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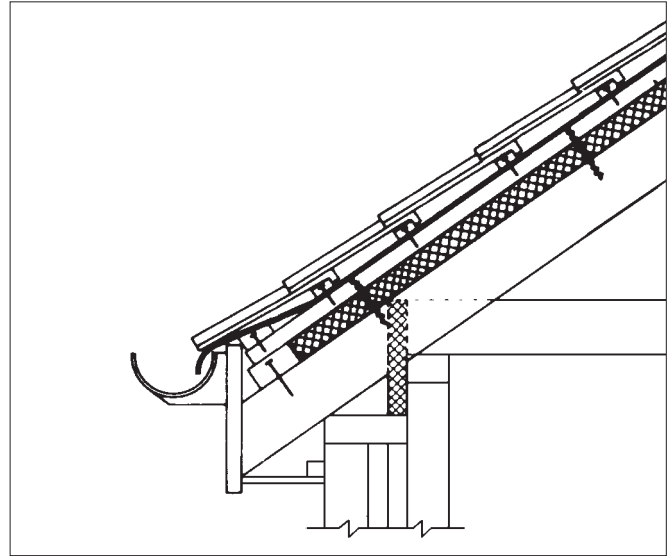
**Agrément Certificate**  
**No 94/3061**

**PRODUCT SHEET 1 —KOOLTHERM K7 SARKING BOARD****PRODUCT SCOPE AND SUMMARY OF CERTIFICATE**

This Certificate relates to Kooltherm K7 Sarking Board, a foil-composite faced phenolic foam board for use in new warm roof constructions where the ceiling follows the pitch of the roof and encloses a habitable space.

**THIS CERTIFICATE INCLUDES:**

- factors relating to compliance with UK 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**

**Properties in relation to fire** — the insulation will not contribute to the development stages of a fire or present a smoke or toxic hazard (see section 6).

**Thermal performance** — subject to the selection of an appropriate board thickness, the construction can improve on the elemental U value. The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the roof and other building elements (see section 7).

**Condensation** — the risk of interstitial condensation will be minimal under normal conditions of use (see section 9).

**Resistance to moisture** — the boards will not be adversely affected by rain showers during installation, nor by wind-driven snow or rain penetrating the tiling in service (see section 8)

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

The BBA has awarded this Agrément Certificate for Kooltherm K7 Sarking Board to Kingspan Insulation Ltd as fit for its intended use provided it is installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Date of First issue: 5 January 1995

Date of Fourth issue: 22 November 2007

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](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, Kooltherm K7 Sarking Board, 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 2000 (as amended) (England and Wales)

Requirement:	B3	Internal fire spread (structure)
Comment:		The product is acceptable. See section 6.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product is acceptable. See sections 9.1 and 9.6 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		See sections 7.2 to 7.5 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 11 of this Certificate.



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

Regulation:	8	Fitness and durability of materials and workmanship
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:	2.2	Separation
Comment:		The product will not affect the external fire rating of a tiled or slated roof into which it is incorporated, with reference to clause 2.2.10 <sup>(1)(2)</sup> . See section 6.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		When used in conjunction with an appropriate vapour control layer the product will be unrestricted under this Standard, with reference to clauses 3.15.1 <sup>(1)</sup> , 3.15.3 <sup>(1)</sup> and 3.15.4 <sup>(1)</sup> . See sections 9.1 and 9.7 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, 6.1.1 <sup>(1)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)</sup> , 6.2.3 <sup>(1)</sup> and 6.1.2 <sup>(2)</sup> , 6.2.1 <sup>(2)</sup> and 6.2.4 <sup>(2)</sup> of these Standards. The product can also contribute to satisfying clauses, 6.2.4 <sup>(1)</sup> , 6.2.5 <sup>(1)(2)</sup> and 6.2.6 <sup>(2)</sup> of these Standards. See sections 7.2 to 7.5 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 11 of this Certificate.
Regulation:	C5	Condensation
Comment:		The product is acceptable. See section 9.1.
Regulation:	E4	Internal fire spread – Structure
Comment:		The product will not affect the external fire rating of a tiled or slated roof in which it is incorporated. See section 6.1 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Comment:		See sections 7.2 to 7.5 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: 12 *Installation – General* (12.1 and 12.2).

## Non-regulatory Information

### NHBC Standards 2007

NHBC accepts the use of Kooltherm K7 Sarking Board, when installed and used in accordance with this Certificate, in relation to NHBC Standards, Chapter 7.2 *Pitched roofs*.

### Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Kooltherm K7 Sarking Board, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-section *Pitched roofs*.

## General

Kooltherm K7 Sarking Board is for use as a thermal insulation sarking board above rafters or between and/or below rafters for tiled and slated pitched roofs, designed and constructed in accordance with the relevant Clauses of BS 5534 : 2003.

## Technical Specification

### 1 Description

1.1 Kooltherm K7 Sarking Board is manufactured from closed-cell phenolic foam, faced with aluminium foil, bonded to glass tissue on both sides. The nominal properties of the product are given in Table 1.

Table 1 Nominal properties

Description	Value
Length	2400 mm
Width	1200 mm
Thickness at 5 mm increments	20 mm to 180 mm
Minimum compressive strength at 10% deformation	125 kPa
Foam vapour resistivity	240 MNs(gm) <sup>-1</sup>
Facing vapour resistance	600 MNsg <sup>-1</sup>

1.2 The product is suitable for use above rafters. It is suitable also for applications between or below rafters.

1.3 Ancillary products used with the boards are:

- vapour permeable roof tile underlay (~ 0.17 MNsg) — eg Kingspan Nilvent.17 installed over, or fully supported below counter battens, or equivalent (see section 3.5)
- Helical fixings
- nailable sarking clips
- aluminium tape
- galvanized slab nails
- nails and treated battens.

1.4 Proprietary fixings approved by the BBA can be used with the boards. Names and addresses of suppliers of approved fixings are available from Kingspan Insulation Ltd and from the BBA.

### 2 Delivery, site handling and storage

2.1 Boards are delivered shrink-wrapped in polythene on non-returnable pallets, each pack including a label detailing the manufacturer's trade name, product name, grade and the BBA identification mark incorporating the number of this Certificate.

2.2 Where possible, packs should be stored inside. If stored outside they should be off the ground on a clean, flat surface.

2.3 The boards must be protected from moisture, mechanical damage and prolonged exposure to sunlight and should be stored either under cover or protected with opaque polythene.

2.4 Some care must be exercised in handling individual boards to avoid crushing the edges and corners.

2.5 The boards must not be exposed to open flame or to other ignition sources.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Kooltherm K7 Sarking Board.

## Design Considerations

### 3 Use

3.1 Kooltherm K7 Sarking board is satisfactory for use above, between and/or below roof rafters in conjunction with internal lining board, roof tile underlay, timber counter battens and tiling battens in tiled or slated, pitched roofs, designed and constructed in accordance with the relevant clauses of BS 5534 : 2003 for dwellings or other buildings with similar temperature and humidity conditions.

3.2 The boards are for use in pitched roof constructions where the ceiling follows the pitch of the roof and encloses a habitable space.

3.3 Although the boards will contribute to the buckling and racking strength of the roof, normal cross-bracing is required.

3.4 When installing over rafters, the boards must not be walked on except over supporting roof timbers. The boards have insufficient nail holding ability to be considered as an alternative to timber sarking.

3.5 Vapour permeable roof tile underlays used in conjunction with the boards must be the subject of a current BBA Certificate and be used in accordance with, and within the limitations of that Certificate.

3.6 Detailing and jointing of the boards should avoid cold bridging. Gaps should be filled. Flue pipes passing through the insulation should be suitably sleeved.

3.7 If the boards are to be installed flush with the internal face of the rafters, a ventilated air space of minimum depth 50 mm may be required between the underside of the roof tile underlay and the upper face of the board dependent on the specification of roof tile underlay utilised (see section 9.3).

## 4 Strength

The boards, when installed in accordance with the manufacturer's instructions and this Certificate, will resist the loads likely to be met during installation and in service.

## 5 Structural stability (with boards over the rafters)

5.1 The resistance to wind uplift and likely dead loads depends upon factors peculiar to each project, ie roof geometry, geographical location. The effect of wind loading should be calculated in accordance with BS 6399-2 : 1997 and the snow loadings should be calculated in accordance with BS 6399-3 : 1988 for each case.

5.2 When calculating the fixing spacing required to resist the calculated loadings, the requirements of BS 5268-2 : 2002 should be followed where possible. The Certificate holder can advise on the use of the correct proprietary fixings and improved nails in accordance with these requirements.

## 6 Properties in relation to fire



6.1 The boards 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, paragraphs 5.11 and 5.12

**Scotland** — Mandatory Standard 2.2, clauses 2.2.7<sup>(2)</sup> and 2.2.10<sup>(1)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet E, paragraph 3.21.

6.2 When installed between or under the rafters 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.

6.3 The use of the boards will not affect the rating obtained by tiled or slated roofs when evaluated by assessment or test to BS 476-3 : 1958.

6.4 When tested for fire propagation and surface spread of flame, the product achieved the ratings shown in Table 2. When tested for smoke obscuration to BS 5111-1 : 1974 the foam core achieved less than 5%.

Table 2 Fire rating

Board	BS 476-6		BS 476-7
	Index of performance (I)	Sub-index of performance ( $i_1$ )	Surface spread of flame (Class)
Foam core <sup>(1)</sup>	<1.2 <sup>(1)</sup>	<6 <sup>(1)</sup>	1
K7	<1.2 <sup>(1)</sup>	<6 <sup>(1)</sup>	1

(1) The combination of these results meets the criteria for Class 0 fire ratings as defined in the national Building Regulations.

## 7 Thermal performance

7.1 Calculations of the thermal transmittance (U value) of a specific roof construction should be carried out in accordance with BS EN ISO 6946 : 1997 and BRE<sup>(1)</sup> report (BR 443 : 2006) *Conventions for U value calculations* using the declared thermal conductivities for the product (see Table 3).

(1) Building Research Establishment.

Table 3 Thermal conductivity values ( $Wm^{-2}K^{-1}$ )

Board thickness (mm)	Thermal conductivity ( $Wm^{-2}K^{-1}$ )
15–24	0.024
25–44	0.023
>45	0.021



7.2 The product can contribute to a roof system achieving the following design U values as outlined in the national Building Regulations thus:

#### England and Wales and Northern Ireland

- 0.16  $Wm^{-2}K^{-1}$  required for 'notional' dwellings in SAP 2005 (see also section 7.3)
- 0.25  $Wm^{-2}K^{-1}$  limit average specified in Approved Documents; L1A (Table 2), L2A (Table 4), Technical Booklets F1 (Table 2.2) and F2 (Table 2.4)
- 0.35  $Wm^{-2}K^{-1}$  limit for an individual element specified in Approved Document L1A (Table 2), L2A (Table 4), Technical Booklets F1 (Table 2.2) and F2 (Table 2.4).

#### Scotland

- 0.16  $Wm^{-2}K^{-1}$  required for the 'simplified approach – packages 1 to 6' 'notional' dwelling in Mandatory Standard 6.1, clause 6.1.6<sup>(1)</sup> (see also section 7.3)
- 0.20  $Wm^{-2}K^{-1}$  limit average specified in Mandatory Standard 6.2, clause 6.2.1<sup>(1)(2)</sup> (see also section 7.3)
- 0.35  $Wm^{-2}K^{-1}$  limit for an individual element specified in Mandatory Standard 6.2, clause 6.2.1<sup>(1)(2)</sup>.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

7.3 Roofs with U values lower than (or the same as for Scottish dwellings) the relevant 'notional' value above will contribute to a building meeting its target overall reduction in carbon dioxide emissions of about 20% (or 18% to 25% in Scotland) for dwellings and 23% to 28% for buildings other than dwellings. Roofs with higher U values will require additional energy saving measures in the building envelope and/or services.

7.4 Compliance with the guidance referred to in section 7.2 will allow the use of the default psi values from Table 3 of BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings* and Table K1 of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005), in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM) (use 'simplified approach' for Scotland).

7.5 The product can maintain or contribute to maintaining continuity of thermal insulation at junctions between the roof and the other building elements. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in:

#### England and Wales

*Limiting thermal bridging and air leakage: Robust construction details for dwellings and similar buildings* TSO 2002

#### Scotland

Accredited Construction Details (Scotland)

#### Northern Ireland

Accredited Construction Details (version 1.0).

## 8 Resistance to moisture

The boards will not be adversely affected by rain showers during installation, nor by wind-driven snow or rain penetrating the tiling in service. Water absorption is low and its influence on the  $\lambda$  value is minimal.

## 9 Condensation

### Interstitial condensation



9.1 Roofs will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2002, Section 8.4 and Appendix D.

9.2 The insulation board joints are not sealed, but they are used in conjunction with a vapour check plasterboard internal lining (see section 12.3). A suitable permeable roof tile underlay (see section 3.5) may then be laid over the counter battens without ventilated air space.

9.3 Where the boards are installed in a roof with an existing horizontal ceiling, a 'warm' space is created and no ventilation is required. Any insulation at ceiling level, however, should be removed.

9.4 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*.

## Surface condensation



9.6 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $0.35 \text{ Wm}^{-2}\text{K}^{-1}$  at any point and the junctions with walls are designed in accordance with the relevant requirements of TSO publication *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings, 2002* or BRE Information Paper IP 1/06.



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

## 10 Maintenance and repair

Damaged boards can be replaced easily prior to the installation of counter battens, or timber sarking.

## 11 Durability



The boards will have a life equivalent to that of the roof structure in which they are incorporated.

## Installation

### 12 General

12.1 Installation of Kooltherm K7 Sarking Board must be in accordance with the relevant clauses of BS 5534 : 2003 and the manufacturer's instructions, and can be carried out in all conditions normal to roof work, but in windy conditions handling difficulties may be experienced.

12.2 The boards are light to handle and can be cut easily but care must be taken to prevent damage, particularly edge damage. Since the product will not support the weight of operatives, appropriate care must be taken during installation and tiling.

12.3 Foil-faced or vapour check plasterboard (used for vapour check purposes) must be provided with supports (noggings) along all edges.

12.4 The roof tile underlay is fixed over the counter battens (Figures 1 and 2) or over rafters (Figures 3 and 4) and tiling battens may then be fixed horizontally at spacings to suit the tiles or slates specified.

### 13 Procedure

**Over rafter insulation** (single layer system) (see Figure 1)

13.1 Boards are laid on to rafters starting at the stop rail and working towards the ridge so they cover the whole roof area. They should be tightly butted and fixed in a staggered pattern. Board joints should be butted over rafters, not mid-span. It is important to ensure a tight fit between boards, boards and rafters and other detailed elements. At ridges and verges, boards should be cut to achieve a close butt joint.

13.2 Treated counter battens are fixed above the insulation boards down the line of each rafter run from eaves to ridge using the Helical fixings at a minimum spacing of 300 mm centres. A minimum 37 mm fixing penetration into the rafter should be maintained. Short lengths of counter batten should be tightly butted.

Figure 1 Over rafter insulation

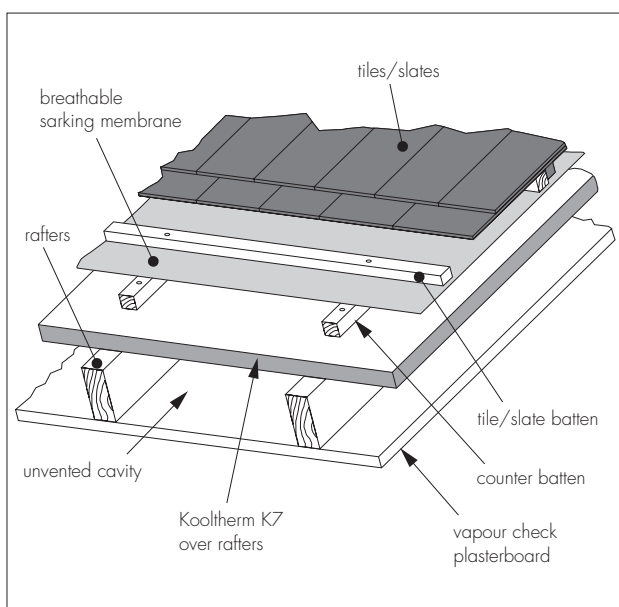


Figure 2 Over and between rafter insulation

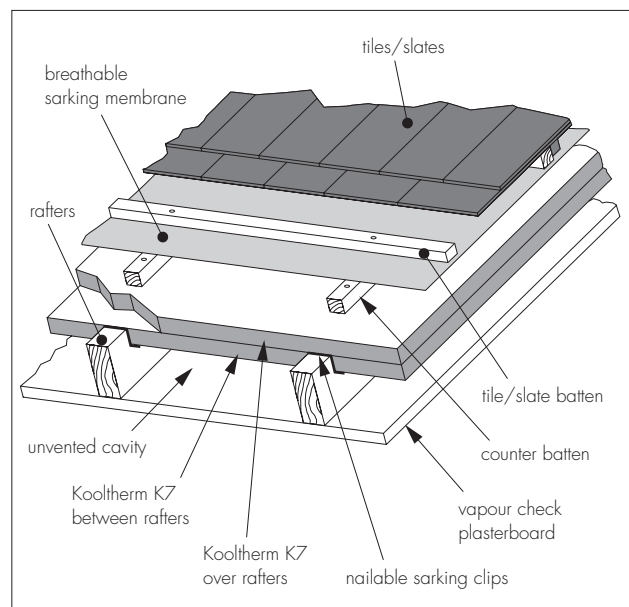


Figure 3 Between rafters insulation

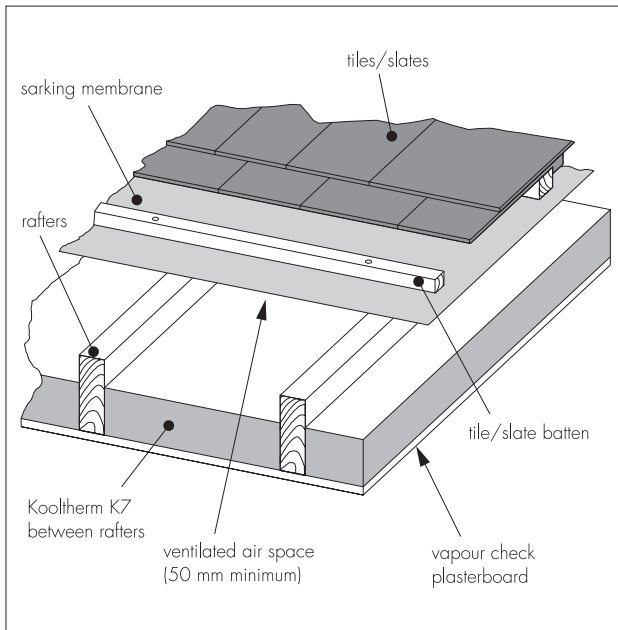
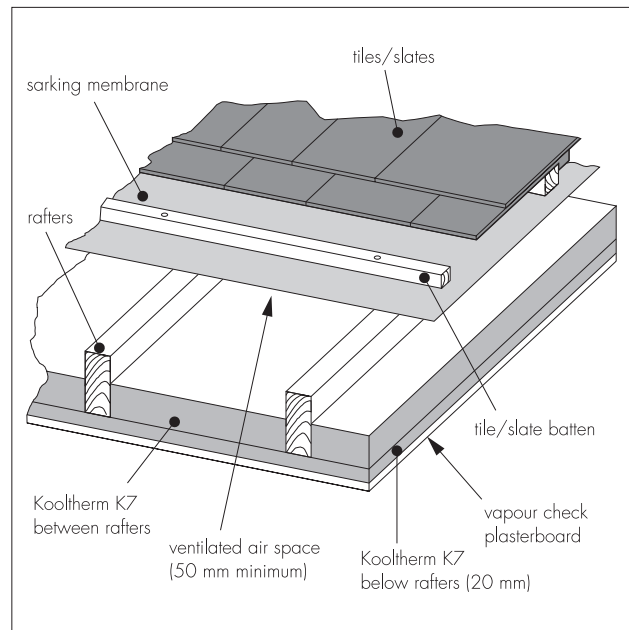


Figure 4 Between and below rafters



### Over and between rafter insulation (two layer system) (see Figure 2)

13.3 K7 boards are cut to fit tightly between rafters and are supported on stop battens or galvanized metal angles. Over rafter boards are laid to cover the whole roof area with the joints staggered and lightly butted. The boards are secured to counter battens running down the length of the rafters and fixed at a minimum spacing of 300 mm centres through the counter batten and insulation.

### Between rafters — retrofit (see Figure 3)

13.4 K7 boards are cut to fit tightly between the rafters and butt against stop battens or galvanized metal angles which maintain a ventilated air space suitable for the underlay ventilation requirements.

### Between and below rafters (see Figure 4)

13.5 Boards may be attached to the underside of rafters either as a single layer or in conjunction with insulation boards between the rafters.

13.6 Boards are temporarily fixed with clout head nails and joints butted and taped. Appropriate internal lining panels may then be fixed through the insulation into the underside of the rafters.

### Finishing

13.7 The vapour permeable roof tile underlay should be installed in accordance with the manufacturer's instructions and the appropriate BBA Certificate.

13.8 Roof tiles or slates are installed in accordance with the relevant clauses of BS 5534 : 2003.

13.9 Internal lining panels appropriate to the application and required decoration are installed.

### 14 Investigations

14.1 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.

14.2 An examination was made of data relating to:

- compressive strength
- flexural strength
- proprietary fixings
- dimensional stability with temperature
- closed cell count
- water absorption
- dimensional accuracy
- thermal conductivity (fresh and aged)
- ignitability
- density
- fire propagation
- surface spread of flame
- obscuration.

14.3 A series of tests was conducted to establish the behaviour of the boards under a thermal gradient.

14.4 An assessment of the thermal and hygrothermal properties of the system was made, including condensation risk calculations for typical installations.

14.5 Assessments of the structural adequacy, durability and behaviour in fire of the system were made.

## Additional Information

The quality management systems of Kingspan Insulation Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9002 : 1994 by LPCB Ltd (Certificate No 10697).



## Bibliography

- BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*
- BS 476-6 : 1989 *Fire tests on building materials and structures — Method of test for fire propagation for products*
- BS 476-7 : 1997 *Fire tests on building materials and structures — Method of test for fire propagation for products*
- BS 5111-1 : 1974 *Laboratory methods of test for determination of smoke generation characteristics of cellular plastics and cellular rubber materials — Method for testing a 25 mm cube test specimen of low density material (up to 130 kg/m<sup>3</sup>) to continuous flaming conditions*
- BS 5250 : 2002 *Code of practice for control of condensation in buildings*
- BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*
- BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*
- BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*
- BS 6399-3 : 1988 *Loading for buildings — Code of practice for imposed roof loads*
- BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- BS EN ISO 9002 : 1994 *Quality systems — Model for quality assurance in production, installation and servicing*

## 15 Conditions

15.1 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.

15.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

15.3 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.

15.4 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.

15.5 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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