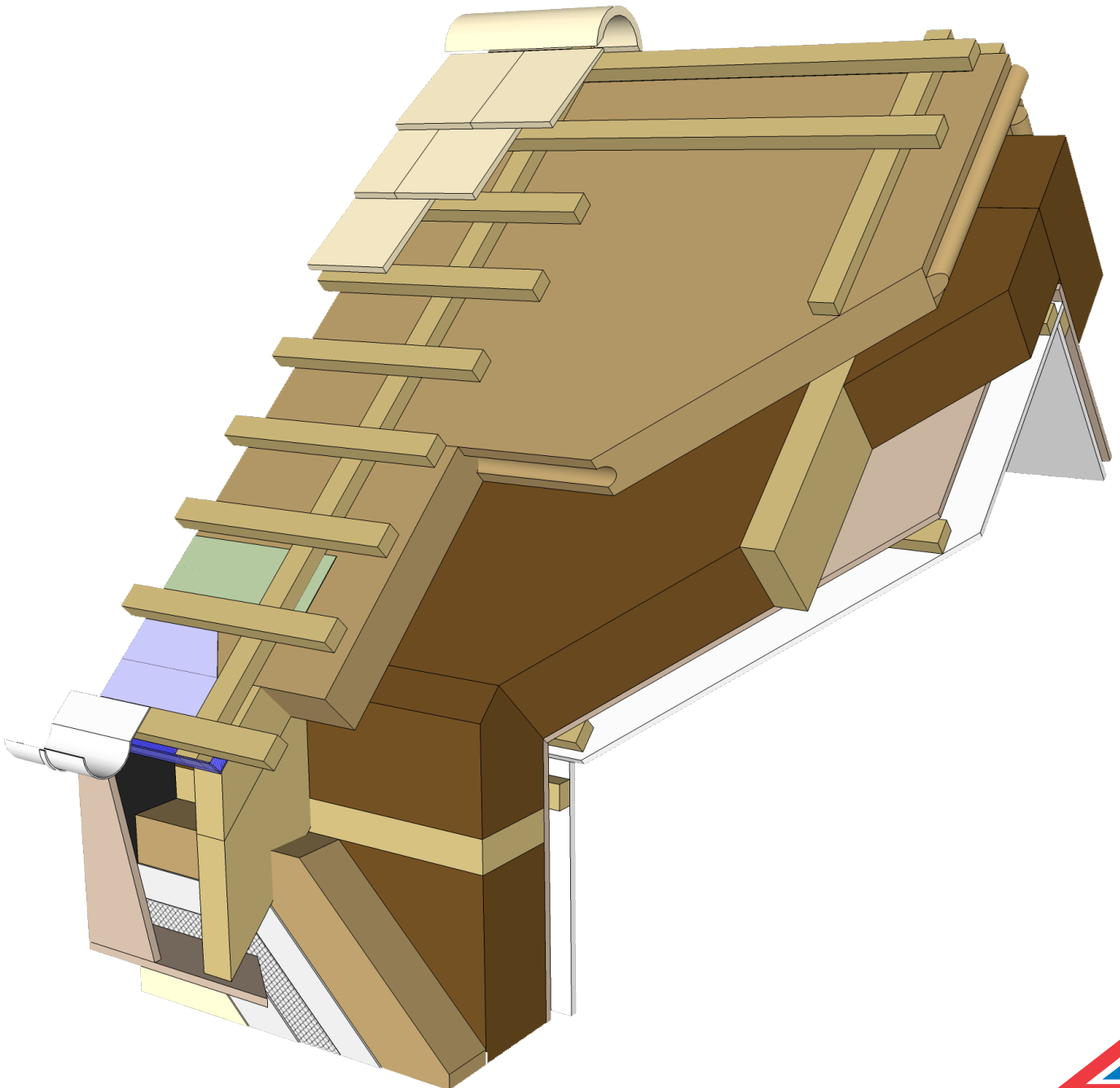




Natural  
Building  
Technologies

# Technical Manual

## NBT Pitched roof system



# NBT Pitched Roof

## Introduction

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### NBT Pitched Roof

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No limits to design: NBT Pitched Roof can be used with dormers, roof windows, all kinds of roofing materials and for pitches as low as 10° without a membrane

### Description of NBT Pitched Roof System

NBT Pitched Roof system provides a vapour permeable insulation and sarking layer that offers thermal and acoustic performance without the need for a waterproof membrane.

The system is suitable for over rafter insulation and adaptable to all kind of roofing materials: Tiles, slates, zinc, green roof etc.

Made from over 95 % waste softwood and under 5 % inert water-proofing additives, NBT PAVATEX woodfibre boards (PAVATHERM-PLUS, ISOROOF) are a genuinely sustainable nontoxic building material.

To produce NBT PAVATEX boards, waste wood fibres are pulped and mixed with water. The pulp is heated to activate the natural lignin they contain in order to glue the fibres together. The pulp is then pressed into boards, dried, and cut to size.

The advanced manufacturing process uses the inherent properties of wood fibres to produce boards with many excellent technical qualities for thermal and acoustic insulation, thermal storage capacity, vapour permeability and moisture control.

## Performance Guide

A modern roof insulation system must do more than just protect building occupants from cold. It must create a comfortable and healthy environment in all possible combinations of external and internal conditions and control the effects of external heat, cold, noise and internal moisture generation.

### NBT Pitched Roof System...

Keep the building warmer for longer in cold weather:

Low thermal conductivity and high vapour permeability provide high thermal insulation with no risk of interstitial condensation. Vapour barriers are unnecessary. Wood fibre boards reduce the effect of thermal bridging and the interlocking board design easily achieves good wind-tightness, so increasing thermal performance. Energy use for heating is significantly reduced leading to lower CO<sub>2</sub> emissions and running costs.

Keep the building quieter:

The high mass and the fibrous texture of NBT PAVATEX woodfibre boards gives excellent acoustic performance to buildings.

Keep the building cooler in hot weather:

The unique combination of high density, high specific heat capacity and low thermal conductivity gives NBT Pitched Roof solutions the effect of thermal mass that would normally be associated with green roofs. Compared to conventional sarking material the risk of condensation behind it during cold nights is minimized as the boards will store the day's heat.

Keep the building dry and breathable:

NBT PAVATEX woodfibre boards are very vapour permeable and hygroscopic. This allows them to disperse accumulating short term moisture and protect vulnerable elements of the building fabric, with no reduction in the performance of the boards themselves. The boards allow moisture from within the structure to pass easily to the outside. This provides a safeguard against high moisture content. This is vital for the long-term health of the building fabric, and is completely overlooked by most conventional insulation systems.

### NBT Natural Insulation Products for:

Simple and robust  
Improved heat storage  
Excellent sound insulation

Highly vapour permeable constructions that do not need membranes to control interstitial condensation

Substantial saving of build cost compared with conventional timber frame construction

Simple robust construction has few skilled operations and is easily adapted for off site manufacture

Reduced thermal bridging - ideal to achieve high standard and beyond



# NBT Pitched Roof

## Airtightness

### Principle

A building envelope should be airtight when all ventilation openings are closed. The design requirement for air changes has to be provided by opening the windows manually, other controllable ventilation openings or suitable mechanical ventilation systems.

When assessing the air permeability of the building envelope, the following aspects must be considered separately:

- Individual building components must exhibit the necessary airtightness in accordance with building component standards
- The overall air permeability of the building envelope must meet the limiting and target values of building regulations
- Local air permeability (leaks, primarily on the inside) can lead to moisture damage because they allow moist interior air to infiltrate the construction
- Local air permeability and associated draughts can have a detrimental effect on the thermal comfort of the occupants and can also lead to increased energy consumption

### Air permeability

The air permeability of the building envelope is specified by the ratio of surface area of the building to the hourly air exchange rate for a 50 Pa pressure difference. In Part L Building Regulations an air permeability of  $10.0 \text{ m}^3/\text{m}^2/\text{h}$  is allowed. 0.6 Air changes/hour at 50 Pa pressure for Passivhaus .

### Design and construction

To ensure that the building envelope has the necessary degree of airtightness, an airtightness layer is required over all parts of the construction on the warm side of the thermal insulation. Generally, the vapour control layer and airtight layer functions are combined and provided by one membrane, sheeting or a board type material (OSB, multi-ply board, plywood etc.). Such materials require fixings and permanent air tight seals at joints and junctions in the form of adhesive tape, glue, mechanical fasteners etc., Or may need to be held in place with battens.

Rock wool and glass-fibre boards, wood fibreboards, wooden panelling, planking, acoustic linings, building papers, plaster board etc. cannot achieve the degree of

airtightness required for modern buildings.

The airtightness layer must be conceived at the design stage as a “seamless” layer over the entire building envelope, planned with its practical installation in mind, and shown as a separate layer on all drawings. Good planning includes corresponding information in the tender documents and detail in the working and fabrication drawings. The materials used to achieve the



Sketch of the principle of an airtightness layer: Build tight, ventilate right.

airtightness must be sealed airtight at junctions with adjoining elements such as windows, doors and foundations. The installation of several layers each of which are only partially airtight will not result in a building with an adequate degree of sealing.

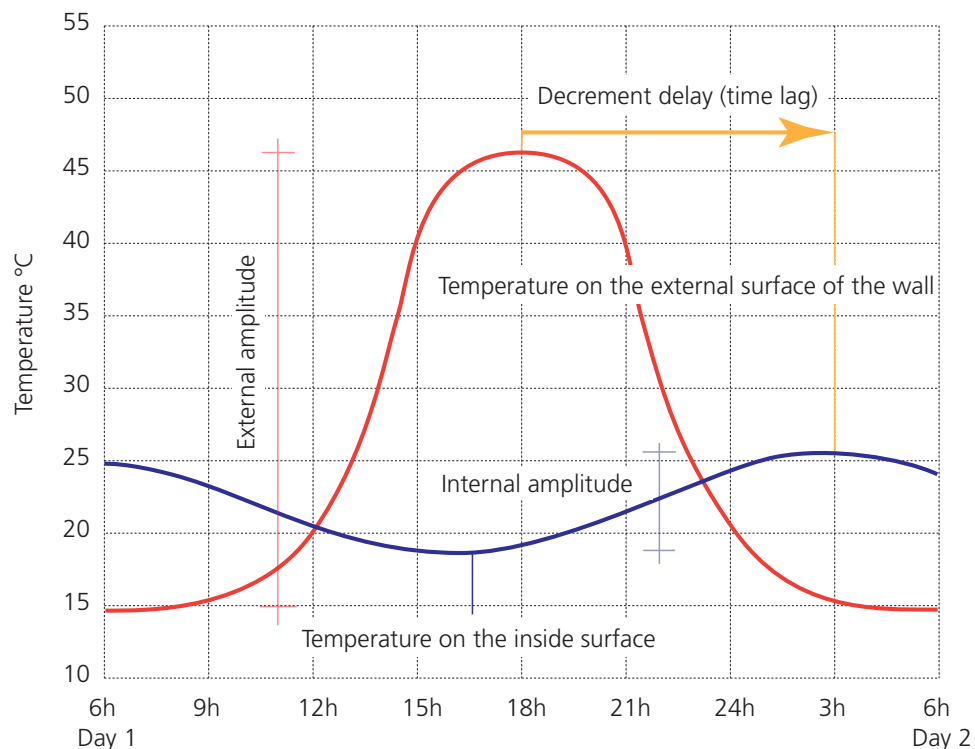
### Testing

In order to achieve an airtight building envelope, measures and checks during construction and after completion of the building are necessary. If the airtightness layer has been properly designed and planned, expensive blower door measurements, leak detection by means of smoke tests or IR thermography, and unnecessary costs of repairs can be saved.

**A properly designed and constructed building will fulfil airtightness requirements without the need for further special work. NBT systems provide proper design and site support to ensure that the correct levels of airtightness are achieved.**

# NBT Pitched Roof

## Summer Overheating



### Selecting the right insulation

**As part of a building's design it is important to consider the effects of summer overheating control, particularly when there are rooms in roofs or where the construction system is lightweight such as steel or timber frame.**

Summer overheating is caused by any or a combination of three reasons:

- high internal gains from appliances, people, machines etc.
- high solar gain through windows due to poor summer shading
- heat passing directly through the walls

The solution to the first is to reduce the gains or ventilate, the second requires better shading, and the third is solved by reducing peak heat gain to the room by changing the decrement delay and factor.

Decrement delay and factor can be thought of as the amount a peak external surface temperature is smoothed out by the structure, and the time that the peak is delayed before it reaches the inside.

To reduce the solar heat passing through a roof or a wall,

a low decrement factor is needed, and more importantly, it should delay the passage of heat by between 6 - 12 hours after the external solar radiation peak – this means that the decrement delay of a wall or roof construction should be between 6 - 12 hours.

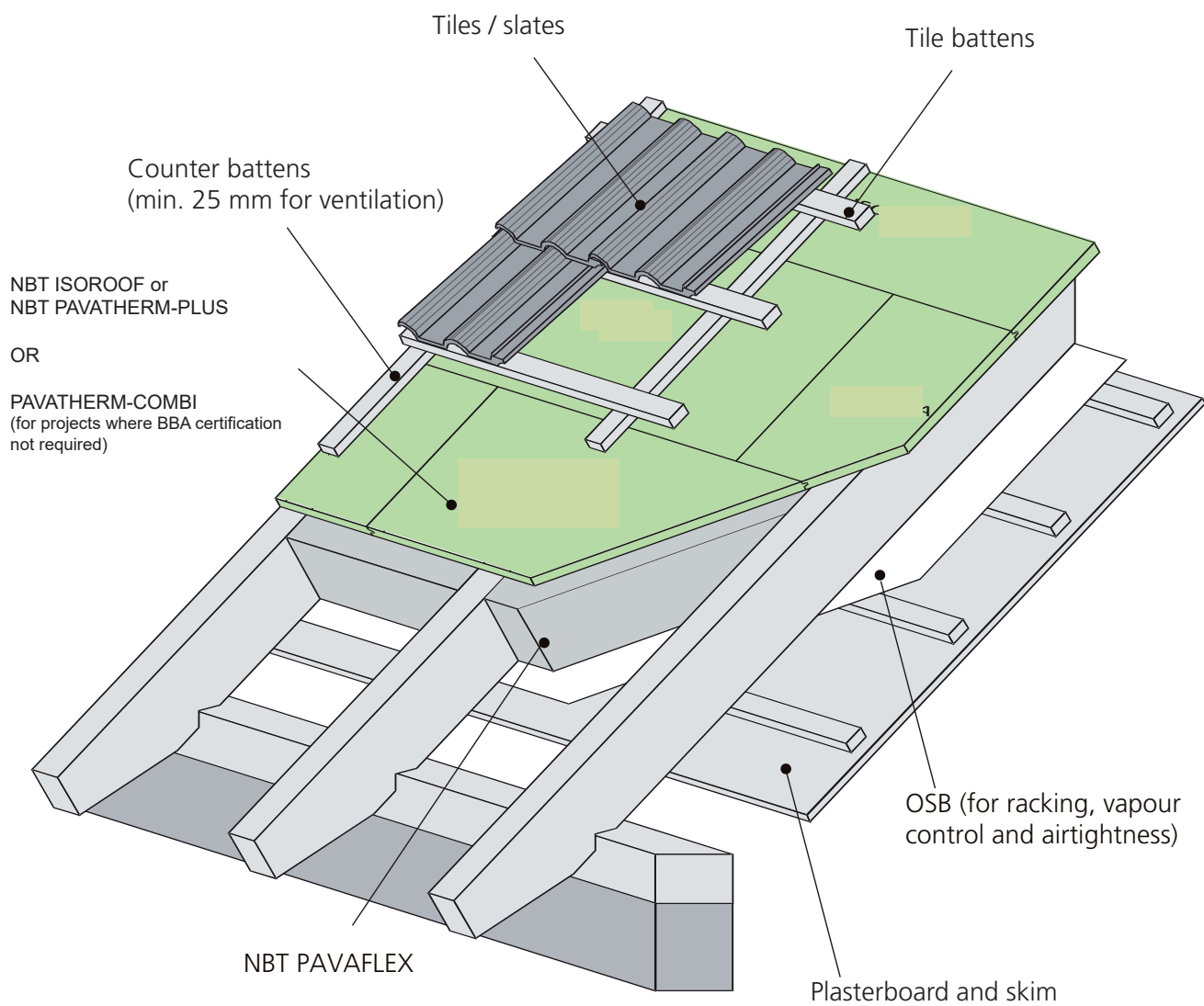
In terms of achieving these satisfactory values, an insulation material that has a high thermal mass is needed to produce better values. A combination of density, thermal conductivity and specific heat capacity is required.

**NBT PAVATEX woodfibre boards have an excellent combination of low  $\lambda$  (k-value) (0.038 - 0.047 W/m<sup>2</sup>K), high specific heat capacity (2100J/kgK) and for insulation boards a high density (140 - 240 kg/m<sup>3</sup>). These values far exceed any conventional insulation material. This means that with NBT PAVATEX woodfibre insulation a roof or "lightweight" structure such as lightweight frame building can perform as though it was a much more massive structure.**

The consequence is the reduction of internal temperatures by 4° C or more in summer compared to a room which may have the same U-value but conventional insulation.

# NBT Pitched Roof

## Build-up



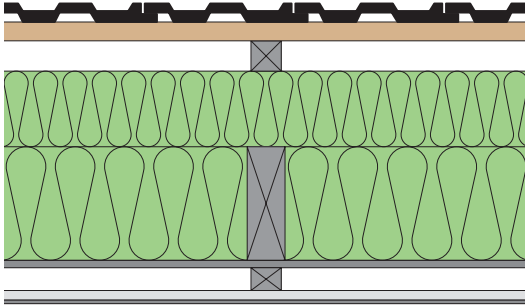


# NBT Pitched Roof

## Physical Properties

\* Contact NBT for bespoke U-value calculations. Specially for Pavatherm-Combi system

### Physical Properties NBT Pitched Roof



1. Roofing (tiles, slates etc. )
2. Counter battens 25 x 38 mm
3. NBT ISOROOF 20/35 mm or  
NBT PAVATHERM-PLUS<sup>+</sup> 60/80/100/120 mm
4. Rafters / NBT PAVAFLEX
5. OSB (support & airtightness) or Airtight membrane
6. Service void 25 mm (can be insulated for improved performance)
7. Plasterboard 12.5 mm with plaster, skim and NBT emulsion paint

#### 100 mm rafters

Insulation onto rafters	NBT ISOROOF		NBT PAVATHERM-PLUS <sup>+</sup>			
	20 mm	35 mm	60 mm	80 mm	100 mm	120 mm
U-Value [W/m <sup>2</sup> K]	0.31	0.28	0.24	0.21	0.19	0.18
Admittance [W/m <sup>2</sup> K]	1.05	1.05	1.05	1.05	1.05	1.05
Sound insulation ca. [dB] tiles / slates	43 / 47	44 / 48	44 / 48	45 / 49	46 / 50	47 / 51
Decrement delay [h]	3.9	4.9	6.4	7.8	9.2	10.6

#### 150 mm rafters

Insulation onto rafters	NBT ISOROOF		NBT PAVATHERM-PLUS <sup>+</sup>			
	20 mm	35 mm	60 mm	80 mm	100 mm	120 mm
U-Value [W/m <sup>2</sup> K]	0.23	0.21	0.19	0.17	0.16	0.15
Admittance [W/m <sup>2</sup> K]	1.05	1.05	1.05	1.05	1.05	1.05
Sound insulation ca. [dB] tiles / slates	46 / 50	47 / 51	47 / 51	48 / 52	49 / 53	50 / 54
Decrement delay [h]	5.7	6.7	8.3	9.7	11.1	12.5

#### 175 mm rafters

Insulation onto rafters	NBT ISOROOF		NBT PAVATHERM-PLUS <sup>+</sup>			
	20 mm	35 mm	60 mm	80 mm	100 mm	120 mm
U-Value [W/m <sup>2</sup> K]	0.20	0.19	0.17	0.16	0.15	0.14
Admittance [W/m <sup>2</sup> K]	1.05	1.05	1.05	1.05	1.05	1.05
Sound insulation ca. [dB] tiles / slates	47 / 51	48 / 52	49 / 52	49 / 53	50 / 54	51 / 55
Decrement delay [h]	6.7	7.7	9.3	10.7	12.1	13.5

#### 219 mm rafters

Insulation onto rafters	NBT ISOROOF		NBT PAVATHERM-PLUS <sup>+</sup>			
	20 mm	35 mm	60 mm	80 mm	100 mm	120 mm
U-Value [W/m <sup>2</sup> K]	0.17	0.16	0.15	0.14	0.13	0.12
Admittance [W/m <sup>2</sup> K]	1.05	1.05	1.05	1.05	1.05	1.05
Sound insulation ca. [dB] tiles / slates	48 / 52	49 / 53	49 / 53	50 / 54	51 / 55	52 / 56
Decrement delay [h]	8.3	9.3	10.9	12.3	13.7	15.1

Note: Calculations are done according to BS EN ISO 6946:1997 and BR 443. Rafters width assumed to be 50mm at 600 mm centres (allowances for wall plates etc, give a 9% bridging area for the timber). Rafters depth is taken to be the same as the thickness of insulation specified. Passivhaus solutions are marked in green.

# NBT Pitched Roof

## Designers: Key Considerations

### General:

The NBT Pitched Roof System must only be installed by competent contractors. Provide the contractor with full and complete details for all critical areas of the system including those listed below - leave nothing to be agreed "on site".

### System Guarantee:

The system is guaranteed only if boards and accessories approved by NBT are used. NBT Pitched Roof system has LABC (Local Authority Building Control) approval and BBA (British Board of Agrément) approval (BBA CERTIFICATE No 07/4448).

### System Movement Joints:

Movement joints in the substrate must be incorporated into the NBT Pitched Roof system.

### Weather tightness/Pitches:

For weather tightness seal the boards against the structure at all open joints, intersections, openings and penetrations and along all edges using NBT PAVATAPE + PAVABASE primer. As a thumb rule, tape all junctions where there's no T&G. T&G joints need not to be taped.

Allow for ISO-BLOCO sealing foam tape as second seal around window/door or similar openings. ISO-BLOCO is sandwiched between the substrate and the board edge. Tape it over as a first seal.

(Installation Procedure NBT CLAD System, page 12 - 14).

- For pitches  $\geq 18^\circ$  boards are laid 'dry' (no glue and/or breather membrane is necessary). The boards are interlocking on all sides providing weather tightness
- For pitches  $\geq 10^\circ$  and  $< 18^\circ$  joints of boards are glued: Apply a bead of NBT PAVATEX PAVACOL glue to the upper face of each tongue before fitting the next board
- For pitches  $\geq 5^\circ$  and  $< 10^\circ$  cover the whole surface with a sealed breather membrane (eg. NBT PAVATEX ADB membrane)
- Refer Flat Roof manual for pitches  $< 5^\circ$

Alternatively, 'NBT PAVATEX ADB' self-adhesive breathable membrane could be used for all pitches less  $< 5^\circ$ . The membrane is provided with self-adhesive strip to seal overlaps. Tape the joints, edges and penetrations with recommended tapes and primer.

### Airtightness:

Carefully detail the OSB layer for airtightness at all openings and at internal corners and junctions.

As an alternative, an airtight membrane (NBT PAVATEX DB 3.5) can be used for airtightness. Fully tape all overlaps, edges, penetrations and openings.

Avoid using vapour check, such as polythene membrane or similar. It would obstruct the breathability of the system

### Vapour control layer:

NBT systems are breathable build-ups and no vapour control membrane is required. The airtightness layer on the inside controls vapour and there is no risk of interstitial condensation.

### Ventilation batten space:

Sufficient air movement between NBT ISOROOF / NBT PAVATHERM-PLUS<sup>+</sup> and the roofing material is required. In accordance with BS EN 5250 for tight outer coverings batten space ventilation is necessary to avoid condensation underneath the roofing material.

Ventilation space must be a continuous slot and should be  $> 25\text{mm}$  with  $> 25\text{mm}$  counter battens on top for open finish (slate, clay tile etc.)  $> 40\text{mm}$  counter batten for closed finishes such as metal roof.

Allow for eaves and ridge vents to maintain proper air movement to help eliminating any excess moisture buildup in the ventilation gap.

Strategy to ventilate around roof lights should be considered to facilitate unobstructed air flow. Such as tile vents top and bottom of the roof light or broken counter battens to allow air to exit the blocked space between batten centres to the adjacent counter batten rows. Please contact NBT for details.



# NBT Pitched Roof

## Installers: Key Considerations

### General:

The NBT Pitched Roof System must only be installed by competent contractors.

The details and specifications in this guide and from the designer should be followed as the basis for a successful installation.

The system can be guaranteed only if boards and accessories approved by NBT are used in the specified manner.

Movement joints in the substrate must be incorporated into the NBT Pitched Roof system.

### Boards:

Plan board layout to reduce wastage prior to commencing installation.

Boards must span at least 2 rafters. Board edges should not coincide with rafter positions, which should be at  $\leq 650$  mm centres. Minimum bond overlap is 200 mm between courses.

Boards must not be wet or damaged and board edges must be tightly butted together.

Tightly fill all gaps between boards with woodfibre and seal area with NBT PRIMER and NBT PAVATAPE (Installation Procedure NBT Pitched Roof, page 12 - 14).

For weather tightness seal the boards against the structure at all joints, intersections, openings and penetrations and along all edges using NBT PAVATAPE

+ PAVABASE primer. As a thumb rule, tape all junctions where there's no T&G. T&G need not to be taped.

Allow for ISO-BLOCO sealing foam as second seal around window/door or similar openings. ISO-BLOCO is sandwiched between the substrate and the board edge. Tape it over as a first seal.

- For pitches  $\geq 18^\circ$  boards are laid 'dry' (no glue and/or breather membrane is necessary). The boards are interlocking on all sides providing weather tightness
- For pitches  $\geq 10^\circ$  and  $< 18^\circ$  joints of boards are glued: Apply a bead of NBT PAVATEX PAVACOL glue to the upper face of each tongue before fitting the next board
- For pitches  $\geq 5^\circ$  and  $< 10^\circ$  cover the whole surface with a sealed breather membrane (eg. NBT PAVATEX ADB membrane)
- Refer Flat Roof manual for pitches  $< 5^\circ$

Alternatively, 'NBT PAVATEX ADB' self-adhesive breathable membrane could be used for all pitches less  $< 5^\circ$ . The membrane is provided with self-adhesive strip to seal overlaps. Tape the joints, edges and penetrations with recommended tapes and primer.

After fixing and sealing, the boards could be left exposed for maximum 60 days, before applying the roofing material.



*use your loft as a room!*

A roof that is insulated with NBT PAVATEX reduces energy costs greatly and does so over decades. An investment with pay-back. You may be driven to demand habitable roof space by the need to fully utilise all of the potential for space to accommodate changing life styles such as extra space for a home office, guest rooms, children's play rooms etc.

# NBT Pitched Roof

## Installation Procedures

### General:

The system comprises NBT ISOROOF or NBT PAVATHERM-PLUS<sup>+</sup> boards supplied together with all accessories by NBT

### Access:

Scaffolding and access to the work must be carried out in accordance with current CDM and Health and Safety Regulations

### Adverse Weather/Storage:

Application of the system must only take place in suitable weather conditions in accordance with NBT recommendations, protecting the works if necessary. Boards should be tilted/covered within 2 months. Boards should be stored flat and dry. Edges should be protected to prevent damage to tongue & groove.

### Cutting:

The boards are easily cut with any of the following tools:

- NBT PAVATEX jigsaw blades (bayonet fitting to suit most makes of jigsaw)
- Standard wave edge insulation knife
- Circular saw, hand-held or bench mounted with a fine, cross-cut, tungsten tipped blade

Safety goggles and dust mask must be worn during cutting to protect the user from the small, non hazardous, dust particles.

### Fitting and fixing:

Fill the rafters with friction fitted insulation batt 'PAVAFLEX' or other similar between rafter insulation and prepare the boards to be laid on the rafters.

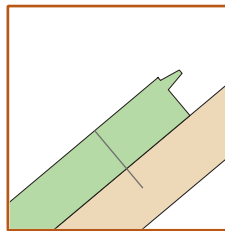
Boards must span at least 2 rafters. Board edges should not coincide with rafters positions, which should be at < 650 mm centres. The faces of the boards should be flush.

Use a sprocket (timber piece) at the eaves to support the first course of the boards as shown in detail 'PR-C-WR-01b' page 15.

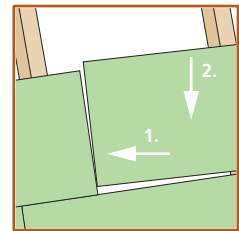
Locate the 1<sup>st</sup> course of boards with grooved side down and edge tongue and groove joints fully engaged. Initially fix through the boards into the timber rafters using 1 - 2 fixings per rafter/board.

Install 2<sup>nd</sup> course in ½ bond pattern with overlap  $\geq 200$  mm, ensuring all board joints are fully engaged and tightly joined. Fix to rafters as for 1<sup>st</sup> course. Fill any gaps and areas of damaged boards with loose woodfibres and apply a "patch" of NBT PRIMER and NBT PAVATAPE. The final fixing will be through the counter battens.

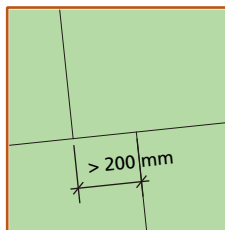
The boards are fitted as shown. Please note that NBT PAVATEX system glue may be applied whilst fitting subject to roof pitch. Glue is not required if brethable membrane is planned and rater centres are <650mm (see section Pitches below):



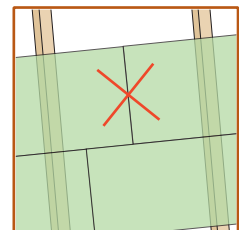
Fix first NBT ISOROOF or NBT PAVATHERM-PLUS<sup>+</sup> with tongue uppermost using 1 fixing per rafter. Final fixing occurs through batten into rafter.



Fix subsequent rows ensuring that the tongue is fully engaged by locating end tongue first then slide down onto lower board. Fix with 1 fixing per rafter.



Boards must be installed with a minimum 200 mm staggered bond.



Ensure that no vertical joint is next to another within the same rafter space.

### Pitches:

- For pitches  $\geq 18^\circ$  boards are laid „dry“ (no glue and/or breather membrane is necessary). The boards are interlocking on all sides providing weather tightness
- For pitches  $\geq 10^\circ$  and  $< 18^\circ$  joints of boards are glued: Apply a bead of PAVATEX PAVACOLL system glue to the upper face of each tongue before fitting the next board
- For pitches  $\geq 5^\circ$  and  $< 10^\circ$  the whole surface must be covered with a sealed breather membrane (eg. PAVATEX ADB breathable membrane)
- Refer Flat Roof manual for pitches  $< 5^\circ$

Alternatively, 'NBT PAVATEX ADB' self-adhesive breathable membrane could be used for all pitches less  $< 5^\circ$ . The membrane is provided with self-adhesive strip to seal overlaps. Tape the joints, edges and penetrations with recommended tapes and primer.

### Damaged boards and butt edged joints:

Any damaged areas and "butt edged" joints in the NBT ISOROOF or NBT PAVATHERM-PLUS<sup>+</sup> layer should be filled tightly with woodfibre offcuts - primed and taped with NBT PAVATAPE to ensure the integrity of the layer and to prevent water ingress (see using NBT PAVATAPE section on page 12).

### Openings and penetrations:

All openings and penetrations should be primed and taped with NBT PAVATAPE or NBT PAVATEX FLEX tape to ensure the integrity of the layer and to prevent water ingress (see using NBT PAVATAPE section on page 12).

### System Movement joints:

Movement joints in the substrate must be incorporated into the NBT Pitched Roof system. After the whole roof section has been fitted cut a 5 mm wide groove through the board on the centre line of a rafters. Seal over the groove with NBT PAVATAPE to form a sealed air gap.

### Fixing:

- Only use fixings in accordance with NBT's recommendations or manufacture's instructions
- Counter battens have to be applied AFTER taping/sealing the board surface
- Fix through counter battens and NBT ISOROOF or NBT PAVATHERM-PLUS<sup>+</sup> directly into rafters
- Fix tile battens and roofing material with conventional roofing techniques
- No of fixings required 6/m<sup>2</sup>
- For insulation thickness greater than 100mm please contact NBT for further advice

Thickness insulation	EJOT fixing
20 mm	VHT-R or TK-R x 100
35 mm	VHT-R or TK-R x 120
60 mm	VHT-R or TK-R x 140
80 mm	VHT-R or TK-R x 160
100 mm	VHT-R or TK-R x 180

Fixing can also be done with HELIFIX InSkew 600. Please refer to Helifix for fixing lengths and application limits.

Fixings recommendations given above are for buildings:

- with  $\leq 2$  storeys
- in areas with basic wind speed  $\leq 26$  m/s
- with roof pitches  $\leq 60^\circ$
- with roofing (tiles, slates etc.)  $\leq 95$  kg/m<sup>2</sup>

Please refer to the fixing manufacturer and consult structural engineer if you intent to use NBT Pitched Roof outside of these boundaries.

# NBT Pitched Roof

## Installation Procedures

### Using NBT PAVATAPE:

#### Guidelines for use

- Only use NBT PAVATAPE on dry, clean and dust-free substrates
- Use after fitting boards and always before installing battens
- Two priming solutions are available dependent on weather conditions and drying time:
  1. PAVABASE - minimum processing temperature for the substrate and air +5°C. Drying time at 20°C and +5°C are ~ 20min and 50min respectively.
  2. PAVAPRIM - minimum processing temperature for the substrate and air -10°C. Drying time at 20°C and +5°C are ~ 15min and 30min respectively.
- NBT PAVATAPE, PAVABASE AND PAVAPRIM should not be applied if the temperature of the product is below 5°C or above 40°C
- Apply NBT PRIMER with a brush or roller onto the board and abutments and allow to dry

- Store NBT PAVATAPE rolls on a flat surface in a dry, cool and dust-free environment.
- Shelf life when stored at around 20°C is unlimited for NBT PAVATAPE. NBT PAVABASE AND PAVAPRIM needs to be used within 15 and 24 months respectively after manufacture.

#### Notes:

A high quality breather membrane (**NBT PAVATEX ADB**) can be used over ridges instead of NBT PAVATAPE if required. Please ensure that the stop of the membrane is placed over the ridge to offer maximum weather protection. The membrane needs to be pulled tight and firmly secured under the counter batten.

If the roof design has many roof lights and/or valleys, the use of a breather membrane on top of the NBT ISOROOF/ NBT PAVATHERM-PLUS<sup>+</sup> might be an optional

#### How to install



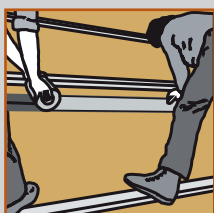
Apply NBT PRIMER with a brush or a roller and allow to dry



Clean surface with a brush. Surface **MUST** be dry to ensure good adhesion (use of hot air gun to dry board)

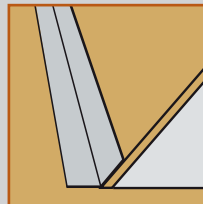


Press NBT PAVATAPE on firmly using a hard faced decorators seam roller or

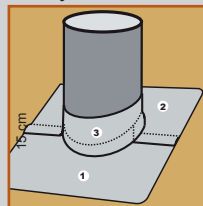


Roll out NBT PAVATAPE and press down with other hand. Avoid creases

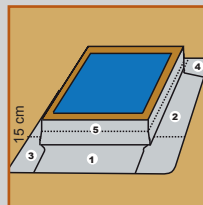
#### When to use



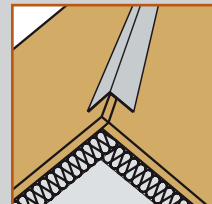
Valleys



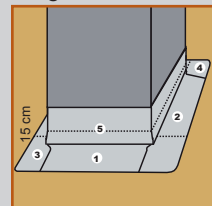
Vent pipes



Rooflights



Ridges



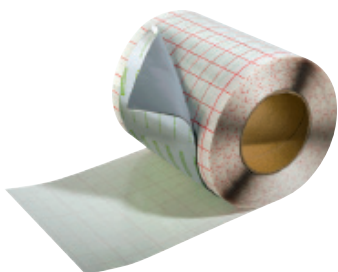
Chimneys and wall abutments

For quick application, PAVATEX FLEX, tape could be used for Vent pipes, chimney and roof light. Prime before application.

# NBT Pitched Roof

## Components & Accessories

### NBT PAVATAPE:



- High adhesive force
- Resistant to ageing, weather and UV
- Robust and tear resistant
- Contains no solvent or bitumen

#### Delivery form

	Roll weight [kg]	Roll length [m]	Roll width [mm]	Box contents [units]
PAVATAPE 75	13.0	15	75	6
PAVATAPE 150	13.3	15	150	4

### NBT PAVABASE:



- Solvent-free
- Simple, reliable installation
- Primed area is easily visible
- Cleaning when still liquid with water

#### Delivery form

	Contents per container [ml]	Box contents [units]
Tub	5000	–

### NBT PAVAPRIM:



- Solvent-free and without odour
- Can be used at temperatures down to -10°C
- High self-adhesive force after a short drying time
- Convenient spray bottle with non-blocking nozzle

#### Delivery form

	Contents per container [ml]	Box contents [units]
Bottle	1000	6

For more information please visit [www.natural-building.co.uk](http://www.natural-building.co.uk)

# NBT Pitched Roof

## Components & Accessories

### NBT PAVACOLL:



- Solvent-free and without odour
- Fast, controlled hardening
- Adheres to moist surfaces
- Strong, elastic and resistant adhesive joints instead of hard, brittle bonds

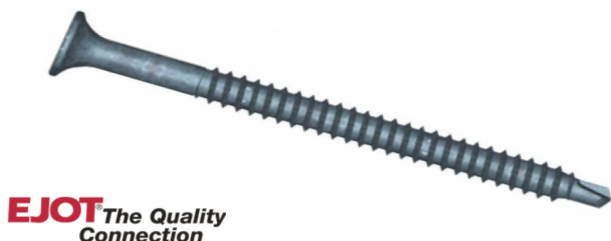
#### Delivery form

	Contents per container (ml/ g)	Box contents [units]	Accessories included
Cartridge	310/443	12	12 snap-off nozzles
Tubular bag	600/858	10	10 large conical nozzles

### EJOT TKR

Climadur coated carbon steel fixings for fixing battens through insulation back into timber studs. Embedment into timber 40 mm.

TKR 4.8 available in wide range of thickness starting from 60mm to 300mm.



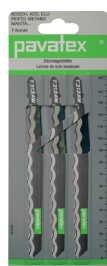
### Helifix InSkew600

Stainless Steel fixings with 6 mm outside helical diameter. For fixing battens through insulation back into timber studs. InSkew effectively withstands compression loads. Embedment into timber 35mm.

InSkew600 120 mm  
InSkew600 140 mm  
InSkew600 160 mm  
InSkew600 170 mm



### Saw Blades for Woodfibre



Jig saw



Reciprocating saw

- With special serrated blade for cutting the woodfibre boards. Fit all regular makes (Bosch, AEG, ELU, Festo, Metabo, Makita, etc.).

#### Delivery form

Version	Value
Length for jig saws	152 mm
Box content jig saws	15 saw blades
Length for reciprocating saws	225 mm
Box content reciprocating saws	3 saw blades

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Projected Eaves - Pitch > 18° - Clad Wall System

Thermal Performance of Junction

- Ensure continuity of the insulation throughout the junction
- Ensure that the full depth of insulation between the rafter & stud abuts the wall plate.
- Ensure that the insulation is installed tightly between the studs and is in contact with the external insulation without air cavity.

Airtightness Layer Continuity

- Ensure internal airtightness continuity between the roof and the wall. Use NBT recommended tapes at the junction.
- Ensure all the joints/overlaps, corners, edges and penetrations are sealed with NBT airtightness tapes & sealant. Use recommended primer on the masonry prior to tape.

Weather Tightness Continuity

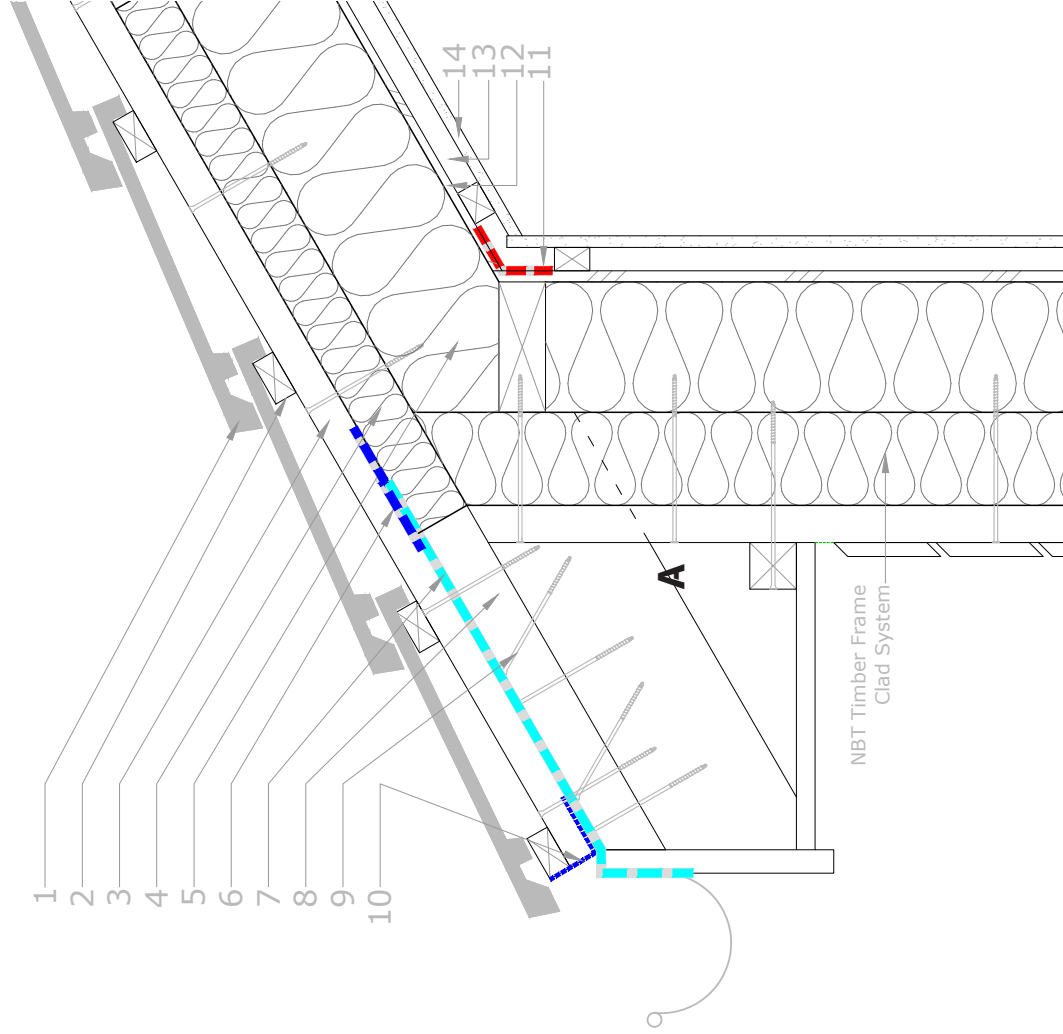
- Ensure weather tightness continuity between the NBT over stud insulation and NBT over rafter insulation boards.
- Latex impregnation of top surface and T&G joints of the boards provide weather tight seal, however boards must be protected at all open joints and damaged area either by taping with NBT tapes + primer or covering the area with breathable membrane (taped)
- Dress the over rafter boards using a strip of breathable membrane or similar into the gutter as shown.

Notes

- Use sprocket as a stop and to minimize over rafter insulation length, it will also reduce the number of fixings. Please consult structural engineer for fixings detail.
- For pitch less than 18° use breathable membrane over the insulation boards.
- Over rafter insulation boards can be dressed behind fascia board to detect the leak in roof for quick repair.

Key to Components

- |  |   |
|--|---|
| 1. Roof tile   | 9. NBT VHTR or TKR fixings  |
| 2. Tile batten   | 10. Fascia Vent, WEMICO 9071 or similar                                   |
| 3. 40mm ventilation batten                                 | 11. NBT Pavafix airtight tape   |
| 4. NBT ISOROOF or NBT Pavatherm Plus T&G insulation boards | 12. OSB or Vapour Control membrane (fully taped joints using NBT Pavafix) |
| 5. NBT Pavaflex batt                                       | 13. Battens for service void (optional)                                   |
| 6. NBT Pavatape + primer                                   | 14. Plaster board + Skim  |
| 7. Eaves tray, membrane or similar                         |   |
| 8. Timber Sproket  |   |



PR-R-WR-03a

Pitch >18° - Render Wall System

Thermal Performance of Junction

- Ensure continuity of the insulation throughout the junction
- Ensure that the full depth of insulation between and over the rafter & stud abuts the wall plate.
- Ensure that the insulation is installed tightly between the studs and is in contact with the external/ internal insulation without air cavity.

Airtightness Layer Continuity

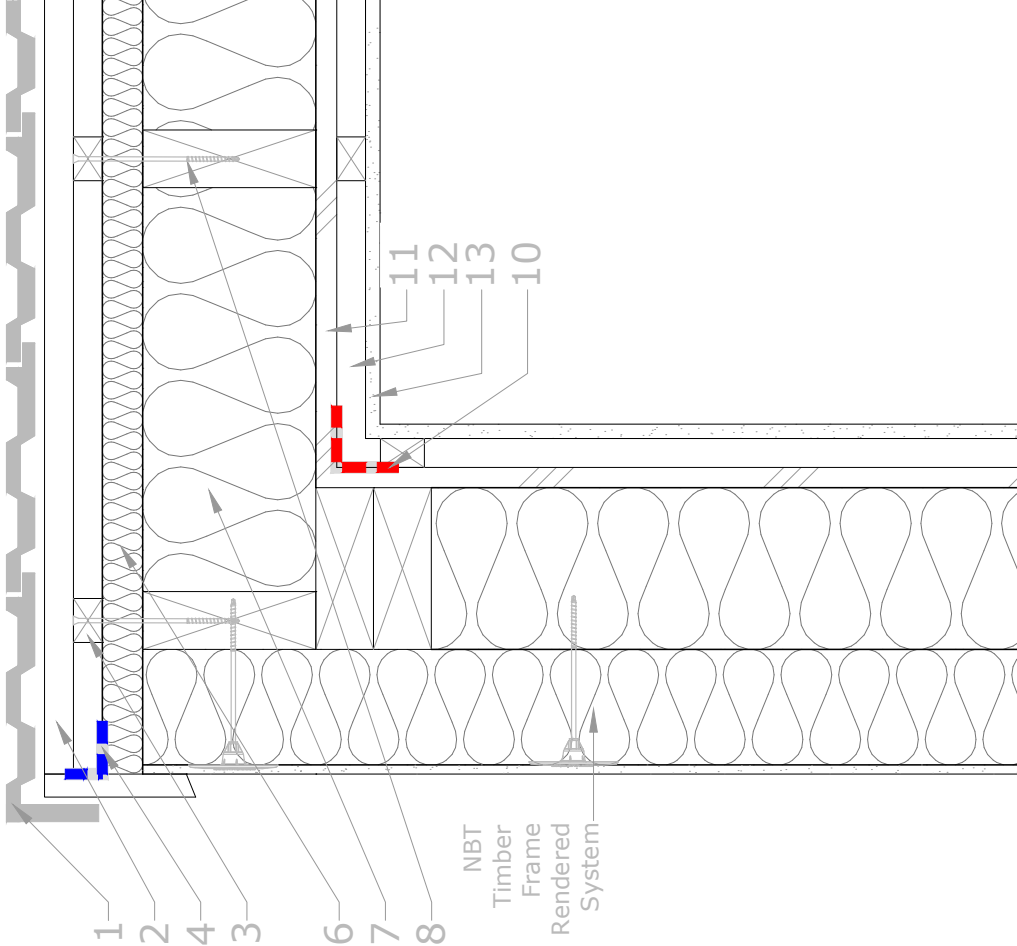
- Ensure internal airtightness continuity between the roof and the wall. Use NBT recommended tapes at the junction.
- Ensure all the joints/overlaps, corners, edges and penetrations are sealed with NBT airtightness tapes & sealant. Use recommended primer on the masonry prior to tape.

Weather Tightness Continuity

- Ensure weather tightness continuity between the NBT over stud insulation and NBT over rafter insulation boards.
- Latex impregnation of top surface and T&G joints of the boards provide weather tight seal, however boards must be protected at all cut, butt and damaged area either by taping with NBT tapes + primer or covering the area with breathable membrane (taped)

Notes

- Please consult structural engineer for fixings detail.
- For pitch less than 18° use breathable membrane over the insulation boards.



Key to Components

- |  |  |
|--|--|
| 1. Roof tile   | 8. NBT VHTR or TKR fixings   |
| 2. Tile batten   | 9. ---   |
| 3. 40mm ventilation batten                                 | 10. NBT Pavaflex airtight tape   |
| 4. NBT Pavatape + primer                                   | 11. OSB or Vapour Control membrane (fully taped joints using NBT Pavaflex) |
| 5. ---   | 12. Battens for service void (optional)                                    |
| 6. NBT ISOROOF or NBT Pavatherm Plus T&G insulation boards | 13. Plaster board + Skim   |
| 7. NBT Pavaflex batt                                       |  |

### Pitch > 18°

#### THERMAL PERFORMANCE OF JUNCTION

- ☐ Ensure continuity of the insulation throughout the junction
- ☐ Ensure that the full depth of insulation between the rafter & stud
- ☐ Ensure that the insulation is installed tightly between the studs and is in contact with the external/internal insulation without air cavity.

#### AIRTIGHTNESS LAYER CONTINUITY

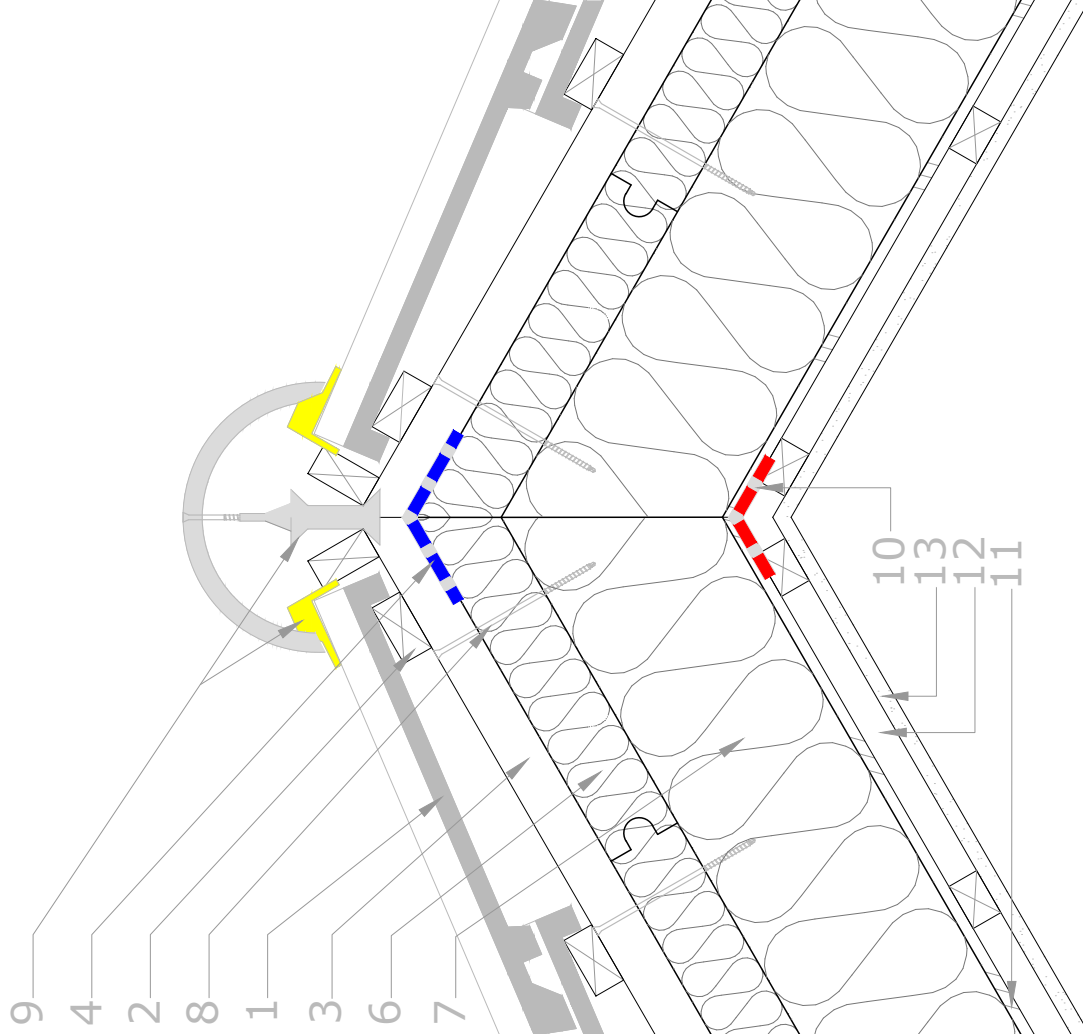
- ☐ Ensure internal airtightness continuity between the roof ridge junction. Use NBT recommended tapes at the junction.
- ☐ Ensure all the joints/overlaps, corners, edges and penetrations are sealed with NBT airtightness tapes & sealant. Use recommended primer on the masonry prior to tape.

#### WEATHER TIGHTNESS CONTINUITY

- ☐ Ensure weather tightness continuity between the NBT over rafter insulation boards at the ridge. NBT tape + primer.
- ☐ Latex impregnation of top surface and T&G joints of the boards provide weather tight seal, however boards must be protected at all cut, butt and damaged area either by taping with NBT tapes + primer or covering the area with breathable membrane (taped)

#### NOTES

- ☐ Please consult structural engineer for fixings detail.
- ☐ For pitch less than 18° use breathable membrane over the insulation boards.



#### KEY TO COMPONENTS

- |   |  |
|---|--|
| 1. Roof tile  | 8. NBT VHTR or TKR fixings   |
| 2. Tile batten  | 9. Hambleside Danelaw HD DFR3 or similar dry fix ventilated ridge system   |
| 3. 40mm ventilation batten                                  | 10. NBT Pavaflex airtight tape or Membrane taped                           |
| 4. NBT Pavatape + primer                                    | 11. OSB or Vapour Control membrane (fully taped joints using NBT Pavaflex) |
| 5. --   | 12. Battens for service void (optional)                                    |
| 6. NBT ISOROOOF or NBT Pavatherm Plus T&G insulation boards | 13. Plaster board + Skim   |
| 7. NBT Pavaflex batt  |  |

**For your notes & sketches**



# NBT Product Overview: Insulation

## ISOROOF sarking board



PAVATEX wood fibre board for breathable roof & wall constructions

Size: 770 x 2500 mm  
Cover area: 750 x 2480 mm  
Thicknesses: 20\* & 35 mm  
k-value /  $I_D$ : 0.046 W/(mK)  
Density: 230 kg/m<sup>3</sup>  
Compr. strength: 150 kPa (at 10 % compression)

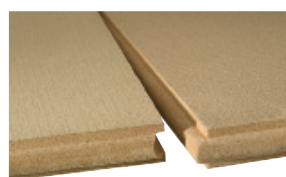
## PAVATEX DIFFUTHERM external wall insulation



Wood fibre board for rendered external walls

Size: 580 x 1450 mm  
Cover: 560 x 1430 mm  
Thicknesses: 60, 80, 100 & 120 mm  
k-value /  $I_D$ : 0.043 W/(mK)  
Density: 190 kg/m<sup>3</sup>  
Compr. strength: 80 kPa (at 10 % compression)

## PAVATHERM-PLUS sarking board



Composite wood board for roof & wall insulation

Size: 580 x 1800 mm  
Cover area: 560 x 1780 mm  
Thicknesses: 60, 80, 100, 120 mm  
k-value /  $I_D$ : 0.043 W/(mK)  
Density: 180 kg/m<sup>3</sup>  
Compr. strength: 100 kPa (at 10 % compression)

## PAVATHERM-COMBI multipurpose



Composite wood board for roof & wall insulation

Size: 580 x 1800 mm  
Cover area: 560 x 1780 mm  
Thicknesses: 60, 80, 100, 120 mm  
k-value /  $I_D$ : 0.041 W/(mK)  
Density: 145 kg/m<sup>3</sup>  
Compr. strength: 100 kPa (at 10 % compression)

## PAVADENTRO internal wall insulation



Innovative wood fibre insulation board for refurbishment

Size: 600 x 1020 mm  
Cover area: 590 x 1010 mm  
Thicknesses: 40, 60, 80 & 100 mm  
k-value /  $I_D$ : 0.043 W/(mK)  
Density: 175 kg/m<sup>3</sup>  
Compr. strength: 70 kPa (at 10 % compression)

## PAVADRY internal wall insulation



Innovative wood fibre insulation board for refurbishment

Size: 600 x 1020 mm  
Cover area: 590 x 1010 mm  
Thicknesses: 52, 72 & 92 mm  
(Pavadentro/Hardboard) k-value /  $I_D$ : 0.043 / 0.14 W/(mK)  
(Pavadentro/Hardboard) Density: 175/740 kg/m<sup>3</sup>  
(Pavadentro) Compr. strength: 70 kPa (at 10 % compression)

## PAVATHERM-PROFIL wall & floor board



Wood fibre board for insulating floors or internal walls with plaster

Size: 600 x 1020 cm  
Cover: 590 x 1010 mm  
Thicknesses: 40 & 60 mm  
k-value /  $I_D$ : 0.043 W/(mK)  
Density: 175 kg/m<sup>3</sup>  
Compr. strength: 70 kPa (at 10 % compression)

## PAVATHERM general purpose insulation board



Universal wood fibre board for use in external & internal walls, floors & roofs

Sizes/Cover: 600 x 1020 mm  
Thicknesses: 20 -140 mm  
k-value /  $I_D$ : 0.038 W/(mK)  
Density: 110 kg/m<sup>3</sup>  
Compr. strength: 50 kPa (at 10 % compression)

## NBT Pavaflex



Flexible woodfibre insulation batts for loft, walls, floors & ceilings

Size I: 375 x 1350 mm  
Size II: 575 x 1350 mm  
Thicknesses: 50, 80, 100 & 140 mm  
k-value /  $I_D$ : 0.038 W/(mK)  
Density: 55 kg/m<sup>3</sup>  
Compr. strength: -

## PAVABOARD load bearing insulation



Wood fibre board for highly insulated floors that have to carry loads

Size/Cover: 600 x 1020 mm  
Thicknesses: 40 & 60 mm  
k-value /  $I_D$ : 0.046 W/(mK)  
Density: 220 kg/m<sup>3</sup>  
Compr. strength: 150 kPa (at 10 % compression)

## PAVAFLOC - cellulose fibres



Packaging: Bags of 12.5 kg (compressed)  
Cover area: e.g. 30-60 kg/m<sup>3</sup>  
k-value /  $I_D$ : 0.038 W/(mK)

\* contact NBT for details or download data sheet online

For more information please visit [www.natural-building.co.uk](http://www.natural-building.co.uk)



Natural  
Building  
Technologies



# Natural Building Materials and Systems



**high performance systems** NBT PAVATEX woodfibre systems provide exceptional thermal & acoustic insulation, summer overheating protection and moisture control for the whole building in wall roof and floor



**low carbon, renewable products** NBT PAVATEX boards are made of waste wood and lock up the equivalent of ca. 11 tonnes of CO<sub>2</sub> per building. Raw material resources are entirely renewable, unlimited and FSC certified



**healthy housing** NBT PAVATEX insulation boards are certified by natureplus as non-polluting and the NBT systems lead to breathable constructions; NBT PAVATEX insulation is specified exclusively by the Sentinel Haus Institute for healthy housing



**tried & tested systems** NBT PAVATEX woodfibre insulation are widely used across Europe in all climates and conditions; physical values are 3rd party tested and guaranteed and production is according to BS EN



**local service & support** Pavatex's partner in the UK is Natural Building Technologies (NBT) who are a Technical Sales Company with nationwide coverage based in Oakley, Bucks. NBT lead the UK sustainable materials & systems for high performance building shells



**swiss quality & know-how for the UK** produced and developed in Switzerland for more than 70 years by the world's most innovative woodfibre insulation manufacturer

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