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Agrément Certificate
11/4819
Product Sheet 1

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

LOW-E FOIL INSULATION FOR USE IN PITCHED ROOF APPLICATIONS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Low-E Foil Insulation for use in Pitched Roof Applications, above or below rafters in slated or tiled roofs, designed in accordance with BS 5534 : 2003, in new and existing domestic buildings.

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 roof (see section 5).

Condensation risk — the product has a water vapour resistance of 2000 MN·s·g⁻¹ (see section 6).

Behaviour in relation to fire — the product has a fire Class 1 rating in accordance with BS 476-7 : 1997 (see section 7).

Air leakage — the product may be used as a vapour control layer 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

A handwritten signature in black ink, appearing to read 'Simon Wroe'.

Simon Wroe
Head of Approvals — Physics

A handwritten signature in black ink, appearing to read 'Greg Cooper'.

Greg Cooper
Chief Executive

Date of First issue: 17 May 2011

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

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 Pitched Roof 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 a roof meeting this requirement. See sections 6.1 and 6.6 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:	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:		The product can contribute to satisfying this Standard, with reference to clauses 3.15.1 ⁽¹⁾ , 3.15.3 ⁽¹⁾ to 3.15.5 ⁽¹⁾ and 3.15.7 ⁽¹⁾ . See sections 6.1 and 6.7 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying these Standards, with reference to clauses, or parts of, 6.1.1 ⁽¹⁾ , 6.1.3 ⁽¹⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾ , 6.2.3 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.9 ⁽¹⁾ to 6.2.11 ⁽¹⁾ , and 6.2.13 ⁽¹⁾ . 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 ⁽¹⁾ and Schedule 6 ⁽¹⁾ . (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:		The product can contribute to a roof satisfying 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 satisfying these Regulations. 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 Pitched Roof Applications, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*, Design Standard 7.2, Clause D10 – D11.

Technical Specification

1 Description

1.1 Low-E Foil Insulation for use in Pitched Roof 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 roof 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 ²)	Mass per unit area g·m ⁻²
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 in accordance with the Certificate holder's installation procedures.

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

- timber battens and counter battens
- roof tile underlay
- self-adhesive tape
- roofing tiles and slates
- vapour control layer
- staples
- additional insulation
- plasterboard.

2 Delivery and site handling

2.1 The product is delivered to site in rolls and each 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, rolls should be stored inside. If stored outside, the product should be raised above ground level and not come into 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 Pitched Roof Applications.

Design Considerations

3 General

3.1 Low-E Foil Insulation for use in Pitched Roof Applications is suitable for use as a flexible insulation material for application above or below rafters in slated or tiled roofs designed in accordance with BS 5534 : 2003. It is for use in conjunction with other insulation materials to reduce the thermal transmittance (U value) in new or existing pitched roofs.

3.2 Care must be taken to ensure that the product is covered after installation, as it must not be exposed to showers or wind-driven rain.

3.3 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) of specific roof constructions incorporating the product should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report (BR 443 : 2006), *Conventions for U-value calculations* using the following values:

- 0.15 m²·K·W⁻¹ thermal resistance of insulation (nominal thickness 5 mm) with no air spaces either side
- 0.06 emissivity of outer layers
- 0.44 m²·K·W⁻¹ air cavity⁽¹⁾ resistance of minimum thickness 15 mm
- 0.00 m²·K·W⁻¹ R⁽²⁾ value of product when compressed between battens and rafters
- 30%/70% percentage of Low-E thickness in rafter and plasterboard-batten cavities, respectively, for roof applications.

(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 roof will depend on the thickness of additional insulation used, the extent and arrangement of timber bridging and the insulating value of other roof components/layers. Example roof constructions are shown in Figure 1 and example U values of roofs incorporating the product are shown in Table 2.

Figure 1 Example roof constructions

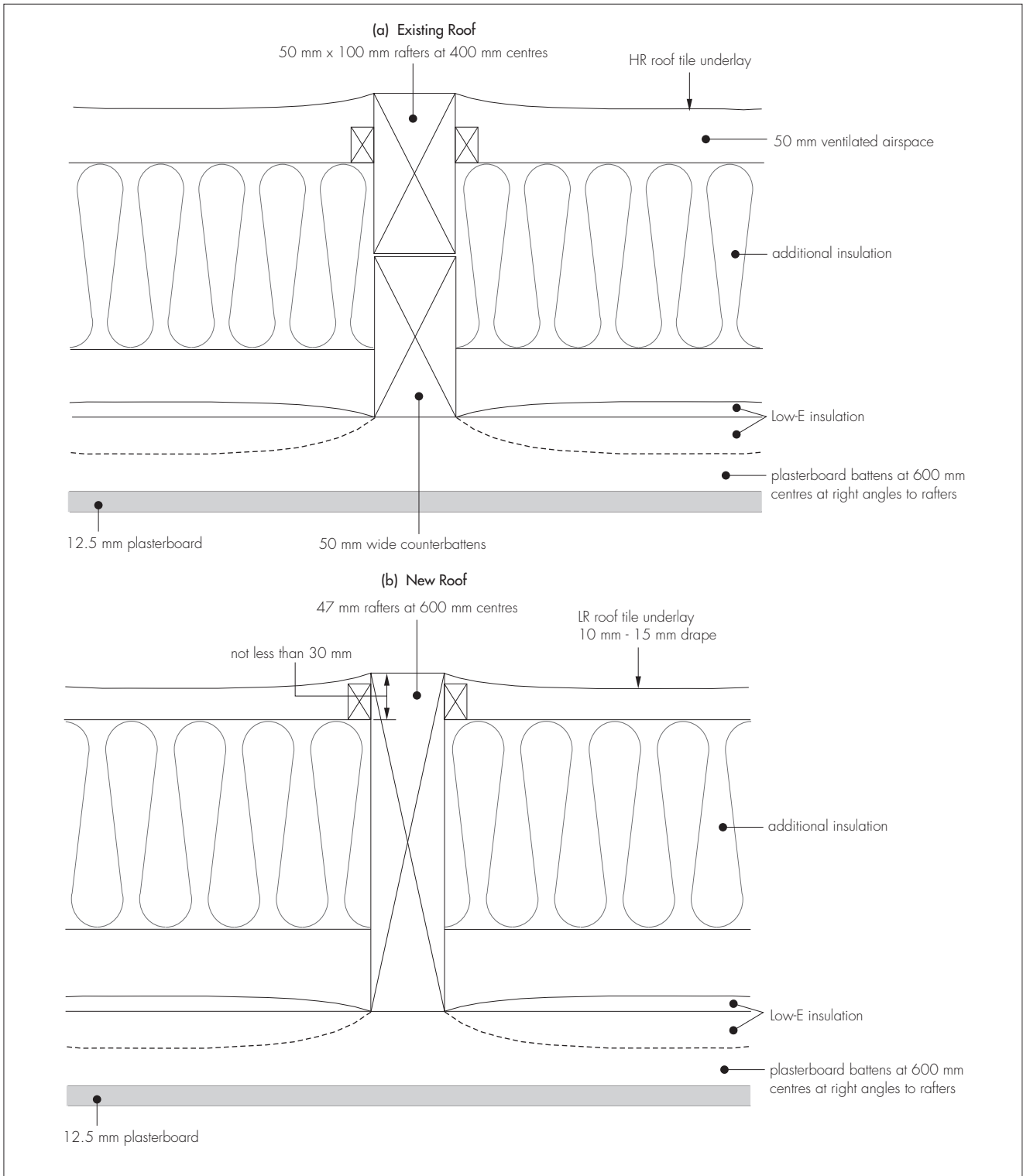


Table 2 U values for specific constructions as detailed

Construction	U value ($W \cdot m^{-2} \cdot K^{-1}$)
200 mm rafter with 130 mm phenolic ⁽¹⁾	0.18
200 mm rafter with 150 mm phenolic insulation ⁽²⁾	0.14

- (1) Existing roof: rafter, 50 mm width at 400 mm centres. Tiled over a breather membrane, Low-E insulation placed underside of rafter and 25 mm thick batten. 12.5 mm plasterboard ($\lambda = 0.021 W \cdot m^{-2} \cdot K^{-1}$) fixed to the battens. Phenolic insulation ($\lambda = 0.020 W \cdot m^{-2} \cdot K^{-1}$, foil faced, emissivity = 0.2).
- (2) New roof: rafter, 47 mm width at 600 mm centres. Tiled over a breather membrane, Low-E insulation placed underside of rafter and 25 mm thick batten. 12.5 mm plasterboard ($\lambda = 0.021 W \cdot m^{-2} \cdot K^{-1}$) fixed to the battens. Phenolic insulation ($\lambda = 0.020 W \cdot m^{-2} \cdot K^{-1}$, foil faced, emissivity = 0.2).



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 Roofs incorporating the product will adequately limit the risk of interstitial condensation when designed and constructed in accordance with BS 5250 : 2002, Section 8.4 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 in excess of $2000 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$. It can be used as vapour control layer when installed in accordance with section 13.

6.4 In all cases, where high vapour resistance roof tile underlays are used, ventilation to the air space should be in accordance with the recommendations of BS 5250 : 2002 or relevant BBA Certificate for the roof tile underlay. When installed in conjunction with other insulation materials, the water vapour resistance and installation instructions of the additional insulation should also be taken into consideration.

6.5 When the product is installed above the rafters, then an additional vapour control layer should be installed below the rafters and before the plasterboard.

Surface condensation



6.6 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.35 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ 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 IP 1/06.



6.7 Roofs 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 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.

7.2 The insulation must not be carried over junctions between roofs and walls required to provide a minimum period of fire resistance. The continuity of fire resistance must be maintained, for example as described in:

England and Wales — Approved Document B, Volume 1, Sections 5.11 and 5.12

Scotland — Mandatory Standard 2.2, clause 2.2.10⁽¹⁾

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet E, paragraph 3.21.

7.3 The use of the product will not affect the fire rating obtained for tiled or slated roofs when evaluated by assessment.

7.4 When installed with an internal lining board, eg 12.5 mm thick plasterboard, the insulation will be contained between the roof and internal lining board, until one is destroyed. Therefore, the insulation will not contribute to the development stages of a fire or present a smoke or toxic hazard.

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

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

8 Proximity of flues and appliances

When the product is installed in close proximity to certain flue pipes and/or heat-producing appliances, for buildings subject to national Building Regulations the relevant provisions and guidance given below should be met:

England and Wales — Approved Document J, paragraph 2.15

Scotland — Mandatory Standard 3.19, clause 3.19.1⁽¹⁾ and 3.19.4⁽¹⁾

(1) Technical Handbook (Domestic).

Northern Ireland — Technical Booklet L, paragraph 2.9.

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 m³·hr⁻¹·m⁻².

9.2 When the product is used as a vapour control layer and an air barrier, the airtightness of the system is reliant on the careful sealing of the insulation and is dependent on maintaining the integrity of seal throughout. In addition to sealing at all joints, the product must be suitably sealed at the perimeter and all penetrations. Details of sealing at eaves, ridges, hips, valleys and penetrations must be in accordance with the Certificate holder's instructions.

10 Maintenance

Once installed, the product does not require any maintenance. Small holes, rips or punctures in the outer layers during installation must be repaired with adhesive tape.

11 Durability



The product when installed as specified, will have a life equivalent to that of the roof structure in which it is incorporated.

Installation

12 General

12.1 Installation of Low-E Foil Insulation for use in Pitched Roof Applications and additional insulation products should be in accordance with the Certificate holder's instructions and current good building practice.

12.2 The product is attached to the rafters by using staples at 200 mm centres, prior to fixing battens.

12.3 When the product is cut to fit around openings, care should be taken to minimise and seal any gaps.

12.4 The product can be cut using a knife.

13 Procedure

Above rafters installation

13.1 Installation starts from the eaves and the insulation is unrolled parallel to the eaves.

13.2 As the product is unrolled across the rafters, it is fixed using nails or staples of at least 15 mm length.

13.3 The next roll must overlap the preceding layer by the predetermined guide and the overlap should be sealed along the entire length using the self-adhesive tape which is factory bonded to the edge of the product.

13.4 The product should be permanently fixed in place using counter battens parallel to the rafters, held in place with nails.

13.5 When the top layer has been battened, any excess material should be cut by running a sharp knife along the edge of the batten.

13.6 A roof tile underlay should be installed on the counter battens and tiling battens attached perpendicular to the rafters.

13.7 Roof tiles or slates are installed in accordance with BS 5534 : 2003.

13.8 When applying roof tiles or slates to a warm roof construction the recommendations of the tile/slate manufacturer should be followed.

Below rafters installation

13.9 Installation starts from the ridge with the product being unrolled parallel to the eaves.

13.10 As the product is unrolled across the rafters, it is fixed in place using staples of at least 14 mm depth.

13.11 The next roll must overlap the preceding layer by the predetermined guide and the overlap is sealed along the entire length using the self-adhesive tape that is factory bonded to the edge of the product.

13.12 The product should be permanently fixed in place using wooden battens parallel to the rafters, held in place with nails.

13.13 When the bottom layer has been battened, any excess material should be continued onto the adjacent element in order to keep the continuity of the air barrier function.

13.14 Any exposed cut edges of the product should be sealed with a suitable adhesive tape. Any tears or holes in the outer layer should be repaired with self-adhesive tape.

Additional insulation

13.15 Additional insulation materials must be used. Care should be taken to ensure that all air spaces are maintained in accordance with the manufacturer's instructions for their products. Advice should be sought from the Certificate holder.

Technical Investigations

14 Tests

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

- emissivity
- core R value
- air infiltration
- tensile strength
- tear and puncture strength
- 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 An assessment was made of data relating to the thermal insulation properties of the material and behaviour in fire.

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

15.3 The product has been tested within the following construction and resulted in a thermal transmittance, U value, of $0.66 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$. The construction consisted of Low-E reflective foil insulation battened over 38 mm rafters 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 (up).

15.4 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 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

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*

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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 and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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 In granting this Certificate, the BBA is not responsible for:

- 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 the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

16.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.