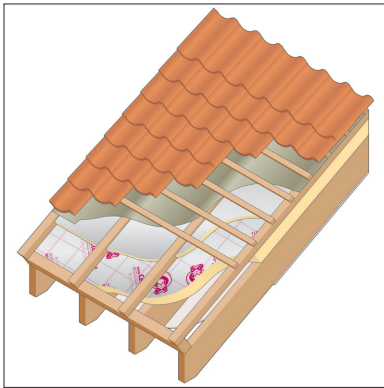


Celotex Limited**CELOTEX T-BREAK TB3000, TUFF-R GA3000 AND EXTRA-R XR3000 (PITCHED ROOF INSULATION)**

Certificate No 95/3197

DETAIL SHEET 3
Third issue***Product**

- THIS CERTIFICATE RELATES TO CELOTEX T-BREAK TB3000, TUFF-R GA3000 AND EXTRA-R XR3000 (PITCHED ROOF INSULATION).
- The products are for use as insulation above, between and/or below rafters in tiled or slated pitched roofs designed and constructed in accordance with the relevant clauses of BS 5534 : 2003.
- The boards are 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 loft space.
- The products must be used in conjunction with a suitable water vapour permeable roof tile underlay.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the Conditions of Certification.

Technical Specification**1 Description**

1.1 Celotex T-Break TB3000, tuff-R GA3000 and Extra-R XR3000 (Pitched Roof Insulation) are rigid polyisocyanurate-modified polyurethane foam board with a foil/kraft/foil tri-laminate facing on both sides and are available in nominal dimensions given in Table 1.

Table 1 Nominal dimensions

	Board type		
	TB3000	GA3000	XR3000
Length (mm)	2400	2400	2400
Width (mm)	1200	1200	1200
Thickness (mm)	12-45	50-100	110-200

1.2 Ancillary products used with the boards are:

- roof tile underlay — fully-supportable vapour permeable and the subject of a current Agrément Certificate
- aluminium foil self-adhesive tape
- Helifix InSkew 600
- stainless steel fixings
- nails
- battens
- roofing slates or tiles
- internal lining board.

1.3 Other proprietary fixings approved by the BBA can be used with the boards. Names and addresses of suppliers of approved fixings are available from the Certificate holder.

Design Data**2 General**

2.1 Celotex T-Break TB3000, tuff-R GA3000 and Extra-R XR3000 (Pitched Roof Insulation) boards are satisfactory for use above, between and/or below roof rafters in conjunction with internal lining board, roof tile underlay, timber counter battens and tiling battens in tiled or slated, pitched roofs, designed and constructed in accordance with the relevant clauses of BS 5534 : 2003 for dwellings or other buildings with similar temperature and humidity conditions.

2.2 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.

2.3 Although the boards will contribute to the buckling and racking strengths of the roof, normal cross-bracing is necessary when using them.

2.4 During installation the boards must not be walked on except over supporting roof timbers. The boards have insufficient nail holding ability to be considered as an alternative to timber sarking.

2.5 It is essential that detailing and jointing of the boards achieves a convection-free envelope of high vapour resistance (see section 8). 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.

3 Strength


The boards, when installed in accordance with the Certificate holder's instructions, will resist the loads likely to be met during installation and in service, (see sections 2.4 and 11.2).

4 Structural stability

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

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

5 Behaviour in relation to fire

 5.1 The boards must not be carried over junctions between roofs and walls required to provide a minimum period of fire resistance. The continuity of fire resistance must be maintained, for example as described in:

England and Wales

Approved Document B, paragraphs 9.28 to 9.31

Scotland

Mandatory Standard 2.20

Northern Ireland

Technical Booklet E, paragraph 3.15.


5.2 The use of the boards will not affect the rating obtained by tiled or slated roofs when evaluated by assessment or tested to BS 476-3 : 2004.

5.3 When installed with an internal lining board the insulation will be contained between the roof and internal lining board until one is destroyed. Therefore, the insulation will not contribute to the development stages of a fire or present a smoke or toxic hazard.

6 Thermal insulation

6.1 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 $0.023 \text{ Wm}^{-1}\text{K}^{-1}$. The U value of a typical warm pitched roof construction will depend on the insulation thickness and rafter depth.

(1) Building Research Establishment.

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

England and Wales and Northern Ireland

- $0.16 \text{ Wm}^{-2}\text{K}^{-1}$ required for 'notional' dwellings in SAP 2005 (see also section 6.3)
- $0.25 \text{ Wm}^{-2}\text{K}^{-1}$ limit average specified in Approved Documents; L1A (Table 2), L2A (Table 4), Technical Booklets F1 (Table 2.2) and F2 (Table 2.4)
- $0.35 \text{ Wm}^{-2}\text{K}^{-1}$ limit for an individual element specified in Approved Document L1A (Table 2), L2A (Table 4), Technical Booklets F1 (Table 2.2) and F2 (Table 2.4).

Scotland

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

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic)

6.3 Where a proposed wall U value is not better than (or is greater than in Scotland) the relevant 'notional' value specified in section 6.2, additional energy saving measures will be required in the building envelope and/or services to achieve the required overall carbon dioxide emission rate reduction of about 20% in dwellings (18% to 25% in Scotland) and 23% to 28% in buildings other than dwellings.

6.4 Compliance with the guidance referred to in section 6.2 will allow the use of the default psi values from Table 3 of BRE Information Paper IP/06 *Assessing the effects of thermal bridging at junctions and around openings* and Table K1 of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005), in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM) (use 'simplified approach' for Scotland).

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

England and Wales

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

Scotland

Accredited Construction Details (Scotland)

Northern Ireland

Accredited Construction Details (version 1.0).

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 : 2002, Section 8.4 and Appendix D.

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

7.3 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) *Thermal insulation: avoiding risks*.

Surface condensation



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



7.5 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).

8 Resistance to moisture

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

9 Maintenance and repair

Damaged boards can be replaced easily prior to the installation of counter battens.

10 Durability



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

Installation

11 General

11.1 Installation of Celotex T-Break TB3000, tuff-R GA3000 and Extra-R XR3000 (Pitched Roof Insulation) boards must be in accordance with the relevant clauses of BS 5534 : 2003 and the manufacturer's instructions, and can be carried out in all conditions normal to roof work.

11.2 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.

11.3 The boards can be cut easily but care must be taken to prevent damage particularly to edges. Damaged boards should not be used. Small areas of damaged facer may be repaired with self-adhesive aluminium foil tape.

11.4 It is important to fill/seal gaps and joints in the insulation envelope (see section 2.5).

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

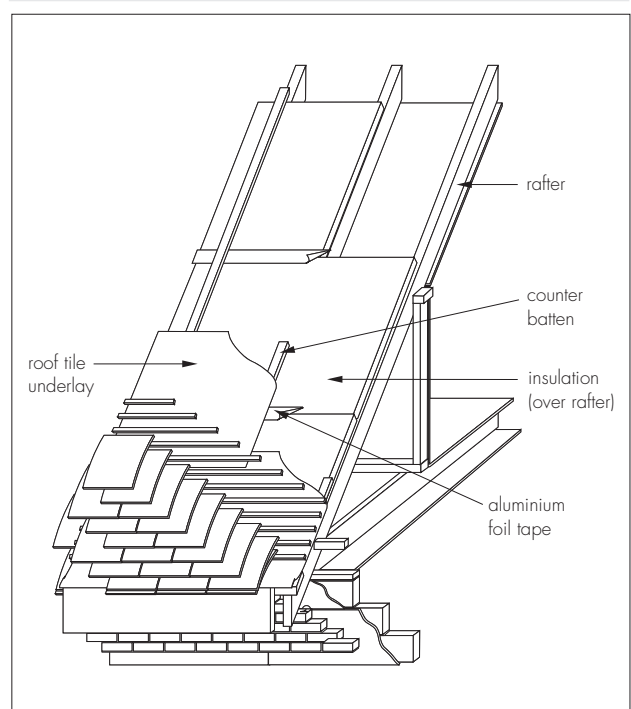
11.6 When applying roof tiles or slates to a warm roof construction, the recommendations of the manufacturer should be followed.

12 Procedure

Over rafters insulation (see Figure 1)

12.1 A treated-timber stop batten, equal in thickness to the insulation board, is fixed at eaves level and the boards butted directly against it.

Figure 1 Over rafters insulation



12.2 The 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.

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

12.4 Once the boards have been fixed to the rafters, all joints between boards and between boards and stop battens should be sealed using self-adhesive aluminium foil tape.

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

Method 1

12.6 Counter battens (38 mm by 50 mm) should be fixed using Helifix InSkew 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.

12.7 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 : 2003 at the required batten gauge. Where permeable tile underlays are used they should be installed in accordance with the appropriate Agrément Certificate.

Method 2

12.8 Counter battens 12 mm by 50 mm (or 19 mm by 50 mm in Scotland) should be fixed using Helifix InSkew fixings at maximum centre-to-centre spacing of 900 mm. These fixings should pass through the counter batten and the insulation and penetrate the supporting timber by a minimum of 37 mm.

12.9 The roof tile underlay should be installed in the conventional manner and held in place by tiling battens fixed by the Helifix InSkew fixings passing through the tiling batten, roof tile underlay, counter batten and insulation and penetrating the supporting timber by a minimum of 37 mm at the required batten gauge in accordance with BS 5534 : 2003. Where vapour permeable tile underlays are used they should be installed in accordance with the appropriate Agrément Certificate.

12.10 When the board thickness is not greater than 25 mm, the counter battens (38 mm by 50 mm) may be fixed through the insulation to the supporting timber by means of slab nails (3.35 mm diameter, 100 mm long) at maximum centre-to-centre spacing of 400 mm.

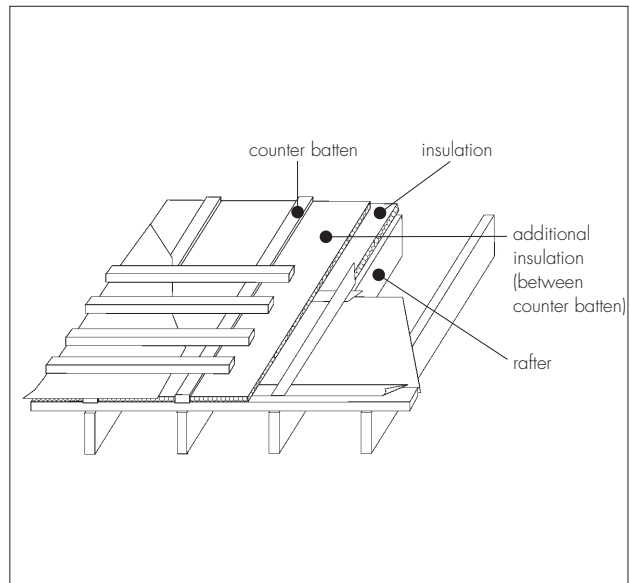
12.11 The roof tile underlay should be installed in the appropriate manner. Tiling battens should be nailed through the underlay into the counter battens

in accordance with BS 5534 : 2003 at the required batten gauge. Where vapour permeable tile underlays are used they should be installed in accordance with the appropriate Agrément Certificate.

Method 3 (see Figure 2)

12.12 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.

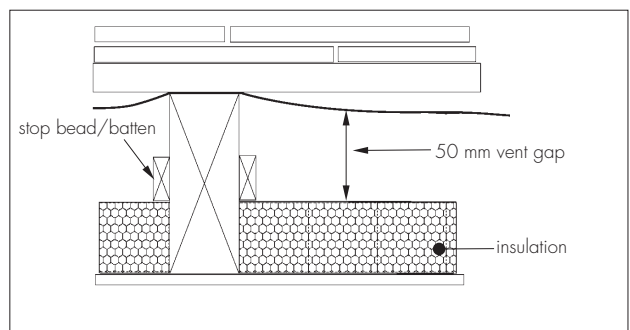
Figure 2 Additional insulation



Between rafters insulation

12.13 Boards are cut and from the inside, fitted tightly between the rafters flush with the underside and butt against stop beads or battens which maintain a ventilated air gap at least 50 mm deep (see Figure 3). Where vapour permeable roof tile underlays are used, the insulation may be installed without a ventilated air space (see section 7.1).

Figure 3 Fitted board

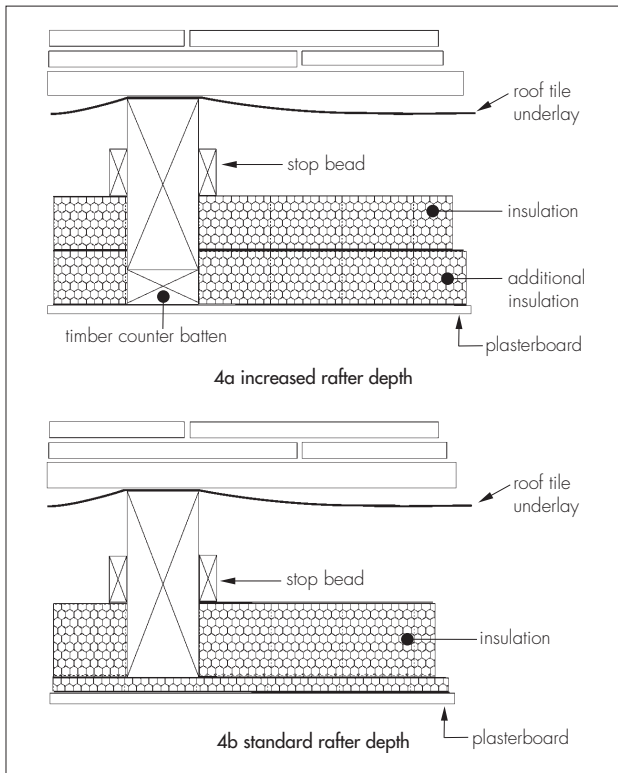


12.14 Horizontal joints are butted and taped and a vapour control layer is fitted to the underside of the rafters.

12.15 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:

- increase the rafter depth by attaching timber counter battens to the underside of the rafter (see Figure 4a), or preferably,
- add a second layer of insulation to the underside of the rafters (see Figure 4b).

Figure 4 Additional insulation



Under rafters insulation

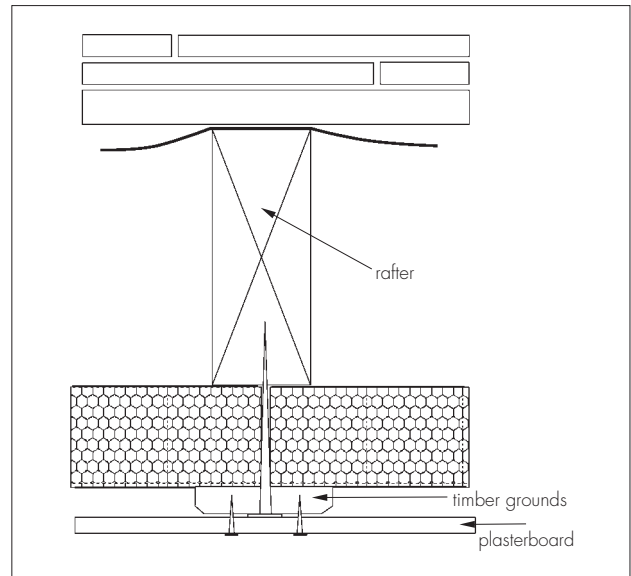
12.16 Boards may be attached to the underside of rafters either as a single layer or in conjunction with insulation boards between the rafters.

12.17 Boards are temporarily fixed with broad-headed clout nails and joints butted and taped. Appropriate internal lining panels may then be

fixed through the insulation and into the underside of the rafters.

12.18 Where the insulation thickness makes securing of the internal lining panels impractical, timber grounds of appropriate depth may be fixed through to the rafters and the panels secured to the grounds (see Figure 5).

Figure 5 Added timber grounds



Finishing

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

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

Technical Investigations

The following is a summary of the technical investigations carried out on Celotex T-Break TB3000, tuff-R GA3000 and Extra-R XR3000 (Pitched Roof Insulation) boards.

13 Tests

Tests were carried out to determine thermal conductivity.

14 Investigations

An examination was made of data relating to:

- dimensional accuracy
- density
- compressive strength
- dimensional stability with temperature
- thermal conductivity (fresh and aged)
- closed cell count.

15 Other investigations

15.1 The hygrothermal properties of typical constructions was assessed.

15.2 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 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*

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

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 6399-3 : 1988 *Loading for buildings — Code of practice for imposed roof loads*

BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*



On behalf of the British Board of Agrément

Date of Third issue: 13th November 2007

Chief Executive

**Original Detail Sheet issued on 31st March 1996. This amended version includes change of product names and reference to revised national Building Regulations and British Standards, updated Thermal insulation and Condensation sections.*

