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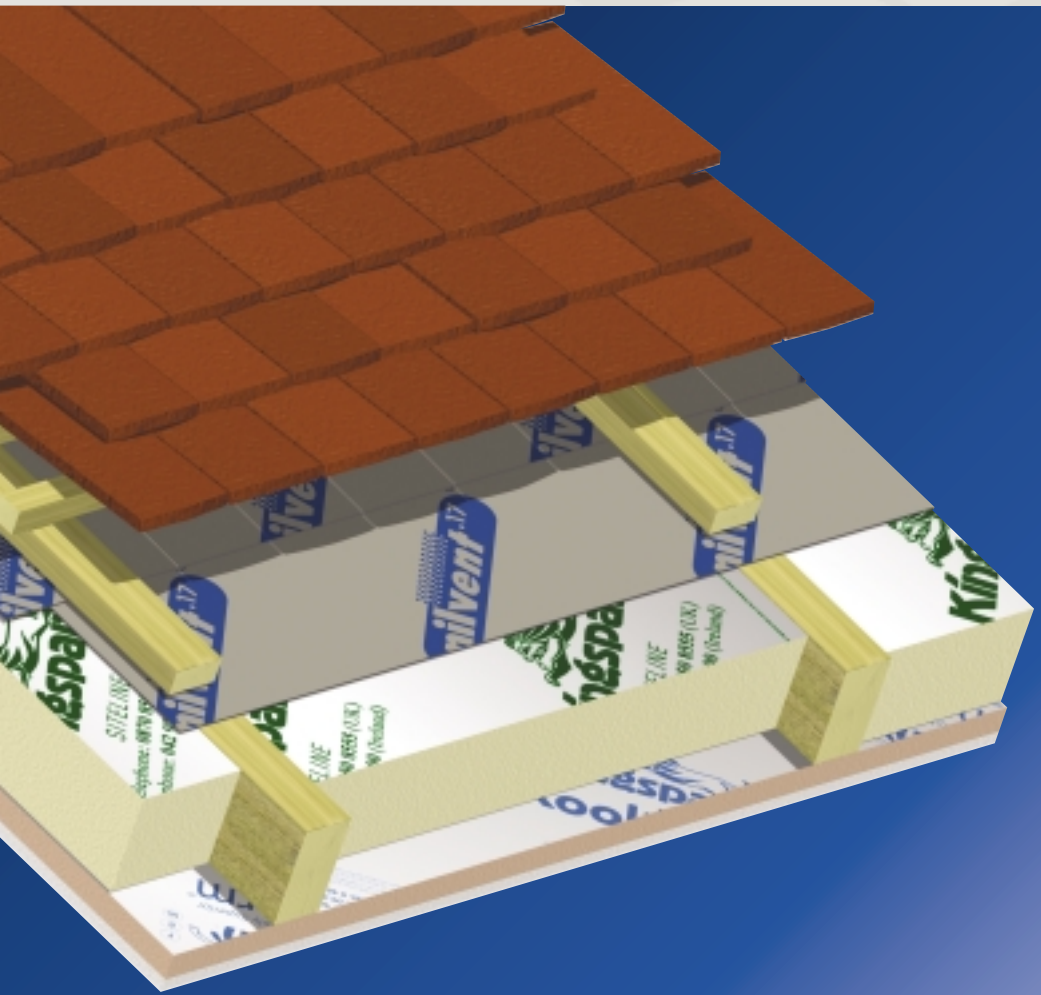
Fifth Issue May 2007

Thermapitch® TP10

RAFTER LEVEL INSULATION FOR TILED OR SLATED PITCHED WARM ROOF SPACES



- High performance rigid urethane insulation – thermal conductivity 0.023 W/m·K
- On average its use creates 15% more usable warm roof space
- Insulation of pipes and tanks is unnecessary
- No condensation risk
- Unaffected by air movement
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build and refurbishment
- Non–deleterious material
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP)

zero o.d.p

BBA BRITISH BOARD OF AGREMENT CERTIFICATE 95/3126

nilflam

Kingspan® Insulation Solutions

Typical Design Details

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

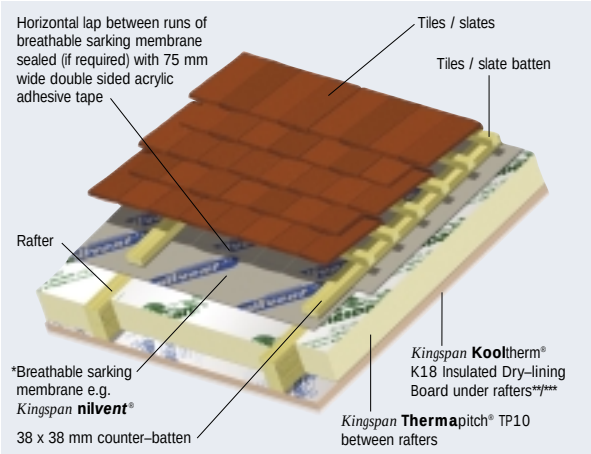


Figure 1a Fully Filled Insulation Between Rafters – No Sarking Board

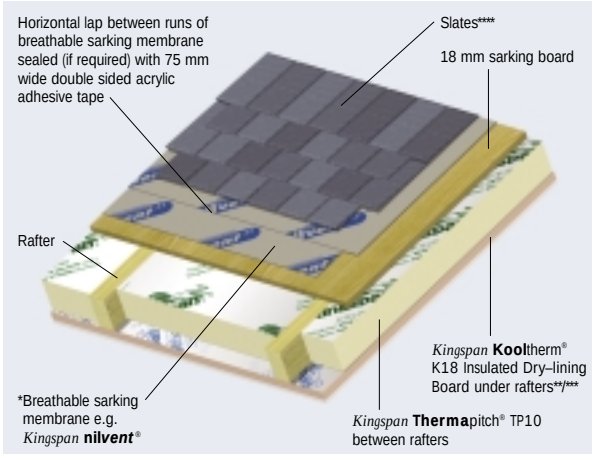


Figure 1b Fully Filled Insulation Between Rafters – 18 mm Sarking Board

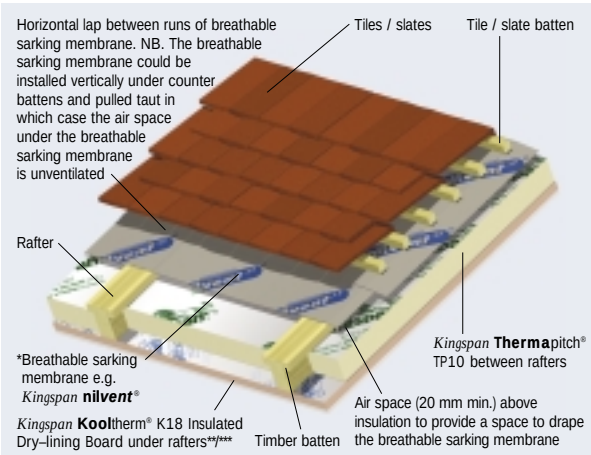


Figure 1c Partially Filled Insulation Between Rafters – No Sarking Board

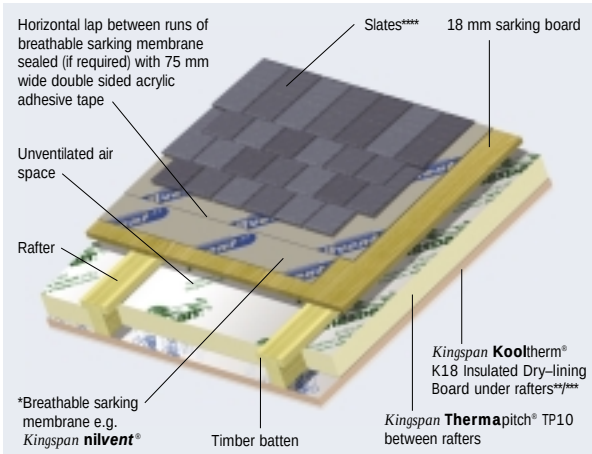


Figure 1d Partially Filled Insulation Between Rafters – 18 mm Sarking Board

Ventilated Insulation Between & Under Rafters (Recommended for Loft Conversion)

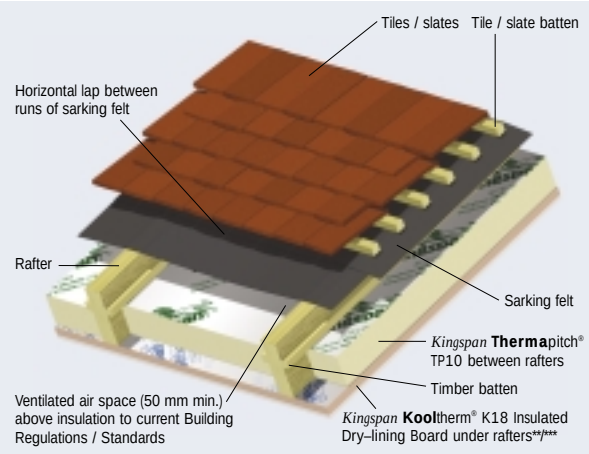


Figure 2a No Sarking Board

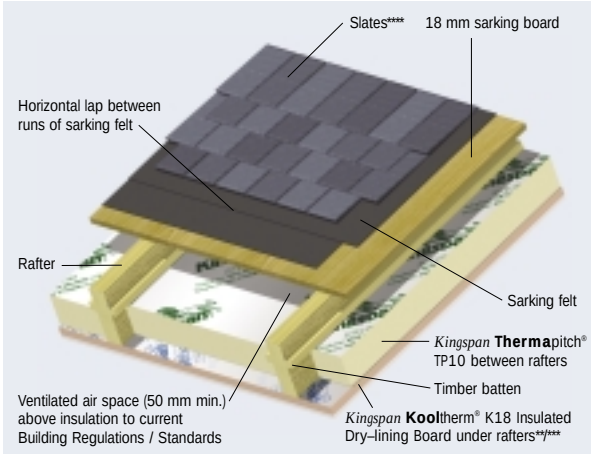


Figure 2b 18 mm Sarking Board

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

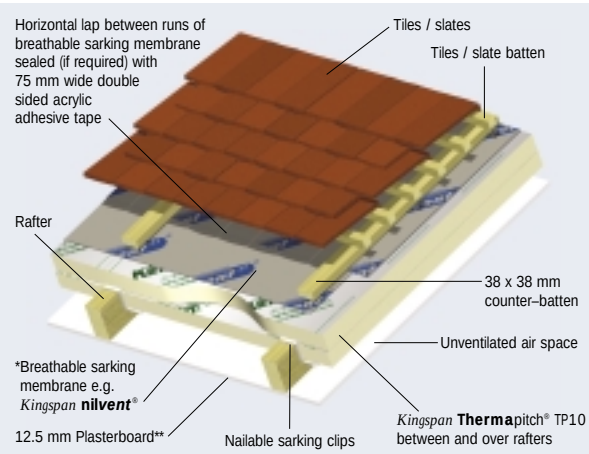


Figure 3a No Sarking Board

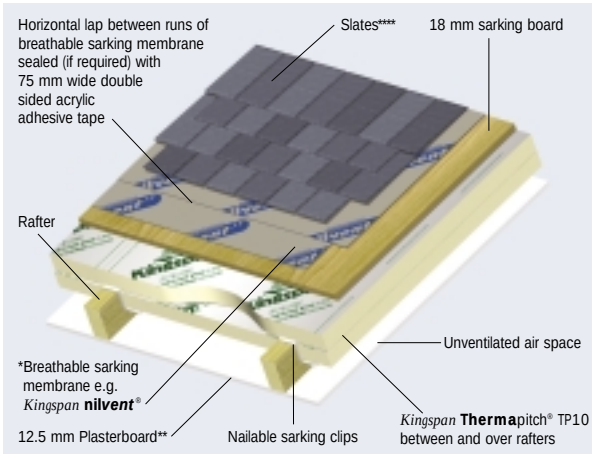


Figure 3b 18 mm Sarking Board

* *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.*

** *The requirement for a vapour control layer and / or under 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® K18 Insulated Dry–lining Board *contains an integral vapour control layer.*

**** *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.*

***** *Suitability recommended by the Kingspan Insulation Technical Service Department (see rear cover).*

Specification Clause

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

The rafter level insulation shall be *Kingspan* **Therma**pitch® TP10 ____mm thick comprising a CFC/HCFC–free rigid urethane insulation core with low emissivity composite foil facings on both sides manufactured to the highest standards in accordance with both the requirements of draft BS 4841–5 and quality control systems approved to BS EN ISO 9001: 2000 / I.S. EN ISO 9001: 2000 by Kingspan Insulation Limited and shall be applied in accordance with the instructions issued by them.

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

Design Considerations

Sustainability

In the past, erroneously, the relative environmental sustainability of insulation materials has been compared on the basis of embodied energy and ozone depletion potential. It is now recognised that a much wider basket of embodied environmental impacts (including those caused by their embodied energy), rather than embodied energy alone, is the only credible tool of comparison. Time has also annulled ozone depletion potential as an issue as all insulation materials are now banned from using CFC and HCFC blowing agents by law.

For buildings designed to today's Building Regulations energy use standards it is now also known that the embodied environmental impacts of all of the materials and labour used to create a building are insignificant in comparison with the lifetime operational environmental impacts of that building, and so are of very limited importance. Since it is operational energy use that creates the vast majority of operational environmental impact, saving energy by specifying the lowest U–values possible is the most environmentally sustainable action to take.

However, one of the most neglected facts about environmentally sustainable buildings is that the longevity of their standards of operational energy use, and therefore the longevity of their operational environmental impacts, is critical. The performance of some insulants, such as mineral fibre, can deteriorate rapidly if exposed to water penetration, air movement or compression. This may increase operational energy use and hence compromise the environmental sustainability of the finished building to an alarming degree. Other insulation materials, such as rigid phenolic or rigid urethane, are not vulnerable to any of these problems.

In summary, designers should:

(a) specify the lowest possible U–value regardless of insulation type;

(b) design out the risk of their chosen insulant not performing as specified; and

(c) if the latter is not possible, choose an insulant that is at low risk of failure e.g. a cellular plastic insulation material.

However, manufacturers should not rest on their laurels; it is a matter of social responsibility to be open and honest about the environmental impact of the manufacture of a product, and a full Life Cycle Analysis (LCA) based on a much wider basket of environmental impacts, rather than embodied energy alone, is recognised as the preferred tool to achieve this. Kingspan Insulation was the first insulation manufacturer to openly complete and publish independently certified Ecoprofiles (a type of LCA) on its product ranges. The Ecoprofile for the *Kingspan* **Therma**™ range of rigid urethane insulation products was performed by Building Research Establishment (BRE). The product range comfortably achieves a BRE Green Guide A rating.

But there is far more to sustainability than whether or not a product, process or company affects the environment in a positive or a negative way. A company can, and should, demonstrate its financial viability and social responsibility, as well as ensure that its materials and methods do not add unduly to the burden placed on the planet.

Kingspan Insulation has now put the manufacture of its products at its Pembridge facility in Herefordshire through a rigorous independent appraisal of its economic, social, environmental and natural resource impacts using Arup's SPeAR® tool.

The results show a well balanced performance in terms of sustainability, and that Kingspan Insulation is already meeting legislation or best practice in most areas, even moving beyond best practice in some. Kingspan Insulation is the first and only construction material manufacturer to have taken this bold move and openly publish the results.

Unventilated (Sealed and Unsealed) and Ventilated Constructions

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

Recent research suggests that the unventilated, sealed roof approach yields a more energy efficient roof as the impacts of ventilation and incidental infiltrating cold air are negated.

Position of Insulation

Dependent on the designed insulation value of the construction and the available rafter depth and headroom, different approaches can be taken. It is recommended to use two layers of insulation to achieve required U–values. The major benefit of two layer systems and the Insulation Over Rafter approach is that thermal bridging caused by the rafter is prevented and the potential for pattern staining in the position of the rafters is completely avoided. The choice may be influenced by the available headroom and concerns over the depth of bargeboards.

Approaches with a layer of insulation over rafter are likely to yield very large fascia boards and so generally, between and under rafter insulation approaches are probably more desirable e.g. Figures 1 and 2.

Note: However, where the choice is for two layers, the layer with the greatest effective R–value should be placed uppermost in order to prevent condensation between the two layers.

Unventilated Roof – Ventilation Considerations
Unventilated roof approaches create a warm pitched roof space, which does not require cross ventilation. Recent research suggests that sealing an unventilated roof yields a more energy efficient roof, as the impacts of ventilation and 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. 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 breather membrane manufacturer.

The requirement for a vapour control layer and / or under–tile ventilation should be assessed to BS 5250: 2002 (Code of practice for control of condensation in buildings). Vapour check plasterboard or a separate vapour control layer can be specified as preferred, if required.

Note: *Kingspan* **Kool**therm® K18 Insulated Dry–lining Board, as used in Figure 1, contains an integral vapour control layer.

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: 2002 (Code of practice for control of condensation in buildings). Vapour check plasterboard or a separate vapour control layer can be specified as preferred, if required.

Note: *Kingspan* **Kool**therm® K18 Insulated Dry–lining Board, as used in Figure 2, contains an integral vapour control layer.

Breathable Sarking Membrane
BS 5250: 2002 recommends that the vapour resistance of the breathable sarking membrane must not exceed 0.60 MN·s/g e.g. *Kingspan* **nil*vent***®.

Position of Breathable Sarking Membrane
The taping of breathable sarking membrane joints 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 slated roof, 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 some cases with a continuous surface (Figures 1a & 3a, and 1b & 3b when counter-battens, tiling battens and tiles replace slates nailed directly into the sarking board) the breathable sarking membrane can be installed over the counter–battens. This yields a marginally better design U–value but it may be more difficult to seal the breathable sarking membrane joints effectively, as the membrane must be draped over the counter–battens in horizontal runs so as to provide a water drainage channel. The air movement allowed by the unsealed membrane may negate the benefit of putting the membrane above the counter–battens.

In situations where there is no continuous surface (Figure 1c), the breathable sarking membrane can be draped over the rafters in horizontal runs to provide a channel for water drainage. In this situation, sealing of the breathable sarking membrane joints will prove difficult.

In roofs with no continuous surface, 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 (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).

Mansard Roofs / Walls
Kingspan **Therma**pitch® TP10 can be used for the construction of insulated tiled or slated mansard roofs / walls. Its application on such contracts is identical to the standard specification, which is given here.

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

Typical U-values

The U–value requirements as detailed in the appropriate Building Regulations / Standards can be easily achieved utilising the appropriate thickness of *Kingspan* **Therma**pitch® TP10. The calculation of U–values for pitched roof insulation purposes is determined by a number of factors:

- whether the loft space be habitable or not;
- whether the ceiling line follows the pitch of the roof, or whether it comprises a flat, horizontal ceiling;
- the pitch of the roof (where a horizontal ceiling is to be used); and
- rafter centres / depth / width.

The following examples have been calculated using the Combined Method for compliance with Building Regulations / Standards revised after 2002. These examples are based on the constructions shown in Figures 1 to 3 with 50 mm wide rafters at 400 / 600 mm centres underlined with 3 mm skim coated *Kingspan* **Kool**therm® K18 Insulated Dry–lining Board, unless otherwise stated.

If your construction is any different, please contact the Kingspan Insulation Technical Service Department (see rear cover).

Combined Method – U–values were calculated using the method which has been adopted to bring National standards in line with the European Standard calculation method, BS / I.S. EN ISO 6946: 1997 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation method).

NB when calculating U–values to BS / I.S. EN ISO 6946: 1997, the type of mechanical fixing used may change the thickness of insulation required. These calculations assume that the over rafter layer, where featured, is fixed using a stainless steel fixing with a cross sectional area 7.45 mm² with 3.7 fasteners per m² (insulant thickness 0–40 mm), 6.2 per m² (insulant thickness 41–60 mm) and 8.3 per m² (insulant thickness 61–80 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 together with condensation risk analysis should be completed for each individual project. Please contact the Kingspan Insulation Technical Service Department (see rear cover) for assistance.

Unventilated – Insulation Between & Under Rafters

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
75	0.25	0.27
100	0.21	0.22
115	0.19	0.20
125	0.18	0.19
150	0.15	0.17
155	0.15	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated Kingspan **Kool**therm® K18 Insulated Dry–lining Board *comprising 12.5 mm plasterboard and 25 mm of insulation of thermal conductivity 0.023 W/m·K.*

NB Thickness shown in the table above is only the between rafter component.

Fully Filled Insulation Between Rafters – No Sarking Board (Fig 1a)

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
75	0.25	0.26
100	0.21	0.22
115	0.19	0.20
125	0.18	0.19
150	0.15	0.17
155	0.15	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated Kingspan **Kool**therm® K18 Insulated Dry–lining Board *comprising 12.5 mm plasterboard and 25 mm of insulation of thermal conductivity 0.023 W/m·K.*

NB Thickness shown in the table above is only the between rafter component.

Fully Filled Insulation Between Rafters – 18 mm Sarking Board (Fig 1b)

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
25	0.37	0.38
30	0.35	0.36
35	0.33	0.34
40	0.31	0.32
45	0.29	0.31
50	0.28	0.29
60	0.26	0.27
65	0.25	0.26
70	0.24	0.25
75	0.23	0.24
80	0.22	0.23
90	0.20	0.22
95	0.20	0.21
100	0.19	0.20
110	0.18	0.19
120	0.17	0.18
125	0.17	0.18
130	0.16	0.17
145	0.15	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated Kingspan **Kool**therm® K18 Insulated Dry–lining Board *comprising 12.5 mm plasterboard and 25 mm of insulation of thermal conductivity 0.023 W/m·K.*

NB Thickness shown in the table above is only the between rafter component.

NB Calculations assume that there is a minimum 25 mm airspace between the rafters above the insulation layer installed between them.

Partially Filled Insulation Between Rafters – No Sarking Board (Fig 1c)

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
25	0.37	0.38
30	0.34	0.36
35	0.33	0.34
40	0.31	0.32
50	0.28	0.29
60	0.26	0.27
65	0.24	0.26
70	0.24	0.25
75	0.23	0.24
80	0.22	0.23
90	0.20	0.22
95	0.20	0.21
100	0.19	0.20
110	0.18	0.19
120	0.17	0.18
125	0.16	0.18
130	0.16	0.17
145	0.15	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated Kingspan **Kool**therm® K18 Insulated Dry–lining Board *comprising 12.5 mm plasterboard and 25 mm of insulation of thermal conductivity 0.023 W/m·K.*

NB Thickness shown in the table above is only the between rafter component.

NB Calculations assume that there is a minimum 25 mm airspace between the rafters above the insulation layer installed between them.

Partially Filled Insulation Between Rafters – 18 mm Sarking Board (Fig 1d)

Ventilated – Insulation Between & Under Rafters

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
25	0.43	0.45
30	0.40	0.42
40	0.35	0.37
45	0.33	0.35
50	0.32	0.33
55	0.30	0.32
60	0.28	0.30
70	0.26	0.28
75	0.25	0.27
80	0.24	0.26
90	0.22	0.24
100	0.21	0.22
105	0.20	0.22
110	0.19	0.21
120	0.18	0.20
125	0.18	0.19
130	0.17	0.19
140	0.16	0.18
155	0.15	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated Kingspan **Kool**therm® K18 Insulated Dry–lining Board *comprising 12.5 mm plasterboard and 25 mm of insulation of thermal conductivity 0.023 W/m·K.*

NB Thickness shown in the table above is only the between rafter component.

NB Calculations assume that there is a minimum 50 mm ventilated airspace between the rafters above the insulation layer installed between them.

No Sarking Board (Fig 2a)

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
25	0.43	0.45
30	0.40	0.42
40	0.35	0.37
45	0.33	0.35
50	0.32	0.33
55	0.30	0.32
60	0.28	0.30
70	0.26	0.28
75	0.25	0.27
80	0.24	0.26
90	0.22	0.24
100	0.21	0.22
105	0.20	0.22
110	0.19	0.21
120	0.18	0.20
125	0.18	0.19
130	0.17	0.19
140	0.16	0.18
155	0.15	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated Kingspan **Kool**therm® K18 Insulated Dry–lining Board *comprising 12.5 mm plasterboard and 25 mm of insulation of thermal conductivity 0.023 W/m·K.*

NB Thickness shown in the table above is only the between rafter component.

NB Calculations assume that there is a minimum 50 mm ventilated airspace between the rafters above the insulation layer installed between them.

18 mm Sarking Board (Fig 2b)

Unventilated – Insulation Between & Over Rafters

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
20+20	0.43	0.44
25+25	0.37	0.38
25+30	0.34	0.35
30+30	0.32	0.33
40+40	0.26	0.27
40+45	0.24	0.25
50+50	0.21	0.22
50+60	0.20	0.20
60+60	0.18	0.19
60+65	0.18	0.18
70+70	0.17	0.17
70+75	0.16	0.17
75+75	0.16	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated 12.5mm plasterboard.

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

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

No Sarking Board (Fig 3a)

Insulant Thickness (mm)	U–value (W/m²·K) Rafter centres (mm) 600	400
20+20	0.43	0.44
25+25	0.37	0.38
25+30	0.34	0.35
30+30	0.32	0.33
40+40	0.26	0.27
40+45	0.24	0.25
50+50	0.21	0.22
50+60	0.19	0.20
60+60	0.18	0.19
60+65	0.18	0.18
70+70	0.16	0.17
70+75	0.16	0.17
75+75	0.16	0.16

NB Calculations based on rafters being underlined with 3 mm skim coated 12.5mm plasterboard.

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

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

18 mm Sarking Board (Fig 3b)

Sitework

Over Rafter Layer of Insulation

Over rafter insulation without a sarking board (Figure 3a), is simply fixed by placing the *Kingspan* **Therma**pitch® TP10 boards over the rafters and under 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 *Kingspan* **Therma**pitch® TP10.

Over rafter insulation with slates fixed directly into a sarking board (Figure 3b), is simply fixed by placing the *Kingspan* **Therma**pitch® TP10 boards over the rafters with the sarking board overlaid. Secure the sarking board and *Kingspan* **Therma**pitch® TP10 to the rafters by fixing through both the sarking board and the *Kingspan* **Therma**pitch® TP10.

Over rafter insulation with a sarking board and tiles on tiling battens and counter–battens, is simply fixed by placing the *Kingspan* **Therma**pitch® TP10 boards over the rafters with the sarking board overlaid, and with 38 x 38 mm softwood treated 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 *Kingspan* **Therma**pitch® TP10.

Kingspan **Therma**pitch® TP10 should be tightly butted. Boards may be laid either across or down the line of the rafters and should preferably be laid break bonded. All board joints running from eaves to ridge must occur over rafters. There is no necessity to tape board joints. A preservative treated stop rail should be secured to the rafters close to the eaves (see Figures 6a & 6b).

Fixings for Over Rafter Insulation

Helifix In–Skew, Target Skewfast, Wallfast, Timfix or similar approved fixings should be applied at centres appropriate to the design of the roof and location of the building.

Refer to:

Helifix Limited	+44 (0) 20 8735 5222;
Target Fixings Limited	+44 (0) 1344 777 189; or
Wallfast Limited	+44 (0) 23 9229 8443.

Between Rafter Layer of Insulation

Between rafter insulation can be installed by three methods. In cases where the insulation between rafters is to be flush with the top of the rafters but does not fill the full rafter depth (Figure 3), install the insulation by the use of nailable sarking clips. The nailable sarking clips are driven into the upper surface of each rafter at one–metre intervals up the roof slope. The nailable sarking clips then support lengths of *Kingspan* **Therma**pitch® TP10 suitably trimmed to size and placed between the rafters.

In cases where the insulation between rafters is to be flush with the bottom of the rafters but does not fill the full rafter depth (Figures 1c, 1d, 2a & 2b), install the insulation with the aid of battens nailed to the side of the rafters. The battens should be in the appropriate position to ensure the insulation is flush with the bottom of the rafters.

In cases where the insulation between rafters fully fills the rafter depth (Figures 1a & 1b), simply install the correct thickness of insulation in such a manner that it is flush with the bottom of the rafters.

In all cases, ensure that insulation boards are tightly butted and that there is a tight fit between the insulation and the rafters. Fill all gaps with expanding urethane sealant.

Under Rafter Layer of Insulation

Please refer to literature for *Kingspan* **Kool**therm® K18 Insulated Dry–lining Board.

Breathable Sarking Membrane

The specified breathable sarking membrane (e.g. *Kingspan* ***nilvent***®) is applied as specified. Application advice should be sought from the appropriate membrane manufacturer.

Sarking Felt

In cases without a sarking board, the sarking felt is draped over the rafters to provide a channel for water drainage and held in place by the slate / tile battens, which are nailed through the felt to the rafters.

In cases with a sarking board, the sarking felt is applied over the sarking board and held in place by the slates or counter–battens which are nailed through the felt to the sarking board.

Slating and Tiling

Slating and tiling over *Kingspan* **Therma**pitch® TP10 is exactly the same as on any other pitched roof except that in some instances the slate / tile battens are fixed to the previously applied counter–battens. It is, however, essential that slate or tiling rubble does not lie in contact with the breathable sarking membrane (if used) as this may allow wind driven rain or melted snow to penetrate the breathable sarking membrane.

Surface Treatment

Kingspan **Therma**pitch® TP10 has a foil faced durable surface and no further treatment is necessary. *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

Installed *Kingspan* **Therma**pitch® TP10 boards should be protected against inclement weather.

Availability

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

Packaging

According to quantity, the boards are supplied in packs or on pallets, labelled and shrinkwrapped in polythene.

Storage

The packaging of *Kingspan* **Therma**pitch® TP10 should not be considered adequate for long term outdoor protection. Ideally, boards should be stored inside a building. If, however, outside storage cannot be avoided the boards should be stacked clear of the ground and covered with a 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 leaflet on this topic which satisfies the requirements set out in the Control of Substances Hazardous to Health Regulations 1988 (COSHH) is available from the Kingspan Insulation Marketing Department (see rear cover).

Please note that the reflective surface on this product is designed to enhance its thermal performance. As such, it will reflect light as well as heat, including ultraviolet light. Therefore, if this board 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 facing 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.

If nailable sarking clips are used, ensure care is taken to avoid skin and eye contact with any sharp edges.

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

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

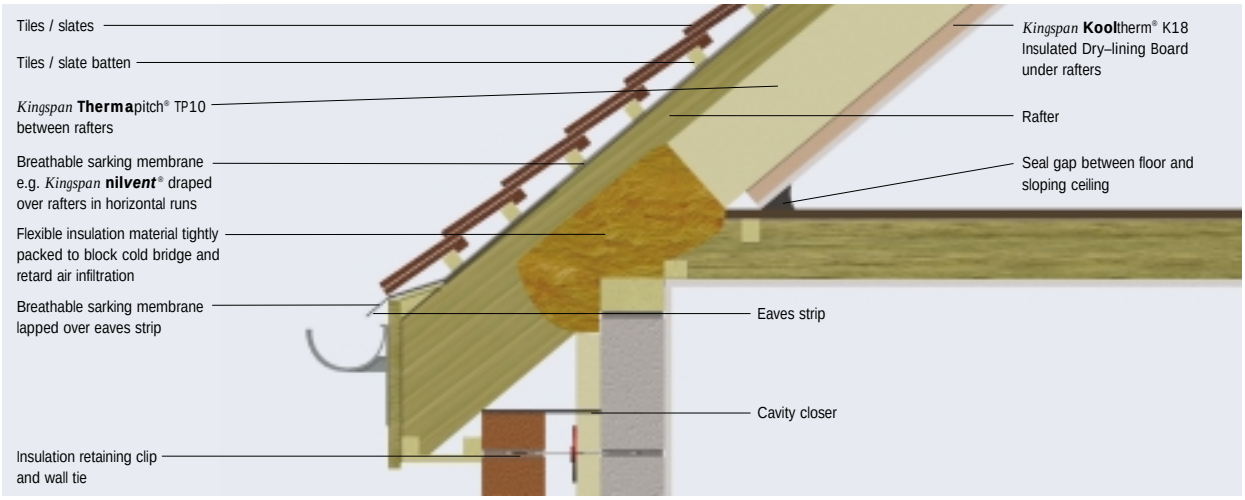


Figure 4a Overhanging Eaves Detail – Section Perpendicular to Ridge

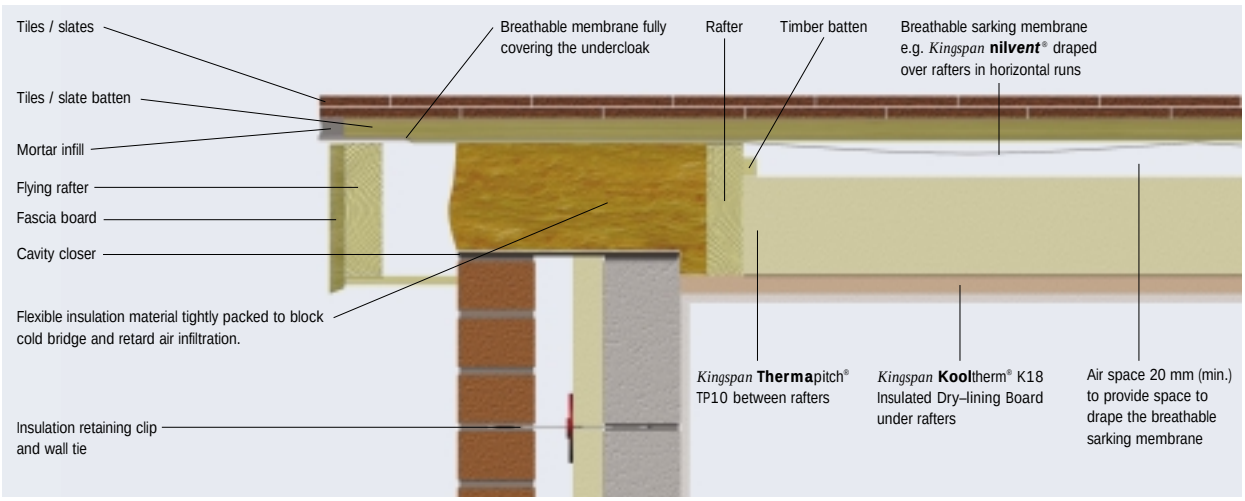


Figure 4b Section Parallel to Ridge

Ventilated – Insulation Between & Under Rafters (Recommended for Loft Conversion)

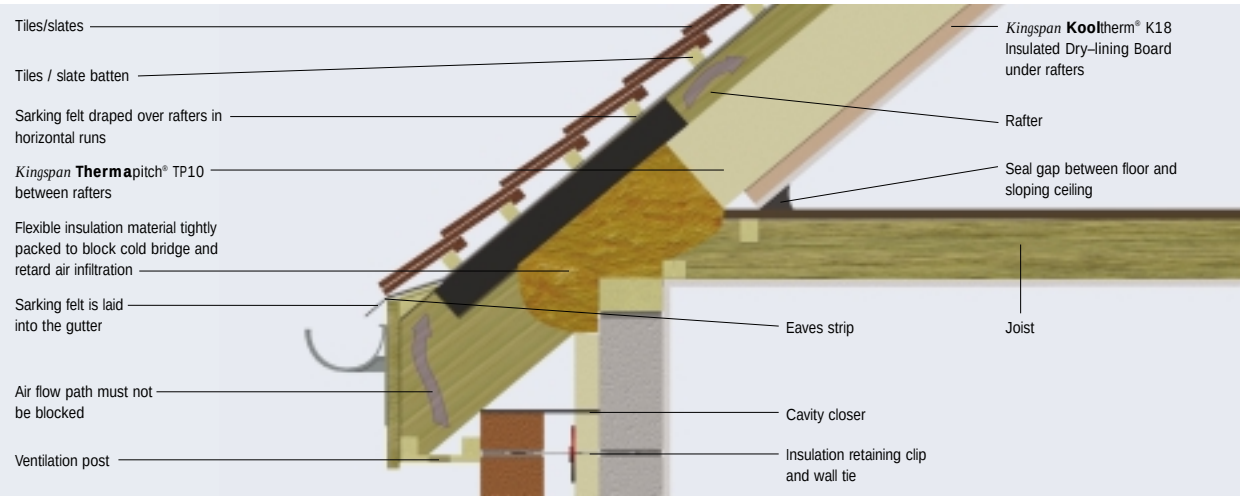


Figure 5a Overhanging Eaves Detail – Section Perpendicular to Ridge

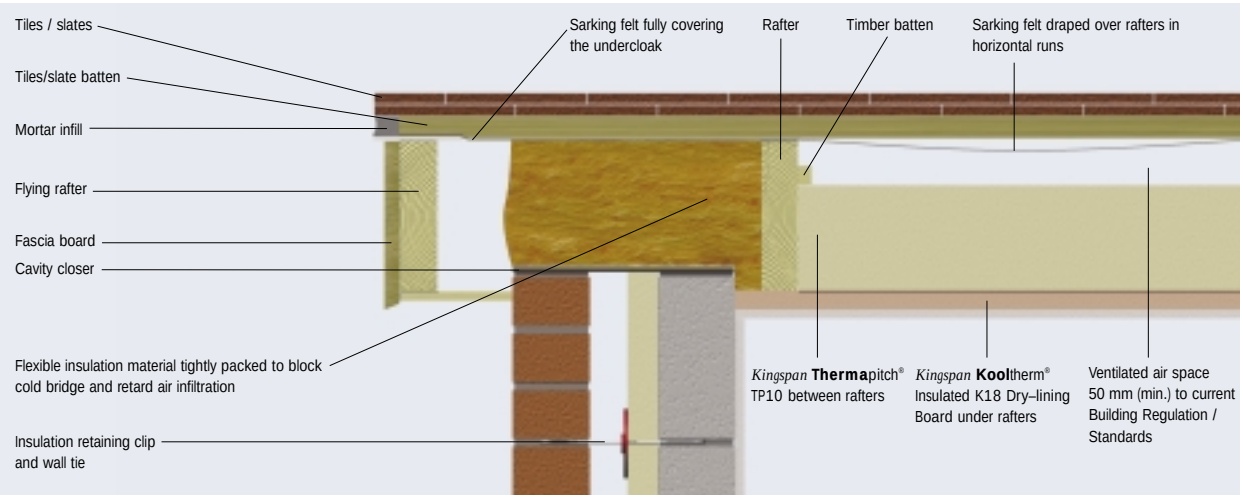


Figure 5b Section Parallel to Ridge

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

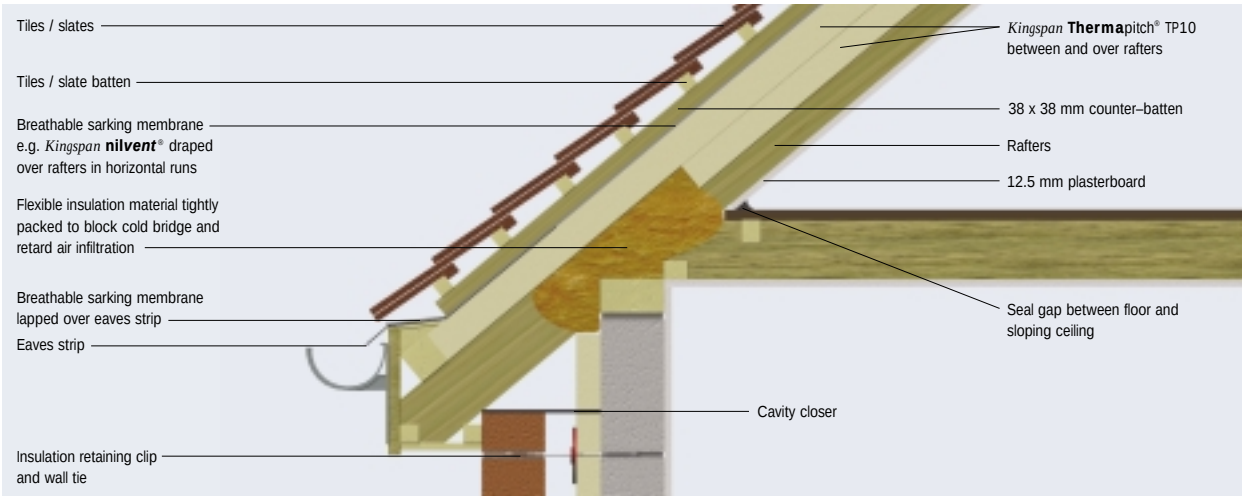


Figure 6a Overhanging Eaves Detail – Section Perpendicular to Ridge

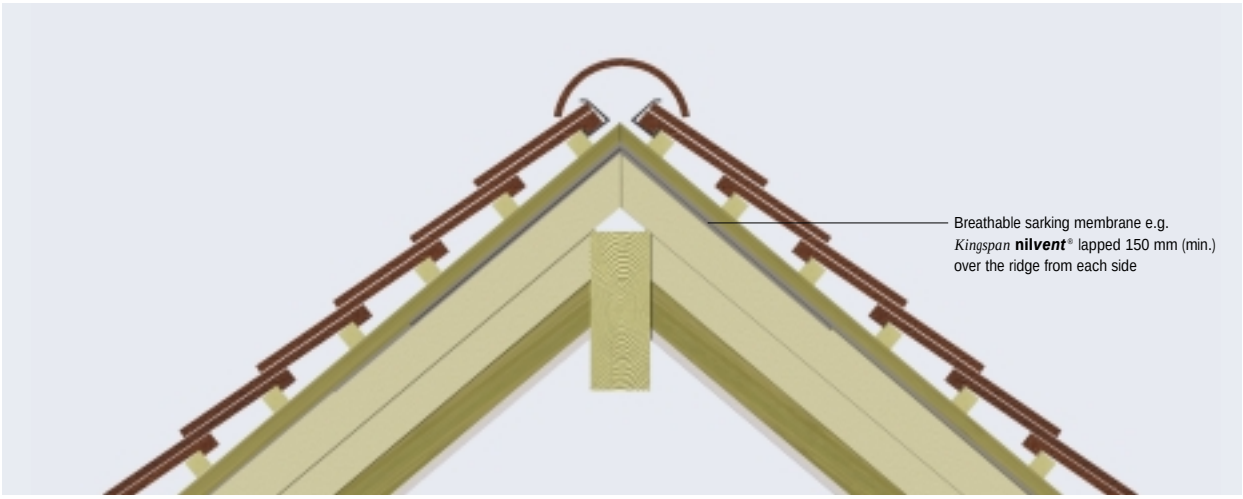


Figure 6b Ridge Detail – Section Perpendicular to Ridge

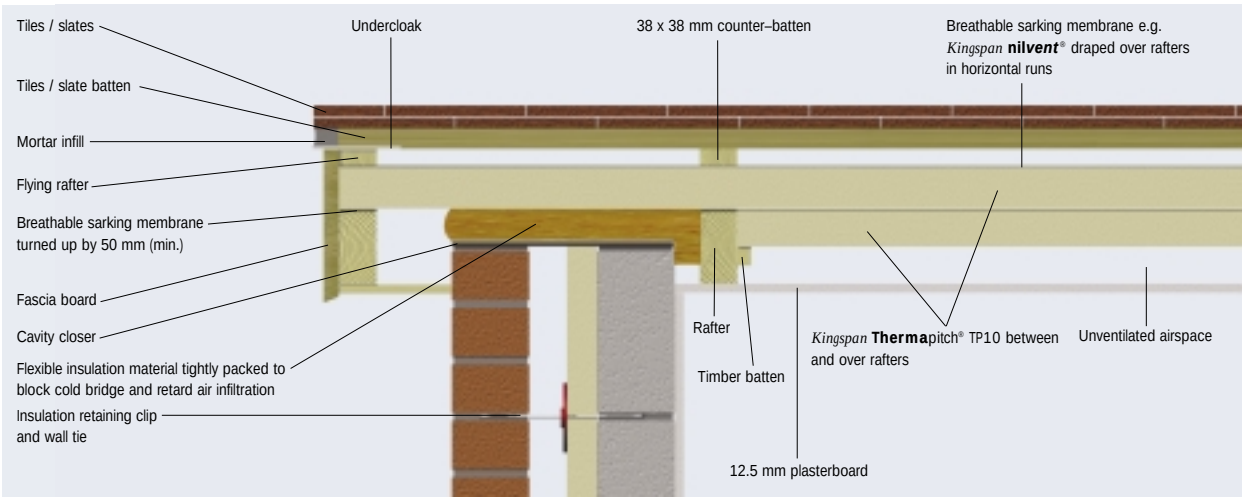


Figure 6c Section Parallel to Ridge

Product Description

The Facings

Kingspan **Therma**pitch® TP10 is faced on both sides with a low emissivity composite foil facing which is highly resistant to the transmission of water vapour. This reflective, low emissivity surface can effectively double the thermal resistance of the cavity in which the board is placed.

The Core

The core of *Kingspan* **Therma**pitch® TP10 is manufactured from trademarked **Nil**flam® technology (a high performance CFC/HCFC–free polyisocyanurate (PIR) based formulation). *Kingspan* **Therma**pitch® TP10 has a typical density of 32 kg/m³.

CFC/HCFC–free

Kingspan **Therma**pitch® TP10 is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential (ODP).

zero O.D.P

Product Data

Standards and Approvals

Kingspan **Therma**pitch® TP10 is manufactured to the highest standards in accordance with draft BS 4841–5 (Rigid polyurethane (PUR) and polyisocyanurate (PIR) products for building end–use applications. Specification for laminated insulation boards for pitched roofs) and under quality control systems approved to BS EN ISO 9001: 2000 / I.S. EN ISO 9001: 2000 (Quality management systems. Requirements).

Its use is covered by BBA Certificate 95/3126.

Manufactured to BS EN ISO 9001: 2000
Certificate No. 388

I.S. EN ISO 9001: 2000
Registration No. 19.0633

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

Typically exceeds 140 kPa at 10% compression when tested to BS EN 826: 1996 (Thermal insulating products for building applications. Determination of compression behaviour).

Water Vapour Resistance

Modified to include board facings, the boards achieve a resistance far greater than 100 MN·s/g when tested in accordance with BS 4370–2: 1993 (Methods of test for rigid cellular materials. Methods 7 to 9).

Durability

If correctly applied, *Kingspan* **Therma**pitch® TP10 has 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 adhesives 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.

Fire Performance

Kingspan **Therma**pitch® TP10, when subjected to British Standard fire tests, achieves the results given below.

Construction	Result
BS 476–3: 1958 (External fire membrane adopted exposure roof test)	SAA rating
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)	Class 1 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–values and R–values quoted are in accordance with the Harmonised European Standard BS EN 13165: 2001 (Thermal insulation products for buildings – Factory made rigid polyurethane foam (PUR) products – Specification) using so called 90 / 90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

Thermal Conductivity

The boards achieve a thermal conductivity (λ–value) of 0.023 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.

Insulant Thickness (mm)	Thermal Resistance (m^2·K/W)
20	0.85
25	1.05
30	1.30
40	1.70
50	2.15
55	2.35
60	2.60
65	2.80
70	3.00
75	3.25
80	3.45
90	3.90
95	4.10
100	4.30
105	4.55
110	4.75
115	5.00
120	5.20
125	5.40
130	5.65
135	5.85
140	6.05
145	6.30
150	6.50
155	6.70

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

Kingspan Insulation

Kingspan Insulation offers an extensive range of premium and high performance insulation products, breathable membranes and pre–insulated systems for the construction industry. Following an extensive investment programme, Kingspan Insulation is continuing to lead the insulation industry by manufacturing its insulation products with zero Ozone Depletion Potential (ODP) and quoting thermal performance data in accordance with the new harmonised European Standards.

Kingspan Insulation Limited specialises in the solution of insulation problems. The Kingspan Insulation range of insulation products meet the exacting requirements of the construction industry and are produced to the highest standards, including BS EN ISO 9001: 2000 / I.S. EN ISO 9001: 2000. Each product has been designed to fulfil a specific need and has been manufactured to precise standards and tolerances.

Insulation for:

- Pitched Roofs
- Flat Roofs
- Cavity Walls
- Timber and Steel Framing
- Externally Insulated Cladding Systems
- Floors
- Soffits

Solutions:

- Insulated Dry–Lining
- Tapered Roofing Systems
- *Kingspan* **Kool**Duct® Pre–Insulated Ducting
- *Kingspan* **nil*vent***® Breathable Membranes

The Kingspan Insulation Product Range

The *Kingspan* Kooltherm® **K–range**

- With a thermal conductivity of 0.021–0.024 W/m·K CFC/HCFC–free rigid phenolic insulation is the most thermally efficient insulation product commonly available.
- Utilises the thinnest possible insulation board to achieve required U–values.
- Fire performance can be equivalent to mineral fibre.
- Achieves a Class 0 fire rating to the Building Regulations and Low Risk rating for the Technical Standards in Scotland.
- Achieves the best possible rating of < 5% smoke obscuration when tested to BS 5111: Part 1: 1974.
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP).

The *Kingspan* Therma™ Range

- With a thermal conductivity of 0.023–0.028 W/m·K CFC/HCFC–free rigid urethane insulation is one of the most thermally efficient insulation products commonly available.
- Easily achieves required U–values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP).

The *Kingspan* Styrozone® **& Purlcrete® Ranges**

- Rigid extruded polystyrene insulation (XPS) has the highest compressive strength of any commonly available insulant.
- Ideal for specialist applications such as inverted roofing and heavy–duty flooring.
- Easily achieves required U–values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP).

All Products

- Their closed cell structure resists both moisture and water vapour ingress – problems which can be associated with open cell materials such as mineral fibre and which can result in reduced thermal performance.
- Unaffected by air movement – problems that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install – non–fibrous.
- Provide reliable long term thermal performance over the lifetime of the building.

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