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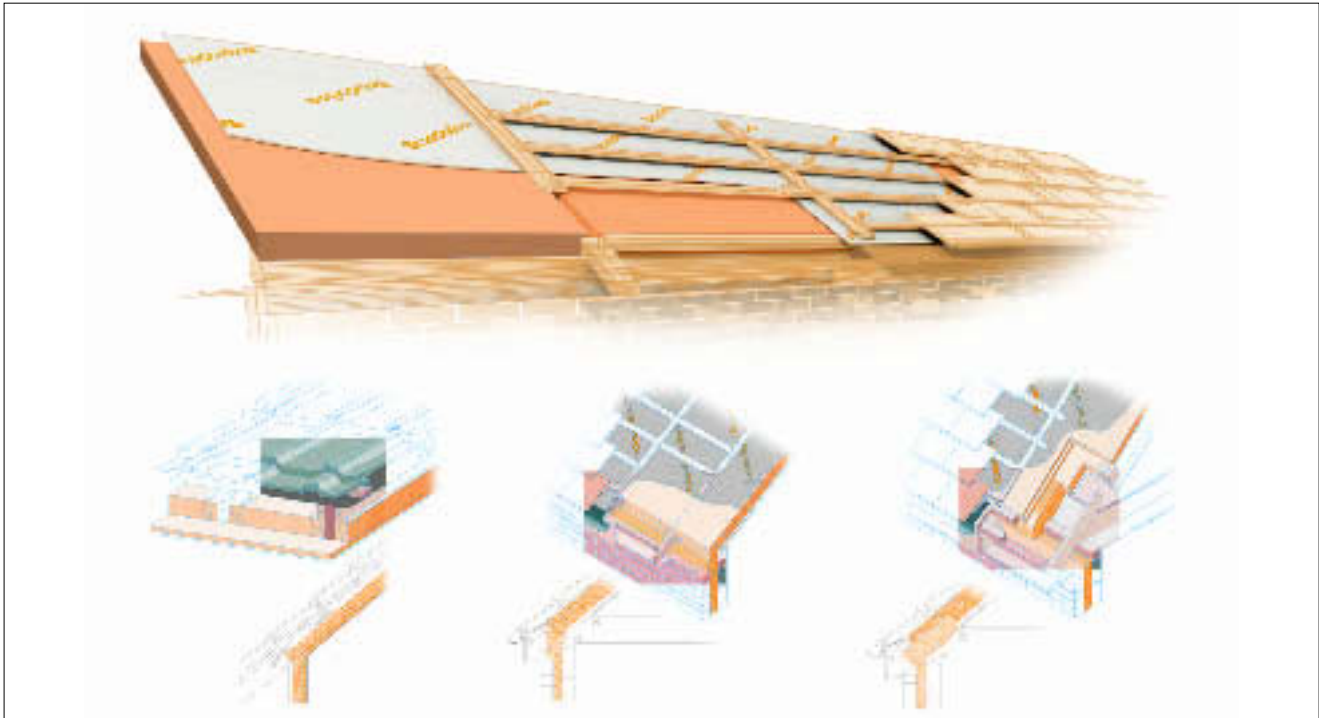
**Agreement
 Certificate
 No 06/4386**

Designated by Government
 to issue
 European Technical
 Approvals

POLYFOAM WARM ROOF INSULATION SYSTEMS

Sous-toiture isolants
 Dachlattung wärmedämmung

Product



• THIS CERTIFICATE REPLACES No 95/3097 AND RELATES TO POLYFOAM WARM ROOF INSULATION SYSTEMS, COMPRISING RIGID EXTRUDED POLYSTYRENE BOARDS DESCRIBED IN THE ACCOMPANYING DETAIL SHEETS.


• The product is for use as thermal insulation above and/or between rafters in tiled or slated pitched roofs, designed and constructed in accordance with the relevant clauses of BS 5534 : 2003.

• The product is for use where the ceiling follows the pitch of the roof and encloses a habitable space, or where the ceiling is horizontal and encloses a habitable loft space.

continued

Regulations — Detail Sheet 1

1 The Building Regulations 2000 (as amended) (England and Wales)

 The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of roof insulation with the Building Regulations. In the opinion of the BBA, Polyfoam Warm Roof Insulation Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The product can contribute to a building meeting, its Target Emission Rate. See the relevant tinted areas of the <i>Thermal performance</i> section of these Front Sheets.
Requirement: C2(c)	Resistance to moisture
Comment:	The product will contribute to enabling a roof to meet this Requirement. See the relevant tinted area of the <i>Condensation</i> section of these Front Sheets.
Requirement: Regulation 7	Materials and workmanship
Comment:	The product is acceptable. See the <i>Durability</i> section of these Front Sheets.

continued

- The product must be used in conjunction with a suitable water vapour permeable roof tile underlay.

These Front Sheets must be read in conjunction with the relevant accompanying Detail Sheets, which provide information specific to particular products.

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2 The Building (Scotland) Regulations 2004



In the opinion of the BBA, Polyfoam Warm Roof Insulation Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards as listed below.

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 the <i>Durability</i> section and <i>Installation</i> part of these Front Sheets.
Regulation:	9	Building standards — construction
Standard:	3.15	Condensation
Comment:		The product can satisfy, or contribute to satisfying the requirements of this Standard, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ to 3.15.4 ⁽¹⁾⁽²⁾ . See the relevant tinted area of the <i>Condensation</i> section of these Front Sheets.
Standard:	6.2	Building insulation envelope
Comment:		The product can satisfy or contribute to satisfying the requirements of this Standard, with reference to clauses 6.2.1 ⁽¹⁾⁽²⁾ (Table 1) and 6.2.4 ⁽¹⁾⁽²⁾ . See the relevant tinted areas of the <i>Thermal performance</i> section of these Front Sheets. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Polyfoam Warm Roof Insulation Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is an acceptable material. See the <i>Durability</i> section of these Front Sheets.
Regulation:	C5	Condensation
Comment:		The product will contribute to enabling a roof to satisfy this Regulation. See the relevant tinted area of the <i>Condensation</i> section of these Front Sheets.
Regulation:	F2	Building fabric
Comment:		The product will satisfy, or contribute to satisfying the requirements of the Elemental method of limiting heat loss. See the relevant tinted areas of <i>Thermal performance</i> section of these Front Sheets.

4 Construction (Design and Management) Regulations 1994 (as amended)

Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See sections: 5 *Delivery and site handling* (5.4) and 15 *Installation — General* (15.2) of these Front Sheets.

5 Delivery and site handling

5.1 The boards are delivered to site in shrink-wrapped polythene packs. Each pack includes a label bearing the product name, manufacturer's trade name, manufacturing data, and the BBA identification mark incorporating the number of this Certificate and:

- board dimensions and type of edge profile
- number of boards in pack
- grade of insulation
- manufacturer's reference code.

5.2 Where possible, packs should be stored inside. If stored outside, they should be off the ground on a clean, level surface and under cover to protect against moisture and mechanical damage.

5.3 The boards should be stored under cover or protected with opaque polythene sheeting. Prolonged exposure to sunlight causes degradation and breakdown of the surface.

5.4 Care must be exercised when handling individual boards to avoid damaging the edges and corners.

5.5 Where large volumes are stored indoors, adequate ventilation may be required. Boards must not be exposed to elevated temperatures.

5.6 The boards must not be exposed to open flame or other ignition sources. Care must be taken to prevent contact with solvents, liquid bitumen or mastic products and solvent-based wood preservatives.

Design Data

6 General

6.1 Polyfoam Warm Roof Insulation Systems are satisfactory for use as a thermal insulation of new and existing pitched roofs. The boards are used in conjunction with internal lining board (such as plasterboard), a vapour-permeable 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.

6.2 The boards are for use in constructions where the ceiling follows the pitch of the roof and encloses a habitable space, or where the ceiling is horizontal and encloses a loft space.

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

6.4 The boards must not be walked on except over supporting roof timbers. Boards should not be considered as an alternative to timber sarking as they have insufficient nail holding ability.

6.5 It is essential that detailing and jointing of the boards achieves a convection-free envelope of high vapour resistance (see section 1.1). Any gaps should be filled, eg with expanding polyurethane foam. Ridges, abutments and penetrations should also be sealed. Flue pipes passing through the insulation should be suitably sleeved.

6.6 Moisture entering the roof can be minimised using a minimum of 125 µm polyethylene vapour control layer with sealed gaps, placed under the inclined ceiling between the insulation and the internal finish.

7 Strength

The boards will resist the loads likely to be met during installation and in service (see sections 6.4 and 1.5.2). The boards have a minimum compressive strength at yield of 200 kPa.

8 Structural stability

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

8.2 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 must advise on the use of the correct proprietary fixings and improved nails and fixing capacity in accordance with BS 5268-2 : 2002.

9 Behaviour in relation to fire

9.1 The boards melt when exposed to excessive heat and are classified as combustible, however the increase in fire load in the building, consequent upon their use, is small.

9.2 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 9.28 to 9.31

Scotland

Mandatory Standard 2.2

Northern Ireland

Technical Booklet E, paragraph 3.15.


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

9.4 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.

10 Thermal performance

10.1 Calculations of the thermal transmittance (U value) of specific roof constructions should be carried out in accordance with BS EN ISO 6946 : 1997 and BRE⁽¹⁾ report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared thermal conductivity ($\lambda_{90/90}$ value) of the boards as 0.029 Wm⁻¹K⁻¹ for Polyfoam and 0.030 Wm⁻¹K⁻¹ for Polyfoam Raftersqueeze.

(1) Building Research Establishment.

 10.2 Subject to the selection of an appropriate board thickness, the construction can improve on the Elemental U value of 0.25 Wm⁻²K⁻¹ required by the Building Regulations. The product, therefore, can contribute to enabling a building to meet the Target Emission Rate 'average' improvements of 20% (dwellings) and from 23% to 28% (buildings other than dwellings) specified in Approved Documents L1A and L2A respectively.


10.3 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the roof and other building elements. Guidance in this respect, and on limiting heat loss by air infiltration, can be found in the TSO publication *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002.

10.4 Compliance with the guidance referred to in section 10.2 including airtightness measures 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)⁽¹⁾.


(1) Published by the Department for Communities and Local Government on its website: www.communities.gov.uk

10.5 When installed in roofs of existing buildings, the product can meet, or contribute to meet, the relevant requirements of the following guidance documents:

- Approved Document L1B, section 2
- Approved Document L2B, section 3.


 10.6 Subject to the selection of an appropriate board thickness, roofs can satisfy the Elemental Target U value of 0.25 Wm⁻²K⁻¹ specified in the Technical Handbook, clause 6.2.1, Table 1.

10.7 The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the roof and other building elements. Guidance in BRE report (BR 262 : 2002) *Thermal insulation : avoiding risks* is acceptable.

 10.8 Subject to the selection of an appropriate board thickness, a roof construction, in Northern Ireland can satisfy the Elemental Target U value of 0.35 Wm⁻²K⁻¹ specified in Technical Booklet F, Tables 1.2 and 1.4.

11 Condensation


Interstitial condensation


 11.1 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.

11.2 The boards have a high water vapour resistance and when installed with tightly-butted joints and filled/sealed gaps, in a continuous layer will provide a convection-free envelope of high vapour resistance. In these circumstances, or where a vapour control layer is used, a suitable vapour-permeable roof tile underlay may be laid over the insulation boards without a ventilated air space. Where high vapour resistance roof tile underlays are used, ventilation to the air space should be considered in accordance with the recommendations of BS 5250 : 2002 or relevant BBA Certificate for the roof tile underlay.

11.3 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).

Surface condensation

 11.4 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.35 Wm⁻²K⁻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*, TSO 2002 or BRE Information Paper IP 01/06.

 11.5 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).


12 Resistance to moisture

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

13 Maintenance and repair

Damaged boards can be replaced before the installation of counter battens.

14 Durability

 The boards are rot proof, stable and durable and will have a life equivalent to that of the roof structure in which they are incorporated.

Installation

15 General

15.1 Installation of Polyfoam Warm Roof Insulation Systems must be in accordance with the relevant parts of BS 5534 : 2003, and the Certificate holder's instructions.

15.2 The boards are light to handle but some handling difficulties may be experienced in windy conditions. Once laid the boards will not support the weight of operatives, appropriate care must be taken during installation and tiling in accordance to *Work at Height Regulations* : 2005.

15.3 The boards can be cut using a sharp knife or fine-toothed saw but care must be taken to prevent damage particularly to edges. Damaged boards should not be used.

15.4 Where the system is installed in traditional and timber-framed construction, cavity barriers at the junction of the external wall and roof space should be provided.

15.5 When using multiple layers of board, the thinnest board should be placed on the internal side

15.6 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 tightly butted joints.

15.7 Gaps and joints in the insulation envelope (see section 6.5) should be filled/sealed with flexible sealant or expanding foam.

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

15.9 When applying roof tiles or slates to a warm roof construction, the recommendations of the tile manufacturer should be followed.

Technical Investigations

The following is a summary of the technical investigations carried out on Polyfoam Warm Roof Insulation Systems.

16 Tests

Tests were carried out in accordance with BS EN 13164 : 2001 to determine:

- compressive stress at 10% deformation
- long-term water absorption by total immersion
- water vapour transmission
- dimensional stability at specified temperature and humidity
- thermal conductivity (λ value)
- bowing under a thermal gradient.

17 Investigations

An examination was made of test data relating to BS EN 13164 : 2001 relating to:

- dimensional stability under specified temperature and humidity
- shear strength
- cohesive strength
- flexural strength
- water vapour permeance
- thermal conductivity
- density
- compressive strength.

18 Other investigations

A re-evaluation was made of existing data supporting BBA Certificate No 95/3097, for a similar material.

Additional Information

Knauf Insulation Limited have declared the designation codes (see Table 1) in accordance with Section 6 of BS EN 13164 : 2001.

Table 1 Certificate holder's declared designation codes/level or class — BS EN 13164 : 2001

	Pitched Roofboard	Sarking Board	Raftersqueeze
Thickness	T1	T1	T1
Compressive stress at 10% deformation	CS(10\Y)200	CS(10\Y)200	CS(10\Y)200
Dimensional stability at 23°C/90% RH	DS(23,90)	DS(23,90)	DS(23,90)
Water absorption by immersion ⁽¹⁾ total (%)	WL(T)5	WL(T)5	—
Thermal conductivity ($\lambda_{90/90}$ value) ($Wm^{-1}K^{-1}$)	0.029	0.029	0.030

(1) For 50 mm thickness.

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 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 13164 : 2001 *Thermal insulation products for buildings — Factory made products of extruded polystyrene foam (XPS) — Specification*

19 Conditions

19.1 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.

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

19.3 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.

19.4 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 or 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.

19.5 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 or in the future; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any present or future 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.



In the opinion of the British Board of Agrément, Polyfoam Warm Roof Insulation Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 06/4386 is accordingly awarded to Knauf Insulation Limited.

On behalf of the British Board of Agrément

Date of issue: 6th November 2006

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

Chief Executive

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British Board of Agrément

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For technical or additional information,
contact the Certificate holder (see
front page).
For information about the Agrément
Certificate, including validity and
scope, tel: Hotline 01923 665400,
or check the BBA website.



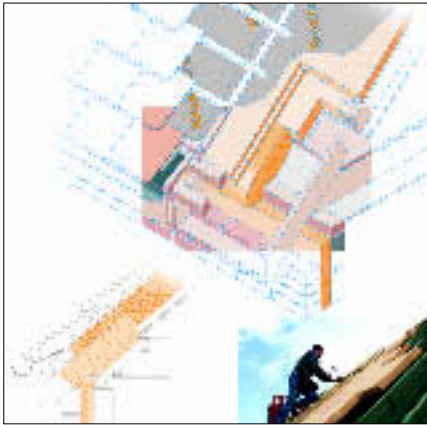
Knauf Insulation Limited

Certificate No 06/4386

DETAIL SHEET 2

POLYFOAM PITCHED ROOFBOARD

Product



• THIS DETAIL SHEET RELATES TO POLYFOAM PITCHED ROOFBOARD, USED IN A WARM ROOF INSULATION SYSTEM.

- The product is for use above rafters in new and existing constructions.
- Polyfoam Raftersqueeze (see Detail Sheet 4) is used as an infill panel between rafters to provide additional insulation.
- The product must be used in conjunction with a suitable water vapour permeable roof tile underlay (such as Knauf Breatheline) or an underlay in accordance with BS 5534 : 2003.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification, respectively.

Technical Specification

1 Description

1.1 Polyfoam Pitched Roofboard comprises extruded polystyrene insulation board manufactured in accordance with BS EN 13164 : 2001, Section 4.2 and the relevant parts of Section 4.3.

1.2 The boards incorporate a flame-retardant additive and have nominal characteristics of:

length (mm)	1250
width (mm)	600
thickness (mm)	35, 50, 60, 75
nominal density (kgm ⁻³)	30
declared thermal conductivity (Wm ⁻¹ K ⁻¹)	0.029
edge use	shiplap rebate over rafters

1.3 The boards are installed in conjunction with an appropriate internal lining board, for example, standard gypsum plasterboard to BS 1230-1 : 1985.

1.4 Ancillary products used with the boards are:

- roof tile underlay — fully-supported vapour permeable (such as Knauf Breatheline)
- Helifix InSkew, Ejot, Hilti fixings or other similar spiral fixings
- galvanized slab nails, ring-shank nails, treated battens and tiling laths, as used in standard roofing work.
- pre-treated battens and tiling laths
- sealant
- roofing slates or tiles.

Installation

2 Procedure

2.1 A horizontal, preservative-treated anchor batten or stop rail (preferably outside the vertical line of the wall insulation) the same thickness as the Polyfoam Pitched Roofboard is fixed to the rafters to correspond with the first tile batten at the eaves. A continuous tilting fillet is fitted at the eave to support the fascia board and the underlay.

2.2 The boards are laid from anchor batten to ridge, with their lengths either parallel to the rafters or parallel to the eaves, depending on rafter spacing. Joints running up the slope of the roof should be staggered, joints running across the roof do not have to be cut to rest on rafters and will interlock as applied. The tightly butted boards are fixed temporarily by tacking and finally secured by counter battens.

2.3 At the ridge, either one board laps the other or both butt tightly against the ridge board where appropriate.

2.4 When boards are cut to fit around openings, eg at the roof perimeter, care should be taken to minimise gaps. All gaps should be filled with expanding polyurethane foam.

2.5 Where additional insulation is required, Polyfoam Raftersqueeze boards (see Detail Sheet 4) are fitted between rafters under the Polyfoam Pitched Roofboard ensuring a tight fit. The board is designed to compression fit between rafters at 600 mm centres, being slightly oversized in width. For other centres, cutting may be necessary. The board is installed by squeezing an edge to push-fit

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into position through the underside of the roof, flush with the Polyfoam Pitched Roofboard, ensuring no gaps are present.

2.6 Treated softwood counter battens (minimum 32 mm deep by 50 mm) are fixed at each rafter run from eaves to ridge with fixings at a maximum of 200 mm centres. A minimum 35 mm fixing penetration into the rafter should be maintained, or 38 mm if nails are used. Short lengths of counter batten should be tightly butted.

2.7 A vapour-permeable underlay is laid either over or under the counter battens depending on the recommendations of the membrane manufacturer. Tiling battens are nailed into the counter battens parallel to the eaves at the required gauge, in accordance with BS 5534 : 2003.

2.8 Concrete or other roof tiles are installed in accordance with the relevant clauses of BS 5534 : 2003.

2.9 Internal lining panels appropriate to the application and required decoration are applied.

2.10 Typical installation details are shown in Figures 1, 2 and 3.

Figure 1 Typical installation details — section

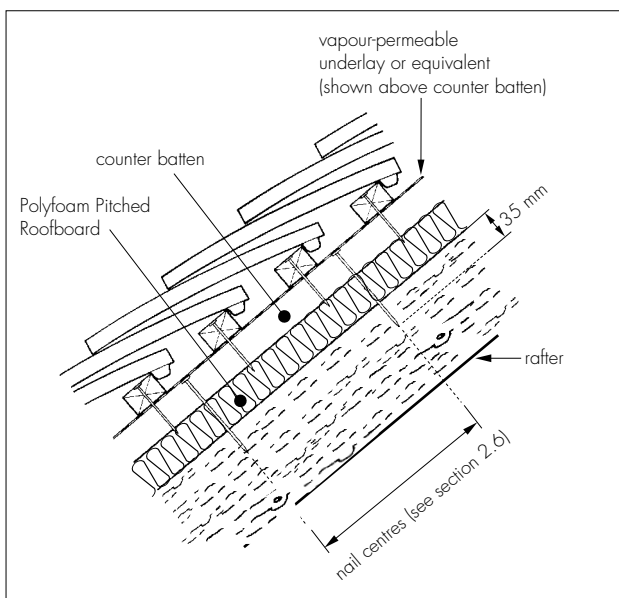


Figure 2 Typical installation details — eaves/ridge detail

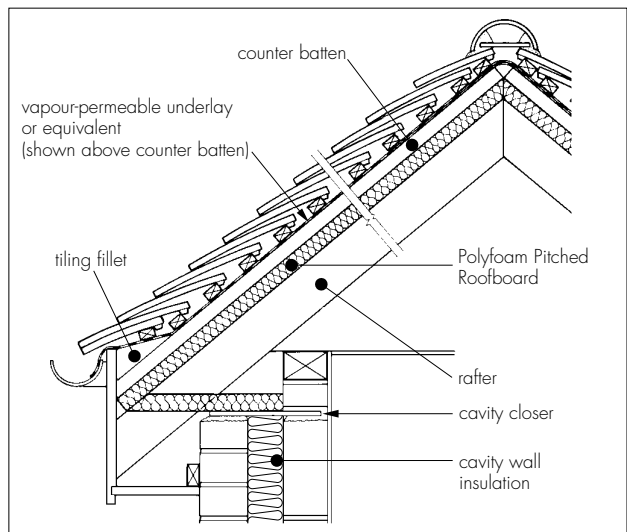
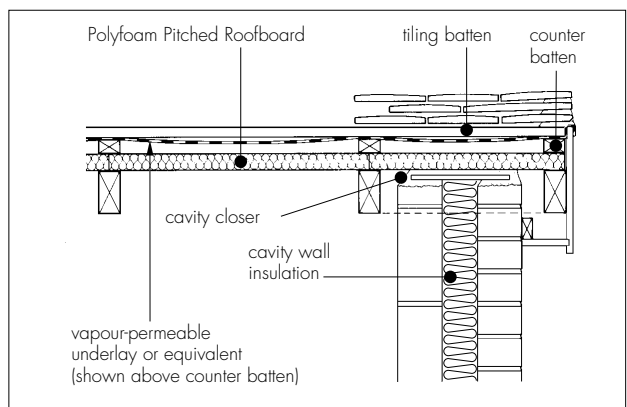


Figure 3 Typical installation details — verge detail



Bibliography

BS 1230-1 : 1985 *Gypsum plasterboard — Specification for plasterboard excluding materials submitted to secondary operations*

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

BS EN 13164 : 2001 *Thermal insulation products for buildings — Factory made products of extruded polystyrene foam (XPS) — Specification*



On behalf of the British Board of Agrément

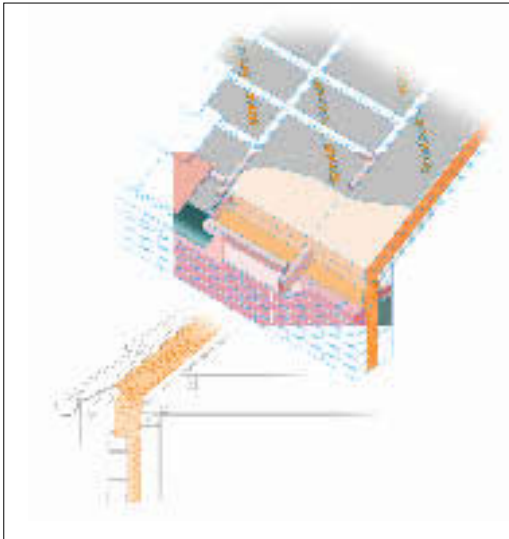
Date of issue: 6th November 2006

Chief Executive



Knauf Insulation Limited

Certificate No 06/4386

DETAIL SHEET 3**POLYFOAM SARKING BOARD****Product**

• THIS DETAIL SHEET RELATES TO POLYFOAM SARKING BOARD FOR USE AS A WARM ROOF INSULATION SYSTEM.

• The product is for use above and between rafters in new constructions where rafters are at 600 mm centres.

• Polyfoam Raftersqueeze (see Detail Sheet 4) is used as an infill panel between rafters to provide additional insulation.

• The product must be used in conjunction with a suitable water vapour permeable roof tile underlay (such as Knauf Breatheline), or an underlay in accordance with BS 5534 : 2003.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification, respectively.

Technical Specification**1 Description**

1.1 Polyfoam Sarking Board comprises extruded polystyrene insulation boards and are manufactured in accordance with BS EN 13164 : 2001, Section 4.2 and the relevant parts of Section 4.3.

1.2 Polyfoam Sarking Board is a T-shaped overlay board.

1.3 The boards incorporate a flame-retardant additive and have nominal characteristics of:

length (mm)	2400
width (mm)	600 ⁽¹⁾
thickness (mm)	75 (55 above rafter)
nominal density (kgm ⁻³)	30
declared thermal conductivity (Wm ⁻¹ K ⁻¹)	0.029

edge 'T' shape rebate — long edges
width/depth of rebate 25 x 20
use above and between rafters

(1) Including rebate.

1.4 The boards are installed in conjunction with an appropriate internal lining board, for example, standard gypsum plasterboard to BS 1230-1 : 1985.

1.5 Ancillary products used with the boards are:

- roof tile underlay — fully-supported vapour permeable (such as Knauf Breatheline)

- Helifix InSkew, Ejot, Hilti fixings and other similar spiral fixings
- galvanized slab nails
- nails, treated timber battens, and tiling laths as used in standard roofing work
- pre-treated battens and tiling laths
- roofing slates or tiles
- sealant.

Installation**2 Procedure**

2.1 Roof rafters must be accurately positioned using Polyfoam Sarking Board as templates (for 50 mm rafters only), if necessary, using the width as the spacing unit.

2.2 A timber stop rail is fixed to the ends of the rafters to act as a fixing for counter battens.

2.3 Boards are laid over the rafters starting at eaves level and working to the ridge. Care should be taken to ensure all joints are close fitted to prevent air leakage.

2.4 At the ridge, both butt tightly against the ridge board.

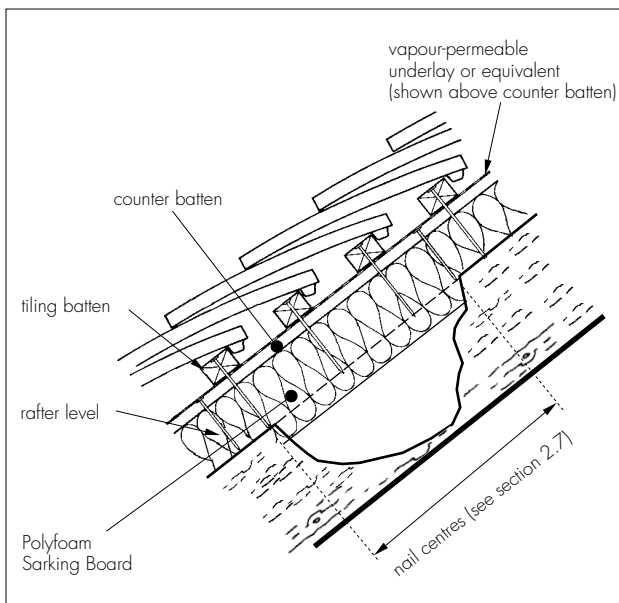
2.5 When boards are cut to fit around openings, eg at the roof perimeter, care should be taken to minimise gaps. All gaps should be filled with expanding polyurethane foam.

2.6 Where additional insulation is required, Polyfoam Raftersqueeze boards (see Detail Sheet 4)

are fitted between rafters under the Polyfoam Sarking Board ensuring a tight fit. The board is designed to compression fit between rafters at 600 mm centres, being slightly oversized in width. For other centres, cutting may be necessary. The board is installed by squeezing an edge to push-fit into position through the underside of the roof, flush with the Polyfoam Sarking Board ensuring no gaps are present.

2.7 Initially, the boards are secured (see Figure 1) by treated softwood counter battens (32 mm by 50 mm minimum) running along each rafter and secured with galvanized nails (145 mm long by 3.35 mm diameter) at a maximum of 300 mm centres. The precise nailing pattern should be determined in accordance with section 8.2 of the Front Sheets.

Figure 1 Typical installation detail



2.8 A vapour-permeable underlay is laid either over or under the counter battens depending on the recommendations of the membrane manufacturer. Tiling battens are secured by nailing through the counter batten and insulation board and into the rafter, using galvanized slab nails (165 mm long by 3.35 mm diameter) parallel to the eaves in accordance with BS 5534 : 2003. In areas of high wind speeds, stronger battens will be required (see Figure 1).

2.9 Alternatively, counter battens (see Figure 2) should be 32 mm thick and secured with slab nails (145 mm long by 3.35 mm diameter). Nails should be spaced at a maximum of 200 mm centres in dupitched roofs and 150 mm centres in monopitched roofs, but the precise nailing pattern

should be determined in accordance with section 8.2 of the Front Sheets.

2.10 Tiling battens are fixed by nailing through the counter battens using galvanized slab nails, in accordance with BS 5534 : 2003 (see Figure 2).

2.11 Typical installation details are shown in Figures 3 to 5.

Finishing

2.12 Concrete or other roof tiles are installed in accordance with the relevant clauses of BS 5534 : 2003.

2.13 The underside of rafters should be lined with plain or foil-backed 12.5 mm thick plasterboard.

Figure 2 Typical installation details

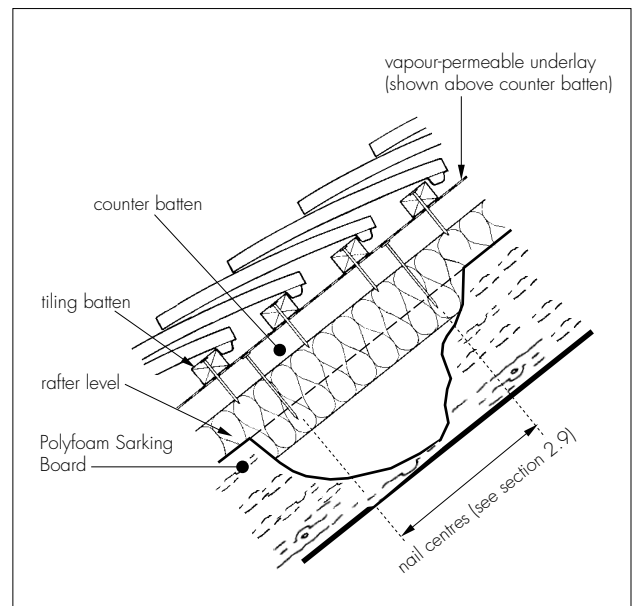


Figure 3 Typical installation details — valley gutter

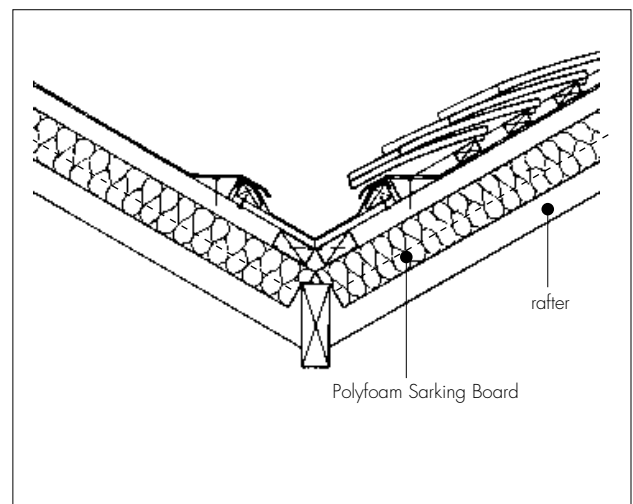


Figure 4 Typical installation details — eaves/ridge detail

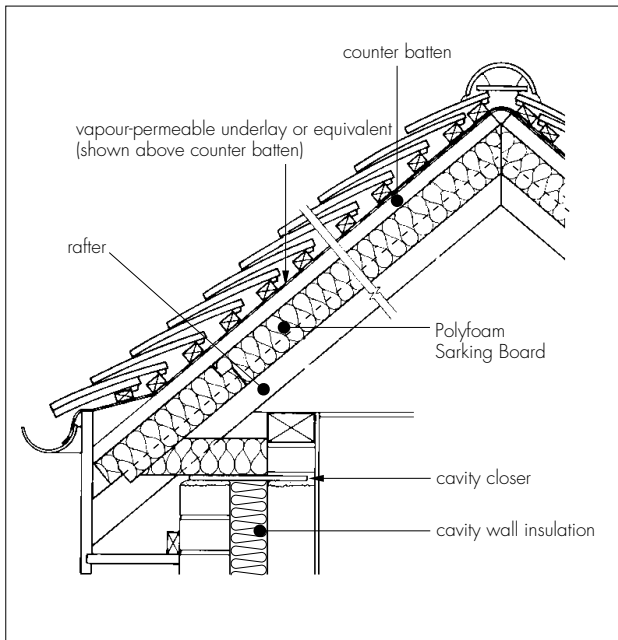
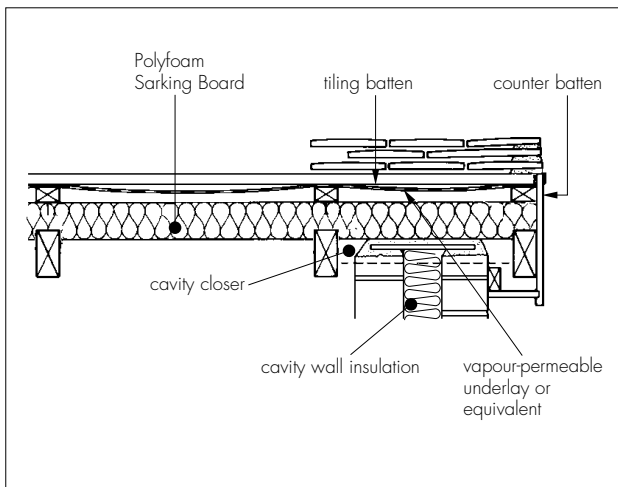


Figure 5 Typical installation details — verge detail



Bibliography

BS 1230-1 : 1985 *Gypsum plasterboard — Specification for plasterboard excluding materials submitted to secondary operations*

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

BS EN 13164 : 2001 *Thermal insulation products for buildings — Factory made products of extruded polystyrene foam (XPS) — Specification*



On behalf of the British Board of Agrément

Date of issue: 6th November 2006

Chief Executive

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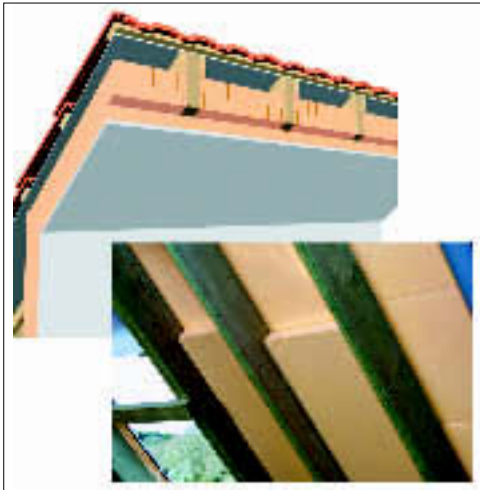
Knauf Insulation Limited

Certificate No 06/4386

DETAIL SHEET 4

POLYFOAM RAFTERSQUEEZE

Product



- THIS DETAIL SHEET RELATES TO POLYFOAM RAFTERSQUEEZE, USED AS A HYBRID WARM ROOF INSULATION SYSTEM.
- The product is for use as an infill panel between rafters to provide insulation in new and existing constructions.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations, general information relating to the product, and the Conditions of Certification, respectively.

Technical Specification

1 Description

1.1 Polyfoam Raftersqueeze comprises extruded polystyrene insulation board manufactured in accordance with BS EN 13164 : 2001, Section 4.2 and the relevant parts of Section 4.3.

1.2 The boards have slotted sections allowing tight compression fitting between rafters.

1.3 The boards incorporate a flame-retardant additive and have nominal characteristics of:

length (mm)	1200
width (mm)	565
thickness (mm)	50, 65, 75
nominal density (kgm ⁻³)	30
thermal conductivity (Wm ⁻¹ K ⁻¹)	0.030
edge (mm)	square/slotted
use	between rafters

1.4 The boards are installed in conjunction with an appropriate internal lining board, for example, standard gypsum plasterboard to BS 1230-1 : 1985 or insulated plasterboard.

1.5 Ancillary products used with the boards are:

- roof tile underlay — fully-supported, permeable (such as Knauf Breatheline)
- galvanized slab nails, ring-shank nails, treated battens and tiling battens, as used in standard roofing work.
- pre-treated battens and tiling battens
- sealant
- roofing slates or tiles.

Installation

2 General

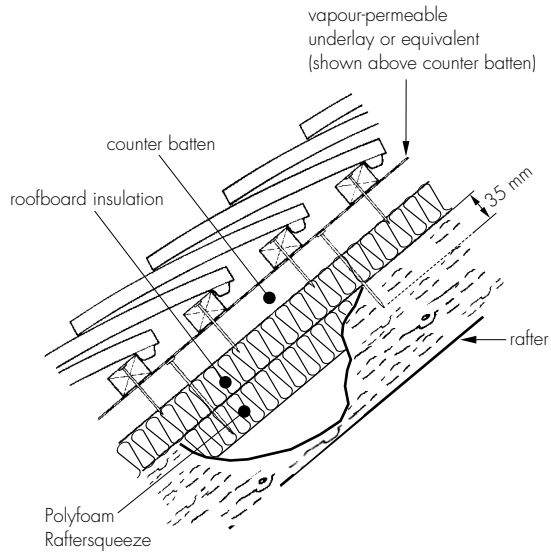
2.1 Polyfoam Raftersqueeze is used in pitched roofing as an infill between rafters. The boards can also be used in conjunction with Polyfoam Pitched Roofboard (Detail Sheet 2) and Polyfoam Sarking Board (Detail Sheet 3).

2.2. The boards can also be used in conjunction with insulating plasterboard laminates.

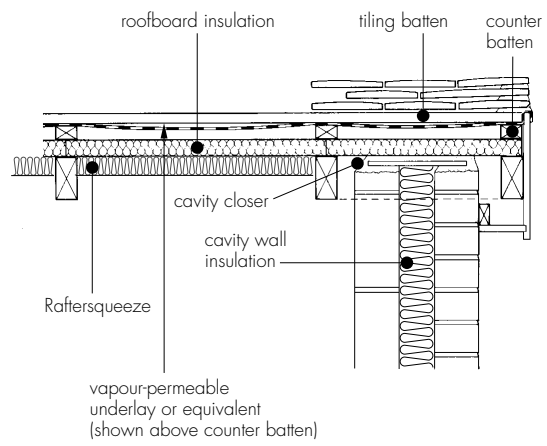
2.3 Typical installation details are shown in Figure 1.

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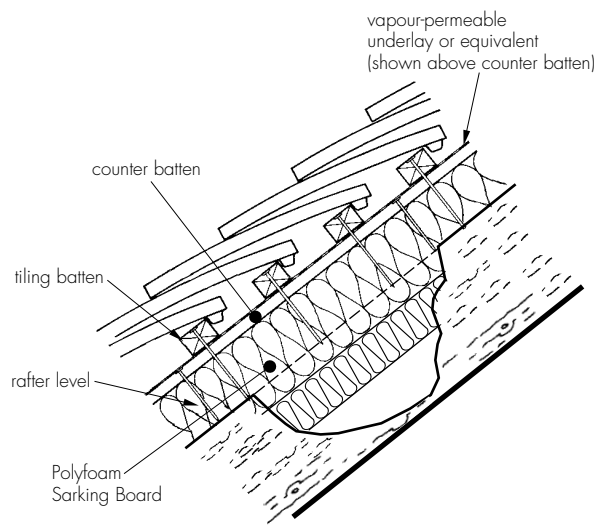
Figure 1 Typical installation detail



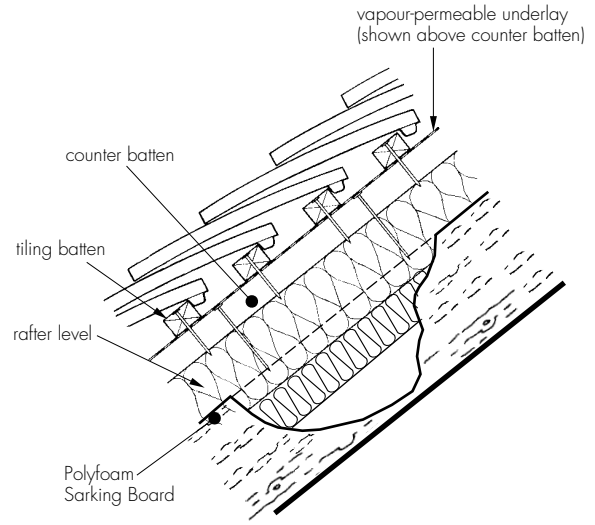
cross-section – above rafter insulation



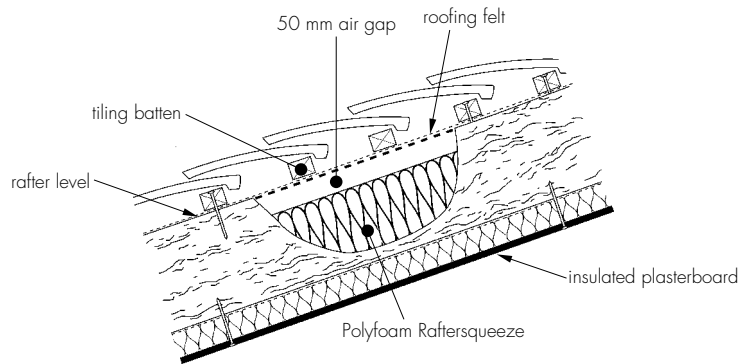
verge detail



cross-section – above/between rafter insulation



cross-section – above/between rafter insulation (alternative method)



cross-section – refurbishment detail using insulated plasterboard

3 Procedure

In conjunction with above and/or between rafter insulation

3.1 Rafter squeeze boards are designed to compression fit between rafters at 600 mm centres and are slightly oversized for this purpose. For other rafter widths cutting may be necessary. The boards are installed by squeezing an edge to push-fit into position through the underside of the roof, flush with the existing insulation ensuring no gaps are present.

In conjunction with insulated plasterboard

3.2 Rafter squeeze boards are installed by squeezing and edged to push-fit into position through the underside of the roof, flush with the underside of the rafter.

3.3 Where the roofing underlay is impervious a minimum 50 mm ventilation gap above the insulation must be maintained between the underlay and the insulation. Where necessary, a retention batten is installed along the side of the rafters to ensure this gap is maintained.

3.4 The boards are installed from eaves to ridge with each board tightly butted against the previous one. Care should be taken to ensure continuity with wall insulation at eaves.

3.5 Insulated plasterboard is installed to the underside of the rafters, flush with the Rafter squeeze and mechanically fixed in accordance with the manufacturer's instructions.

Bibliography

BS 1230-1 : 1985 *Gypsum plasterboard — Specification for plasterboard excluding materials submitted to secondary operations*

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

BS EN 13164 : 2001 *Thermal insulation products for buildings — Factory made products of extruded polystyrene foam (XPS) — Specification*



On behalf of the British Board of Agrément

Date of issue: 6th November 2006

A handwritten signature in black ink, appearing to read 'G. A. Cooper', is written over a light grey background.

Chief Executive

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