Insulation
Great Britain

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Thermaroof® TR24

Insulation for flat roofs waterproofed with partially bonded torch applied multi-layer bituminous waterproofing



Kingspan®

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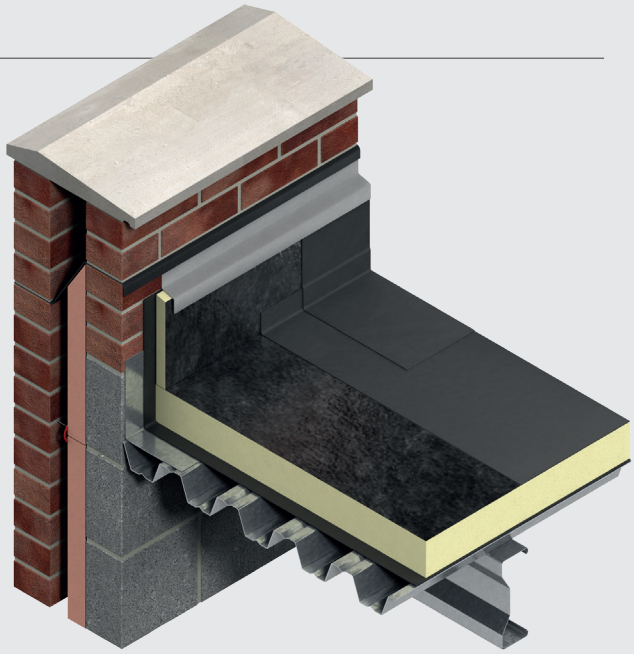
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Introduction

- High performance rigid thermoset polyisocyanurate (PIR) insulation - thermal conductivity 0.024 - 0.027 W/mK
- Compatible with majority of torch applied waterproofing systems
- Resistant to the passage of water vapour
- The boards' rigid structure allows for straight forward handling and cutting using standard tools
- Ideal for new build and refurbishment

Visit our free online U-value calculator. Offering free, quick and easy calculations for wall, floor and roof constructions.



Useful links

Website

Kingspan Thermaroof® TR24 webpage

Certification

Kingspan Thermaroof® TR24 BES 6001 Certificate of Approval

Kingspan Thermaroof® TR24 Environmental Product Declaration

Declaration of Performance (DoP)

Kingspan Thermaroof® TR24 Declaration of Performance - 30 – 130 mm thickness (UKDoP)

Kingspan Thermaroof® TR24 Declaration of Performance - 140 mm and 150 mm thickness only (CE DoP)

Product Safety Information

Kingspan Thermaroof® TR24 product safety information

Product details

The upper facing

Thickness	Upper facing
30 – 130 mm	bitumen coated glass tissue with a thermofusible polypropylene fleece, autohesively bonded to the insulation core during manufacture
140 mm and 150 mm	bitumen coated glass tissue

The core

The core of Kingspan Thermaroof® TR24 is a fibre-free rigid thermoset polyisocyanurate (PIR) insulant.

Fibre-free Core

The lower facing

The lower facing of Kingspan Thermaroof® TR24 is a mineralised glass tissue autohesively bonded to the insulation core during manufacture.

Standards & approvals

Kingspan Thermaroof® TR24 is manufactured in accordance with the requirements of BS EN 13165: 2012 + A2: 2016 (Thermal insulation products for buildings. Factory made rigid polyurethane foam (PU) products. Specification).

Kingspan Thermaroof® TR24 is manufactured under a management system certified to ISO 9001: 2015 (Quality Management System), ISO 14001: 2015 (Environmental Management System), ISO 45001: 2018 (Occupational Health and Safety Management System), ISO 50001: 2018 (Energy Management System) and ISO 37301: 2021 (Compliance Management System).

Standard dimensions

Kingspan Thermaroof® TR24 is available in the following standard size:

Nominal dimension		Availability
Insulant thickness: 30 – 130 mm (manufactured in Pembridge & Selby, Great Britain)		
Length	(mm)	1200
Width	(mm)	600
Insulant thickness: 140 mm & 150 mm (manufactured in Castleblayney, Ireland)		
Length	(mm)	1200
Width	(mm)	1200
Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes		

Compressive stress

The declared compressive stress of Kingspan Thermaroof® TR24 is 150 kPa at 10% compression, when tested to BS EN 826 (Thermal insulating products for building applications. Determination of compression behaviour).

Water vapour resistivity

The product achieves a resistivity greater than 300 MNs/gm, when tested in accordance with BS EN 12086: 2013 (Thermal insulating products for building applications. Determination of water vapour transmission properties). Kingspan Thermaroof® TR24 Systems should always be installed over a vapour control layer or sealed metal deck (see 'Water vapour control' on page 10).

Durability

If correctly installed, Kingspan Thermaroof® TR24 will remain effective for the life of the building. 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 Thermaroof® TR24 resist attack by mould and microbial growth and do not provide any food value to vermin.

Product details

Fire performance

For guidance regarding the routes to compliance for meeting the Building Regulations / Standards, refer to the relevant Technical Bulletins and links to Government websites at **www.kingspaninsulation.co.uk/fireregulations**.

Under System 4 AVCP, Kingspan Thermaroof® TR24 has a Euroclass rating of F.

There can be materials placed above the insulation layer within a roofing system including, but not limited to, waterproofing materials, reinforcement layers, primers and carrier membranes. These additional materials complete the roofing system. As such, the fire performance of a roofing system is predominantly determined by these finishes.

Compliance for meeting the fire safety requirements of the Building Regulations / Standards can be evaluated by testing the fire performance of the roofing system. The most commonly used route to compliance involves testing the full roofing system and uses test method DD CEN/TS 1187: 2012 (Test methods for external fire exposure to roofs). External roof exposure testing is typically carried out by the waterproofing manufacturer / system supplier, due to the complexities of the roofing system outlined above.

NB Test evidence to demonstrate compliance with the fire safety requirements of the Building Regulations / Standards incorporating the Kingspan Thermaroof® TR24 within a roof system would be required to be provided from the chosen waterproofing system supplier. Without the required classification for the proposed roof system, achieved through either an external roof exposure test or an overlay of inorganic material, the use of Kingspan Thermaroof® TR24 must be restricted to at least 20 metres in England and 24 metres in Scotland, or more from any point of the relevant boundary.

Further details on 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 EN 13165: 2012 + A2: 2016 (Thermal insulation products for buildings. Factory made rigid polyurethane foam (PU) products. Specification).

Thermal conductivity

The boards achieve a thermal conductivity (λ-value) of:

0.027 W/mK (insulant thickness < 80mm)

0.025 W/mK (insulant thickness 80 - 119 mm)

0.024 W/mK (insulant thickness ≥ 120 mm)

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^2K/W).

Product thickness (mm)	Thermal resistance (m^2K/W)
30	1.10
50	1.85
80	3.20
100	4.00
120	5.00
130	5.40
140	5.80
150	6.25

NB 140 mm and 150 mm boards are manufactured in Castleblayney (Co. Monaghan) and available as 1200 mm x 1200 mm boards only.

Typical construction and U-values

Assumptions

The U-values in the tables that follow have been calculated using the method detailed in BS EN ISO 6946: 2017 (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.

These examples are based on Kingspan Thermaroof® TR24, waterproofed using partially bonded torch applied multi-layer bituminous waterproofing. The Thermaroof® TR24 insulation board is fully bonded to a sealed metal deck or alternatively a vapour control layer. These layers have themselves been fully bonded to the type of deck listed for each application. The ceiling, where applicable, is taken to be a 3 mm skim coated 12.5 mm plasterboard with a cavity between it and the underside of the deck.

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.

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

U-value table key

Further information on the applicable notional and area weighted average limiting U-values is available in the relevant geographical documentation:

- Approved Documents L to the Building Regulations for England;
- Approved Documents L to the Building Regulations for Wales;
- Technical Handbooks Section 6 to the Building Standards for Scotland;

Concrete deck

Dense concrete deck with suspended ceiling

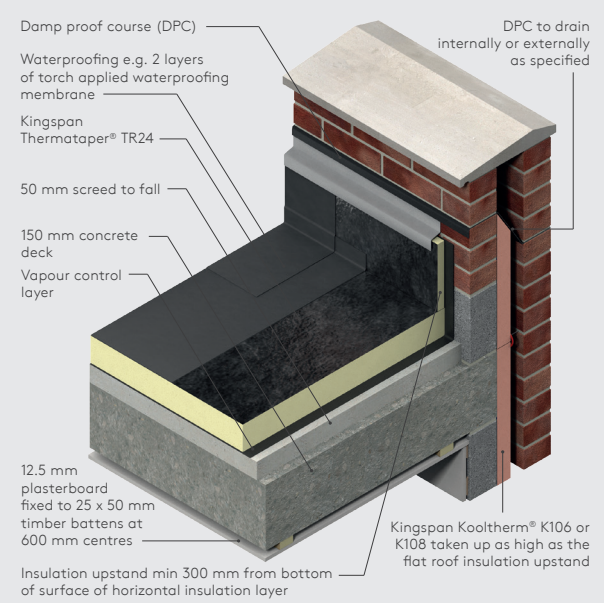


Figure 1

Packer board* thickness (mm)	Product thickness of Kingspan Thermaroof® TR24 (mm)	U-value (W/m²K)
0	80	-
0	100	0.22
0	120	0.18
0	130	0.17
0	140	0.16
0	150	0.15
80	80	0.14
90	100	0.12
100	120	0.11

* The packer board is taken to be Kingspan Thermaroof® TR27. Please refer to the relevant Kingspan Insulation literature for details of this product.

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Typical construction and U-values

Timber deck

Timber deck with plasterboard ceiling

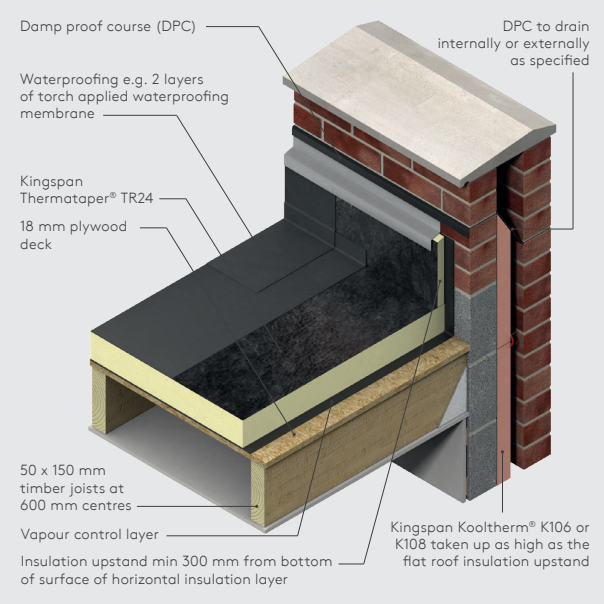


Figure 2

Packer board* thickness (mm)	Product thickness of Kingspan Thermaroof® TR24 (mm)	U-value (W/m²K)
0	80	-
0	100	0.22
0	120	0.18
0	130	0.17
0	140	0.16
0	150	0.15
80	80	0.14
90	100	0.12
100	120	0.10

* The packer board is taken to be Kingspan Thermaroof® TR27. Please refer to the relevant Kingspan Insulation literature for details of this product.

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Metal deck

Metal deck with no ceiling

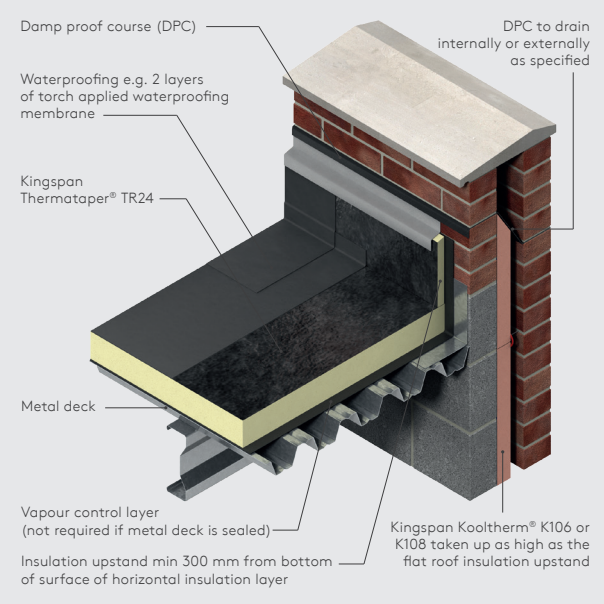


Figure 3

Packer board* thickness (mm)	Product thickness of Kingspan Thermaroof® TR24 (mm)	U-value (W/m²K)
0	80	-
0	100	0.24
0	120	0.20
0	130	0.18
0	140	0.17
0	150	0.16
80	80	0.15
100	100	0.12
110	120	0.10

* The packer board is taken to be Kingspan Thermaroof® TR27. Please refer to the relevant Kingspan Insulation literature for details of this product.

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Design considerations

Linear thermal bridging

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/mK; referred to as a 'psi-value'; and expressed as a 'ψ-value'.

The lower the ψ-value, the better the performance. ψ-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, primary energy or delivered energy rates.

ψ-values can comprise either, or a combination of, calculated and 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.

- Care is required to ensure continuation of insulation wherever possible between the wall and roof for best thermal performance. Where this is not possible, the roof and wall insulation should be overlapped and ideally, insulation material introduced between.
- Parapet detailing can represent a good, low heat loss approach, with insulation continuity maintained using an insulated upstand to reduce cold bridging. A minimum 30 mm thick Kingspan Thermaroof® TR24 upstand should be used around the perimeter of the roof on the internal façade of parapets. The upstand should extend a minimum of 150 mm above the roof insulation and achieve a minimum distance of 300 mm between the top of the insulation upstand and the bottom of the horizontal roof insulation. Wall insulation should be carried up into parapets at least as high as the flat roof insulation upstand.
- Lightweight aggregate blockwork to the inner leaf of wall constructions can help to improve thermal performance at junctions generally and where used for the inner leaf of parapet walls it can help to reduce losses.
- Where a parapet construction is not used, to achieve best performance, the roof insulation should be carried over the wall plate to meet and extend past the wall insulation layer. For a timber warm roof construction, the first joist zone above the wall plate can be filled with insulation for best performance and to maintain thermal continuity.
- Rooflight or ventilator kerbs should be insulated with Kingspan Thermaroof® TR24. Where the rooflight is installed on an independent upstand, a minimum of 30 mm insulation should be provided to the upstand.
- Where guttering is incorporated within a flat roof construction, this should be accounted for within the overall thermal design of the roof via an area-weighted calculation for the whole roof; the risk of localised interstitial condensation from reduced insulation provision at the gutter should be considered.

Design considerations

Environmental impact & responsible sourcing

Environmental Product Declaration

An Environmental Product Declaration (EPD), verified by EPD Hub in accordance with the EPD Hub Core PCR version 1.2 (24 March 2025) for Type III environmental product declarations of construction products and the EN 16783 complementary Product Category Rules (cPCR) for thermal insulation products, to EN 15804: 2012 + A2: 2019 (Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products), has been created for Kingspan Thermaroof® TR24 produced at Kingspan Insulation's Pembridge (Herefordshire) and Selby (North Yorkshire) manufacturing facilities

Responsible sourcing

Kingspan Thermaroof® TR24 produced at Kingspan Insulation's Pembridge (Herefordshire) and Selby (North Yorkshire) manufacturing facilities is certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Good'.

BES 6001
Responsible Sourcing
www.greenbooklive.com

To download the EPD or BES 6001 certificate please visit our **website**.

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 upon request from **literature@kingspaninsulation.co.uk**

Specification clause

Kingspan Thermaroof® TR24 should be described in specifications as:-

The roof insulation shall be Kingspan Thermaroof® TR24 ____mm thick: comprising a rigid thermoset polyisocyanurate insulation core faced with a bitumen coated glass tissue finished with a thermofusible polypropylene fleece on its upper surface and a mineralised glass tissue on its lower surface. The product shall be manufactured in accordance with the requirements of BS EN 13165: 2012 + A2: 2016; under a management system certified to ISO 9001: 2015, ISO 14001: 2015, ISO 45001: 2018, ISO 50001: 2018 and ISO 37301: 2021; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

Product classifications

Uniclass UK

Pr_25_31_28_65 Polyisocyanurate (PIR) foam insulation
Pr_25_71_63_66 Polyisocyanurate (PIR) foam board
Pr_80_77_76_65 Polyisocyanurate (PIR) insulation

CAWS

J41 420, J42 420 (Standard and Intermediate)
J41 26, J42 27 (Minor Works)

Details also available at **source.thenbs.com**.

Building Information Modelling (BIM)

BIM objects for Kingspan Thermaroof® TR24 can be downloaded at **source.thenbs.com.**

Wind loadings

Wind loadings should be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (National Annex to Eurocode 1 Actions on Structures. General Actions. Wind Actions) taking into account:

- length / width / height of the building;
- orientation of the building;
- wind speed; aspect (e.g. on a hill side); and
- topographical value of the surrounding area.

Falls

The fall on a flat roof, constructed using Kingspan Thermaroof® TR24, is normally provided by the supporting structure being directed towards the rainwater outlets. The fall should be smooth and steep enough to prevent the formation of rainwater pools. In order to ensure adequate drainage, BS 6229: 2018 (Flat roofs with continuously supported coverings. Code of practice) recommends uniform gradients of not less than 1 in 80. However, because of building settlement, it is advisable to design in even greater falls. These can be provided by a Kingspan Thermataper® tapered roofing system (see below).

Tapered roofing

Kingspan Thermaroof® TR24 is also available in a tapered version, Kingspan Thermataper® TT44, comprising a rigid thermoset polyisocyanurate insulation core, faced on the underside with a mineralised glass tissue autohesively bonded to the insulation core during manufacture. The top surface is finished with a bitumen coated glass tissue finished with a thermofusible polypropylene fleece. Kingspan Thermataper® TT44 comes with a supporting design service. This ensures that the most cost-effective solution for a roof is identified and that the end result is a tapered system design which meets a roof's rainwater run-off and insulation requirements. Further details of Kingspan Thermataper® TT44 are available from the Kingspan Insulation Tapered Roofing Department (see rear cover), which should be consulted as early as possible in the process of designing a roof.

Design considerations

Roof waterproofing

Kingspan Thermaroof® TR24 is designed for use in conjunction with most partially bonded torch applied multi-layer bituminous waterproofing. When applying waterproofing, torch with minimum heat at all times. Torch the roll of waterproofing felt using flame / edge guards at all times.

Do not directly apply the torch to the insulation facing. The waterproofing membrane should be installed in accordance with the membrane manufacturer's instruction. For further advice please contact the Kingspan Insulation Technical Service Department (see rear cover).

Water vapour control

Kingspan Thermaroof® TR24 should be installed over a separate vapour control layer, in new build roofs, unless it is being used in conjunction with a sealed metal deck. Regardless of the deck type it is recommended that a condensation risk analysis is carried out for every project.

For refurbishment projects involving the addition of insulation to existing insulated flat roofs, or roofs constructed of insulated steel-faced composite panels, it is imperative that a U-value calculation and condensation risk analysis is carried out for every project to ensure that the correct thickness of insulation is installed to achieve the required thermal performance whilst avoiding interstitial condensation. Compatibility between the existing or proposed roofing membrane and associated materials should always be confirmed with the roofing membrane manufacturer.

In refurbishment projects, where Kingspan Thermaroof® TR24 is to be installed over an existing bituminous waterproofing membrane, the membrane can be used as a vapour control layer, as long as it is in a good water-tight condition. Where this is not the case, a separate vapour control layer should be installed.

The type of separate vapour control layer required will be dependent upon the chosen method of fixing the insulation boards.

For mechanically fixed applications, a minimum vapour control layer should consist of a 1000 gauge (250 micron) polythene sheet, with all joints lapped and then sealed with double-sided self adhesive tape.

For applications where the insulation boards are to be bonded to the vapour control layer, a minimum vapour control layer should consist of a coated roofing felt complying with Type 3B to BS EN 13707: 2013 (Flexible sheets for waterproofing. Reinforced bitumen sheets for roof waterproofing. Definitions and characteristics), or S1P1 to BS 8747: 2007 (Reinforced bitumen membranes (RBMs) for roofing. Guide to selection and specification), or any appropriate metal-cored vapour control layer.

Where the separate vapour control layer is to be bonded, allowance should be made for adequate bonding of the vapour control layer to the substrate, so as to provide a suitable surface upon which to lay the insulation boards and sufficient resistance to wind up-lift (see 'Wind Loading').

Roof loading / traffic

Kingspan Thermaroof® TR24 is suitable for use on access roof decks subject to limited foot traffic. Where inappropriate foot traffic is liable to occur, it is recommended that the roof surface is protected by promenade tiles. For further advice on the acceptability of specific foot traffic regimes, please contact the Kingspan Insulation Technical Service Department.

Sitework

Installing over metal decks

- Metal decks should be clean, dry, without large projections, steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- If using a sealed metal deck there is no requirement for a separate vapour control layer.
- If the metal deck is not sealed, and the insulation boards are to be bonded down, in order to ensure an adequate bond between the metal deck and the vapour control layer, the metal deck should be suitably primed, in accordance with the primer manufacturer's instructions, prior to the application of the hot bitumen, or suitable alternative proprietary adhesive system, used to bond the vapour control layer to the deck.
- If the metal deck is not sealed, and the insulation boards are to be mechanically fixed, the vapour control layer should be loose-laid.
- Where one run of the specified vapour control layer laps another, there should be minimum 150 mm side and end overlaps, which should be adequately sealed.
- Turn the vapour control layer (VCL) up at roof edges to suit the specified waterproofing. In RBM systems, the AVCL should be dressed at least 100 mm above the insulation height, or be continuous and sealed where insulation is installed to the upstand. . Final detailing should be confirmed with the roofing manufacturer.
- Boards of Kingspan Thermaroof® TR24 can be used in a mechanically fixed system that is approved by the waterproofing manufacturer.
- In bonded systems, the insulation should be fixed to the AVCL using a suitable single-part polyurethane adhesive. Apply the adhesive in the correct pattern and centres to achieve the required performance. Always check the required adhesion centres with the roofing manufacturer.
- Insulation boards should always be laid break-bonded, either with their long edges at right angles to the trough openings, or diagonally across the corrugation line, and with joints lightly butted. There should be no gaps at abutments.
- Rooflight or ventilator kerbs should be insulated with Kingspan Thermaroof® TR24. Where the rooflight is installed on an independent upstand, a minimum of 30 mm insulation should be provided to the upstand.
- A 30 mm thick Kingspan Thermaroof® TR24 upstand should be used around the perimeter of the roof on the internal façade of parapets.
- A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

Installing over concrete decks

- Concrete decks should be clean, dry, without large projections, steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- If the insulation boards are to be bonded down, in order to ensure an adequate bond between the vapour control layer and the concrete deck, the concrete or screeded surface should be suitably primed, in accordance with the primer manufacturer's instructions, prior to the application of the hot bitumen, or suitable alternative proprietary adhesive system, used to bond the vapour control layer to the deck.
- If the insulation boards are to be mechanically fixed, the vapour control layer should be loose-laid.
- Where one run of the specified vapour control layer laps another, there should be minimum 150 mm side and end overlaps, which should be adequately sealed.
- Turn the vapour control layer (VCL) up at roof edges to suit the specified waterproofing. In RBM systems, the AVCL should be dressed at least 100 mm above the insulation height, or be continuous and sealed where insulation is installed to the upstand. Final detailing should be confirmed with the roofing manufacturer.
- In bonded systems, the insulation should be fixed to the AVCL using a suitable single-part polyurethane adhesive. Apply the adhesive in the correct pattern and centres to achieve the required performance. Always check the required adhesion centres with the roofing manufacturer..
- Boards of Kingspan Thermaroof® TR24 can be used in a mechanically fixed system that is approved by the waterproofing manufacturer.
- Insulation boards should always be laid break-bonded, either with their long edges at right angles to the edge of, or diagonally across the roof, and with joints lightly butted. There should be no gaps at abutments.
- Rooflight or ventilator kerbs should be insulated with Kingspan Thermaroof® TR24. Where the rooflight is installed on an independent upstand, a minimum of 30 mm insulation should be provided to the upstand.
- A 30 mm thick Kingspan Thermaroof® TR24 upstand should be used around the perimeter of the roof on the internal façade of parapets.
- A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

Sitework

Installing over plywood decks

- Plywood decks should be clean, dry, without large projections, steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- If the insulation boards are to be bonded down, in order to ensure an adequate bond between the plywood deck and the vapour control layer, the plywood surface should be suitably primed, in accordance with the primer manufacturer's instructions, prior to the application of the hot bitumen, or suitable alternative proprietary adhesive system, used to bond the vapour control layer to the deck.
- Alternatively, the vapour control layer can be nailed to the deck, in which case the nail heads will become sealed with the subsequent bonding of the insulation boards to the vapour control layer.
- If the insulation boards are to be mechanically fixed, the vapour control layer should be loose-laid.
- Where one run of the specified vapour control layer laps another, there should be minimum 150 mm side and end overlaps, which should be adequately sealed.
- Turn the vapour control layer (VCL) up at roof edges to suit the specified waterproofing. In RBM systems, the AVCL should be dressed at least 100 mm above the insulation height, or be continuous and sealed where insulation is installed to the upstand. Final detailing should be confirmed with the roofing manufacturer.
- In bonded systems, the insulation should be fixed to the AVCL using a suitable single-part polyurethane adhesive. Apply the adhesive in the correct pattern and centres to achieve the required performance. Always check the required adhesion centres with the roofing manufacturer.
- Boards of Kingspan Thermaroof® TR24 can be used in a mechanically fixed system that is approved by the waterproofing manufacturer.
- Insulation boards should always be laid break-bonded, either with their long edges at right angles to the edge of, or diagonally across the roof, and with joints lightly butted. There should be no gaps at abutments.
- Joints between insulation boards should not coincide with those between the plywood sheets.
- Rooflight or ventilator kerbs should be insulated with Kingspan Thermaroof® TR24. Where the rooflight is installed on an independent upstand, a minimum of 30 mm insulation should be provided to the upstand.
- Where upstands exist Kingspan Thermaroof® TR24 should be used around the perimeter on the internal façade of the parapets to achieve a minimum thermal resistance of 1.10 m^2K/W.
- Batten needs to be 10mm lower than the insulation height.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

Installing over existing flat roofs

- The existing waterproofing membrane surface should be clean, dry, without large projections, steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- Where the existing waterproofing membrane is not fit for purpose as a vapour control layer, and the new insulation boards are to be bonded down, a separate vapour control layer should be bonded to it with hot bitumen, or suitable alternative proprietary adhesive system. If the insulation boards are to be mechanically fixed, the vapour control layer should be loose-laid.
- Where one run of the specified vapour control layer laps another, there should be minimum 150 mm side and end overlaps, which should be adequately sealed.
- Turn the vapour control layer (VCL) up at roof edges to suit the specified waterproofing. In RBM systems, the AVCL should be dressed at least 100 mm above the insulation height, or be continuous and sealed where insulation is installed to the upstand. Final detailing should be confirmed with the roofing manufacturer.
- In bonded systems, the insulation should be fixed to the AVCL using a suitable single-part polyurethane adhesive. Apply the adhesive in the correct pattern and centres to achieve the required performance. Always check the required adhesion centres with the roofing manufacturer.
- Boards of Kingspan Thermaroof® TR24 can be used in a mechanically fixed system that is approved by the waterproofing manufacturer.
- Insulation boards should always be laid break-bonded, either with their long edges at right angles to the edge of, or diagonally across the roof, and with joints lightly butted. There should be no gaps at abutments.
- Rooflight or ventilator kerbs should be insulated with Kingspan Thermaroof® TR24. Where the rooflight is installed on an independent upstand, a minimum of 30 mm insulation should be provided to the upstand.
- A 30 mm thick Kingspan Thermaroof® TR24 upstand should be used around the perimeter of the roof on the internal façade of parapets.
- A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

Mechanical fixings

- The number of mechanical fixings required to fix Kingspan Thermaroof® TR24 will vary with the geographical location of the building, the local topography, and the height and width of the roof concerned along with the deck type.
- A minimum of 4 fixings are required to secure 1.2 x 0.6 m (30 – 130 mm thickness) boards of Kingspan Thermaroof® TR24 to the deck.
- A minimum of 5 fixings are required to secure 1.2 x 1.2 m (140 and 150 mm thickness) boards of Kingspan Thermaroof® TR24 to the deck.

- The requirement for additional fixings should be assessed in accordance with BS EN 1991–1.4: 2005 + A1: 2010 (National Annex to Eurocode 1. Actions on structures, General Actions, Wind Actions).
- Mechanical fixings must be arranged in an even pattern.
- Fasteners at insulation board edges must be located > 50 and < 150 mm from edges and corners of the board and not overlap board joints.
- Please refer to page 10 for recommended fixing patterns.
- Each fixing should incorporate a square or circular plate washer (min. 50 x 50 mm or 50 mm diameter).
- If two layers of insulation are to be installed, the base layer should be mechanically fixed with minimum 1 No. fixing in the centre of the insulation board before fixing the top layer as described above.
- Where alternative mechanical fixing systems are specified, such as bar fixing systems, the specified system must give similar restraint to the insulation board as would be attained by the use of conventional telescopic tube fasteners.

Installing in two layers

- In situations where two layers of insulation are required, both layers should be installed in the same manner, as detailed in the preceding sections. However, if mechanical fixing methods are to be employed, refer to 'Mechanical Fixings' for guidance on the number of fixings to be used in each layer.
- In all cases, the layers should be horizontally offset relative to each other so that, as far as possible, the board joints in the two adjacent layers do not coincide with each other (see Figure 4).

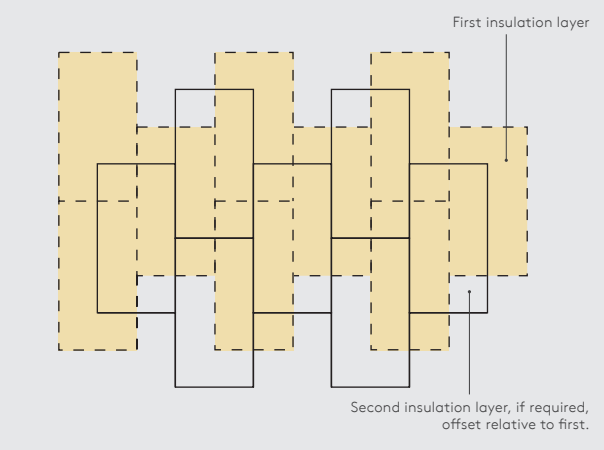


Figure 4

General

Following trades

- The roof must be adequately protected when building works are being carried out on or over the roof surface. This is best achieved by close boarding. The completed roof must not be used for the direct storage of heavy building components such as bricks or air conditioning equipment.

Daily working practice

- At the completion of each day's work, or whenever work is interrupted for extended periods of time, a night joint must be made in order to prevent water penetration into the roof construction.

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.

Availability

- Kingspan Thermaroof® TR24 is available through specialist insulation distributors and selected roofing merchants throughout the UK.

Packaging and storage

- The polyethylene polythene 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, outside storage cannot be avoided, then 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.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website **www.kingspaninsulation.co.uk/safety**.

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

Mechanical fixing patterns

1.2 x 0.6 m boards (30 - 130 mm thicknesses)

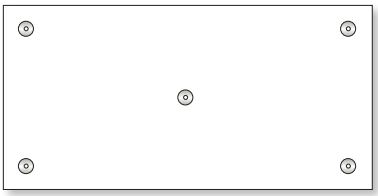
Recommended fixing patterns

For insulation boards that are to be secured to the deck using mechanical fixings, the recommended fixing patterns for Kingspan Thermaroof® TR24 (1.2 x 0.6 m boards, 30 - 130 mm thicknesses) are shown below. The number of fixings necessary should also be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (National Annex to Eurocode 1. Actions on structures, General Actions, Wind Actions).

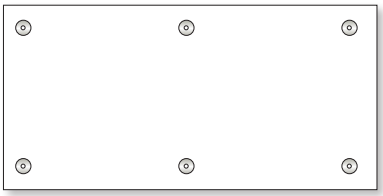
The images below show the minimum recommended fixing patterns, the number of fixings used and the resulting fixing density (number of fixings per m^2).



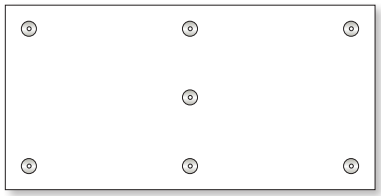
4 No. per board
(1.2 x 0.6 m board - 5.55 fixings / m^2)



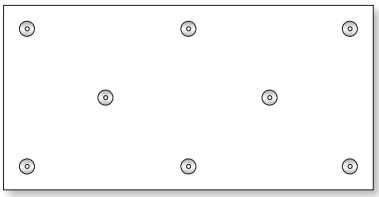
5 No. per board
(1.2 x 0.6 m board - 6.94 fixings / m^2)



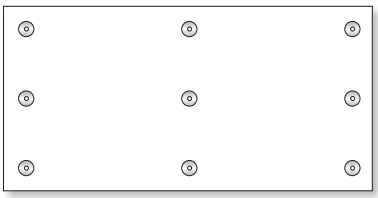
6 No. per board
(1.2 x 0.6 m board - 8.33 fixings / m^2)



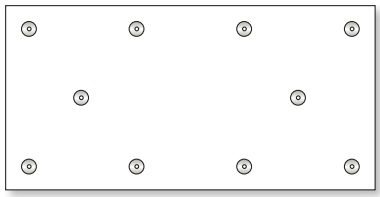
7 No. per board
(1.2 x 0.6 m board - 9.72 fixings / m^2)



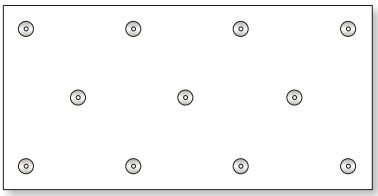
8 No. per board
(1.2 x 0.6 m board - 11.11 fixings / m^2)



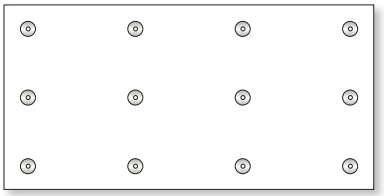
9 No. per board
(1.2 x 0.6 m board - 12.50 fixings / m^2)



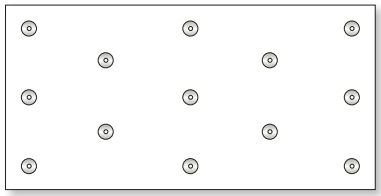
10 No. per board
(1.2 x 0.6 m board - 13.88 fixings / m^2)



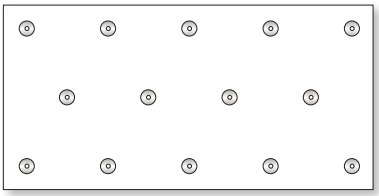
11 No. per board
(1.2 x 0.6 m board - 15.27 fixings / m^2)



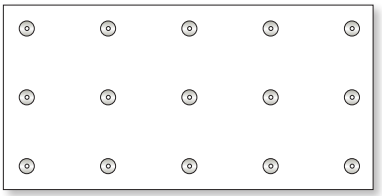
12 No. per board
(1.2 x 0.6 m board - 16.66 fixings / m^2)



13 No. per board
(1.2 x 0.6 m board - 18.05 fixings / m^2)



14 No. per board
(1.2 x 0.6 m board - 19.44 fixings / m^2)



15 No. per board
(1.2 x 0.6 m board - 20.83 fixings / m^2)

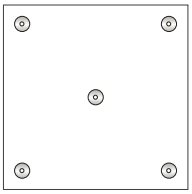
Mechanical fixing patterns

1.2 x 1.2 m boards (140 & 150 mm thicknesses only)

Recommended fixing patterns

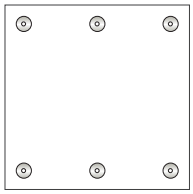
The recommended fixing patterns for Kingspan Thermaroof® TR24 (1.2 x 1.2 m boards, 140 & 150 mm thicknesses) are shown below. The number of fixings necessary should be assessed in accordance with EN 1991-1-4: 2005 + A1: 2010 (National Annex to Eurocode 1. Actions on structures, General Actions, Wind Actions).

The images below show recommended fixing patterns, the number of fixings used and the resulting fixing density (number of fixings per m^2). A minimum of 5 fixings are required to secure a 1.2 x 1.2 m insulation board to the deck.

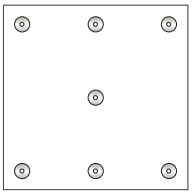


5 No. per board
(1.2 x 1.2 m board - 3.47 fixings / m^2)

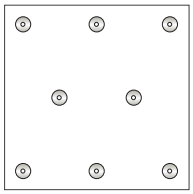
NB A minimum of 5 fixings are required to secure a 1.2 x 1.2 m board to the deck.



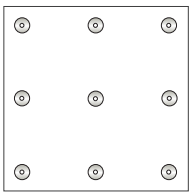
6 No. per board
1.2 x 1.2 m board - 4.16 fixings / m^2



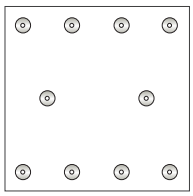
7 No. per board
1.2 x 1.2 m board - 4.86 fixings / m^2



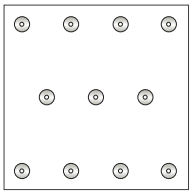
8 No. per board
1.2 x 1.2 m board - 5.55 fixings / m^2



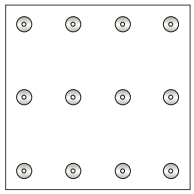
9 No. per board
1.2 x 1.2 m board - 6.25 fixings / m^2



10 No. per board
1.2 x 1.2 m board - 6.94 fixings / m^2



11 No. per board
1.2 x 1.2 m board - 7.63 fixings / m^2



12 No. per board
1.2 x 1.2 m board - 8.33 fixings / m^2

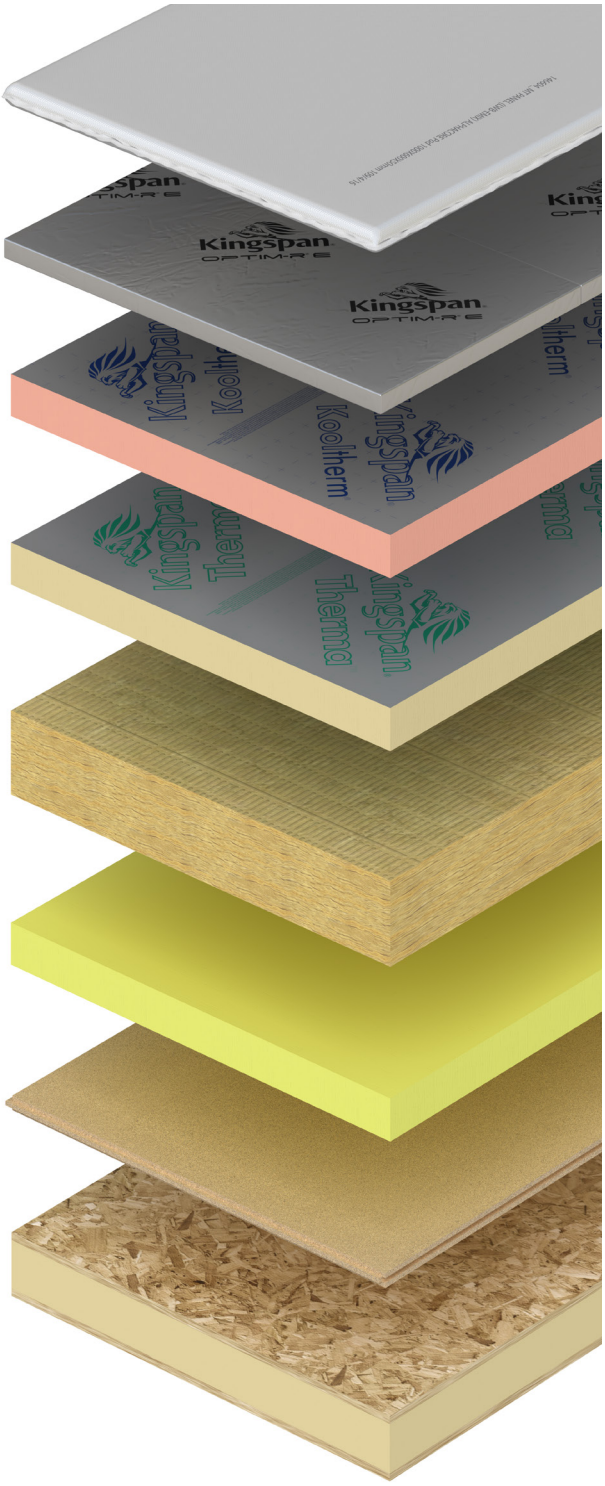
NB Mechanical fixings e.g. telescopic tube fasteners, must be arranged in an even pattern. Fasteners at board edges must be located > 50 mm and < 150 mm from edges and corners of the board and not overlap board joints.

About Kingspan Insulation

Products & solutions

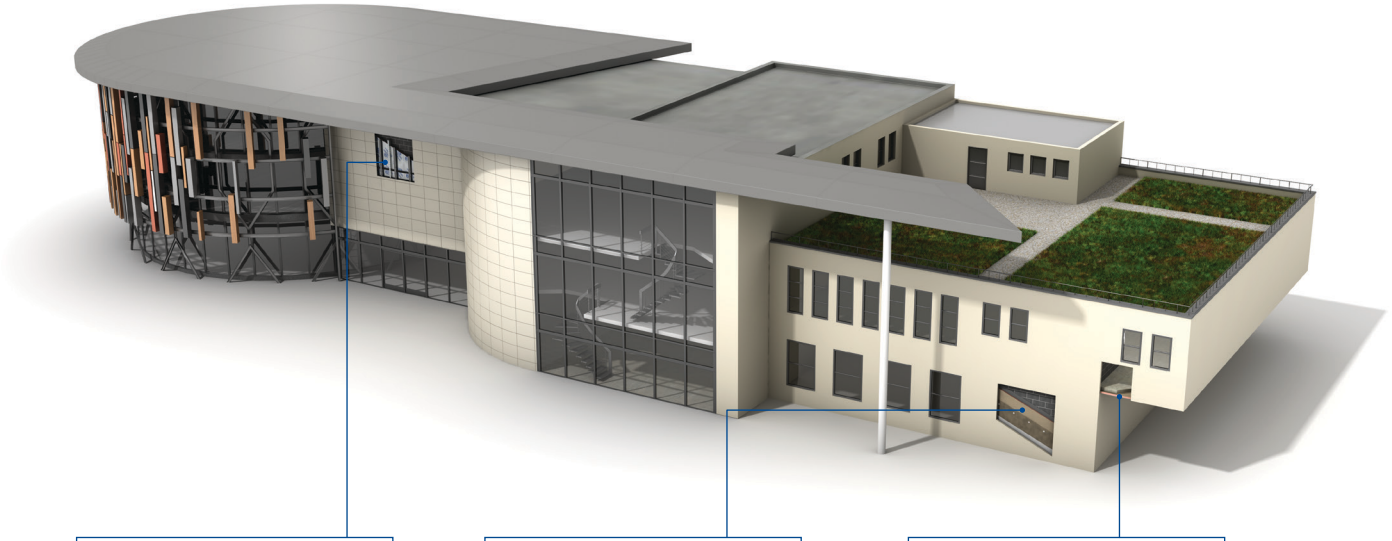
Rigid insulation products for building fabric applications, including roofs, walls and floors.

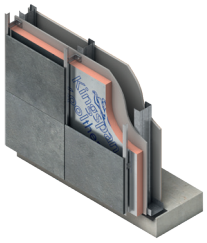
- Kingspan AlphaCore® – microporous silica-based insulation.
- Kingspan OPTIM-R® – vacuum insulation panel (VIP) systems.
- Kingspan Kooltherm® – phenolic insulation.
- Kingspan Therma™ – PIR insulation.
- K-Roc® – rock mineral fibre insulation.
- Kingspan GreenGuard® – extruded polystyrene insulation (XPS).
- STEICO - wood fibre insulation.
- Kingspan TEK® – structural insulated panels (SIPs).
- Cavity closers – PVC-U extrusions with an insulation cor
- Membranes – for pitched roofs and walls.



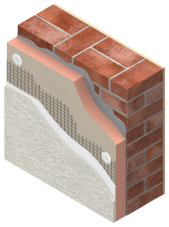
About Kingspan Insulation

Solutions available for roofs, walls and floors of commercial buildings, from schools to retail.





Insulation for use behind rainscreen or masonry façade systems



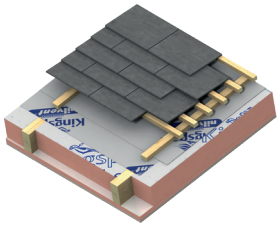
External insulation for masonry walls



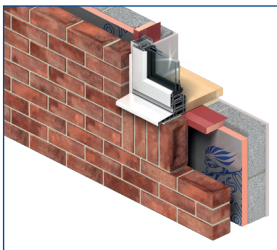
Insulation for structural ceilings (soffits)

About Kingspan Insulation

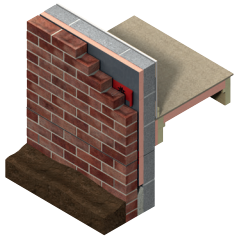
From new housing developments to refurbishing your home, we offer a number of different solutions for roof, wall and floor applications.



Insulation for tiled or slated pitched warm roof spaces



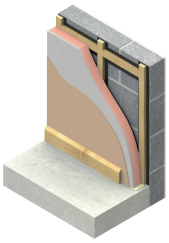
Insulated extrusions for closing wall cavities at openings



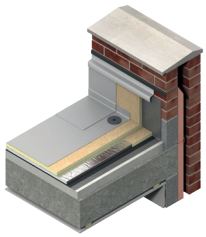
Full and partial fill cavity wall insulation



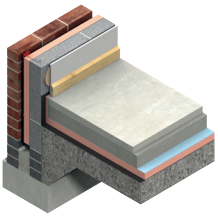




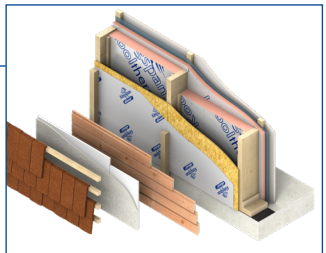
Insulation for tiled or slated pitched warm roof spaces



Insulation for flat roofs and terraces



Insulation for floors



Insulation for timber and steel framing systems

About Kingspan Insulation

Company details

Kingspan Insulation Ltd is part of the Kingspan Group plc., one of Europe's leading construction product manufacturers. The Kingspan Group was formed in the late 1960s and is a publicly quoted group of companies headquartered in Kingscourt, County Cavan, Ireland.


Kingspan Group, Ireland

Kingspan Insulation Ltd is a market leading manufacturer of rigid insulation products and insulated systems for building fabric and building services applications.

Our head office is located in Pembridge, in the heart of rural Herefordshire. Our northern hub is near Selby in North Yorkshire. We also have a hub in Castleblayney, Ireland. All three sites are accredited to the independent compliance standard ISO 37301: 2021.


Kingspan Insulation, Pembridge

Services

Our support services provide fast and accurate advice no matter what your role is. Visit our website to access the following services.

- U-value calculations – free, quick and easy U-value calculations with our U-value Calculator.
- Help and advice on your projects, including stockists, how to guides, regulatory guidance and e-learning.
- Dedicated Specification and Sales teams to support projects.


Product awareness

- Building Information Modelling (BIM) – download BIM objects for our products.
- Tapered roofing service – Kingspan Insulation's tapered roofing systems come with a supporting design service to ensure the most cost-effective solution for a roof is identified.


Tapered Roofing Services

- CPDs – Kingspan Insulation offer a number of free CPD seminars for architects and specifiers covering a wide range of industry topics. CPDs can be booked or a range of online learning courses can be found online.
- Product awareness training – build your team's knowledge with on-site training and support with one of our experienced product technicians who cover the full range of Kingspan products and applications, from flooring to roofing and everything in-between with both internal and external wall insulations.

PLANET PASSIONATE

Planet Passionate is our group wide global sustainability programme.

Our Planet Passionate programme aims to have a positive impact on three big global challenges: climate change, circularity and protection of our natural world.

Scan for our latest progress report to learn more about our targets, partnerships and global commitments.



Contact details

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www.kingspaninsulation.co.uk

For individual department contact details please visit
www.kingspaninsulation.co.uk/contact

Visit our free online U-value calculator.
Offering free, quick and easy calculations for wall, floor and roof constructions.

For the most up-to-date version of this brochure please scan or click **here.**

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