Technical Manual, Internal Wall Insulation

NBT Refurb System IWI - Pavadentro
The modernisation of old and historic buildings where changes to the external façade are not permitted can present a real challenge to specifiers and builders. Insulation of the exterior walls can only be carried out internally, but unsuitable insulation can lead to interstitial condensation causing critical problems for the building shell. Moisture damage and biological degradation are common symptoms where the use of conventional internal insulation systems with vapour barriers and non-breathing systems are used.

NBT PAVADENTRO wood fibre insulation board, especially designed for internal insulation of the exterior walls on old and historic buildings, was awarded the innovation award by the Swiss Federal Department for the Environment. The board reduces the formation of condensation in the existing construction to a minimum & creates a comfortable living environment.

Advantages of NBT PAVADENTRO:
- natural product made from waste soft wood
- breathable, vapour-permeable construction
- creates healthy, comfortable living environment
- protects building fabric
- outstanding hygroscopic properties
- moisture dispersion through capillary action
- external facade remains visible and unchanged
- easy-to-handle board size (1 person) for modernisation, refurbishment and conservation projects

NBT PAVADENTRO for the internal insulation of exterior walls is an innovative, ecological insulation with excellent capillary and hygroscopic properties which prevent condensation formation and degradation of the building fabric. In addition the specially designed integrated mineral functional layer provides effective moisture control by slowing water vapour diffusion into the fabric, but allowing and creating capillary transmission.

Manufacture and Ecology
NBT PAVADENTRO meets all ecological requirements from its manufacture to final disposal. The natural, renewable raw material for NBT PAVADENTRO boards consists of splinters and wood chips of native Swiss softwoods which arise as by-products in local sawmills. The mineral functional layer consists of silicates, which are sourced from German quarries.

The wood’s own natural lignin, which already performs the function of a binding agent in the tree, is used as a binder, without the addition of further artificial binding agents.

NBT PAVADENTRO will remain effective as insulation material for the life of the building in which it is incorporated. It contains only natural materials and therefore can be recycled, composted or used to produce heat energy at the end of its life.
Comparison between standard refurbishment and NBT PAVADENTRO

By insulating an existing exterior wall with standard insulation on the inside the dew point is on the cold side of the insulation, in the existing wall. Moisture damage and degradation of the envelope are common symptoms. Often vapour barriers are used to prevent moisture passing into the existing structure. However these membrane solutions often do not work properly in refurbishment because the sealing fails and/or is not feasible on integrated elements such as partition walls or timber beams that commonly have cracks. This then results in significant amount of moisture penetrating these areas leading to condensation and decay.

**NBT Pavadentro** works with the physics of moisture transfer rather than attempting to work against it with the inclusion of vapour barriers. Condensation accumulation is prevented by a combination of:

- **Vapour openness** – allowing vapour diffusion through the wall
- **Hygroscopicity**, high absorption of vapour as it diffuses through the woodfibre prevents moisture build up at the interface of existing wall and insulation.
- **Moisture storage** – Hygroscopicity combined with a relatively high density gives the material the capacity for moisture storage that prevents accumulation of liquid condensation
- **Moisture redistribution** through highly capillary active woodfibre ensures there is no localised excess moisture

**Construction Example & Principle**

1. External finish
2. Timber frame with brick infill, 140mm
3. Internal plaster levelling wall (capillary conductive, min. 5mm)
4. NBT PAVADENTRO 100mm with mineral functional layer
5. Internal plaster

**Your advantages**

Before: Minimal thermal protection
After: Provides good thermal protection, guarantees a comfortable & healthy living environment & minimises energy consumption

Before: Very little overheating protection
Decrement delay = 3.9 hours
After: Keeps interior temperatures at comfortable levels in summer
Decrement delay = 7.9 hours

**U-value**

Before: 2.35 W/(m²K)
After: 0.35 W/(m²K)

Before: Provides good thermal protection, guarantees a comfortable & healthy living environment & minimises energy consumption

before: 2.35 W/(m²K)
After: 0.35 W/(m²K)
After: Keeps interior temperatures at comfortable levels in summer
Decrement delay = 7.9 hours

For more information please visit [www.natural-building.co.uk](http://www.natural-building.co.uk)
Suitable buildings:
The existing wall should be vapour open (does not contain any resin paint etc.). NBT PAVADENTRO is suitable for:
• Solid masonry (brick/block)
• Cavity wall
• Timber frame with brick infill
• Natural stone

Installation criteria:
• Insulation only for dry areas (not suitable for rooms with constantly high humidity)
• External wall must be sufficiently protected against driving rain
• No rising damp within the structural element
• No application below DPC level
• Only above ground level

Partially installed internal insulations increase the risk of mould formation (see also “irb-report” F2454) and should be avoided. Always install insulation return on both sides of the dividing structural element such as partition wall, intermediate floor (insulate between joists) or similar.

Integrated partition walls

Non structural solid building elements can be separated at the external element to allow continuous insulation on the external element surface

Intermediate Floors

Embedded joist ends –
Tape the joist with NBT tapes to the existing masonry (prime the substrate before tape) for airtightness. Lime parge coat on wall (RK38) and 50mm Pavaflex between joists against external wall (regardless of Pavadentro thickness) or cut and fit Pavadentro between joists.

Parallel joists –
as general boards may be delaminated to fit between wall or 50mm Pavaflex between joists against external wall (regardless of Pavadentro thickness)

Integrated load-bearing walls

NBT recommends that integrated solid building elements, which cannot be separated from the external wall should be insulated with NBT DIFFUTHERM, NBT DIFFUTHERM reveal boards or NBT PAVADENTRO.
Application: Key Conditions

Window

The window frame may be fixed flush with the inside of the existing wall to reduce thermal bridging in the

Reveal

Reveal: Always insulate reveals with maximum possible thickness of insulation (maximum 20 mm thinner than the insulation board on the walls)

Joints for external and internal corners
To be butt-jointed and tight fitted.

The insulation method shown above (inside corner) should also be applied correspondingly for an external corner
Installation Procedures:

1. **NBT levelling plaster**: If the existing wall has unevenness greater than 8 mm a levelling coat has to be applied. This levelling plaster has to be capillary conductive. Allow 1 day per 1 mm thickness drying time for the levelling coat before applying the absorbent plaster and the NBT PAVADENTRO boards. NBT recommends using the following lime plaster:
   - As levelling coat use NBT lime plaster RK 38

2. **NBT absorbent plaster**: It is essential to apply a capillary conductive absorbent plaster across the whole surface between existing wall and NBT PAVADENTRO insulation board. The NBT absorbent plaster can either be applied to the wall or the boards surface as an adhesive bond. This should be at least 5 mm thick and applied with a toothed trowel.
   - As absorbent plaster use NBT lime plaster RK 70 N

**Note:**
The absorbent plaster also acts as the airtightness layer if at least 8 mm thick in all places and sealed with adhesive airtightness tape at all junctions (see detail drawings on pages 4 and 5).

3. **Mounting**: Ensure that the green mineral functional layer in the NBT PAVADENTRO board is nearer to the wall:
   - Ensure that the board joints are staggered ≥ 200 mm
   - All horizontal and vertical joints must be firmly butted and should not be in line with wall openings or wall projections (windows, doors, beams etc.).

4. **Fixing**: NBT PAVADENTRO wood fibre insulation boards can be fixed with either insulation screws fixings or wide staples. Fixings need to be flush with the surface of the NBT PAVADENTRO insulation board. The fixing given below depend on board thickness:
   - Embedment of screw into timber: ≥ 40 mm
   - Optimum distance from edge of board: 100 mm
   - Minimum distance from edge of board: 50 mm
   - Fixings per board: ≥ 3

   **Fixing with wide staples**
   - Required clamp lengths: 95 - 135 mm
   - Embedment of staple into timber: ≥ 30 mm
   - Optimum distance from edge of board: 100 mm
   - Minimum distance from edge of board: 30 mm
   - Distance between staples: ≤ 180 mm
   - Fixings per board: 4 x 3 = 12 pieces

4.2 **Onto masonry**:
   - EJOT NT U, lengths: ≥ 95 mm
   - Embedment into masonry ≥ 35 mm
   - Optimum distance from edge of board: 100 mm
   - Minimum distance from edge of board: 50 mm
   - Fixings per board: ≥ 3

5. **Corners**: To be butt-jointed and tightly fitted.

6. **Plastering**: NBT lime or clay plasters

6.1 **Lime**

**Option 1**: Baumit RK70 lime plaster as finish and base coat - Plain, slightly pitted, fine finish with aggregate up to 0.6mm (ideal for matching traditional lime finishes)

Smooth finish possible with a mist coat and two coats of NBT emulsion:

**Same day application of Base coat and Finish**
Apply RK70 to a thickness of 5-7mm, this can be achieved with a 6-7mm toothed trowel to remove excess plaster. Embed reinforcing mesh into toothed surface. Leave 1 - 1½ hours for RK70 to firm up slightly, and apply another coat of RK70 at between 4-6mm to cover original material.

Upon setting (either same day or next morning, depending on temperature and humidity conditions), the surface can be lightly rubbed over with a damp fine sponge float in tight circular motions to produce a fine, plain finish. If a smoother finish is required, this can be achieved with a thin bladed plastic trowel which will help to close up the surface; a light mist spray of water may be required to help this process. Slight dampening of the surface is possible to ease reworking, if necessary. Other finishing techniques such as freestyle...
texturing, soft brushing etc. are also possible.

**Option 2 :** Baumit RK38 finish on RK70 base-coat – Plain finish, slightly coarser than RK70 with aggregate up to 0.8mm:

**Same day application of Base coat and Finish**
- Apply RK70 to a thickness of 5-7mm, this can be achieved with a 6-7mm toothed trowel to remove excess plaster. Embed reinforcing mesh into toothed surface. Leave 1 - 1½ hours for RK70 to firm up slightly, and apply RK38 at between 4-6mm to cover original material.

Upon setting (either same day or next morning, depending on temperature and humidity conditions), the surface should be lightly rubbed over with a fine sponge float in tight circular motions to produce a fine, plain finish.

**Option 3 :** Baumit RK30 Kalkinglatte as finish on RK70 base-coat – Very smooth, matt finish with stone dust aggregate (for more modern finish):

Base coat- Apply RK70 to a thickness of 5mm, this can be achieved with a 6-7mm toothed trowel to remove excess plaster, and embed reinforcing mesh into toothed surface. Leave 1 - 1½ hours for RK70 to firm up slightly? Then apply another coat of 2-3mm of the same material RK70, ensuring reinforcing mesh lies just below surface of material. Sponge float on same day to provide a flat surface for the finish coat. Wait for base-coat to fully cure before applying the finishing coat.

Finish coat – Following one week’s drying time, apply RK30 and trowel flat in a full and even coat (1 - 2 mm thick) and leave to slightly cure (ca. 2 hours). A second coat of a slightly wetter consistency is then applied and finished with a plastic trowel to produce a smooth, flat and matt surface. Total thickness ca. 1 - 2 mm thick) Avoid wetting down when troweling the finish; a light mist spray will be enough.

Please contact NBT for the suitability of alternative lime finish coats on the RK70 base-coat.

Lime plaster finishes can be painted with NBT trade emulsion or alternative paint with equally low sd value (vapour permeability).

**6.2 With clay:** Apply NBT clay plaster in the following ways:

- Apply one layer of NBT clay undercoat plaster 5 -7 mm thick (e.g. reinforced with straw fibres). Embed mesh just below surface over the whole surface in the first layer. Finish with 2 mm clay top coat plaster. The plastered surface can then be finished to the desired colour with a coat of mineral, casein or clay paint.
- Apply one layer of NBT clay undercoat plaster 5 - 7 mm thick (e.g. reinforced with straw fibres) with embedded mesh just below surface, second coat with NBT clay decorative mineral plaster 1 - 2 mm thick, available in a wide range of colours, without any additives.

Do not apply plasters or allow drying if air or wall temperature is below +5º C. Ensure sufficient ventilation during application.

**7. Additional meshing:** To reduce the risk of cracking, additional mesh reinforcement is required along all exposed board edges and around all openings.

Bed the mesh in NBT base coat mortar and then apply the main meshed plaster layer, overlapping with the edge strips by more than 100mm.

**8. Joints:** Apply expansion joints to ceiling, integrated beams and other structural elements.
NBT PAVADENTRO
Installation: How to deal with....... 

Services
Wherever possible we recommend running services on the internal walls. Where this is not possible, services can be chased into the board, however, keep penetrations of the functional layer to a minimum (functional layer is located 20mm from the back of the board for all thicknesses).

Where this is not possible, wiring runs can be chased into the existing wall but channels should be infilled with levelling/bonding coat to prevent air gaps behind the insulation (also removing and infilling redundant backboxes). Where internal plaster is being removed, shallow channel conduit can be fixed to the masonry and covered with levelling coat. For switches and sockets, drill through the boards for wires, and mastic around where they enter backboxes. Where necessary, extend wires with isolated connectors in the location of original backboxes. The front face of Pavadentro boards can be chased if required, but will require extra drying time. Penetrations of the green functional layer should be kept to a minimum. Embedding pipes in Pavadentro should be avoided; pipe runs should be included in floor voids. Please contact NBT for further advice.

Objects fixed into the wall
Light objects can be fixed by using a spiral plug, which is pre-drilled though the plaster and Pavadentro boards.

Heavy objects must be fixed back into the substrate. To reduce the risk of surface mould growth (caused by the thermal bridge created with the fixing), we recommend thermally broken fixings such as FISCHER THERMAX.

Cutting
NBT PAVADENTRO boards can be cut easily with a circular or hand saw. A dust mask should be worn.

Existing plaster
Ideal (or where the application of internal insulation is critical e.g. due to challenging location), NBT recommends removing existing plaster. This is due to the fact that some plasters are not very breathable (e.g. dense cement plaster) or cannot deal as well with moisture (gypsum).

However, providing that moisture levels remain low enough, it is possible to leave the existing plaster in situ. Please contact NBT for advice and moisture modelling.

Existing vapour closed surfaces
Vapour closed surfaces need to be removed or (e.g. in the case of paint) opened up mechanically.

Airtightness
Airtightness should be provided as one continuous uninterrupted layer. For the NBT PAVADENTRO SYSTEM the layer of airtightness is the levelling or bonding coat. All penetrations, corners, windows or similar should be taped adequately.

Wet areas
NBT PAVADENTRO SYSTEM is not suitable for areas with a moisture problem caused by rising damp, failing gutters, or where the outer facade cannot provide sufficient protection against driven rain. All of these issues need to be addressed prior to the application of the insulation.

NBT PAVADENTRO SYSTEM can be used in domestic kitchens and, with limitations, in bathrooms. For bathrooms an effective extractor fan is required and NBT Pavadentro is not suitable where tiling is applied onto external walls. Please contact NBT for further advice.

Covering
Non-breathable materials such as tiles, metal sheeting or non breathable paint should not be applied onto NBT PAVADENTRO SYSTEM.

Timber joists
If access to the timber joist is possible, NBT recommends eliminating the thermal bridge by applying insulation between the joists (e.g NBT PAVAFLEX). It is very important to achieve good levels of airtightness around the joists, either with NBT airtightness tapes or with plaster, before installing the insulation.
Thickness of insulation

By fitting internal insulation onto a wall, the temperature of the external wall drops, as the “heating” of the wall through heat loss decreases. The more insulation that is applied internally, the higher the risk that interstitial moisture build up will occur (caused by the lower temperature at the critical interface and by the inability of the wall to move moisture from rain, rising damp etc from the wall to the outside of the building). This however, is not the only point that has to be considered in terms of the insulation thickness. Greater thicknesses will also reduce the living space.

Furthermore, the benefit of applying insulation is not linear to the thickness but decreases with added thickness. The decrease in the benefit is even higher when (unavoidable) thermal bridges (windows, partition walls, intermediate floors, etc.) are taken into account. The more insulation is applied internally, the higher the percentage of heat lost through thermal bridging.

The graph to the right [Schnieders, 2005] shows the reasonable thickness of internal insulation (for a German house; $\lambda_{\text{insulation}} = 0.035\text{W/mK}$) being between 40 and 100mm.

Building Regulations

Please note that according to Building Regulations Part L1B (2010) requirements for existing dwellings section 5.12 the U-Value threshold for refurbishment can be as high as 0.7 W/m²K where it is not possible to achieve 0.3 W/m²K „due to technical, functional or economic reasons“.

Additional flexibility for solid walled and traditional buildings is given in L1b Sections 3.8 and 9: for which “special considerations in making reasonable provision for the conservation of fuel or power may apply” and for which energy efficiency should be improved “as far as is reasonably practicable. The work should not prejudice the character of the host building or increase the risk of long-term deterioration of the building fabric or fittings.”

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Effective cost and energy saving – you need to know where!

Almost 90% of the energy consumption in domestic households is spent on heating and hot water. Up to two thirds of energy consumption can be saved in old buildings through appropriate thermal insulation.

Therefore, energy-efficient refurbishment of existing building stock is recommended.

The average consumption of a house with 100 m² living area is currently 2300 litre oil per year. In contrast new buildings use only 700 litres maximum.

Source: Passivhaus Institut, Darmstadt

<table>
<thead>
<tr>
<th>Existing structure</th>
<th>U-value before</th>
<th>NBT PAVADENTRO</th>
<th>U-value after</th>
</tr>
</thead>
<tbody>
<tr>
<td>350 mm</td>
<td>1.43 W/m²K</td>
<td>60 mm</td>
<td>0.47 W/m²K</td>
</tr>
<tr>
<td>350 mm</td>
<td>1.43 W/m²K</td>
<td>80 mm</td>
<td>0.38 W/m²K</td>
</tr>
<tr>
<td>350 mm</td>
<td>1.43 W/m²K</td>
<td>100 mm</td>
<td>0.32 W/m²K</td>
</tr>
<tr>
<td>450 mm</td>
<td>1.19 W/m²K</td>
<td>60 mm</td>
<td>0.44 W/m²K</td>
</tr>
<tr>
<td>450 mm</td>
<td>1.19 W/m²K</td>
<td>80 mm</td>
<td>0.36 W/m²K</td>
</tr>
<tr>
<td>450 mm</td>
<td>1.19 W/m²K</td>
<td>100 mm</td>
<td>0.31 W/m²K</td>
</tr>
</tbody>
</table>

Cost Saving through additional thermal insulation!

NBT PAVATEX wood fibre insulation boards provide overall protection, and lead to vapour open constructions

NBT PAVADENTRO

Energy-oriented Refurbishment

Timber frame (brick infill)

<table>
<thead>
<tr>
<th>Existing structure</th>
<th>U-value before</th>
<th>NBT PAVADENTRO</th>
<th>U-value after</th>
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</thead>
<tbody>
<tr>
<td>100 mm</td>
<td>2.70 W/m²K</td>
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<tr>
<td>100 mm</td>
<td>2.70 W/m²K</td>
<td>100 mm</td>
<td>0.36 W/m²K</td>
</tr>
<tr>
<td>140 mm</td>
<td>2.35 W/m²K</td>
<td>60 mm</td>
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<tr>
<td>140 mm</td>
<td>2.35 W/m²K</td>
<td>80 mm</td>
<td>0.42 W/m²K</td>
</tr>
<tr>
<td>140 mm</td>
<td>2.35 W/m²K</td>
<td>100 mm</td>
<td>0.35 W/m²K</td>
</tr>
</tbody>
</table>
NBT Natural Insulation Products for:

Simple and robust
Excellent acoustic performance
Highly vapour permeable constructions that do not need membranes to control interstitial condensation
Warmer internal surfaces and less thermal bridges at reveals and openings (reduces condensation)
Dry masonry substrate to improve thermal insulation and moisture storage capacity
Locked up CO$_2$ and waste can be safely composted

Masonry (brick/block)

<table>
<thead>
<tr>
<th>Existing structure</th>
<th>U-value before</th>
<th>NBT PAVADENTRO</th>
<th>U-value after</th>
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</thead>
<tbody>
<tr>
<td>215 mm</td>
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<td>215 mm</td>
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<td>80 mm</td>
<td>0.42 W/m$^2$K</td>
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<tr>
<td>215 mm</td>
<td>2.14 W/m$^2$K</td>
<td>100 mm</td>
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<tr>
<td>240 mm</td>
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<td>0.51 W/m$^2$K</td>
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<td>80 mm</td>
<td>0.41 W/m$^2$K</td>
</tr>
<tr>
<td>240 mm</td>
<td>2.00 W/m$^2$K</td>
<td>100 mm</td>
<td>0.34 W/m$^2$K</td>
</tr>
<tr>
<td>300 mm</td>
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<tr>
<td>300 mm</td>
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<td>100 mm</td>
<td>0.34 W/m$^2$K</td>
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Cavity Wall (50mm cavity uninsulated (A) & insulated (B))

<table>
<thead>
<tr>
<th>Existing structure</th>
<th>U-value before</th>
<th>NBT PAVADENTRO</th>
<th>U-value after</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 mm (A)</td>
<td>1.48 W/m$^2$K</td>
<td>60 mm</td>
<td>0.47 W/m$^2$K</td>
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<tr>
<td>250 mm (A)</td>
<td>1.48 W/m$^2$K</td>
<td>80 mm</td>
<td>0.38 W/m$^2$K</td>
</tr>
<tr>
<td>250 mm (A)</td>
<td>1.48 W/m$^2$K</td>
<td>100 mm</td>
<td>0.32 W/m$^2$K</td>
</tr>
<tr>
<td>250 mm (B)</td>
<td>0.57 W/m$^2$K</td>
<td>60 mm</td>
<td>0.31 W/m$^2$K</td>
</tr>
<tr>
<td>250 mm (B)</td>
<td>0.57 W/m$^2$K</td>
<td>80 mm</td>
<td>0.27 W/m$^2$K</td>
</tr>
<tr>
<td>250 mm (B)</td>
<td>0.57 W/m$^2$K</td>
<td>100 mm</td>
<td>0.24 W/m$^2$K</td>
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NBT PAVADENTRO
Product Characteristics

Delivery Form

<table>
<thead>
<tr>
<th>Design</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>Board thickness</td>
<td>mm</td>
<td>40, 60, 80, 100</td>
</tr>
<tr>
<td>Size</td>
<td>mm</td>
<td>600 x 1020</td>
</tr>
<tr>
<td>Cover area</td>
<td>mm</td>
<td>590 x 1010</td>
</tr>
<tr>
<td>Edges</td>
<td>-</td>
<td>Tongue and groove</td>
</tr>
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Technical Data

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<thead>
<tr>
<th>Properties</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>Density $\rho$</td>
<td>kg/m$^3$</td>
<td>180</td>
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<tr>
<td>Thermal conductivity $\lambda_0$</td>
<td>W/(mK)</td>
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<tr>
<td>Compression strength at 10 % compression</td>
<td>N/mm$^2$</td>
<td>$\geq 0.07$</td>
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<tr>
<td>Tensile strength</td>
<td>N/mm$^2$</td>
<td>$\geq 0.005$</td>
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<tr>
<td>Specific heat capacity $c$</td>
<td>J/(kgK)</td>
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<tr>
<td>Flow resistance per unit length</td>
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<td>$\geq 100$</td>
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<tr>
<td>Euroclass EN 13 501-1</td>
<td>Class</td>
<td>E</td>
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<tr>
<td>Water vapour diffusion at 50 % rel. air humidity $W_{d,lu}$</td>
<td>g/(m$^2$ d)</td>
<td>ca. 45.5</td>
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<tr>
<td>Wood fibre board according to BS EN 13171</td>
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Constituents

<table>
<thead>
<tr>
<th>Raw material</th>
<th>weight-%</th>
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<tr>
<td>Softwood</td>
<td>94.5</td>
</tr>
<tr>
<td>Starch</td>
<td>2.0</td>
</tr>
<tr>
<td>Silicate</td>
<td>3.0</td>
</tr>
<tr>
<td>PVAc-wood glue*</td>
<td>0.5</td>
</tr>
</tbody>
</table>

*bonding of individual layers
# NBT PAVADENTRO

## System Components

<table>
<thead>
<tr>
<th>Product</th>
<th>Use</th>
<th>Details</th>
<th>Picture</th>
</tr>
</thead>
</table>
| NBT PAVADENTRO boards            | Internal insulation for solid walls.                                 | • tongue and grooved  
• thicknesses: 40, 60, 80 and 100mm                                     | ![Image]       |
| EJOT NT-U                        | For fixing the NBT PAVADENTRO SYSTEM to the substrate.              | • minimum embedment into masonry 40mm  
• Box of 100                                                            | ![Image]       |
| FISCHER THERMAX 8 and 10         | For fixing heavy objects to the wall                                 | • thermally broken  
• Box of 20  
• 8 or 10mm diameter                                                     | ![Image]       |
| EJOT SPIRAL ANCHOR               | For fixing light objects to the insulated wall (max 5kg)            | • no thermal bridge  
• Box of 10                                                            | ![Image]       |
| NBT BAUMIT RK38                  | Levelling plaster to straighten uneven walls; up to a maximum thickness of 25mm | • Bag of 25kg                                                             | ![Image]       |
| NBT BAUMIT RK70                  | Lime plaster used as bonding coat, base coat and finishing coat (slightly textured finish) | • Bag of 25kg  
• thickness: 5-8mm (bonding coat)  
6mm (base coat)  
2mm (finish coat)                                                        | ![Image]       |
| NBT BAUMIT RK30 (KalkGlätte)     | Lime plaster used for finishing coat only (smooth, gypsum-like finish) | • Bag of 25kg  
• thickness: ca. 2mm                                                      | ![Image]       |
| NBT PAVAFIX WIN & PAV-APRIM PRIMER| Tape to achieve airtightness                                        | • 25m Rolls and 1L Primer                                                | ![Image]       |

For more information please visit www.natural-building.co.uk
For your notes & sketches
NBT Product Overview: Insulation

**ISOLAIR sarking board**
- **Description**: PAVATEX wood fibre board for breathable roof & wall constructions
- **Size**: 770 x 2500 mm
- **Cover area**: 750 x 2480 mm
- **Thicknesses**: 22 & 35 mm
- **k-value / l<sub>D</sub>**: 0.047 W/(mK)
- **Density**: 240 kg/m³
- **Compr. strenght**: 180 kPa (at 10 % compression)

**PAVATEX DIFFUTHERM external wall insulation**
- **Description**: 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 / l<sub>D</sub>**: 0.043 W/(mK)
- **Density**: 190 kg/m³
- **Compr. strenght**: 80 kPa (at 10 % compression)

**PAVATHERM-PLUS sarking board**
- **Description**: Composite wood board for roof & wall insulation
- **Size**: 800 x 1800 mm
- **Cover area**: 780 x 1780 mm
- **Thicknesses**: 60, 80, 100, 120 & 140 mm
- **k-value / l<sub>D</sub>**: 0.043 W/(mK)
- **Density**: 180 kg/m³
- **Compr. strenght**: 100 kPa (at 10 % compression)

**PAVADENTRO internal wall insulation (lime plaster)**
- **Description**: Innovative wood fibre insulation board for refurbishment, lime plaster finish
- **Size**: 580 x 1100 mm
- **Cover area**: 570 x 1090 mm
- **Thicknesses**: 40, 60, 80 & 100 mm
- **k-value / l<sub>D</sub>**: 0.041 W/(mK)
- **Density**: 145 kg/m³
- **Compr. strenght**: 70 kPa (at 10 % compression)

**PAVADRY internal wall insulation (dry lined)**
- **Description**: Innovative wood fibre insulation board for refurbishment, dry lined finish
- **Size**: 600 x 1010 mm
- **Cover**: 590 x 1010 mm
- **Thicknesses**: 40 & 60 mm
- **k-value / l<sub>D</sub>**: 0.051, 0.048 & 0.047 W/(mK)
- **Density (low/medium)**: 175/740 kg/m³

**REVEAL BOARD**
- **Description**: Universal wood fibre board for use in cladding, roof, wall, render and plaster
- **Size/Cover**: 600 x 1200 mm
- **Cover**: 590 x 1200 mm
- **Thicknesses**: 20 & 40 mm
- **k-value / l<sub>D</sub>**: 0.038 W/(mK)
- **Density**: 110 kg/m³
- **Compr. strenght**: 50 kPa (at 10 % compression)

**PAVATHERM general purpose insulation board**
- **Description**: Universal wood fibre board for use in external & internal walls, floors & roofs
- **Sizes/Cover**: 600 x 1100 mm
- **Thicknesses**: 40 - 240 mm (at 20mm increment)
- **k-value / l<sub>D</sub>**: 0.038 W/(mK)
- **Density**: 55/40 kg/m³
- **Compr. strenght**: 50 kPa (at 10 % compression)

**PAVAROOM insulation lining board**
- **Description**: quick fit, ready to skim internal insulation lining board
- **Size**: 540 x 1250 mm & 540 x 2500 mm
- **Cover area**: 520 x 1230 mm & 520 x 2480 mm
- **Thicknesses**: 30 & 60 mm
- **k-value / l<sub>D</sub>**: 0.044 W/(mK)
- **Density**: 230 kg/m³

**NBT Pavaflex**
- **Description**: 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 / l<sub>D</sub>**: 0.038 W/(mK)
- **Density (dense/light)**: 55/40 kg/m³

For more information please visit www.natural-building.co.uk
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 CO₂ 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.