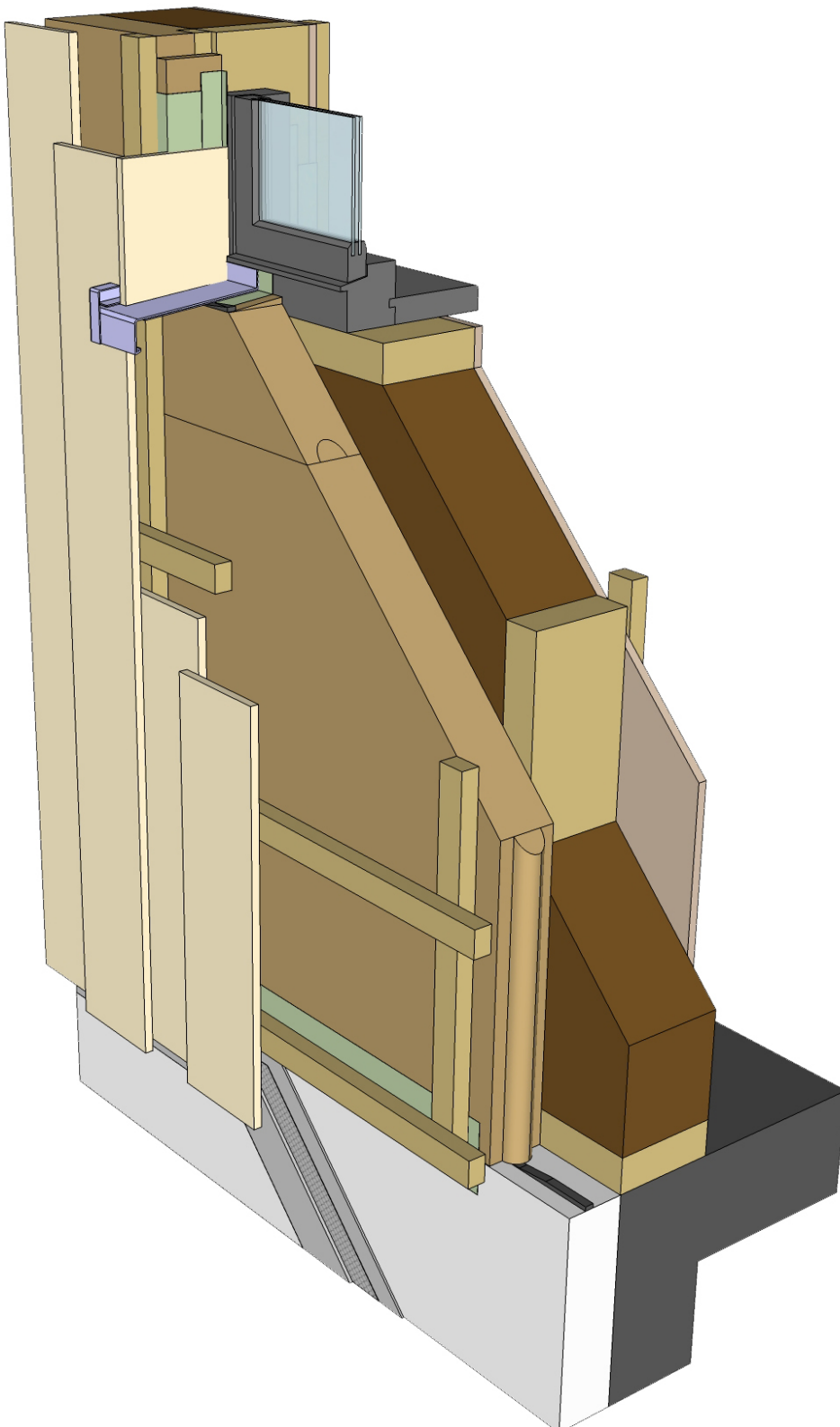




Natural  
Building  
Technologies

# Technical Manual, Timber Frame Clad System



# NBT TIMBER FRAME EWI - Clad

## Introduction


### Content

Description of Timber Frame Systems	2
Performance Guide	3
Airtightness	4
Summer Overheating	5

### NBT CLAD System

System Build up	6
Physical Properties	7
Key Considerations - Designers	8
Key Considerations - Installers	9
Installation Procedures	10
Components & Accessories	13
Detail Drawings NBT CLAD System	15



 No limits to architectural design: NBT CLAD System and NBT RENDER System facades interact together

### NBT Timber Frame Clad Systems

The building system is a timber frame structure insulated between studs and externally with woodfibre (Pavaflex and Isolair or PavathermPlus respectively) and finished with either timber clad, brick clad, metal etc.

Made from over 95 % waste softwood and under 5 % inert water-proofing additives, NBT PAVATEX ISOLAIR OR PAVATHERM-PLUS, are a genuinely sustainable non-toxic 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 wall 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 Building Systems

### Keep the building warm 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. Woodfibre boards reduce the effect of thermal bridging and the interlocking board design easily achieves good windtightness, so increasing thermal performance. Energy use for heating is significantly reduced leading to lower CO2 emissions and running costs.

### Keep the building quieter:

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

### Keep the building cooler in hot weather:

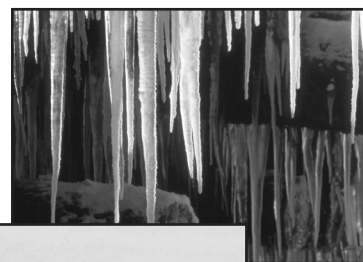
The unique combination of high density, high specific heat capacity and low thermal conductivity gives External Wall Insulation (EWI) solutions the effect of thermal mass that would normally be associated with render onto masonry. Compared to conventional EWI material the risk of condensation behind the render 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 for light weight structures  
Excellent sound insulation for light weight structures  
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



# 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 m<sup>3</sup>/m<sup>2</sup>/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, gypsum fibreboard, 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 airtight-



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

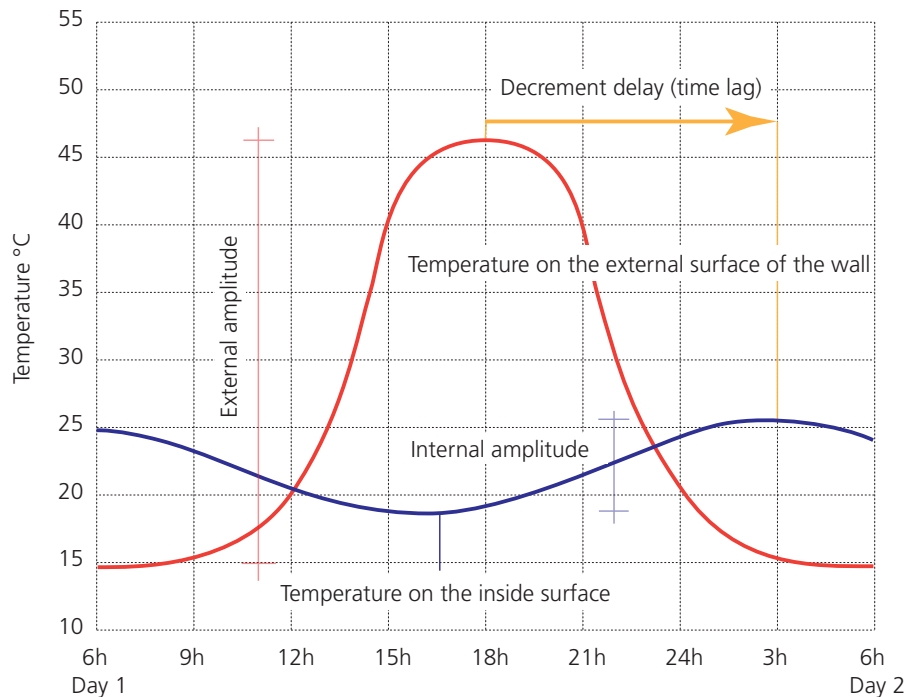
ness must be sealed airtight at junctions with adjoining elements such as windows, doors and foundations. The installation of several layers each of which are only partially airtight will not result in a building with an adequate degree of sealing.

## 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.**

# 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 impor-

tantly, 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.

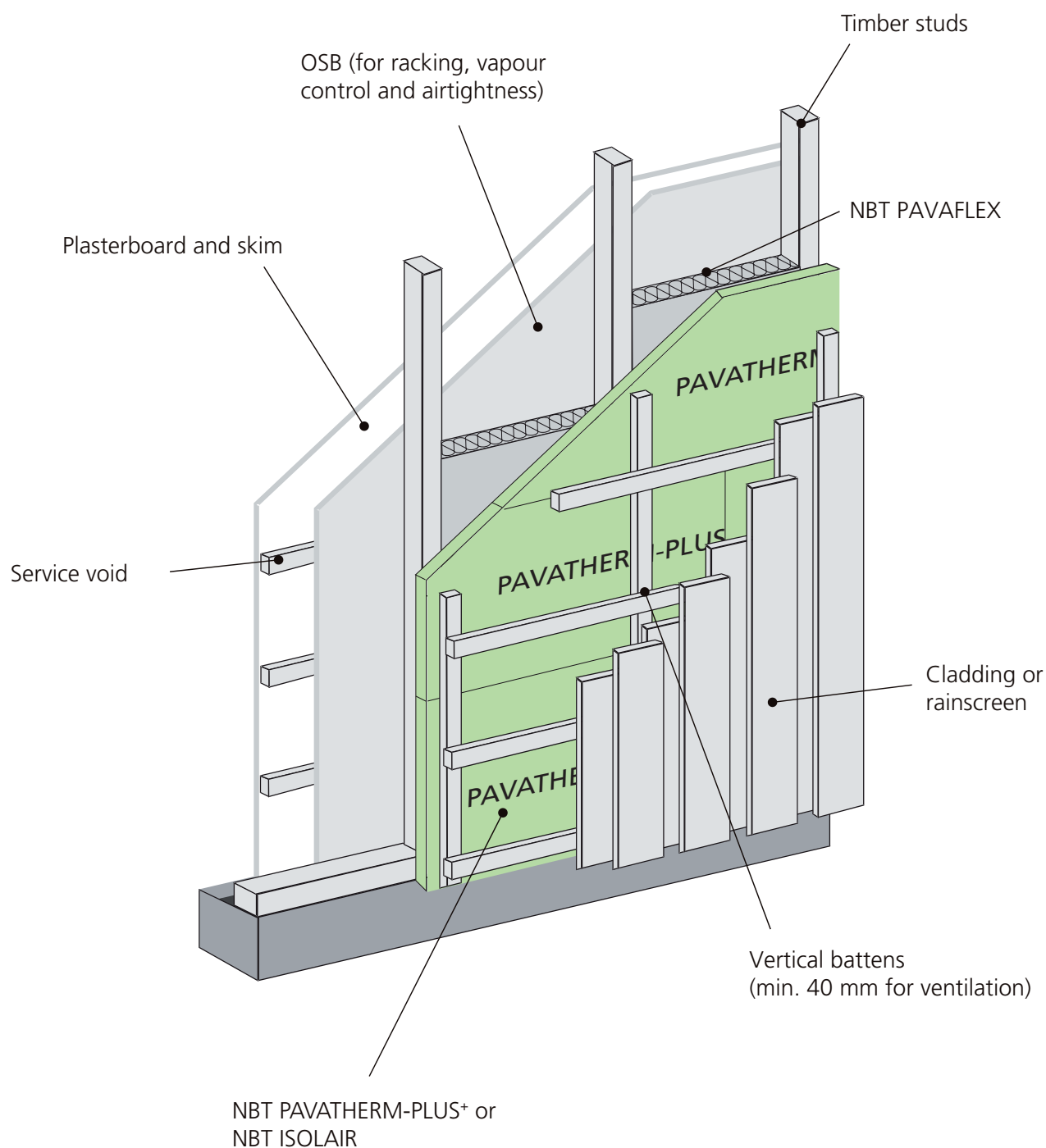
In terms of achieving these satisfactory values, an insulation material that has a high thermal mass is needed to produce better values. A combination of density, thermal conductivity and specific heat capacity is required.

**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 TIMBER FRAME EWI - Clad

## Clad System



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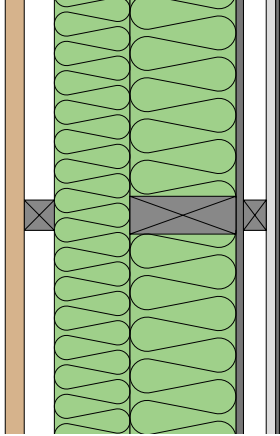
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# NBT TIMBER FRAME EWI - Clad

## Physical Properties

### Physical Properties NBT CLAD System



1. Cladding system (timber, brick, screen etc.)
2. Vertical battens 40 x 40 mm
3. NBT ISOLAIR 22/35 mm or  
NBT PAVATHERM-PLUS+ 60/80/100/120 mm
4. Stud & NBT PAVAFLEX (I<sub>D</sub> = 0.038 W/mK)
5. Racking board incl. airtightness detail  
(e.g. OSB 12/15 mm)
6. Service void 25 mm  
(can be insulated for improved performance)
7. Clay Board or Plasterboard 12.5 mm
8. Plaster, skim and NBT emulsion paint

1. 2. 3. 4. 5.6.7.8.

#### 89 mm stud

Insulated with NBT PAVAFLEX

Insulation onto stud	NBT ISOLAIR		NBT PAVATHERM-PLUS <sup>+</sup>					
	22 mm	35 mm	60 mm	80 mm	100 mm	120 mm	160 mm	200 mm
U-Value [W/m <sup>2</sup> K]	0.35	0.32	0.26	0.23	0.21	0.19	0.16	0.13
Admittance [W/m <sup>2</sup> K]	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Sound insulation ca. [dB]	41	42	42	43	44	46	48	49
Decrement delay [h]	3.6	4.5	6.0	7.4	8.8	9.9	12.6	15.3

#### 140 mm stud

Insulated with NBT PAVAFLEX

Insulation onto stud	NBT ISOLAIR		NBT PAVATHERM-PLUS <sup>+</sup>					
	22 mm	35 mm	60 mm	80 mm	100 mm	120 mm	160 mm	200 mm
U-Value [W/m <sup>2</sup> K]	0.25	0.24	0.20	0.19	0.17	0.16	0.13	0.12
Admittance [W/m <sup>2</sup> K]	1.51	1.51	1.51	1.51	1.51	1.51	1.51	1.51
Sound insulation ca. [dB]	44	45	45	46	47	49	51	52
Decrement delay [h]	5.3	6.4	7.9	9.3	10.6	11.8	14.5	17.2

#### 219 mm stud

Insulated with NBT PAVAFLEX

Insulation onto stud	NBT ISOLAIR		NBT PAVATHERM-PLUS <sup>+</sup>					
	22 mm	35 mm	60 mm	80 mm	100 mm	120 mm	160 mm	200 mm
U-Value [W/m <sup>2</sup> K]	0.18	0.17	0.15	0.14	0.13	0.13	0.11	0.10
Admittance [W/m <sup>2</sup> K]	1.53	1.53	1.53	1.53	1.53	1.53	1.53	1.53
Sound insulation ca. [dB]	47	48	48	49	50	51	52	54
Decrement delay [h]	8.3	9.3	10.8	12.2	13.6	14.8	17.5	20.1

Note: Calculations are done according to BS EN ISO 6946:1997 and BR 443. Studs assumed to be 38 x 89 mm, 38 x 140 mm and 50 x 219 mm at 600 mm centres (allowances for sole plates etc. give a 15% bridging area for the timber). Stud depth is taken to be the same as the thickness of insulation specified. 160 mm insulation layer onto studs is made of NBT PAVATHERM-PLUS<sup>+</sup> 80 mm & NBT PAVATHERM 80 mm; 200 mm insulation layer onto studs is made of NBT PAVATHERM-PLUS<sup>+</sup> 100 mm & NBT PAVATHERM 100 mm. Passivhaus solutions are marked in green.

# NBT TIMBER FRAME EWI - Clad

## Designers: Key Considerations

### General:

The NBT CLAD 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 CLAD System has LABC (Local Authority Building Control) approval and BBA (British Board of Agrément) approval (BBA CERTIFICATE No 08/4549).

If NHBC warranty is wanted the timber frame will need to be preservative treated in accordance with NHBC standard chapter 6.2 'External timber frame walls'. Additionally the system must have a service zone to the interior.

### DPC-Level:

Do not use NBT ISOLAIR or NBT PAVATHERM-PLUS<sup>+</sup> boards below DPC level.

### Building Height:

The NBT CLAD System is certified for use in buildings where the height to the top floor is  $\leq 18$  m. If intended for use in higher buildings, contact NBT for advice.

### Non Load Bearing:

The NBT CLAD System must be designed so that no loads from the structure are carried by the boards or cladding system.

Ensure that any cladding system/protection screens are securely fixed back to the structure.

Carefully plan the location of down-pipes, lights, security systems etc. and attach fixing discs screwed directly to the structure where the attachment is more than that can be carried directly by the cladding (i.e. cast iron guttering). Contact NBT for further advice on fixings.

### Expansion joints:

Expansion joints must be provided for wall elevations  $\geq 18$  m. After the whole wall section has been fitted cut a 5 mm wide groove through the board on the centre line of a stud. Seal over the groove with NBT PAVATAPE to form a sealed air gap.

### System Movement Joint:

Where structural movement joints or change in substrate occur a system movement bead should be incorporated into the NBT CLAD System to prevent break due to differential movement. Use strip of mineral wool or similar flexible insulation between the board and tape it (Pavatape + primer) over for weather protection.

### Weather tightness:

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 joints 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.

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

### Rain Penetration:

Design a positive strategy for avoiding rain penetration of the NBT CLAD System. This will include:

- Generous overhangs for roofs, eaves and copings (in no case  $\leq 30$  mm)
- Drip details on all overhangs
- Careful detailing of flashings at critical areas eg. balconies, decks, walkways, parapets, copings, service penetrations, roof abutments, intersecting and adjoining buildings, etc.
- Window and door frames set back from the external face of the wall by at least the thickness of the insulation boards.

### Airtightness:

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

### Ventilation:

Ventilation cavity is important for system performance. Min 25, 40 and 50mm vertical counter battens to provide continuous ventilation, timber vertical cladding, timber horizontal cladding and closed cladding (metal or brick) respectively.

### Fire Break:

Detail fire stop as required by Building Regulations while maintaining the ventilation.

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# NBT TIMBER FRAME EWI - Clad

## Installers: Key Considerations

### General:

The NBT CLAD 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 of a successful installation.

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

Timber frames must not be excessively wet when the boards are applied to avoid trapping moisture within the construction.

Movement joints in the substrate must be incorporated into the NBT CLAD System.

Carefully plan the location of down-pipes, lights, security systems etc. and attach fixing discs screwed directly to the structure or fix battens where the attachment is more than can be carried directly by the cladding (i.e. cast iron guttering). Contact NBT for further advice on fixings.

### Boards:

Plan board layout to reduce wastage prior to commencing installation.

Boards must span at least 2 studs. Board edges need not coincide with stud 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/damage between boards with woodfibre and seal area with NBT PRIMER and NBT PAVATAPE (Installation Procedure NBT CLAD System, 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.

Do not use the NBT CLAD System below DPC level.

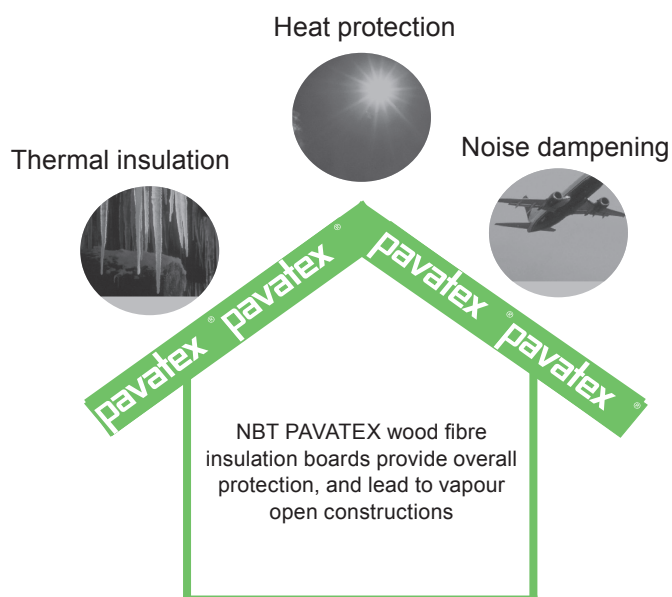
Do not allow the boards to stand exposed to weather for more than 60 days after fixing and before applying the cladding system.

### Cladding:

Ensure that any cladding system/rain screens are securely fixed back to the structure. In general cladding is fixed to the counter batten which is fixed back to the structure.

Only use the fixings recommended by NBT.

The cladding system should offer weather protection to the system and it should be detailed so as to allow an unobstructed flow of air ventilation to the void between the cladding and to the face of the NBT CLAD System boards.



# NBT TIMBER FRAME EWI - Clad

## Installation Procedures

### General:

The system comprises NBT ISOLAIR 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 clad within 2 months. Boards should be stored flat and dry. Edges should be protected to prevent damage to tongue & groove.

### Board System:

Do not use the NBT CLAD system below DPC. Board edges should be adequately protected at DPC level to prevent water ingress.

### 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:

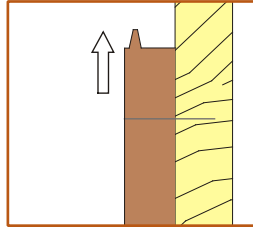
Boards must span at least 2 studs. Board edges need not coincide with stud positions, which should be at < 850 mm centres. The faces of the boards should be flush. Stagger fixings where board edges coincide with a stud position.

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 studs using 1 - 2 fixings per stud/board.

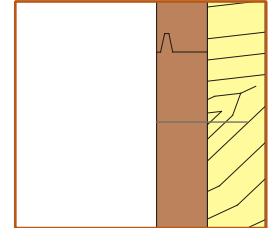
Install 2<sup>nd</sup> course in ½ bond pattern with overlap  $\geq$  200 mm, over-lapping board ends at vertical corners, ensuring all board joints are fully engaged and tightly

joined. Fix to studs 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.

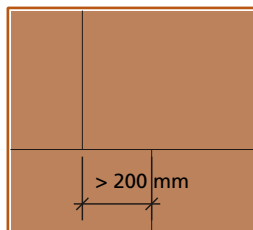
The final fixing will be through the counter batten or thermally broken washer fixings subject to type of cladding. See page 12.



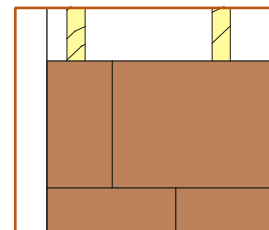
Fix first row of boards with tongue uppermost using 1 - 2 fixings per board. Final fixing occurs through counter batten exceptions in some cases (heavy rain screen )



Fix subsequent rows ensuring that the tongue is fully engaged. Use a plumb line for marking positioning of fixing to ensure fixing goes into studs. Fix as first row



Boards must be installed with a minimum 200 mm staggered bond



Boards must span at least 2 studs. Board edges need not coincide with stud positions, which should be at  $\leq$  650 mm centres

### Damaged boards and butt edged joints:

Any damaged areas and "butt edged" joints 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 the right page).

### Openings, corners, penetrations & abutment:

All openings, corners and penetrations and cut/exposed edges should be primed and taped with NBT PAVATAPE to ensure the integrity of the layer and to prevent water ingress (see using NBT PAVATAPE section on the right page).

# NBT TIMBER FRAME EWI - Clad

## Installation Procedures

### Expansion joints:

Expansion joints must be provided for wall elevations  $\geq 18$  m. After the whole wall section has been fitted cut a 5 mm wide groove through the board on the centre line of a stud. Seal over the groove with NBT PAVATAPE to form a sealed air gap.

### Cladding System:

Ensure that any cladding system/protection rain screens are securely fixed back to the frame.

Only use the fixings in accordance with NBT's recommendations or manufacturer's instructions.

The cladding system should offer weather protection to the NBT CLAD System.

The cladding system should be detailed to offer adequate weather protection to the NBT CLAD System at all openings and abutments.

The cladding system should be detailed so as to allow an unobstructed flow of ventilation in the void behind the cladding and to the face of the NBT CLAD System boards.

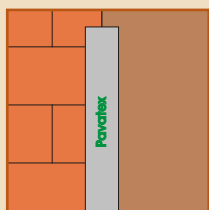
### Using NBT PAVATAPE

Guidelines for use

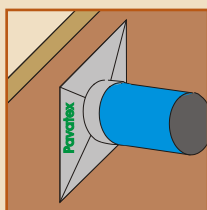
- Only use NBT PAVATAPE on dry, clean and dust-free substrates
- Use after fitting boards and always before installing battens
- Two priming solutions are available dependent on weather conditions and drying time:
  1. PAVABASE - minimum processing temperature for the substrate and air  $+5^{\circ}\text{C}$ . Drying time at  $20^{\circ}\text{C}$  and  $+5^{\circ}\text{C}$  are  $\sim 20\text{min}$  and  $50\text{min}$  respectively.
  2. PAVAPRIM - minimum processing temperature for the substrate and air  $-10^{\circ}\text{C}$ . Drying time at  $20^{\circ}\text{C}$  and  $+5^{\circ}\text{C}$  are  $\sim 15\text{min}$  and  $30\text{min}$  respectively.
- NBT PAVATAPE, PAVABASE AND PAVAPRIM should not be applied if the temperature of the product is below  $5^{\circ}\text{C}$  or above  $40^{\circ}\text{C}$
- 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  $20^{\circ}\text{C}$  is unlimited for NBT PAVATAPE. NBT PAVABASE AND PAVAPRIM needs to be used within 15 and 24 months respectively after manufacture.

### Using NBT PAVATAPE

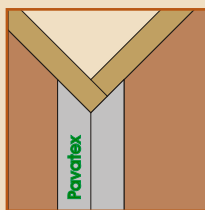
When to use



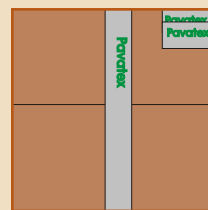
System change



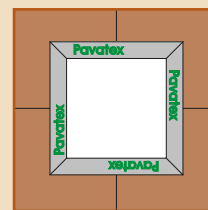
Penetrations



Angles, corners

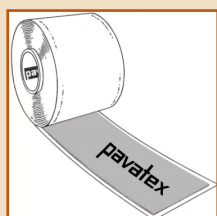


Butt edge joints and

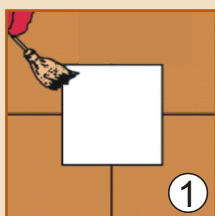


Exposed Openings

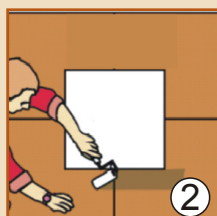
How to install



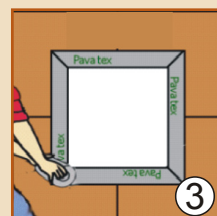
NBT PAVATAPE self adhesive butyl tape  
15 m long x 150 mm wide



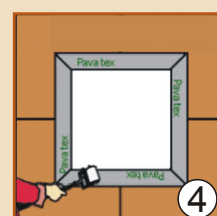
1  
Clean surface with a brush. Surface MUST be dry to ensure good adhesion (use of hot air gun to dry board)



2  
Apply NBT PRIMER with a brush or a roller and allow to dry



3  
Roll out NBT PAVATAPE and press down with other hand. Avoid creases



4  
Press NBT PAVATAPE on firmly using a hard faced decorators seam roller or similar

# NBT TIMBER FRAME EWI - Clad

## Installation Procedures

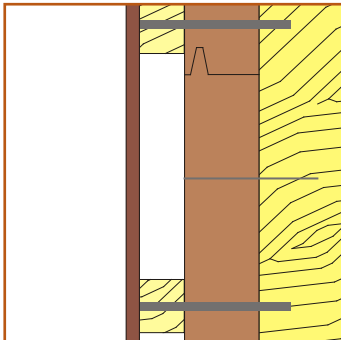
### Fixing Cladding:

- Only use fixings in accordance with NBT's recommendations or manufactures instructions
- Batten/rail system should applied AFTER taping/sealing the board surface
- In general fixings should be at 200 mm centres - for exposed areas/buildings  $\geq 18$  m high please contact NBT or the fixing manufacturer for advice
- Usa a plumb line for marking positioning of fixing and wall ties to ensure fixing goes into studs
- In all fixings method NBT strongly recommend to seek structural engineer or the fixing manufacturer for advice.

### Timber Batten onto Stud:

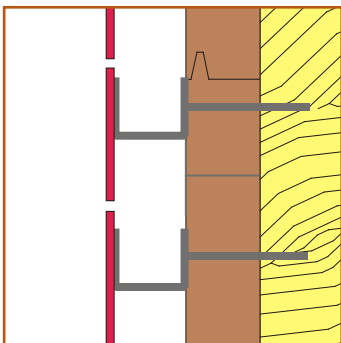
Initially fix the boards as described. Final fixing occurs through the counter battens. For fixing of timber battens over the NBT CLAD System onto timber stud/substrate, NBT recommends the use of:

- EJOT TKR (embedment  $\geq 40$  mm)



### Rain Screen onto Stud:

Initially fix the boards as described. Final fixing of the system occurs on installation of the rail system - fixings as specified by the rain screen supplier.



### Ventilation for Timber Clad & Rain Screen-

Min 25, 40 and 50mm vertical counter battens to provide continuous ventilation for timber vertical cladding, timber horizontal cladding and closed cladding (metal or brick)

### Brick Facade onto Stud:

For brick facade NBT suggest two options. Option 1 avoids excessive thermal bridging from through fixing as in option 2 below.

#### Option 1 (preferred)

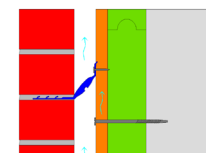
Fix the boards through the counter batten as explained in 'Timber Batten onto Studs' section.

Tie the bricks using Ancon Staifix STF6 Timber Ties, or similar fixed back to the counter batten.



Plan View

1 23 4 5 678



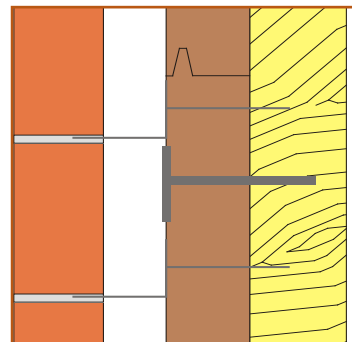
Section View

#### Option 2

Use of 3 no. fixings per board/stud; final fixing of the system occurs at this stage:

- EJOT STR-H (embedment  $\geq 40$  mm)
- STR-H comes with integrated washer.

Brick clad then can be fixed with Ancon Staifix-Thor Helical Timber Ties, TIM6 or Helifix InSkew600 or similar. Ties penetration into the board must be sealed with NBT PAVACOLL system glue. Apply the glue on the ties once it is hammered in.



### Ventilation for Brick Clad Option 1 & 2 -

min 50mm properly vented cavity, every fourth brick in a course should be air brick and vents at the top to maintain the flow.

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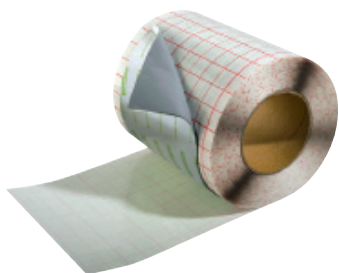
info@natural-building.co.uk

www.natural-building.co.uk

# NBT TIMBER FRAME EWI - Clad

## 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

# NBT TIMBER FRAME EWI - Clad

## 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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# NBT TIMBER FRAME EWI - Clad

## Eaves Detail

### TF-C-WR-01

#### THERMAL PERFORMANCE OF JUNCTION

- Ensure continuity of the insulation throughout the junction.
- Ensure that the full depth of insulation between and over the 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 wall and roof OSB. 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 woodfibre board and masonry prior to tape.

#### WEATHER TIGHTNESS CONTINUITY

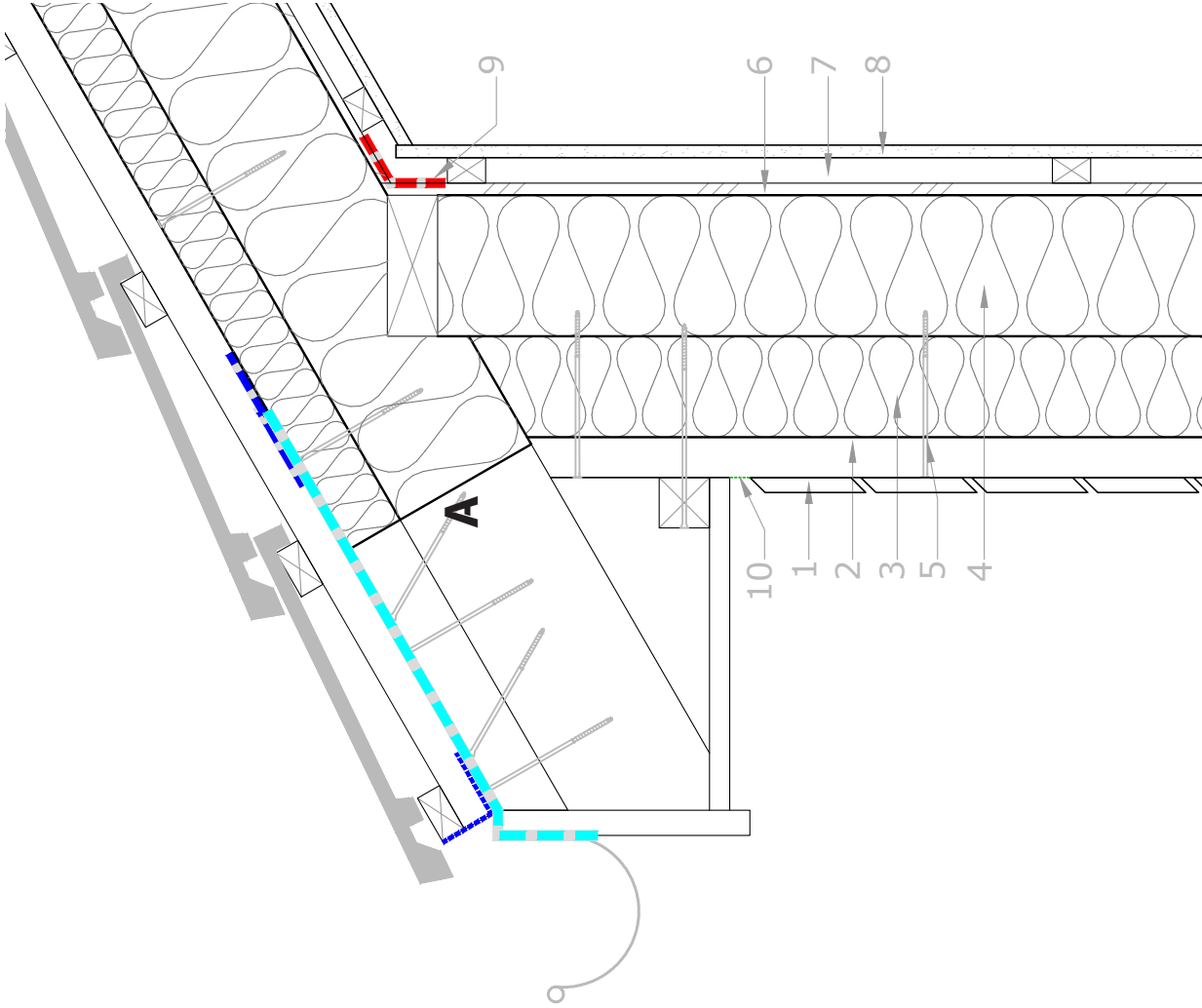
- Ensure weather tightness continuity between the NBT Wall Insulation and roof insulation. If required use NBT Expansion sealing tape.
- Ensure PavathermPlus or Isolair boards are protected by Pavatape and expansion sealing tape (where applicable) at all the corners, butt ends, cut edges, exposed boards and around penetrations. Check other details for reference.

#### NOTES

- Support the Pavaflex between rafters at point 'A' from sliding with pieces of membrane taped between rafters or use cross battens. Alternatively PavathermPlus or Isolair boards can be pushed up the underside of NBT over rafter insulation to form a continuous insulation envelop and will support the Pavaflex between rafters.

#### KEY TO COMPONENTS

- |   |                 |
|---|-----------------|
| 1. External Cladding or similar (rainscreen)    | 10. Insect Mesh |
| 2. 40mm vertical counter batten for ventilation |                 |
| 3. NBT PavathermPlus or Isolair T&G boards      |                 |
| 4. NBT Pavaflex between studs                   |                 |
| 5. NBT recommended fixings                      |                 |
| 6. OSB (fully taped joints using NBT Pavafix)   |                 |
| 7. Battens for service void (optional)          |                 |
| 8. Plaster board + Skim                         |                 |
| 9. NBT Airtightness tape (NBT Pavafix)          |                 |



### TIMBER FRAME - NBT CLAD SYSTEM - EAVES

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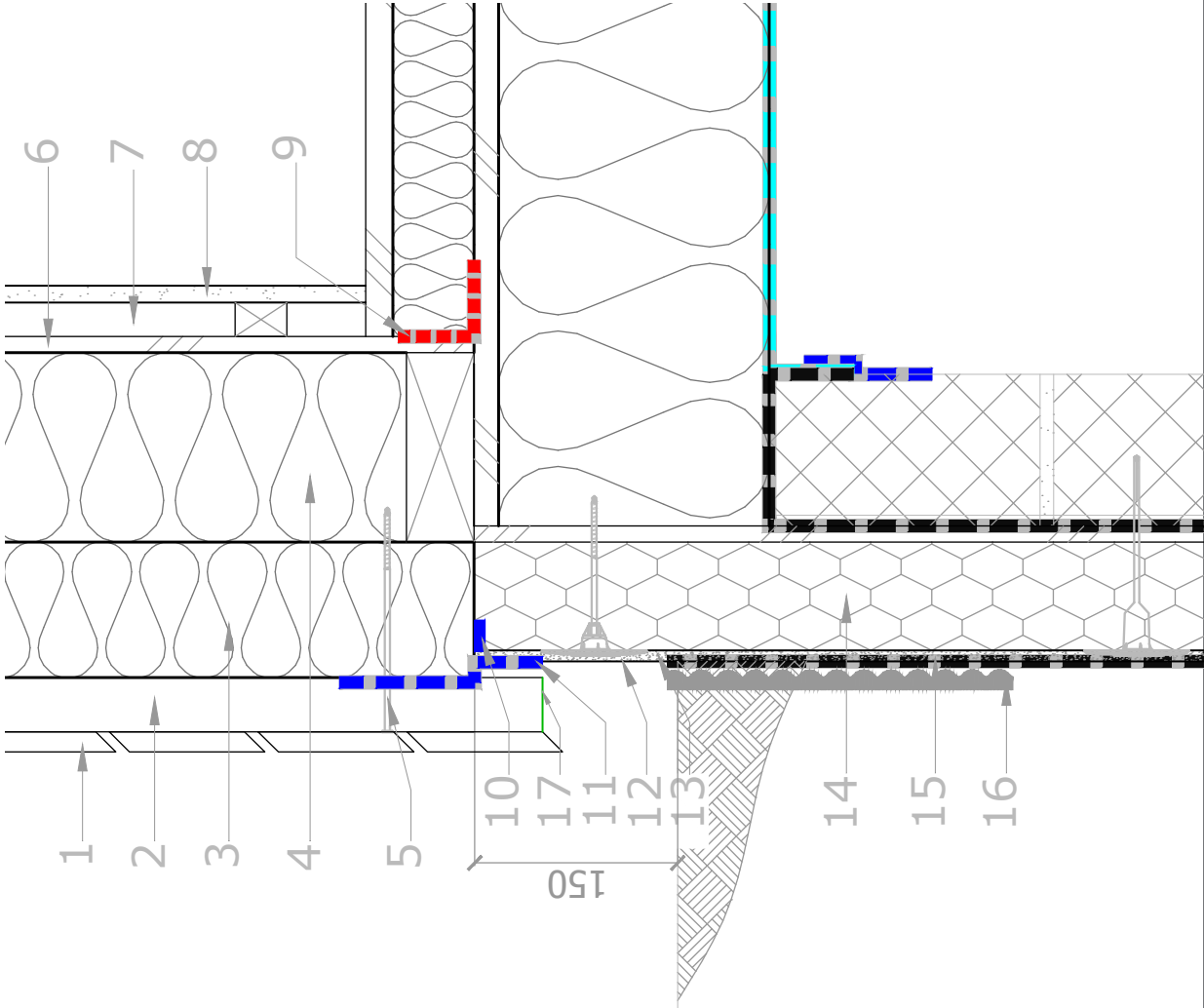
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# NBT TIMBER FRAME EWI - Clad

## Plinth Detail

### TF-C-WF-01

### TIMBER FRAME - NBT CLAD SYSTEM - Horizontal Clad - PLINTH



#### Thermal Performance of Junction

- Ensure continuity of the insulation throughout the junction
- Ensure that the full depth of insulation between and over the stud abuts the sole 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 wall and the floor. 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 woodfibre board and masonry prior to tape.

#### Weather Tightness Continuity

- Ensure weather tightness continuity between the NBT PavathermPlus or Isolair and NBT Plinth boards. Use NBT Pavatape + primer and NBT expansion sealing tape at the interface as shown.
- Ensure PavathermPlus or Isolair boards are protected by Pavatape and expansion sealing tape (where applicable) at all the corners, butt ends, cut edges, exposed boards and around penetrations. Check other details for reference.

#### Notes

- Ensure NBT PavathermPlus or Isolair boards starts above the DPM level and ideally min. 300mm above the ground level. If it is less than 300mm please make sure that the bottom of the boards are protected by cladding and tape. Boards must not be installed below 150mm above ground.
- Allow for soak away drain at the plinth to avoid standing water such as French Drain or similar

#### Key to Components

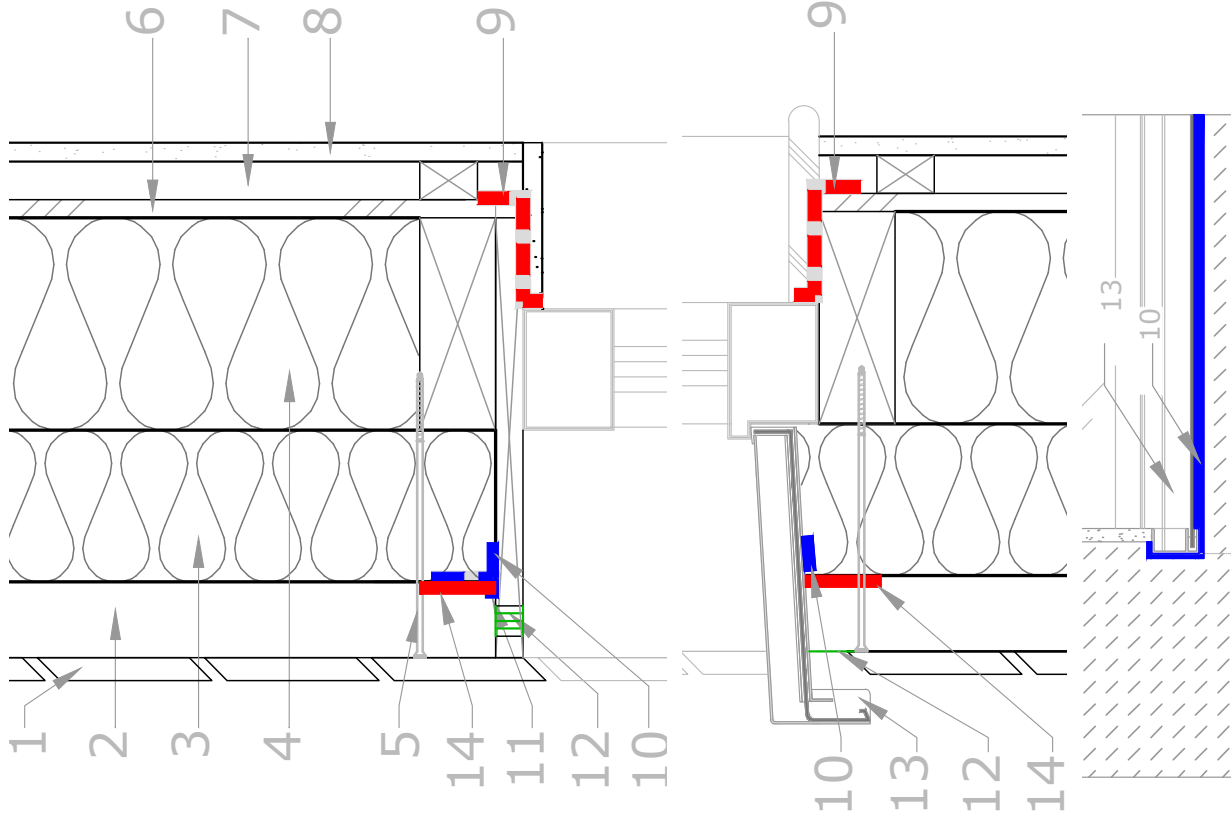
- |   |   |
|---|---|
| 1. External Cladding or similar (rainscreen)    | 10. NBT expansion sealing tape. (ISO-BLOCO 600)                       |
| 2. 40mm vertical counter batten for ventilation | 11. NBT Pavatape with Pavabase primer                                 |
| 3. NBT PavathermPlus or Isolair T&G boards      | 12. NBT HM50 6mm base coat (meshed)                                   |
| 4. NBT Pavaflex between studs                   | 13. NBT HM50 2mm top coat, finish - NBT Silicon or NBT Nanopor paint) |
| 5. NBT recommended fixings                      | 14. NBT Plinth & Perimeter board                                      |
| 6. OSB (fully taped joints using NBT Pavafix)   | 15. Damp proof membrane   |
| 7. Battens for service void (optional)          | 16. Combined drainage and protection layer                            |
| 8. Plaster board + Skim                         | 17. insect mesh   |
| 9. NBT Airtightness tape (NBT Pavafix)          |   |

# NBT TIMBER FRAME EWI - Clad

## External Window Detail

### TF-C-WO-01

### TIMBER FRAME - NBT CLAD SYSTEM - Standard HEAD & SILL



#### THERMAL PERFORMANCE OF JUNCTION

- Ensure continuity of the insulation throughout the junction.
- Ensure that the full depth of insulation between and over the stud abuts the head/sill timber.
- 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 OSB and the frame. 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 woodfibre board and masonry prior to tape.

#### WEATHER TIGHTNESS CONTINUITY

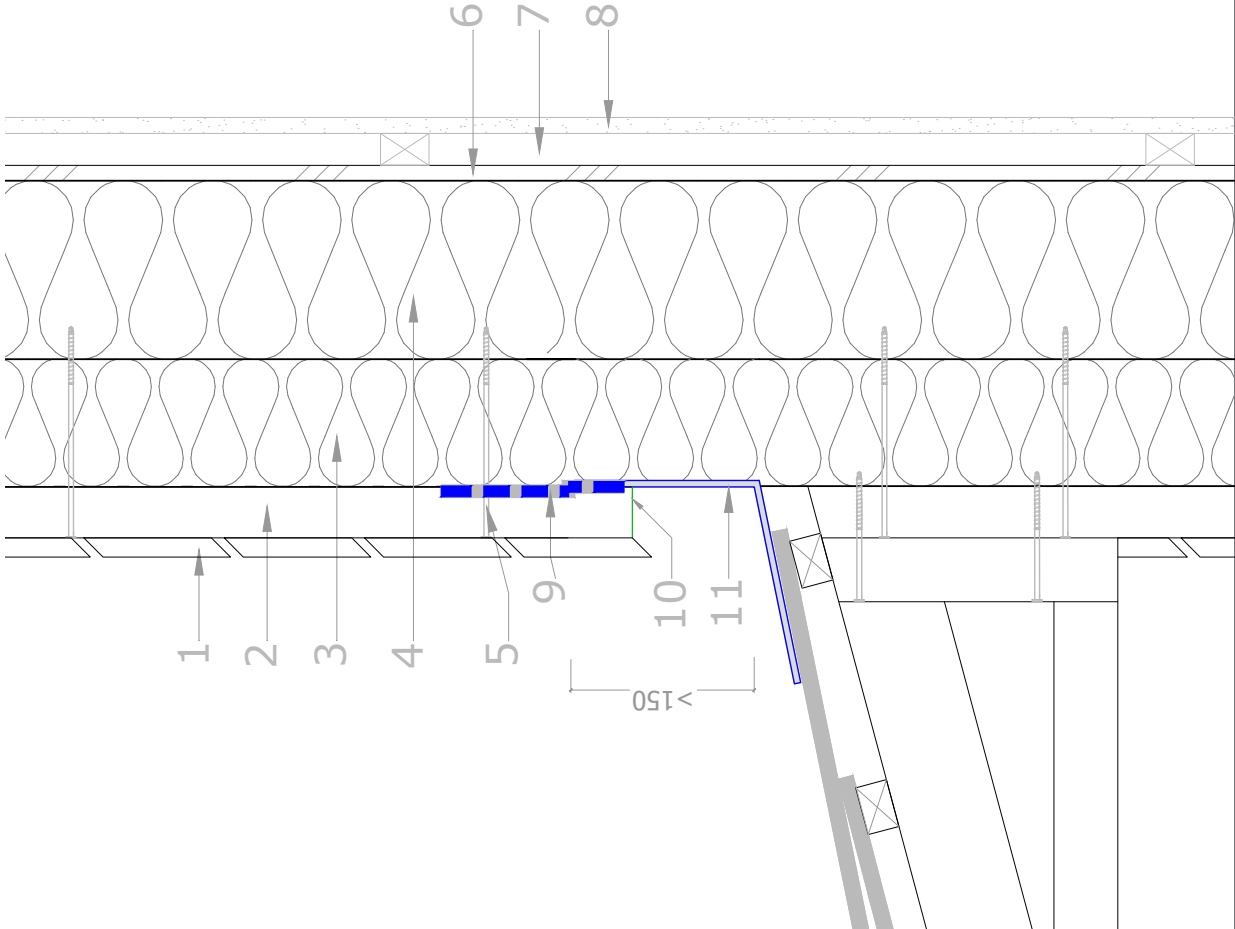
- Ensure weather tightness continuity between the NBT Pavatherm Plus or Isolair and the frame. Use NBT expansion sealing tape and NBT External tape at the interface as shown.
- Ensure all the joints/overlaps, corners, edges and penetrations are sealed with NBT airtightness tapes & sealant. Use recommended primer on the woodfibre board and masonry prior to tape.

#### NOTES

- Detail fire stop as required, maintaining the ventilation.
- Incorporate expansion resistance sill, please contact NBT for details

#### KEY TO COMPONENTS

- |   |   |
|---|---|
| 1. External Cladding or similar (rainscreen)    | 10. NBT expansion sealing tape. (ISO-BLOCO 600)                   |
| 2. 40mm vertical counter batten for ventilation | 11. NBT Pavatape with Pavabase primer                             |
| 3. NBT PavathermPlus or Isolair T&G boards      | 12. Insect Mesh   |
| 4. NBT Pavaflex between studs                   | 13. NBT expansion resistance sill, please contact NBT for details |
| 5. NBT recommended fixings                      | 14. Fire Stop   |
| 6. OSB (fully taped joints using NBT Pavafix)   |   |
| 7. Battens for service void (optional)          |   |
| 8. Plaster board + Skim                         |   |
| 9. NBT Airtightness tape (NBT Pavafix)          |   |



**THERMAL PERFORMANCE OF JUNCTION**

- Ensure continuity of the insulation throughout the junction
- Ensure that the full depth of insulation between and over the stud abuts the sole 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 all the joints/overlaps, corners, edges and penetrations are sealed with NBT airtightness tapes & sealant. Use recommended primer on the woodfibre board and masonry prior to tape.

**WEATHER TIGHTNESS CONTINUITY**

- Ensure the min. height of flashing on the boards should be 150mm.
- Tape the flashing on the boards are shown. Do not use hot torch weld.

**NOTES**

□

**KEY TO COMPONENTS**

- |   |                   |
|---|-------------------|
| 1. External Cladding or similar (rainscreen)    | 10. Insect mesh   |
| 2. 40mm vertical counter batten for ventilation | 11. Lead Flashing |
| 3. NBT PavathermPlus or Isolair T&G boards      |                   |
| 4. NBT Pavaflex between studs                   |                   |
| 5. NBT recommended fixings                      |                   |
| 6. OSB (fully taped joints using NBT Pavafix)   |                   |
| 7. Batts for service void (optional)            |                   |
| 8. Plaster board + Skim                         |                   |
| 9. NBT Pavatape with Pavabase primer            |                   |

# NBT Product Overview: Insulation

## ISOLAIR sarking board



PAVATEX wood fibre board for breathable roof & wall constructions

Size: 770 x 2500 mm  
Cover area: 750 x 2480 mm  
Thicknesses: 22\*, 35 & 60 mm  
k-value /  $I_D$ : 0.044 W/(mK)  
Density: 200 kg/m<sup>3</sup>  
Compr. strength: 250 kPa (at 10 % compression)

## PAVATEX DIFFUTHERM external wall insulation



Wood fibre board for rendered external walls

Size: 790 x 1300 mm  
Cover: 780 x 1290 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)

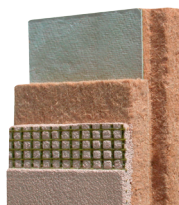
## PAVATHERM-PLUS sarking board



Composite wood board for roof & wall insulation

Size: 800 x 1600 mm  
Cover area: 780 x 1580 mm  
Thicknesses: 60, 80, 100 mm  
k-value /  $I_D$ : 0.043 W/(mK)  
Density: 180 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)

## 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)

## 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 mm  
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)

## NBT PAVATHERM-FORTE



Square edged woodfibre boards for flat roof insulation

Size/Cover: 600 x 1020 mm  
Thicknesses: 80, 100, 120, 140 mm  
k-value /  $I_D$ : 0.043 W/(mK)  
Density: 175 kg/m<sup>3</sup>  
Compr. strength: 70 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)

## NBT Warmcel 100 cellulose fibres



Loose fill derived from waste UK newsprint treated with fire retardant and biocidal additives

Packaging: Bags of 8 kg (compressed)  
Cover area: e.g. 1 m<sup>2</sup> at 228 mm  
k-value /  $I_D$ : 0.035 W/(mK)  
Density: 35 kg/m<sup>3</sup>



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 Sentinal 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

Natural Building Technologies Ltd

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Subject to alteration due to development-Nov, 2013 - US