

## Recticel Insulation Products

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Agrément Certificate  
**95/3113**  
Product Sheet 1

### RECTICEL INSULATION

### EUROTHANE Bi-3, Bi-3A TAPERED AND SILVER ROOF INSULATION BOARDS

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Eurothane Bi-3, Bi-3A Tapered and Silver Roof Insulation Boards, comprising rigid thermoset polyurethane and polyisocyanurate boards respectively with a bitumen-coated glass tissue or aluminium foil/kraft paper laminate facing on both sides respectively. The products are for use as a thermal insulation layer and to create or improve falls on limited access concrete, metal or timber flat roof decks. They are used in conjunction with a vapour control layer and adhesively bonded or mechanically fixed roof waterproofing membranes in 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 declared thermal conductivities\* ( $\lambda_{90/90}$  value) are shown in Table 2 (see section 6).

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

**Strength and stability** — when installed on suitable substrates using appropriate adhesive and/or mechanical fixing methods, the products can adequately transfer maintenance traffic loads and wind loads to the roof deck (see section 8).

**Behaviour in relation to fire** — the overall fire rating of any roof containing the products will depend on the type of deck and the nature of the roof waterproof covering (see section 9).

**Durability** — the products, when used as thermal insulation in the roof system described in this Certificate, will have a life at least as long as that of a roof waterproofing covering (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

Handwritten signature of Sean Moriarty in black ink.

Sean Moriarty — Head of Approvals  
Energy and Ventilation

Handwritten signature of Greg Cooper in black ink.

Greg Cooper  
Chief Executive

Date of First issue: 20 August 2012

Originally certificated on 27 March 1995

*The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)*

*Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.*

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# Regulations

In the opinion of the BBA, Eurothane Bi-3, Bi-3A Tapered and Silver Roof Insulation Boards, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting 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)

<b>Requirement:</b> A1	<b>Loading</b>
<b>Comment:</b>	The products are acceptable. See section 8.1 of this Certificate.
<b>Requirement:</b> C2(c)	<b>Resistance to moisture</b>
<b>Comment:</b>	The products will contribute to a roof meeting this Requirement. See sections 7.1 and 7.4 of this Certificate.
<b>Requirement:</b> L1(a)(i)	<b>Conservation of fuel and power</b>
<b>Comment:</b>	The products can meet or contribute to a roof meeting this Requirement. See sections 6.2 and 6.3 of this Certificate.
<b>Requirement:</b> Regulation 7	<b>Materials and workmanship</b>
<b>Comment:</b>	The products are acceptable materials. See section 11 and the <i>Installation</i> part of this Certificate.



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

<b>Regulation:</b> 8(1)	<b>Fitness and durability of materials and workmanship</b>
<b>Comment:</b>	The products can contribute to a construction satisfying this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b> 9	<b>Building Standards – construction</b>
<b>Standard:</b> 1.1	<b>Structure</b>
<b>Comment:</b>	The products are acceptable, with reference to clauses 1.1.1 <sup>(1)(2)</sup> , 1.1.2 <sup>(1)(2)</sup> and 1.1.3 <sup>(1)(2)</sup> . See section 8.1 of this Certificate.
<b>Standard:</b> 3.15	<b>Condensation</b>
<b>Comment:</b>	The products will contribute to a roof meeting 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 3.15.6 <sup>(1)(2)</sup> . See sections 7.1 and 7.5 of this Certificate.
<b>Standard:</b> 6.1(b)	<b>Carbon dioxide emissions</b>
<b>Standard:</b> 6.2	<b>Building insulation envelope</b>
<b>Comment:</b>	The products can contribute to satisfying the requirements of these Standards, with reference to clauses, or parts of 6.1.2 <sup>(2)</sup> , 6.1.6 <sup>(1)</sup> , 6.2.1 <sup>(1)(2)</sup> , 6.2.3 <sup>(1)</sup> , 6.2.4 <sup>(2)</sup> , 6.2.5 <sup>(2)</sup> , 6.2.6 <sup>(1)</sup> , 6.2.7 <sup>(1)</sup> , 6.2.8 <sup>(1)(2)</sup> , 6.2.9 <sup>(1)(2)</sup> , 6.2.10 <sup>(1)(2)</sup> , 6.2.11 <sup>(1)(2)</sup> , 6.2.12 <sup>(2)</sup> and 6.2.13 <sup>(1)(2)</sup> . See sections 6.2 and 6.3 of this Certificate.
<b>Standard:</b> 7.1(a)(b)	<b>Statement of sustainability</b>
<b>Comment:</b>	The products can contribute to meeting 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 products can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 <sup>(2)</sup> [Aspect 1 <sup>(2)</sup> ], 7.1.6 <sup>(2)</sup> [Aspect 1 <sup>(2)</sup> ] and 7.1.7 <sup>(2)</sup> [Aspect 1 <sup>(2)</sup> ]. See section 6.2 of this Certificate.
<b>Regulation:</b> 12	<b>Building standards – conversions</b>
<b>Comment:</b>	Comments made in relation to 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). (2) Technical Handbook (Non-Domestic).



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

<b>Regulation:</b> B2	<b>Fitness of materials and workmanship</b>
<b>Comment:</b>	The products are acceptable. See section 11 and the <i>Installation</i> section of this Certificate.
<b>Regulation:</b> C5	<b>Condensation</b>
<b>Comment:</b>	The products will contribute to a roof meeting this Regulation. See section 7.1 of this Certificate.
<b>Regulation:</b> D1	<b>Stability</b>
<b>Comment:</b>	The products are acceptable. See section 8.1 of this Certificate.
<b>Regulation:</b> F2(a)(i)	<b>Conservation measures</b>
<b>Regulation:</b> F3(2)	<b>Target carbon dioxide Emissions Rate</b>
<b>Comment:</b>	Roofs incorporating these products can satisfy or contribute to satisfying this Regulation. See sections 6.2 and 6.3 of this Certificate.

## Construction (Design and Management) Regulations 2007

## Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.3) of this Certificate.

# Additional Information

## NHBC Standards 2011

NHBC accepts the use of Eurothane Bi-3, Bi-3A Tapered and Silver Roof Insulation Boards, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards, Chapter 7.1 Flat roofs and balconies*.

## CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13165 : 2008. 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 Eurothane Bi-3, Bi-3A Tapered and Silver Roof Insulation Boards are rigid thermoset polyurethane and polyisocyanurate insulation boards respectively, manufactured using CFC/HCFC free materials, incorporating facings on both sides that comprise either:

- bitumen-coated, glass tissue (Eurothane Bi-3 and Bi-3A Tapered), or
- aluminium foil/kraft paper laminate (Eurothane Silver).

1.2 The products have nominal characteristics as shown in Table 1.

Table 1 Nominal characteristics

	Bi-3	Bi-3A Tapered	Silver
Length* and width* (mm)	1200 x 600 1200 x 1000	1200 x 600	1200 x 600 1200 x 1000 2400 x 1200 2500 x 1200
Thickness* (mm)	30 to 140	1:60 : 20/40, 40/60 60/80, 80/100 and 1:80 : 30/45, 45/60, 60/75, 75/90, 90/105 and 1:120 : 30/40, 40/50, 50/60, 60/70, 70/80, 80/90, 90/100	30 to 150
Compressive strength at 10% compression (kPa)		Thicknesses ≤ 60 mm = 140 Thicknesses > 60 mm = 150	
Density (kg·m <sup>-3</sup> )		30	
Rebated edge available	yes	no	yes
Lap joint available	yes	no	yes
1:60 and 1:80 taper	no	yes	no

1.3 The products are installed as part of a roof system in conjunction with the following items:

- waterproofing membrane
- vapour control layer (VCL)
- fixings — incorporating a countersunk washer.

## 2 Manufacture

2.1 Raw materials are injected onto the lower insulation facer on a conveyor belt. The exothermic reaction expands the foam, which then comes into contact with the upper insulation facer. 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 has:

- agreed with the Certificate holder 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 non conformities
- 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 Recticel Insulation Products has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 and by Lloyd's Register Quality Assurance [Certificate (ANT951267.1)].

### 3 Delivery and site handling

3.1 The products are delivered to site shrink-wrapped in polythene packs containing a label with the products description and characteristics, the manufacturer's name, 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. Products that have been allowed to get wet, or that are damaged must not be used. Nothing should be stored on top of the products.

3.3 The products must not be exposed to a naked flame or other ignition sources. The products must not be exposed to solvents or other chemicals.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Eurothane Bi-3, Bi-3A Tapered and Silver Roof Insulation Boards.

## Design Considerations

### 4 General

4.1 Eurothane Bi-3, Bi-3A Tapered and Silver Roof Insulation Boards are suitable for use as a thermal insulation layer on concrete, metal or timber flat roofs, with access limited to maintenance only.

4.2 Decks should be designed in accordance with the relevant clauses of either BS 6229 : 2003 or BS 8217 : 2005 and, where appropriate, the *NHBC Standards 2011*, Chapter 7.1, Section 4.

4.3 Roofs should incorporate an effective VCL below the products.

4.4 The products are for use with one of the following waterproofing specifications:

- built-up bitumen felt to BS 8747 : 2007 laid in accordance with BS 8217 : 2005
- other bitumen waterproofing systems which are the subject of a current Agrément Certificate, laid in accordance with, and within the limitations imposed by that Certificate
- mastic asphalt laid in accordance with BS 8218 : 1998
- other waterproofing systems which are the subject of a current Agrément Certificate laid in accordance with, and within the limitations imposed by, that Certificate.

4.5 Limited access roofs are defined for the purpose of this Certificate as those roofs subject only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc (see also section 12.11).

4.6 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80 and a maximum 1:6 as defined in BS 6229 : 2003.

4.7 For design purposes on flat roofs, twice the minimum finished fall should be assumed, unless a detailed analysis of the roof is available, including overall and local deflections, direction of falls etc.

4.8 The tapered product may be used where appropriate to achieve the minimum finished falls required.

### 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 thermal transmittance (U value), should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared thermal conductivity\* ( $\lambda_{90/90}$  value) given in Table 2.

Table 2 Physical characteristics

	Bi-3 and Bi-3A Tapered ≤60 mm	Bi-3 and Bi-3A Tapered >60 mm	Silver
Thermal conductivity* (W·m <sup>-1</sup> ·K <sup>-1</sup> )	0.028	0.027	0.023



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 Tables 3 and 4.

Table 3 Example U values for constructions with galvanized steel fixings

Insulation thickness (Bi-3) <sup>(1)</sup> (mm)			U value (W·m <sup>-2</sup> ·K <sup>-1</sup> )
Concrete <sup>(2)(3)</sup>	Timber <sup>(2)(4)</sup>	Metal <sup>(2)(5)</sup>	
—	135	—	0.20
115	105	120	0.25

- (1) Nearest available thickness.  
 (2) Includes 5.55 galvanized steel insulation fixings per m<sup>2</sup>, with a 4.8 mm cross sectional diameter.  
 (3) 150 mm concrete decking 2.0 W·m<sup>-1</sup>·K<sup>-1</sup>, VCL, 3 mm waterproofing membrane.  
 (4) 12.5 mm plasterboard, 150 mm timber joists (12.5%)/air cavity (87.5%), 18 mm plywood decking, VCL, 1.5 mm waterproofing membrane.  
 (5) Metal deck (not included in calculation), VCL, 3 mm waterproofing membrane.

Table 4 Example U values for a fully adhered system

Insulation thickness (Bi-3) <sup>(1)</sup> (mm)			U value (W·m <sup>-2</sup> ·K <sup>-1</sup> )
Concrete <sup>(2)</sup>	Timber <sup>(3)</sup>	Metal <sup>(4)</sup>	
140	135	—	0.18
130	120	130	0.20
100	95	105	0.25

- (1) Nearest available thickness.  
 (2) 150 mm concrete decking 2.0 W·m<sup>-1</sup>·K<sup>-1</sup>, VCL, 3 mm waterproofing membrane.  
 (3) 12.5 mm plasterboard, 150 mm timber joists (12.5%)/air cavity (87.5%), 18 mm plywood decking, VCL, 1.5 mm waterproofing membrane.  
 (4) Metal deck (not included in calculation), VCL, 3 mm waterproofing membrane.

6.3 The products can contribute to maintaining continuity of thermal insulation at junctions between elements and openings. For Accredited Construction Details the corresponding psi values in BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*, 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 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 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 D and Annex H and BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*.

7.2 For the purposes of calculations, the vapour resistivity/resistance value of the individual components may be taken as:

- insulation 300 MN·s·g<sup>-1</sup>·m<sup>-1</sup>
- foil facing 4000 MN·s·g<sup>-1</sup>
- bitumen facing 180 MN·s·g<sup>-1</sup>.

7.3 To minimise moisture entering the roof an effective VCL such as 0.25 mm minimum thickness polyethylene should be used with sealed and lapped joints and be turned up around the insulation and bonded to the weatherproofing 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 W·m<sup>-2</sup>·K<sup>-1</sup> at any point and the junctions with other elements are designed in accordance with section 6.3.



7.5 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 W·m<sup>-2</sup>·K<sup>-1</sup> 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 Strength and stability



8.1 When installed on suitable flat roof decks, using appropriate fixings and/or adhesive, the products can adequately transfer maintenance traffic loads and negative and positive (suction and pressure) wind loads to the roof deck.

8.2 The roof construction or immediate substrate to which the products are fixed must be structurally sound and have sufficient strength and stability, to resist all dead, imposed and wind loads.

8.3 The suitability of the roof construction, and in particular the immediate substrate, to accept the adhesive bond and mechanical fixing must be established before installation. In-situ pull-out and pull-through testing to determine the minimum safe working load of mechanical fixings should be undertaken prior to installation. The advice of the Certificate holder should also be sought in respect of suitable mechanical fixings.

8.4 The type and number of fixings will depend on the roof construction and location; the Certificate holder's advice should be sought. The Certificate holder recommends a minimum number of fixings per board size, see section 13.14.

8.5 All design analysis must be in accordance with British or European Standards relevant to the construction. The requirement for fixings to suit the wind uplift requirements for the particular site should be assessed in accordance with BS 6399-2 : 1997 or BS EN 1991-1-4 : 2005. All calculations should be carried out by a suitably qualified Engineer.

8.6 Each fixing must incorporate a head or washer which is a minimum of 50 mm diameter if round or 50 mm by 50 mm if square. Location of fixings installed along the edges or at corners of the product are shown in Figures 1 and 2.

8.7 For adhesive application of the insulation product, the substrate must be free of dust, dry and installation should be in accordance with the instructions of the adhesive manufacturer. The surface of the substrate must have sufficient cohesive strength to resist the calculated wind load acting upon the structure.

8.8 When adhering is the chosen method for the insulation or waterproofing, adhesion between the insulation products and VCL and between the products and overlay must be adequate to resist the effects of wind suction and thermal cycling likely to be experienced under normal conditions. In areas where high wind speeds can be expected, additional mechanical fixings should be considered and the advice of a suitably qualified Engineer should be sought as to the method of fixing as defined in the relevant clauses of BS 6399-2 : 1997 and BS EN 1991-1-4 : 2005.

8.9 Roof waterproof covering systems (see section 4.4 for suitable types) must be applied in accordance with the relevant Agrément Certificates or manufacturers guidance.

8.10 For design purposes, the products may be assumed to have an allowable compressive strength as detailed in Table 1.

8.11 The products have not been assessed for use with permanent distributed or concentrated loads, such as air conditioning units, mechanical plants, water tanks, etc. Such loads should be supported directly on the roof construction. The products are not suitable when permanent roof access is required.

8.12 When profiled decking is used, the products will need to span across the ribs. Maximum permissible spans between ribs for the products different thicknesses are shown in Table 5.

*Table 5 Maximum clear span*

Maximum clear span (mm)		Minimum roofboard thickness (mm)
< 75		25
> 75	≤ 100	30
> 100	≤ 125	35
> 125	≤ 150	40
> 150	≤ 175	45
> 175	≤ 200	50
> 200	≤ 225	55
> 225	≤ 250	60

8.13 When maintenance is required to the roof waterproofing, protective boarding should be laid over the roof surface to avoid concentrations of load.

## 9 Behaviour in relation to fire

9.1 The fire rating of any roof containing the products will depend on the type of deck and the nature of the roof waterproof covering.

9.2 The designation of the roof covering must meet or satisfy the requirements of the national Building Regulations, thus: **England and Wales** — Approved Document B, Volumes 1 and 2, sections 10 and 14 respectively. Notional designations of some common roof coverings are given in Approved Document B, Volumes 1 and 2, Appendix A, Table A5

**Scotland** — Mandatory Standards 2.8, clause 2.8.1<sup>(1)(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — Technical Booklet E, section 4. If, on flat roofs, the waterproof covering is protected by one of the surface finishes defined in Technical Booklet E, Table 4.6, the roof is deemed to be of designation AA.

9.3 The designation of other specifications, eg when used on combustible substrates, should be confirmed by:

**England and Wales** — test or assessment in accordance with Approved Document B, Volumes 1 and 2, Appendix A, Clause 6

**Scotland** — test to conform to clauses 2.C<sup>(1)</sup> and 2.F<sup>(2)</sup>

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

**Northern Ireland** — test or assessment by a UKAS accredited laboratory, or an independent consultant with appropriate experience.

## 10 Maintenance

Maintenance of the insulation layer will not be required, provided the roof waterproof covering remains intact.

## 11 Durability



The products are rot-resistant and durable, and will have a life at least as long as that of the roof waterproof covering.

## Installation

### 12 General

12.1 Eurothane Bi-3, Bi-3A Tapered and Silver Roof Insulation Boards must be installed in accordance with the Certificate holder's instructions and BS 6229 : 2003, BS 8217 : 2005, or the relevant Agrément Certificate, depending on the waterproofing to be applied. Bitumen bonding may be augmented by mechanical fixings where appropriate (see section 8.5 of this Certificate).

12.2 Care should be taken to ensure the deck is graded to the correct fall, is dry, clean and free from any projections or gaps.

12.3 If the products used are tapered and they are to be effective in providing a uniform fall it is essential that the structural deck is true and even. Any hollows, depressions, backfalls, found in the roof deck, eg must be rectified prior to laying the insulation.

12.4 For both mechanically and adhesively fixed products, the suitability of the substrate deck to accept an adhesive bond or mechanical fixings must be checked prior to the work commencing.

12.5 The deck to which the VCL is to be applied must be level, dry, sound, and if bonded, free from dust and grease and other defects which may impair the bond. For adhered products, all deck joints should be taped and, where necessary, the deck coated with bitumen primer to BS 3416 : 1991.

12.6 On multi-storey buildings or in areas subject to high wind loads, additional mechanical fixings may be required and the advice of the Certificate holder should be sought on any limitations of use.

12.7 The mechanical fixing frequency and pattern should be predetermined in accordance with the Certificate holder's instructions and the relevant clauses of BS 6399-2 : 1997 or BS EN 1991-1-4 : 2005. Each fixing should incorporate a minimum of 50 mm diameter circular plate countersunk washer or a 50 mm by 50 mm square washer, which must not restrain more than one board.

12.8 To prevent moisture being trapped on, or in the insulation it is essential to:

- protect the products during laying, before the application of the roof waterproofing, or to lay the roof covering at the same time as laying the products. However if the products are accidentally wetted, they must be replaced
- the products should be installed only when the ambient temperature is above 5°C to prevent condensation.

12.9 The products can be cut with a sharp knife or fine-toothed saw to fit around projections through the roof.

12.10 The products are for use with the waterproofing membranes specified in section 4.4, are laid in accordance with the relevant British Standard or subject of a current Agrément Certificate, laid in accordance with, and within, the limitations imposed by that Certificate.

12.11 Once installed, access to the roof should be restricted in accordance with section 4.5.

### 13 Procedure

#### General

13.1 The number of mechanical fixings required to fix the products will vary depending on the geographical location of the building, the topographical data, and height and width of the roof concerned etc.

13.2 The requirements for an additional number of fixings above those specified in section 13.14 should be assessed in accordance with BS 6399-2: 1997 or BS EN 1991-1-4 : 2005.

## Concrete decks

13.3 Before applying the VCL, an appropriate levelling screed should be applied where necessary and, if adhering the VCL and insulation boards, the whole deck treated with a suitable primer. The advice of the Certificate holder should also be sought in respect of a suitable primer.

13.4 For adhered products, the VCL is fully bonded with hot bitumen and the laps sealed, and the products applied in the manner described for timber decks (see section 13.10 and 13.11).

## Metal decks

13.5 If adhering the VCL and insulation boards, the deck should be treated with a suitable primer before applying the VCL. The advice of the Certificate holder should also be sought in respect of a suitable primer.

13.6 For adhered products, a reinforced VCL is fully bonded in hot bitumen, which is bonded to the metal deck and the insulation boards are then applied in the manner described for timber decks (see section 13.10 and 13.11).

13.7 The insulation boards are laid with the long edges at right angles to the ribs and all board ends must be fully supported on a rib.

13.8 The thickness of the roofboard used depends on the width of the rib openings of the metal deck as indicated in section 8, Table 5.

## Timber decks (eg tongue-and-groove boards, plywood)

13.9 A VCL is nailed to the deck, in accordance with BS 8217 : 2005.

13.10 The VCL should be turned up around the insulation and sealed to the waterproof finish at all edges and penetrations such as roof lights. Advice may be sought from the Certificate holder.

13.11 Hot bitumen adhesive is applied over the VCL and the insulation boards are fully embedded into it, in a brick bonded pattern.

## Mechanical fixings

13.12 The products can also be secured to concrete, metal or timber decks by means of mechanical fixings.

13.13 A 0.25 mm thick polythene VCL should be laid, with 150 mm sealed laps. The VCL should be turned up around the insulation and sealed to the waterproof finish at all edges and penetrations such as roof lights. Advice should be sought from the Certificate holder.

13.14 The products are laid over the VCL in a brick-bonded pattern. On profiled metal decks, the products are secured to the deck with a minimum of four or six or eight mechanical fixings placed within the individual board area (1200 mm by 600 mm and 1200 mm by 1000 mm) and (2400 mm by 1200 mm) and (2500 mm by 1200 mm) respectively, and are sited from all edges as shown in Figures 1 and 2. Countersunk washers with circular plates of at least 50 mm diameter or 50 mm by 50 mm square should be used with each fixing. The requirement of additional fixings assessed in accordance with BS 6399-2 : 1997 or BS EN 1991-1-4 : 2005.

Figure 1 Fixing layout for 1200 mm by 600 mm and 1200 mm by 1000 mm boards — minimum fixing numbers

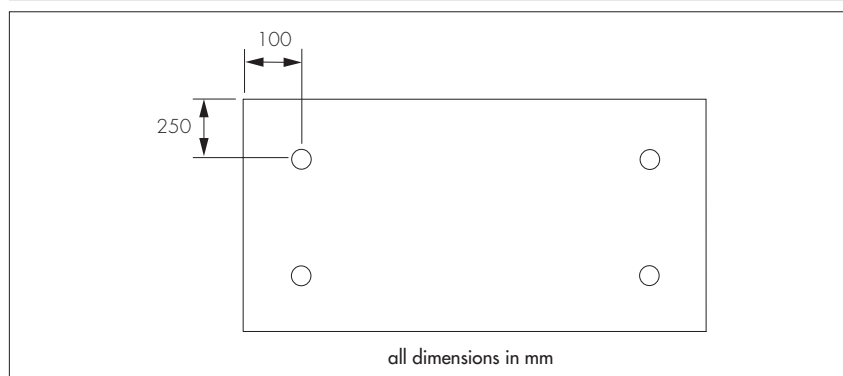
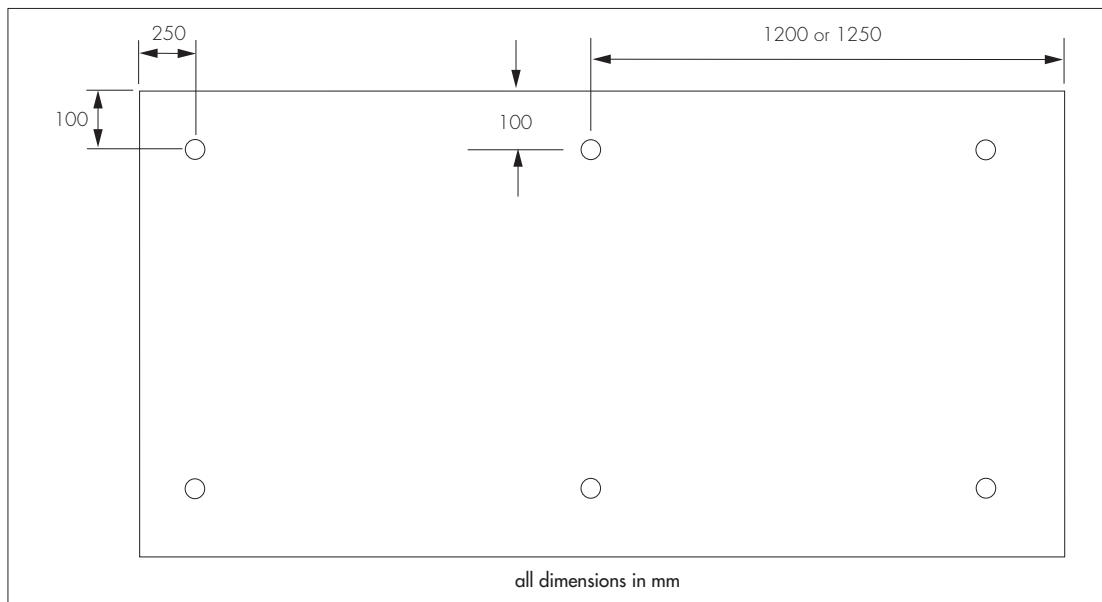




Figure 2 Fixing layout for 2400 mm by 1200 mm and 2500 mm by 1200 mm boards  
— minimum fixing numbers



### Weatherproofing (all systems)

13.15 The waterproofing system should be applied above the insulation boards in accordance with section 4.4.

## Technical Investigations

### 14 Investigations

14.1 An assessment was made of the results of test data relating to:

- density
- thermal resistance (fresh and aged)
- dimensional stability
- tensile strength
- compressive strength at 10% compression
- water vapour resistivity
- wind uplift
- water absorption.

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

## Bibliography

BS 3416 : 1991 *Specification for bitumen based coatings for cold application, suitable for use in contact with potable water*

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

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

BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*

BS 8218 : 1998 *Code of practice for mastic asphalt roofing*

BS 8747 : 2007 *Reinforced bitumen membranes (RBMs) for roofing — Guide to selection and specification*

BS EN 13165 : 2008 *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PUR) products — Specification*

BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*

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*

## 15 Conditions

15.1 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.

15.2 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.

15.3 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.

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

15.5 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.

15.6 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.