeter and all penetrations. Details of sealing at gaps and penetrations must be in accordance with the Certificate holder's instructions.

## 10 Maintenance

As the product is confined within the floor cavity and has suitable durability (see section 11), maintenance is not required. Small holes, rips or punctures in the outer layers during installation must be repaired with adhesive tape.

## 11 Durability



The product is rot-proof, dimensionally stable and, when installed with the overlays specified in this Certificate, will remain effective as an insulating material for the life of the building in which it is incorporated.

# Installation

## 12 General

12.1 Installation of Low-E Foil Insulation for use in Floor Applications should be in accordance with the Certificate holder's instructions for floor applications. Reference should also be made to BR Report (BR 262 : 2002).

12.2 On exposed or semi-exposed intermediate timber floors, prior to installing the product, the floor should be inspected thoroughly for possible defects and its condition should meet the recommendations of BS 8201 : 1987, Section 6.

## 13 Procedure

13.1 The product can be installed over joists and fixed with staples into the side of the joists, to create an airspace, or kept taut across the top of the joists and counter battened to create an airspace.

13.2 The product may be fitted between joists by stapling to the sides of the joists at the required depth. Rolls may be joined using self adhesive joining tape as specified by the Certificate holder. The product should not be sealed and it will not provide a continuous VCL.

13.3 Where metal framing is used, timbers can be installed either parallel or perpendicular to the frame.

13.4 The staples should be stapled every 200 mm to 300 mm using staples of minimum 12 mm length.

13.5 A minimum cavity of 15 mm should be left between the product and the finished floor.

### Additional Insulation

13.6 Used with additional insulation, care should be taken to install the insulation in accordance with the manufacturer's instructions for their products and advice should be sought from the Certificate holder.

13.7 A dpm must always be used.

## 14 Tests

14.1 Results of tests carried out on Low-E Foil Insulation for use in Floor Applications were assessed to determine:

- emissivity
- air infiltration
- tensile strength and elongation
- tear and puncture resistance
- resistance to water vapour transmission.

14.2 The product was also tested after ageing at 28 days at 70°C and 100% humidity for emissivity, which resulted in an emissivity value of 0.06.

## 15 Investigations

15.1 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.

15.2 An assessment was made of data relating to the thermal insulation properties of the material and behaviour in fire.

15.3 A site visit was carried out to assess the practicability of installation.

15.4 The product has been tested within the following construction and resulted in a thermal transmittance, U value, of  $0.32 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ . The construction consisted of Low-E reflective foil insulation battened over 38 mm joists at 400 mm centres. Two unventilated cavities were created, one between the insulation and a sheet of foil backed plasterboard and the other between the insulation and a sheet of thin plywood substituted for the breather membrane/tiles. The overall thickness of the test element was 261 mm. Heat flow direction vertical (down).

15.5 An assessment of the risk of interstitial condensation in typical constructions was made.

## Bibliography

- BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test to determine the classification of the surface spread of flame of products*
- BS 5250 : 2002 *Code of practice for control of condensation in buildings*
- BS 8201 : 1987 *Code of practice for flooring of timber, timber products and wood based panel products*
- BS EN 300 : 2006 *Oriented Strand Boards (OSB) — Definitions, classification and specifications*
- BS EN 312 : 2003 *Particleboards — Specifications*
- BS EN 12114 : 2000 *Thermal performance of buildings — Air permeability of building components and building elements — Laboratory test method*
- BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- BS EN ISO 13370 : 2007 *Thermal performance of buildings — Heat transfer via the ground — Calculation methods*
- CP 102 : 1973 *Code of practice for protection of buildings against water from the ground*
- DD CEN/TS 12872 : 2007 *Wood-based panels — Guidance on the use of load-bearing boards in floors, walls and roofs*

## 16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

16.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

16.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

16.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal.

16.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.