APPENDIX 1

New Pointing to stonework as per St Astier Specification (taken from their website)

Re-Pointing Masonry Walls: Brick, Blocks and Natural Stone with Pure Natural Lime

Where scaffolding is in place, fine mesh debris netting securely fixed to the outside of the scaffold gives basic protection to the working area slowing down strong wind whilst allowing good natural light for the works. Securely fixed haps or polythene placed over plywood sheeting on to the top of the scaffold from the wall heads or just below the gutters will ensure that rain does not wash down the face of the walls. Scaffolding should always be erected in such a manner as to allow the highest point of the building to be protected. In an ideal world, a temporary roof would be desirable, however the costs may be prohibitive. As regards external protection the work should be covered with hessian sheets, polythene or both. Polythene should never come in contact with the work. Accurate records of the minimum and maximum temperatures below the covers should be taken daily, with provision to record these over weekends and holiday breaks. To avoid rapid drying and consequent high shrinkage, especially in hot or windy weather conditions keep all work damp by repeatedly applying a fine mist of clean potable water, if necessary several times a day, until the mortar has hardened.

Re-pointing.

Before any re-pointing work is undertaken a survey of the building should be carried out by the supervising officer and the contractor to determine the precise areas to be re-pointed.

Often much of the old lime mortar raked out is sound and could, with advantage, have been left in place. Todays builder expects mortar to be strong, hard, dense and cement rich. Strength is perceived to be a prerequisite and soft lime mortars are often removed in the belief that the softness is a sign of failure. In other instances, entire elevations are re-pointed to provide a uniform colour, rather than re-pointing defective joints with a suitable and compatible mortar.
It is essential that all pointing is carried out to match previously approved samples. This will remove any tendency for artistic licence on the part of the builder. The finish achieved on mortar joints can have a dramatic effect on the performance and visual appearance of the completed work, although this is often not immediately realised, sometimes only being condemned after the scaffold has been taken down and the full visual impact becomes apparent.

Preparation

Joints should be thoroughly cleaned from top to bottom after pre-wetting the wall. Use brushes, low pressure compressed air or wash out the joints with a hose. Remove all loose materials and dust. This is important as dust that is left in the joints will deplete the bond.

Application

Mortar should be plastic and workable but as stiff as possible. It should be pushed into the back of the joints in layers, avoiding large volumes of deep filling at all times. On rubble elevations, pinning stones should be used to fill wide and deep joints in the same style as the original build. This will reduce the volume of mortar required and will assist the process of setting and final full carbonation.
A good yardstick is to keep the joint thickness to no more than a "finger" thick, if the joints are wider than this they should be pinned with compatible matching masonry.
A "well filled" joint is close to flush with the surrounding masonry or to the weathered edge.
Recessed joints define the masonry components and detract from the appearance of the wall,

becoming a feature in themselves. Historically the common practice was to fully flush point and line out rubblework.

Finishing

To ensure good compaction and adhesion within the joint, the mortar can be tamped firmly back with a stiff bristle brush as it starts to firm up. The timing of this is critical. If it is carried out too soon after placing, fines in the mix will be drawn to the surface and will form a dense skin, inhibiting the proper curing of the mortar. Once the surface of the mortar is firm (usually the next day) lightly scraping the surface to expose the aggregate can improve the appearance of the mortar and make the joints less visible. This process should not be undertaken before the surface has stiffened or mortar will be smeared onto the face of the stone. Brickwork has a number of specific joint finishes too numerous to go into in this general guide, but the principles of timing the finishing of the joint still apply.
The fines in the mix will determine the finished colour, therefore a wide range of natural colours is achievable without pigmentation. The whiteness of St Astier limes ensures the best colour reproduction of the chosen aggregate.

Some re-pointing NHL mortar mixes

Joint type	Joint size	Pre-mixed mortar	Lime	Sand	Ratio Lime : Sand
Ashlar / Tuck joint	1-5mm	Ashlar / Tuck pointing mix or EcoMortar type F NHL2 EF or EcoMortar F NHL 3.5 EF in exposed areas	NHL 2 NHL 3.5	0.8mm to 0.075mm	2 : 1 1 : 1
High porosity masonry	5-10mm	EcoMortar type C NHL 2 TF or EcoMortar NHL 3.5 TF in exposed areas	NHL 2 NHL 3.5	1-2mm to 0.075mm	1 : 2 1 : 2.5
	10-20mm	EcoMortar type C NHL 3.5 M	NHL 2 NHL 3.5	3-5mm to 0.075mm	1 : 2 1 : 2.5
Medium porosity masonry	5-10mm	EcoMortar type C NHL 2 TF or EcoMortar NHL 3.5 TF in exposed areas	NHL 2 NHL 3.5 NHL 5	1-2mm to 0.075mm	1 : 2 1 : 2.5 1 : 2.5 or 3
	10-20mm	EcoMortar type C NHL 3.5 M	NHL 2 NHL 3.5 NHL 5	3-5mm to 0.075mm	1 : 2 1 : 2.5 1 : 2.5 or 3
Low porosity masonry	5-10mm	EcoMortar type C NHL 2 TF or EcoMortar NHL 3.5 TF in exposed areas	NHL 3.5 NHL 5	1-2mm to 0.075mm	1 : 2.5 1 : 2.5 or 3
	10-20mm	EcoMortar type C NHL 3.5 M	NHL 3.5 NHL 5	3-5mm to 0.075mm	1 : 2 1 : 2.5or 3

Floor tiles or stone slabs	1-5mm	EcoMortar Type C NHL 3.5 EF	NHL 3.5 NHL 5	1-2mm to 0.075mm	1 : 2 1 : 2 or 2.5
	5-10mm	EcoMortar Type C NHL 3.5 F	NHL 5	3-5mm to 0.075mm	1 : 2

APPENDIX 2

What does a conservation package include?

- Roof window with pre-fitted glazing bar.
- Laminated safety glazing as standard.
- Insulation collar and underfelt collar provided for a weathertight and energy efficient installation.

VELUX conservation roof windows

For traditional buildings

When planning dictates that a window of traditional external appearance is required, conservation roof windows should be considered. All of our conservation roof windows have the same technical features of a VELUX roof window but in a traditional black conservation style.

Please visit **velux.co.uk/onlinebrochure** for information on how to create your own grey conservation package.

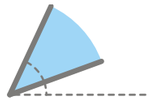
- Available in either centre-pivot or top-hung.
- Black external profiles and glazing bar.
- RAL colour 9005.
- Recessed installation for slate and tiled roofs.
- Top-hung roof windows listed below are suitable for emergency escape.
- Other sizes and glazing options available – contact us for further information.

Conservation roof windows

External frame size (nominal w x h) cm		55 x 98	55 x 118	66 x 118	78 x 118	78 x 140	134 x 98
Code	**Description**	**CK04**	**CK06**	**FK06**	**MK06**	**MK08**	**UK04**
Centre-pivot white painted							
GGL SD5N2 U-value 1.3 W/m²K	GGL 2570 roof window + EDN recessed flashing for slate up to 8mm thick (min 20° roof pitch).	£484	£502	£555	£584	£629	£732
GGL SD5P2 U-value 1.3 W/m²K	GGL 2570 roof window + EDP flashing for plain tiles up to 14mm thick (min 25° roof pitch).	£426	£442	£491	£517	£558	£652
GGL SD5W2 U-value 1.3 W/m²K	GGL 2570 roof window + EDW flashing for tiles up to 120mm in profile (min 15° roof pitch).	£426	£442	£491	£517	£558	£652
GGL SD5J2 U-value 1.3 W/m²K	GGL 2570 roof window + EDJ recessed flashing for tiles up to 90mm in profile (min 20° roof pitch).	£484	£502	£555	£584	£629	£732
Top-hung white painted. For roof pitches of 55°-75°, please specify special springs when ordering.							
GPL SD5N2 U-value 1.3 W/m²K	GPL 2570 roof window + EDN recessed flashing for slate up to 8mm thick (min 20° roof pitch).	-	-	-	-	£763	-
GPL SD5P2 U-value 1.3 W/m²K	GPL 2570 roof window + EDP flashing for plain tiles up to 14mm thick (min 25° roof pitch).	-	-	-	-	£692	-
GPL SD5W2 U-value 1.3 W/m²K	GPL 2570 roof window + EDW flashing for tiles up to 120mm in profile (min 15° roof pitch).	-	-	-	-	£692	-
GPL SD5J2 U-value 1.3 W/m²K	GPL 2570 roof window + EDJ recessed flashing for tiles up to 90mm in profile (min 20° roof pitch).	-	-	-	-	£763	-

▸ All roof windows have a delivery time of 2 days.
▸ Delivery time is in working days from receipt of orders placed before 4pm (UK) and 11.30am (NI).

Roof pitch



20°-65°

Suitable for roof pitches between 20° and 65°.

Rooflights for uninhabited spaces

Rooflights

- Frame and integrated flashing made of maintenance-free polyurethane.
- Operated using a handle with three ventilation positions.
- Extruded aluminium sash which can be hinged on both sides, opening to an angle of 90°.
- Opening restrictor that engages at 90° only.
- Black internal and external finish.

Uninhabited spaces

Our rooflights are designed in such a way that you have the opportunity to bring light into uninhabited spaces. It is not advisable to use these rooflights in habitable rooms due to their thermal performance.

Rooflights for uninhabited spaces

External frame size (nominal w x h) cm		54 x 83	46 x 61
Code	**Description**		
GVT 103 0059Z U-value 3.1 W/m²K	Side-hung outward-opening rooflight.	£192	-
GVK 0000Z U-value 5.1 W/m²K	Side-hung outward-opening rooflight.	-	£141

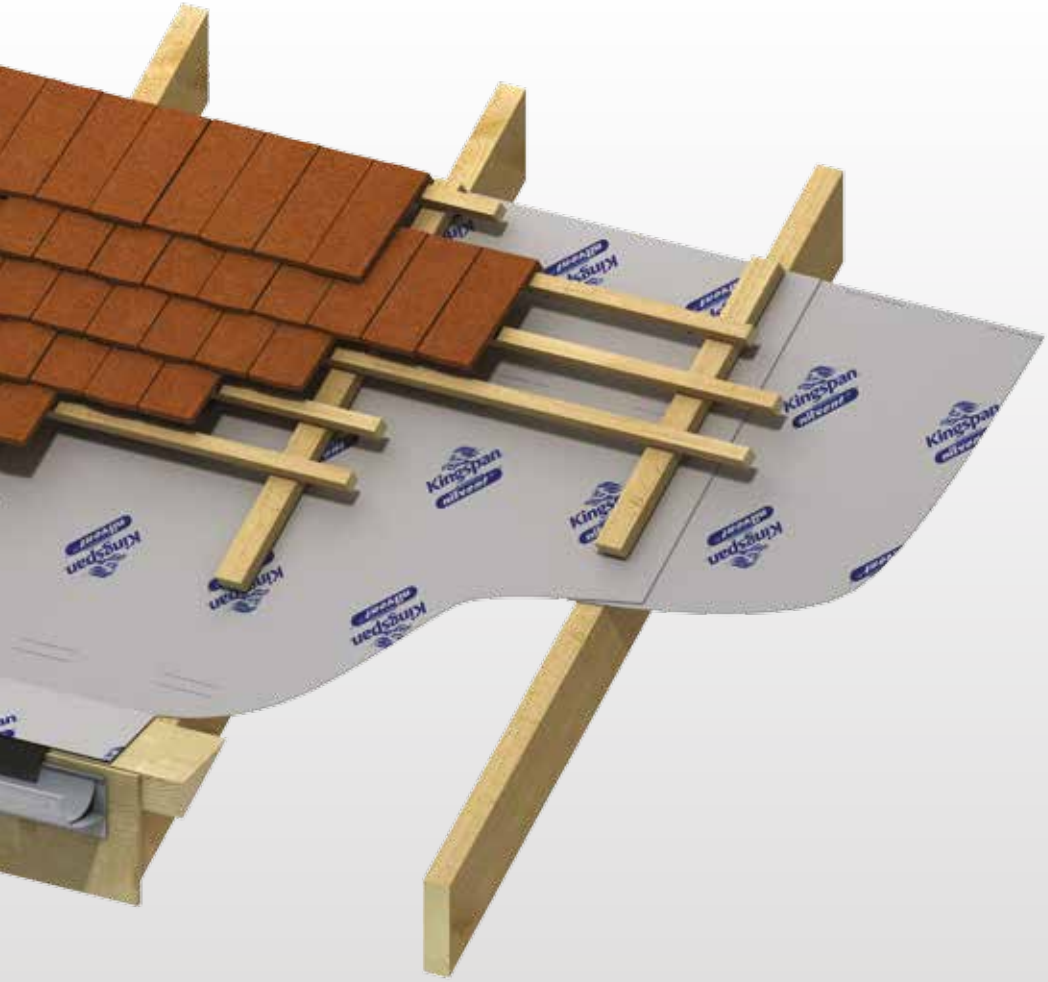
▸ All rooflights have a delivery time of 2 days.
▸ Delivery time is in working days from receipt of orders placed before 4pm (UK) and 11.30am (NI).

APPENDIX 3

CI/SfB (27.9) Ln6 L3
Seventh Issue September 2017

nilvent®

BREATHABLE MEMBRANE FOR UNVENTILATED PITCHED ROOFS AND TIMBER FRAME WALLS



- Waterproof – can be used as a temporary roof covering
- Non–tenting
- Airtight at normal building pressures
- Excellent water vapour permeability
- Strong – excellent nail tear and tensile strengths
- Quiet under wind loading
- Durable – heat and UV stable
- Lightweight
- Easy to handle and install
- Ideal for new build

Kingspan®

Low Energy – Low Carbon Buildings

Typical Constructions

Pitched Roofs

Horizontal Installation on a Continuous Substrate

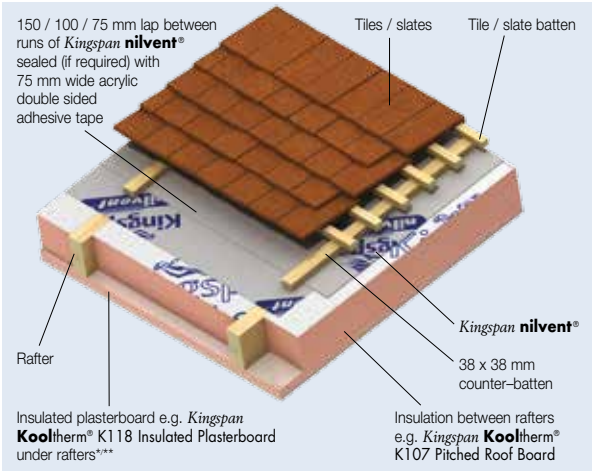


Figure 1a – Fully Filled Insulation Between Rafters – No Sarking Board – Battens & Tiles

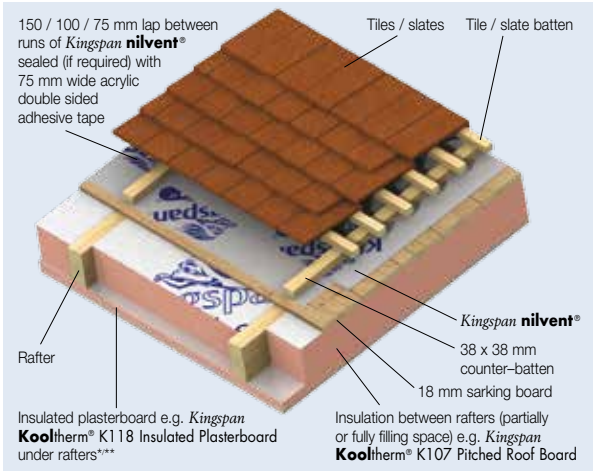


Figure 1c – Insulation Between Rafters – Sarking Board – Battens & Tiles

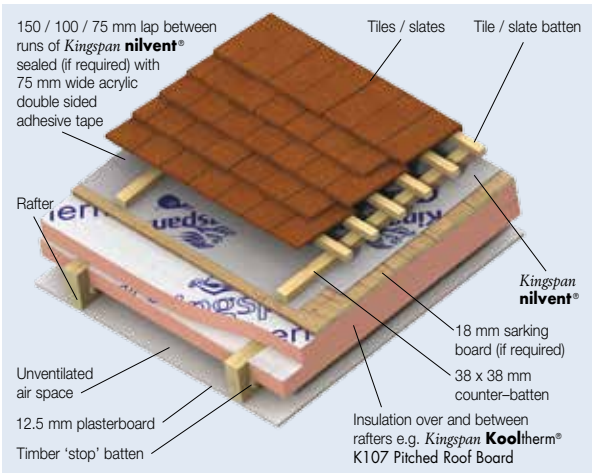


Figure 1b – Insulation Over Rafters – Sarking Board / No Sarking Board – Battens & Tiles

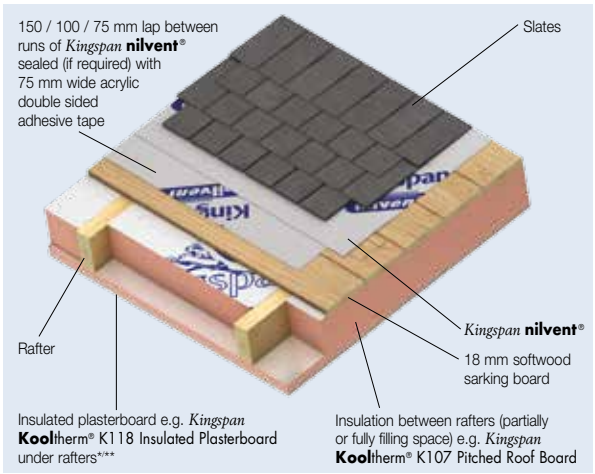


Figure 1d – Insulation Between Rafters – Sarking Board & Natural Slates

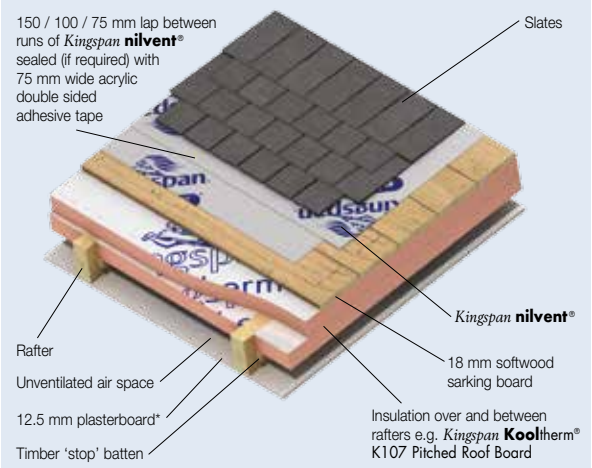


Figure 1e – Insulation Over Rafters – Sarking Board and Natural Slates

Vertical Installation on a Discontinuous Substrate

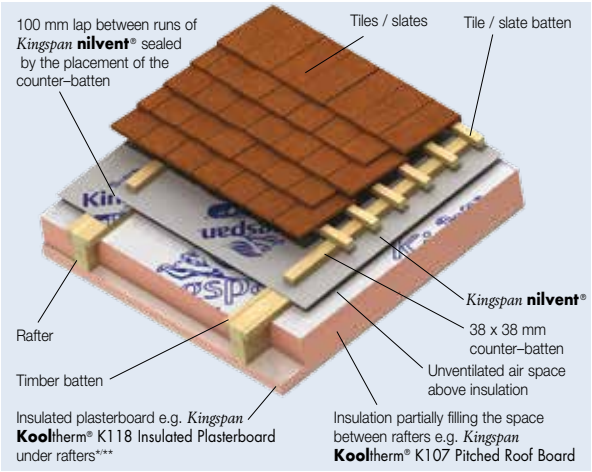


Figure 2 – Partially Filled Insulation Between Rafters – No Sarking Board – Battens & Tiles

Horizontal Installation on a Discontinuous Substrate

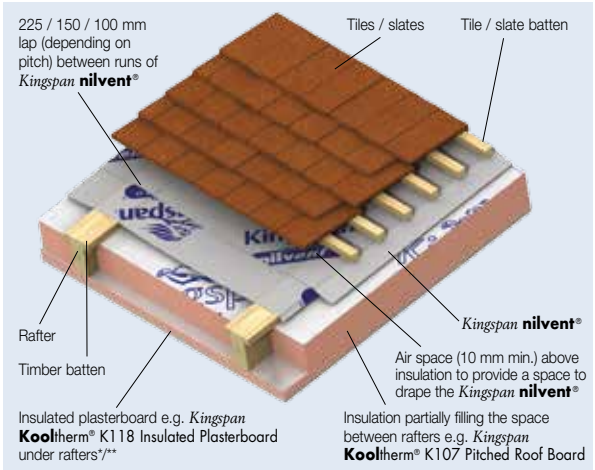


Figure 3a – Partially Filled Insulation Between Rafters – No Sarking Board – Battens & Tiles

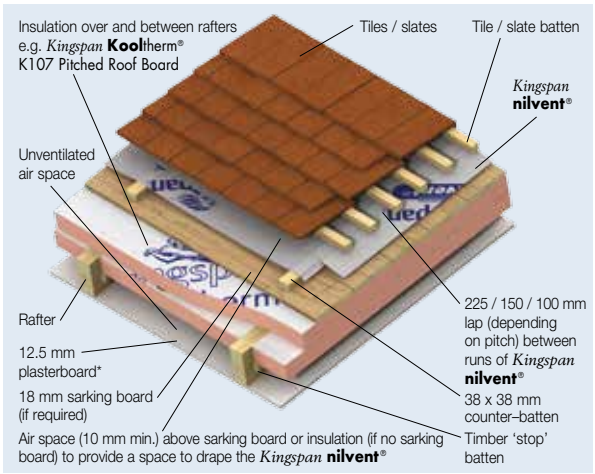


Figure 3b – Insulation Over Rafters – Sarking Board / No Sarking Board – Battens & Tiles

Typical Constructions

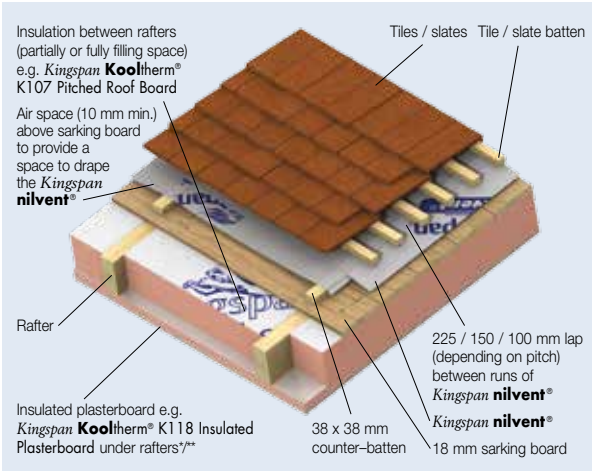


Figure 3c – Insulation Between Rafters – Sarking Board – Battens & Tiles

* *The requirement for a vapour control layer and / or under the tile ventilation should be assessed to BS 5250: 2002. Vapour check plasterboard or a separate vapour control layer can be used as preferred.*

** *Kingspan* **Kool**therm® K118 Insulated Board *contains an integral vapour control layer which, with appropriate detailing at joints, penetrations and wall perimeters, can increase the vapour resistance of the roof lining.*

Timber Frame Walls

Horizontal Installation

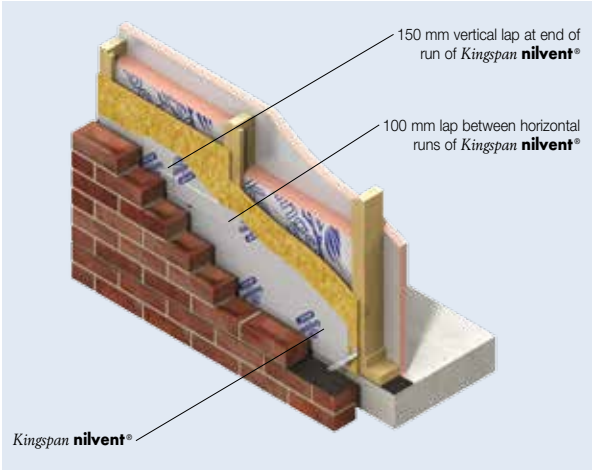


Figure 4 – External Masonry

Vertical Installation

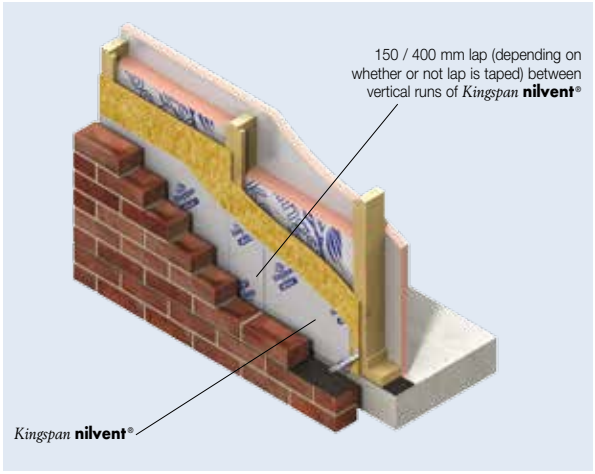


Figure 5a – External Masonry

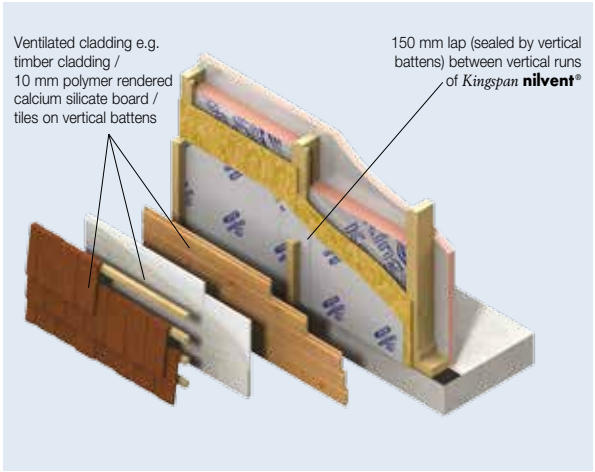


Figure 5b – Ventilated Cladding

Design Considerations

Sustainability & Responsibility

Kingspan Insulation has a long–term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; as a substantial landholder; and as a key member of its neighbouring communities.

A report covering the sustainability and responsibility of Kingspan Insulation Ltd's British operations at its Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is available at www.kingspaninsulation.co.uk/sustainabilityandresponsibility.

Specification Clause

Kingspan **nilvent**® should be described in specifications as:–

The breathable membrane shall be *Kingspan* **nilvent**® comprising a laminated 3–layer polyolefin construction. The product shall be manufactured under a management system certified to ISO 9001: 2008 and ISO 14001: 2004, and shall be applied in accordance with the instructions issued by Kingspan Insulation Limited.

NBS Specifications

Details also available in NBS Plus.
NBS users should refer to clauses:
H21 130, H30 350, H31 280, P10 320 (Standard and Intermediate)
H21 20, H30 50, H31 55, P10 65 (Minor Works)

Building Information Modelling (BIM)

Kingspan Insulation's BIM objects can be downloaded in Revit and in IFC formats. For more information please visit www.kingspaninsulation.co.uk/bim.

Pitched Roofs

Horizontal Installation on a Continuous Substrate

In these cases, the breathable sarking membrane is installed either under counter–battens, which provide a channel for water drainage (Figures 1a–1c), or, in situations with a sarking board under a natural slate roof, directly under the slates (as neither tile battens nor counter–battens are used) (Figures 1d and 1e).

The membrane is laid taut, and joints between runs of membrane are sealed with tape, if required.

Vertical Installation on a Discontinuous Substrate

Kingspan **nilvent**® is installed in vertical runs, from eaves to eaves, in one length, under counter–battens (see Figure 2). Installed in this way there will be no laps along the length of a run and laps between runs can be formed over a rafter, where counter–battens can secure them and make an airtight joint. The membrane should be laid taut, with no valleys between rafters.

NB It is theoretically possible to install the membrane vertically with a valley between rafters, however this adds no technical benefit, will prove cumbersome, and has the disadvantage of allowing greater wind induced membrane movement (see section on 'Wind Induced Membrane Movement').

Horizontal Installation on a Discontinuous Substrate

In situations where there is no continuous surface (see Figures 3a–3c), the breathable sarking membrane can be draped over the rafters or counter–battens, to provide a channel for water drainage. There should be a minimum 10 mm gap, between the membrane and the tile / slate batten, to afford a drainage channel for any penetrating rain. No counter–batten is required above the *Kingspan* **nilvent**® as water can freely drain under the tile / slate battens.

NB It is possible to have the membrane laid taut with counter–battens above. This is not as practical and incurs the cost penalty of extra counter–battens. It does, however, have the advantage of allowing reduced wind induced membrane movement (see section on 'Wind Induced Membrane Movement').

In these situations, it may not be practical to seal the laps between the runs of *Kingspan* **nilvent**®, and the roof should be considered as being unsealed.

General

Kingspan **nilvent**® meets all of the recommendations and requirements for underlays detailed in BS 5534: 2014 + A1: 2015 (Slating and tiling for pitched roofs and vertical cladding. Code of practice) and NFRC Technical Bulletin 6.

Design Considerations

Waterproofing

If installed as per the instructions given in this document, *Kingspan* **nilvent**® will give a watertight structure under normal weather conditions. *Kingspan* **nilvent**® can be safely used, even in constructions with a large number of nail penetrations through the membrane, e.g. where natural slates are nailed directly into a sarking board.

Ventilation and Condensation Risk

Most buildings contain air that is more humid than the air outside of that building. This humidity differential drives the moisture from the inside to the outside of a building's structure. When the moisture is confronted with a relatively cold and impermeable layer it may condense. In pitched roofs, sarking felt can be such a layer.

The traditional way of avoiding the risk of condensation in roofs, is to ventilate the moisture away, by introducing airflow directly above the insulation layer and below the sarking felt. Modern remedies for roofs include the use of breathable sarking membranes to replace sarking felt.

Breathable sarking membranes negate the need for ventilation directly above the insulation layer. They do this because they have a low vapour resistance, which allows water vapour to escape through the breathable membrane to the outside of the building. Studies have shown that ventilation directly above an insulation layer can reduce its thermal efficiency.

BS 5250: 2011 + A1: 2016 (Code of practice for control of condensation in buildings) defines a breathable membrane as a membrane with a vapour resistance that must not exceed 0.60 MN·s/g. It further sub–defines breathable membranes into two types: HR breathable membranes have a vapour resistance > 0.25 MN·s/g; and LR breathable membranes have a vapour resistance that must not exceed 0.25 MN·s/g. *Kingspan* **nilvent**® is an LR underlay, as defined by BS 5250: 2011 + A1: 2016, and has a vapour resistance of 0.10 MN·s/g.

There must be adequate provision, for vapour to disperse to atmosphere, outside of *Kingspan* **nilvent**®.

For horizontal installation on a continuous substrate and for vertical installation, Kingspan Insulation recommends the use of minimum 25 mm thick counter–battens over the breathable sarking membrane, to create an airspace, between the breathable membrane and the tile / slate battens, large enough to encourage air movement. They also allow the dust and debris from tiling and slating to slide down the slope and emerge at the eaves. The use of counter–battens also makes it easier to achieve interconnecting airspaces at interruptions to the main roof area – such as roof windows, chimneys, dormers, hips, and valleys.

For horizontal installation on a discontinuous substrate, counter–battens are not necessary to provide air movement. As long as *Kingspan* **nilvent**® is draped such that there is a minimum 10 mm gap between the membrane and the tile / slate batten, the void so created will be sufficient.

With some roof coverings (e.g. pantiles, natural slates and cambered plain tiles), irregularities in their surfaces should allow sufficient natural ventilation to remove moisture from the space above the breathable membrane. With other roof coverings (e.g. sheet metal, interlocking tiles and artificial slates), provision of vents to encourage ventilation may be necessary.

Natural slates nailed through *Kingspan* **nilvent**® into a sarking board, without counter–battens or slate battens, provide for enough air movement to disperse vapour because of the gaps created by their irregularity. Artificial slates may not be suitable for direct fixing to a sarking board, because the regularity of their shape may not provide for enough air movement to disperse vapour. It may be necessary to put counter–battens and slate battens in place under artificial slates, to provide an airspace for ventilation.

Ventilation beneath the underlay is not required, and should be avoided.

Airtightness & Sealed vs. Unsealed Constructions

As we drive for buildings with lower and lower U–values, in order to save on wasteful heat losses, the component of heat lost from a building directly through its fabric becomes less, as a proportion of total heat lost. The proportion lost by accidental air–leakage becomes more significant. This air–leakage is not the same as deliberate ventilation. This accidental air–leakage into a roof can be lessened by sealing the roof construction to make it as airtight as possible.

Research has proven that a sealed roof approach yields a more energy efficient roof, as the impacts of incidental infiltrating cold air are negated. Therefore, if creating an unventilated roof, it is preferable to fully seal all joints in the breathable sarking membrane with tape. 75 mm wide acrylic double sided adhesive tape should be used for sealing joints in *Kingspan* **nilvent**®.

However, there is limited point in carefully sealing a roof structure if the specified breathable membrane is not airtight. *Kingspan* **nilvent**® is airtight at normal building pressures.

The ideal is to install *Kingspan* **nilvent**® in a manner that is practical, and maximises the ability to achieve an airtight construction.

The use of horizontal runs of *Kingspan* **nilvent**® is by far the most practical method of installation, however, it is difficult to achieve airtightness unless the *Kingspan* **nilvent**® is to be laid onto a continuous surface (see Figures 1a–1e). The taping of breathable membrane joints is considerably easier to achieve if this is the case.

The use of vertical runs of *Kingspan* **nilvent**® is not as practical a method of installation as horizontal runs, however, it is easy to achieve airtightness as the laps between runs are sealed by the counter–battens that are installed over them (see Figure 2).

If the sealing of the roof is deemed to be unimportant, horizontal installation without sealing joints with tape will always be the most practical solution, regardless of whether it is laid onto a continuous or discontinuous surface (see Figures 1a–1e and 3a–3c). However, it must be stressed that these roof configurations are not recommended, on thermal efficiency grounds.

Wind Induced Membrane Movement
Wind blowing over a pitched roof generates positive and negative air pressures. These air pressures can cause underlays to move up and down. This effect is increased if the underlay is draped rather than installed taut. A roof underlay is required to reduce the wind loading on the tiles / slates, in order to stop them from becoming detached from the roof.

Tile / Slate Damage
Under extreme conditions, if the membrane stretches as it moves up and down, it can knock against the tiles / slates and cause damage. The upward deflection of the underlay, under maximum negative pressure, must be small enough to avoid contact with the underside of the tiles / slates.

Kingspan **nilvent**® has mechanical properties sufficient to prevent this effect, given the wind uplift forces prevalent in the UK and Ireland.

Wind Noise
Under extreme conditions, underlays can produce a noise, irritating to occupants, as they move up and down. *Kingspan* **nilvent**® is quiet under wind loading.

Mansard Roofs / Walls
Kingspan **nilvent**® can be used for the construction of insulated tiled or slated mansard roofs / walls. Its installation procedures are identical to those for pitched roofs.

Timber Frame Walls

Installation
Kingspan **nilvent**® may be installed in horizontal or vertical runs. In both cases, upper layers must overlap lower layers, so water is shed away from the ply, OSB, or insulation sheathing.

The membrane is fixed taut, and joints between runs of membrane are sealed with tape, if required.

Waterproofing
Kingspan **nilvent**® resists windblown rain and snow, and will protect the sheathing and timber frame from external moisture penetration. The product can be used as a temporary weather protection during construction, prior to the completion of external brickwork or cladding. This time period must be limited to two months, as *Kingspan* **nilvent**® is not resistant to long term UV exposure.

Ventilation and Condensation Risk
Condensation can be controlled, in timber frame walls, by ensuring there is a layer of high vapour resistance on the warm side of the insulation. The vapour resistance of the wall lining can be increased by the use of: a vapour check plasterboard*, the use of *Kingspan* **Kool**therm® K118 Insulated Plasterboard, which contains an integral vapour control layer*, a layer of polythene sheeting*, or by the application of two coats of Gyproc Drywall Sealer, if required.

** With appropriate detailing at joints, penetrations and wall perimeters.*

A breathable membrane with low vapour resistance, e.g. *Kingspan* **nilvent**®, allows any moisture that does penetrate the construction to escape to the outside of the building.

A condensation risk analysis should be carried out following the procedures set out in BS 5250: 2011 + A1: 2016 (Code of practice for the control of condensation in buildings). The Kingspan Insulation Technical Service Department (see rear cover) can provide this service.

Fire Stops

Current Building Regulations / Standards should be considered with regard to the requirements for, and provision of, fire stops.

Lightning Protection

Building designers should give consideration to the requirements of BS / I.S. EN 62305: 2011 (Protection against lightning).

Sitework

Pitched Roofs

Horizontal Installation on a Continuous Substrate

- Start installation at the eaves.
- Fit an eaves strip, of a UV–resistant material, to overhang the eaves / fascia by 50–60 mm.
- Lap the *Kingspan* **nilvent**®, logo–up, over the eaves strip (if required), with the bottom edge of the *Kingspan* **nilvent**® in line with the top of the fascia.
- *Kingspan* **nilvent**® should be laid taut.
- Temporarily fix in place with clout nails, and cut to length with a sharp knife.
- The second run of *Kingspan* **nilvent**® should lap over the top of the first, by the distance shown in the table below.

Rafter pitch (degrees)	Minimum lap (mm)
12.5 – 14	150
15 – 34	100
≥ 35	75

- The printed tramlines on the top surface of *Kingspan* **nilvent**® indicate a distance of 150 mm.
- Use 75 mm wide acrylic double sided adhesive tape to seal horizontal laps between runs of *Kingspan* **nilvent**® (unless otherwise specified).
- Vertical laps between lengths of *Kingspan* **nilvent**® should be not less than 100 mm wide, and be positioned so as to coincide with a rafter position.
- These laps will be secured and sealed by the later fixing of the counter–battens.
- Avoid vertical laps over the same rafter position, in successive runs of *Kingspan* **nilvent**®.

NB In constructions with a sarking board under a slated roof with no counter–battens or slate battens, the vertical laps are taped with 75 mm wide acrylic double sided adhesive tape, and fixed in place with clout nails.

- Continue installation up the roof, in the same manner, to the ridge. Install counter–battens (min. 25 mm deep) and tile / slate battens, in the usual manner, as proves necessary to fully fix the *Kingspan* **nilvent**® in place, and to provide a support for moving up the roof.
- Lap over the ridge by not less than 150 mm each side (total overlap of 300 mm).
- Complete the installation of counter–battens and tile / slate battens over the whole area installed.

NB In constructions with a sarking board under a slated roof with no counter–battens or slate battens, Kingspan **nilvent**® *is laid over the whole roof using roof ladders or similar for access prior to slating.*

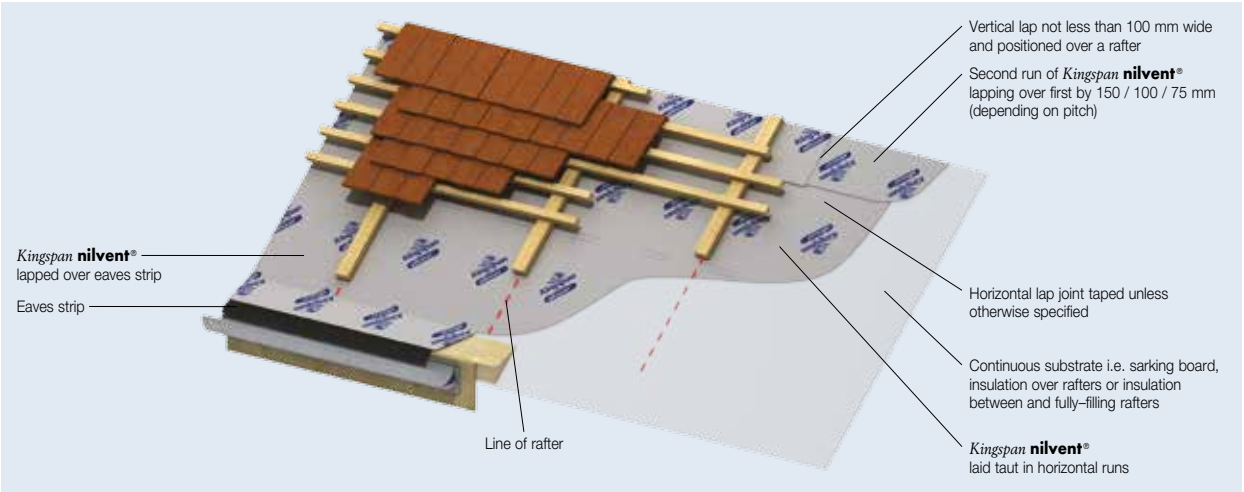


Figure 5c Eaves – Fully Supported Horizontal Installation

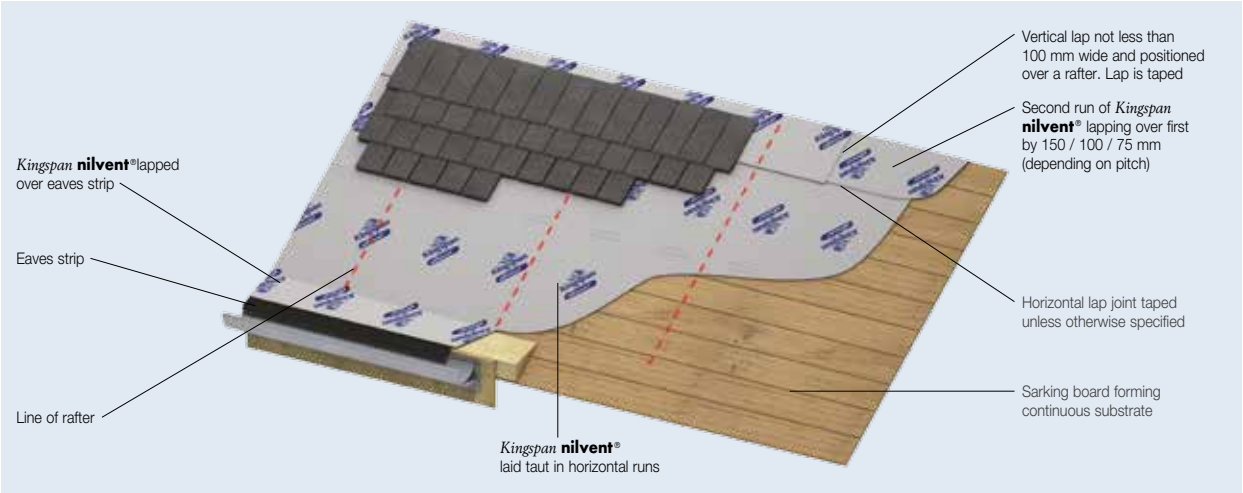


Figure 5d Eaves – Fully Supported Horizontal Installation with Natural Slates

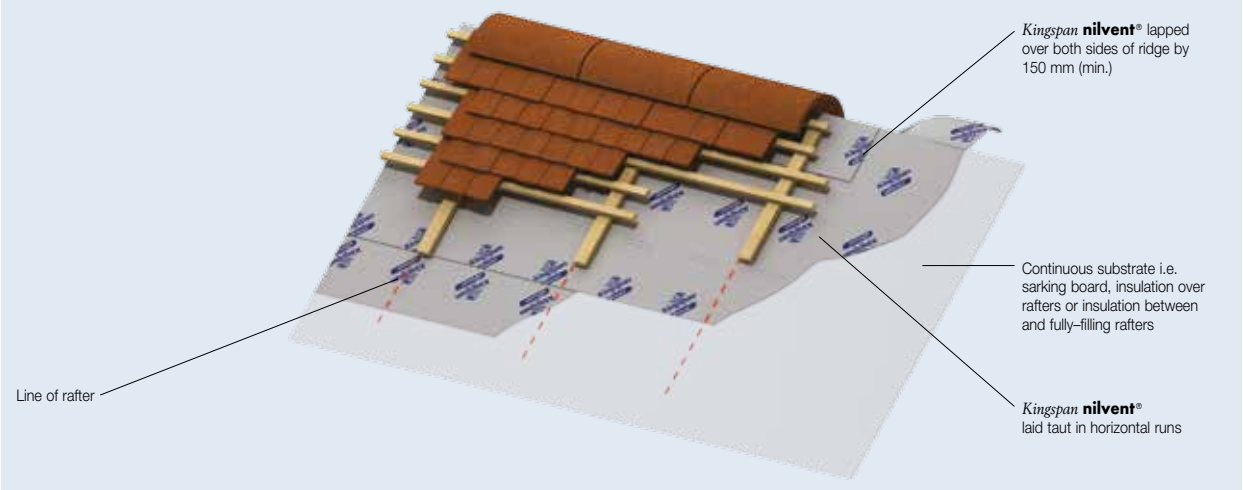


Figure 5e Ridge – Fully Supported Horizontal Installation

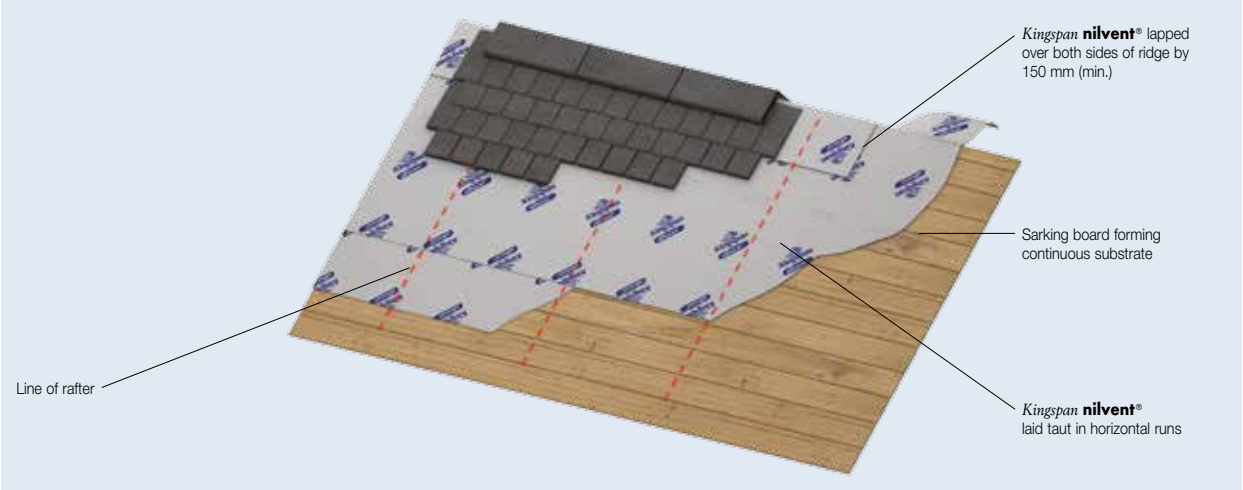


Figure 5f Ridge – Fully Supported Horizontal Installation with Natural Slates

Vertical Installation on a Discontinuous Substrate

- For ease of installation, thread a wood or metal bar through the core of the *Kingspan* **nilvent**® roll, and set it on bearers on the scaffold platform.
- The leading edge of the *Kingspan* **nilvent**® can then be taken up and over the ridge, and down to the opposite eaves.
- Fit an eaves strip, of a UV–resistant material, to overhang the eaves / fascia by 50–60 mm.
- Lap the *Kingspan* **nilvent**®, logo–up, over the eaves strip (if required), with the bottom edge of the *Kingspan* **nilvent**® in line with the top of the fascia. *Kingspan* **nilvent**® should be laid such that it is taut in both horizontal and vertical directions.
- Each run of *Kingspan* **nilvent**® should be installed in a single piece from eaves to eaves.
- Temporarily fix in place with clout nails, cut to length with a sharp knife, move sideways and repeat the process.
- The second run of *Kingspan* **nilvent**® should lap over the first by not less than 100 mm, and be positioned so that the lap coincides with a rafter position.
- The printed tramlines on the top surface of *Kingspan* **nilvent**® indicate a distance of 150 mm.
- These laps should be secured and sealed by the fixing of counter–battens (min. 25 mm deep), as work progresses across the roof. Counter–battens should be fixed through to the rafters below, with fixings at a maximum of 300 mm centres.
- Continue installation across the roof in the same manner, then install tile / slate battens over the whole area installed.

NB Kingspan **nilvent**® *can be laid in a vertical orientation with a drape. However, counter–battens will still be required to give an effective seal. If sealing of the roof is not required, and counter–battens are not specified, it will prove a lot easier to install Kingspan* **nilvent**® *horizontally with a drape (see page 11).*

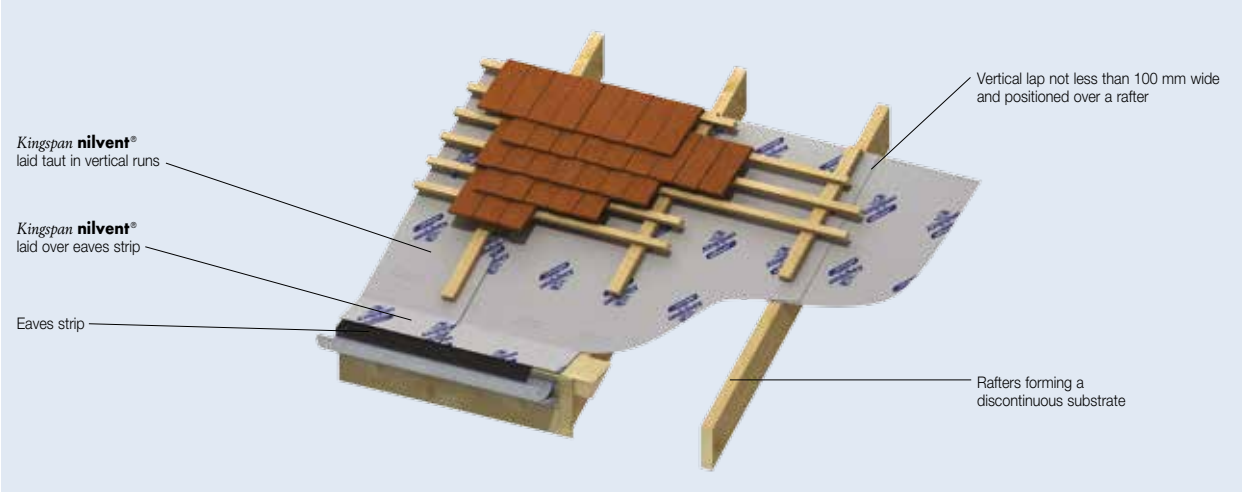


Figure 6a Eaves – Vertical Installation

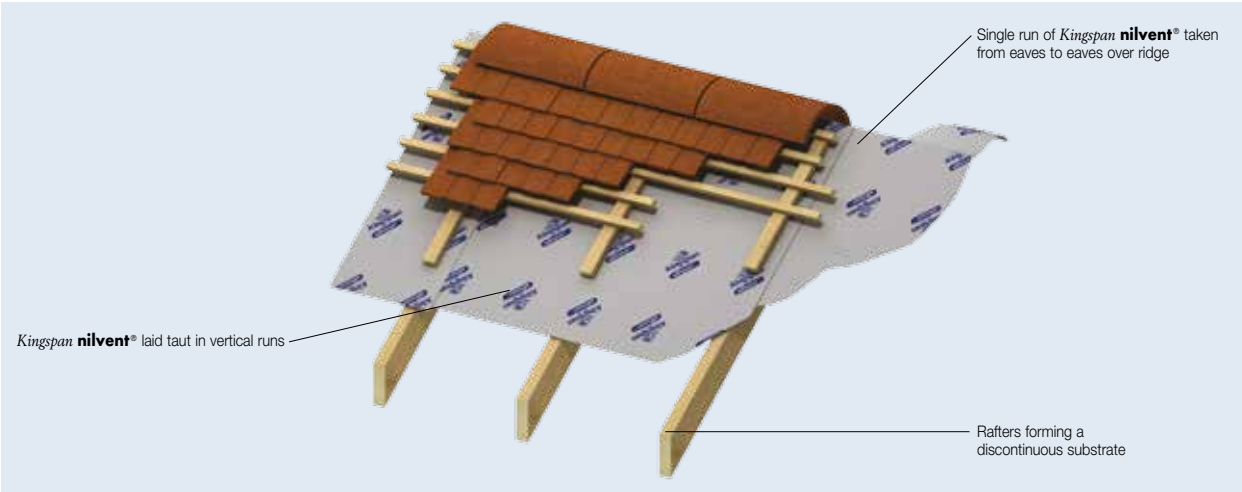


Figure 6b Ridge – Vertical Installation

Horizontal Installation on a Discontinuous Substrate

- Start installation at the eaves.
- Fit an eaves strip, of a UV–resistant material, to overhang the eaves / fascia by 50–60 mm.
- Lap the *Kingspan* **nilvent**®, logo–up, over the eaves strip (if required), with the bottom edge of the *Kingspan* **nilvent**® in line with the top of the fascia.
- *Kingspan* **nilvent**® and the eaves strip should be laid in such a manner as to create a valley between rafters (see Figure 3a) or counter–battens (see Figures 3b–3c), to allow water drainage.
- Temporarily fix in place with clout nails, and cut to length with a sharp knife.
- The second run of *Kingspan* **nilvent**® should lap over the top of the first, by the distance shown in the table below.

Rafter pitch (degrees)	Minimum lap (mm)
12.5 – 14	225
15 – 34	150
≥ 35	100

- The printed tramlines on the top surface of *Kingspan* **nilvent**® indicate a distance of 150 mm.
- It may not be practical to attempt to seal the laps between the runs of *Kingspan* **nilvent**®.
- Vertical laps between lengths of *Kingspan* **nilvent**® should be not less than 100 mm wide, and be positioned so as to coincide with a rafter.
- These laps will be secured and sealed by the later fixing of the tile / slate battens.
- Avoid vertical laps over the same rafter or counter–batten position, in successive runs of *Kingspan* **nilvent**®.
- Continue installation up the roof, in the same manner, to the ridge.
- Install tile / slate battens, in the usual manner, as proves necessary to fully fix the *Kingspan* **nilvent**® in place, and to provide a support for moving up the roof.
- Lap over the ridge by not less than 150 mm each side (total over lap of 300 mm).
- Complete the installation of tile / slate battens over the whole area installed.

NB Kingspan **nilvent**® *can be laid taut without draping on a discontinuous substrate. In which case, install as in the method (shown on page 8) for horizontal installation on a continuous substrate. Effective taping of joints will prove extremely difficult.*

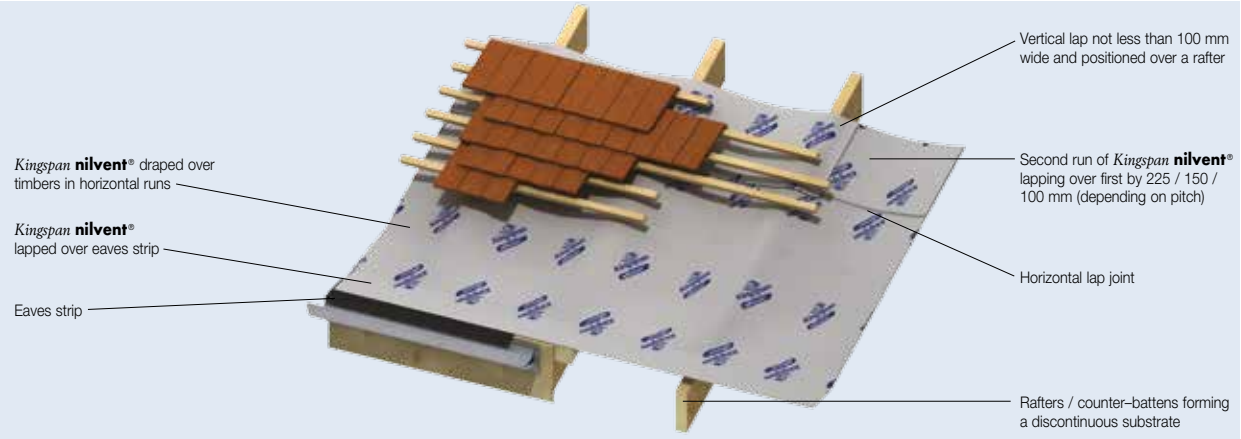


Figure 7a Eaves – Draped Horizontal Installation

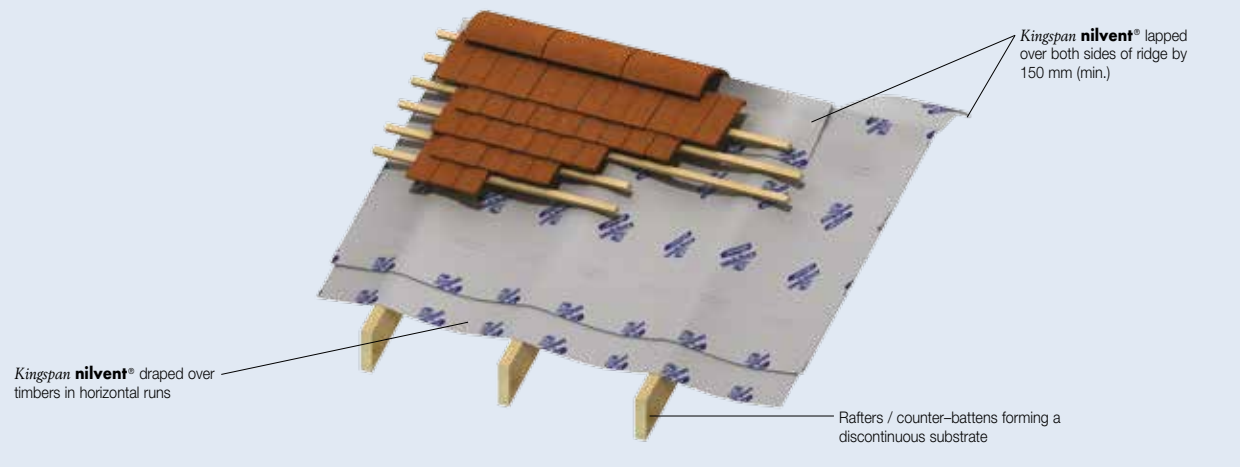


Figure 7b Ridge – Draped Horizontal Installation

Abutments

- At any abutment, chimney stack or similar roof penetration, apply 1.5 mm butyl rubber tape (e.g. glazing tape) to the abutment.
- Turn up the *Kingspan* **nilvent**® at least 50 mm under the flashing, and secure it with a counter–batten / tiling batten, pressed firmly against the abutment, and fixed to the end rafter or trimmer.
- In constructions with a sarking board under a slated roof with no counter–battens or slate battens, the above method is followed without the batten to secure the membrane.

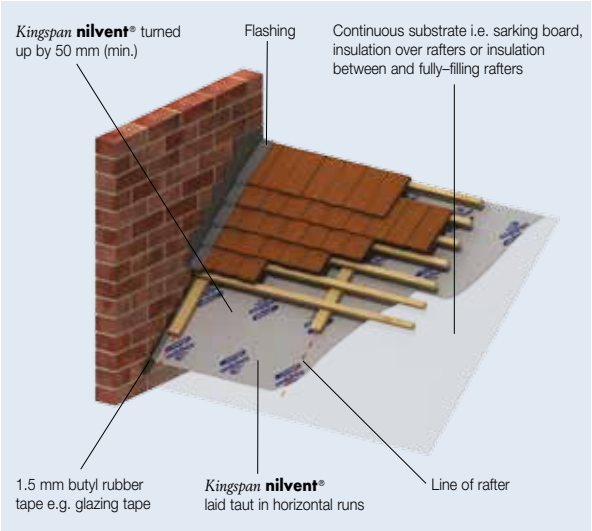


Figure 8a Abutments – Fully Supported Horizontal Installation

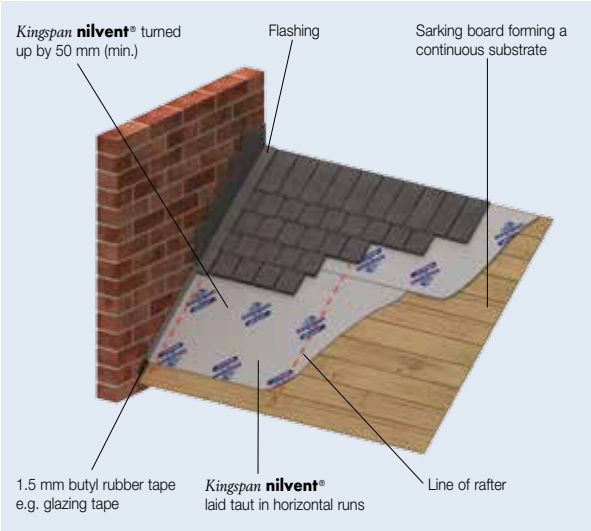


Figure 8b Abutments – Fully Supported Horizontal Installation with Natural Slates

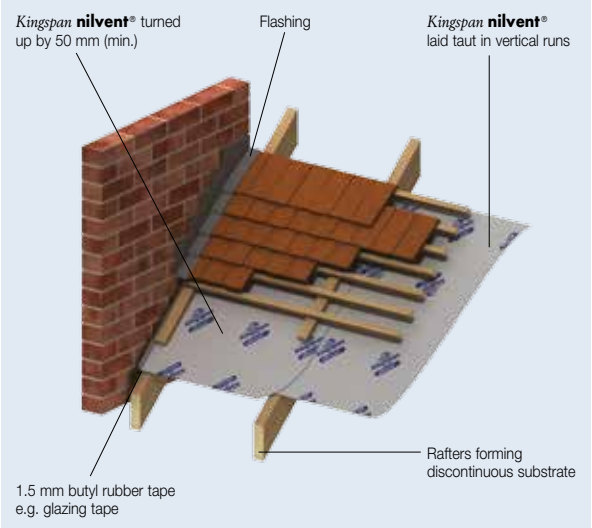


Figure 8c Abutments – Vertical Installation

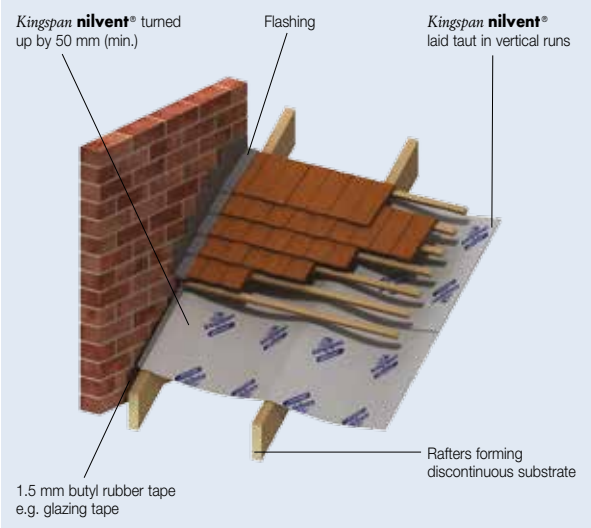


Figure 8d Abutments – Draped Horizontal Installation

Verges

- Extend the *Kingspan* **nilvent**® across the gable wall and overhang.
- Turn it up at least 50 mm behind the fascia board, before fixing with a batten to the flying rafter.
- Where no counter–battens are used, extend the *Kingspan* **nilvent**® across the gable wall and overhang, and extend it to fully cover the undercloak.

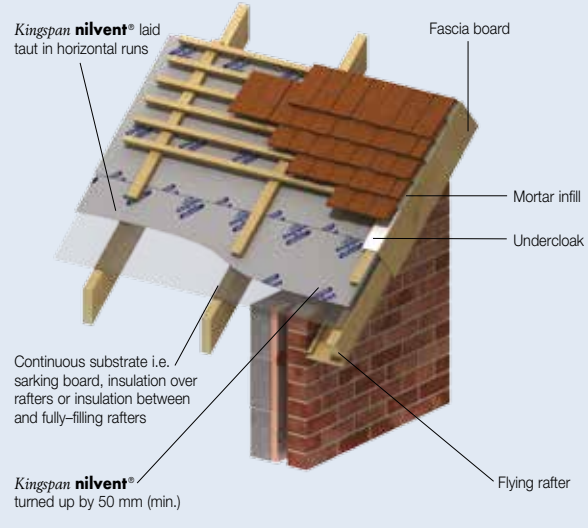


Figure 9a Verges – Fully Supported Horizontal Installation

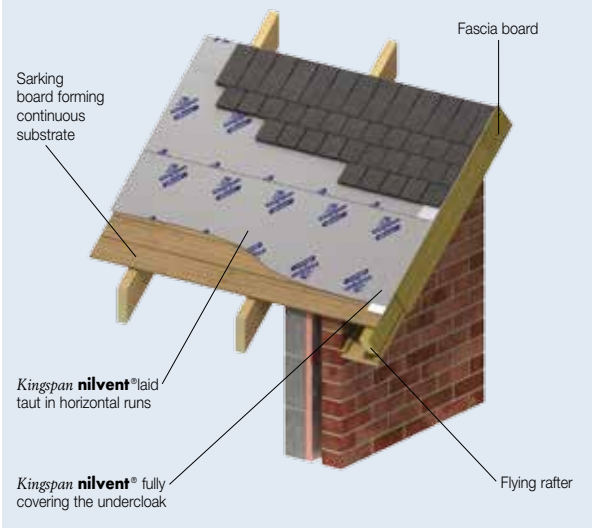


Figure 9b Verges – Fully Supported Horizontal Installation with Natural Slates

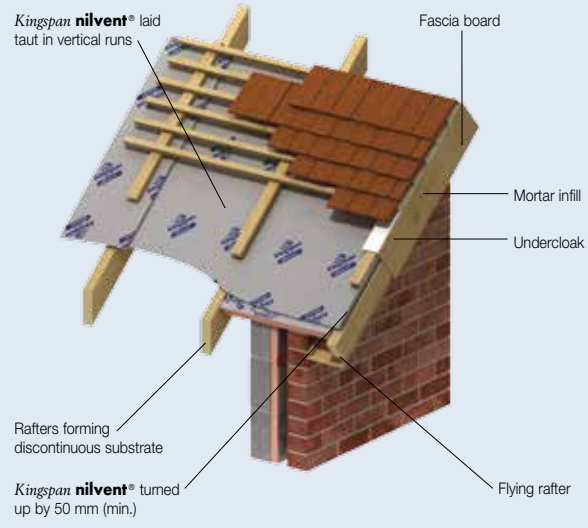


Figure 9c Verges – Vertical Installation

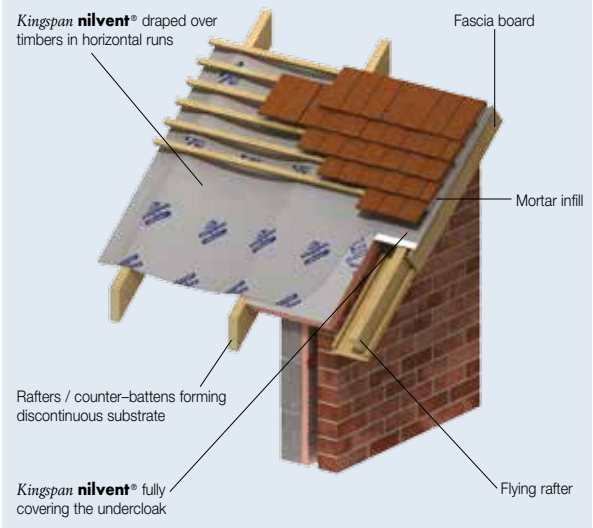


Figure 9d Verges – Draped Horizontal Installation

Hips

- Fit the *Kingspan* **nilvent**® to the hipped end of the roof before covering the main roof area.
- Pull the *Kingspan* **nilvent**® over the hip rafter and trim off the surplus, leaving an overlap of at least 150 mm. Secure in the same manner as for the main roof area.
- Once the hipped end is covered, move round and lay *Kingspan* **nilvent**® on the main roof area.
- Fold over hip rafters, and trim off surplus material.

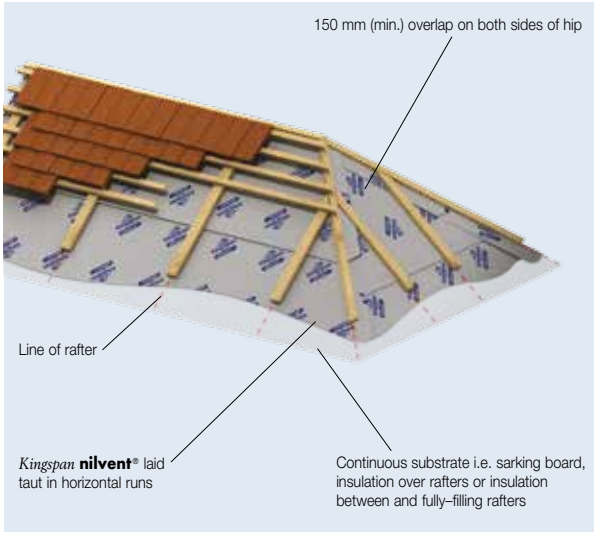


Figure 10a Hips – Fully Supported Horizontal Installation

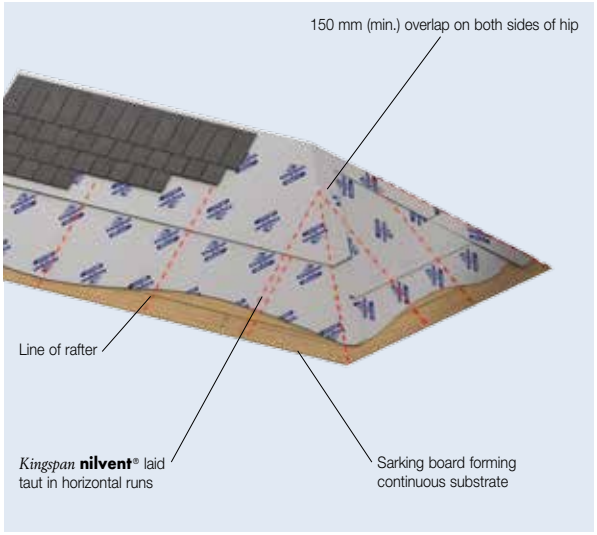
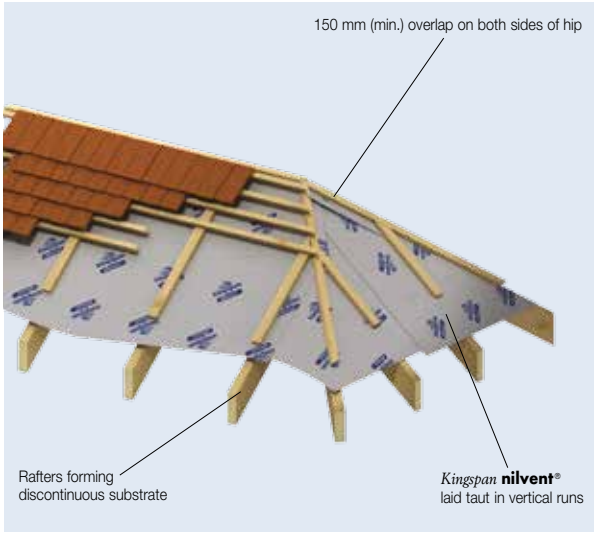


Figure 10b Hips – Fully Supported Horizontal Installation with Natural Slates



10c Hips – Vertical Installation

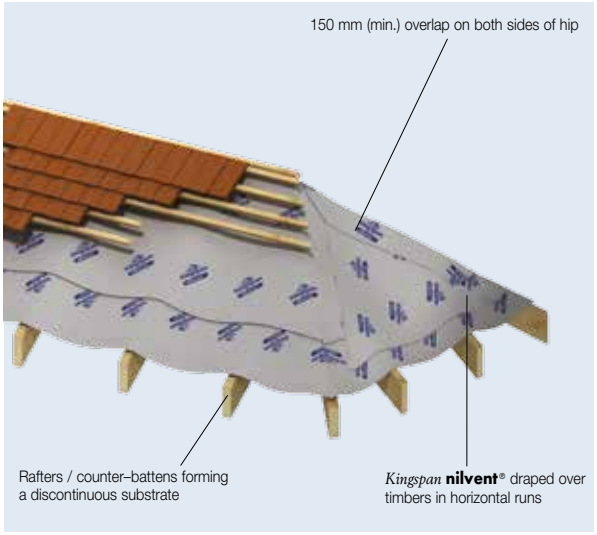


Figure 10d Hips – Draped Horizontal Installation

Valleys

- Lay the *Kingspan* **nilvent**® along the main roof area until you reach the valley.
- Fold the *Kingspan* **nilvent**® into the valley. Trim off surplus leaving not less than 300 mm of material beyond the centre line of the valley.
- Laid in this way there is no need to apply a separate strip of *Kingspan* **nilvent**® in the valley.
- Cut counter–battens (if required) short of the valley, to encourage air movement and allow run–off of any water penetrating the tiles / slates.
- *Kingspan* **nilvent**® forms an excellent underlay beneath zinc, lead or GRP valley gutter liners.

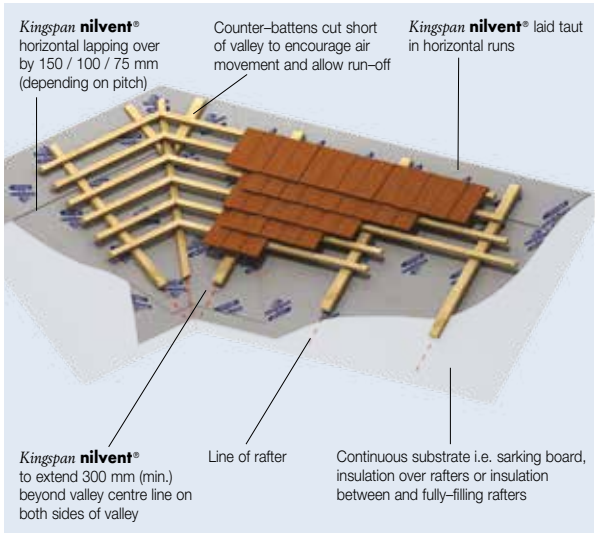


Figure 11a Valleys – Fully Supported Horizontal Installation

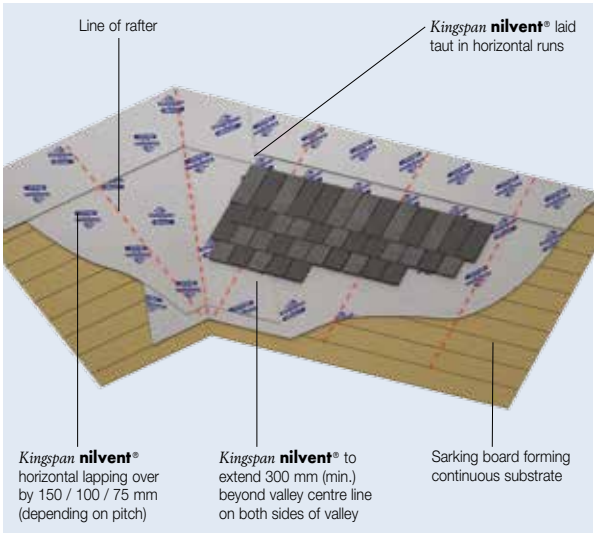


Figure 11b Valleys – Fully Supported Horizontal Installation with Natural Slates

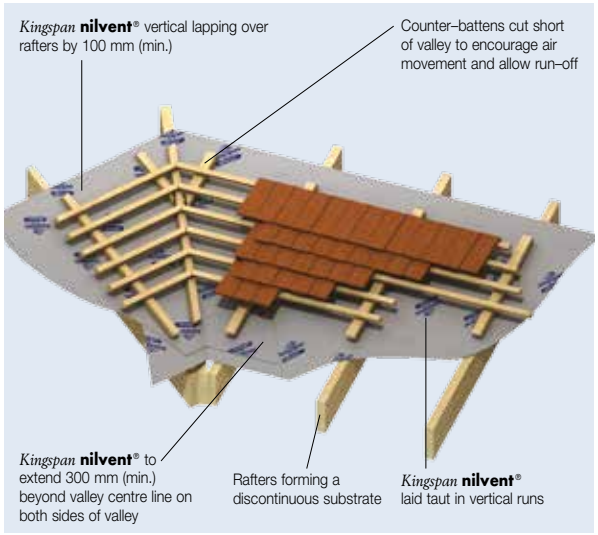


Figure 11c Valleys – Vertical Installation

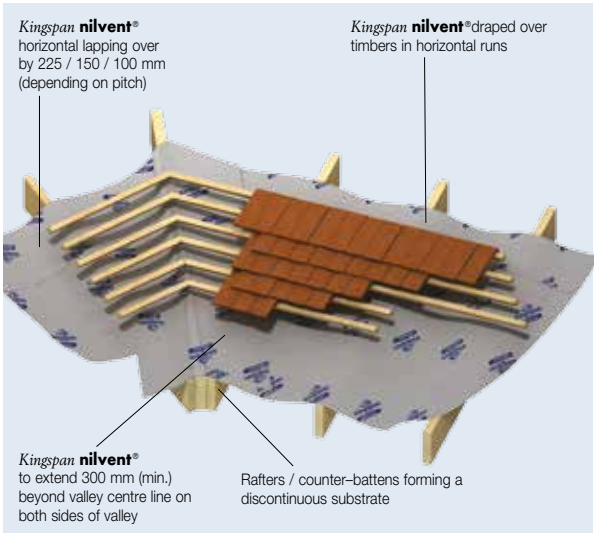


Figure 11d Valleys – Draped Horizontal Installation

Sitework

Rooflights

- Please refer to the instructions provided by the rooflight manufacturer. In the absence of manufacturer's information, cut and fit *Kingspan* **nilvent**® neatly around the rooflight kerb, with an upstand of 50 mm.
- Seal the underlay to the kerb all round, using 1.5 mm butyl rubber tape (e.g. glazing tape).

Slating and Tiling

- Slating and tiling over *Kingspan* **nilvent**® is exactly the same as on any other pitched roof except that, in some instances, the slate / tile battens (if required) are fixed to the previously applied counter–battens.
- It is, however, essential that slate or tiling rubble does not lie in contact with *Kingspan* **nilvent**® as this may facilitate water penetration.

Timber Frame Walls

Fixing

- *Kingspan* **nilvent**® can be fixed to a timber frame wall either horizontally or vertically.
- In both cases, it must be fixed so that upper layers overlap the lower layers by a minimum of 100 mm, so that water is shed away from the sheathing.
- *Kingspan* **nilvent**® must be secured at regular intervals using either nails or staples to prevent damage by wind.
- Nails should comprise galvanized mild steel, austenitic stainless steel, phosphor bronze, or silicon bronze. Staples should comprise austenitic stainless steel.
- The positions of studs should be marked on the face of the *Kingspan* **nilvent**®, usually with tape, to enable fixing of wall ties or battens.
- It is essential that the lowest timbers in the wall are protected by the breather membrane.

Lapping and Jointing

- Horizontal laps should be a minimum of 75 mm.
- For horizontal installation, vertical laps should be a minimum of 150 mm, with laps in adjacent strips of product staggered.
- For vertical installation, the vertical laps should be 150 mm minimum, if the laps are sealed with an acrylic double–sided adhesive tape or vertical battens applied to the outside of the membrane, or 400 mm min., if the laps are unsealed.

General

Pipe Penetrations

- For all pipe penetrations, *Kingspan* **nilvent**® is star cut and dressed up the side of the penetrations. Use tape to seal the *Kingspan* **nilvent**® around the pipe.

Damage Repair

- Whilst *Kingspan* **nilvent**® is strong and durable in normal use, it may be damaged by careless handling.
- The risk of damage may be increased if *Kingspan* **nilvent**® is left uncovered on the roof for longer than is necessary.
- Any repairs are normally carried out with self–adhesive tape before installation of the outer leaf / roof covering.

Temporary Waterproof Covering

- It is often necessary for *Kingspan* **nilvent**® to act as a temporary, waterproof, wall or roof covering.
- *Kingspan* **nilvent**® is UV–resistant and can be safely exposed on site for a period not exceeding 2 months.

Cutting

- Cutting should be carried out using a sharp knife.

Availability

- *Kingspan* **nilvent**® is available through specialist insulation distributors and selected builders' and roofing merchants throughout the UK and Ireland.

Packaging and Storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Ideally, rolls should be stored inside a building. If, however, outdoor storage cannot be avoided, the rolls should be stored on their sides, on a clean dry surface, and protected from sunlight.

Health and Safety

- *Kingspan* **nilvent**® is chemically inert and safe to use.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website www.kingspaninsulation.co.uk/safety or www.kingspaninsulation.ie/safety.

Please note that the white upper surface on this product is designed to enhance its performance. This surface will reflect light, including ultraviolet light. Therefore, if this membrane is being installed during very bright or sunny weather, it is advisable to wear UV protective sunglasses or goggles, and if the skin is exposed for a significant period of time, to protect the bare skin with a UV block sun cream.

Warning – do not stand on or otherwise support your weight on this product unless it is fully supported by a load–bearing surface.

Product Details

Composition

Kingspan **nilvent**® comprises a laminated, 3–layer polyolefin construction. The top layer provides protection from UV and mechanical damage. The middle layer is the functional layer. The bottom layer provides abrasion resistance. *Kingspan* **nilvent**® has a light grey upper surface, printed with the *Kingspan* **nilvent**® logo, and a dark grey lower surface.

Standards and Approvals

Kingspan **nilvent**® is manufactured to the highest standards under a management system certified to ISO 9001: 2008 (Quality management systems. Requirements) and ISO 14001: 2004 (Environmental management systems. Requirements with guidance for use).

Its use is covered by BBA Certificate 11/4870.

Standard Dimensions

Kingspan **nilvent**® is available in the following dimensions:

Nominal Dimension	Availability
Roll Length (m)	50
Roll Width (m)	1.5
Thickness (mm)	0.40
Area per Roll (m^2)	75
Weight (kg/m^2)	0.13
Weight per Roll (kg)	9.8

Water Vapour Resistance

Kingspan **nilvent**® is an LR underlay, as defined by BS 5250: 2011 + A1: 2016 (Code of practice for control of condensation in buildings). It achieves a resistance of 0.10 MN·s/g and a water vapour transmission S_d of 0.02 m when tested in accordance with BS EN 13859-1: 2014 (Flexible sheets for waterproofing. Definitions and characteristics of underlays. Underlays for discontinuous roofing).

Liquid Water Penetration Resistance

Kingspan **nilvent**® is classified as W1, when tested, unaged, in accordance with BS EN 1928: 2000 – Method A (Flexible sheets for waterproofing. Bitumen, plastic and rubber sheets for waterproofing. Determination of watertightness). W1 is the best possible classification.

Kingspan **nilvent**® is non–tenting, and can be fully or partially supported.

Air Permeability

Kingspan **nilvent**® is airtight, when tested at normal building pressures, i.e. 50 Pa pressure difference.

Tensile Strength

Kingspan **nilvent**® achieves an unaged tensile strength of 270 N / 50 mm in the longitudinal direction, and 225 N / 50 mm in the transverse direction, when tested in accordance with BS EN 12311–1: 2000 (Flexible sheets for waterproofing. Determination of tensile properties. Bitumen sheets for roof waterproofing).

Nail Tear Strength

Kingspan **nilvent**® achieves a nail tear strength of 120 N in the longitudinal direction, and 140 N in the transverse direction, when tested in accordance with BS EN 12310–1: 2000 (Flexible sheets for waterproofing. Determination of resistance to tearing (nail shanks). Bitumen sheets for roof waterproofing).

UV / Heat Ageing

Kingspan **nilvent**® maintains its W1 classification for liquid water penetration, and its tensile strength is only reduced to 220 N / 50 mm in the longitudinal direction, and 160 N / 50 mm in the transverse direction, when aged in accordance with BS EN 1297: 2004 (Flexible sheets for waterproofing. Bitumen, plastic and rubber sheets for roofing. Method for artificial ageing by long term exposure to the combination of UV radiation, elevated temperature and water) and BS EN 1296: 2001 (Flexible sheets for waterproofing. Bitumen, plastic and rubber sheets for roofing. Method of artificial aging by long term exposure to elevated temperature).

This means that *Kingspan* **nilvent**® maintains adequate functional performance after continuous exposure to UV–light at 50°C for 336 hours, and then continuous exposure to a temperature of 70°C for 90 days.

Kingspan **nilvent**® can be left exposed on a roof or wall for a period of up to 2 months, after which time is must be fully protected from UV–light.

Wind Noise Sensitivity

Kingspan **nilvent**® is quiet when exposed to the wind uplift forces prevalent in the UK and Ireland.

Resistance to Solvents & Fungi

Kingspan **nilvent**® resists attack by mould and fungus growth, and will not encourage insect attack.

Kingspan **nilvent**® is resistant to most organic and inorganic chemicals, including acids, alkalis and salts. Direct contact with wet solvents causes temporary expansion and a slight loss of physical properties. *Kingspan* **nilvent**® is not affected by the timber preservatives and treatments traditionally used in the UK and Ireland to protect timber from rotting, even when they are not fully dried out.

Limiting Temperatures

Kingspan **nilvent**® retains its strength and flexibility at temperatures down to –40ºC and up to +80ºC.

Contact Details

Customer Service

For quotations, order placement and details of despatches please contact the Kingspan Insulation Customer Service Department on the numbers below:

UK – Tel: +44 (0) 1544 388 601
– Fax: +44 (0) 1544 388 888
– email: customerservice@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 979 5000
– Fax: +353 (0) 42 975 4299
– email: info@kingspaninsulation.ie

Literature & Samples

Kingspan Insulation produces a comprehensive range of technical literature for specifiers, contractors, stockists and end users. The literature contains clear user friendly advice on typical design; design considerations; thermal properties; sitework and product data.

For copies please contact the Kingspan Insulation Marketing Department, or visit the Kingspan Insulation website, using the details below:

UK – Tel: +44 (0) 1544 387 384
– Fax: +44 (0) 1544 387 484
– email: literature@kingspaninsulation.co.uk
– www.kingspaninsulation.co.uk/literature

Ireland – Tel: +353 (0) 42 979 5000
– Fax: +353 (0) 42 975 4299
– email: info@kingspaninsulation.ie
– www.kingspaninsulation.ie/literature

Tapered Roofing

For technical guidance, quotations, order placement and details of despatches please contact the Kingspan Insulation Tapered Roofing Department on the numbers below:

UK – Tel: +44 (0) 1544 387 383
– Fax: +44 (0) 1544 387 483
– email: tapered@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 975 4297
– Fax: +353 (0) 42 975 4296
– email: tapered@kingspaninsulation.ie

Technical Advice / Design

Kingspan Insulation supports all of its products with a comprehensive Technical Advisory Service. Calculations can be carried out to provide U–values, condensation / dew point risk, required insulation thicknesses etc…

U–value calculations can also be carried out on the Kingspan Insulation U–value Calculator, available for free online at www.uvalue-calculator.co.uk or downloaded as an App.

The Kingspan Insulation Technical Service Department can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

The Kingspan Insulation British Technical Service Department operates under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U–value and Condensation Risk Calculations.

BBA CERTIFICATE CS/1004-4 U Value Competency Scheme

Please contact the Kingspan Insulation Technical Service Department on the numbers below:

UK – Tel: +44 (0) 1544 387 382
– Fax: +44 (0) 1544 387 482
– email: technical@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 975 4297
– Fax: +353 (0) 42 975 4296
– email: technical@kingspaninsulation.ie

General Enquiries

For all other enquiries contact Kingspan Insulation on the numbers below:

UK – Tel: +44 (0) 1544 388 601
– Fax: +44 (0) 1544 388 888
– email: info@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 979 5000
– Fax: +353 (0) 42 975 4299
– email: info@kingspaninsulation.ie

Kingspan Insulation Ltd. reserves the right to amend product specifications without prior notice. Product thicknesses shown in this document should not be taken as being available ex–stock and reference should be made to the current Kingspan Insulation price–list or advice sought from Kingspan Insulation's Customer Service Department (see above left). The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified for suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a Technical Advisory Service (see above), the advice of which should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of this literature is current by contacting the Kingspan Insulation Marketing Department (see left).

Kingspan®

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APPENDIX 4

Manthorpe Building Products

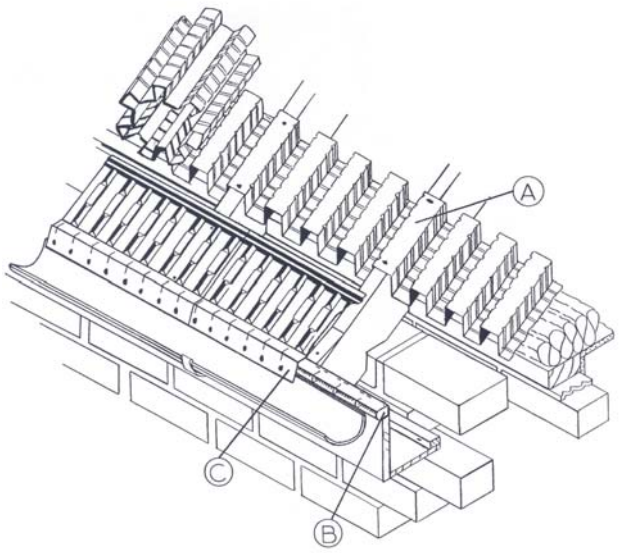
Product Information Sheet

Combination Roofing Pack

CODE **G1290**

For more detailed information on the individual products see the product information sheet numbers below: -

G500	Roll Panel Ventilator	MBP 8012
G1200N	Over Fascia Ventilator	MBP 8010
G1280	Felt Support Tray	MBP 8025



Description:

The G1290 Roof Ventilation Pack provides a quick and practical solution to roof ventilation requirements. It is suitable for either 400mm, 450mm, or 600mm rafter centres for new build or refurbishment where rafter centres are not consistent or unknown.

References:

BRE:	DIGEST 14/262/270
BSI:	BS5250
BSI:	BS5534
DOE:	Building Regs F2
NHBC:	Technical Bulletin 6/21
NHBC:	Good Practice Guide
NHBC:	Standards 7.2
P.S.A:	Defects in Buildings

Fitting Instructions:

The G500 Roll Panel Ventilator (A) should be rolled out over the full length of the eaves and pulled to adjust to the correct roof truss centres then nailed or stapled down to secure in position as shown.

The G1200N Over Fascia Ventilator (B) should be nailed to the top of the fascia board through the fixing holes provided along the full length of the eaves as shown.

The G1280 Felt Support Tray (C) should be used with timber fillets. The front “bobble” edge should be dressed down towards the gutter and either stapled or nailed into the position over the G1200N Over Fascia Vent. The first “bobble” of each tray should be used to locate the over lap of 25mm as each tray is 625mm long. Felt should be dressed over the G1280 Felt Support Tray as normal.

COLOURS	Black
PACKING DETAILS G1290 COMBINATION PACK CONTAINS	1X6 Meter G500 6X1 Meter G1200N 10X G1280
WEIGHT	3kg per box
FREE AIRFLOW	10,000mm²/M equivalent to a continuous gap of 10mm

MANTHORPE BUILDING PRODUCTS LTD
MANTHORPE HOUSE
BRITTAIN DRIVE
CODNOR GATE BUSINESS PARK
RIPLEY
DERBYSHIRE DE5 3ND

TEL: 01773 303 000
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WEB: www.manthorpebp.co.uk

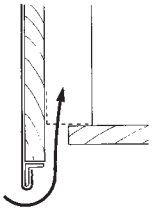
DRN M.A | Date 20.06.19

DRG No **MBP 8026**

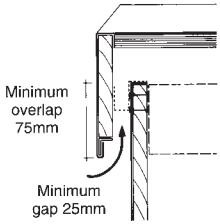
Issue **B**

VENTILATION DETAILS (DETAILED DRAWINGS AVAILABLE)

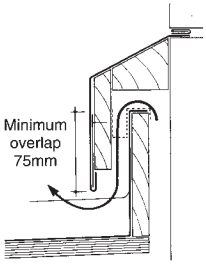
CONTINUOUS AT THE SOFFIT



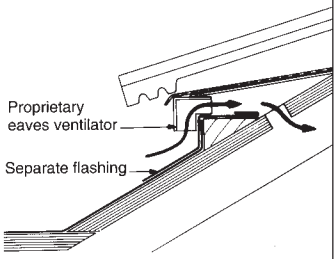
CONTINUOUS AT THE EAVES



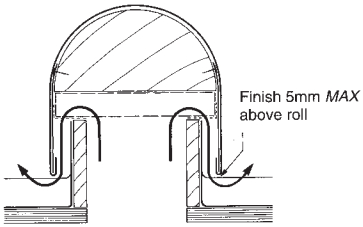
CONTINUOUS AT ABUTMENT



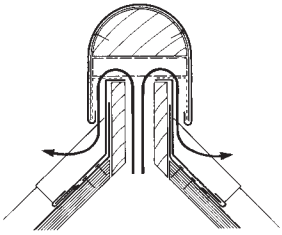
GUTTER SIDE



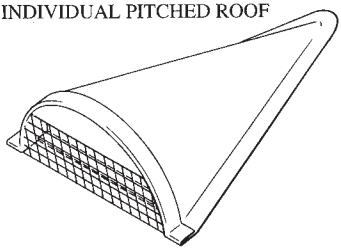
CONTINUOUS AT HIGHEST POINT



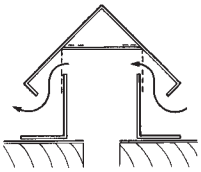
CONTINUOUS AT THE RIDGE



INDIVIDUAL PITCHED ROOF



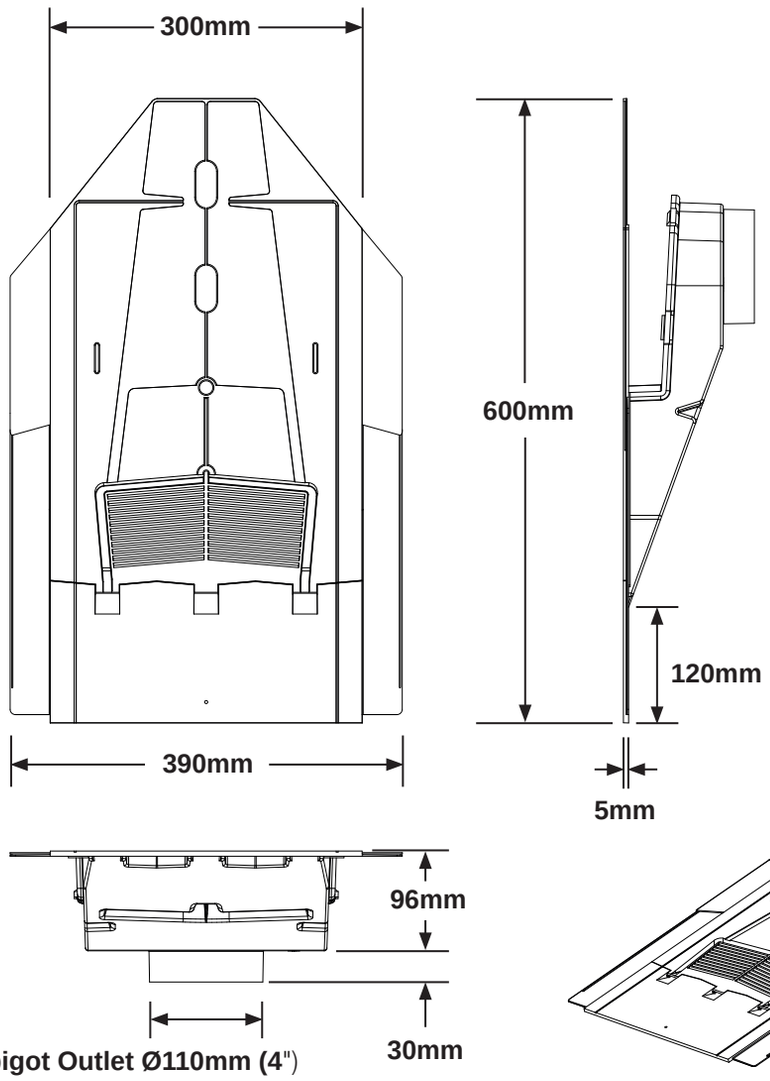
INDIVIDUAL FLAT ROOF



APPENDIX 5

manthorpe building products | Product Information Sheet

In-Line Slate Ventilator | CODE **GILSV30-25**



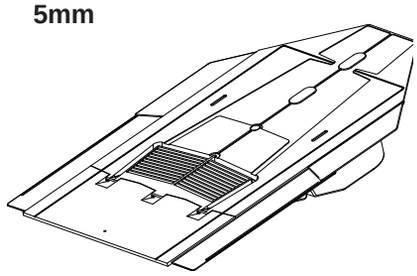
Spigot Outlet Ø110mm (4")

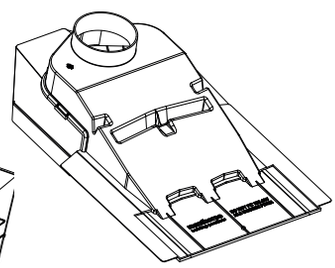
Description

The Manthorpe In-Line Slate Ventilator is designed to provide a quick and simple solution to the problems of roofspace ventilation and extraction through a roof covered with natural or man-made slates.

The vents flat profile with it's lightly textured finish helps to maintain an unbroken appearance to the roofline whether used at high or low level.

The tortured path through the 4mm louvred grill and internal weathering geometry is designed to maintain airflow whilst channelling any water ingress out of the vent and on to the roof covering.





Part Weight	0.883 kg
Box Qty	10
Material	Polypropylene
Colours	Black, Grey
Free Airflow	8,800 mm² per unit

References

BSI: BS 5250:2011 Control of Condensation in Building
BSI: BS 5534:2014 Code of Practice for Slating and Tiling
BRE: Tested to prEN 15601 (report no. BP137758)
Building Regulations 2010
NHBC: Good Craftsmanship Guides

Features

- In-line and discreet low profile design.
- Lightly textured surface finish
- 4mm louvred flyscreen grill.
- Protective edge laps improve weatherproofing
- Suits 600 x 300mm slates (500 x 250mm by trimming slates).
- No batten cutting required for larger format slates.
- Wind tunnel tested at the BRE (report BP137758)
- Integral 4" outlet feeds directly into roof space.
- Built-in pipe adaptor for mechanical extraction.
- Suitable for use down to a 22.5° roof pitch.

MANTHORPE BUILDING PRODUCTS LTD
MANTHORPE HOUSE
BRITTAIN DRIVE
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DRN B.H. | Date 20.06.19

The company maintains a policy of continuous development of its product range and reserves the right to amend the specification without notice.

DRG No **MBP 8312**

Issue **E**

APPENDIX 6

KNAUFINSULATION

www.knaufinsulation.co.uk

EARTHWOOL LOFT ROLL 40

March 2018

APPLICATIONS

DESCRIPTION

Loft Roll 40 provides premium perfomance with a thermal conductivity of 0.040 W/mK. Combi-cut products have partially cut perforations, providing the flexibility to be used between joists at either 400mm or 600mm centres, or used unsplit as a full-width roll.

PERFORMANCE

Thermal

Thermal conductivity:	0.040 W/mK

Fire

Classification:	EUROCLASS A1 to BS EN 13501-1

Vapour resistivity

Water vapour resistivity:	5.00MNs/g.m

BENEFITS

- ✔ Euroclass A1 non-combustible
- ✔ Superior thermal performance
- ✔ Lightweight quilt for ease of installation.
- ✔ Available as:
  Partially cut rolls for use with:
  - timber joists at 400mm centres or,
  - timber joists at 600mm centres or,
  - unsplit as a full width roll.

SPECIFICATIONS

Thickness (mm)	Thermal conductivity (W/mK)	Thermal resistance (m^2K/W)	Length (m)	Width (mm)	Area per pack (m^2)
200	0.040	5.00	4.85	1140 (2x570/3x380)	5.53
150	0.040	3.75	7.53	1140 (2x570/3x380)	8.58
100	0.040	2.50	11.25	1140 (2x570/3x380)	12.83

All dimensions are nominal

CERTIFICATION

challenge.
create.
care.

EARTHWOOL LOFT ROLL 40

March 2018

ADDITIONAL INFORMATION

Durability

Earthwool Loft Roll 40 is odourless, rot proof, non-hygroscopic, does not sustain vermin and will not encourage the growth of fungi, mould or bacteria.

Application

Earthwool Loft Roll 40 is primarily used for the thermal insulation of pitched roofs at ceiling level. When used at ceiling level it is usually laid in two layers, with the first layer between the joists and the second layer over, and at right angles to the joists.

Standards

Earthwool Loft Roll 40 is manufactured in accordance with BS EN 13162, EN 50001 Energy Management Systems, OHSAS 18001 Occupational Health and Safety Management Systems, ISO 14001 Environmental Management Systems, and ISO 9001 Quality Management Systems, as certified by Bureau Veritas.

Environmental

Earthwool Loft Roll 40 represents no known threat to the environment and has zero Ozone Depletion Potential and zero Global Warming Potential.

Vapour resistivity

Earthwool Loft Roll 40 offers negligible resistance to the passage of water vapour and has a water vapour resistivity of 5.00MNs/g.m.

Handling and storage

Earthwool Loft Roll 40 is easy to handle and install, being lightweight and easily cut to size, where necessary. It is supplied in polythene packs which are designed for short term protection only. For longer term protection on site, the product should be stored either indoors, or under cover and off the ground. Earthwool Loft Roll 40 should not be left permanently exposed to the elements.

with ECOSE® TECHNOLOGY

Knauf Insulation mineral wool products made with ECOSE Technology® benefit from a no added formaldehyde binder, which is up to 70% less energy intensive than traditional binders and is made from rapidly renewable bio-based materials instead of petroleum-based chemicals. The technology has been developed for Knauf Insulation's glass and rock mineral wool products, enhancing their environmental credentials without affecting the thermal, acoustic or fire performance. Insulation products made with ECOSE Technology® contain no dye or artificial colours.

Knauf Insulation Ltd

PO Box 10, Stafford Road, St.Helens,
Merseyside, WA10 3NS. UK

Customer Service: 0844 800 0135 Technical Support Team: 01744 766 666 Literature: 08700 668 660

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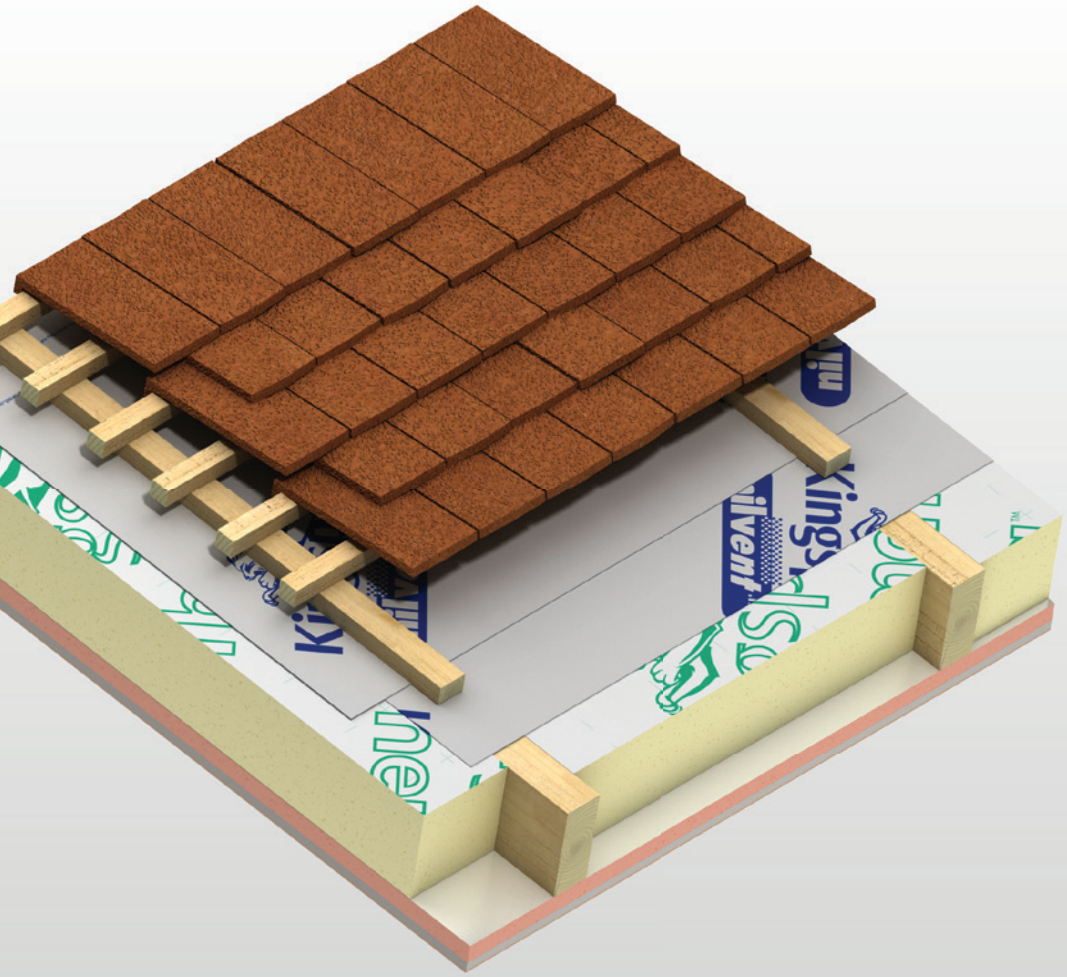
APPENDIX 7

CI/SfB (27.9) Rn7 M2
Seventh Issue September 2017

Thermapitch® TP10

INSULATION FOR TILED OR SLATED PITCHED WARM ROOF SPACES



- High performance rigid thermoset insulation – thermal conductivity 0.022 W/m·K
- Unaffected by air infiltration
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build and refurbishment
- Non–deleterious material
- Manufactured with a blowing agent that has zero ODP and low GWP
- Robust Details for Part E of the Building Regulations (England & Wales)

Fibre-free Core

Kingspan®

Low Energy – Low Carbon Buildings

Typical Constructions and U-values

Assumptions

CERTIFICATE CS/1004-4
U Value Competency Scheme

The U–values in the tables that follow have been calculated, under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U–value and Condensation Risk Calculations, using the method detailed in BS EN ISO 6946: 2017 / I.S. EN ISO 6946: 2007 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation methods), and using the conventions set out in BR 443 (Conventions for U–value calculations). They are valid for the constructions shown in the details immediately above each table.

NB Calculations assume that the insulation core of Kingspan **Kool**therm® K118 Insulated Plasterboard *has a thermal conductivity of 0.018 W/m·K.*

NB When calculating U–values to BS EN ISO 6946: 2017 / I.S. EN ISO 6946: 2007, the type of mechanical fixing used may change the thickness of insulation required. The effect of fixings for Kingspan **Kool**therm® K118 Insulated Plasterboard *in the U–value calculations for Figures 1a, 1b, 1c, 1d, 2a, 2b, 4a & 4c is insignificant as the insulation layer penetrated is not the main insulation layer. The U–value calculations for Figures 3a & 3b assume that over rafter layers of insulation are fixed using stainless steel fixings with a cross sectional area 7.90 mm², with 3.7 fasteners per m² (insulant thickness 0–40 mm), 6.2 per m² (insulant thickness 41–60 mm), 8.3 per m² (insulant thickness 61–80 mm) and 10.0 per m² (insulant thickness 81–100 mm). The U-value calculations for Figures 3a & 3b also assume that over rafter layers of insulation are fixed using stainless steel fixings with a cross sectional area 9.1 mm², with 11.1 fasteners per m² (insulant thickness 101–125 mm). Please contact the Kingspan Insulation Technical Service Department (see rear cover) for project calculations.*

NB For the purposes of these calculations the standard of workmanship has been assumed good, and therefore the correction factor for air gaps has been ignored.

NB The figures quoted are for guidance only. A detailed U–value calculation and a condensation risk analysis should be completed for each project.

NB If your construction is different from those specified, and / or to gain a comprehensive U–value calculation along with a condensation risk analysis of your project, please consult the Kingspan Insulation Technical Service Department for assistance (see rear cover).

Image Key

1. *In Figures 1a & 3a the breathable sarking membrane can be placed over the counter–battens, draped to provide for drainage and overlain with tile / slate battens. This will yield a marginally better U–value but it will be more difficult to seal the breathable sarking membrane effectively.*
2. *The requirement for a vapour control layer and / or under tile ventilation should be assessed to BS 5250: 2011 + A1: 2016. Vapour check plasterboard or a separate vapour control layer can be used as preferred (see 'Design Considerations – Vapour Control Layer').*
3. *Kingspan* **Kool**therm® K118 Insulated Plasterboard *contains an integral vapour control layer (see 'Design Considerations – Vapour Control Layer').*
4. *If tiles are to be used then this normally necessitates the use of counter–battens and tiling battens over the breathable sarking membrane to allow for water drainage and attachment of the tiles.*

U-value Table Key

Where an ✗ is shown, the U–value is higher than the worst of the maximum new build area weighted average U–values allowed by the:

- 2013 editions of Approved Documents L to the Building Regulations for England;
- 2014 editions of Approved Documents L to the Building Regulations for Wales;
- 2015 editions of Technical Handbooks Section 6 to the Building Standards for Scotland;
- 2012 editions of Technical Booklets F1 & F2 to the Building Regulations for Northern Ireland; and
- 2011 edition of Technical Guidance Document L (Dwellings) and 2008 edition of Technical Guidance Document L (Buildings other than Dwellings) to the Building Regulations for the Republic of Ireland.

Where an 💧 is shown, the combination of insulation products may result in an interstitial condensation risk and so the calculations have been excluded.

Unventilated – Insulation Between & Under Rafters at 600 mm Centres (Recommended for New Build or Re-roofing)

Fully Filled Insulation Between Rafters – No Sarking Board

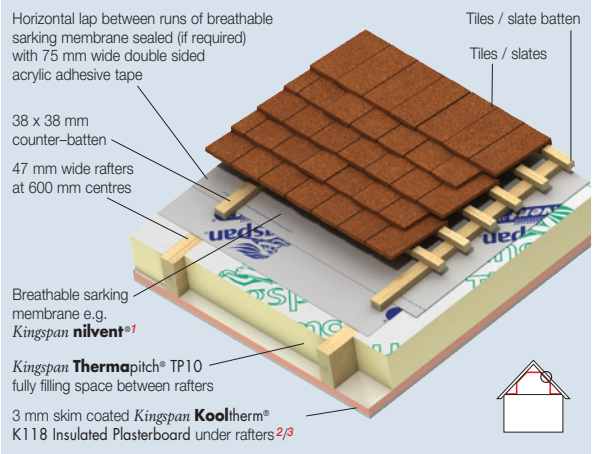


Figure 1a

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Rafters of Depth Shown Fully Filled with *Kingspan* **Therma**pitch® TP10			
Rafter Depth (mm)	Product Thickness of *Kingspan* **Kool**therm® K118 Insulated Plasterboard* (mm)		
	32.5	57.5	72.5
100	0.21	0.16	0.14
125	0.18	0.14	0.12
150	0.15	0.12	0.11

** Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Fully Filled Insulation Between Rafters – 18 mm Sarking Board

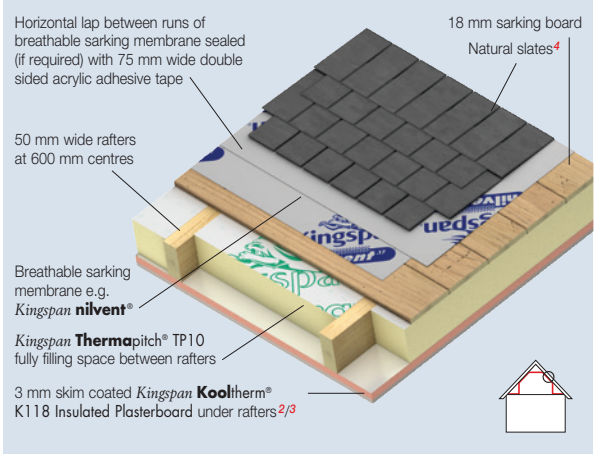


Figure 1b

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Rafters of Depth Shown Fully Filled with *Kingspan* **Therma**pitch® TP10			
Rafter Depth (mm)	Product Thickness of *Kingspan* **Kool**therm® K118 Insulated Plasterboard* (mm)		
	32.5	57.5	72.5
100	0.20	0.16	0.14
125	0.17	0.14	0.12
150	0.15	0.12	0.11

** Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Typical Constructions and U-values

Partially Filled Insulation Between Rafters – No Sarking Board

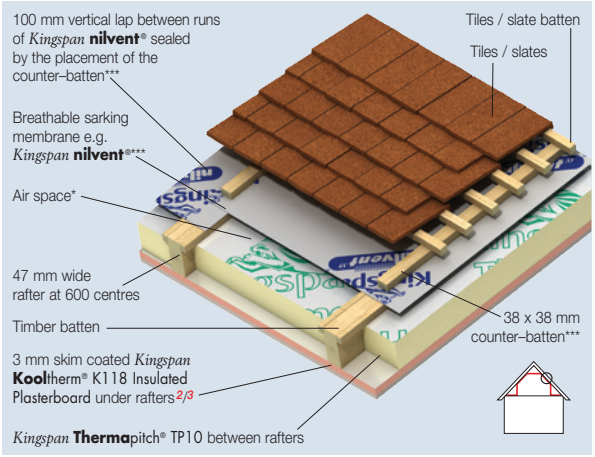


Figure 1c

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Rafters of Depth Shown Partially Filled with *Kingspan* **Therma**pitch® TP10

Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Product Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard** (mm)		
	32.5	57.5	72.5
100 mm Deep Rafters			
50	✗	💧	💧
55	✗	0.19	💧
60	0.26	0.19	💧
70	0.24	0.18	💧
75	0.23	0.17	0.15
125 mm Deep Rafters			
50	✗	💧	💧
55	✗	0.19	💧
60	✗	0.19	💧
70	0.24	0.17	💧
75	0.23	0.17	0.15
80	0.22	0.16	0.14
90	0.20	0.16	0.14
100	0.19	0.15	0.13
150 mm Deep Rafters			
50	✗	💧	💧
55	✗	0.19	💧
60	✗	0.18	💧
70	0.24	0.17	💧
75	0.23	0.17	0.15
80	0.22	0.16	0.14
90	0.20	0.16	0.14
100	0.19	0.15	0.13
110	0.18	0.14	0.13
120	0.17	0.13	0.12
125	0.16	0.13	0.12

* *A minimum 13 mm air space must be maintained above the insulation in order to claim the maximum thermal resistance in the cavity.*

** *Product thickness = insulant thickness + 12.5 mm plasterboard.*

*** *If sealing the roof is deemed to be unimportant, it is possible to lay the breathable membrane in horizontal runs, draped between rafters. This negates the requirement for counter battens. The U–values shown above remain valid.*

NB *Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.*

Partially Filled Insulation Between Rafters – 18 mm Sarking Board

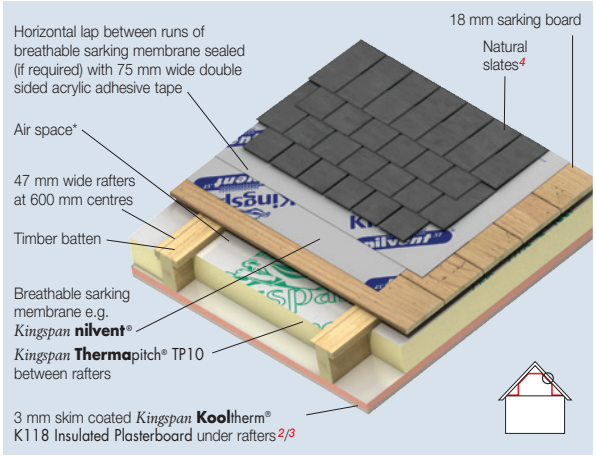


Figure 1d

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Rafters of Depth Shown Partially Filled with *Kingspan* **Therma**pitch® TP10

Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Product Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard** (mm)		
	32.5	57.5	72.5
100 mm Deep Rafters			
50	✗	💧	💧
55	✗	0.19	💧
60	0.25	0.18	💧
70	0.23	0.17	💧
75	0.22	0.17	0.15
80	0.21	0.16	0.14
90	0.20	0.16	0.14
125 mm Deep Rafters			
50	✗	💧	💧
55	✗	0.19	💧
60	0.25	0.18	💧
70	0.23	0.17	💧
75	0.22	0.17	0.15
80	0.21	0.16	0.14
90	0.20	0.15	0.14
100	0.19	0.15	0.13
110	0.18	0.14	0.13
150 mm Deep Rafters			
50	✗	💧	💧
55	✗	0.19	💧
60	0.25	0.18	💧
70	0.23	0.17	💧
75	0.22	0.17	0.15
80	0.21	0.16	0.14
85	0.20	0.16	0.14
90	0.20	0.15	0.14
100	0.19	0.15	0.13
110	0.18	0.14	0.12
120	0.17	0.13	0.12
125	0.16	0.13	0.12
130	0.16	0.13	0.12
140	0.15	0.12	0.11

* *A minimum 13 mm air space must be maintained above the insulation in order to claim the maximum thermal resistance in the cavity.*

** *Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB *Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.*

Ventilated – Insulation Between & Under Rafters at 400 mm Centres (Recommended for Loft Conversion where Re-roofing is not Intended)

No Sarking Board

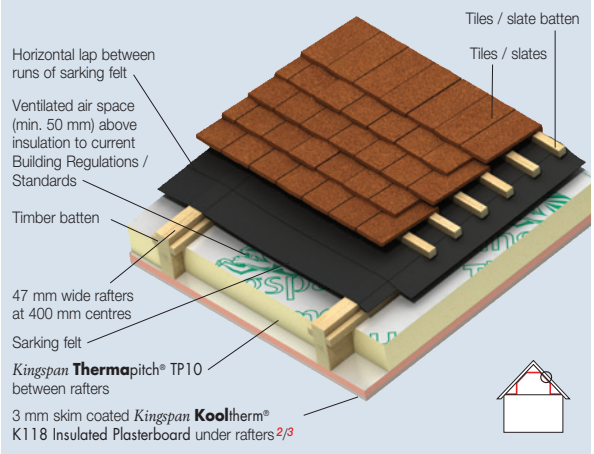


Figure 2a

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Rafters of Depth Shown Partially Filled with *Kingspan* **Therma**pitch® TP10

Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Product Thickness of *Kingspan* **Kool**therm® K118 Insulated Plasterboard* (mm)	
	57.5	72.5
125 mm Deep Rafters		
50	💧	💧
55	0.21	💧
60	0.20	💧
70	0.19	💧
75	0.18	0.16
150 mm Deep Rafters		
50	💧	💧
55	0.21	💧
60	0.20	💧
70	0.19	💧
75	0.18	0.16
80	0.17	0.15
90	0.16	0.14
100	0.16	0.14

* *Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

18 mm Sarking Board

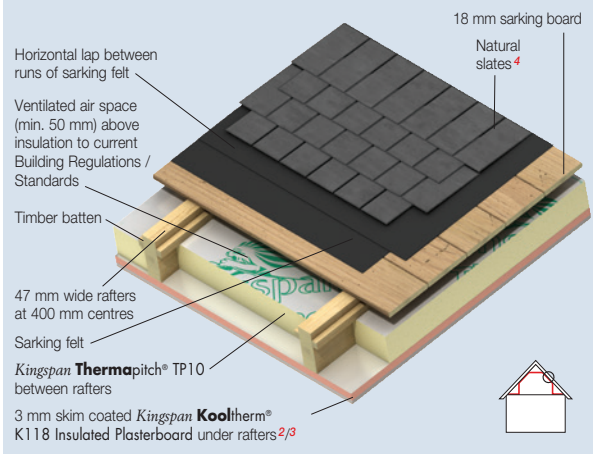


Figure 2b

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Rafters of Depth Shown Partially Filled with *Kingspan* **Therma**pitch® TP10

Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Product Thickness of *Kingspan* **Kool**therm® K118 Insulated Plasterboard* (mm)	
	57.5	72.5
125 mm Deep Rafters		
50	💧	💧
55	0.21	💧
60	0.20	💧
70	0.19	💧
75	0.18	0.16
150 mm Deep Rafters		
50	💧	💧
55	0.21	💧
60	0.20	💧
70	0.19	💧
75	0.18	0.16
80	0.17	0.15
90	0.16	0.14
100	0.16	0.14

* *Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Typical Constructions and U-values

Unventilated – Insulation Between & Over Rafters at 600 mm Centres (Recommended for New Build or Re-roofing)

No Sarking Board

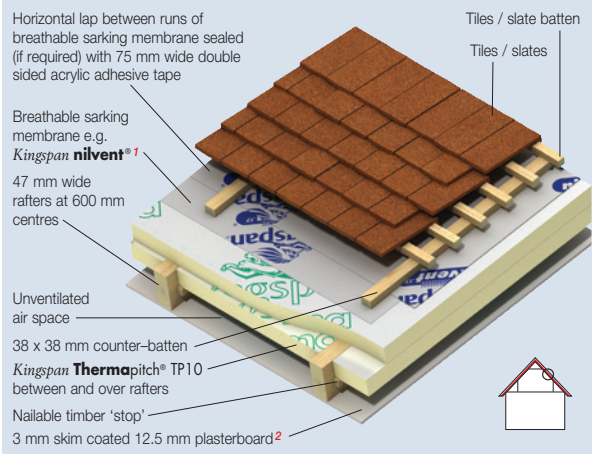


Figure 3a

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Therma**pitch® TP10 and Different Rafter Depths			
Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Rafter Depth (mm)		
	100	125	150
35 + 40*	✗	✗	✗
40 + 40	0.25	0.25	0.25
50 + 50	0.21	0.21	0.21
60 + 60	0.18	0.18	0.18
70 + 70	0.16	0.16	0.15
75 + 75	0.15	0.15	0.15
80 + 80	0.14	0.14	0.14
90 + 90	0.13	0.12	0.12
100 + 100	0.12	0.11	0.11
100 + 110*	0.11	0.11	0.11
100 + 120*	0.11	0.10	0.10
100 + 125*	0.11	0.10	0.10

* *First thickness refers to thickness between rafters, second thickness over rafters.*
The thermal resistance of the over rafter layer of insulation must be ≥ that of the between rafter layer so as to avoid condensation.

NB *Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.*

18 mm Sarking Board

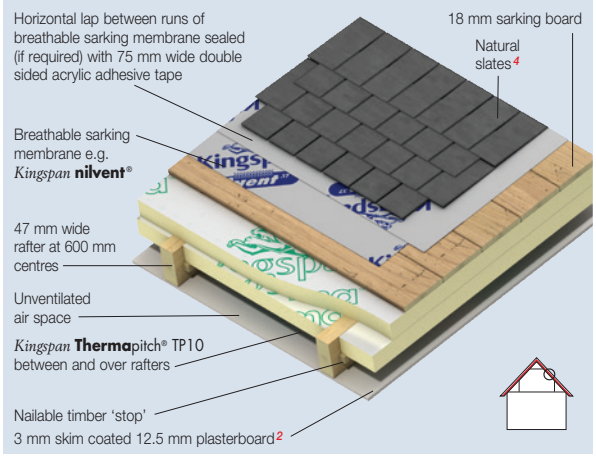


Figure 3b

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Therma**pitch® TP10 and Different Rafter Depths			
Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Rafter Depth (mm)		
	100	125	150
35 + 35	✗	✗	✗
35 + 40*	✗	0.25	0.25
40 + 40	0.25	0.24	0.24
50 + 50	0.20	0.20	0.20
60 + 60	0.18	0.18	0.17
70 + 70	0.15	0.15	0.15
75 + 75	0.15	0.14	0.14
80 + 80	0.14	0.14	0.14
90 + 90	0.12	0.12	0.12
100 + 100	0.12	0.11	0.11
100 + 110*	0.11	0.11	0.11
100 + 120*	0.11	0.10	0.10
100 + 125*	0.11	0.10	0.10

* *First thickness refers to thickness between rafters, second thickness over rafters.*
The thermal resistance of the over rafter layer of insulation must be ≥ that of the between rafter layer so as to avoid condensation.

NB *Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.*

Ventilated and Unventilated – Dwarf Wall and Loft Floor / Ceiling Level Insulation

Dwarf Wall – Insulation Between Studs and Inside Studs

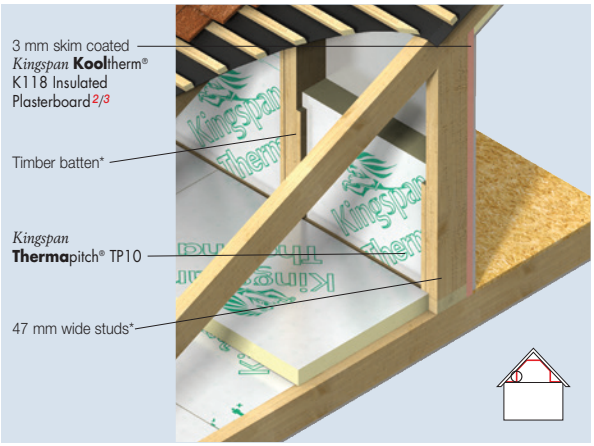


Figure 4a

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Studs Shown Filled with Various Thicknesses of *Kingspan* **Therma**pitch® TP10

Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Product Thickness of *Kingspan* **Kool**therm® K118 Insulated Plasterboard** (mm)			
	32.5		57.5	
	Stud Centres (mm)		Stud Centres (mm)	
	400	600	400	600
Ventilated Construction				
30	✗	✗	💧	💧
35	✗	✗	💧	💧
40	0.35	0.34	💧	💧
50	0.32	0.30	💧	💧
55	0.30	0.29	0.21	0.21
60	0.29	0.28	0.21	0.20
70	0.27	0.25	0.19	0.19
75	0.26	0.24	0.19	0.18
80	0.25	0.25	0.18	0.18
90	0.23	0.22	0.17	0.17
100	0.22	0.21	0.16	0.16
110	0.21	0.19	0.16	0.15
120	0.19	0.18	0.15	0.14
125	0.19	0.18	0.15	0.14
130	0.18	0.17	0.14	0.14
140	0.18	0.16	0.14	0.13
150	0.17	0.16	0.13	0.13
Unventilated Construction				
25	✗	0.35	💧	💧
30	0.35	0.33	💧	💧
35	0.33	0.32	💧	💧
40	0.31	0.30	💧	💧
50	0.29	0.27	💧	💧
55	0.28	0.26	0.20	0.19
60	0.26	0.25	0.19	0.19
70	0.25	0.23	0.18	0.17
75	0.24	0.22	0.18	0.17
80	0.23	0.22	0.17	0.17
90	0.21	0.20	0.16	0.16
100	0.20	0.19	0.16	0.15
110	0.19	0.18	0.15	0.14
120	0.18	0.17	0.14	0.14
125	0.18	0.17	0.14	0.13
130	0.17	0.16	0.14	0.13
140	0.17	0.15	0.13	0.13
150	0.16	0.15	0.13	0.12

* *Where the insulation between studs exceeds the depth of the stud, the stud must be battened out to correspond with the thickness of insulation and horizontal timber 'stop' battens must be fixed to the outer surface of the stud to provide a 'stop' for the insulation boards so that they can finish flush with the inner surface of the timber studs.*

** *Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB *Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.*

Loft Floor or Flat Ceiling – Insulation Between and Over Joists

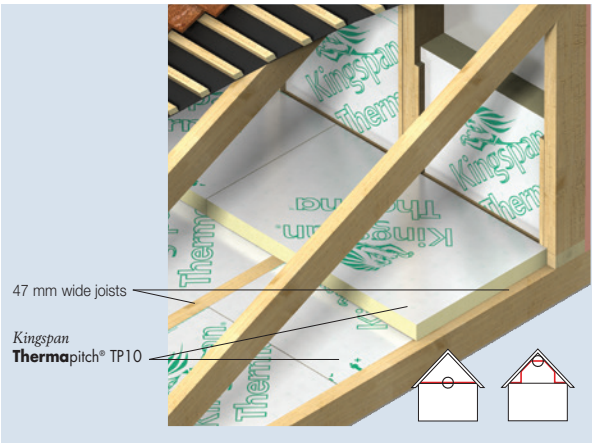


Figure 4b

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Therma**pitch® TP10 Installed Between and Over Joists of Depths and Centres Shown

Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Joist Centres (mm)			
	400		600	
	Ventilated Construction	Unventilated Construction	Ventilated Construction	Unventilated Construction
100 mm Deep Joists				
100 + 100	0.12	0.12	0.12	0.11
100 + 110*	0.11	0.11	0.11	0.11
100 + 120*	0.11	0.11	0.10	0.10
100 + 125*	0.11	0.10	0.10	0.10
100 + 130*	0.10	0.10	0.10	0.10
125 mm Deep Joists				
125 + 125	0.10	0.10	0.09	0.09
150 mm Deep Joists				
150 + 150	0.08	0.08	0.08	0.08

* *First thickness refers to thickness between rafters, second thickness over rafters.*

The thermal resistance of the over rafter layer of insulation must be ≥ that of the between rafter layer so as to avoid condensation.

NB *Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.*

Typical Constructions and U-values

Loft Floor or Collar Tie – Insulation Between and Under Joists

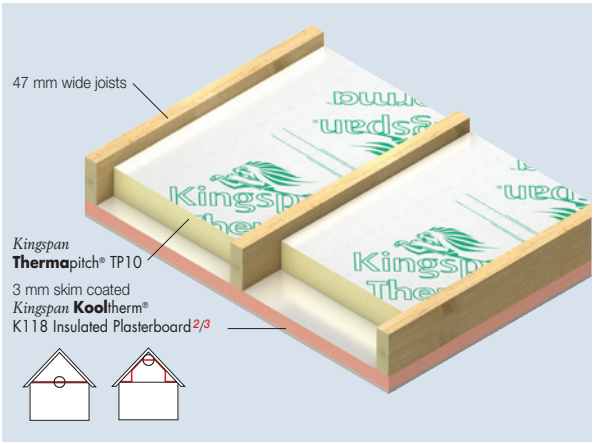


Figure 4c

U–values (W/m²·K) for Various Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard Assuming Joists at Centres Shown with Various Thicknesses of *Kingspan* **Therma**pitch® TP10 Installed Between Joists

Thickness of *Kingspan* **Therma**pitch® TP10 (mm)	Thickness of *Kingspan* **Kool**therm® K118 Insulated Plasterboard* (mm)			
	57.5		72.5	
	Joist Centres (mm)		Joist Centres (mm)	
	400	600	400	600
Ventilated Construction				
50	💧	💧	💧	💧
55	0.21	0.20	💧	💧
60	0.20	0.20	💧	💧
70	0.19	0.18	💧	💧
75	0.19	0.18	0.16	0.15
80	0.18	0.17	0.16	0.15
90	0.17	0.16	0.15	0.14
100	0.16	0.15	0.14	0.14
110	0.15	0.15	0.14	0.13
120	0.15	0.14	0.13	0.12
125	0.14	0.14	0.13	0.12
130	0.14	0.13	0.13	0.12
140	0.14	0.13	0.12	0.11
150	0.13	0.12	0.12	0.11
Unventilated Construction				
50	💧	💧	💧	💧
55	0.20	0.20	💧	💧
60	0.20	0.19	💧	💧
70	0.18	0.18	💧	💧
75	0.18	0.17	0.16	0.15
80	0.17	0.17	0.15	0.15
90	0.17	0.16	0.14	0.14
100	0.16	0.15	0.14	0.13
110	0.15	0.14	0.13	0.13
120	0.14	0.14	0.13	0.12
125	0.14	0.13	0.12	0.12
130	0.14	0.13	0.12	0.12
140	0.13	0.12	0.12	0.11
150	0.13	0.12	0.11	0.11

* *Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB Where the insulation between joists exceeds the depth of the joist and access to the loft space is required, the joists must be battened out to correspond with the thickness of insulation and a protective layer (e.g chipboard / OSB) fixed over the insulation.

NB Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Linear Thermal Bridging at Wall to Pitched Roof Junctions

Basic Principles

Linear thermal bridging describes the heat loss / gain that occurs at junctions between elements e.g. where an external wall meets the roof, or at junctions around openings in the building fabric where the thermal insulation layer is discontinuous e.g. sills, jambs and lintels.

Interruptions within the insulation layer by materials with poorer insulating properties can result in a thermal bridge, which in turn can lead to problems of condensation and mould growth, especially if there is a drop in surface temperature.

The heat flow at these junctions and opening locations, over and above that through the adjoining plane elements, is the linear thermal transmittance of the thermal bridge: measured in W/m·K; referred to as a 'psi–value'; and expressed as a 'ψ–value'.

The lower the ψ–value, the better the performance. ψ–value values are taken into account in the calculation methodologies e.g. the Standard Assessment Procedure (SAP) that are used to assess the operational CO_2 emissions and, where applicable, the fabric energy efficiency of buildings.

ψ–values can comprise either, or a combination of, approved, calculated or assumed values.

Reducing Linear Thermal Bridging

Detailing at junctions to minimise the effects of thermal bridging and the associated risk of condensation or mould growth is important and there are some simple design considerations that can be adopted to help mitigate the risks and to reduce heat losses.

- For junctions between external walls and roof constructions, continuity and overlap of insulation layers is the key to minimising heat losses.
- Insulated plasterboard can be used on the inner blockwork leaf to improve eaves and gable performance.
- Increasing the insulation depth between and under rafters can help to improve eaves performance, although this may influence the truss design (stub end trusses can create additional depth at eaves).
- Care is required to ensure continuation of insulation to the soffit and into the eaves for best thermal performance.
- Lightweight aggregate blockwork to the inner leaf can help improve gable performance.
- For best gable junction thermal performance, it is important not to omit perimeter insulation between the first roof truss and the wall, or to stop cavity wall insulation short of the roof insulation.

The details in the images that follow (Figures 5a – 9b) are designed to reflect Approved Construction Details (England & Wales / Scotland / Northern Ireland) and Accredited Construction Details (Republic of Ireland), collectively referred to here as ACDs.

Unventilated – Insulation Between & Under Rafters (Recommended for New Build or Re–roofing)

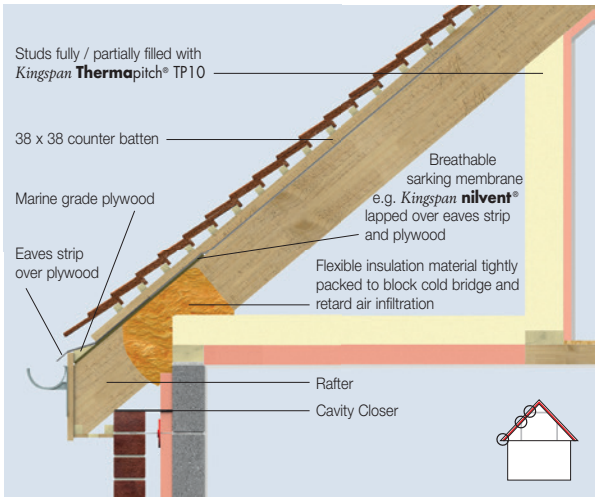


Figure 5a – Overhanging Eaves Detail

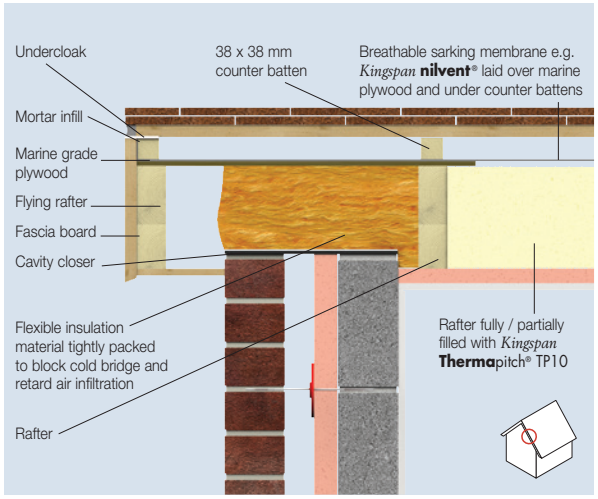


Figure 5b – Eaves Detail

Ventilated – Insulation Between & Under Rafters (Recommended for Loft Conversion where Re–Roofing is not Intended)

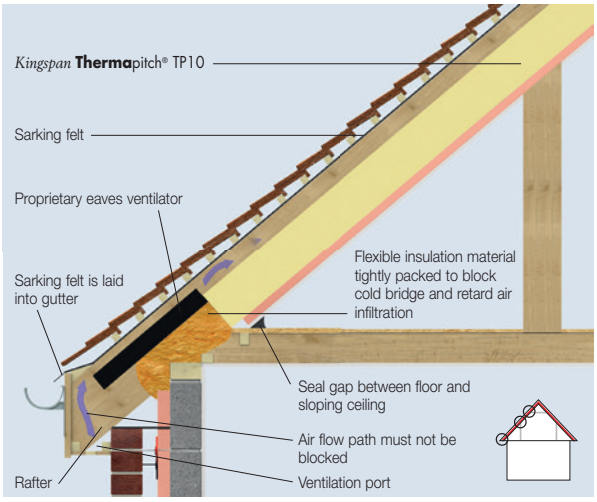


Figure 6a – Overhanging Eaves Detail

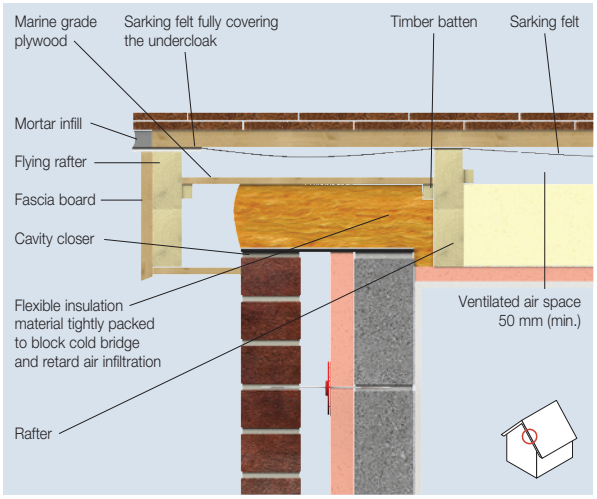


Figure 6b – Eaves Detail

Typical Constructions and U-values

Unventilated – Insulation Between & Over Rafters (Recommended for New Build or Re–roofing)

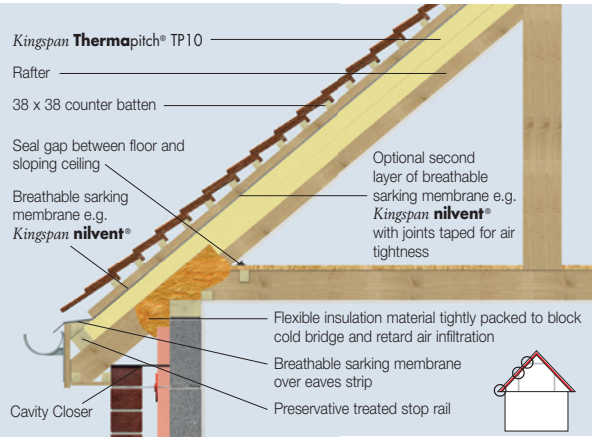


Figure 7a – Overhanging Eaves Detail

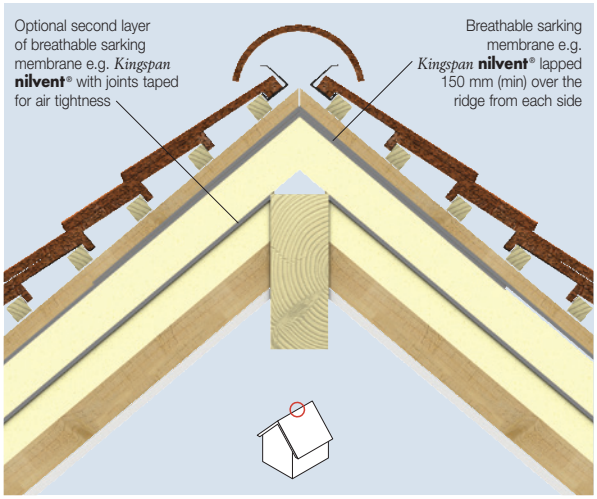


Figure 7b – Ridge Detail

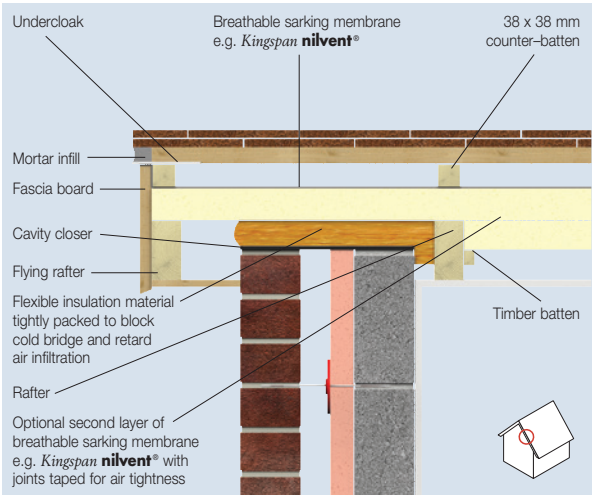


Figure 7c – Eaves Detail

Loft Floor Insulation – Insulation Between and Over Joists

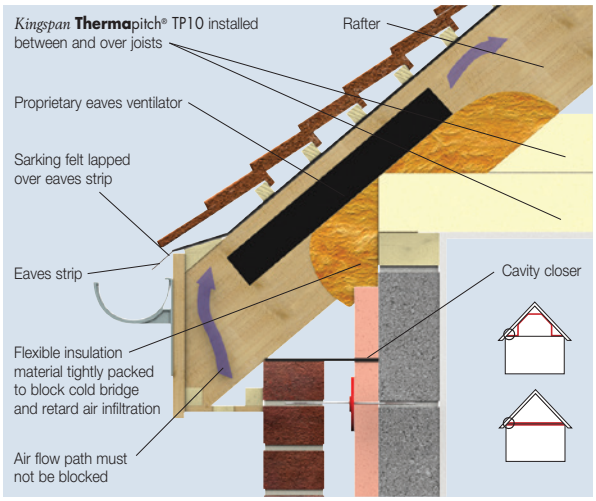


Figure 8a – Ventilated Loft Floor Detail at Eaves

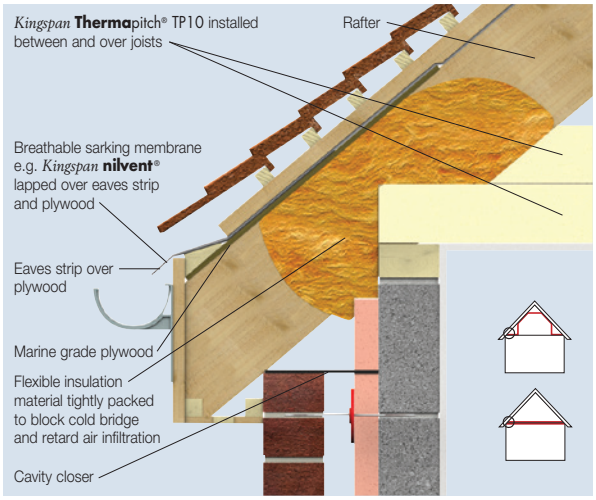


Figure 8b – Unventilated Loft Floor Detail at Eaves

Loft Floor Insulation – Insulation Between and Under Joists

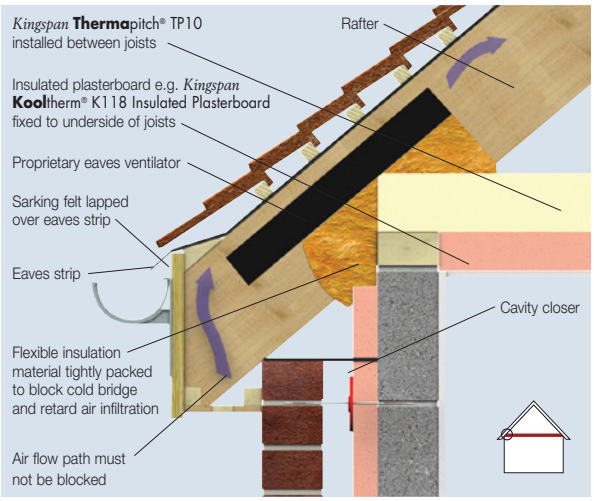


Figure 9a – Ventilated Loft Floor Detail at Eaves

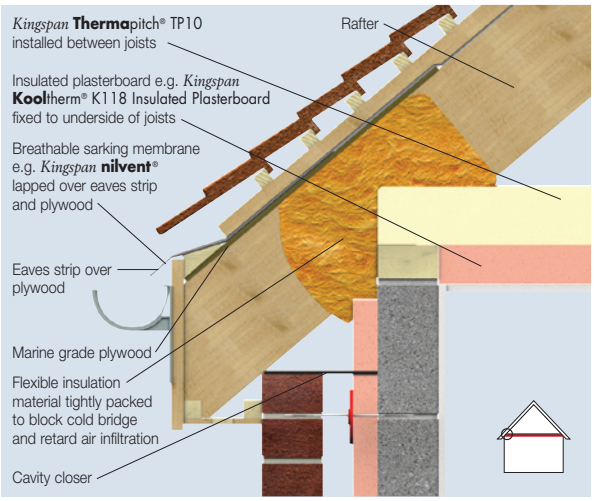


Figure 9b – Unventilated Loft Floor Detail at Eaves

Design Considerations

Environmental Impact & Responsible Sourcing

Green Guide Rating

An Ecoprofile, certified by BRE Certification to the 2008 BRE Environmental Profiles Methodology, has been created for *Kingspan* **Therma**pitch® TP10 produced at Kingspan Insulation's British and Irish manufacturing facilities. The BRE has assigned the product a 2008 Green Guide Summary Rating of A+.

Environmental Profiles Scheme
Certificate Number ENP 500

Responsible Sourcing

Kingspan **Therma**pitch® TP10 produced at Kingspan Insulation's Pembridge and Selby manufacturing facilities is certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Excellent'.

BES 6001 Responsible Sourcing
www.greenbooklive.com

Kingspan **Therma**pitch® TP10 is manufactured under a management system certified to ISO 14001: 2004.

NB The above information is correct at the time of writing. Please confirm at the point of need by contacting Kingspan Insulation's Technical Service Department (see rear cover), from which a copy of Kingspan Insulation's certificates can be obtained.

Sustainability & Responsibility

Kingspan Insulation has a long–term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; as a substantial landholder; and as a key member of its neighbouring communities.

A report covering the sustainability and responsibility of Kingspan Insulation Ltd's operations at its Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is available at www.kingspaninsulation.co.uk/sustainabilityandresponsibility.

NBS Specifications

Details also available in NBS Plus.
NBS users should refer to clause:
K11 695, P10 140 (Standard and Intermediate)
K11 55 (Minor Works)

Design Considerations

Specification Clause

Kingspan **Therma**pitch® TP10 should be described in specifications as:–

The rafter / joist level insulation shall be *Kingspan* **Therma**pitch® TP10 ____ mm thick: comprising a high performance fibre–free rigid thermoset polyisocyanurate (PIR) insulation core faced on both sides with a low emissivity composite foil facing. The product shall be manufactured: with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP); in accordance with the requirements of BS 4841–5; under a management system certified to ISO 9001: 2008, ISO 14001: 2004, BS / I.S. OHSAS 18001: 2007 and ISO 50001: 2011; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

Building Information Modelling (BIM)

Kingspan Insulation's BIM objects can be downloaded in Revit and in IFC formats. For more information please visit www.kingspaninsulation.co.uk/bim.

Insulation at Rafter Level – Choice of Build Up

Unventilated and Ventilated Constructions

There is generally a choice between unventilated and ventilated constructions, except in the case of refurbishment / loft conversions. In these instances, unless the whole roof is to be stripped or unless there is a breathable sarking membrane already in situ, it is impossible to use an unventilated roof, because a breathable sarking membrane cannot be installed.

Position of Insulation

Dependent on the designed U–value of the construction and the available rafter depth and headroom, different approaches can be taken.

In most cases, approaches with layers of insulation between and over rafters are likely to yield very tall fascia boards and so, generally, between and under rafter insulation approaches are probably more desirable e.g. Figures 1 and 2. The exception to the rule is when very low U–values are required, in which case headroom may become an issue for between and under rafter solutions, so between and over rafter solutions may be more practical.

Unventilated Roof – Ventilation Considerations

Unventilated roof approaches create a warm pitched roof space which does not require cross ventilation. Research suggests that sealing an unventilated roof yields a more energy efficient roof, as the impacts of ventilation and incidental infiltrating cold air can be minimised. Therefore, if creating an unventilated roof, it is preferable to fully seal all joints in the breathable sarking membrane (see 'Position of Breathable Sarking Membrane' below). Any water vapour reaching the breathable sarking membrane escapes without condensing. There is then adequate air movement beneath the tiles to dissipate this water vapour to the outside atmosphere. Tape for sealing joints in the breathable sarking membrane should be specified in accordance with the recommendations of the breathable membrane manufacturer.

The requirement for a vapour control layer and / or under–tile ventilation should be assessed to BS 5250: 2011 + A1: 2016 (Code of practice for control of condensation in buildings).

Ventilated Roof – Ventilation Considerations

In these cases the Building Regulations / Standards require a 50 mm ventilation air gap between the insulation and the sarking felt, so as to avoid condensation.

The requirement for a vapour control layer should be assessed to BS 5250: 2011 + A1: 2016.

Vapour Control Layer

If required, the vapour resistance of the roof lining can be increased by the use of a vapour check plasterboard*, the use of *Kingspan* **Kool**therm® K118 Insulated Plasterboard, which contains an integral vapour control layer*, the use of a layer of polythene sheeting*, or by the application of two coats of Gyproc Drywall Sealer.

** With appropriate detailing at joints, penetrations and roof perimeters.*

Breathable Sarking Membrane

BS 5250: 2011 + A1: 2016 recommends that low resistance breathable sarking membranes for use in unventilated systems must not have a vapour resistance that exceeds 0.25 MN.s/g, e.g. *Kingspan* **nilvent**®.

Position of Breathable Sarking Membrane

The sealing of breathable sarking membrane joints with tape is considerably easier to achieve if the membrane is installed on a continuous surface (Figures 1a, 1b, 1d, 3a & 3b).

In these cases the breathable sarking membrane is installed under the counter–battens (which provide a channel for water drainage) or, in situations with a sarking board under a natural slated roof, the breathable sarking membrane is installed directly under the slates (as neither tile battens nor counter–battens are used).

Generally, when a continuous surface is available, it will prove easier to install the breathable sarking membrane in horizontal runs, whilst still enabling easy sealing between runs.

In roofs with no continuous surface (Figure 1c), it is preferable, though more difficult, to install the breathable sarking membrane in vertical runs with junctions between runs sealed by counter–battens placed over the laps in rafter positions. The breathable sarking membrane is installed taut as the counter–batten provides a space for water drainage.

Recommended Solutions for New Build / Re–roofing

The ideal solution for new build or re–roofing projects is, therefore, between and under rafter insulation with a continuous surface for the breathable sarking membrane so that it can be installed in horizontal runs under counter–battens with laps sealed with tape (Figures 1a, 1b & 1d).

The next best solution is, therefore, between and under rafter insulation with no continuous surface for the breathable sarking membrane, and the breathable sarking membrane installed in vertical runs with laps sealed under counter–battens (Figure 1c).

Where very low U–values are required, for new build or re–roofing projects, the ideal solution is between and over rafter insulation with the breathable sarking membrane installed in horizontal runs under counter battens with laps sealed with tape (Figures 3a & 3b).

Insulating at Ceiling Level – Choice of Build Up

When insulating at ceiling level in a pitched roof with loft insulation between and over joists (Figures 4b, 8a & 8b) it is vital to ensure the continuity of insulation at the specified R–value right to the eaves. This can be difficult because of the angle of pitch of the roof and the position of the rafters can prevent the insulation laid over the joists from being fitted all the way to the eaves. The use of *Kingspan* **Therma**pitch® TP10 in between joists and *Kingspan* **Kool**therm® K118 Insulated Plasterboard below joists (Figures 4c, 9a & 9b) allows continuity of insulation and can minimise heat loss from this linear thermal bridge.

Mansard Roofs / Walls

Kingspan **Therma**pitch® TP10 can be used for the construction of insulated tiled or slated mansard roofs / walls. Design and installation guidance is as for pitched roofs.

Fire Stops

Current Building Regulations / Standards should be considered with regard to the requirements for, and provision of, fire stops.

Acoustics

Kingspan **Therma**pitch® TP10 can be used in masonry separating wall room–in–roof junctions as detailed in the Robust Details for Building Regulations (England & Wales) Part E–WM–1 to E–WM–6, E–WM–8 and E–WM–10.

Lightning Protection

Building designers should give consideration to the requirements of BS / I.S. EN 62305: 2011 (Protection against lightning).

Sitework

Over Rafter Insulation

General

- A preservative treated stop rail should be secured to the rafters at the eaves.
- *Kingspan* **Therma**pitch® TP10 may be laid either across or down the line of the rafters and should be laid lightly butted and preferably break bonded.
- All board joints running from eaves to ridge must occur over rafters.
- Ensure continuity of insulation at the ridge of the roof.
- There is no necessity to tape board joints.

Over Rafter Insulation Without a Sarking Board

- Lay 38 x 38 mm treated softwood counter–battens in line with the rafters.
- Secure the counter–battens to the rafters by fixing through both the counter–battens and the insulation boards.

Over Rafter Insulation With Slates Fixed Directly into a Sarking Board

- Overlay the insulation boards with the sarking board.
- Secure the sarking board and insulation boards to the rafters by fixing through both the sarking board and the insulation.

Over Rafter Insulation with a Sarking Board and Tiles on Tiling Battens and Counter–Battens

- Overlay the insulation boards with the sarking board, and lay 38 x 38 mm treated softwood counter–battens in line with the rafters.
- Secure the counter–battens to the rafters by fixing through the counter–batten, the sarking board and the insulation.

Fixings for Over Rafter Insulation

- Approved fixings should be applied at centres appropriate to the design of the roof and location of the building.

  Refer to:

Ancon Building Products www.ancon.co.uk	+44 (0) 114 275 5224
Helifix Limited www.helifix.co.uk	+44 (0) 20 8735 5222
MAK Fasteners www.makfasteners.com	+353 (0) 1 451 99 00
Target Fixings Limited www.targetfixings.com	+44 (0) 1635 58 00 88
Wallfast Limited www.wallfast.co.uk	+44 (0) 23 9229 8443

Sitework

Between Rafter Insulation

Between Rafter Insulation Partially Filled Flush to the Top Surface of Rafters

- If *Kingspan* **Therma**pitch® TP10 is to be installed between and over rafters, the between rafter layer must be flush with the top of the rafters in order to prevent the risk of air movement between the two layers of insulation boards.
- If the between rafter layer of insulation is to be fitted from the outside, install the insulation with the use of timber 'stop' battens.
- Push insulation, trimmed to suit rafter spacings, between the rafters so they are flush with the top surface of the rafters.
- Side–nail treated softwood battens to the rafters to hold the boards in place.

Between Rafter Insulation Partially Filled Flush to the Bottom Surface of Rafters

- *Kingspan* **Therma**pitch® TP10 installed between rafters must be flush with the bottom of the rafters in order to prevent the risk of air movement between the boards and the ceiling.
- Where the insulation between rafters is to be flush with the bottom of the rafters but does not fill the full rafter depth, install the insulation, trimmed to suit rafter spacings, with the aid of treated softwood battens nailed to the side of the rafters to provide a 'stop' above the insulation.
- The battens should be in the appropriate position to ensure the insulation is flush with the bottom of the rafters.
- An additional restraint to the insulation boards will be provided by *Kingspan* **Kool**therm® K118 Insulated Plasterboard fixed to the inside face of the rafters.

Between Rafter Insulation Fully Filling the Depth of the Rafters

- Where the insulation between rafters fully fills the rafter depth, simply install the correct thickness of insulation, trimmed to suit rafter spacings, in such a manner that it is flush with the bottom and top of the rafters.

Between Joist Insulation

- *Kingspan* **Therma**pitch® TP10 installed between joists must be flush with the bottom of the joists in order to prevent the risk of air movement between the boards and the ceiling.
- Install the correct thickness of insulation, trimmed to suit rafter spacings, in such a manner that it is flush with the bottom of the joists.
- The insulation must not be used as a weight bearing surface and, if the thickness of insulation exceeds the depth of the joists, batten out the joists such that they stand proud of the insulation.
- Where there is no over joist insulation, and the loft is to be used for storage, 9 mm (min.) plywood / chipboard / OSB should be mechanically fixed over the joists. Where pedestrian access is required, 18 mm (min.) plywood / chipboard / OSB should be installed instead.

Over Joist Insulation

- If *Kingspan* **Therma**pitch® TP10 is to be installed between and over joists, the between joist layer must fully fill the joist depth, so that it is flush with the bottom and the top of the joists, in order to prevent the risk of air movement either above or below the insulation boards. It must not stand proud above the joists, otherwise a gap would be created over the joists themselves.
- The insulation over joists must be tapered so it fits snugly under rafters at the eaves.
- The insulation must not be used as a weight bearing surface. If loft storage, or pedestrian access to the loft area, is necessary, it is recommended that one of the following options is adopted.
- Where the loft is to be used for storage, 9 mm (min.) plywood / chipboard / OSB should be mechanically fixed over the joists, with the over joist insulation layer laid on top. Where pedestrian access is required, a further layer of 18 mm (min.) plywood / chipboard / OSB should also be installed over the insulation boards.
- A proprietary insulated loft storage, or pedestrian access, board can be installed.
- Alternatively, treated softwood battens should be laid perpendicular to the joists, at 600 mm (max.) centres, and fixed to them. The depth of the battens should be ≥ to that of the over joist insulation layer. The over joist insulation layer is installed between the battens following the guidance for between joist insulation (above). 18 mm (min.) plywood / chipboard / OSB should be mechanically fixed over the battens.

Between Dwarf Wall Stud Insulation

- *Kingspan* **Therma**pitch® TP10 installed between studs must be flush with the inside surface of the studs in order to prevent the risk of air movement between the boards and plasterboard / insulated plasterboard.
- Nail treated softwood battens to the side of studs to provide a 'stop' and prevent the insulation boards moving within the stud cavity.
- This 'stop' should be positioned such that the insulation boards finish flush with the inside surface of the studs.
- If the insulation boards are thicker than the timber studs fix appropriately sized treated softwood battens to the back of the studs and fix timber 'stop' straps diagonally to the battens in an appropriate pattern to hold the insulation boards in place. Each board must be restrained by a minimum of two diagonal straps.
- Insulation boards may be temporarily held in place with large headed clout nails fixed through the 'stop' battens / straps.
- The boards will be further restrained by the plasterboard / insulated plasterboard lining fixed to the inside face of the timbers.
- To avoid air leakage, any penetrations through the insulation (electrical sockets, plumbing and wiring etc) should be sealed with flexible sealant or equivalent, or a combination of flexible polyurethane foam and flexible sealant or equivalent.

Under Rafter / Joist or Inside Dwarf Wall Studs Insulation

- Please refer to literature for *Kingspan* **Kool**therm® K118 Insulated Plasterboard. This literature is available from the Kingspan Insulation Marketing Department or from the Kingspan Insulation website (see rear cover for details).

General

Fitting Insulation Boards Between Rafters / Joists / Studs

- Measure the distance between the rafters / joists / studs before cutting the boards as spacings can vary.
- Ensure that insulation boards are lightly butted and that there is a tight fit between the insulation and the rafters / joists / studs.
- Fill all gaps with expanding urethane sealant.

Surface Treatment

- *Kingspan* **Therma**pitch® TP10 is not intended to provide an internal finish and should be underlined with a suitable building board.

Cutting

- Cutting should be carried out either by using a fine toothed saw, or by scoring with a sharp knife, snapping the board over a straight edge and then cutting the facing on the other side.
- Ensure accurate trimming to achieve close–butting joints and continuity of insulation.

Daily Working Practice

- At the completion of each day's work, or whenever work is interrupted for extended periods of time, board edges and joints should be protected from inclement weather.

Availability

- *Kingspan* **Therma**pitch® TP10 is available through specialist insulation distributors and selected builders' and roofing merchants throughout the UK and Ireland.

Packaging and Storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Ideally, boards should be stored inside a building. If, however, outdoor storage cannot be avoided the boards should be stacked clear of the ground and covered with an opaque polythene sheet or weatherproof tarpaulin. Boards that have been allowed to get wet should not be used.

Health and Safety

- Kingspan Insulation products are chemically inert and safe to use.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website www.kingspaninsulation.co.uk/safety or www.kingspaninsulation.ie/safety.

Please note that the reflective surfaces on this product are designed to enhance its thermal performance. As such, they will reflect light as well as heat, including ultraviolet light. Therefore, if this product is being installed during very bright or sunny weather, it is advisable to wear UV protective sunglasses or goggles, and if the skin is exposed for a significant period of time, to protect the bare skin with a UV block sun cream.

The reflective facings used on this product can be slippery underfoot when wet. Therefore, it is recommended that any excess material should be contained to avoid a slip hazard.

Warning – do not stand on or otherwise support your weight on this product unless it is fully supported by a load bearing surface.

Product Details

The Facings

Kingspan **Therma**pitch® TP10 is faced on both sides with a low emissivity composite foil, autohesively bonded to the insulation core during manufacture. This reflective, low emissivity surface improves the thermal resistance of any unventilated cavity adjacent to the board.

The Core

The core of *Kingspan* **Therma**pitch® TP10 is manufactured with **Nilflam**® technology, a high performance fibre–free rigid thermoset polyisocyanurate (PIR) insulant manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Standards and Approvals

Kingspan **Therma**pitch® TP10 is manufactured to the highest standards in accordance with BS 4841–5: 2006 (Rigid polyisocyanurate (PIR) and polyurethane (PUR) products for building end–use applications. Specification for laminated boards (roofboards) with auto-adhesively or separately bonded facings for use as thermal insulation boards for pitched roofs).

Kingspan **Therma**pitch® TP10 is also manufactured to the highest standards under a management system certified to ISO 9001: 2008 (Quality Management Systems. Requirements), ISO 14001: 2004 (Environmental Management Systems. Requirements), BS / I.S. OHSAS 18001: 2007 (Occupational Health and Safety Management Systems. Requirements) and ISO 50001: 2011 (Energy Management Systems. Requirements with Guidance for Use).

The use of *Kingspan* **Therma**pitch® TP10 produced at Kingspan Insulation's Pembridge and Selby manufacturing facilities is covered by BBA Certificate 14/5133, and that produced at Kingspan Insulation's Castleblayney manufacturing facility by NSAI Agrément Certificate 03/0196.

Standard Dimensions

Kingspan **Therma**pitch® TP10 is available in the following standard size:

Nominal Dimension		Availability
Length	(m)	2.4
Width	(m)	1.2
Insulant Thickness	(mm)	Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Compressive Strength

The compressive strength of *Kingspan* **Therma**pitch® TP10 typically exceeds 140 kPa at 10% compression when tested to BS / I.S. EN 826: 2013 (Thermal insulating products for building applications. Determination of compression behaviour).

Water Vapour Resistance

Adjusted for the effect of board joints, the product typically achieves a resistance far greater than 100 MN·s/g, when tested in accordance with BS / I.S. EN 12086: 2013 (Thermal insulating products for building applications. Determination of water vapour transmission properties).

Durability

If correctly installed, *Kingspan* **Therma**pitch® TP10 can have an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

Resistance to Solvents, Fungi & Rodents

The insulation core is resistant to short–term contact with petrol and with most dilute acids, alkalis and mineral oils. However, it is recommended that any spills be cleaned off fully before the boards are installed. Ensure that safe methods of cleaning are used, as recommended by suppliers of the spilt liquid. The insulation core is not resistant to some solvent–based adhesive systems, particularly those containing methyl ethyl ketone. Adhesives containing such solvents should not be used in association with this product. Damaged boards or boards that have been in contact with harsh solvents or acids should not be used.

The insulation core and facings used in the manufacture of *Kingspan* **Therma**pitch® TP10 resist attack by mould and microbial growth, and do not provide any food value to vermin.

Fire Performance

Kingspan **Therma**pitch® TP10 is Class 1, as defined by BS 476–7: 1997 (Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products).

Kingspan **Therma**pitch® TP10, when assessed to the British Standard fire tests shown specified in the table below, can achieve the result shown, where the external finish of the pitched roof consists of slate or concrete roof tiles. For specifications with different external finishes please consult the roof finish manufacturer for their specific fire classification details.

Test	Result
BS 476–3: 2004 (External fire membrane adopted exposure roof test)	SAA rating

Further details of the fire performance of Kingspan Insulation products may be obtained from the Kingspan Insulation Technical Service Department (see rear cover).

Thermal Properties

The λ–values and R–values detailed below are quoted in accordance with BS / I.S. EN 13165: 2012 + A1: 2015 (Thermal insulation products for buildings. Factory made rigid polyurethane foam (PU) products. Specification).

Thermal Conductivity

The boards achieve a thermal conductivity (λ–value) of 0.022 W/m·K.

Thermal Resistance

Thermal resistance (R–value) varies with thickness and is calculated by dividing the thickness of the board (expressed in metres) by its thermal conductivity. The resulting number is rounded down to the nearest 0.05 (m^2·K/W).

Insulant Thickness (mm)	Thermal Resistance (m^2·K/W)
25	1.10
30	1.35
40	1.80
50	2.25
55	2.50
60	2.70
70	3.15
75	3.40
80	3.60
85	3.85
90	4.05
100	4.50
110	5.00
120	5.45
125	5.65
130	5.90
140	6.35
150	6.80

NB Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Insulation Product Benefits

Kingspan OPTIM-R® Vacuum Insulation Panel (VIP) Products

- With a declared value thermal conductivity of 0.007 W/m·K, these products provide an insulating performance that is up to five times better than commonly used insulation materials.
- Provides high levels of thermal efficiency with minimal thickness.
- Over 90% (by weight) recyclable.

Kingspan **Kool**therm® Range Products

- With a thermal conductivity of 0.018–0.023 W/m·K these are the most thermally efficient insulation products commonly used.
- The thinnest commonly used insulation products for any specific U–value.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan **Therma**™ Range **Products**

- With a thermal conductivity of 0.022–0.028 W/m·K these are amongst the more thermally efficient insulation products commonly used.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan **Styr**ozone® Range **Products**

- Rigid extruded polystyrene insulation (XPS) has the necessary compressive strength to make it the product of choice for specialist applications such as heavy duty flooring, car park decks and inverted roofing.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP).

All Products

- Unaffected by air infiltration – a problem that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install.
- If installed correctly, can provide reliable long term thermal performance over the lifetime of the building.
- Each product achieves the required fire performance for its intended application.

Contact Details

Customer Service

For quotations, order placement and details of despatches please contact the Kingspan Insulation Customer Service Department on the numbers below:

UK – Tel: +44 (0) 1544 388 601
– Fax: +44 (0) 1544 388 888
– email: customerservice@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 979 5000
– Fax: +353 (0) 42 975 4299
– email: info@kingspaninsulation.ie

Literature & Samples

Kingspan Insulation produces a comprehensive range of technical literature for specifiers, contractors, stockists and end users. The literature contains clear user friendly advice on typical design; design considerations; thermal properties; sitework and product data.

For copies please contact the Kingspan Insulation Marketing Department, or visit the Kingspan Insulation website, using the details below:

UK – Tel: +44 (0) 1544 387 384
– Fax: +44 (0) 1544 387 484
– email: literature@kingspaninsulation.co.uk
– www.kingspaninsulation.co.uk/literature

Ireland – Tel: +353 (0) 42 979 5000
– Fax: +353 (0) 42 975 4299
– email: info@kingspaninsulation.ie
– www.kingspaninsulation.ie/literature

Tapered Roofing

For technical guidance, quotations, order placement and details of despatches please contact the Kingspan Insulation Tapered Roofing Department on the numbers below:

UK – Tel: +44 (0) 1544 387 383
– Fax: +44 (0) 1544 387 483
– email: tapered@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 975 4297
– Fax: +353 (0) 42 975 4296
– email: tapered@kingspaninsulation.ie

Technical Advice / Design

Kingspan Insulation supports all of its products with a comprehensive Technical Advisory Service. Calculations can be carried out to provide U–values, condensation / dew point risk, required insulation thicknesses etc…

U–value calculations can also be carried out on the Kingspan Insulation U–value Calculator, available for free online at www.uvalue-calculator.co.uk or downloaded as an App.

The Kingspan Insulation Technical Service Department can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

The Kingspan Insulation British Technical Service Department operates under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U–value and Condensation Risk Calculations.

BBA CERTIFICATE CS/1004-4 U Value Competency Scheme

Please contact the Kingspan Insulation Technical Service Department on the numbers below:

UK – Tel: +44 (0) 1544 387 382
– Fax: +44 (0) 1544 387 482
– email: technical@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 975 4297
– Fax: +353 (0) 42 975 4296
– email: technical@kingspaninsulation.ie

General Enquiries

For all other enquiries contact Kingspan Insulation on the numbers below:

UK – Tel: +44 (0) 1544 388 601
– Fax: +44 (0) 1544 388 888
– email: info@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 979 5000
– Fax: +353 (0) 42 975 4299
– email: info@kingspaninsulation.ie

Kingspan Insulation Ltd. reserves the right to amend product specifications without prior notice. Product thicknesses shown in this document should not be taken as being available ex–stock and reference should be made to the current Kingspan Insulation price–list or advice sought from Kingspan Insulation's Customer Service Department (see above left). The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified for suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a Technical Advisory Service (see above), the advice of which should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of this literature is current by contacting the Kingspan Insulation Marketing Department (see left).

Kingspan®

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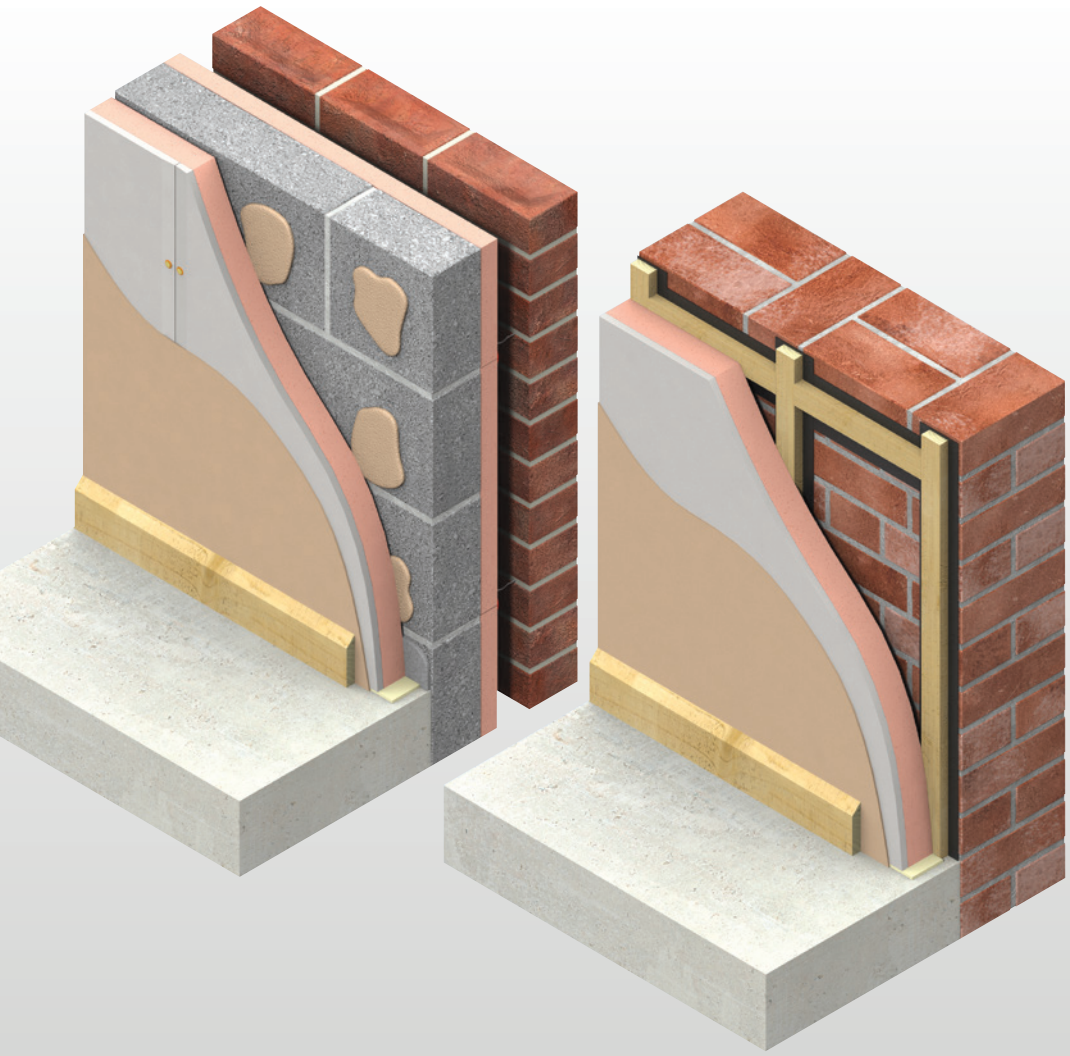
APPENDIX 8

CI/SfB (21.9) Rn7 M2
Third Issue September 2019

Kooltherm® K118 Insulated Plasterboard

INSULATED PLASTERBOARD FOR MECHANICALLY FIXED & ADHESIVELY BONDED INSULATED DRY-LINING



- Premium performance rigid thermoset phenolic insulation – thermal conductivity of 0.018 W/m·K
- Insulation, dry–lining and vapour control in one board
- Allows quick response heating
- Unaffected by air infiltration
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build, retrofit and refurbishment
- Non–deleterious material
- Manufactured with a blowing agent that has zero ODP and low GWP

Fibre-free Core

EVEN THINNER LOWER λ EVEN BETTER

Kingspan®

Low Energy – Low Carbon Buildings

Typical Constructions and U-values

Assumptions

CERTIFICATE CS/1004-4
U Value Competency Scheme

The U–values in the tables that follow have been calculated, under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U–value and Condensation Risk Calculations, using the method detailed in BS EN ISO 6946: 2017 / I.S. EN ISO 6946: 2007 (Building components & building elements. Thermal resistance & thermal transmittance. Calculation methods), and using the conventions set out in BR 443 (Conventions for U–value calculations). They are valid for the constructions shown in the details immediately above each table.

These examples are based on the use of 3 mm skim coated *Kingspan* **Kool**therm® K118 Insulated Plasterboard dot and dab bonded to the construction supplemented with appropriate secondary fixings, or mechanically fixed to both 25 x 47 mm treated softwood timber battens and metal studding / channels.

NB When calculating U–values to BS EN ISO 6946: 2017 / I.S. EN ISO 6946: 2007, the type of mechanical fixing used may change the thickness of insulation required. For the mechanically fixed options to timber battens or metal studding / channels, the use of carbon steel fasteners of cross sectional area 4 mm² has been assumed at a density of 16.7 per m².

NB The calculations for adhesively bonded applications assume the use of 2 appropriate secondary fixings per board for acrylic sealant and PU foam adhesive, and 6 appropriate secondary fixings per board for drywall adhesive. No correction factor for mechanical fixings has been taken into account as appropriate secondary fixings, such as nailable plugs or helical anchor fixings at a rate of 2 or 6 per board, do not have an adverse effect on U–values.

NB For the purposes of these calculations the standard of workmanship has been assumed good, and therefore the correction factor for air gaps has been ignored.

NB The figures quoted are for guidance only. A detailed U–value calculation and a condensation risk analysis should be completed for each project.

NB If your construction is different from those specified, and / or to gain a comprehensive U–value calculation along with a condensation risk analysis of your project, please consult the Kingspan Insulation Technical Service Department for assistance (see rear cover).

U-value Table Key

Where an ✗ is shown, the U–value is higher than the worst of the maximum new build area weighted average U–values allowed by the:

- 2013 editions of Approved Documents L to the Building Regulations for England;
- 2014 editions of Approved Documents L to the Building Regulations for Wales;
- 2015 editions of Technical Handbooks Section 6 to the Building Standards for Scotland;
- 2012 editions of Technical Booklets F1 & F2 to the Building Regulations for Northern Ireland; and
- 2011 edition of Technical Guidance Document L (Dwellings) and 2008 edition of Technical Guidance Document L (Buildings other than Dwellings) to the Building Regulations for the Republic of Ireland.

Where an 💧 is shown, the combination of insulation products may result in an interstitial condensation risk and so the calculations have been excluded.

Solid Masonry Walls

Solid Brickwork

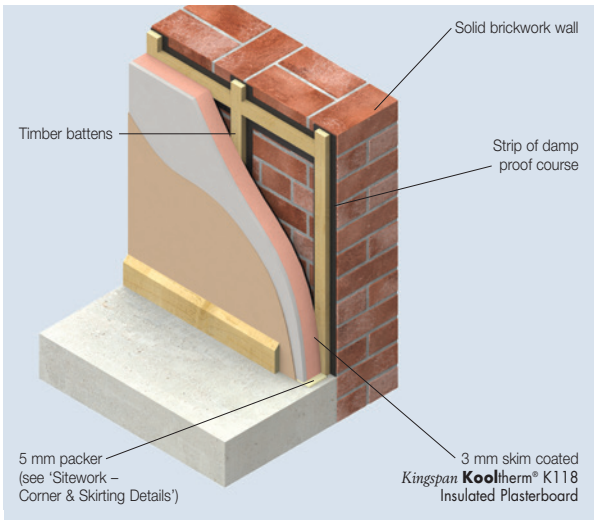


Figure 1

U–values (W/m²·K) for Various Product Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard and Different Fixing Methods

Product Thickness* (mm)	Brickwork Thickness	
	102.5 mm	215 mm
Timber Battens at 600 mm centres		
52.5	0.34	0.33
57.5	0.32	0.30
62.5	0.29	0.28
67.5	0.27	0.26
72.5	0.26	0.25
82.5	0.23	0.22
87.5	0.22	0.21
92.5	0.21	0.20
102.5	0.19	0.18
112.5	0.17	0.17
122.5	0.16	0.15
Metal Studding / Channels at 600 mm centres		
52.5	✗	0.34
62.5	0.31	0.29
67.5	0.28	0.27
72.5	0.27	0.26
82.5	0.24	0.23
87.5	0.22	0.22
92.5	0.21	0.21
102.5	0.19	0.19
112.5	0.18	0.17
122.5	0.16	0.16

** Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Solid Brickwork with Existing Lining

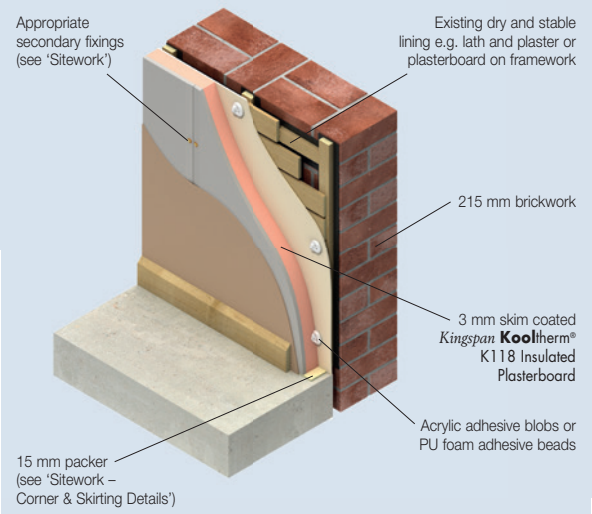


Figure 2

Kooltherm® K118 Insulated Plasterboard Product Thickness* (mm)	U–values ($W/m^2 \cdot K$)
32.5	✗
37.5	✗
42.5	✗
52.5	0.34
57.5	0.31
62.5	0.29
72.5	0.25
82.5	0.22
87.5	0.20
92.5	0.19

** Product thickness = insulant thickness + 12.5 mm plasterboard.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Solid Stonework

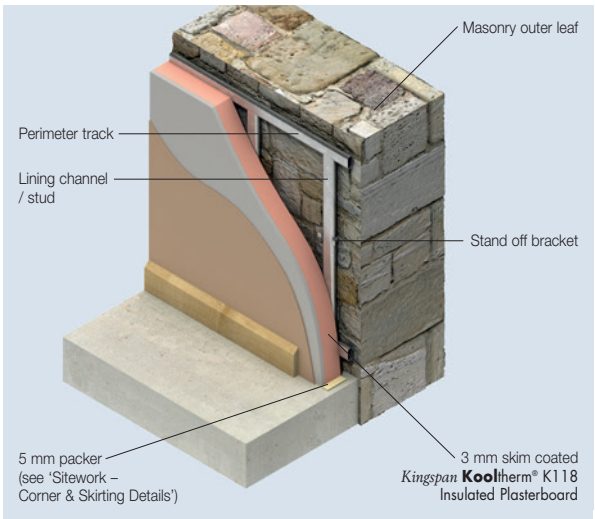


Figure 3

U–values ($W/m^2 \cdot K$) for Various Product Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard and Different Fixing Methods		
Product Thickness* (mm)	Thickness of Stonework	
	300 mm Sandstone**	450 mm Sandstone**
Timber Battens at 600 mm centres		
52.5	0.34	0.33
57.5	0.32	0.31
62.5	0.29	0.29
67.5	0.27	0.27
72.5	0.26	0.25
82.5	0.23	0.22
87.5	0.22	0.21
92.5	0.21	0.20
102.5	0.19	0.18
112.5	0.17	0.17
122.5	0.16	0.16
Metal Studding / Channels at 600 mm centres		
52.5	✗	0.35
57.5	0.33	0.32
62.5	0.31	0.30
67.5	0.28	0.28
72.5	0.27	0.26
82.5	0.24	0.23
87.5	0.22	0.22
92.5	0.21	0.21
102.5	0.19	0.19
112.5	0.18	0.17
122.5	0.16	0.16

** Product thickness = insulant thickness + 12.5 mm plasterboard.*

*** Calculations assume sandstone stonework of λ–value (2.30 W/m·K).*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Typical Constructions and U-values

Masonry Cavity Walls

102.5 mm Brick Outer Leaf / Cavity / 100 mm Block Inner Leaf

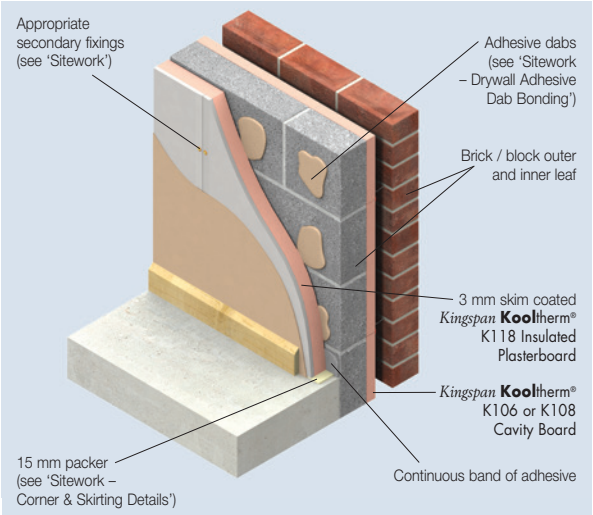


Figure 4

U–values (W/m²·K) for Various Product Thicknesses of *Kingspan* **Kool**therm® K118 Insulated Plasterboard and Thicknesses of *Kingspan* **Kool**therm® K108 Cavity Board

Kooltherm® K118 Product Thickness* (mm)	Inner Leaf Blockwork Density and λ–value (W/m·K)				
	Dense (1.13)	Medium (0.51)	Lightweight (0.15)**	Aerated (0.11)**	Thin Joint Aerated (0.11)***
Clear / Hard to Treat Cavity					
37.5	✗	✗	✗	0.34	0.33
42.5	✗	✗	✗	0.31	0.31
47.5	0.35	0.34	0.30	0.28	0.28
52.5	0.32	0.31	0.28	0.26	0.26
57.5	0.29	0.28	0.26	0.25	0.24
62.5	0.27	0.26	0.24	0.23	0.23
72.5	0.23	0.23	0.21	0.20	0.20
82.5	0.21	0.20	0.19	0.18	0.18
87.5	0.20	0.19	0.18	0.17	0.17
92.5	0.19	0.18	0.17	0.17	0.17
100 mm Cavity Partially Filled with 50 mm of *Kingspan* Kooltherm® K108 Cavity Board†					
32.5	0.19	0.18	0.17	0.17	0.17
37.5	0.18	0.18	0.17	0.16	0.16
42.5	0.17	0.17	0.16	0.15	0.15
52.5	0.16	0.15	0.15	0.14	0.14
62.5	0.14	0.14	0.13	0.13	0.13
67.5	💧	💧	💧	💧	💧
100 mm Cavity Partially Filled with 60 mm of *Kingspan* Kooltherm® K108 Cavity Board†					
32.5	0.17	0.17	0.16	0.15	0.15
37.5	0.16	0.16	0.15	0.15	0.15
42.5	0.16	0.15	0.15	0.14	0.14
52.5	0.14	0.14	0.13	0.13	0.13
62.5	0.13	0.13	0.12	0.12	0.12

* *Product thickness = insulant thickness + 12.5 mm plasterboard.*

** *A 6.6% thermal bridging factor has assumed for the effect of mortar joints.*

*** *A 1.4% thermal bridging factor has assumed for the effect of mortar joints.*

† *Please read the section entitled 'Residual Cavity Width' in the literature for Kingspan* **Kool**therm® K108 Cavity Board *for details of cavity width requirements in the UK and Ireland.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Linear Thermal Bridging at Junctions

Basic Principles

Linear thermal bridging describes the heat loss at junctions between elements, which is additional to the losses occurring through roofs, walls and floors. This heat loss is represented by the junction's psi (Ψ) value. The lower the Ψ–value, the better the performance of a junction detail. The Ψ–values and lengths of linear thermal bridges are accounted for in a new building's energy and carbon dioxide emissions calculations. Existing building junction losses are not typically accounted for in whole building heat loss calculations and only the risk of surface condensation and mould growth are considered.

Heat typically flows through the easiest path, for example in a masonry cavity wall the linear thermal bridge is primarily the inner leaf of masonry and in a timber frame wall the linear thermal bridge is primarily the sole plate and the construction below it. These linear thermal bridges can be reduced by increasing the distance that the heat has to travel.

Whilst there are some 'approved' details available, they are specifically targeted at new build constructions. However, where applicable, they are also considered good practice for refurbishment.

Design Considerations

Reducing Linear Thermal Bridging

Detailing at junctions to minimise the effects of thermal bridging and the associated risk of condensation or mould growth is important and there are some simple design considerations that can be adopted when insulating internally to help mitigate the risks and to reduce heat loss.

At a window or door opening, the primary linear thermal bridge is the reveal. This heat loss can be reduced by insulating the reveal. The key factor is the thermal resistance (R–value) of the insulation layer. Reveals should be designed to accommodate 32.5 mm (min.) of *Kingspan* **Kool**therm® K118 Insulated Plasterboard.

The application of internal insulation above and below an intermediate floor reduces the overall heat loss, but can increase the losses through the intermediate or separating floor. To reduce these losses, where possible, the edge of the intermediate floor within the floor void should also be insulated.

Where the properties to both sides of a party wall are to be insulated, best practice to minimise heat losses through the junction with external walls would be to return the insulation back along the party wall for at least 400 mm back from the external wall.

NB Where insulating the external walls to only one side of a party wall, and the other property remains uninsulated, it is better not to insulate back along the return, as this can increase the losses to the uninsulated side, increasing the risk of surface condensation and mould growth for the uninsulated property.

For further advice on details to reduce linear thermal bridging please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

Responsible Sourcing

Kingspan **Kool**therm® K118 Insulated Plasterboard produced at Kingspan Insulation's Pembridge manufacturing facility is certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Excellent'.

NB The above information is correct at the time of writing. Please confirm at the point of need by contacting Kingspan Insulation's Technical Service Department (see rear cover), from which a copy of Kingspan Insulation's BES 6001 certificate can be obtained.

BES 6001
Responsible Sourcing
www.greenbooklive.com

Sustainability & Responsibility

Kingspan Insulation has a long–term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; as a substantial landholder; and as a key member of its neighbouring communities.

A report covering the sustainability and responsibility of Kingspan Insulation Ltd's British operations at its Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is available at www.kingspaninsulation.co.uk/sustainabilityandresponsibility.

Specification Clause

Kingspan **Kool**therm® K118 Insulated Plasterboard should be described in specifications as:–

The wall dry–lining insulation shall be *Kingspan* **Kool**therm® K118 Insulated Plasterboard____ mm thick: comprising a premium performance rigid thermoset fibre–free phenolic insulation core with 12.5 mm plasterboard bonded to its front surface and a low emissivity composite foil facing on its reverse surface. The product shall have a thermal conductivity of 0.018 W/m·K. The product shall be manufactured: with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP); under a management system certified to ISO 9001: 2015, ISO 14001: 2015; BS OHSAS 18001: 2007 and ISO 50001: 2011; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

NBS Specifications

Details also available in NBS Plus.
NBS users should refer to clause(s):
K10 145, K10 155, K10 165,
K10 175, K10 205, K10 415
(Standard and Intermediate)
K10 15, K10 35, K10 41 (Minor Works)

Design Considerations

Design Standards

BS 8212: 1995 (Code of practice for dry lining and partitioning using gypsum plasterboard) should be considered.

Fixing Methods

Kingspan **Kool**therm® K118 Insulated Plasterboard can be installed utilising either mechanical fixing or adhesive techniques.

Limitations

Kingspan **Kool**therm® K118 Insulated Plasterboard has a gypsum plasterboard face. It should, therefore, not be used to isolate dampness, nor be used in continuously damp or humid conditions.

When fixing *Kingspan* **Kool**therm® K118 Insulated Plasterboard to walls, the boards are normally fixed with their long edges vertical. Boards may be fixed horizontally with an increased number of timber noggins, metal fixing straps or fixing T's. For ceilings, the boards must be installed with the long edge running perpendicular to the joists or rafters (see 'Sitework – Mechanical Fixing – To Timber Framing Studs / Battens').

Fire Stops

Current Building Regulations / Standards should be considered with regard to the requirements for and provision of fire stops.

Water Vapour Control / Condensation

Consideration should be given to the risk of condensation, when designing thermal elements.

When internally lining a construction with insulation, condensation can be controlled by ensuring there is a layer of high vapour resistance on the internal surface of the construction. *Kingspan* **Kool**therm® K118 Insulated Plasterboard contains an integral vapour control layer and, when installed correctly, with appropriate detailing at joints between sheets, penetrations and wall perimeters, can provide the necessary vapour resistance. If required, the vapour resistance of the wall lining can be increased by the application of two coats of Gyproc Drywall Sealer.

A condensation risk analysis should be carried out following the procedures set out in BS 5250: 2011 + A1: 2016 (Code of practice for control of condensation in buildings). The Kingspan Insulation Technical Service Department (see rear cover) can provide this service.

Sitework

Preparation

- The existing structure should be surveyed to ensure the construction is capable of supporting the weight of the internal wall system, ancillary items and any post–installation fittings.
- Existing wallpaper, skirting, picture rails, gloss paint and projecting window boards may need to be removed. Some internal finishes, such as vinyl wallpaper or gloss paint, can be scored or sanded as an alternative method to removal.
- The wall surface should be clean, stable and free from dust, contamination and loose or friable materials.
- The amount of preparation and removal required will be dependent on the chosen internal wall system.
- Check the structure is dry. Remedial work should be undertaken to remove dampness before installation of the internal wall insulation. Internal wall insulation must not be used to isolate dampness.
- Ensure there are no gaps at the perimeter (including floors, ceilings, internal corners or junctions), or around openings or service penetrations. For optimum airtightness, existing gaps should be sealed using a continuous fillet of drywall adhesive or flexible sealant, before wall lining commences.
- Positions for all new services should be determined. Existing services should be assessed to determine any alterations that may need to be made, for example relocating sockets and switches. Wall mounted fixings, such as electrical sockets, should be fitted to take into account the additional wall lining thickness.
- New wall linings must be designed to accommodate the thickness of the new insulated dry lining solution, particularly at reveals, heads, sills and in relation to ceiling height.

Mechanical Fixing

To Timber Framing Studs / Battens

- This method may be used on timber frame constructions or on dry, stable constructions capable of supporting battens and associated fixings. Timber battens can be packed out using proprietary shims to correct alignment and provide a space to accommodate services.
- Guidelines should be marked out at maximum 600 mm centres to indicate the positioning of the vertical battens.
- Vertical timber framing studs / battens should be set at maximum 600 mm horizontal centres, around the perimeter of the walls, at floor and ceiling, and around any openings and services which penetrate the system.
- If fixing to battens, they should be mechanically fixed to the wall, and comprise 25 x 47 mm (min.) treated softwood, backed with a strip of damp proof course (DPC).
- Each sheet of *Kingspan* **Kool**therm® K118 Insulated Plasterboard should lap timber framing studs / battens / noggins by 19 mm (min.) at sheet joints.
- Battens should be fixed approximately 75 mm from the ends of each timber batten and positioned at a maximum 600 mm apart.
- Where joints between sheets of insulated plasterboard are unsupported by the timber framing studs / battens, timber noggins should be installed.
- Each sheet of insulated plasterboard should be lightly butted, with fixings located no less than 10 mm from the bound edges of the sheet.
- *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be cut approximately 5 mm short of the floor to ceiling height.
- Sheets of *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be located centrally over the timber studs / battens and fixed using either drywall screws at 300 mm centres (or 200 mm at external corners), or large headed galvanised clout nails at 150 mm centres. Each sheet of insulated plasterboard should be lightly butted.
- When installing sheets onto timber, fixings should be long enough to allow minimum 25 mm penetration of the timber frame or minimum 22.5 mm penetration of the the timber battens. Fixings should not penetrate through the battens.
- Fixings should be driven straight, with the heads embedded just below the surface of the plasterboard.
- Care should be taken not to overdrive nails / screws.
- The perimeter of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard and the 5 mm clearance gap at the base of the wall should be sealed with a flexible sealant or equivalent.

To Metal Wall Liner Systems

- This method may be used on any dry, stable constructions capable of supporting the stand–off brackets, tracks and associated fixings. It can be used to correct substantial substrate irregularities, or where a larger cavity is required to accommodate services.
- Because metal framing systems are proprietary, sitework guidance should be sought from the framing system manufacturer.
- However, in the absence of any other guidance, the instructions laid out below may be followed.
- The maximum undulation on the wall or service protrusion should be measured to determine the required cavity depth.
- Guidelines should be marked out on the floor and ceiling to indicate where the metal tracks will be positioned.
- The metal tracks should be fixed to the floor, ceiling and perimeters at a maximum of 600 mm centres using appropriate fixings for the proprietary system.
- Vertical guidelines should be marked out on the wall at a maximum 600 mm centres to indicate the position of the lining channels. Horizontal marks should also be made at 800 – 900 mm vertical centres (see manufacturers details for specific dimensions) to indicate the fixing points for the individual stand–off brackets. Brackets should be fixed using appropriate fixings.
- The lining channels should be fitted and fixed into the metal tracks at ceiling and floor level at a maximum of 600 mm centres, in line with the stand–off bracket positions, using appropriate fixings for the proprietary system, extending if required.
- Bracket legs on the stand–off brackets should be bent forward. Screws should then be inserted through holes in the brackets and fixed to the lining channels using appropriate fixings, such as 13 mm wafer headed drywall screws or jack point screws. Bracket legs can then be bent back to sit clear of the channel face.
- At internal angles or corner, a lining channel or track should be positioned tight into the corner to provide support for the lining.
- Fixing straps or fixing T's should be used to secure unsupported board joints. Metal channels or tracks should also be positioned around the perimeter of openings to support the board.
- *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be cut approximately 5 mm short of the floor to ceiling height.

- *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be located centrally over the metal lining channels and fixed using self–tapping drywall screws at 300 mm centres (or 200 mm at external corners). Each sheet of insulated plasterboard should be lightly butted.
- Fixings should be located no less than 10 mm from bound edges of the sheet, and be long enough to allow minimum 10 mm penetration of the metal.
- Fixings should be driven straight, with the heads embedded just below the surface of the plasterboard.
- Care should be taken not to overdrive screws.
- The perimeter of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard and the 5 mm clearance gap at the base of the wall should be sealed with a flexible sealant or equivalent.

Adhesive Bonding

Drywall Adhesive Dab Bonding

- This method is suitable for use on brick, block or concrete cavity or rendered solid walls, which are dry, stable and free from moisture penetration.
- This method is not suitable for use directly on non–rendered solid masonry walls where there is a risk of moisture penetration, or on timber or steel frame construction.
- The cavity formed by the dabs can be used to incorporate services less than 25 mm in depth. Alternatively, minimum chasing of the background will be required.
- Minor irregularities of the substrate can be corrected within the dab depth. Typically, gypsum based adhesive should be applied in dabs of 10 – 25 mm thickness, therefore the existing substrate should not exceed a 15 mm tolerance from the high spot of the background to either end of the wall.
- A bonding agent may be required on the substrate to reduce suction or improve mechanical key. This should be applied in continuous bands to correspond with the drywall adhesive dab or band locations.
- A total distance of 10 mm plus the thickness of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be allowed for from the wall's high point. A line should then be drawn across the floor. This should be plumbed for alignment before transferring the line to the ceiling and extending the line to the room corners. Guidelines should also be marked out vertically on the walls at 1,200 mm horizontal centres to indicate where the edges of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard should finish.
- There are many suitable adhesives that can be used. Please see Table 1 for details.

Suitable Adhesive	Bonding Agent to be Applied to the Insulation	No. of Appropriate Secondary Fixings Required
Knauf Drywall Plasterboard Adhesive	No	2
GTEC Universal Bonding Compound	Yes	6
British Gypsum Gyproc DriWall Adhesive	Yes	6
All Other Brands Not Listed	Yes	6

Table 1 – Adhesive Options for Drywall Adhesive Dab Bonding

- The drywall adhesive should be appropriate for use on the intended masonry substrate. Advice should be sought from the drywall adhesive manufacturer for its recommended system.
- *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be cut approximately 15 mm short of the floor to ceiling height.
- Some adhesives will require an additional bonding agent to be applied to the insulation (see Table 1). Suitable bonding agents such as Thistle Bond-It or PVAc should be used. PVAc bonding agents should conform to BS 5270-1: 1989 (Bonding agents for use with gypsum plasters and cement. Specification for polyvinyl acetate (PVAC) emulsion bonding agents for indoor use with gypsum building plasters).
- If required, one coat of undiluted bonding agent is to be applied with a roller onto the surface of the insulation foil facer on the reverse of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard, in bands of minimum 150 mm wide around the perimeter and also down the centre of the board (to coincide with the positioning of the dabs of adhesive) (see Figure 5).

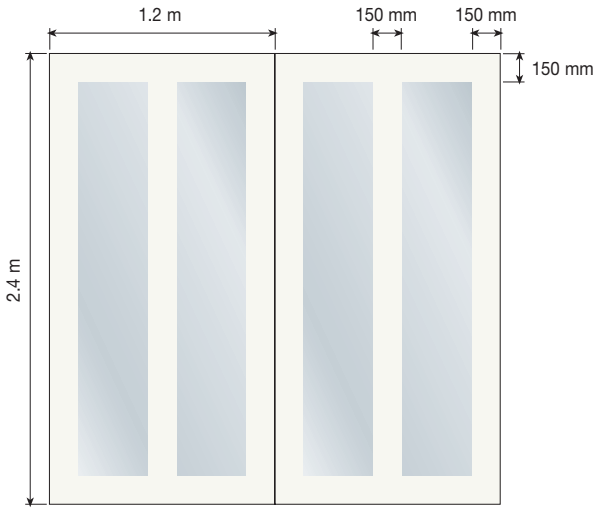


Figure 5 – A Bonding Agent Should be Applied Around the Perimeter and Down the Centre of the Board

- A continuous band of drywall adhesive is applied around the perimeter of each wall and around any openings or services, in order to support the insulation board edges and act as a fire stop / cavity barrier if required.
- The adhesive adjacent to the board joints should be applied approximately 25 mm in from the edge of the boards to avoid bridging the joint.
- Adhesive dabs are generally applied to the background in three vertical rows, but a minimum of 20% of the insulated plasterboard area should be covered with adhesive. Each drywall adhesive dab should be 50 to 75 mm wide and approximately 250 mm long, positioned vertically at approximately 300 mm centres and horizontally at 600 mm centres.

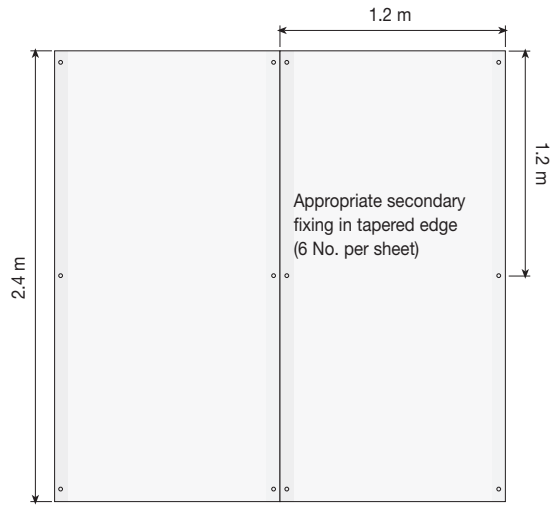


Figure 6 – Appropriate Secondary Fixing Pattern for Drywall Adhesive Dab Bonding Using 6 Additional Fixings (See Figure 7 for the Appropriate Secondary Fixing Pattern when using 2 Additional Fixings)

- Fixings should be long enough to allow minimum 25 mm penetration into the fair faced masonry.
- Fixings should be driven straight, with the heads embedded just below the surface of the plasterboard.
- Care should be taken not to overdrive screws.
- Each sheet of insulated plasterboard should be lightly butted.
- The perimeter of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be sealed. The 15 mm clearance gap at the base of the wall should be sealed with a combination of flexible polyurethane foam and flexible sealant or equivalent.

Acrylic Sealant / PU Foam Adhesive Bonding

- This method is suitable for use on flat brick, block or concrete cavity or rendered solid walls, which are dry, stable and free from moisture penetration.
- This method is also suitable for use on linings such as lath and plaster, plaster or plasterboard, providing the existing structure is dry, stable and free from moisture penetration.
- This method is not suitable for use directly on non–rendered solid masonry walls where there is a risk of moisture penetration.
- In order to provide sufficient space for services, the background will need to be chased out, unless the services exist within the wall or are contained within the lining framework cavity. Existing services should be assessed to determine any alterations that may need to be made, for example relocating sockets and switches.
- The existing substrate should be within a 5 mm tolerance when measured with a 2,000 mm straight edge. A total distance of 2-3 mm plus the thickness of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be allowed for from the wall's high point. A line should then be drawn across the floor. This should be plumbed for alignment before transferring the line to the ceiling and extending the line to the room corners.
- Guidelines should be marked out on the walls at 1,200 mm horizontal centres to indicate where the edges of *Kingspan* **Kool**therm® K118 Insulated Plasterboard should finish.
- *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be cut approximately 15 mm short of the floor to ceiling height.
- There are many suitable adhesives that can be used. Please see Table 2 for details.

Fixing Method	Suitable Adhesive	Bonding Agent to be Applied to the Insulation	No. of Appropriate Secondary Fixings Required
Acrylic Sealant Adhesive	Firetherm Intumastic ADL	No	2
Acrylic Sealant Adhesive	Geocel QUICKGRIP SUPERGRAB	No	2
PU Foam Adhesive	Dow INSTA-STIK MP	No	2

Table 2 – Adhesive Options for Acrylic Sealant / PU Foam Adhesive Bonding

Sitework

- Acrylic sealant adhesive should be gun–applied to the wall or back of the board in blobs at 300 mm centres, horizontally and vertically.
- PU foam adhesive should be gun-applied to the wall or back of the board in continuous beads 20 – 25 mm wide. A minimum of 3 vertical beads should be applied per board (unless otherwise stated by the PU foam adhesive manufacturer). A continuous bead of PU foam adhesive should also be applied horizontally at the top and the bottom of the board.
- The adhesive adjacent to the board joints should be applied approximately 25 mm in from the edge of the boards to avoid bridging the joint.
- The boards should be lifted tight to the ceiling using a foot–lifter and supported by the packing strips until the adhesive sets. If the wall height exceeds 2,400 mm, start from the bottom of the wall, working upwards, to allow boards to be held on the lower level of the wall and prevent any boards from sliding down.
- The boards should then be tapped back to align with the predetermined guidelines on the floor and ceiling. The use of a spirit level is recommended to provide a vertical plumb finish.
- Once the adhesive has set, appropriate secondary fixings should be used in addition to the adhesive.
- These are normally applied at a rate of 2 No. per sheet, 15 mm in from the edge of the sheet, after the adhesive has set (see Figure 7).

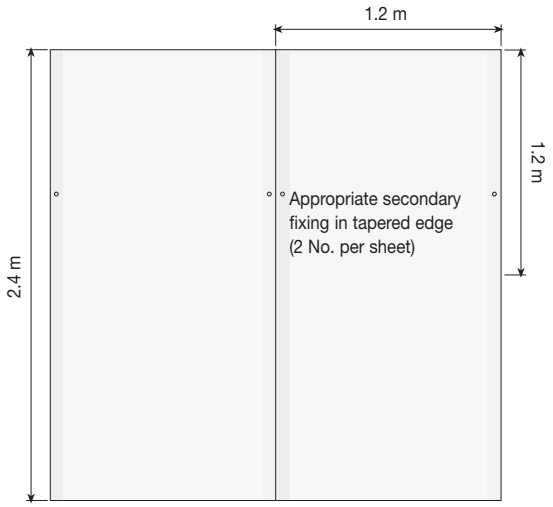


Figure 7 – Appropriate Secondary Fixing Pattern for Acrylic Sealant / PU Foam Adhesive Bonding

- It is recommended that appropriate secondary fixings are positioned in the tapered edge of the sheets so that they are covered when the board is finished (e.g. joints taped and 3 mm skim coating). The number of appropriate secondary fixings is specified in Table 2.
- Fixings should be long enough to allow minimum 25 mm penetration into the masonry (excluding plaster). If a lining exists, fixings should be long enough to allow minimum 25 mm into the timber or 10 mm into the metal framework (excluding plasterboard or lath and plaster).
- Fixings should be driven straight, with the heads embedded just below the surface of the plasterboard.
- Care should be taken not to overdrive screws.
- Each sheet of insulated plasterboard should be lightly butted.
- The perimeter of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be sealed. The 15 mm clearance gap at the base of the wall should be sealed with a combination of flexible polyurethane foam and flexible sealant or equivalent.

To Timber Joists or Rafters

- Sheets of *Kingspan* **Kool**therm® K118 Insulated Plasterboard may be used to line ceilings (see Figure 8).

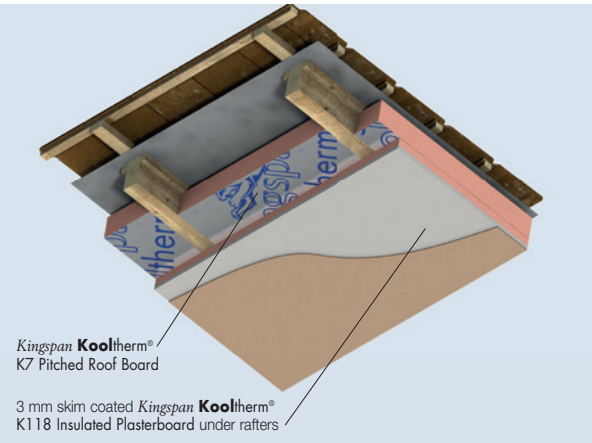


Figure 8 – Mechanically Fixed to Timber Rafters with *Kingspan* **Kool**therm® K7 Pitched Roof Board Between Rafters

- Sheets must always be placed with the long edge running across the joists or rafters, and all edges must be supported.
- Where joints between sheets of insulated plasterboard are unsupported by the timber joists / rafters, timber noggins should be installed.
- Each sheet of insulated plasterboard should lap joists / rafters / noggins by 19 mm (min.) at sheet joints.
- Sheets should be fixed using either drywall screws at 230 mm centres, or large–headed galvanized clout nails placed at 150 mm centres.
- Each sheet of insulated plasterboard should be lightly butted, with fixings located no less than 10 mm from the bound edges of the sheet. Fixings should be long enough to allow a minimum 25 mm penetration of the timber.
- Fixings should be driven straight, with the heads embedded just below the surface of the plasterboard.
- Care should be taken not to overdrive nails / screws.
- The perimeter of the *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be sealed with a flexible sealant or equivalent.

Fixing Heavy Internal Fittings

- Suitable mechanical fixings should be used for heavy internal fittings (kitchen units, shelving etc), to ensure the load is applied direct to the supporting wall and not to the *Kingspan* **Kool**therm® K118 Insulated Plasterboard.

For details on fixings refer to:

Tiger Fixings www.tigerfixings.com	+44 (0) 8456 038 877
MAK Fasteners www.makfasteners.com	+353 (0) 1 451 99 00
Fischer Fixings www.fischer.ie	+353 (0) 1 642 6700

- Alternatively, where there are to be extensive heavy internal fittings, the construction outlined in Figure 9 can be adopted.

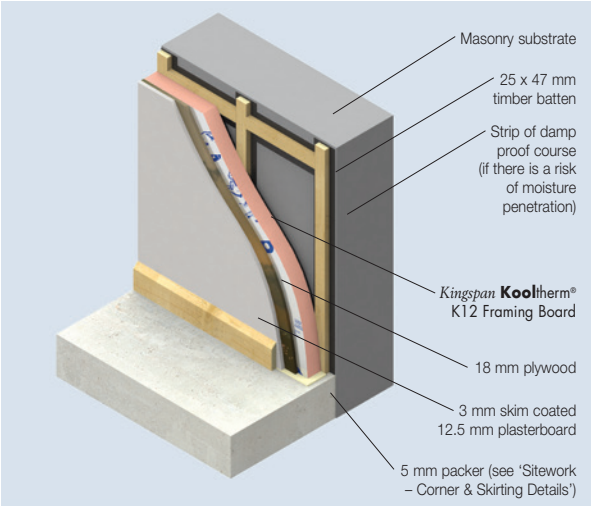


Figure 9

- Vertical timber framing studs / battens should be set at maximum 600 mm horizontal centres.
- If fixing to battens, they should be mechanically fixed to the wall, and comprise 25 x 47 mm (min.) treated softwood, backed with a strip of damp proof course (DPC).
- *Kingspan* **Kool**therm® K12 Framing Board should be cut approximately 5 mm short of the floor to ceiling height.
- Where insulation board joints are unsupported by the timber framing studs / battens, timber noggins should be installed.

Sitework

- Each insulation board should lap timber framing studs / battens / noggins by 19 mm (min.) at board joints.
- Boards of *Kingspan* **Kool**therm® K12 Framing Board should be temporarily fixed / nailed to timber framing studs / battens.
- 18 mm plywood should then be fixed through insulation boards to the timber framing studs / battens, using either drywall screws at 300 mm centres, or large headed galvanised clout nails at 150 mm centres.
- When fixing plywood through the insulation boards onto timber battens, fixings should be located no less than 10 mm from the bound edges of the sheets, and be long enough to allow minimum 22.5 mm penetration of the timber. Fixings should not penetrate through the battens.
- When fixing plywood through the insulation boards onto a timber frame, fixings should be located no less than 10 mm from the bound edges of the sheets, and be long enough to allow a minimum 25 mm penetration of the timber.
- Fixings should be driven straight, with the heads embedded just below the surface of the plywood.
- 12.5 mm plasterboard is then fixed to the plywood, using either drywall screws at 300 mm centres, or large headed galvanised clout nails at 150 mm centres.
- Fixings should be driven straight, with the heads embedded just below the surface of the plasterboard.
- Care should be taken not to overdrive nails / screws.
- The 5 mm clearance gap at the base of the wall should be sealed with a flexible sealant or equivalent.
- Heavy fittings can be fixed through the plasterboard directly to the plywood.

Corner & Skirting Details

- For external corners (including reveals), the lining should run past the corner and the insulating backing of *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be cut back to create a junction (see Figures 10 & 12). Sheets should be cut and rebated to allow a plasterboard / plasterboard joint at the angle (see Figures 10 & 11).
- Ensure sheets are lightly butted and air gaps minimised to reduce the risk of cold bridging (see Figures 10 & 12). Any air gaps should be sealed with flexible sealant or equivalent, or a combination of flexible polyurethane foam and flexible sealant or equivalent.

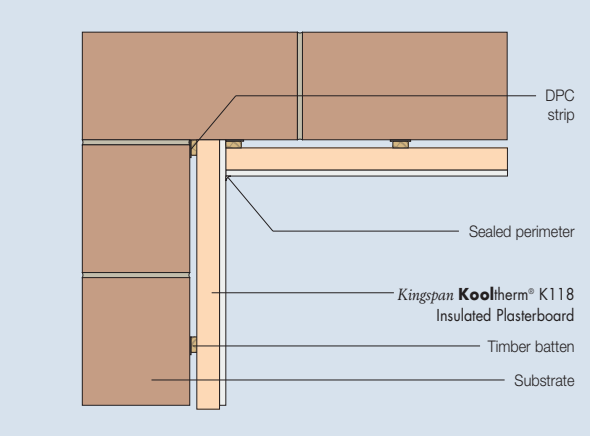


Figure 10 – Internal Corner Detail

- For mechanically fixed applications, a 5 mm packer should be used at the base of the wall to provide a level surface from which to build up the boards.
- For adhesively bonded applications, a 15 mm packer should be used at the base of the wall to provide a level surface from which to build up the boards.
- The packer should be replaced with a flexible / sealant or equivalent (for 5 mm gaps), or with a combination of flexible polyurethane foam and flexible sealant or equivalent (for 15 mm gaps) (see Figure 11).

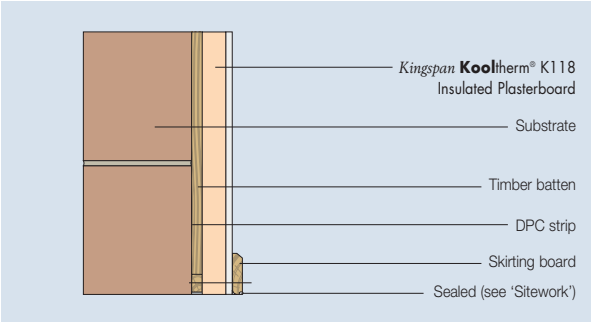


Figure 11 – Packer and Skirting Detail

Window / Door Reveals, Separating / Internal Walls & Soffit / Head Details

- Reveal lining can be either bonded in place or mechanically fixed. Secondary fixings should be used when bonding the lining in place.
- If the main wall lining has been installed using timber battens / studs or metal framing, then the reveal linings can still be bonded, providing the secondary fixings are installed into the timber battens / studs or metal studs, either side of the opening and to the head and sill of the opening.
- A 32.5 mm sheet of *Kingspan* **Kool**therm® K118 Insulated Plasterboard should be used to line the window or door reveals. Where the depth of the window or door frames does not allow for this, the reveal can be cut back or the existing lining can be removed.
- The junction of the external wall and separating / internal wall should also be insulated with 32.5 mm (min.) of *Kingspan* **Kool**therm® K118 Insulated Plasterboard, for a minimum distance of 400 mm back from the external all lining.

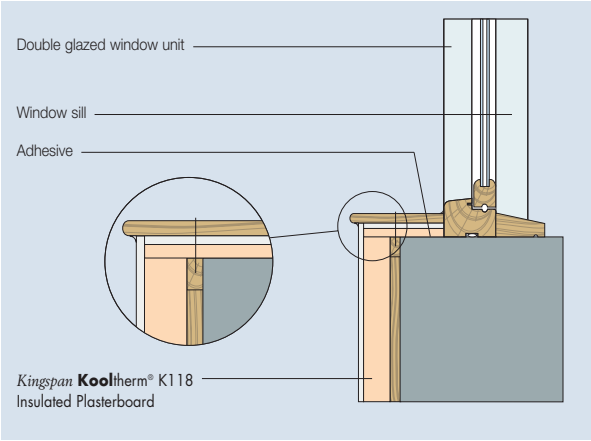


Figure 12 – Insulated Reveal and External Corner

Finishing

- To avoid air leakage, any penetrations through the insulation (electrical sockets, plumbing and wiring etc) should be sealed with flexible sealant or equivalent, or a combination of flexible polyurethane foam and flexible sealant or equivalent.
- Any remaining gaps between boards / sheets of insulation should be filled with flexible sealant or equivalent, or a combination of flexible polyurethane foam and flexible sealant or equivalent.
- Tapered edged boards allow the employment of standard dry–lining techniques.
- Plasterboard tape should be employed at all board joints, and a plaster skim finish applied.
- The skimming should be carried out in accordance with the specified plaster manufacturer's instructions, particularly in relation to the need to allow thorough drying of the plaster prior to decoration.

Sitework

General

Cutting

- Cutting should be carried out either by using a fine toothed saw, or by using a sharp knife to cut through the insulation and paper backing of the plasterboard, then snapping the sheet face down over a straight edge and cutting the paper facing of the plasterboard on the other side.
- Ensure accurate trimming to achieve close butting joints and continuity of insulation.

Availability

- *Kingspan* **Kool**therm® K118 Insulated Plasterboard is available through specialist insulation distributors and selected builders' merchants throughout the UK and Ireland.

Packaging and Storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Ideally sheets should be stored inside a building. If, however, temporary outdoor storage cannot be avoided then the sheets should be stacked flat on a level base, clear of the ground, and completely protected from inclement weather by use of an opaque polythene sheet or weatherproof tarpaulin. Sheets that have been allowed to get wet should not be used.

Health and Safety

- Kingspan Insulation products are chemically inert and safe to use.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website www.kingspaninsulation.co.uk/safety or www.kingspaninsulation.ie/safety.

Please note that the reflective surfaces on this product are designed to enhance its thermal performance. As such, they will reflect light as well as heat, including ultraviolet light. Therefore, if this product is being installed during very bright or sunny weather, it is advisable to wear UV protective sunglasses or goggles, and if the skin is exposed for a significant period of time, to protect the bare skin with a UV block sun cream.

The reflective facings used on this product can be slippery when wet. Therefore, it is recommended that any excess material should be contained to avoid a slip hazard.

Warning – do not stand on or otherwise support your weight on this product unless it is fully supported by a load bearing surface.

Product Details

The Front Facing

The front facing of *Kingspan* **Kool**therm® K118 Insulated Plasterboard is an A2,s1,d0 Euroclass tapered edge gypsum based plasterboard which readily accepts dry–jointing materials and plaster skim.

The Core

The core of *Kingspan* **Kool**therm® K118 Insulated Plasterboard is a premium performance rigid thermoset fibre–free phenolic insulant manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Fibre-free Core

The Reverse Face

The reverse facing of *Kingspan* **Kool**therm® K118 Insulated Plasterboard is a low emissivity composite foil, autohesively bonded to the insulation core during manufacture. This reflective, low emissivity surface improves the thermal resistance of any unventilated cavity adjacent to the product.

Standards & Approvals

Kingspan **Kool**therm® K118 Insulated Plasterboard is manufactured to the highest standards under a management system certified to ISO 9001: 2015 (Quality Management Systems. Requirements), ISO 14001: 2015 (Environmental Management Systems. Requirements), BS OHSAS 18001: 2007 (Occupational Health & Safety Management Systems. Requirements) and ISO 50001: 2011 (Energy Management Systems. Requirements with guidance for use).

The use of *Kingspan* **Kool**therm® K118 Insulated Plasterboard is covered by BBA Certificate 16/5299 and by LABC Registered Details Certificate No. EWWS545J.

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 16/5299

registered LABC Registered Details

Standard Dimensions

Kingspan **Kool**therm® K118 Insulated Plasterboard is available in the following standard size:

Nominal Dimension		Availability
Length	(m)	2.4
Width	(m)	1.2
Plasterboard Thickness	(mm)	12.5
Insulant Thickness	(mm)	Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Compressive Strength

The compressive strength of *Kingspan* **Kool**therm® K118 Insulated Plasterboard typically exceeds 100 kPa at 10% compression, when tested to BS / I.S. EN 826: 2013 (Thermal insulating products for building applications. Determination of compression behaviour).

Water Vapour Resistance

Adjusted for the effect of board joints, the non–plasterboard component of the product typically achieves a resistance far greater than 100 MN·s/g, when tested in accordance with BS / I.S. EN 12086: 2013 (Thermal insulating products for building applications. Determination of water vapour transmission properties). For the purposes of calculation of condensation risk, the resistivity of the plasterboard component of the product should be taken as 50 MN·s/g·m.

Durability

If correctly installed, *Kingspan* **Kool**therm® K118 Insulated Plasterboard can have an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

Resistance to Solvents, Fungi & Rodents

The insulation core is resistant to short–term contact with petrol and with most dilute acids, alkalis and mineral oils. However, it is recommended that any spills be cleaned off fully before the boards are installed. Ensure that safe methods of cleaning are used, as recommended by the suppliers of the spilt liquid. The insulation core is not resistant to some solvent–based adhesive systems, particularly those containing methyl ethyl ketone. Adhesives containing such solvents should not be used in association with this product. Damaged boards or boards that have been in contact with harsh solvents or acids should not be used.

The insulation core and facings used in the manufacture of *Kingspan* **Kool**therm® K118 Insulated Plasterboard resist attack by mould and microbial growth and do not provide any food value to vermin.

Fire Performance

Kingspan **Kool**therm® K118 Insulated Plasterboard achieves European Classification (Euroclass) B-s1,d0 when classified to EN 13501-1: 2018 (Fire classification of construction products and building elements. Classification using data from reaction to fire tests).

Kingspan **Kool**therm® K118 Insulated Plasterboard, when subjected to EN ISO 5659-2: 2012 (Plastics. Smoke generation. Part 2: Determination of optical density by a single-chamber test), has achieved a mean maximum specific optical density of smoke < 200 in both the presence and absence of a pilot flame at irradiances of 25 and 50 kW/m^2.

Further details of the fire performance of Kingspan Insulation products may be obtained from the Kingspan Insulation Technical Service Department (see rear cover).

Thermal Properties

The λ–values and R–values detailed below are quoted in accordance with BS / I.S. EN 13166: 2012 + A2: 2016 (Thermal insulation products for buildings. Factory made phenolic foam (PF) products. Specification).

Thermal Conductivity

The thermal conductivity (λ–value) of the plasterboard component of *Kingspan* **Kool**therm® K118 Insulated Plasterboard is 0.19 W/m·K.

The thermal conductivity (λ–value) of the insulation core of *Kingspan* **Kool**therm® K118 Insulated Plasterboard is 0.018 W/m·K.

Thermal Resistance

Thermal resistance (R–value) varies with the thickness of each component. It is calculated by dividing the thickness of each component (expressed in metres) by its thermal conductivity, followed by adding the resulting figures together. The sum is rounded down to the nearest 0.05 (m^2·K/W).

*Product Thickness (mm)	Thermal Resistance (m^2·K/W)
32.5	1.15
37.5	1.45
42.5	1.70
47.5	2.00
52.5	2.25
57.5	2.55
62.5	2.80
67.5	3.10
72.5	3.35
82.5	3.95
87.5	4.20
92.5	4.50
102.5	5.05
112.5	5.60
122.5	6.15

** Product thickness = insulation thickness + 12.5 mm plasterboard.*

NB Refer to local distributor or Kingspan Insulation price list for current stock and non–stock sizes.

Contact Details

Customer Service

For quotations, order placement and details of despatches please contact the Kingspan Insulation Customer Service Department on the numbers below:

UK – Tel: +44 (0) 1544 388 601
– email: customerservice@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 979 5000
– email: info@kingspaninsulation.ie

Literature & Samples

Kingspan Insulation produces a comprehensive range of technical literature for specifiers, contractors, stockists and end users. The literature contains clear user friendly advice on typical design; design considerations; thermal properties; sitework and product data.

For copies please contact the Kingspan Insulation Marketing Department, or visit the Kingspan Insulation website, using the details below:

UK – Tel: +44 (0) 1544 387 384
– email: literature@kingspaninsulation.co.uk
– www.kingspaninsulation.co.uk/literature

Ireland – Tel: +353 (0) 42 979 5000
– email: info@kingspaninsulation.ie
– www.kingspaninsulation.ie/literature

Tapered Roofing

For technical guidance, quotations, order placement and details of despatches please contact the Kingspan Insulation Tapered Roofing Department on the numbers below:

UK – Tel: +44 (0) 1544 387 383
– email: tapered@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 975 4297
– email: tapered@kingspaninsulation.ie

Technical Advice / Design

Kingspan Insulation supports all of its products with a comprehensive Technical Advisory Service. Calculations can be carried out to provide U–values, condensation / dew point risk, required insulation thicknesses etc…

U–value calculations can also be carried out on the Kingspan Insulation U–value Calculator, available for free online at www.uvalue-calculator.co.uk or downloaded as an App.

The Kingspan Insulation Technical Service Department can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

The Kingspan Insulation British Technical Service Department operates under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U–value and Condensation Risk Calculations.

BBA CERTIFICATE CS/1004-4 U Value Competency Scheme

Please contact the Kingspan Insulation Technical Service Department on the numbers below:

UK – Tel: +44 (0) 1544 387 382
– email: technical@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 975 4297
– email: technical@kingspaninsulation.ie

General Enquiries

For all other enquiries contact Kingspan Insulation on the numbers below:

UK – Tel: +44 (0) 1544 388 601
– email: info@kingspaninsulation.co.uk

Ireland – Tel: +353 (0) 42 979 5000
– email: info@kingspaninsulation.ie

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