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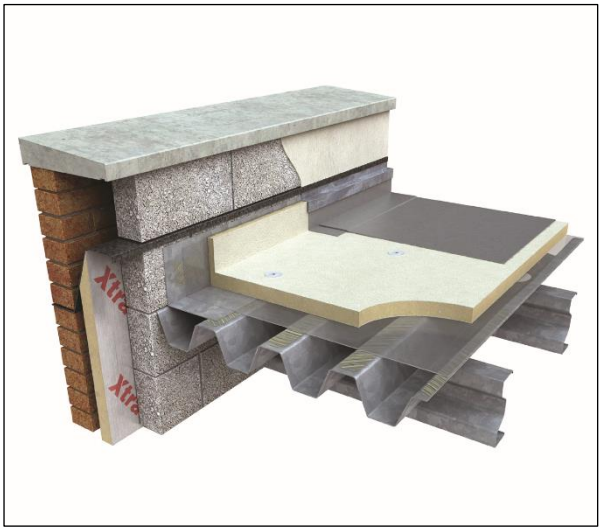
Agrément Certificate
11/4878
Product Sheet 3

XTRATHERM THIN-R

XTRATHERM THIN-R FLAT ROOF INSULATION BOARD (FR-MG)

This Agrément Certificate Product Sheet(1) relates to Xtratherm Thin-R Flat Roof Insulation Board (FR-MG), a rigid thermoset polyisocyanurate mineral-coated glassfibre-faced insulation board for use as a thermal insulation layer and to create or improve falls on limited access concrete, timber or metal flat roof decks in domestic and non-domestic buildings. It is used in conjunction with a vapour control layer and mechanically-fixed or adhesively-bonded roof waterproofing membrane.

(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 product has declared thermal conductivity values (λ_D) of 0.024 $W \cdot m^{-1} \cdot K^{-1}$ to 0.027 $W \cdot m^{-1} \cdot K^{-1}$ depending on thickness (see section 6).

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

Strength and stability — when installed on suitable substrates using appropriate fixing methods, the product 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 product will depend on the type of deck and the nature of the roof waterproof covering (see section 9).

Durability — the product, 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 product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Third issue: 8 February 2022

Originally certificated on 15 November 2011

Hardy Giesler
Chief Executive Officer

Regulations

In the opinion of the BBA, Xtratherm Thin-R Flat Roof Insulation Board (FR-MG), 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)

Requirement:	**A1**	**Loading**
Comment:		The product can contribute to satisfying this Requirement. See sections 8.1 and 8.2 of this Certificate.
Requirement:	**B4(2)**	**External fire spread**
Comment:		Roofs incorporating the product can satisfy this Requirement. See section 9 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The product can contribute to satisfying this Requirement. See sections 7.1 and 7.4 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The product can satisfy or contribute to a roof satisfying this Requirement. See sections 6.1 and 6.2 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is acceptable. See section 11 and the *Installation* 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 product can contribute to satisfying these Regulations; however, compensating fabric/services measures may be required. See section 6 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	**8(1)**	**Durability, workmanship and fitness of materials**
Comment:		The product is acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	1.1	Structure
Comment:		The product can contribute to satisfying this Standard, with reference to clauses 1.1.2[(1)(2)] and 1.1.3[(1)(2)]. See sections 8.1 and 8.2 of this Certificate.
Standard:	2.8	Spread from neighbouring buildings
Comment:		Roofs incorporating the product can satisfy this Standard, with reference to clause 2.8.1[(1)(2)]. See section 9 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to satisfying this Standard, 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 3.15.6[(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 product can contribute to satisfying these Standards, with reference to clauses, or parts of, 6.1.1[(1)], 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[(1)(2)], 6.2.9[(1)(2)], 6.2.10[(1)(2)], 6.2.11[(1)(2)], 6.2.12[(2)] and 6.2.13[(1)(2)]. However, compensating fabric/services measures may be required. See sections 6.1 and 6.2 of this Certificate.

Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product 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 product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4[(1)(2)] [Aspects 1[(1)(2)] and 2[(1)]], 7.1.6[(1)(2)] [Aspects 1[(1)(2)] and 2[(1)]] and 7.1.7[(1)(2)] [Aspect 1[(1)(2)]]. See section 6.1 of this Certificate.
Regulation:	**12**	**Building standards applicable to conversions**
Comment:		Comments in relation to the product 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 (as amended)

Regulation:	**23**	**Fitness of materials and workmanship**
Comment:		The product is acceptable. See section 11 and the *Installation* part of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The product can contribute to satisfying this Regulation. See section 7.1 of this Certificate.
Regulation:	**30**	**Stability**
		The product can contribute to satisfying this Regulation. See sections 8.1 and 8.2 of this Certificate.
Regulation:	**36(b)**	**External fire spread**
Comment:		Roofs incorporating the product can satisfy this Regulation. See section 9 of this Certificate.
Regulation:	**39(a)(i)**	**Conservation measures**
Regulation	**40(2)**	**Target carbon dioxide emission rate**
Comment:		The product can contribute to satisfying these Regulations. however, compensating fabric/services measures may be required. See sections 6.1 and 6.2 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 section: 3 *Delivery and site handling* (3.3) of this Certificate.

Additional Information

NHBC Standards 2022

In the opinion of the BBA, Xtratherm Thin-R Flat Roof Insulation Board FR/MG), 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 *Flat roofs, terraces and balconies.*

CE marking

The Certificate holder has taken the responsibility of CE marking the product, in accordance with harmonised European Standard BS EN 13165 : 2012.

Technical Specification

1 Description

1.1 Xtratherm Thin-R Flat Roof Insulation Board (FR-MG) is a rigid thermoset polyisocyanurate insulation board incorporating a mineral-coated glassfibre facing on both sides.

1.2 The board has the nominal characteristics of:

Length and width (mm)	1200 x 600, 1200 x 1200 or 2400 x 1200
Thickness (mm)	25 to 165 (in 5 mm increments)
Compressive strength at 10% compression (kPa)	150
Edge detail	Squared, rebated.

1.3 Boards are also available in a tapered version for falls of 1:120, 1:80 and 1:60 (1200 mm by 1200 mm).

1.4 The product is installed as part of a roof system in conjunction with the following items (which are outside the scope of this Certificate):

- waterproofing membrane
- vapour control layer (VCL)
- fixings, — for use with waterproof membrane incorporating a countersunk washer with circular plates of at least 75 mm diameter or 75 mm by 75 mm square
- bitumen, polyurethane or solvent-based adhesive — adhered systems
- primer — concrete and metal decks.

2 Manufacture

2.1 Xtratherm Thin-R Roof Insulation boards are manufactured using CFC/HCFC free materials. Raw materials, mixed to a controlled formulation, are blended and poured onto the facing then cured and cut to the required dimensions.

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

- 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 being operated by the manufacturer are being maintained.

2.3 The management system of Xtratherm Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015, BS EN ISO 14001 : 2015 and OHSAS 18001 : 2007 by BRE (Certificates 718, 718EMS and 718-HS respectively).

3 Delivery and site handling

3.1 The boards are delivered to site in packs, shrink-wrapped in polythene, containing a label with the product description and characteristics, manufacturer's name, and BBA logo incorporating the number of this Certificate.

3.2 It is essential that the boards are stored off the ground, inside or under cover on a flat, dry, level surface in a well-ventilated area, and with nothing stored on top. The product 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.

3.3 The boards must not be exposed to a naked 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 Xtratherm Thin-R Flat Roof Insulation Board (FR-MG).

Design Considerations

4 General

4.1 Xtratherm Thin-R Flat Roof Insulation Board (FR-MG) is 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 : 2018 or BS EN 13956 : 2012 and, where appropriate, the NHBC Standards, Chapter 7.1.

4.3 Roofs should incorporate a VCL below the product that is compatible both with the product and the waterproofing system. Advice should be sought from the Certificate holder.

4.4 The product is for use with the following waterproofing systems:

- built-up specifications including reinforced bitumen membranes to BS 8747 : 2007 in accordance with the recommendations of Table 5, and installed to the relevant clauses of BS 8217 : 2005
- Mastic asphalt membrane to BS 8218 : 1998
- Liquid applied systems, which are the subject of a current Agrément Certificate, laid in accordance with, and within, the limitations imposed by that Certificate.
- Single ply membranes (adhesive or mechanically fixed), 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, cleaning of gutters, etc.

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 of 1:6 as defined in BS 6229 : 2018.

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.

5 Practicability of installation

The boards are designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2019, using the declared thermal conductivity values (λ_D) given in Table 1.

Table 1 Thermal conductivity (λ_D)

Insulation thickness (mm)	Thermal conductivity ($W \cdot m^{-1} \cdot K^{-1}$)
<80	0.027
80 to 120	0.025
≥120	0.024

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 product are shown in Tables 2, 3 and 4 of this Certificate.

Table 2 Example U values for a fully-adhered system

U Value ($W \cdot m^{-2} \cdot K^{-1}$)	Xtratherm Thin-R FR-MG insulation thickness (mm)[1]		
	Concrete[2]	Timber[3]	Metal[4]
0.13	—[5]	—[5]	—[5]
0.16	145	135	145
0.18	125	120	130
0.20	120	110	120
0.25	95	90	95

(1) Nearest available thickness.
(2) 150 mm concrete decking with thermal conductivity of 2.5 $W \cdot m^{-1} \cdot K^{-1}$, VCL, 1.5 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, 1.5 mm waterproofing membrane.
(5) For improved thermal/carbon emission performance, additional insulation thicknesses may be considered.

Table 3 Example U values for constructions with stainless steel fixings

U Value ($W \cdot m^{-2} \cdot K^{-1}$)	Xtratherm Thin-R FR-MG insulation thickness (mm)[1]		
	Concrete[2][3]	Timber[2][4]	Metal[2][5]
0.13	—[6]	—[6]	—[6]
0.16	155	150	155
0.18	140	130	140
0.20	125	120	125
0.25	105	95	105

(1) Nearest available thickness.
(2) Includes 5.55 stainless steel fixings per m^2, with an additional 3.55 stainless steel waterproofing fixings per m^2, both with a 4.8 mm cross-sectional diameter.
(3) 150 mm concrete decking with thermal conductivity of 2.5 $W \cdot m^{-1} \cdot K^{-1}$, VCL, 1.5 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, 1.5 mm waterproofing membrane.
(6) For improved thermal / carbon emission performance, additional insulation thicknesses may be considered.

Table 4 Example U values for constructions with galvanized steel fixings

U Value ($W \cdot m^{-2} \cdot K^{-1}$)	Xtratherm Thin-R FR-MG insulation thickness (mm)[1]		
	Concrete[2][3]	Timber[2][4]	Metal[2][5]
0.13	—[6]	—[6]	—[6]
0.16	—[6]	—[6]	—[6]
0.18	160	155	160
0.20	145	140	145
0.25	120	110	120

(1) Nearest available thickness.
(2) Includes 5.55 galvanized steel fixings per m^2, with an additional 3.55 galvanized steel waterproofing fixings per m^2, both with a 4.8 mm cross-sectional diameter.
(3) 150 mm concrete decking with thermal conductivity of 2.5 $W \cdot m^{-1} \cdot K^{-1}$, VCL, 1.5 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, 1.5 mm waterproofing membrane.
(6) For improved thermal / carbon emission performance, additional insulation thicknesses may be considered.

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.

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, Annexes D and H and the relevant guidance.

7.2 For the purposes of assessing the risk of interstitial condensation, the insulation core vapour resistivity may be taken as approximately 344 $MN \cdot s \cdot g^{-1} \cdot m^{-1}$.

7.3 To minimise moisture entering the roof, a VCL with sealed and lapped joints should be used, which must be turned up around the insulation and bonded to the waterproofing 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 $W \cdot m^{-2} \cdot K^{-1}$ 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 $W \cdot m^{-2} \cdot K^{-1}$ 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 Strength and stability

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

8.2 When adhesively fixed, adhesion between the insulation board component and VCL, and between the boards and overlay, is adequate to resist the effects of wind suction and thermal cycling likely to be experienced under normal conditions. Metal deck profiles should give a bonding area of at least 33% of the total projected surface area. In areas where high wind speeds can be expected, mechanical fixing should be considered, and the advice of the Certificate holder should be sought as to the method of fixing. Reference should be made to BS EN 1991-1-4 : 2005 where a calculation is required for a specific building project.

8.3 The roof construction must be structurally sound and have sufficient strength and stability to resist all dead, imposed and wind loads. It must also have adequate resistance to the pull-out forces created by the wind forces acting on the specified fixings used.

8.3 The suitability of the substrate to accept the adhesive bond or mechanical fixings must be established before installation. Mechanical fixings must be checked before installation by carrying out in-situ pull-out or pull-through tests to determine the minimum safe working load the fixings can resist. The advice of the Certificate holder should also be sought in respect of suitable mechanical fixings.

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

8.6 All design analysis must be carried out by a suitably experienced and competent individual 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 EN 1991-1-4 : 2005.

8.7 For the adhesive-bonded application, the substrate must be free of dust and dry, and the installation must 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 product and VCL, and between the product 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 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 manufacturer's guidance.

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

8.11 The product has 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 product is not suitable for use when permanent roof access is required.

8.12 When profiled decking is used, the product will need to span across the ribs. Maximum permissible spans between ribs for the different product 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 of the roof waterproofing is required, protective boarding should be laid over the roof surface to avoid concentrations of loads.

9 Behaviour in relation to fire

9.1 The reaction to fire classification of the product in accordance with BS EN 13501-1 : 2007 is Class E.

9.2 The resistance to fire exposure of a built-up roofing system will be dependent on the fire performance of the combined individual components and cannot be predicted from the classification of the insulation alone. The classification of a specific roof system must be confirmed by reference to the requirements of the documents supporting the national Building Regulations.

9.3 In the opinion of the BBA, a system comprising: 18 mm OSB/3 supporting deck, 50 or 150 mm thick FR/MG insulation board, 3 mm bitumen base layer, 4 mm reinforced bitumen underlay and 3 mm SBS bitumen water proofing membrane, can be classified as B_{ROOF}(t4) in accordance with BS EN 13501-5 : 2016 (1)

(1) WF report No. 21157J issued on 12/08/2021.

10 Maintenance

The product, once installed, does not require any regular maintenance and has suitable durability provided the roof waterproof layers are inspected and maintained at regular intervals (see section 11).

11 Durability

The product is 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 Xtratherm Thin-R Flat Roof Insulation Board (FR-MG) must be installed in accordance with the Certificate holder's instructions and BS 6229 : 2003, BS 8217 : 2005 and BS EN 13956 : 2012.

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

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

12.4 The suitability of the substrate deck to accept an adhesive bond or mechanical fixing must be checked prior to the work commencing.

12.5 The deck to which the VCL is to be applied must be even, dry, sound and free from dust and grease and other defects which may impair the bond. All deck joints should be taped.

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 EN 1991-1-4 : 2005.

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

- protect the boards during laying before the application of the roof waterproofing, or to lay the roof covering at the same time as laying the boards. However, boards accidentally wetted must be replaced or allowed to dry fully before application of the waterproof layer
- install boards when the ambient temperature is above 5°C, to prevent condensation.

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

12.10 Boards are for use with the waterproofing membranes as described in section 4.4.

12.11 Once installed, access to the roof should be restricted in accordance with section 8.12.

13 Procedure

13.1 The number of mechanical fixings required to fix the product will vary depending on the geographical location of the building, 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 EN 1991-1-4 : 2005.

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

13.3 A VCL is nailed to the deck, in accordance with BS 8217 : 2005. Laps of 150 mm are sealed using the appropriate grade of bitumen, a polyurethane adhesive or a suitable solvent-based adhesive in accordance with BS 8217 : 2005.

13.4 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.

13.5 Hot bitumen adhesive or a polyurethane adhesive or a suitable solvent-based adhesive is applied over the VCL and the roofing boards are fully embedded into it, in a brick bonded pattern.

Concrete deck

13.6 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.

13.7 For adhered systems, the VCL is fully bonded with hot bitumen, a polyurethane adhesive or a suitable solvent-based adhesive and the laps sealed, and the boards applied in the manner described for timber decks (see section 13.4 and 13.5).

Metal decks

13.8 If adhering the VCL and insulation boards, the deck should be prepared and 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.

13.9 For adhered systems, a reinforced VCL is fully bonded to the metal deck using a polyurethane adhesive or a suitable solvent-based adhesive, and the board applied in the manner described for timber decks (see section 13.4 and 13.5).

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

13.11 The thickness of the roof board used depends on the width of the rib openings of the metal deck as indicated in section 8.13, Table 5.

Mechanical fixings

13.12 The boards can be secured to concrete, metal and 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 boards are laid over the VCL in a brick-bonded pattern. On profiled metal decks, the boards are secured to the deck with a minimum of four, six or eleven mechanical fixings placed within the individual board area (1200 mm by 600 mm), (1200 mm by 1200 mm) and (2400 mm by 1200 mm) respectively, sited between 50 mm and 150 mm from all edges (see Figures 1 to 3). A minimum of six fixings per 1200 mm by 1200 mm tapered board are recommended, sited 210 mm from all edges (see Figure 4). Countersunk washers with circular plates of at least 75 mm diameter or 75 mm by 75 mm square should be used with each fixing. The requirement of additional fixings assessed in accordance with BS EN 1991-1-4 : 2005.

Weatherproofing (all systems)

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

Figure 1 Fixing layout 1200 mm by 600 mm board — minimum number of fixings

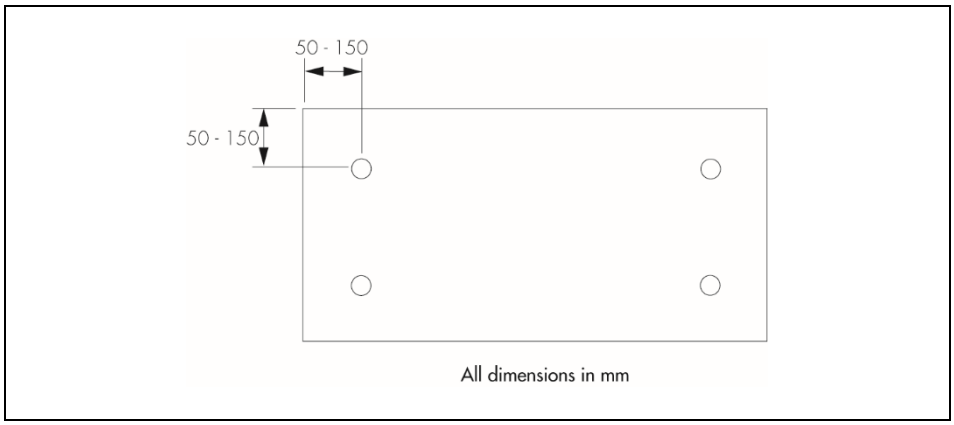


Figure 2 Fixing layout 1200 mm by 1200 mm board — minimum number of fixings

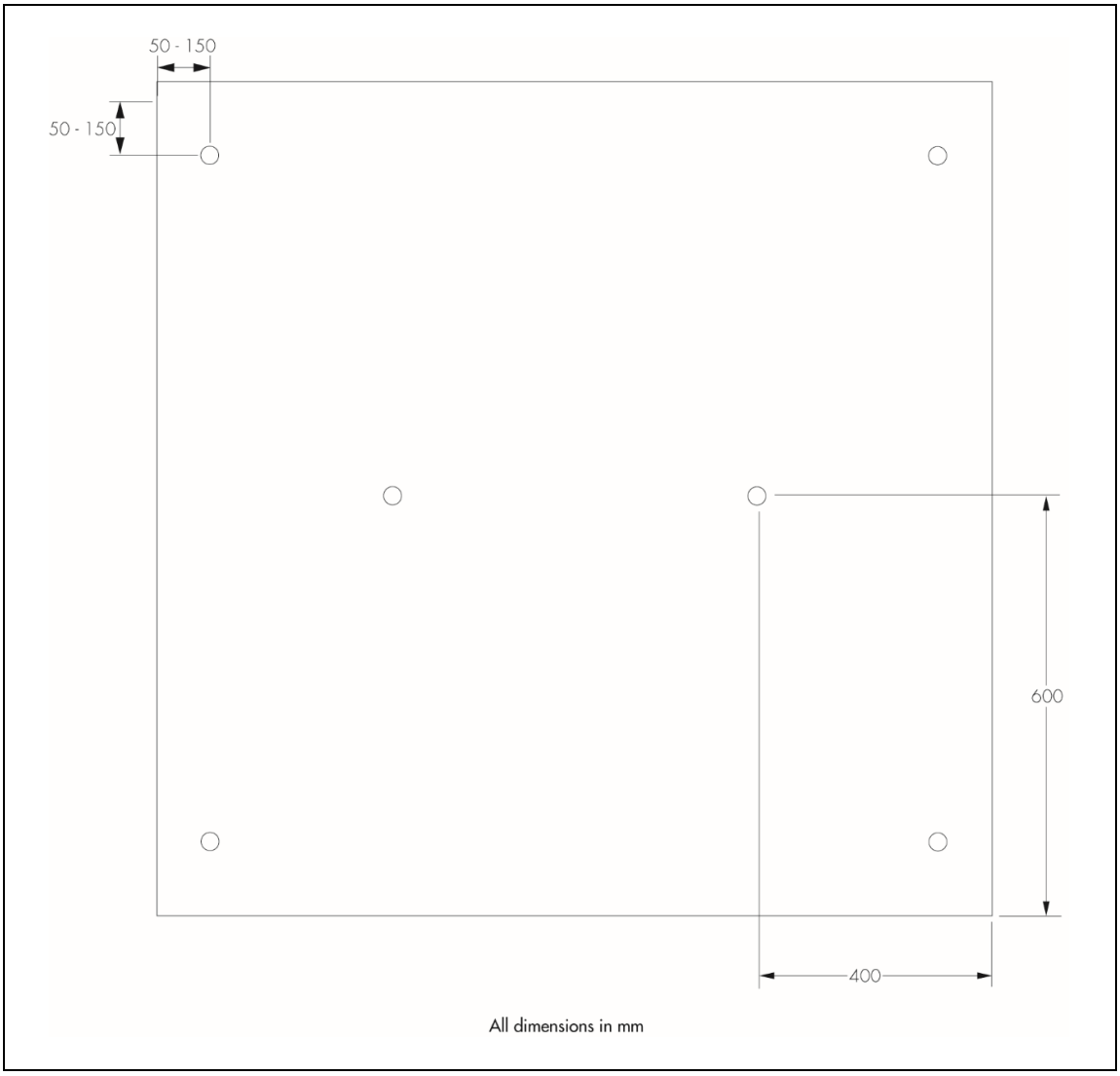


Figure 3 Fixing layout 2400 mm by 1200 mm board — minimum number of fixings

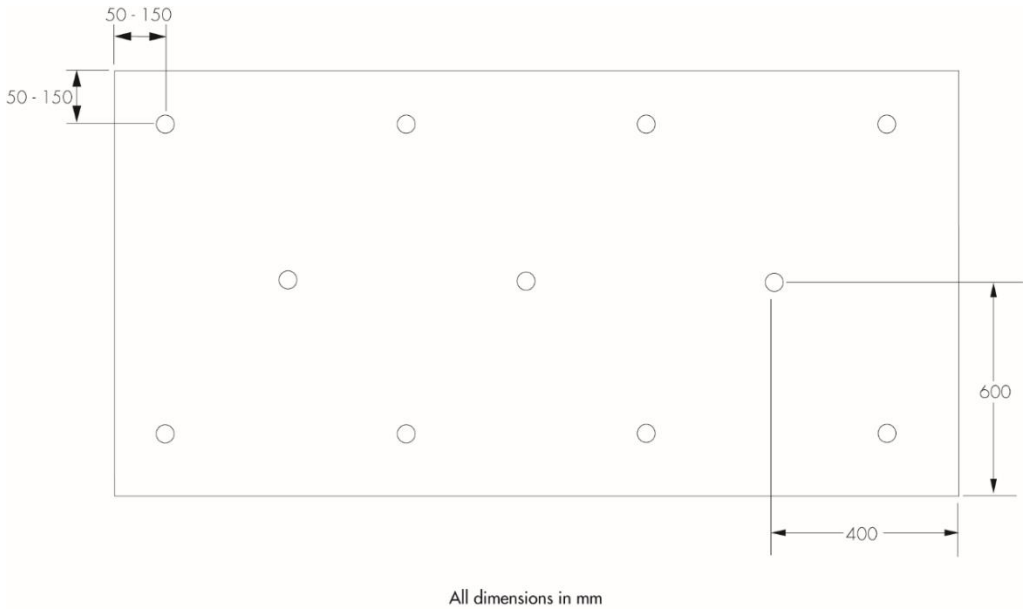
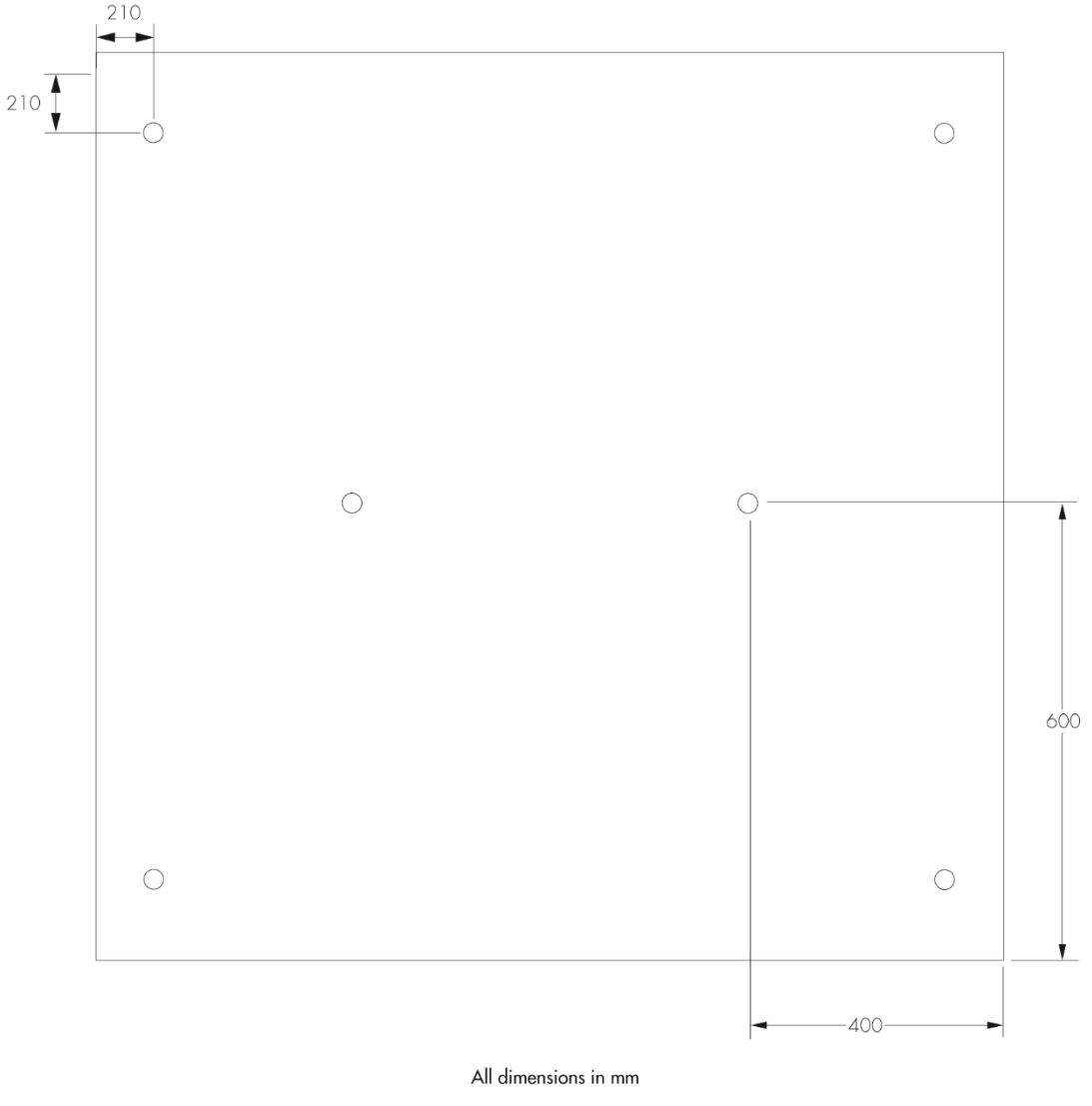


Figure 4 Fixing layout 2400 mm by 1200 mm board — minimum number of fixings



14 Tests

Tests were carried out and the results assessed to determine:

- behaviour under variations in temperature (unrestrained)
- behaviour under distributed load and increased temperature
- effect of concentrated load on cantilevered parts
- bowing under the effect of a thermal gradient
- behaviour on exposure to moisture
- tensile strength perpendicular to faces
- wind uplift
- density
- compressive strength
- dimensional stability in built-up roofing (bitumen pour test)
- dimensional stability under specified temperature and humidity conditions.

15 Investigations

15.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

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

- dimensional stability with temperature
- effect of concentrated load under a free span
- fire rating
- thermal conductivity (fresh and aged).

15.3 An assessment of the risk of interstitial condensation was made.

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

Bibliography

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

BS 6229 : 2018 *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*

EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 — Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 + A1 : 2010 – UK National Annex to *Eurocode 1 — Actions on structures — General actions*

BS EN 13165 : 2012 + A2 : 2016 *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PU) products — Specification*

BS EN 13956 : 2012 *Flexible sheets for waterproofing. Plastic and rubber sheets for roof waterproofing — Definitions and characteristics*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*

BRE Report (BR 443 : 2019) *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
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- 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.

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