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Agrément Certificate
07/4448
Product Sheet 1

NATURAL BUILDING TECHNOLOGIES PAVAROOF INSULATING SARKING BOARDS

PAVATHERM PLUS INSULATION AND ISOLAIR INSULATION

This Agrément Certificate Product Sheet⁽¹⁾ relates to Pavatherm Plus Insulation and Isolair Insulation, wood-fibre material of different densities for use as insulating sarking boards in pitched roofs.

(1) Hereinafter known 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 — Pavatherm Plus Insulation and Isolair Insulation have a thermal conductivity of $0.043 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ and $0.047 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$ respectively and can contribute to meeting the relevant requirements of the Building Regulations (see section 6).

Condensation risk — the products have a vapour resistance of $25 \text{ MN}\cdot\text{s}\cdot\text{m}^{-1}\cdot\text{g}^{-1}$ and can contribute to resisting the risk of condensation (see section 7).

Behaviour in relation to fire — the products have a Class E for reaction to fire in accordance with BS EN 13501-1 : 2002 (see section 8).

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

John Albon — Head of Approvals
Energy and Ventilation

Greg Cooper
Chief Executive

Date of Second issue: 8 April 2013

Originally certificated on 18 June 2007

The BBA is a UKAS accredited certification body — Number 1113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

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

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Regulations

In the opinion of the BBA, Pavatherm Plus Insulation and Isolair Insulation, 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) (as amended)

Requirement:	C2(c)	Resistance to moisture
Comment:		The products are acceptable. See sections 7.1 and 7.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The products can contribute to satisfying this Requirement. See sections 6.1 and 6.3 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	26	CO ₂ emission rates for new buildings
Comment:		The products can contribute to satisfying this Regulation. See sections 6.1 and 6.3 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The products can contribute to a construction satisfying this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.15	Condensation
Comment:		The products are acceptable, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ and 3.15.4 ⁽¹⁾⁽²⁾ . See sections 7.1 and 7.3 of this Certificate.
Standard:	6.1(a)(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The products can contribute to satisfying 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 ⁽¹⁾⁽²⁾ , 6.2.5 ⁽¹⁾⁽²⁾ and 6.2.6 ⁽²⁾ of these Standards. See sections 6.1 and 6.3 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		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 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:		All comments given for these systems under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012

Regulation:	23	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 11 and <i>Installation</i> of this Certificate.
Regulation:	29	Condensation
Comment:		The products are acceptable. See section 7.1 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The products can contribute to satisfying this Regulation. See sections 6.1 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 sections: 3 *Delivery and site handling* (3.3) and 13 *General* (13.2 and 13.3) of this Certificate.

Additional Information

NHBC Standards 2013

NHBC accepts the use of Pavatherm Plus Insulation and Isolair Insulation, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard BS EN 13171 : 2008. An asterisk(*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

Designation

The Certificate holder has declared the designation of this product to be WF-EN13171-T3-CS(10/Y)70-TR2.5-WS1.0-MU5-AF100 in accordance with BS EN 13171 : 2008, section 6.

Technical Specification

1 Description

1.1 Pavatherm Plus Insulation and Isolair Insulation are a wood-based fibreboard material, manufactured in accordance with BS EN 13171 : 2008. Pavatherm Plus contains a top layer of 20 mm thick, higher density Isolair. The products have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Property	Pavatherm Plus	Isolair
Length ^{(1)*} (mm)	1580, 1780	2480
Width* (mm)	560, 780	750
Thickness ^{(1)*} (mm)	60, 80 and 100 to 160	22, 35, 52 and 60
Nominal density* (kg ⁻¹ .m ⁻³)	180	240
Vapour resistivity* (MN.s.m ⁻¹ .g ⁻¹)	25	25
Edge detail	tongue-and-groove (all edges)	tongue-and-groove (all edges)

(1) Other sizes available to special order.

1.2 The products contain 0.5 % PVA adhesive, 0.7% paraffin and 5% latex.

1.3 Ancillary products used with these products are:

- Pavatape – a butyl rubber tape with laminated aluminium foil, 150 mm wide
- Pavaprim (primer) — for use on cut pieces/edges, prior to taping
- Pavatex system adhesive — in a dispensing gun
- Fixings — Starfix Thor Helical and/or Helifix Inskew 600 and/or EJOT TKR.

2 Manufacture

2.1 The products are manufactured from sawmill wood dust and shavings.

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 operated by the manufacturer are being maintained.

2.3 The management system of Pavatex SA in both locations in Switzerland has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by SQS Certificate (Certificate 14086).

3 Delivery and site handling

3.1 The manufacturer's product name and product lot number are printed on each pallet. Boards are delivered to the site with hardboard to protect the edges. Each pack is labelled with the manufacturer's name, product name, board dimensions, product code, production lot numbers and the BBA logo incorporating the number of this Certificate.

3.2 Where possible, packs should be stored inside. If stored outside, they should be off the ground on a clean, dry, level surface and under cover to protect against moisture and mechanical damage.

3.3 Where large volumes are stored, particularly indoors, flammable materials and ignition sources should not be permitted in the vicinity.

3.4 Contact with solvent-based wood preservatives, paint thinners and solvents such as (toluene, white spirit), can damage the products and, therefore, should be avoided.

3.5 The boards may suffer delamination if handled inappropriately during installation.

3.6 Damaged products should be discarded.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Pavatherm Plus Insulation and Isolair Insulation.

Design Considerations

4 General

4.1 Pavatherm Plus Insulation and Isolair Insulation are for use above rafters as insulating sarking boards for 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. Additional insulation must be used between the rafters, see example in section 6.2.


4.2 New buildings subject to the national Building Regulations should be designed in accordance with the relevant recommendations of BS EN 1995-1-1 : 2004.

4.3 De-rating of any electrical cables in areas where the product restricts the flow of air should be assessed.

5 Practicability of installation

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

6 Thermal performance

 6.1 Calculations of the thermal transmittance (U value) of a specific roof construction should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE⁽¹⁾ Report (BR 443 : 2006) *Conventions for U-value calculations*, using the declared thermal conductivity* ($\lambda_{90/90}$) of 0.043 W·m⁻¹·K⁻¹ for Pavatherm Plus Insulation and 0.047 W·m⁻¹·K⁻¹ for Isolair Insulation.


(1) Building Research Establishment.

6.2 Some examples of U values are given in Table 2.

Table 2 Example U values for use as sarking board in pitched roofs

U value (W·m ⁻² ·K ⁻¹)	Thickness of insulating sarking required (mm)			
	With 150 mm Pavatherm* (with $\lambda_{90/90}$ of 0.038 W·m ⁻¹ ·K ⁻¹) between the rafters (150 mm deep)		With 220 mm Pavatherm* (with $\lambda_{90/90}$ of 0.038 W·m ⁻¹ ·K ⁻¹) between the rafters (220 mm deep)	
	Pavatherm Plus	Isolair	Pavatherm Plus	Isolair
0.13	160	—	100	—
0.15	140	—	60	—
0.16	120	—	—	52
0.18	80	—	—	22
0.20	60	—	—	—
0.25	—	22	—	—

Note: *example additional insulation between rafters is a wood-fibre based CE marked product to BS EN 13171 : 2008.

 6.3 The products can maintain, or 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). For new-build, see also SAP 2009, Appendix K, and the *iSBEM User Manual*

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, Annexes D and H.

Surface condensation



7.2 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 the relevant requirements of *Limiting thermal bridging and air leakage : Robust construction details for dwellings and similar buildings*, TSO 2002, or BRE Information Paper IP 1/06.



7.3 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 and designed in accordance with BS 5250 : 2011, Annex H. Further guidance may be obtained from BRE Report (BR 262 : 2002) *Thermal insulation: avoiding risks*.

8 Behaviour in relation to fire

8.1 The products have a Class E classification for reaction to fire in accordance with BS EN 13501-1 : 2002.

8.2 The board 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 5.11 and 5.12

Scotland — Mandatory Standard 2.2, clause 2.2.1⁽¹⁾⁽²⁾

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

Northern Ireland — Technical Booklet E, paragraph 4.15.

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

8.4 When installed with an internal lining board, eg 12.5 mm thick plasterboard, 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.

9 Resistance to moisture

The board will not be adversely affected by rain during installation, nor by wind-driven snow or rain penetrating the tiling in service.

10 Maintenance and repair

10.1 As the products are protected within the roof, maintenance is not required.

10.2 Damaged products can be replaced before the installation of counter battens.

11 Durability



When installed in accordance with the Certificate holder's instructions, the board will have a life equivalent to that of the roof structure in which it is incorporated.

12 Reuse and recyclability

The products comprise wood-fibre that can be recycled for making compost and environmentally declared in accordance with BS EN ISO 14025 : 2006.

Installation

13 General

13.1 Installation of Pavatherm Plus Insulation and Isolair Insulation must be in accordance with the relevant parts of BS 5534 : 2003, and the Certificate holder's instructions.

13.2 The board is light to handle but some handling difficulties may be experienced in windy conditions. Once laid, the board will not support the weight of operatives unless greater than 50 mm. Care must be taken during installation and tiling in accordance with the *Work at Height Regulations, 2005*.

13.3 When cutting the boards a mask should always be used to avoid inhalation of wood-dust.

13.4 The board can be cut using a fine-toothed saw but care must be taken to prevent damage particularly to edges. Damaged boards should not be used.

13.5 Where the board is installed in traditional and timber-framed construction, cavity barriers at the junction of the external wall and roof space should be provided.

13.6 It is important to ensure a tight fit between boards, boards and rafters and other detailed elements. At ridges and verges, boards should be cut to achieve tightly butted joints.

13.7 Gaps and joints in the insulation envelope should be filled with wood-fibre offcuts and taped to ensure integrity.

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

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

14 Procedure

14.1 An initial preservative-treated anchor or stop rail (one fixing per rafter) is used to secure the first board.

14.2 The products are laid with tongue uppermost (towards the ridge) and parallel with the eaves.

14.3 Subsequent boards should be laid by locating the end tongue, sliding the new board into position, secured by one fixing per rafter, and finally securing by counter battens.

14.4 Joints in the vertical plane should be staggered, to prevent joints falling within the same rafter space. An expansion joint is required for every 15 m of eave.

14.5 Where boards are butt edge jointed, wood-fibre offcuts should be used to fill voids, and the board primed and taped to ensure integrity.

14.6 Where additional roof insulation is required, the insulation can be installed between rafters. Cutting may be required for this type of installation. The products are installed by pushing between the rafters through the underside of the roof and are held in place with timber battens.

14.7 Fixings used must be in accordance with the Certificate holder's installation instructions.

14.8 Tiling battens are nailed into the counter battens parallel to the eaves at the required gauge in accordance with BS 5534 : 2003.

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

Technical Investigations

15 Tests

Tests were carried out in accordance with BS EN 13171 : 2001 to determine:

- behaviour under a thermal gradient
- compressive stress at 10% deformation
- bond strength between Isolair and Pavatherm Plus layers of the Pavatherm Plus Insulation.

16 Investigations

16.1 An examination was made of test data relating to:

- dimensional stability under specified temperature and humidity
- shear strength
- cohesive strength
- water vapour permeability
- thermal conductivity
- compressive strength
- material class
- flexural strength
- water absorption
- water penetration
- density
- dimensional accuracy and flatness
- reaction to fire
- dimensional stability at 70°C
- condensation risk
- durability
- burning characteristics.

16.2 The manufacturing process was evaluated, including methods for quality control and details obtained of the quality and composition of 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 : 2011 *Code of practice for control of condensation in buildings*

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

BS EN 1995-1-1 : 2004 *Eurocode 5 : Design of timber structures — General — Common rules and rules for buildings*
BS EN 13171 : 2001 *Thermal insulation products for buildings — Factory made wood fibre (WFI) products — Specification*
BS EN 13171 : 2008 *Thermal insulation products for buildings — Factory made wood fibre (WFI) products — Specification*
BS EN 13501-1 : 2002 *Fire classification of construction products and building elements. Classification using test data from reaction to fire tests*
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*
BS EN ISO 14025 : 2006 *Environmental labels and declarations — Type III environmental declarations — Principles and procedures*

Conditions of Certification

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- is copyright of the BBA
- is subject to English Law.

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

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

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

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

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

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

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