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**Agrément Certificate**

**17/5405**

Product Sheet 6

**CELOTEX INSULATION**

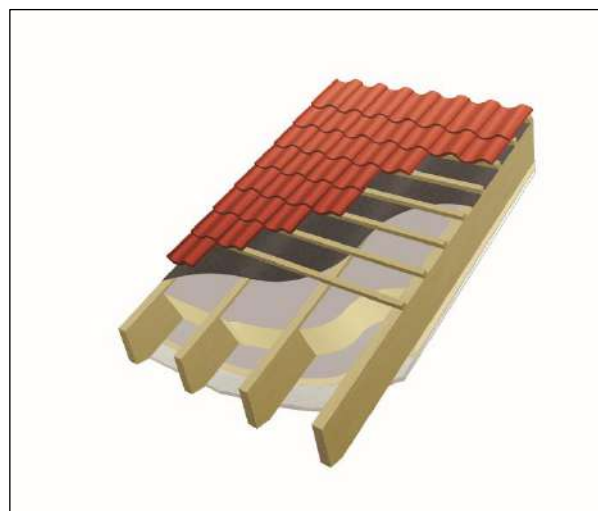
**CELOTEX RANGE OF PIR INSULATION BOARDS FOR PITCHED ROOF INSULATION**

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to the Celotex Range of PIR Insulation Boards for Pitched Roof Insulation, comprising rigid polyisocyanurate (PIR) foam boards with foil-facings, for use as insulation installed above, between and/or below rafters in tiled or slated pitched roofs in 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 products have declared thermal conductivities ( $\lambda_D$ ) of 0.023 W·m<sup>-1</sup>·K<sup>-1</sup> for Celotex TB3000 and GA3000, and 0.022 W·m<sup>-1</sup>·K<sup>-1</sup> for Celotex TB4000, GA4000 and XR4000 (see section 6).

**Condensation risk** — the products can contribute to limiting the risk of condensation (see section 7).

**Durability** — the products are durable, rot proof and sufficiently stable to remain effective as insulation for the life of the building (see section 11).

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

Date of Third issue: 20 November 2018

John Albon – Head of Approvals  
Construction Products

Originally certificated on 23 January 2018

Claire Curtis-Thomas  
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.*

*Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.*

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## Regulations

In the opinion of the BBA, Celotex Range of PIR Insulation Boards for Pitched Roof Insulation, if installed, used and maintained in accordance with this Certificate, can 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)

|                     |                 |   |
|---------------------|-----------------|---|
| <b>Requirement:</b> | <b>C2(c)</b>    | <b>Resistance to moisture</b>   |
| Comment:            |                 | The products can contribute to satisfying this Requirement. See sections 7.1 and 7.5 of this Certificate. |
| <b>Requirement:</b> | <b>L1(a)(i)</b> | <b>Conservation of fuel and power</b>   |
| Comment:            |                 | The products can contribute to satisfying this Requirement. See section 6 of this Certificate.            |
| <b>Regulation:</b>  | <b>7</b>        | <b>Materials and workmanship</b>  |
| Comment:            |                 | The products are acceptable. See section 11 and the <i>Installation</i> part of this Certificate.         |
| <b>Regulation:</b>  | <b>26</b>       | <b>CO<sub>2</sub> emission rates for new buildings</b>  |
| <b>Regulation:</b>  | <b>26A</b>      | <b>Fabric energy efficiency rates for new dwellings (applicable to England only)</b>                      |
| <b>Regulation:</b>  | <b>26A</b>      | <b>Primary energy consumption rates for new buildings (applicable to England only)</b>                    |
| <b>Regulation:</b>  | <b>26B</b>      | <b>Fabric performance values for new dwellings (applicable to Wales only)</b>                             |
| Comment:            |                 | The products can contribute to satisfying these Regulations. See section 6 of this Certificate.           |



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

|                    |             |   |
|--------------------|-------------|---|
| <b>Regulation:</b> | <b>8(1)</b> | <b>Durability, workmanship and fitness of materials</b>   |
| Comment:           |             | The products are acceptable. See section 11 and the <i>Installation</i> part of this Certificate.   |
| <b>Regulation:</b> | <b>9</b>    | <b>Building standards applicable to construction</b>  |
| Standard:          | 3.15        | Condensation  |
| Comment:           |             | The products can contribute to satisfying this Standard, with reference to clauses 3.15.1 <sup>(1)(2)</sup> , 3.15.3 <sup>(1)(2)</sup> , 3.15.4 <sup>(1)(2)</sup> , 3.15.5 <sup>(1)(2)</sup> and 3.15.7 <sup>(1)(2)</sup> . See sections 7.1 and 7.6 of this Certificate.   |
| Standard:          | 6.1(b)      | Carbon dioxide emissions  |
| Standard:          | 6.2         | Building insulation envelope  |
| Comment:           |             | The products can contribute to satisfying this Standard with reference to clauses or parts of clauses 6.1.1 <sup>(1)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)(2)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.4 <sup>(1)(2)</sup> , 6.2.5 <sup>(2)</sup> , 6.2.6 <sup>(1)(2)</sup> , 6.2.7 <sup>(1)</sup> , 6.2.8 <sup>(2)</sup> , 6.2.9 <sup>(1)(2)</sup> , 6.2.10 <sup>(1)</sup> , 6.2.11 <sup>(1)(2)</sup> , 6.2.12 <sup>(2)</sup> and 6.2.13 <sup>(1)(2)</sup> . 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. In addition, the product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 <sup>(1)(2)</sup> [Aspects 1 <sup>(1)(2)</sup> and 2 <sup>(1)</sup> ], 7.1.6 <sup>(1)(2)</sup> [Aspects 1 <sup>(1)(2)</sup> and 2 <sup>(1)</sup> ] and 7.1.7 <sup>(1)(2)</sup> [Aspect 1 <sup>(1)(2)</sup> ]. See section 6.1 of this Certificate. |

|                    |           |   |
|--------------------|-----------|---|
| <b>Regulation:</b> | <b>12</b> | <b>Building standards applicable to conversions</b>   |
| <b>Comment:</b>    |           | All comments given for the products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> . |
|                    |           | (1) Technical Handbook (Domestic).<br>(2) Technical Handbook (Non-Domestic).  |



## The Building Regulations (Northern Ireland) 2012 (as amended)

|                    |                 |   |
|--------------------|-----------------|---|
| <b>Regulation:</b> | <b>23</b>       | <b>Fitness of materials and workmanship</b>   |
| <b>Comment:</b>    |                 | The products are acceptable. See section 11 and the <i>Installation</i> part of this Certificate. |
| <b>Regulation:</b> | <b>29</b>       | <b>Condensation</b>   |
| <b>Comment:</b>    |                 | The products can contribute to satisfying this Regulation. See section 7.1 of this Certificate.   |
| <b>Regulation:</b> | <b>39(a)(i)</b> | <b>Conservation measures</b>  |
| <b>Regulation:</b> | <b>40(2)</b>    | <b>Target carbon dioxide emission rate</b>  |
| <b>Comment:</b>    |                 | The products can contribute to satisfying these Regulations. See section 6 of this Certificate.   |

## Construction (Design and Management) Regulations 2015

## Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: *3 Delivery and site handling (3.4) and 12 General (12.2)* of this Certificate.

## Additional Information

### NHBC Standards 2018

In the opinion of the BBA, the Celotex Range of PIR Insulation Boards for Pitched Roof Insulation, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements 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 13165 : 2012. An asterisk (\*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

## Technical Specification

### 1 Description

The Celotex Range of PIR Insulation Boards for Pitched Roof Insulation comprises rigid polyisocyanurate foam (PIR) boards with foil-facings. The nominal characteristics of the products are given in Table 1.

**Table 1 Nominal characteristics**

| <b>Product</b> | <b>Facings</b>   | <b>Board size (mm)</b> | <b>Thickness range (mm)</b> | <b>Edge profile</b> |
|----------------|--|------------------------|-----------------------------|---------------------|
| Celotex TB3000 | Composite foil-facing both sides (printed on one side only) <sup>(1)</sup> | 1200 x 2400            | 12 to 45                    | square edge         |
| Celotex GA3000 | Composite foil-facing both sides (printed on one side only) <sup>(1)</sup> | 1200 x 2400            | 50 to 95                    | square edge         |
| Celotex TB4000 | Composite foil-facing both sides (printed on one side only) <sup>(1)</sup> | 1200 x 2400            | 12 to 45                    | square edge         |
| Celotex GA4000 | Composite foil-facing both sides (printed on one side only) <sup>(1)</sup> | 1200 x 2400            | 50 to 100                   | square edge         |
| Celotex XR4000 | Composite foil-facing both sides (printed on one side only) <sup>(1)</sup> | 1200 x 2400            | 110 to 200                  | square edge         |

(1) See sections 4.3 and 12.3.

## 2 Manufacture

2.1 Celotex PIR insulation is manufactured by a lamination process, formed between aluminium foil-facings that are glued together in a continuous laminator, where the adhesive is a mixture of two primary chemicals, polyol and MDI. An added blowing agent causes this adhesive to expand into foam that hardens, which is then cut to its finished board size and packed.

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

- agreed with the Certificate holder/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 Celotex has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 and BS EN ISO 14001 : 2015 by SGS UK Ltd (Certificate Numbers GB91/504 and GB11/83526).

## 3 Delivery and site handling

3.1 The products are delivered to site in polythene-wrapped packs. Each pack of boards contains a label with the manufacturer’s name, board dimensions and the BBA logo incorporating the number of this Certificate.

3.2 The products must be protected from prolonged exposure to sunlight, and stored dry, flat and raised above ground level (to avoid contact with ground moisture). Where possible, packs should be stored inside. If stored outside, they should be under cover, or protected with opaque polythene sheeting.

3.3 The products are light and easy to handle and care should be taken to avoid crushing the edges or corners. If damaged, the products should be discarded.

3.4 The products must not be exposed to open flame or other ignition sources, or to solvents or other chemicals.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Celotex Range of PIR Insulation Boards for Pitched Roof Insulation.

### 4 Use

4.1 The Celotex Range of PIR Insulation Boards for Pitched Roof Insulation is suitable for use as insulation within tiled or slated pitched roofs, in conjunction with internal lining board, roof tile underlay, timber counter battens and tiling battens in tiled or slated, in new and existing domestic or non-domestic buildings, and may be installed:

- above sloping rafters
- above and between sloping rafters
- between and below sloping rafters.

4.2 Roofs should be designed and constructed in accordance with the relevant clauses of BS 5250 : 2011, BS 5534 : 2014, BS 8212 : 1995 and BS EN 1995-1-1 : 2004.

4.3 For optimum thermal performance, the boards must be installed with the correct orientation of their printed foil-facings. See section 12.3.

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

4.5 It is essential that detailing and jointing of the boards achieves a convection-free envelope of high vapour resistance. 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 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 product, dependent on the specification of the roof tile underlay used (see section 7.2).

### 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) of specific roof constructions should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using the following values:

Celotex TB3000 and GA3000

- PIR insulation core — declared thermal conductivity( $\lambda_D$ )\* of  $0.023 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
- composite foil-facings both sides, printed on one side only — for unprinted facing, an aged emissivity ( $\epsilon$ ) (to BS EN 15976 : 2011) of 0.05.

Celotex TB4000, GA4000 and XR4000

- PIR insulation core — declared thermal conductivity( $\lambda_D$ )\* of  $0.022 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$
- composite foil-facings both sides, printed on one side only — for unprinted facing, an aged emissivity ( $\epsilon$ ) (to BS EN 15976 : 2011) of 0.05.

6.2 The U value of a completed roof will depend on the insulation thickness, and the number and type of fixings, and the roof structure and its internal finish. Calculated U values for example constructions in accordance with the national Building Regulations are given in Table 2.

Table 2 Example U values — pitched roof

| Target U value<br>( $W \cdot m^{-2} \cdot K^{-1}$ ) | Celotex TB3000, TB4000, GA3000, GA4000, XR4000 insulation thickness<br>(mm) |                     |   |
|---|---|---------------------|---|
|   | Over rafters <sup>(6)</sup>   | Between rafters     | Between and under rafters <sup>(7)</sup>      |
| 0.13  | 165 <sup>(5)</sup>  | —                   | *120 <sup>(5)</sup> + 85 <sup>(4)</sup>       |
| 0.15  | 140 <sup>(5)</sup>  | —                   | 100 <sup>(4)</sup> + 80 <sup>(4)</sup>        |
| 0.16  | 130 <sup>(5)</sup>  | —                   | 100 <sup>(4)</sup> + 70 <sup>(4)</sup>        |
| 0.18  | 110 <sup>(5)</sup>  | *200 <sup>(5)</sup> | 100 <sup>(4)</sup> + 50 <sup>(4)</sup>        |
| 0.20  | 95 <sup>(4)</sup>   | *165 <sup>(5)</sup> | 100 <sup>(4)</sup> + 40 <sup>(1)</sup> or (2) |
| 0.25  | 80 <sup>(3)</sup> or 75 <sup>(4)</sup>                                      | *130 <sup>(5)</sup> | 95 <sup>(4)</sup> + 20 <sup>(1)</sup> or (2)  |

\*With additional timber battens added beneath 150 mm rafters, to maintain 50 mm ventilated cavity above the insulation

(1) Celotex TB3000

(2) Celotex TB4000

(3) Celotex GA3000

(4) Celotex GA4000

(5) Celotex XR4000

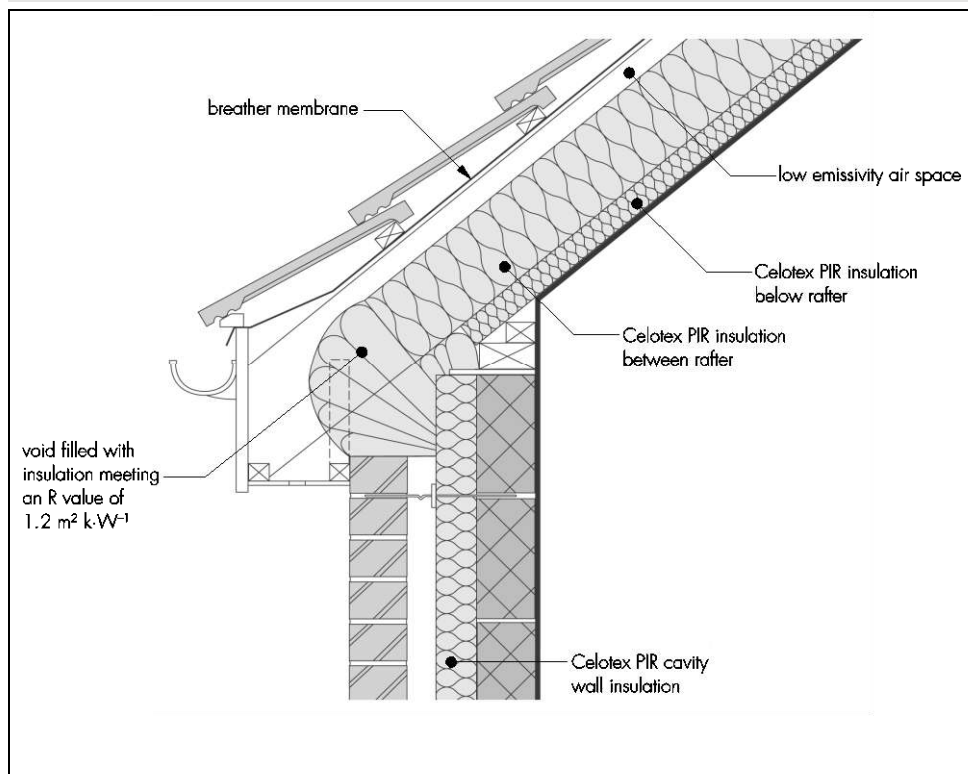
(6) 11 fixings per  $m^2$  – stainless steel ( $\lambda = 17 W \cdot m^{-1} \cdot K^{-1}$ ) with a cross-sectional area of  $9 mm^2$

(7) 14.58 fixings per  $m^2$  – mild steel ( $\lambda = 50 W \cdot m^{-1} \cdot K^{-1}$ ) with a cross-sectional area of  $10.46 mm^2$  for the insulation under the rafters.

## Junctions

6.3 Care must be taken in the overall design and construction of junctions with other elements and openings to minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations. An example of an acceptable junction detail is shown in Figure 1.

Figure 1 Junction between roofs and walls



## 7 Condensation risk

### 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 H and the relevant guidance.

7.2 The foil-facings have a water vapour resistance of  $1000 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$  and the insulation core has a water vapour resistivity of  $300 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}\cdot\text{m}^{-1}$  and, when installed with tightly butted joints and filled/sealed gaps and joints, will provide a continuous convection-free envelope of high vapour resistance. Therefore, a suitable vapour-permeable (LR) roof tile underlay may be laid over the insulation boards without ventilated air space. When using a high resistance (type HR) underlay, the space below it must be ventilated in accordance with BS 5250 : 2011 Annex H.

7.3 Where the products are installed in a roof with either a horizontal or sloping ceiling (ie room-in-the-roof), a 'warm roof' space is created and ventilation should be designed in accordance with BS 5250 : 2011 Annex H. However, any insulation in a horizontal ceiling should be removed.

7.4 Where high humidity may be expected, a vapour control layer (VCL), such as 0.125 mm thickness polyethylene with sealed and lapped joints, should also be installed unless a site-specific condensation risk analysis in accordance with BS EN 15026 : 2007 indicates otherwise.

### Surface condensation



7.5 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed  $0.35 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$  at any point, and the junctions with walls are designed in accordance with section 6.3 of this Certificate.



7.6 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. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 6.3 of this Certificate.

## 8 Strength and stability (over rafter application only)

8.1 The products, when installed in accordance with the manufacturer's instructions and this Certificate, will resist the loads likely to be met in service. During installation, care should be taken 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.

8.2 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 and its UK National Annex. Snow loadings should be calculated in accordance with BS EN 1991-1-3 : 2003 and its UK National Annex.

8.3 The Certificate holder and fixing manufacturer must advise on the use of the correct proprietary fixings and fixing capacity. When considering this and calculating the fixing spacing required to resist the calculated loadings, the requirements of BS EN 1995-1-1 : 2004 and its National Annex must be followed.

## 9 Behaviour in relation to fire

9.1 The Certificate holder has declared a reaction to fire classification\* to EN 13501-1 : 2007 of Class E for TB4000, GA4000 and XR4000 products, and NPD (no performance determined) for TB3000 and GA3000 products.

9.2 When installed between, under or over rafters, with an internal lining board securely fixed to timber (eg 12.5 mm thick plasterboard), the products 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.



9.3 Elements must incorporate cavity barriers at edges, around openings, at junctions with fire-resisting elements and in cavities, in accordance with the relevant provisions of the national Building Regulations.

## 10 Maintenance

As the products are confined within the pitched roof by the overlay and have suitable durability (see section 11), maintenance is not required.

## 11 Durability



The products are durable, rot proof and sufficiently stable to remain effective as an insulation for the life of the building.

## Installation

## 12 General

12.1 Installation of the Celotex Range of PIR Insulation Boards for Pitched Roof Insulation must be in accordance with the relevant clauses of BS 5534 : 2014 and the manufacturer's instructions. Installation can be carried out in all conditions normal to roofing work.

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

12.3 The products have printed logos applied to the outer foil-facing on one side only. To ensure optimum thermal performance, the boards must be installed with the unprinted foil-face always facing the cavity side.

12.4 The products can be cut easily using a sharp knife or fine-tooth saw. Care must be taken to prevent damage, particularly to edges. Damaged boards should not be used. Small areas of damaged facing may be repaired with self-adhesive aluminium foil tape.

12.5 It is important to fill/seal gaps and joints in the insulation envelope, including at all service penetrations. See section 4.5 of this Certificate.

12.6 For installation of roof tiles or slates and internal lining boards, see sections 13.15 and 13.16.

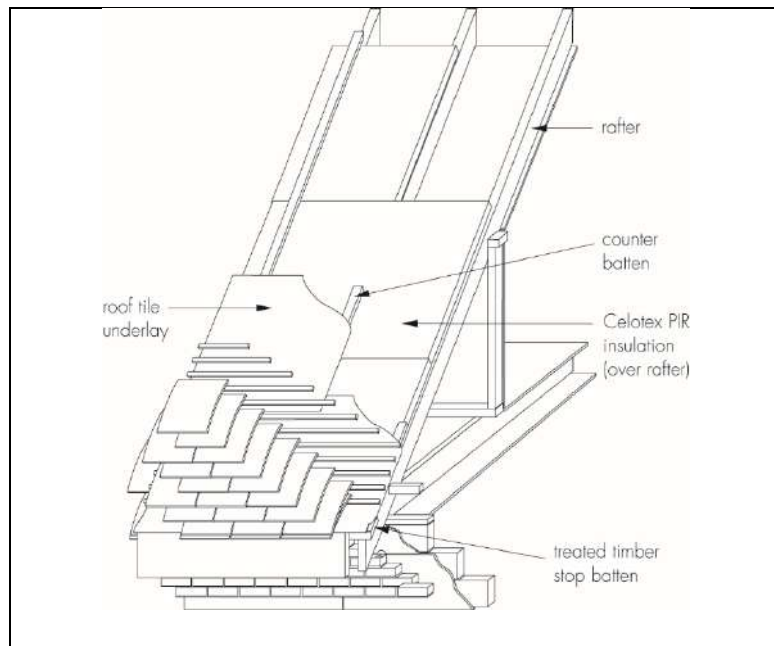
## 13 Procedure

### Insulation above rafters

13.1 A treated-timber stop batten, the same thickness as the insulation board, is fixed to the rafters at eaves level, and the insulation boards are butted directly against it (see Figure 2).



**Figure 2** *Insulation above rafters*



13.2 The insulation boards should be temporarily fixed onto the rafters using broad-headed clout nails and with joints running up the roof slope occurring over the rafters. Cross-joints may be unsupported. For correct orientation of boards, see section 12.3.

13.3 All insulation board joints should be tightly butted. At ridges and verges, the boards should be cut to achieve a close butt joint.

13.4 Counter battens, underlay and tiling battens should be installed using one of the following methods of fixing.

**Method 1**

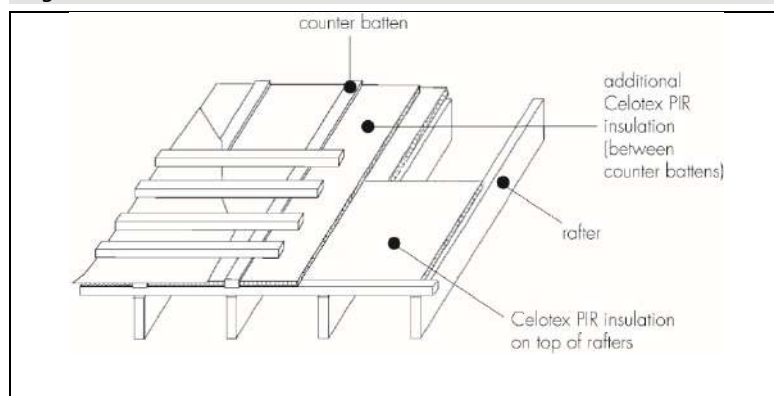
13.5 Counter battens (38 by 50 mm) should be fixed using suitable fixings at maximum centre-to-centre spacing of 400 mm. These fixings should pass through the counter batten and insulation and penetrate the supporting timber by a minimum of 37 mm.

13.6 The roof tile underlay should be installed in the conventional manner. Tiling battens should be nailed through the underlay into the counter batten in accordance with BS 5534 : 2014 at the required batten gauge. Where permeable tile underlays are used, they should be installed in accordance with the appropriate Agrément Certificate.

**Method 2**

13.7 Where additional insulation is required, an additional layer of insulation can be installed between the counter battens, but the counter battens should be at least 12 mm thicker than the insulation boards (see Figure 3).

**Figure 3** *Additional insulation*

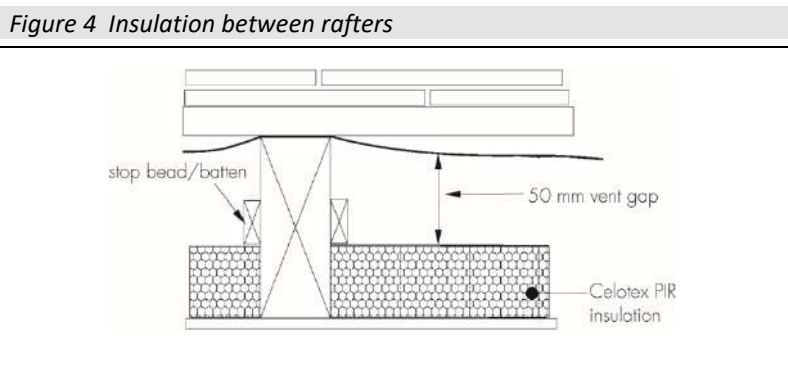


### Insulation between and above rafters

13.8 The product is cut and fitted tightly between the rafters and is supported with stop beads or battens. It is to be installed flush with the top of the rafters. The second layer of insulation is then installed above the rafters as described in sections 13.1 to 13.3

### Insulation between and below rafters

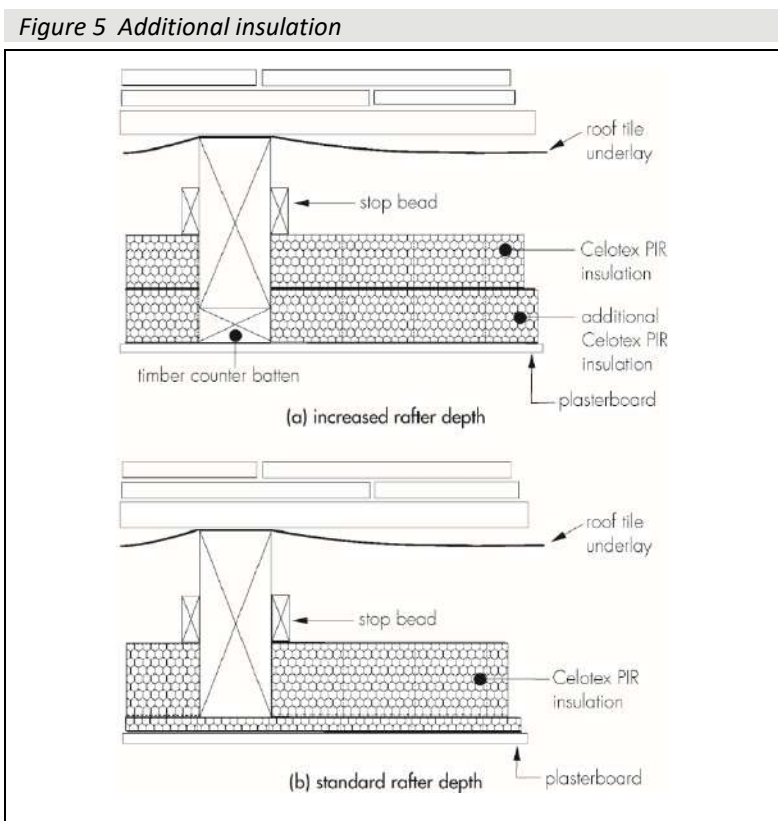
13.9 Following completion of the roof structure, the products are cut and fitted from the inside, tightly between the rafters and flush with the underside, and butted against stop beads or battens which maintain a ventilated air gap at least 50 mm deep (see Figure 4). Where vapour-permeable (LR) roof tile underlays are used, the insulation may be installed without a ventilated air space (see section 7.2).



13.10 A VCL is fitted to the underside of the rafters.

13.11 Where the rafter depth cannot accommodate the required thickness of insulation and maintain the required 50 mm ventilated gap, one of the following options may be considered:

- the rafter depth is increased by attaching timber counter battens to the underside of the rafter [see Figure 5(a)], or preferably,
- a second layer of insulation is added to the underside of the rafters [see Figure 5(b)].

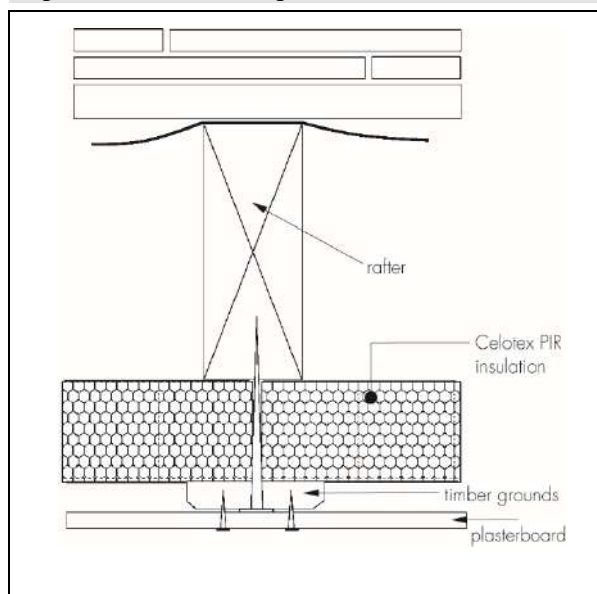


13.12 Boards may be attached to the underside of rafters either as a single layer or in conjunction with insulation boards between the rafters.

13.13 Boards are temporarily fixed with broad-headed clout nails, and joints butted and taped with a self-adhesive aluminium foil tape to provide an effective VCL and air permeability barrier. Appropriate internal lining panels may then be fixed through the insulation and into the underside of the rafters.

13.14 Where the insulation thickness makes securing of the internal lining panels impractical, timber grounds of the appropriate depth may be fixed through to the rafters, and the panels secured to the grounds (see Figure 6).

Figure 6 Added timber grounds



## Finishing

13.15 Roof tiles or slates are installed in accordance with the relevant clauses of BS 5534 : 2014. When applying roof tiles or slates, the recommendations of the manufacturer should be followed.

13.16 Internal lining panels appropriate to the application, for example standard gypsum plasterboard to BS EN 520 : 2004, should be fixed in accordance with BS 8212 : 1995 and the required decoration applied.

## Technical Investigations

### 14 Tests

Results of tests were assessed to determine:

- thermal conductivity
- compressive strength
- load compression characteristics
- effect of cyclic loading.

### 15 Investigations

15.1 An examination was made of data relating to:

- dimensional accuracy
- density
- compressive strength
- dimensional stability

- water vapour transmission
- reaction to fire.

15.2 A condensation risk analysis was carried out.

15.3 A series of U value calculations was carried out.

15.4 A calculation was undertaken to confirm the declared thermal conductivity.

15.5 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 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS 5534 : 2014 + A2 : 2018 *Code of practice for slating and tiling (including shingles)*

BS 8212 : 1995 *Code of practice for dry lining and partitioning using gypsum plasterboard*

BS EN 520 : 2004 + A1 : 2009 *Gypsum plasterboards — Definitions, requirements and test methods*

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BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

### 16 Conditions

16.1 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.

16.2 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.

16.3 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.

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

16.5 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.

16.6 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.