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Agrément Certificate
97/3417
Product Sheet 1

HYTHERM WARM-R INSULATION

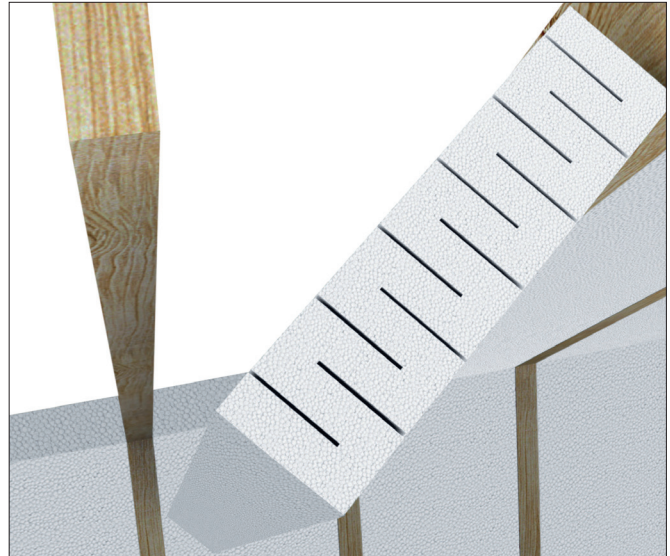
WARM-R HYLOC PITCHED ROOF INSULATION

This Agrément Certificate Product Sheet⁽¹⁾ relates to Warm-R Hyloc Pitched Roof Insulation, comprising slotted or tongue-and-groove expanded polystyrene boards, for use between and over timber pitched roofs of new and existing domestic and non-domestic buildings.

(1) Hereinafter referred to as 'Certificate'.

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 — the EPS 70 and EPS 100 products have a thermal conductivity (λ_D value) of $0.038 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ and $0.035 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ respectively (see section 6).

Condensation — the risk of interstitial condensation should be assessed for each project (see section 7).

Behaviour in relation to fire — the products will not contribute to the development stages of a fire (see section 8).

Durability — the products will have a life equivalent to that of the roof structure in which they are incorporated (see section 13).

The BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'John Albon'.

Date of First issue: 17 September 2014

John Albon — Head of Approvals
Energy and Ventilation

A handwritten signature in black ink, appearing to read 'Claire Curtis-Thomas'.

Claire Curtis-Thomas
Chief Executive

Originally certified on 29 October 1997

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, Warm-R Hyloc Pitched Roof Insulation, if installed, used and maintained in accordance with this Certificate, will satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C2(c)	Resistance to moisture
Comment:		The risk of interstitial condensation must be assessed for each construction. The products can adequately limit the risk of surface condensation. See sections 7.1 and 7.4 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The products can contribute to satisfying this Requirement. See section 6 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation:	26	CO ₂ emission rates for new buildings
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The products can contribute to satisfying these Regulations, but compensating fabric measures may be required. See section 6.2 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The products can satisfy the requirements of this Regulation. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.1.5	Condensation
Comment:		The risk of interstitial condensation must be assessed for each construction. The products can adequately limit the risk of surface condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.3 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ , 3.15.5 ⁽¹⁾⁽²⁾ and 3.15.7 ⁽¹⁾⁽²⁾ . See sections 7.1 and 7.5 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The products can contribute to satisfying clauses, or parts of clauses, 6.1.2 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽²⁾ , 6.2.5 ⁽²⁾ , 6.2.6 ⁽¹⁾ , 6.2.7 ⁽¹⁾ , 6.2.8 ⁽²⁾ , 6.2.9 ⁽¹⁾⁽²⁾ , 6.2.10 ⁽¹⁾ , 6.2.11 ⁽¹⁾⁽²⁾ , 6.2.12 ⁽²⁾ and 6.2.13 ⁽¹⁾⁽²⁾ of these Standards. See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The products can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and, therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. See section 6.2 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments made in relation to these products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012

Regulation:	23	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 13 and the <i>Installation</i> part of this Certificate.
Regulation:	29	Condensation
Comment:		The risk of interstitial condensation must be assessed for each construction. See section 7.1 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The products can contribute to satisfying these Regulations. See section 6 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 sections: 3 *Delivery and site handling* (3.3) and 14 *General* (14.2) of this Certificate.

Additional Information

NHBC Standards 2014

NHBC accepts the use of Warm-R Hyloc Pitched Roof Insulation, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13163 : 2012. An asterisk (*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

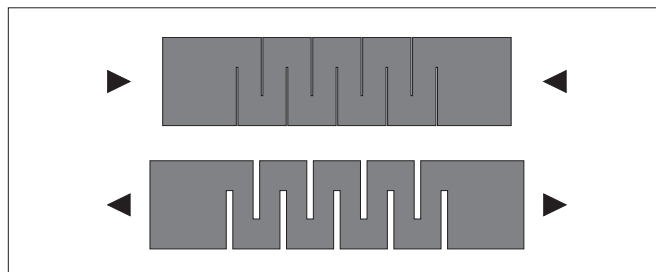
Technical Specification

1 Description

1.1 Warm-R Hyloc Pitched Roof Insulation, is a two-layer expanded polystyrene board system consisting of Hyloc Panels (EPS 70 slotted boards) and Plus Panels (EPS 100 tongue-and-groove boards).

1.2 Hyloc Panels (layer one) are designed to insulate between the rafters. A width variation feature (being slotted) is used to provide width adjustment if required, to ensure a permanent tight fit (see Figure 1). Plus Panel (layer two) provides an interlocking layer over rafters.

Figure 1 Hyloc Panels width adjustment feature



1.3 The boards have the nominal characteristics as shown in Table 1.

Table 1 Nominal characteristics

	Hyloc Panels (EPS 70)	Plus Panels (EPS 100)
Length (mm)	1200	1200
Width (mm)	to suit designed rafter centres	600
Thickness* (mm)	75 to 130 (in 5 mm increments)	40, 50, 60
Thermal conductivity* (λ_D) values ($W \cdot m^{-1} \cdot K^{-1}$)	0.038	0.035
Edge profile	Square	Tongue-and-groove

1.4 Ancillary items for use with this products but outside the scope of this Certificate are:

- water vapour permeable roof tile underlay
- InSkew type fixings or other similar spiral fixings
- galvanized slab nails or ring-shank nails
- timber battens
- vapour control layer (VCL) and plasterboard.

2 Manufacture

2.1 Raw beads are expanded with steam to the required density. An automated process cures and cuts the products to the required size.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Hytherm (Ireland) Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by Loss Prevention Certification Board (Certificate 851).

3 Delivery and site handling

3.1 The products are delivered to site in polythene shrink-wrapped packs containing a label bearing the manufacturer's trade name, product description, and the BBA identification mark incorporating the number of this Certificate.

3.2 It is essential that the products are stored such that they are raised off the ground, are inside or under cover on a flat, dry, level surface in a well-ventilated area. The products must be protected from rain, snow and prolonged exposure to sunlight. Boards that have been allowed to get wet or that are damaged must not be used. Nothing should be stored on top of boards.

3.3 The products must not be exposed to a naked flame or other ignition sources nor to solvents or other chemicals.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Warm-R Hyloc Pitched Roof Insulation.

Design Considerations

4 General

4.1 Warm-R Hyloc Pitched Roof Insulation is for use as thermal insulation in new and existing pitched roofs of dwellings or other buildings with similar temperature and humidity conditions, in conjunction with a vapour-permeable roof tile underlay. The systems are installed above sloping rafters (Plus Panels) and between sloping rafters (Hyloc Panels). For improved thermal/carbon-emissions performance, the designer should consider additional/alternative fabric and/or services measures.

4.2 Roofs should be designed and constructed in accordance with the relevant clauses of BS 5534 : 2003, BS 5250 : 2011, BS 8212 : 1995 and BS EN 1995-1-1 : 2004 and its UK National Annex.

4.3 Although the products will contribute to the buckling and racking strength of the roof, normal cross-bracing must be incorporated to achieve buckling and racking strength requirements.

4.4 During installation, care should be exercised to ensure that the products are not subjected to any construction, or foot traffic loads. Roof timbers of adequate strength should be used to support such loads.

4.5 It is essential that detailing and jointing of the boards achieves a convection-free envelope (see also section 7.3). Any gaps should be filled, and/or taped. Ridges, abutments and penetrations should also be sealed. Flue pipes passing through the insulation should be suitably sleeved.

4.6 Proper care and attention must be given to maintaining the integrity/continuity of the VCL.

4.7 The requirements/provisions of fire stops should be considered with regard to national Building Regulations.

5 Practicability of installation

The products are designed to be installed by a competent general builder, or a contractor, experienced with these types of products.

6 Thermal performance

6.1 Calculations of the thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006 using the thermal conductivity* (λ_D) values of $0.038 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ and $0.035 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ for the Hyloc Panels (EPS 70) and Plus Panels (EPS 100) respectively.

6.2 The U value of a completed roof will depend on the thickness of insulation used, the number and type of fixings and the insulating value of other roof components/layers. Example U values of roofs incorporating the products are shown in Table 2 of this Certificate.

Table 2 U values⁽¹⁾

Element type	Timber dimensions (mm)	Insulation thickness ⁽²⁾ (mm) and location with respect to rafters		U value ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)
		between	outside	
Sloping roof with LR underlay	47 x 150 at 600 centres	105	40	0.25
		130	60	0.20
		(3)	(3)	0.18
		(3)	(3)	0.16
		(3)	(3)	0.15
		(3)	(3)	0.13

(1) Plasterboard taken as 12.5 mm at $0.25 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$.

(2) Nearest available thickness.

(3) See section 4.1.

6.3 The products can contribute to maintaining continuity of thermal insulation at junctions between elements. For Accredited Construction Details the corresponding ψ -values (psi) in BRE Information Paper IP 1/06, 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 *The Government's Standard Assessment Procedure for Energy Rating of Dwellings*, Appendix K and the *iSBEM User Manual* for new-build

Scotland — Accredited Construction Details (Scotland)

Northern Ireland — Accredited Construction Details (version 1.0).

7 Condensation

Interstitial condensation



7.1 Roofs will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2011, Annex D and Annex H and BRE Report BR 262 : 2002 for roofs in England and Wales.

7.2 For the purposes of assessing the risk of interstitial condensation, the product's water vapour resistivity value may be taken from Table 3, which corresponds to the least favourable water vapour resistivity value.

Table 3 Water vapour resistivity

Product grade	Water vapour resistivity (MN·s·g ⁻¹ ·m ⁻¹)
Hyloc Panels	100 to 200
Plus Panels	150 to 350

7.3 To minimise moisture entering the roof an effective VCL such as 125 μ m minimum thickness polyethylene with sealed and lapped joints, should be placed between the insulation and the internal finish.

Surface condensation



7.4 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.35 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point and the junctions are designed in accordance with *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings* TSO 2002, BRE Information Paper IP 1/06 or section 6.3 of this Certificate.



7.5 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $1.2 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2011, Annex H, or section 6.3 of this Certificate. Additional information can be found in BRE Report BR 262 : 2002.

8 Behaviour in relation to fire

8.1 The products are not classified as 'non combustible'.

8.2 When installed with an internal lining board securely fixed to timber, eg 12.5 mm thick plasterboard, the product will be contained between the element and internal lining board until one is destroyed. Therefore, the products will not contribute to the development stages of a fire until the lining is compromised.

8.3 The use of the products will not affect the fire rating obtained by tiled or slated roofs when evaluated by assessment or test to BS 476-3 : 2004.

8.4 Elements must incorporate cavity barriers at edges, around openings and at junctions with fire-resisting elements, and the maximum dimensions of any cavity in any direction must not exceed 10 metres in accordance with the relevant provisions of the national Building Regulations. The design and installation of cavity barriers must take into account any anticipated differential movement.

9 Strength

The products, 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.

10 Structural stability (over rafter application only)

10.1 Resistance to wind uplift will depend largely on the building geometry and its geographical location and should be calculated in accordance with BS EN 1991-1-4 : 2005. Snow loadings should be calculated in accordance with BS EN 1991-1-3 : 2003.

10.2 When calculating the fixing spacing required to resist the calculated loadings, the requirements of BS EN 1995-1-1 : 2004 should be followed where possible. Further guidance can be obtained from the Certificate holder. The Certificate holder must advise on the use of the correct proprietary fixings and approved nails and fixing capacity in accordance with BS EN 1995-1-1 : 2004.

11 Resistance to moisture

An effective roof tile underlay will protect the products from wind-driven snow or rain penetrating the tiles/slates in service.

12 Maintenance

As the products are placed within the roof and have suitable durability (see section 13), maintenance is not required.

13 Durability



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

Installation

14 General

14.1 Installation of Warm-R Hyloc Pitched Roof Insulation must be in accordance with the relevant clauses of BS 5534 : 2003, the manufacturer's instructions and can be carried out in all conditions normal to roofing work.

14.2 The boards are light to handle but some handling difficulties may be experienced in windy conditions. Since the products will not support the weight of operatives, appropriate care must be taken during installation and tiling.

14.3 The products can be cut easily using a sharp knife or fine tooth saw but care must be taken to prevent damage, particularly to edges. Damaged boards should not be used.

14.4 A tight fit must be ensured between the products and rafters, the products at the ridge and at roof/wall junctions.

14.5 It is important to fill/seal gaps and joints in the insulation envelope (see section 4.5).

14.6 Where the products are installed in traditional timber-frame construction, cavity barriers at the junction of the external wall and roof space should be provided.

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

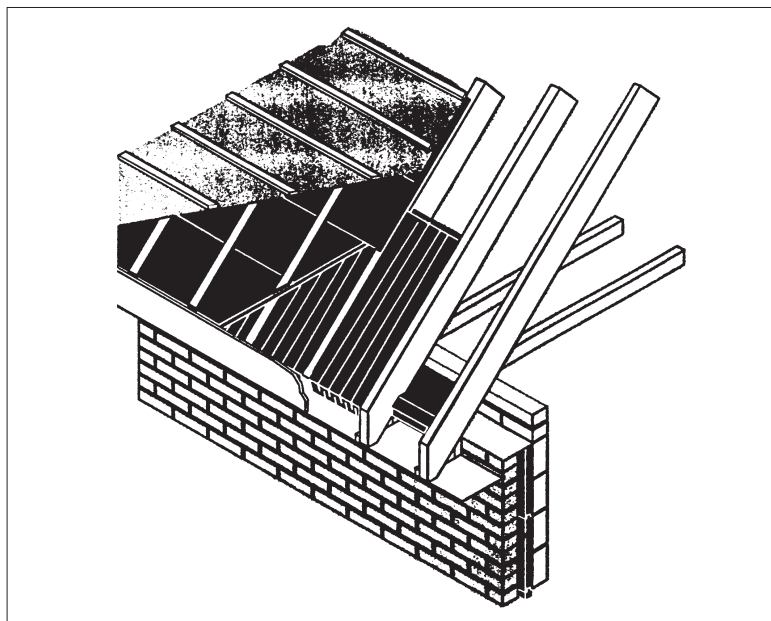
14.8 When applying roof tiles or slates to a warm roof construction, the recommendations of the manufacturer must be followed.

14.9 The products should be installed in conjunction with an appropriate internal lining board for example standard gypsum plasterboard to BS EN 520 : 2004 in accordance with BS 8212 : 1995.

15 Procedure

15.1 The first run of Hyloc Panels are fitted between rafters keeping panels flush with the top face of the rafter and closely butted at ends, commencing at the eaves (see Figure 2).

Figure 2 Two-layer pitched roof system

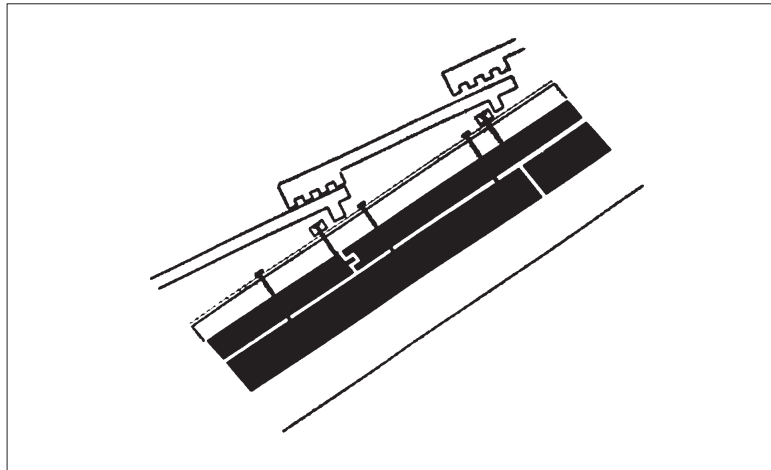


15.2 The first run of Plus Panels is laid over the rafters running across the roof and held in position by a counter batten (44 mm by 35 mm) lightly tacked in place along the line of the rafters.

15.3 Remaining runs of Plus Panels are positioned with the tongue-and-groove fully engaged and vertical joints staggered.

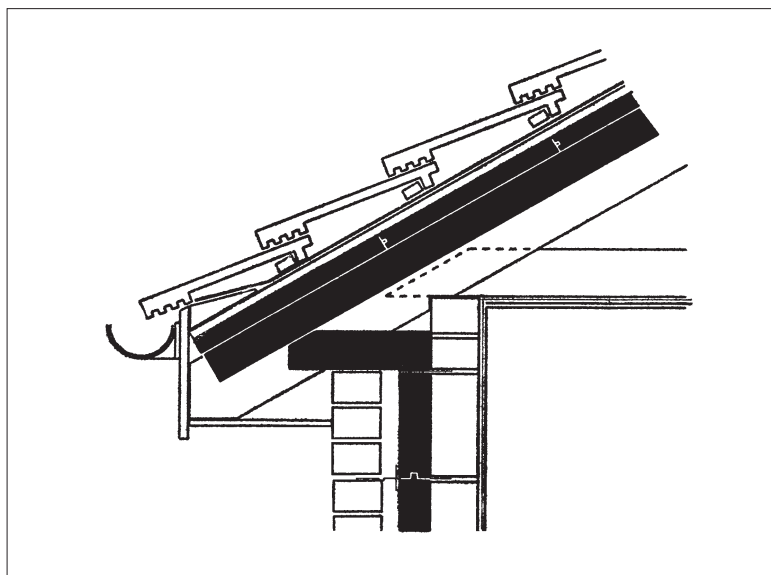
15.4 The procedure is repeated using crawling boards until both layers reach ridge level. The counter batten must be nailed firmly in place (see Figure 3).

Figure 3 Typical fixing method



15.5 vapour-permeable roof tile underlay is positioned over the counter battens, in accordance with the manufacturer's instructions. A continuous timber fillet to support the underlay below the lowest row of tiles is recommended (see Figure 4).

Figure 4 Overhanging eaves detail



15.6 Any gaps must be sealed with flexible sealant or expanding foam.

15.7 Where required, a sealed polythene VCL with a minimum thickness 125 µm with lapped and sealed joints is installed before applying the internal finish.

Technical Investigations

16 Investigations

16.1 An examination was made of test data to BS EN 13163 : 2012 relating to:

- density
- water vapour resistance
- dimensional accuracy
- dimensional stability
- thermal conductivity
- dimensions
- squareness
- flatness
- density
- compressive strength at 10% compression.

16.2 An assessment was made of typical constructions which achieve the design U values.

16.3 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.

Bibliography

- BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*
- BS 8212 : 1995 *Code of practice for Dry lining and partitioning using gypsum plasterboard*
- BS 5250 : 2011 *Code of practice for control of condensation in buildings*
- BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*
- BS EN 520 : 2004 *Gypsum plasterboards — Definitions, requirements and test methods*
- BS EN 1991-1-3 : 2003 *Eurocode 1 : Actions on structures — General actions — Snow loads*
- BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*
- BS EN 1995-1-1 : 2004 *Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*
- NA to BS EN 1995-1-1 : 2004 *UK National Annex to Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*
- BS EN 13163 : 2012 *Thermal insulation products for buildings — Factory made expanded polystyrene (EPS) products — Specification*
- BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- BS EN ISO 9001 : 2008 *Quality management systems. Requirements*
- BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*
- BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*
- BRE Report (BR 443 : 2006) *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 issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

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

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

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

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

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

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

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