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Agrément Certificate
07/4503
Product Sheet 1

REFLECTIVE FOIL INSULATION FOR PITCHED ROOFS

AIRFLEX

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Airflex, a reflective insulation material for use for use as an insulation above and/or below rafters in tiled or slated pitched roofs designed and constructed in accordance with the relevant clauses of BS 5534 : 2003.

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 additional insulation, the product can contribute in meeting the U value requirement for a roof (see section 5).

Condensation risk — the performance of the product with regard to interstitial and surface condensation has been considered and is satisfactory (see section 6).

Behaviour in relation to fire — the roof system using this product can be designed to meet the UK requirements (see section 7).

Air leakage — the product can 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 12).

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

Date of Second issue: 7 January 2011

Originally certificated on 3 January 2008

Simon Wroe
Head of Approvals — Physics

Greg Cooper
Chief Executive

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, Airflex 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:	B3(4)	Internal fire spread (structure)
Comment:		The product will not affect the external fire rating of a tiled or slated roof in which it is installed. See section 7.2 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to a roof meeting this Requirement. See sections 6.1 and 6.8 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		Roofs incorporating the product can contribute to a building meeting its Target Emission Rate. See sections 5.3 and 5.4 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 12 and the *Installation* 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 12 and the *Installation* part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	2.2	Separation
Comment:		The product must not penetrate the separating wall junction with the roof to ensure that the fire-resistant integrity of the separating wall is maintained in accordance with clause 2.2.10[1]. See section 7.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to a roof satisfying the requirements of clauses 3.15.1[1] to 3.15.5[1] and 3.15.7[1] of this Standard. See sections 6.1 and 6.9 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to a roof satisfying the requirements of these Standards, with reference to clauses or parts of 6.1.2[1], 6.1.6[1], 6.2.1[1], 6.2.3[1], 6.2.4[1] and 6.2.5[1]. See sections 5.3 and 5.4 of this Certificate.
Regulation:	12	Building standards — conversions
Comment:		All comments given for this 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 12 and the *Installation* part of this Certificate.
Regulation:	C5	Condensation
Comment:		The product can contribute to a roof satisfying the requirements of this Regulation. See section 6.1 of this Certificate.
Regulation:	E5(b)	External fire spread
Comment:		The product will not affect the external fire rating of a tiled or slated roof in which it is installed. See section 7.2 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Regulation	F3(2)	Target carbon dioxide Emissions Rate
Comment:		The product can contribute to a building satisfying its Target Emission Rate. See sections 5.3 and 5.4 of this Certificate.

Construction (Design and Management) Regulations 2007

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

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

See section: 2 *Delivery and site handling* (2.2) of this Certificate.

Non-regulatory Information

NHBC Standards 2011

NHBC accepts the use of Airflex, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*, Clauses D10–D11.

General

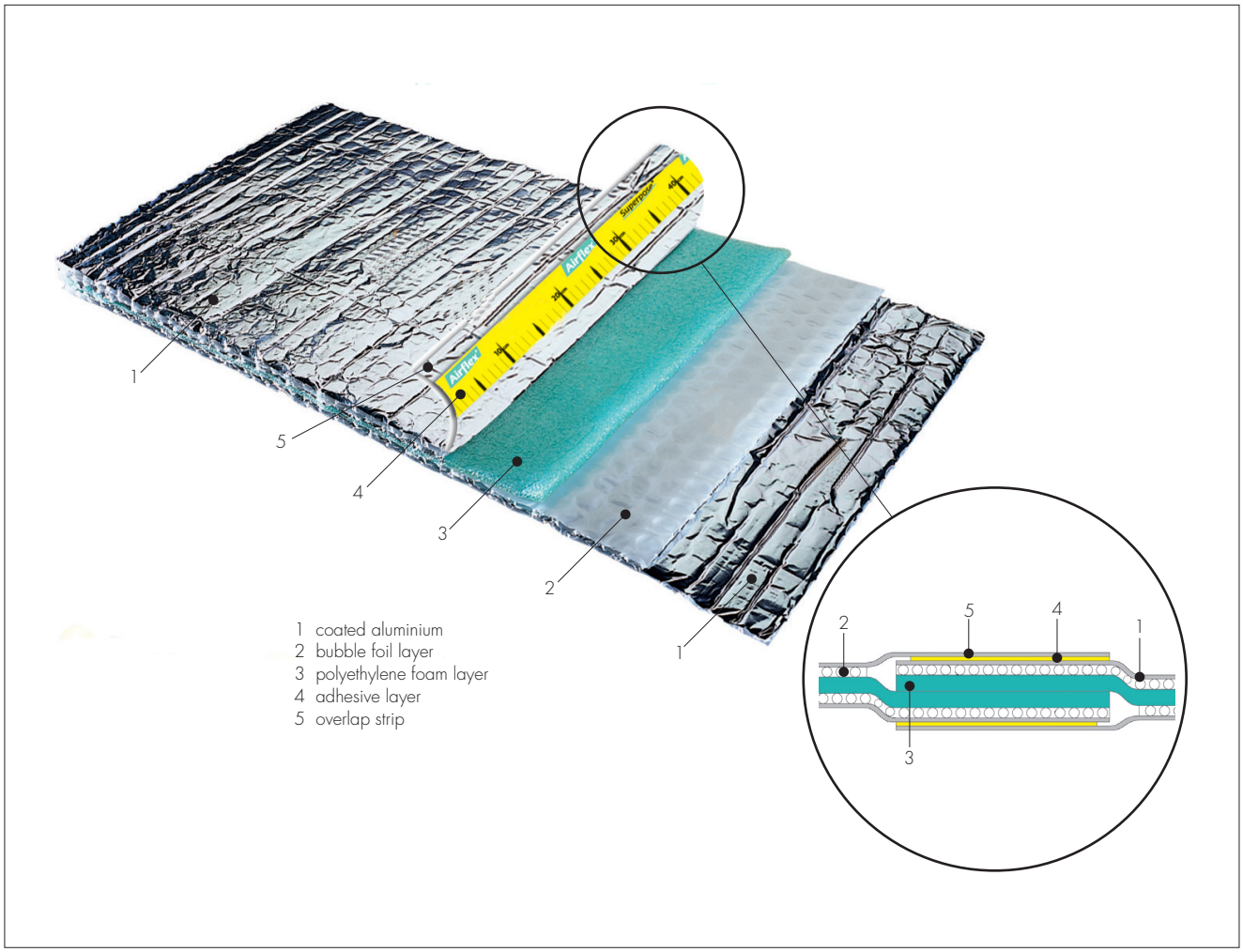
The product is distributed in the UK by KdB Insulation Ltd, 88 Acton Road, Scarva, Craigavon, Co Antrim BT63 6LF. Tel: 028 3884 9042.

Technical Specification

1 Description

1.1 Airflex consists of a 3 mm thick polyethylene foam (25 kg·m^{-3}) core sandwiched between a layer of bubble foil, laminated with a coated aluminium outer layer on both sides (see Figure 1). The layers are line welded together by hot air. The composite sheet incorporates an adhesive layer protected with a siliconised paper strip.

Figure 1 Airflex



1.2 The product is available in roll form with a width of 1.2 m and lengths of 12.5 m and 25 m.

1.3 KdB Isolation's 100 mm wide reflective adhesive tape is an ancillary item used to seal at joints.

1.4 Ancillary items used but outside the scope of this Certificate include:

- nails/staples at least 14 mm in length
- vapour control layer
- roof tile underlay
- pre-treated counter battens, softwood battens and tiling laths
- roofing slates or tiles
- additional insulation.

2 Delivery and site handling

2.1 The product is delivered to site in rolls packed in a protective, branded bag sealed with an end label. BBA symbol is printed on label attached to each roll. Installation instructions are placed in the bag.

2.2 The rolls should be stored in clean, dry conditions not exposed to sunlight and protected from being dropped or crushed by objects. The product must not be exposed to open flame or other ignition sources and must be stored away from flammable material such as paint and solvents. Care must be exercised when storing large quantities on site.

2.3 To ensure maximum performance of the product when installed, precautions must be taken to protect it from mud and dirt.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Airflex.

Design Considerations

3 Use

3.1 Airflex is a flexible insulation to be used in conjunction with other insulation materials to reduce the U value (thermal transmittance) in new or existing pitched roofs. When installed under the rafters, the product performs as a vapour control layer in the roof system (see section 5).

3.2 The product is for use in constructions where the ceiling follows the pitch of the roof and encloses a habitable space.

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 Airflex 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:

0.1 — mean emissivity of outer layers

0.30 $m^2 \cdot K \cdot W^{-1}$ — mean core thermal resistance [*R* value of bubble foil faced insulation (nominal thickness 10.4 mm)], with no airspace one either side.

0.407 $m^2 \cdot K \cdot W^{-1}$ — resistance of 13 mm airspace(1) for upwards heat flow (pitched roof application)(1)

0.00 $m^2 \cdot K \cdot W^{-1}$ — the thickness and resistance values at the compressed point when fixed to the battens

30%/70% — percentage(2) of multi-foil thickness in rafter and plasterboard-batten cavities, respectively, for roof applications

0%/100% — percentage(2) of multi-foil thickness in rafter and plasterboard-batten cavities, when rafter depth is fully filled with insulation.

(1) Unventilated airspace width and length at least 10 x 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 ultimate thermal performance of the product will depend on the construction of the roof on which it is installed and the combination of it with other insulation products is necessary to achieve the Mean design U values shown in section 5.3.

5.3 Typical Mean design U values are as shown in Tables 1 to 3.

Table 1 Mean design roof U values — England and Wales(1)

Construction	U value ($W \cdot m^{-2} \cdot K^{-1}$)
Notional dwelling	0.16
Existing building – new, replaced, renovated or retained roof	0.18
Dwelling new-build limit	0.20

(1) Flexible approaches on existing buildings are given in the Approved Documents.

Table 2 Mean design roof U values — Scotland[1]

Construction	U value ($W \cdot m^{-2} \cdot K^{-1}$)
Notional dwelling	0.13
New dwelling simplified method	0.13
Conversion unheated building (into dwellings)	0.15
Extension to dwelling	0.15
Conversion of unheated building	0.15
Alterations and reconstructions to a dwelling	0.15
Stand-alone building < 50 m^2 to a dwelling	0.15
New dwelling limit	0.18
Conversion of heated building	0.25

(1) Flexible approaches on existing buildings are given in the Technical Handbooks.

Table 3 Mean design roof U values — Northern Ireland[1]

Construction	U value ($W \cdot m^{-2} \cdot K^{-1}$)
Notional dwelling	0.16
Existing building – new, replaced, renovated or retained roof	0.20
Building new-build limit	0.25

(1) Flexible approaches on existing buildings are given in the Technical Booklets.

5.4 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between elements and openings. 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 : 1992 *Interstitial condensation and fabric degradation* and BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*.

6.3 The product has a high water vapour resistance with a measured value in excess of 3000 $MN \cdot s \cdot g^{-1}$.

6.4 When installed in accordance with section 13 and in a continuous layer, the product will provide a convection-free envelope of high vapour resistance.

Installation above rafters

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. Also the product must be used in conjunction with a suitable vapour permeable roof tile underlay without a ventilated air space.

Installation below rafters

6.6 When the product is installed below the rafters it will perform as a vapour control layer and a vapour permeable roof tile underlay must be used above the rafters.

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

Surface condensation

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

6.9 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point. Guidance may be obtained from Section 8 of BS 5250 : 2002 and BRE Report (BR 262 : 2002).

7 Behaviour in relation to fire

7.1 Although the product is combustible it is difficult to ignite and has a declared classification test report result of B in accordance with BS EN 13501-1 : 2002.

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 to 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 by tiled or slated roofs when evaluated by assessment or test to BS 476-3 : 1958.

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

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

Scotland — Mandatory Standard Standard 3.19

Northern Ireland — Technical Booklet L.

9 Air leakage

9.1 Results of tests to BS EN 12114 : 2000 on the product with positive pressure of 50 Pa gave a leakage rate of 0.6 $m^3 \cdot hr^{-1} \cdot m^{-2}$.

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 all joints, the insulation 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.

9.3 The airtightness of the building will also be dependent on the performance of the other building elements. Provided these also incorporate appropriate design details and building techniques, air infiltration through the building fabric should be minimal and the building reasonably airtight.

10 De-rating of electrical cables

In common with other insulation products, in some cases it may be necessary to de-rate electrical cables buried in insulation. In BS 7671 : 2001 it is indicated that where wiring is completely surrounded by insulation, it may need to be de-rated to as low as half its free air current carrying capacity. Guidance should be sought from a qualified electrician.

11 Maintenance and repair

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

12 Durability

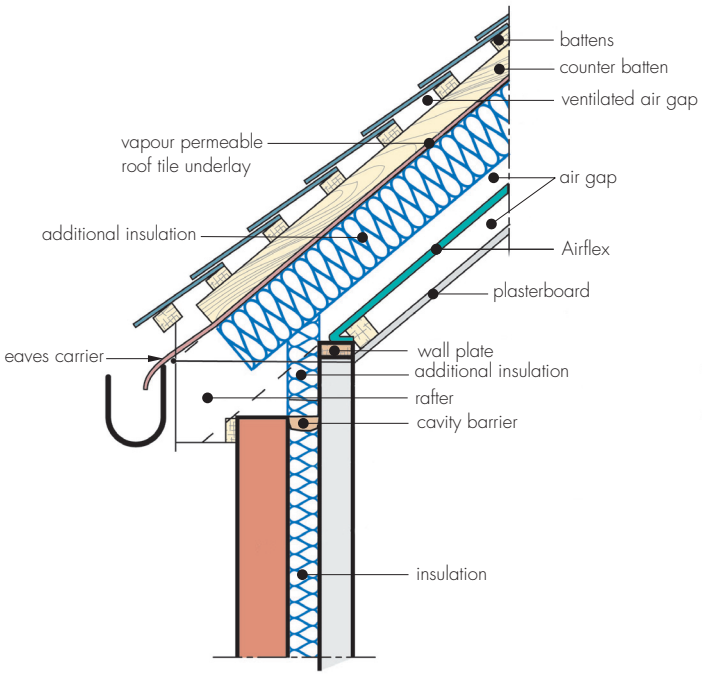
The product is rot-proof, does not tear easily and when installed as specified, will have a life equivalent to that of the roof structure in which it is incorporated.

Installation

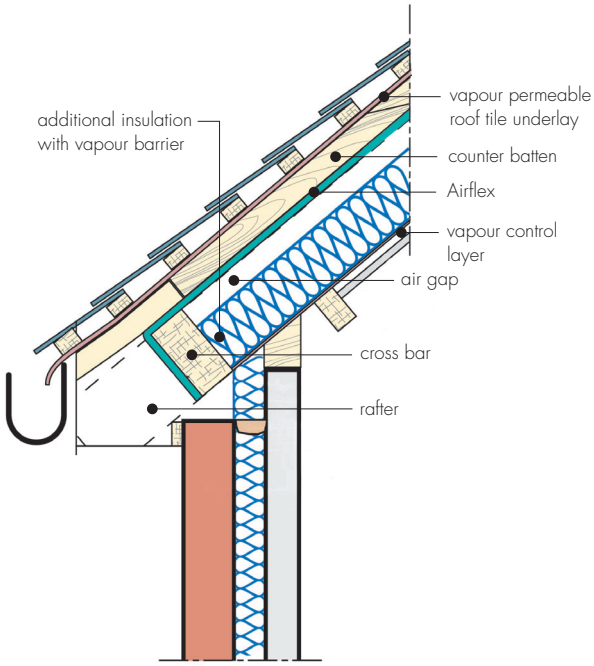
13 General

13.1 Installation of Airflex and additional insulation products should be in accordance with the Certificate holder's instructions and current good building practice (see Figure 2).

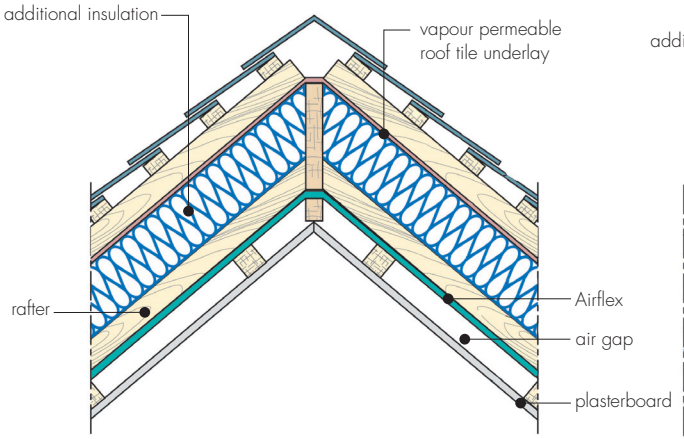
Figure 2 Construction details



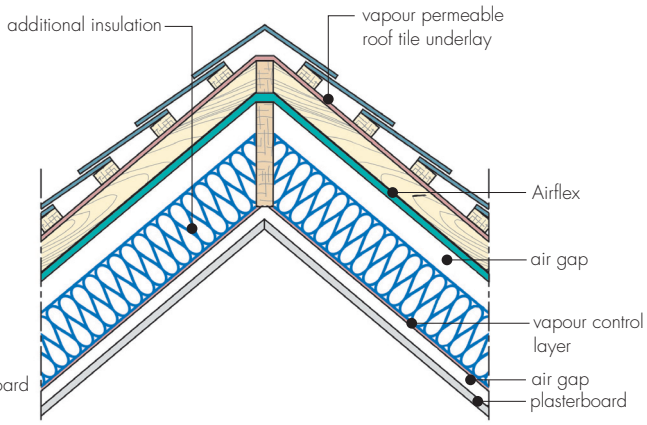
(a) eaves detail — below rafter with additional insulation



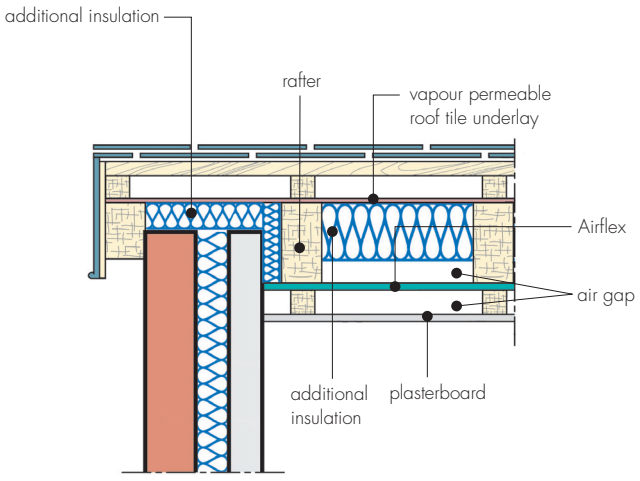
(b) eaves detail — above rafter with additional insulation



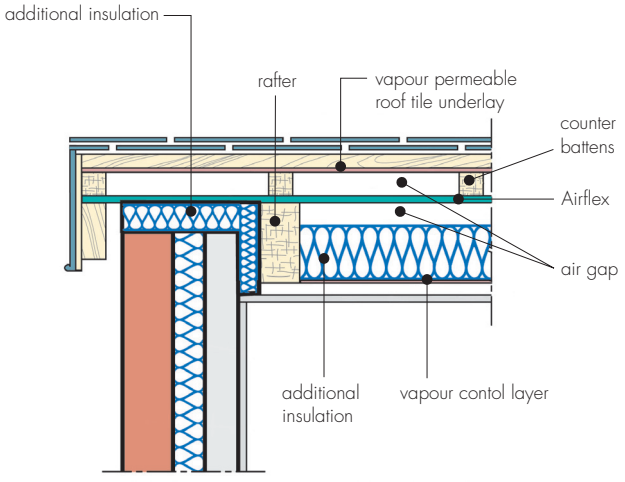
(c) ridge detail — below rafter both sides



(d) ridge detail — above rafter with additional insulation



(e) gable detail — below rafter with additional insulation



(f) gable detail — above rafter with additional insulation

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

13.3 When the product is cut to fit around openings, eg the roof perimeter, care should be taken to minimise gaps.

13.4 The product can be cut easily with a knife.

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

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

14 Procedure

Above rafters installation

14.1 Installation starts from the eaves and the product is unrolled parallel to the eaves.

14.2 As the product is unrolled across rafters it is fixed using nails or staples of at least 14 mm length.

14.3 The next roll must overlap the preceding layer by the predetermined guide and the overlap sealed along the entire length using the self-adhesive tape.

14.4 The product should be permanently fixed in place using wooden battens laid parallel to the rafters, and nailed in position.

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

14.6 A breather membrane should be installed on the counter battens and tiling battens attached perpendicular to the rafters.

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

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

Below rafters installation

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

14.10 As the product is unrolled across the rafters, it is fixed in place using nails or staples of at least 14 mm length.

14.11 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.

14.12 The product should be permanently fixed in place using wooden battens laid parallel to the rafters and nailed in position.

14.13 When the bottom layer has been battened, any excess material may be cut away by running a sharp knife along the edge of the batten.

14.14 Any exposed cut edges of the product should be sealed with a suitable adhesive tape. Any tears or holes in the outer layer must be repaired using KdB Isolation's heat-reflective tape.

14.15 Plasterboard is fixed to the battens. The batten size should be at least 38 mm by 25 mm, with the fixings at either 150 mm spacing nails or 230 mm for screws. The batten size should be sufficient to ensure a 20 mm air gap between the product and the plasterboard.

Additional insulation

14.16 When used with other additional insulation materials, care should be taken to ensure that all gaps are maintained in accordance with the manufacturer's instructions for their products, and advice should be sought from the Certificate holder.

14.17 When the product is installed below the rafters, mineral wool products can be placed directly on top of the product between the rafters without an air space. When the product is installed above the rafters, mineral wool can rest on the vapour control layer and plasterboard without an air space.

Technical Investigations

15 Tests

Tests were carried out on Airflex to determine the emissivity and durability of the outer foil and the water vapour and air permeability of the whole product.

16 Investigations

An assessment of the risk of interstitial condensation in typical constructions was determined for Airflex used above the rafters and below the rafters in pitched roof constructions.

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*

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 7671 : 2001 *Requirements for electrical installations. IEE Wiring Regulations. Sixteenth Edition*

BS EN 12114 : 2000 *Thermal performance of buildings — Air permeability of building components and building elements — Laboratory test method*

BS EN 13501-1 : 2002 *Fire classification of construction products and building elements. Classification using test data from reaction to fire tests*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

17 Conditions

17.1 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.

17.2 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.

17.3 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.

17.4 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.

17.5 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.

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