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Agrément Certificate
No 07/4448

NATURAL BUILDING TECHNOLOGIES ROOF INSULATION

PRODUCT SHEET 1 — PAVATHERM PLUS INSULATION

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Pavatherm Plus Insulation, a wood-fibre insulation for use in pitched roofs.

THIS CERTIFICATE INCLUDES:

- factors relating to compliance with UK 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

Strength — when installed in accordance with the Certificate holder's instructions the board will resist the loads likely to be met during installation and service. The product is non-loadbearing and can only withstand weight directly supported by rafters (see section 4).

Behaviour in relation to fire — the board chars when exposed to excessive heat and is classified as combustible, however, the increase in fire load in the building, consequent upon its use, is small. The product has a classification of Class E for reaction to fire in accordance to EN 13501-1 : 2002 (see section 5).

Thermal performance — subject to the selection of an appropriate board thickness and additional insulation, a roof construction can contribute to meeting national carbon emission rate values. The product can maintain, or contribute to maintaining, continuity of thermal insulation at junctions between the roof and other building elements (see section 6).

Condensation — the board has a low vapour resistance and is installed with tightly-butted joints and filled/sealed gaps, in a continuous layer and will provide a convection-free envelope of low vapour resistance (see section 7).

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 (see section 8).

Durability — the board will have a life equivalent to that of the roof structure in which it is incorporated (see section 10).

The BBA has awarded this Agrément Certificate for Pavatherm Plus Insulation to Natural Building Technologies Ltd as fit for its intended use provided it is installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Date of First issue: 18 June 2007

Greg Cooper: Chief Executive

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

Readers are advised to check the validity 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, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	C2(c)	Resistance to moisture
Comment:		The product is acceptable. See sections 7.1 and 7.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		See sections 6.2 to 6.5 and 6.7 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 10 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See section 10 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	3.15	Condensation
Comment:		When used in conjunction with an appropriate vapour control layer the product will be unrestricted under this Standard, 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 product 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 6.6 and 6.7 of this Certificate. (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



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

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 10 of this Certificate.
Regulation:	C5	Condensation
Comment:		The product is acceptable. See section 7.1 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Comment:		See sections 6.2 to 6.5 and 6.7 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

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

See sections: 1 *Description* (1.2) and 11 *Installation – General* (11.2).

Non-regulatory Information

NHBC Standards 2007

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

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, Pavatherm Plus Insulation, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual*, Section 4 *Superstructure*, Sub-section *Pitched roofs*.

General

Pavatherm Plus Insulation is satisfactory for use in conjunction with timber counter battens and tiling battens in tiled or slated pitched roofs designed and constructed in accordance with the relevant clauses of BS 5534 : 2003 for dwellings or other buildings with similar temperature and humidity conditions.

Technical Specification

1 Description

1.1 Pavatherm Plus Insulation is a wood-based fibreboard material, manufactured in accordance with BS EN 13171 : 2001. In addition, each board contains a top layer of 20 mm thick, higher density Isolair (see Product Sheet 2).

1.2 The board contains PVA adhesive but no wood preservatives, other than 0.7% paraffin and 4% latex and has the nominal characteristics of:

length ⁽¹⁾ (mm)	1580
width (mm)	780
thickness (mm)	60, 80 and 100
declared overall thermal conductivity ($Wm^{-1}K^{-1}$)	0.044
nominal density (kgm^{-3})	170
vapour resistivity ($MNs_{g^{-1}}$)	25
edge detail	tongue-and-groove (all edges)

(1) Other sizes available.

1.3 Ancillary products used with the boards are:

- Pavatape – a butyl rubber tape with laminated aluminium foil of 150 mm width
- Primer – for use on cut pieces/edges, prior to taping
- Pavatex system adhesive – in a dispensing gun
- Starfix Thor Helical and/or Helifix Inskew 600 and/or EJOT TKR fixings.

2 Delivery and site handling

2.1 The manufacturer's product name and product lot number are printed on each board. 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.

2.2 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.

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

2.4 Contact with solvent-based wood preservatives, coal tar and its derivatives (eg creosote), paint thinners and solvents (toluene, white spirit), can cause solvent attack and should therefore be avoided.

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

Assessment and Technical Investigations

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

Design Considerations

3 Use

Pavatherm Plus Insulation is for use above rafters and as insulating sarking for tiled or slated pitched roofs designed and constructed in accordance with the relevant clauses of BS 5534 : 2003.

4 Strength

4.1 When installed in accordance with the Certificate holder's instructions the board will resist the loads likely to be met during installation and service.

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

4.3 When calculating the fixing spacing required to resist the calculated loadings, the requirements of BS 5268-2 : 2002 should be followed where possible. Further guidance can be obtained from the Certificate holder. The Certificate holder must advise on the use of the correct proprietary fixings and improved nails and fixing capacity in accordance with BS 5268-2 : 2002.

5 Behaviour in relation to fire

5.1 The board chars when exposed to excessive heat and is classified as combustible, however, the increase in fire load in the building, consequent upon its use, is small. The product has a classification of Class E for reaction to fire in accordance with EN 13501-1 : 2002.

5.2 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⁾

Northern Ireland — Technical Booklet E, paragraph 3.15.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).


5.3 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.

5.4 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.

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 : 1997 and BRE⁽¹⁾ report (BR 443 : 2006) *Conventions for U value calculations*, using the declared thermal conductivity for the product of $0.044 \text{ Wm}^{-1}\text{K}^{-1}$.

(1) Building Research Establishment.

 6.2 The product must be used in conjunction with additional insulation to achieve the following U values:

- the U value $0.16 \text{ Wm}^{-2}\text{K}^{-1}$ specified for the 'notional' building in Table R1 of Appendix R of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005) or the Simplified Building Energy Model (SBEM) (see section 6.3 of this Certificate)

- the limit average U value of $0.25 \text{ Wm}^{-2}\text{K}^{-1}$
- the limit U value of $0.35 \text{ Wm}^{-2}\text{K}^{-1}$ for the individual element.

6.3 For roofs not improving on the 'notional' roof U value, additional energy saving measures will be required within the building and/or services for a building to achieve the required overall carbon dioxide emission rate reduction of 'average' improvements of 20% (dwellings) and from 23% to 28% (buildings other than dwellings) as outlined in the following guidance documents:

England and Wales — as specified in Approved Documents L1A and L2A

Northern Ireland — as specified in Technical Booklet F1.


6.4 Compliance with the guidance referred to in section 6.7 will allow the use of the default psi values from Table 3 of BRE Information Paper IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings* and Table K1 of *The Government's Standard Assessment Procedure for Energy Rating of Dwellings* (SAP 2005), in Target Emission Rate calculations to SAP 2005 or the Simplified Building Energy Model (SBEM).

6.5 When installed in the roof of existing buildings, the product must be used in conjunction with additional insulation for a roof construction to achieve:

- $0.25 \text{ Wm}^{-2}\text{K}^{-1}$ 'average' limiting U value for an individual element
- $0.35 \text{ Wm}^{-2}\text{K}^{-1}$ limiting U value for an individual element
- $0.20 \text{ Wm}^{-2}\text{K}^{-1}$ for a new or replacement thermal element or upgraded retained element as outlined in the following guidance documents:

England and Wales — Approved Documents L1B, Section 2, and L2B, Section 3

Northern Ireland — as specified in Technical Booklets F1 and F2, Section 3.

 6.6 The product must be used in conjunction with additional insulation to achieve the following U values:

- for 'notional' U values for roofs outlined in the table to 6.1.2⁽¹⁾, 6.1.3⁽²⁾ ($0.16 \text{ Wm}^{-2}\text{K}^{-1}$ for all fuel packages)
- maximum U value of $0.20 \text{ Wm}^{-2}\text{K}^{-1}$ as described by Mandatory Standard 6.2, clause 6.2.1⁽¹⁾⁽²⁾ ($0.25 \text{ Wm}^{-2}\text{K}^{-1}$ non-domestic)
- individual element value of $0.35 \text{ Wm}^{-2}\text{K}^{-1}$
- simplified 'notional' domestic building value as described in Mandatory Standard 6.1, clause 6.1.6⁽¹⁾ ($0.16 \text{ Wm}^{-2}\text{K}^{-1}$)
- for extensions the value described by the diagram to Mandatory Standard 6.2, clause 6.2.9⁽¹⁾ ($0.16 \text{ Wm}^{-2}\text{K}^{-1}$)

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).



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

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

Scotland — Accredited Construction Details

Northern Ireland — Accredited Construction Details (version 1.0).

7 Condensation

Interstitial condensation



7.1 Roofs will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2002, Section 8.4 and Appendix D.

Surface condensation



7.2 Roofs will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.35 \text{ Wm}^{-2}\text{K}^{-1}$ 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 $1.2 \text{ Wm}^{-2}\text{K}^{-1}$ at any point. Guidance may be obtained from BS 5250 : 2002, Section 8, and BRE report (BR 262 : 2002) *Thermal insulation: avoiding risks*.

8 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.

9 Maintenance and repair

Damaged boards can be replaced before the installation of counter battens.

10 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.

Installation

11 General

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

11.2 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 of an appropriate thickness. Care must be taken during installation and tiling in accordance to *Work at Height Regulations : 2005*.

11.3 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.

11.4 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.

11.5 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.

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

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

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

12 Procedure

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

12.2 The board is laid with tongue uppermost, towards the ridge and parallel to the eaves.

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

12.4 Any 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.

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

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

12.7 The board is fixed using fixings in accordance to the Certificate holder's installation instructions.

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

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

Technical Investigations

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

13 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.

14 Investigations

An examination was made of test data relating to:

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

Additional Information

Natural Building Technologies Ltd 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 : 2001, Section 6.

Bibliography

- BS 476-3 : 2004 *Fire tests on building materials and structures — Classification and method of test for external fire exposure to roofs*
- BS 5250 : 2002 *Code of practice for control of condensation in buildings*
- BS 5268-2 : 2002 *Structural use of timber — Code of practice for permissible stress design, materials and workmanship*
- BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*
- BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*
- BS 6399-3 : 1988 *Loading for buildings — Code of practice for imposed roof loads*
- BS EN 13171 : 2001 *Thermal insulation products for buildings — Factory made wood fibre (WVF) products — Specification*
- BS EN ISO 6946 : 1997 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*
- EN 13501-1 : 2002 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

15 Conditions

15.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

15.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

15.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date 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. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.