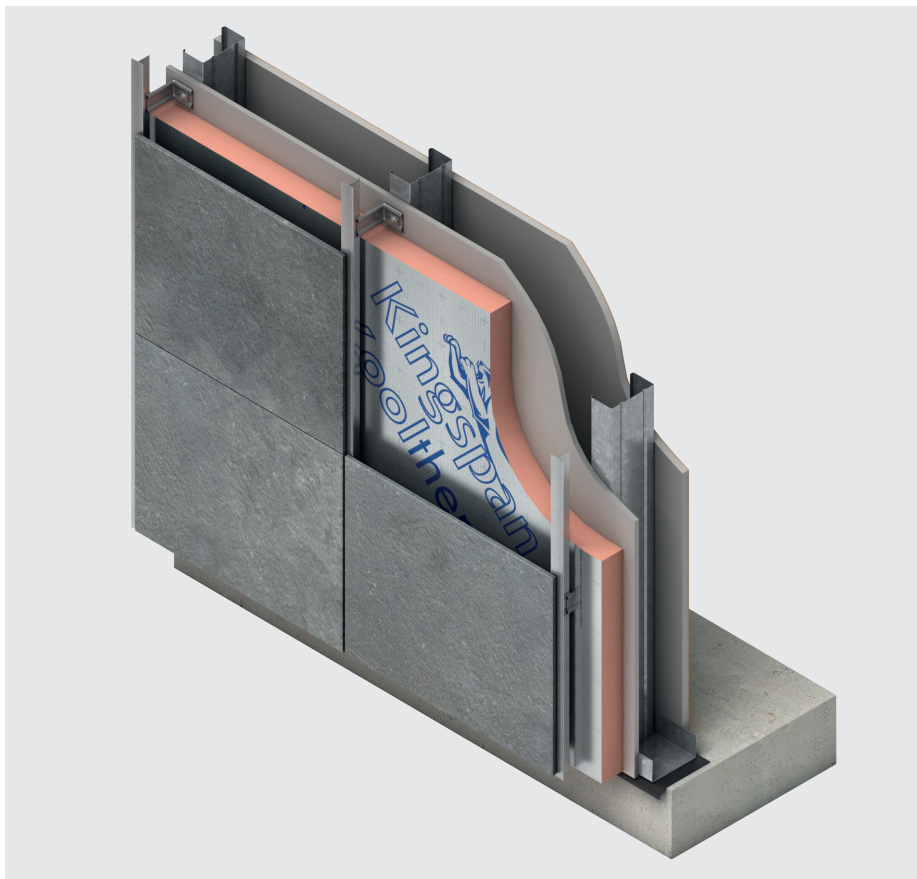


Kooltherm® K15 Rainscreen Board

Insulation for use behind rainscreen façades



- Premium performance rigid thermoset phenolic insulation - thermal conductivity as low as 0.021 W/mK
- Unaffected by air infiltration
- Resistant to the passage of water vapour
- Easy to handle and install compared to some other commonly used insulants
- Ideal for new build and refurbishment

Typical constructions

Assumptions

Rainscreen façade systems are proprietary, resulting in a wide variation of possible system build-ups, material combinations and mechanisms that are used to fix and support the external cladding to the wall structure.

Fixings and supports penetrating the insulation through to the structure form point thermal bridges. The effect on the thermal performance of the overall façade system can be significant. Whilst the use of thermal isolators can assist in mitigating the impact of thermal bridging, the type and placement of fixings and supports can exacerbate heat flow through the façade assembly affecting the U-value.

For these reasons, it is advised that the Kingspan Insulation Technical Service Department is contacted for specific U-value calculations (see rear cover for details).

All calculations are undertaken 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).

NB 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.

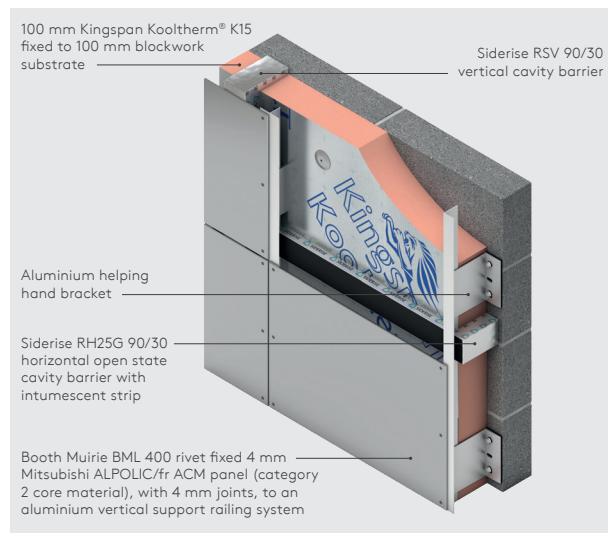


Figure 1: FR ACM panel & masonry blockwork

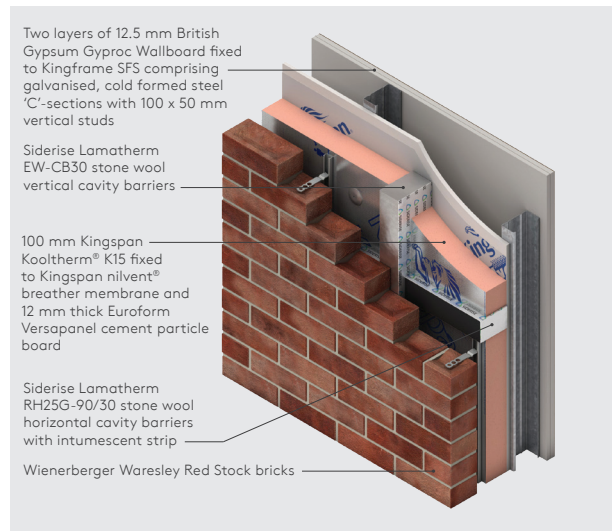


Figure 2: Brickwork facing & Kingspan Kingframe SFS

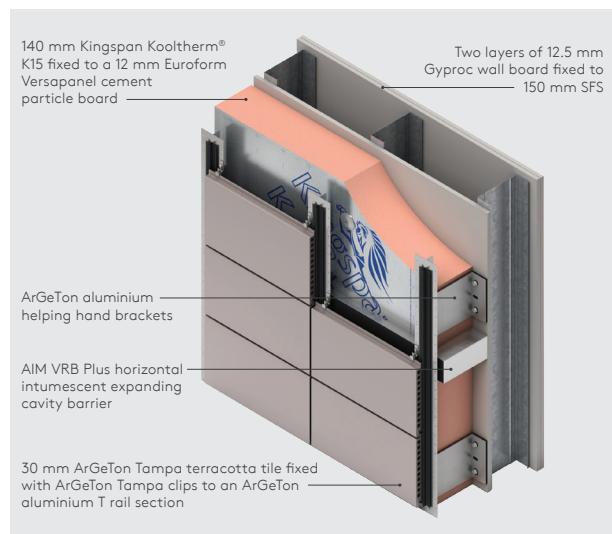


Figure 3: Terracotta tile cladding & SFS

Design considerations

Linear thermal bridging at junctions & point 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 CO₂ emissions and, where applicable, the fabric energy efficiency of new buildings.

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

Existing building junction losses are not typically accounted for in whole building heat loss calculations and only the risks of surface condensation and mould growth are considered.

Point thermal bridging describes the heat loss associated with penetrating an insulation layer at discrete points. Point thermal bridging is typically used as an adjustment to a U-value for an element, taking account of the number of brackets, fixings or fasteners (n) and their associated point thermal losses; these losses are measured in W/mK; referred to as a 'chi-values'; and expressed as a ' χ -values'.

The U-value of a rainscreen wall is adjusted to account for point thermal bridging by adding an adjustment to the U-value based on the number of penetrations per square metre of wall (n) multiplied by the calculated point thermal transmittance (χ) for brackets penetrating the insulation layer. The χ -value can be determined through 3-Dimensional numerical calculation as described in BS EN ISO 10211: 2017 (Thermal bridges in building construction. Heat flows and surface temperatures. Detailed calculations).

Reducing linear & point thermal bridging

Heat typically flows through the easiest path. For a wall insulated with Kingspan Kooltherm® K15, the main linear thermal bridges are the reveals, exposed slab edges and balconies, the junctions between the walls and the roof and where the external wall and ground floor meet. In addition, point linear transmittance will occur through the rainscreen fixing system chosen, where the rainscreen supports penetrate the insulation layer.

Whilst there are some 'approved' details available for insulation installed to the outer face of the construction, these are largely targeted at new build constructions. However, where applicable, they are also considered good practice for refurbishment.

Continuity of insulation is the best approach to limiting losses from junctions or from losses associated with fixing the rainscreen façade; failing continuity, overlap of insulation layers and use of lower conductivity materials represents a good practice approach; however where neither option is possible, the risk of condensation will require particular consideration in determining an appropriate approach. Details and designs should be considered in the context of the building, it's construction, characteristics, condition and ventilation provisions.

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

- The reveal linear thermal bridge can be avoided either by positioning the window frame so that it overlaps the insulated cavity barrier, or if this is not possible, the linear thermal bridge can be reduced by insulating the reveal at jambs, head and sill. Where existing windows or doors are not replaced as part of renovation works, design and detailing of the rainscreen façade should consider the potential for future window replacement works.
- One of the largest thermal bridging losses for buildings is the heat lost through junctions between balconies and the external wall / intermediate floor. Good practice for new buildings is to isolate the external balcony from the building structure, using an appropriate thermal break, combined with consideration of the reinforcement material used to connect the balcony back to the main structure (e.g. stainless steel has a much lower thermal conductivity than mild steel).

Design considerations

- For existing buildings, the option to use an appropriate thermal break may not be available and the effect of heat loss from balconies through the external rainscreen façade needs careful consideration; wrapping the external balcony in appropriate insulation can assist in this circumstance to reduce the effects of heat lost through this junction.
 - For a new build construction, where Kingspan Kooltherm® K15 is used to sheath a frame construction at the edge of ground floors, the distance between the top surface of the floor insulation or perimeter insulation upstand, and the bottom of the wall insulation must be a minimum of 150 mm for a concrete floor and 200 mm for a suspended timber floor. The further appropriate wall insulation extends past the floor insulation, the better the thermal performance of the junction between the wall and the floor. For advice on the appropriate insulation to be used, please contact the Kingspan Insulation Technical Service Department (see rear cover for details).
 - For existing building's junctions between walls and ground floor, good practice wherever possible is to extend the insulation below ground level, so that wall and floor insulation layers overlap; best practice would be to excavate and extend appropriate external insulation below ground level (ideally by at least 300 mm below finished floor level) to increase the heat flow path and therefore reduce junction losses.
 - Where the rainscreen system is used at roof level as part of a parapet detail, insulation continuity should be maintained using an appropriate insulated upstand to reduce cold bridging. A minimum 25 mm thick insulated 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. Insulation should be carried up into parapets at least as high as the flat roof insulation upstand.
- Where insulating as part of a rainscreen system, there are also some simple design considerations that can be adopted to reduce point thermal transmittance.
- Point thermal bridges cause increased flow of heat and should be taken into consideration when designing a façade / façade system. The first priority should be to eliminate continuous conductive elements and instead use discontinuous supports to make required connections back to structure. When the thermal bridge is a necessity, such as when the structure must penetrate uninterrupted through the insulation, look for materials with the lowest possible thermal conductivity or that allows for a reduction in the amount that the insulation layer is bridged. Thermal decoupling of the substructure from the ventilated façade can be achieved through thermal separation layers. The use of a neoprene / plastic gasket, between the 'helping hand' bracket and the structure, can help to mitigate the effects of cold bridging.
 - Support system suppliers should be able to calculate the thermal value of their brackets and isolators, and ensure that the installation minimises the overall impact of thermal bridging. However, in most instances a detailed three-dimensional U-value is required to assess the impact of the chosen design on the framing system. Please contact the Kingspan Insulation Technical Service Department (see rear cover) for further information.
- For further advice on reducing linear and point thermal bridging, please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

Design considerations

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® K15 produced at Kingspan Insulation's Castleblayney, Co. Monaghan manufacturing facility.

Responsible sourcing

Kingspan Kooltherm® K15 produced at Kingspan Insulation's Castleblayney, Co. Monaghan manufacturing facility is manufactured under a management system certified to ISO 14001: 2015.

NB The above information is correct at the time of writing. Please confirm at the point of need by visiting the [Kingspan Insulation website](http://www.kingspaninsulation.co.uk), from which copies of Kingspan Insulation's certificates can be obtained.

Sustainability & responsibility

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

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

Specification clause

Kingspan Kooltherm® K15 should be described in specifications as:-

The wall insulation shall be Kingspan Kooltherm® K15 Rainscreen Board _____ mm thick: comprising a premium performance rigid thermoset fibre-free phenolic insulation core faced on both sides with a low emissivity composite foil facing. The product shall be manufactured under a management system certified to ISO 9001: 2015, ISO 14001: 2015, ISO 37301: 2021, ISO 45001: 2018 and ISO 50001: 2018; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

Product classifications

Uniclass UK

Pr_25_71_63_59 Phenolic Foam Boards
Pr_80_77_76_62 Phenolic Foam Insulation

CAWS

H20/10 (Sheet cladding)
H20/150 (Sheet cladding (attached to metal support systems))
H20/155 (Sheet cladding (attached to timber battens))
H92/776 (Thermal insulation)
Details also available at [NBS Source](http://www.nbs.co.uk).

Building Information Modelling (BIM)

BIM objects for Kingspan Kooltherm® K15 can be downloaded using the Kingspan BIM Designer Software Tool available at www.kingspaninsulation.co.uk/k15.

Fire safety

For guidance regarding the routes to compliance for meeting the fire safety requirements of the Building Regulations / Standards, refer to the relevant Technical Bulletins at www.kingspaninsulation.co.uk/fireregulations.

For those interested in receiving detailed fire test data for Kingspan Kooltherm® K15, it may be obtained by contacting the Kingspan Insulation Technical Service Department at highrisetechnical@kingspan.com.

Fire stop & cavity barrier strategy

Current guidance to the Building Regulations should be considered with regard to the performance requirements for, and the provision of fire stops and cavity barriers.

Water vapour control / condensation

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

A condensation risk analysis should be carried out following the procedures set out in BS 5250: 2021 (Management of moisture in buildings. Code of practice). The Kingspan Insulation Technical Service Department can provide this service.

Glazed façade systems

Contact the Kingspan Insulation Technical Service Department for advice regarding the use of Kingspan Kooltherm® K15 in glazed applications.

Lightning protection

Designers should give consideration to the requirements of BS EN 62305: 2011 (Protection against lightning).

Sitework

Installation

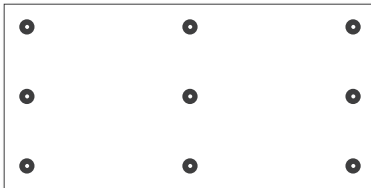
- The installation guidance for Kingspan Kooltherm® K15 outlined in this section must only be followed after considering the below.
- There are potential restrictions placed upon this product which vary dependant on building type, height, construction and location. For guidance regarding the routes to 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.
- Since rainscreen façade systems are proprietary and use differing mechanisms to fix and support the external cladding to the wall structure, installation guidance should be sought from the system manufacturer or supplier.
- Nevertheless, in the absence of any other guidance the instructions set out below may be followed.
- Insulation boards should be installed break-bonded with board edges lightly butted and in such a manner to achieve a close fit between the board and substrate interface so as to avoid gaps behind or between the boards.
- Boards should be cut neatly around fixings and brackets, so as to avoid gaps. Where small gaps are unavoidable, fill gaps with fire rated expanding sealant.
- The number and type of mechanical fixings required to fix Kingspan Kooltherm® K15 will vary with the geographical location of the building, the local topography, the height and width of the wall concerned, the wall structure, and the type of mechanism being used to attach the cladding system.
- A minimum of 3.13 fixings per m² are required to secure the insulation board to the wall structure.
- The requirement for additional fixings should be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (UK National Annex to Eurocode 1. Actions on structures - General actions - Wind actions).
- The fixings should be evenly distributed over the whole area of the board.
- Refer to the column on page 7 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.

Refer to:
 - Ejot UK Limited** +44 (0) 1977 687 040
www.ejot.co.uk
 - Fixfast** +44 (0) 1732 882 387
www.fixfast.com
 - MAK Fasteners** +353 (0) 1 451 99 00
www.makfasteners.com
 - SFS Group Fastening Technology Ltd** +44 (0) 330 0555 888
www.uk.sfs.com
- The joints of Kingspan Kooltherm® K15 should always be taped using a 75 mm min. wide suitable self-adhesive aluminium foil tape.
- In the absence of other protection, exposed edges of Kingspan Kooltherm® K15 should be protected by a suitable self-adhesive aluminium foil tape, with a 50 mm min. wide overlap onto the insulation board face.
- For advice on the specification of self-adhesive aluminium foil tape and application guidelines, refer to:
 - Bostik Limited** +44 (0) 1785 272 625
www.bostik.co.uk

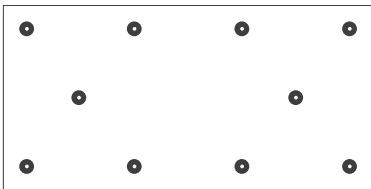
Sitework

Recommended fixing patterns

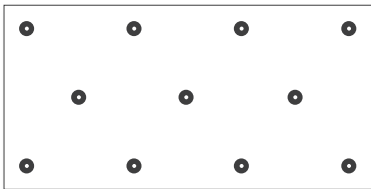
- The images below show recommended fixing patterns, the number of fixings used and the resulting fixing density (number of fixings per m²).



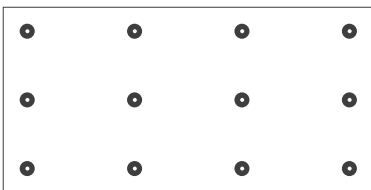
9 no. per board
(2.4 x 1.2 m board - 3.13 fixings / m²)



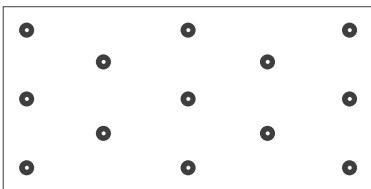
10 no. per board
(2.4 x 1.2 m board - 3.47 fixings / m²)



11 no. per board
(2.4 x 1.2 m board - 3.82 fixings / m²)



12 no. per board
(2.4 x 1.2 m board - 4.17 fixings / m²)



13 no. per board
(2.4 x 1.2 m board - 4.51 fixings / m²)

General

Cutting

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

Daily working practice

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

Availability

- Kingspan Kooltherm® K15 is available through specialist insulation distributors and selected builders' merchants throughout the UK.

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.

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 facings

Kingspan Kooltherm® K15 is faced on both sides with a low emissivity composite foil, autohesively bonded to the insulation core during manufacture.

The core

The core of Kingspan Kooltherm® K15 is a premium performance rigid thermoset fibre-free phenolic insulant.



Standards & approvals

Kingspan Kooltherm® K15 is manufactured under a management system certified to ISO 9001: 2015 (Quality management systems), ISO 14001: 2015 (Environmental management systems), ISO 37301: 2021 (Compliance management systems), ISO 45001: 2018 (Occupational health and safety management systems) and ISO 50001: 2018 (Energy management systems).

The use of Kingspan Kooltherm® K15 produced at Kingspan Insulation's Castleblayney, County Monaghan, Ireland (in thicknesses of 25 - 150 mm) manufacturing facility, is covered by BBA Certificate 14/5134.



Standard dimensions

Kingspan Kooltherm® K15 is available in the following standard size(s):

Nominal dimension	Availability
Length (mm)	2400
Width (mm)	1200
Insulant thickness (mm)	Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Compressive strength

The average compressive strength of Kingspan Kooltherm® K15 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® K15 can have an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

Resistance to solvents, fungi & rodents

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

The insulation core and facings used in the manufacture of Kingspan Kooltherm® K15 resist attack by mould and microbial growth, and do not provide any food value to vermin.

Thermal properties

The λ -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 (λ -value) of: 0.022 W/mK (insulant thickness 25-44 mm); and 0.021 W/mK (insulant thickness 45-150 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 (m²K/W).

Insulant thickness (mm)	Thermal resistance (m ² K/W)
25	1.10
30	1.35
40	1.80
50	2.35
60	2.85
70	3.30
75	3.55
80	3.80
90	4.25
100	4.75
110	5.20
120	5.70
130	6.15
140	6.65
150	7.10

NB Kingspan Insulation's maximum available single insulation thickness is subject to alteration without notice. Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Product details

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.

Kingspan Kooltherm® K15 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-SBI-000057-A and EUI-22-SFB-000057-A
Classification report number	EUI-22-000057-A-Revision 1
Product thickness (mm)	25 - 150
Substrate	Valid with any substrate, except plasterboards, of at least A2-s1,d0 class and at least 652.5 kg/m ³ density
Joints / edges	Vertical and horizontal joints and any edge type

Kingspan Kooltherm® K15 is assessed under Assessment and Verification of Constancy of Performance (AVCP) System 1 for Reaction for Fire.

Certificate of Constancy of Performance	1812-CPR-2217
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Kingspan Kooltherm® K15 has been used in several specific systems which have been successfully tested to BS 8414-1: 2020 (Fire Performance of external cladding systems - Test method for non-loadbearing external cladding systems fixed to, and supported by, a masonry substrate) and, BS 8414-2: 2020 (Fire performance of external cladding systems - Test method for non-loadbearing external cladding systems fixed to, and supported by, a structural steel frame), in accordance with the performance criteria set out in BR 135 (Fire performance of external thermal insulation for walls of multi-storey buildings). These specific constructions must be followed when using the performance-based route as a route to compliance in England, Wales and Scotland. The end use design needs to be carefully considered to replicate the design details used in the tested constructions.

Please note as part of a development project, Kingspan Insulation has made adjustments to the foil facer material of Kingspan Kooltherm® K15. This change affects all Kooltherm® K15 manufactured from the 18th October 2021 onwards. As a result, a number of BS 8414 system tests now have a corresponding assessment in lieu of test, in accordance with the guidance given in BS 9414: 2019 (Fire performance of external cladding systems. The application of results from BS 8414-1 and BS 8414-2 tests). This assessment takes into consideration the change of facing material.

Test reports and assessments owned by Kingspan Insulation, detailing these constructions, are available for download at www.kingspan.com/gb/en/campaigns/kingspan-bs-8414-tested-systems or further information can be provided by emailing highrisetechnical@kingspan.com.

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For individual department contact details please visit

www.kingspaninsulation.co.uk/contact



For the most up-to-date version of this manual 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.

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