

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

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.

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 CO₂ emissions and running costs.

Keep the building quieter:

The high mass and the fibrous texture of 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 PAVATEX 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:

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.

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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 m³/m²/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.

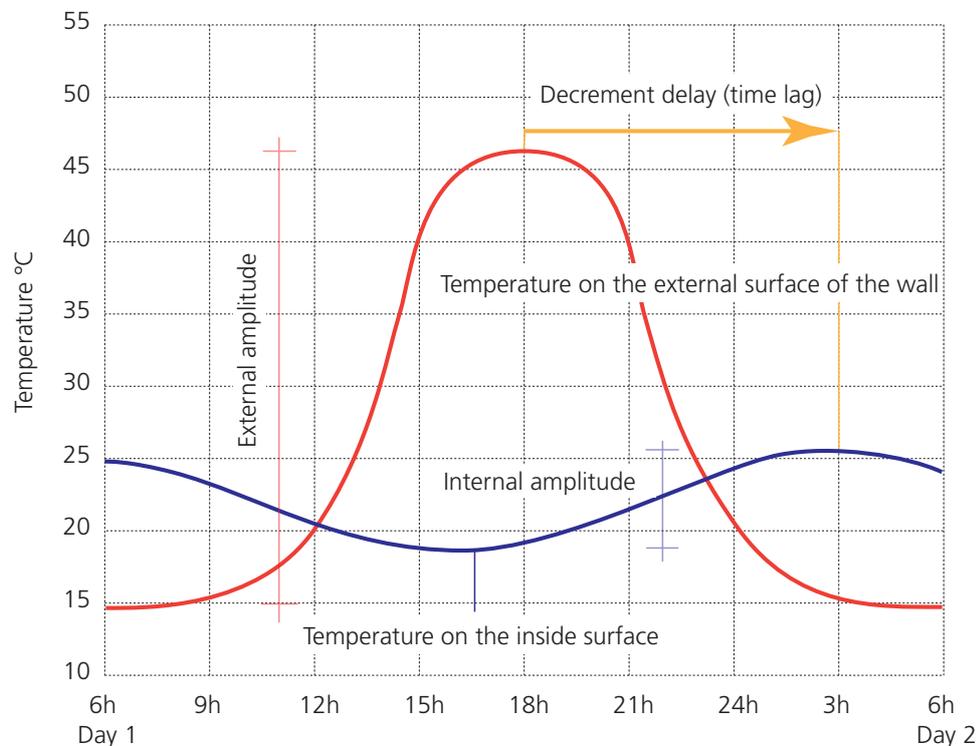
Testing

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.

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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.

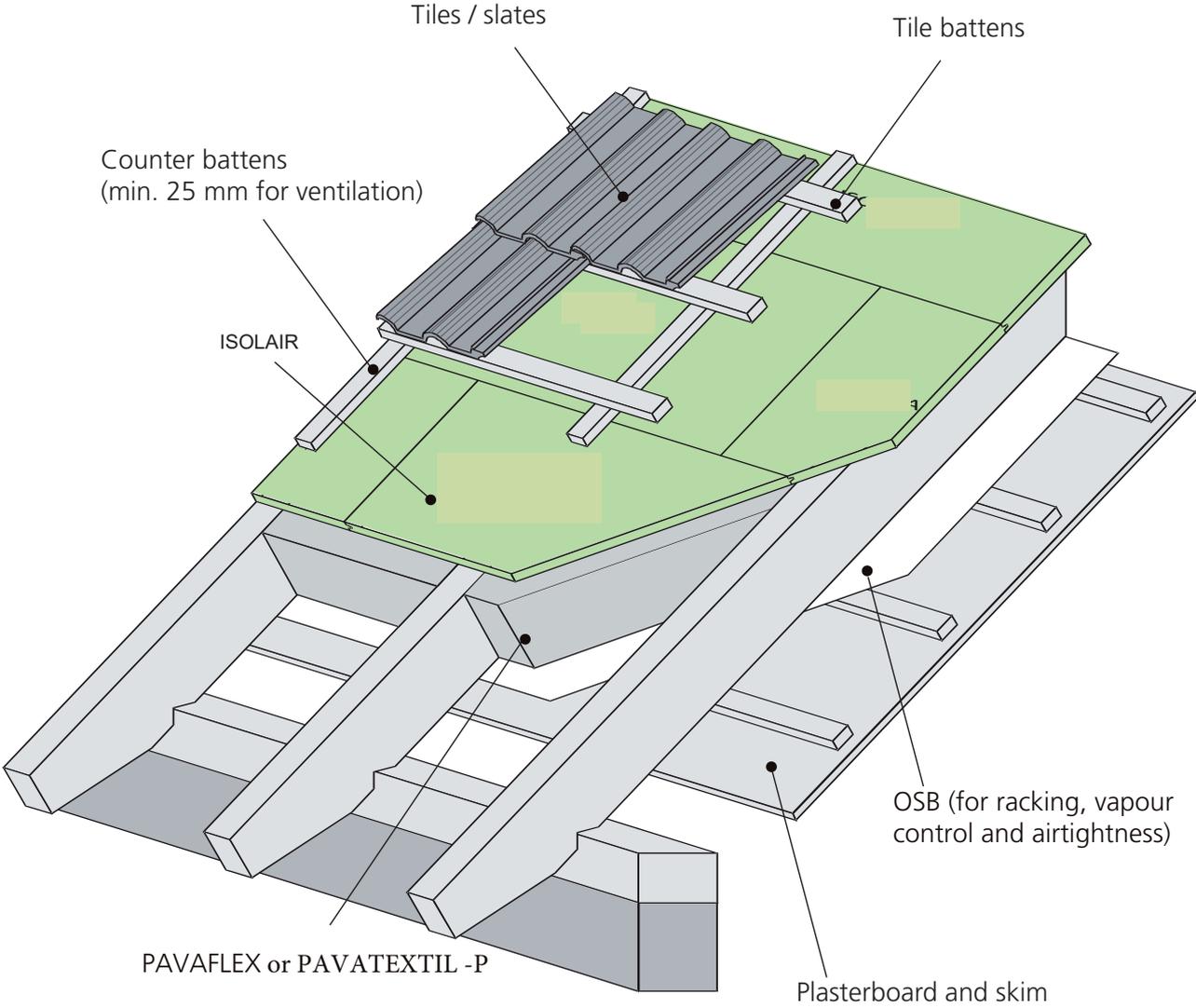
In terms of achieving these satisfactory values, an insulation material that has a high thermal mass is needed to produce better values. A combination of density, thermal conductivity and specific heat capacity is required.

PAVATEX woodfibre boards have an excellent combination of low λ (k-value) (0.038 - 0.047 W/m²K), high specific heat capacity (2100J/kgK) and for insulation boards a high density (140 - 240 kg/m³). These values far exceed any conventional insulation material. This means that with 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.

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Build-up



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Designers: Key Considerations

General:

The 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 Movement Joints:

Movement joints in the substrate must be incorporated into the 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 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.

- For pitches > 18° boards are laid dry (no glue and/or breather membrane is necessary). The boards are interlocking on all sides providing weather tightness
- For pitches > 5° and < 18° it is recommended to use a suitable breather membrane. contact Unity Lime for more details.
- For pitches < 5° see the flat roof system at www.unitylime.co.uk

Airtightness:

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

As an alternative, an airtight membrane (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:

UNITY 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 ISOLAIR 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 > 25mm with > 25mm counter battens on top for open finish (slate, clay tile etc.) >40mm 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.

Pitched Roof

Installers: Key Considerations

General:

The UNITY LIME 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 UNITY are used in the specified manner. Details available on the Warranty Document

Movement joints in the substrate must be incorporated into the 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 ≤ 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 PRIMER and PAVATAPE

For weather tightness seal the boards against the structure at all joints, intersections, openings and penetrations and along all edges using PAVATAPE + PAVAPRIM 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 $> 18^\circ$ boards are laid dry (no glue and/or breather membrane is necessary). The boards are interlocking on all sides providing weather tightness
- For pitches $> 5^\circ$ and $< 18^\circ$ it is recommended to use a suitable breather membrane. contact Unity Lime for more details.
- For pitches $< 5^\circ$ see the flat roof system at www.unitylime.co.uk

After fixing and sealing, the boards could be left exposed for maximum 90 days, before applying the roofing material.

Pitched Roof

Installation Procedures

General:

The system comprises ISOLAIR boards supplied together with all accessories by UNITY LIME

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 manufacturer recommendations, protecting the works if necessary. Boards should be tilted/covered within 3 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:

- 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, PAVATEXIL-P' or other similar between rafter insulation and prepare the boards to be laid on the rafters.

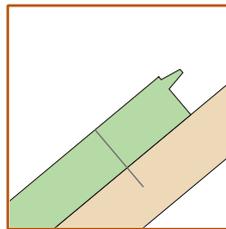
Boards must span at least 2 rafters. Board edges should not coincide with rafters positions, which should be at < 650 mm centres. The faces of the boards should be flush.

Use a sprocket (timber piece) at the eaves to support the first course of the boards.

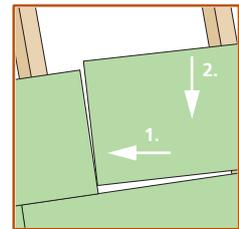
Locate the 1st course of boards with grooved side down and edge tongue and groove joints fully engaged. Initially fix through the boards into the timber rafters using 1 - 2 fixings per rafter/board.

Install 2nd 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 1st course. Fill any gaps and areas of damaged boards with loose woodfibres and apply a "patch" of PRIMER and PAVATAPE. The final fixing will be through the counter battens.

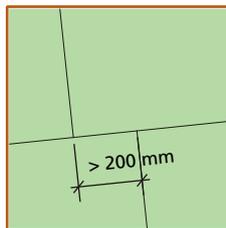
The boards are fitted as shown. Please note that a PAVATEX breather membrane may be applied whilst fitting subject to roof pitch. (see section Pitches below):



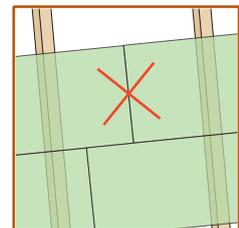
Fix first ISOLAIR with tongue uppermost using 1 fixing per rafter. Final fixing occurs through batten into rafter.



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 $\geq 5^\circ$ and $< 18^\circ$ it is recommended to use a suitable breather membrane. contact Unity Lime for more details.
- For pitches $< 5^\circ$ see the flat roof system at www.unitylime.co.uk

Fixing:

- Only use fixings in accordance with UNITY LIMES recommendations or manufacture's instructions
- Counter battens have to be applied AFTER taping/sealing the board surface
- Fix through counter battens and ISOLAIR directly into rafters
- Fix tile battens and roofing material with conventional roofing techniques
- No of fixings required 6/m²

Damaged boards and butt edged joints:

Any damaged areas and "butt edged" joints in the ISOLAIR layer should be filled tightly with woodfibre offcuts - primed and taped with PAVATAPE to ensure the integrity of the layer and to prevent water ingress.

Openings and penetrations:

All openings and penetrations should be primed and taped with PAVATAPE or PAVATAPE FLEX tape to ensure the integrity of the layer and to prevent water ingress.

System Movement joints:

Movement joints in the substrate must be incorporated into the 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 PAVATAPE to form a sealed air gap.

Pitched Roof

Installation Procedures

Using PAVATAPE:

Guidelines for use

- Only use 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. PAVAPRIM - minimum processing temperature for the substrate and air -10°C. Drying time at 20°C and +5°C are ~ 15min and 30min respectively.
 2. PAVATAPE, AND PAVAPRIM should not be applied if the temperature of the product is below 5°C or above 40°C
 3. Apply PRIMER with a brush or roller onto the board and abutments and allow to dry

- Store 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 PAVATAPE, AND PAVAPRIM needs to be used within 24 months after manufacture.

Notes:

A high quality breather membrane (**PAVATEX ADB**) can be used over ridges instead of 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.

How to install



Apply 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)

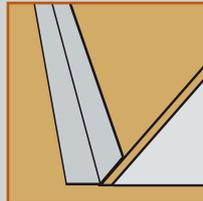


Press PAVATAPE on firmly using a hard faced decorators seam roller

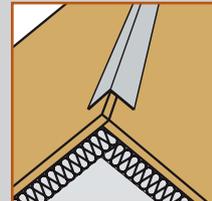


Roll out PAVATAPE and press down with other hand. Avoid creases

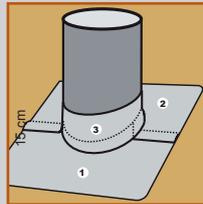
When to use



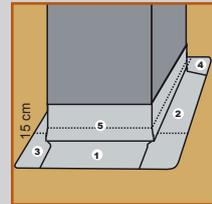
Valleys



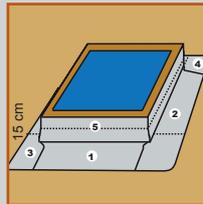
Ridges



Vent pipes



Chimneys and wall abutments



Rooflights

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