

# Kooltherm® K110 Soffit Board

Insulation for structural ceilings (soffits)



- Premium performance rigid thermoset phenolic insulation - thermal conductivity of 0.019 W/mK
- Unaffected by air infiltration
- Resistant to the passage of water vapour
- Easy to handle
- Quick to install
- Ideal for new build and refurbishment
- Non-deleterious material



# Typical constructions and U-values

## Assumptions

The U-values in Table 1 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 construction shown in Figure 1.

These examples are based on the use of Kingspan Kooltherm® K110 mechanically fixed directly to the soffit of a 200 mm concrete deck.

Calculations for thermally broken fasteners assume a thermal conductivity of 1.00 W/mK or less, the effect of which is insignificant.

Calculations for metal fixings assume a cross sectional area of 25.97 mm, with a thermal conductivity of 50 W/mK and 3.82 fixings per m<sup>2</sup>.

NB When calculating U-values to BS EN ISO 6946: 2017, the type of fixing used may change the thickness of insulation required. Please contact the Kingspan Insulation Technical Service Department (see rear cover for details) for a comprehensive U-value calculation, which will take account of the correction factor specific to the fixing.

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

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

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

There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins and links to Government websites at [www.kingspaninsulation.co.uk/fireregulations](http://www.kingspaninsulation.co.uk/fireregulations) (for GB) or contact technical services at [technical@kingspaninsulation.ie](mailto:technical@kingspaninsulation.ie) (for Ireland).

## 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;
- Technical Booklets F1 & F2 to the Building Regulations for Northern Ireland; and
- Technical Guidance Document L (Dwellings) and Technical Guidance Document L (Buildings other than Dwellings) to the Building Regulations for the Republic of Ireland.

## Fixed directly to concrete soffit



Figure 1

Insulant thickness (mm)	U-values (W/m <sup>2</sup> K)	
	Thermally broken fixings	Soffit insulation metal screw fixing
65	0.26	0.32
70	0.25	0.29
75	0.23	0.28
80	0.22	0.26
85	0.21	0.25
90	0.20	0.23
100	0.18	0.21
110	0.16	0.19
120	0.15	0.18
70 + 70	0.13	0.16
70 + 80	0.12	0.15
80 + 80	0.11	0.14
90 + 90	0.10	0.12

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

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# Design considerations

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## Heat loss and linear thermal bridging

### Basic principles

Linear thermal bridging describes the additional heat losses or gains that occur at junctions between elements e.g. where a cavity wall meets the ground or intermediate floor, 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 internal surface 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<sub>2</sub> 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.

Approved details, such as the Acceptable Construction Details (Republic of Ireland) can uplift performance to provide a clear starting point towards achieving compliance, but can be limited in scope and applicability. The greatest opportunity for mitigating the impact of linear thermal bridges can come from following accurately 'modelled' details that take into account the following design considerations.

### Reducing linear thermal bridging

For soffit constructions, supporting beams and columns interrupting the insulation layer can represent significant thermal bridges, which can adversely affect the thermal performance of the floor if not suitably handled. Thermally, the best approach is to fully box around beams with appropriate insulation to limit these losses. For further advice on reducing linear and point thermal bridging, please contact Kingspan Insulation's Technical Service Department (see rear cover for details).

## Environmental impact & responsible sourcing

### Environmental Product Declaration

An Environmental Product Declaration (EPD), certified by BRE Global to the BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804: 2012 + A1: 2013 (Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products), has been created for Kingspan Kooltherm® K110 produced at Kingspan Insulation's Pembridge, Herefordshire manufacturing facility.

### Responsible sourcing

Kingspan Kooltherm® K110 produced at Kingspan Insulation's Pembridge, Herefordshire manufacturing facility is manufactured under a management system certified to ISO 14001: 2015 (Environmental management systems).

NB The above information is correct at the time of writing. Confirm at the point of need by visiting the [Kingspan Insulation website](#) to download the certificates.

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## Sustainability & responsibility

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

A report covering the sustainability and responsibility of Kingspan Insulation Ltd's British operations at its Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is available upon request from [literature@kingspaninsulation.co.uk](mailto:literature@kingspaninsulation.co.uk).

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# Design considerations

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## Specification clause

Kingspan Kooltherm® K110 should be described in specifications as:

The soffit insulation shall be Kingspan Kooltherm® K110 Soffit Board\_\_\_\_\_ mm thick: comprising a premium performance fibre-free rigid thermoset phenolic insulation core with a glass tissue based facing on its inner face and a low emissivity composite foil on its outer face. The product shall have a thermal conductivity of 0.019 W/mK. The product shall be manufactured under a management system certified to ISO 9001: 2015, ISO 14001: 2015, ISO 45001: 2018 and ISO 50001: 2018, by Kingspan Insulation Limited and installed in accordance with the instructions issued by them.

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## Product classifications

Uniclass UK

Pr\_25\_71\_63\_59 Phenolic Foam Boards (Primary)  
Pr\_80\_77\_76\_62 Phenolic Foam Insulation

CAWS

E60/130 Precast slab  
E60/140 Precast floor plate  
P10/185 Soffit insulation  
E60/30 Precast slab

Details also available at [the NBS Source](#).

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## Building Information Modelling (BIM)

BIM objects for Kingspan Kooltherm® K110 can be downloaded using the Kingspan BIM Designer Software Tool available at [www.kingspaninsulation.co.uk/k110](http://www.kingspaninsulation.co.uk/k110).

## Wind loading

Where the insulation boards may be subject to external wind pressure, wind loadings should be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (Eurocode 1 Actions on structures - General actions - Wind actions) / I.S. EN 1991-1-4: 2005 (Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions (Including Irish national annex) taking into account:

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

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## Lightning protection

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

# Sitework

## Fixing directly to concrete soffits

The installation guidance for Kingspan Kooltherm® K110 outlined in this section must only be followed after considering the below.

There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins and links to Government websites at [www.kingspaninsulation.co.uk/fireregulations](http://www.kingspaninsulation.co.uk/fireregulations) (for GB) or contact technical services at [technical@kingspaninsulation.ie](mailto:technical@kingspaninsulation.ie) (for Ireland).

- Insulation boards should be installed break-bonded, with joints lightly butted.
- The number of mechanical fixings required to fix Kingspan Kooltherm® K110 will vary with the geographical location of the building, the local topography, the height and width of the soffit concerned, and the soffit construction.
- A minimum of 11 mechanical fixings, with a minimum head diameter of 25 mm, are required to secure the insulation board to the soffit.
- Where the insulation boards may be subject to external wind pressure, the requirement for additional fixings should be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 / I.S. EN 1991-1-4: 2005.
- The fixings should be evenly distributed over the whole area of the board, and must offer a minimum 40 mm penetration into a solid substrate.
- Please refer to the column opposite for recommended fixing patterns.
- Fixings at board edges must be located > 50 mm and < 150 mm from edges and corners of the board and not overlap board joints.
- Depending upon the fixing type, insulation boards can also be fitted by a shot fired fixing method, which can result in significantly faster installation times. All of the guidance above still applies.

- For details on fixings refer to:

**Ejot UK Limited** +44 (0) 1977 687 040  
[www.ejot.co.uk](http://www.ejot.co.uk)

**Fixfast** +44 (0) 1732 882 387  
[www.fixfast.com](http://www.fixfast.com)

**ITW Spit** +44 (0) 800 731 4924  
[www.itwcp.co.uk/Spit/](http://www.itwcp.co.uk/Spit/)

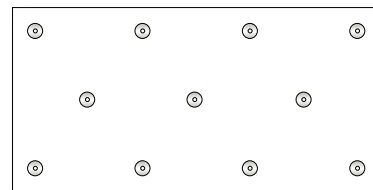
**MAK Fasteners** +353 (0) 1 451 9004  
[www.makfasteners.com](http://www.makfasteners.com)

**Masonry Fixings Services Ltd** +353 (0) 1 642 6700  
[www.masonryfixings.ie](http://www.masonryfixings.ie)

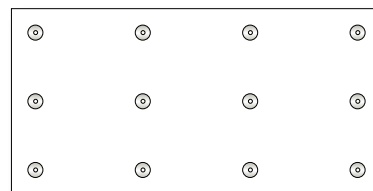
**SFS Intec** +44 (0) 1132 085 500  
[www.sfsintec.biz/uk](http://www.sfsintec.biz/uk)

## Recommended fixing patterns

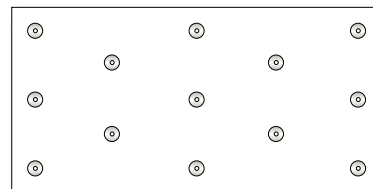
- The images below show recommended fixing patterns, the number of fixings used and the resultant fixing density (number of fixings per m<sup>2</sup>).
- The fixing patterns shown are suitable for continuous flat (even) decks only. For non-continuous decks please contact the Kingspan Insulation Technical Service Department (see rear cover) for further guidance.



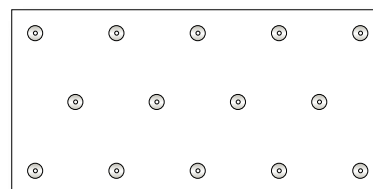
11 No. per board  
(2.4 x 1.2 m board - 3.81 fixings / m<sup>2</sup>)



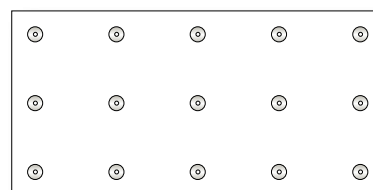
12 No. per board  
(2.4 x 1.2 m board - 4.16 fixings / m<sup>2</sup>)



13 No. per board  
(2.4 x 1.2 m board - 4.51 fixings / m<sup>2</sup>)



14 No. per board  
(2.4 x 1.2 m board - 4.86 fixings / m<sup>2</sup>)



15 No. per board  
(2.4 x 1.2 m board - 5.20 fixings / m<sup>2</sup>)

# Sitework

## Proprietary grid systems

- For information regarding proprietary grid system specifications, please contact the Kingspan Insulation Technical Service Department (see rear cover).

## Taping

- The joints of Kingspan Kooltherm® K110 should always be taped using a suitable 70 mm min. wide self-adhesive aluminium foil tape.
- In the absence of other protection, exposed edges of Kingspan Kooltherm® K110 should be protected by a suitable self-adhesive aluminium foil tape, with a 50 mm min. wide overlap onto the insulation board face (Figure 2).
- For advice on the specification of self-adhesive aluminium foil tape and application guidelines, refer to:

**Bostik Limited** +44 (0) 1785 272 727  
[www.bostik.co.uk](http://www.bostik.co.uk)

**ProTech Global Ltd** +44 (0) 117 298 0573  
[www.protechglobal.co.uk](http://www.protechglobal.co.uk)

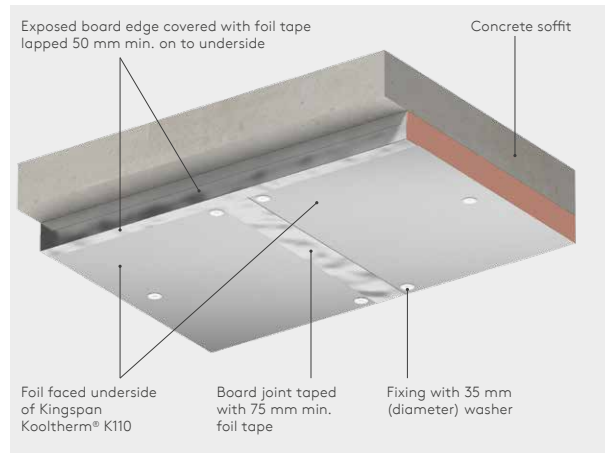


Figure 2: Protection of exposed insulation edges of Kingspan Kooltherm® K110

## General

### Cutting

- Cutting should be carried out either by using a fine toothed saw or 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 Kooltherm® K110 is available through specialist insulation distributors and selected builders' merchants throughout the UK and Ireland.

### Packaging & storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Ideally, boards should be stored inside a building. If, however, 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 & safety

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

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

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

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

# Product details

## The inner facing

The inner (concealed) facing of Kingspan Kooltherm® K110 is a glass tissue based facing, autohesively bonded to the insulation core during manufacture.

## The core

The core of Kingspan Kooltherm® K110 is a premium performance rigid thermoset fibre-free phenolic insulant.



## The outer facing

The outer (exposed) facing of Kingspan Kooltherm® K110 is a low emissivity composite foil, autohesively bonded to the insulation core during manufacture. The exposed facing used on Kingspan Kooltherm® K110 has not been designed with the purpose of an aesthetic finish as its primary function. Where appearance is critical, advice should be sought from Kingspan Insulation's Technical Service Department (see rear cover).

## Standards & approvals

Kingspan Kooltherm® K110 is manufactured to the highest standards under a management system certified to ISO 9001: 2015 (Quality management systems), ISO 14001: 2015 (Environmental management systems), ISO 45001: 2018 (Occupational health & safety management systems) and ISO 50001: 2018 (Energy management systems).

The current manufactured thickness range of 65 - 120 mm of Kingspan Kooltherm K110 is covered by BBA Certificate 16/5299.



## Standard dimensions

Kingspan Kooltherm® K110 is available in the following standard size:

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

## Compressive strength

The compressive strength of Kingspan Kooltherm® K110 typically exceeds 100 kPa, when tested to BS EN 826: 2013 (Thermal insulating products for building applications. Determination of compression behaviour).

## Durability

If correctly installed, Kingspan Kooltherm® K110 can have an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

NB If the building is considered to be in an exposed location advice should be sought from the Kingspan Insulation Technical Service Department to determine the product's suitability.

## 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 Kooltherm® K110 resist attack by mould and microbial growth, and do not provide any food value to vermin.

# Product details

## FM Approval

Kingspan Kooltherm® K110 is FM Approved to FM 4880 (Approval Standard for Class 1 Fire Rating of Building Panels or Interior Finish Materials) October 2015. Kooltherm® K110 (thickness range of 65 - 120 mm) produced at Kingspan Insulation's Pembridge, Herefordshire manufacturing facility is FM Approved.



This approval is valid for ceiling / soffit insulation only, with non-combustible walls with no height restriction. For the purpose of FM Approval, the Kooltherm® K110 entire product thickness and exposed face should be fastened to the supporting structural soffit with metal mechanical fasteners & washer plates with minimum 50 mm wide aluminium tape over joints. For mechanical reasons the fixing specification given on page 4 of this document and the taping specification on page 5 must still be followed.

Not all thicknesses are covered by the FM Approval when fixed in a ceiling / soffit position. Further details of the current FM Approval can be located on the FM Approvals online listing website 'Approval Guide' at [www.fmaprovals.com/approval-guide](http://www.fmaprovals.com/approval-guide) or [www.approvalguide.com](http://www.approvalguide.com) by searching 'Kooltherm K110' or alternatively contact the Kingspan Insulation Technical Service Department (see rear cover).

## Fire performance

There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins and links to Government websites at [www.kingspaninsulation.co.uk/fireregulations](http://www.kingspaninsulation.co.uk/fireregulations) (for GB) or contact technical services at [technical@kingspaninsulation.ie](mailto:technical@kingspaninsulation.ie) (for Ireland).

Kingspan Kooltherm® K110 achieves European Classification (Euroclass) C-s2,d0, when classified to EN 13501-1: 2018 (Fire classification of construction products and building elements - Classification using data from reaction to fire tests).

Please see the table below for further test information, conditions and field of application.

Test report number	EUI-22-SFB-000087-B EUI-22-SBI-000087-B
Classification report number	EUI-22-000194-Revision 1
Product thickness (mm)	65 - 120
Substrate	Valid with any substrate, except plasterboards, of at least A2-s1,d0 class and at least 652.5 kg/m <sup>3</sup> density
Joints / edges	Vertical and horizontal joints and any edge type

Kingspan Kooltherm® K110 is assessed under Assessment and Verification of Constancy of Performance (AVCP) System 1 for Reaction for Fire.

The certificate numbers for constancy of performance are 1812-CPR-1992 (EU) and 2822-UKCA-CPR-0093 (UK).

NB For applications where a product classification of at least B-s3,d2 is required, please refer to Kingspan Kooltherm® K110 PLUS Soffit Board which achieves a Euroclass of B-s1,d0.

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  $\lambda$ -values and R-values detailed below are quoted in accordance with BS EN 13166: 2012 + A2: 2016 (Thermal insulation products for buildings. Factory made phenolic foam (PF) products. Specification).

### Thermal conductivity

The boards achieve a thermal conductivity ( $\lambda$ -value) of 0.019 W/mK.

### 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<sup>2</sup>K/W).

Insulant thickness (mm)	Thermal resistance (m <sup>2</sup> K/W)
65	3.40
70	3.65
75	3.90
80	4.20
85	4.45
90	4.70
100	5.25
110	5.75
120	6.30

NB Kingspan Insulation's maximum available single insulation thickness is subject to alteration without notice. At the time of publication, this specific insulation thickness must be built up from two thinner layers, but this may have changed by the time that the information in this literature is relied upon. Please contact Kingspan Insulation's Technical Service Department (see rear cover) for current stock and non-stock sizes. Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.



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# About Kingspan Insulation

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## 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 Insulation Ltd is a leading manufacturer of premium and high performance rigid insulation products and insulated systems for building fabric and building services applications.

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## Products & solutions

Optimum, premium and high performance rigid insulation products for building fabric applications, including roofs, walls and floors.

- Kingspan OPTIM-R® - optimum performance vacuum insulation panel (VIP) systems.
- Kingspan Kooltherm® - premium performance phenolic insulation.
- Kingspan Therma™ - high performance PIR insulation.
- K-Roc® - rock mineral fibre insulation.
- Kingspan GreenGuard® - extruded polystyrene insulation (XPS).
- Kingspan TEK® - structural insulated panels (SIPs).
- Cavity closers - PVC-U extrusions with an insulation core.
- Membranes - for pitched roofs and walls.

## Services

We are proud to offer one of the most advanced support services in the construction industry, designed to give 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.
- 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.
- 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.

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## Planet Passionate

Planet Passionate, our 10-year group wide global sustainability programme, aims to have a positive impact on three big global challenges: climate change, circularity and protection of our natural world.

The Planet Passionate programme is made up of 12 ambitious targets, addressing the impact of Kingspan's business operations and manufacturing on the four key areas of energy, carbon, circularity and water, with commitments by 2030 to include:

- energy: powering 60% of all Kingspan operations directly from renewable energy with a minimum of 20% of this energy generated on manufacturing sites;
- carbon: achieving net zero carbon manufacturing and a 50% reduction in product CO<sub>2</sub> intensity from primary supply partners;
- circularity: upcycling of 1 billion PET bottles per annum into our manufacturing processes plus zero company waste to landfill across all sites; and
- water: harvesting 100 million litres of rainwater annually on our sites.

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# Contact details

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## Great Britain

**Kingspan Insulation Ltd**  
Pembroke | Leominster  
Herefordshire | HR6 9LA

T: +44 (0) 1544 388 601

E: [info@kingspaninsulation.co.uk](mailto:info@kingspaninsulation.co.uk)

[www.kingspaninsulation.co.uk](http://www.kingspaninsulation.co.uk)

For individual department contact details please visit  
[www.kingspaninsulation.co.uk/contact](http://www.kingspaninsulation.co.uk/contact)

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## Ireland

**Kingspan Insulation Ltd**  
Castleblayney | County Monaghan

T: +353 (0) 42 979 5000

E: [info@kingspaninsulation.ie](mailto:info@kingspaninsulation.ie)

[www.kingspaninsulation.ie](http://www.kingspaninsulation.ie)

For individual department contact details please visit  
[www.kingspaninsulation.ie/contact](http://www.kingspaninsulation.ie/contact)



For the most up-to-date version of this brochure please scan or click [here](#).

To access pre-existing product information or information relating to previously sold/discontinued products please email [literature@kingspaninsulation.co.uk](mailto:literature@kingspaninsulation.co.uk).

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Kingspan Insulation Ltd is not associated with, and its products have not necessarily been tested by, the GREENGUARD Environmental Institute.

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