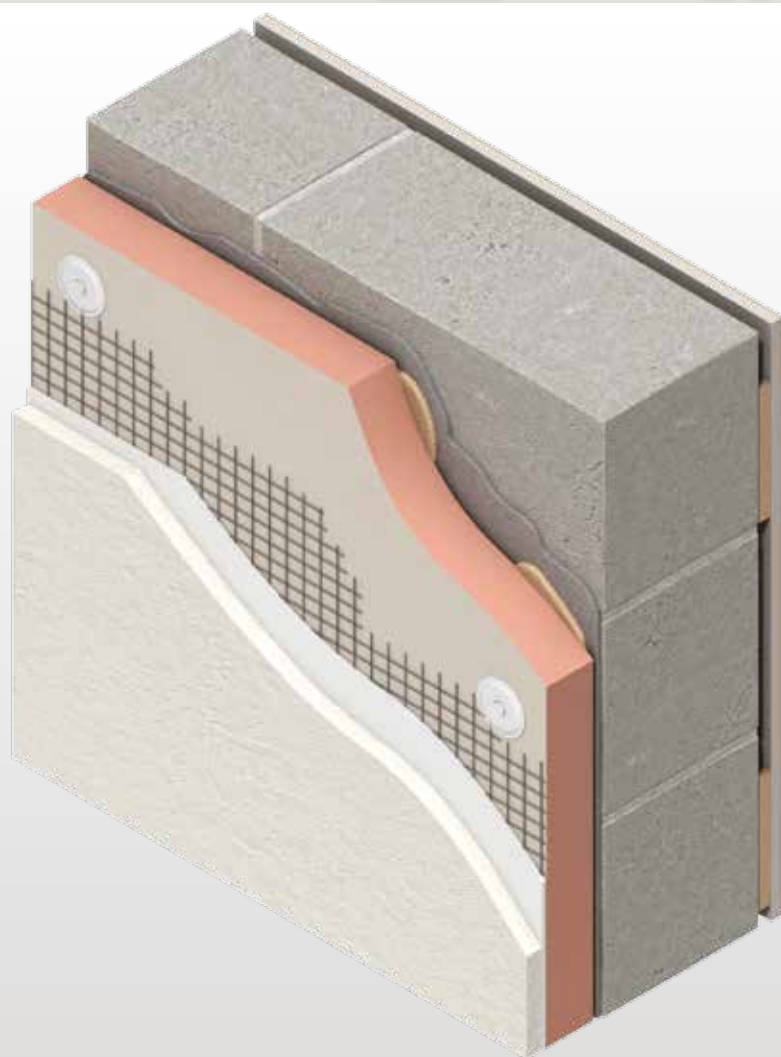




See rear cover for applicable countries

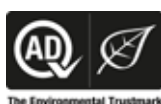
Kooltherm™ K5 External Wall Board

EXTERNAL INSULATION FOR MASONRY WALLS



- Premium performance rigid thermoset insulation – thermal conductivities as low as 0.020 W/m·K
- Rated Class 1 (A) under ASTM E 84
- Negligible smoke obscuration
- Suitable for use behind traditional and lightweight polymer modified renders
- Unaffected by air infiltration
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build and refurbishment
- Non-deleterious material
- Manufactured with a blowing agent that has zero ODP and low GWP
- Approved by Dubai Central Laboratory
- Approved by the State of Qatar Ministry of Interior General Admin of Civil Defence

**Fibre-free
Core**



Kingspan™

*Low Energy –
Low Carbon Buildings*

Typical Constructions and U-values

Assumptions

The U-values in the tables that follow have been calculated, under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U-value and Condensation Risk Calculations, using the method detailed in BS / I.S. EN ISO 6946: 2007 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation method), and using the conventions set out in BR443 (Conventions for U-value calculations). They are valid for the constructions shown in the details immediately above each table.



NB When calculating U-values to BS / I.S. EN ISO 6946: 2007, the type of mechanical fixing used may change the thickness of insulation required. These calculations assume telescopic tube fasteners with a thermal conductivity of 1.00 W/m·K or less, the effect of which is insignificant.

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

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

U-value Table Key

Where an **X** is shown, the U-value is higher than the worst of the maximum new build area weighted average U-values allowed by the Green Building Code (Dubai), Estidama (Abu Dhabi), GSAS (Qatar) and other regulations across the Middle East.

Typical Constructions

200 mm Concrete Block Wall

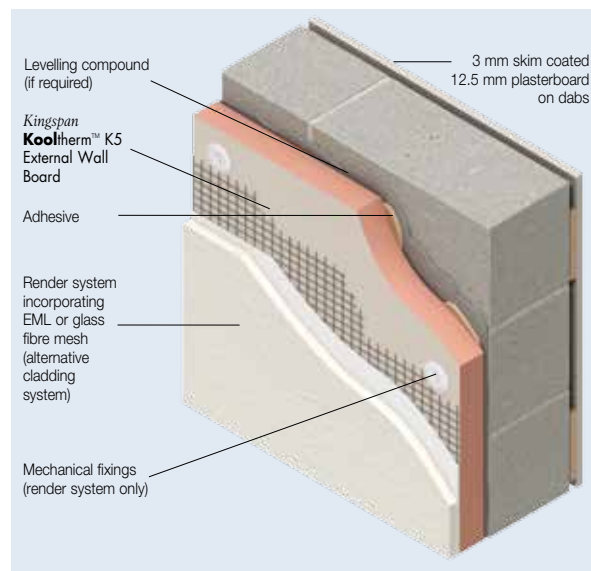


Figure 1

U-values for Various Thicknesses of Kingspan Kooltherm™ K5 External Wall Board with 20 mm Polymer Render

Insulant Thickness (mm)	U-values (W/m ² ·K)
20	X
25	0.51
30	0.45
35	0.40
40	0.37
45	0.34
50	0.31
55	0.29
60	0.27
65	0.25
70	0.24
75	0.22
80	0.21
85	0.20
90	0.19
95	0.18
100	0.17

Table 1: Thicknesses of Kingspan Kooltherm™ K5 External Wall Board, installed within the construction shown in the image above to meet the associated U-value.

Solid Reinforced Concrete Wall

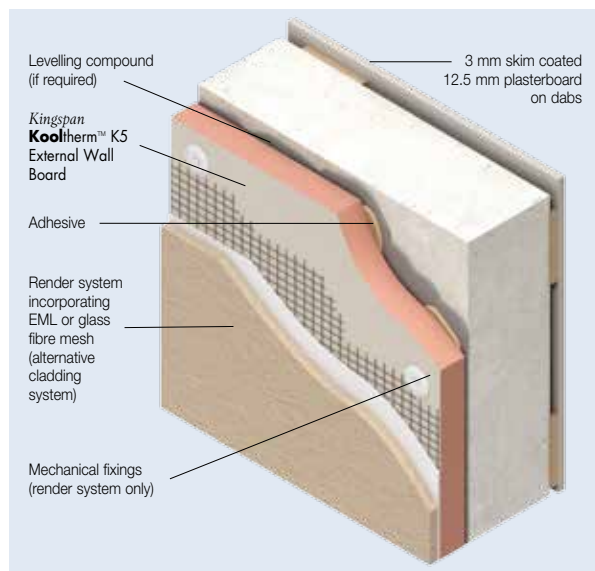


Figure 2

U-values (W/m ² ·K) for Various Thicknesses of Kingspan Kooltherm™ K5 External Wall Board with 20 mm Polymer Render	
Insulant Thickness (mm)	U-values (W/m·K)
20	X
25	0.53
30	0.47
35	0.42
40	0.38
45	0.35
50	0.32
55	0.30
60	0.28
65	0.26
70	0.24
75	0.23
80	0.22
85	0.20
90	0.19
95	0.19
100	0.18

Table 2: Thicknesses of Kingspan Kooltherm™ K5 External Wall Board, installed within the construction shown in the image above to meet the associated U-value.

200 mm Dense Block / 50 mm Cavity / 200 mm Dense Block

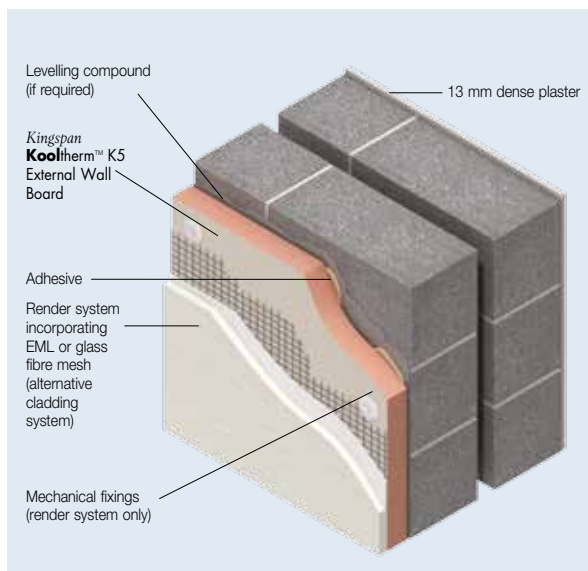


Figure 3

U-values (W/m ² ·K) for Various Thicknesses of Kingspan Kooltherm™ K5 External Wall Board with 20 mm Polymer Render	
Insulant Thickness (mm)	U-values (W/m·K)
15	X
20	0.52
25	0.46
30	0.42
35	0.38
40	0.34
45	0.32
50	0.29
55	0.27
60	0.26
65	0.24
70	0.23
75	0.21
80	0.20
85	0.19
90	0.19
95	0.18
100	0.17

Table 3: Thicknesses of Kingspan Kooltherm™ K5 External Wall Board, installed within the construction shown in the image above to meet the associated U-value.

Linear Thermal Bridging at Openings

Linear thermal bridging describes the heat gain or loss at junctions between elements, where the geometry of the junction means that a building's primary insulation layer is not continuous or is reduced. This heat gain or loss is represented by the junction's ψ (ψ) value. The ψ -values of all the linear thermal bridges in a building are used in whole building carbon dioxide emissions calculation software.

At a window or door openings, in a wall insulated with *Kingspan Kooltherm™ K5 External Wall Board*, the linear thermal bridge is the reveal.

This linear thermal bridge can be avoided, by positioning the window frame so that its outer face is flush with the outer surface of the masonry wall, and overlapping the window frame with the external wall insulation.

If this is not possible, this linear thermal bridge can be reduced by insulating the reveal. The key factor is the thermal resistance (R-value) of this insulation layer.

Reveals should be designed to accommodate the 20 mm of *Kingspan Kooltherm™ K5 External Wall Board* required to achieve an R-value of 0.6 m²·K/W, and the depth of the polymer render (see Figure 4).

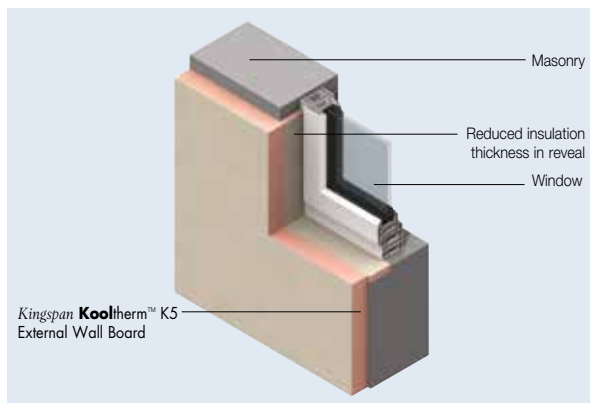


Figure 4

Design Considerations

Environmental Impact & Responsible Sourcing

Green Guide Rating

An Ecoprofile, certified by BRE Certification to the 2008 BRE Environmental Profiles Methodology, has been created for **Kingspan Kooltherm™ K5 External Wall Board** produced at Kingspan Insulation's Pembroke, UK, manufacturing facility. The BRE has assigned the product a 2008 Green Guide Summary Rating of A+.



Environmental Profiles Scheme
Certificate Number ENP 410

Responsible Sourcing

Kingspan Kooltherm™ K5 External Wall Board produced at Kingspan Insulation's Pembroke, UK and Castleblayney, Ireland manufacturing facilities is manufactured under a management system certified to ISO 14001: 2004. The principle polymer component of the product produced at these facilities is also manufactured under a management system certified to ISO 14001: 2004.

Kingspan Kooltherm™ K5 External Wall Board manufactured at Kingspan Insulation's Pembroke, UK manufacturing facility is certified to BES 6001 'Excellent'.



NB The above information is correct at the time of writing. Please confirm at the point of need by contacting Kingspan Insulation (see rear cover), from which copies of Kingspan Insulation's and its suppliers' BES 6001 certificates can be obtained, along with confirmation of Kingspan Insulation's products' Green Guide Ratings.

Sustainability & Responsibility

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

A report covering the sustainability and responsibility of Kingspan Insulation's British operations is available at www.kingspaninsulation.co.uk/sustainabilityandresponsibility.

Specification Clause

Kingspan Kooltherm™ K5 External Wall Board should be described in specifications as:-

The external wall insulation shall be **Kingspan Kooltherm™ K5 External Wall Board** ____ mm thick: comprising a fibre-free premium performance rigid thermoset phenolic insulation core faced on both sides with a glass tissue based facing. The product shall be manufactured: with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP); under a management system certified to ISO 9001: 2008, ISO 14001: 2004 and BS / I.S. OHSAS 18001: 2007; by Kingspan Insulation and installed in accordance with the instructions issued by them.

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: 2002 (Code of practice for the control of condensation in buildings). Kingspan Insulation (see rear cover) can provide this service.

Fire Stops

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

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

Please contact Kingspan Insulation (see rear cover for details) for advice regarding the fire stopping strategy for your construction.

Insulated Render Systems

- Because insulated render systems are proprietary and utilise different mechanisms for attaching insulation to the wall structure, sitework guidance should be sought from the render system manufacturer. However, in the absence of any other guidance, the instructions laid out below may be followed.
- The external masonry wall should be clean, flat, and free from protrusions.
- Where an uneven surface remains, it is recommended that a levelling compound can be applied prior to fixing the insulation boards.
- External wall insulation should start at least 150 mm below the top surface of the ground floor insulation / perimeter insulation upstand (whichever is higher) for a concrete floor.
- Insulation boards should be installed break-bonded, with joints lightly butted.
- Care should be taken to install the specified thickness of insulation around reveals (see Figure 4).
- In the absence of guidance provided by the adhesive manufacturer, a minimum bedding adhesive surface area of 40% is to be applied to the inner face of **Kingspan Kooltherm™ K5 External Wall Board**. This can be achieved by applying the bedding adhesive to the perimeter of the insulation board (i.e. a border of adhesive around the circumference of the board) and 3 additional large dabs of adhesive in the middle area of the insulation board (see figure 4).
- After the adhesive has dried, the boards of **Kingspan Kooltherm™ K5 External Wall Board** are mechanically fixed to the exterior of masonry external walls, preferably using thermally broken telescopic tube fasteners.
- The number and type of mechanical fixings required to fix **Kingspan Kooltherm™ K5 External Wall Board** will vary with the geographical location of the building, the local topography, the height and width of the wall concerned and the wall structure
- A minimum of 5 fixings are required to secure an insulation board to the masonry wall.
- Board edges at openings and external corners should be fixed with fasteners at minimum 300 mm centres.
- Fasteners at board edges must be located > 50 mm, and < 150 mm, from edges and corners of the board, and not overlap board joints.
- The requirement for additional fixings should be assessed in accordance with BS / IS EN 1991-1-4:2005 (National Annex to Eurocode 1. Actions on structures, General Actions, Wind Actions). Assessment of all wind loading calculations and assessment of structural performance for both pull-out and pull-through resistances of the mechanical fixing system, should be carried out by a suitably qualified and experienced person.

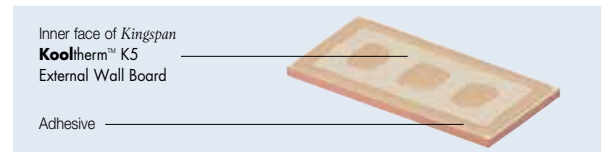


Figure 5 - Adhesive Applied to Inner Face of **Kingspan Kooltherm™ K5 External Wall Board**

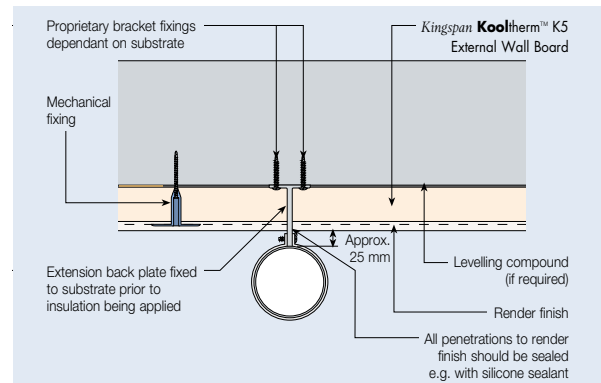


Figure 6 – Drainpipe Extension Detail (Applicable to a Variety of External Building Ancillaries)

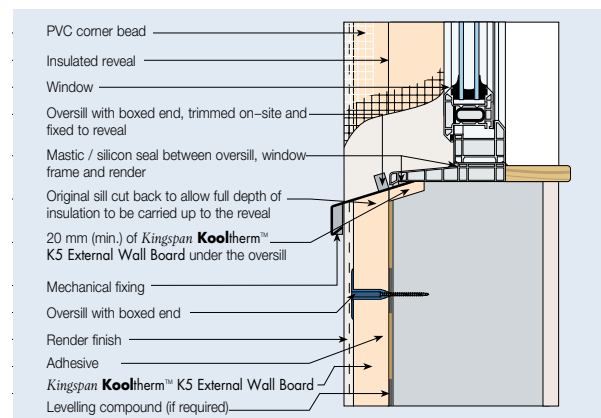


Figure 7 – Oversill Extension Detail (Refurbishment)

General

- Wherever possible, care should be taken to avoid thermal bridging when attaching services and ancillaries to the exterior of the building (see Figure 6).
- Depending on the render finish being applied, advice must be sought from the render manufacturer on the EML / glass fibre mesh, adhesive and levelling mortar to be applied.
- In refurbishment projects, sill extenders and flashings should be used around openings, with care taken to avoid thermal bridging (see Figure 7).

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

- Please contact Kingspan Insulation (see rear cover) to enquire about the availability of *Kingspan* **Kooliherm™** K5 External Wall Board.

Packaging and Storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Ideally, boards should be stored inside a building. If, however, 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 and safe to use.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website www.kingspaninsulation.com.

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™ K5 External Wall Board is faced on both sides with a glass tissue based facing, autohesively bonded to the insulation core during manufacture.

The Core

The core of *Kingspan Kooltherm™ K5 External Wall Board* is a fibre-free premium performance rigid thermoset phenolic insulant manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).



The core of *Kingspan Kooltherm™ K5 External Wall Board* has a 90% (or greater) closed cell structure.

Standards and Approvals

Kingspan Kooltherm™ K5 External Wall Board is manufactured to the highest standards under a management system certified to ISO 9001: 2008 (Quality management systems. Requirements), ISO 14001: 2004 (Environmental Management Systems. Requirements) and BS / I.S OHSAS 18001: 2007 (Health and Safety Management Systems. Requirements).

Kingspan Kooltherm™ K5 External Wall Board, produced at Kingspan Insulation's Pembridge, UK manufacturing facility, is manufactured to the highest standards under a management system certified to ISO 50001: 2011 (Energy management systems. Requirements).

Kingspan Kooltherm™ K5 External Wall Board is approved for use by the State of Qatar Ministry of Interior General Admin of Civil Defence.

Kingspan Kooltherm™ K5 External Wall Board, produced at Kingspan Insulation's Pembridge, UK manufacturing facility, is approved for use by Dubai Central Laboratory.



Kingspan Kooltherm™ K5 External Wall Board, produced at Kingspan Insulation's Pembridge, UK manufacturing facility, is certified by Abu Dhabi Quality and Conformity Council.



Standard Dimensions

Kingspan Kooltherm™ K5 External Wall Board is available in the following standard size:

Nominal Dimension		Availability
Length	(m)	1.2
Width	(m)	0.6
Insulant Thickness	(mm)	Refer to local distributor or Kingspan Insulation for current stock and non-stock sizes.

Table 4: Standard Dimensions of *Kingspan Kooltherm™ K5 External Wall Board*.

Density

The apparent density of *Kingspan Kooltherm™ K5 External Wall Board* is 35 kg/m³ when tested to BS EN 1602: 2013 (Thermal insulating products for building application Determination of the apparent density).

Compressive Strength

The compressive strength of *Kingspan Kooltherm™ K5 External Wall Board* typically exceeds 120 kPa at 10% compression, when tested to BS / I.S.EN 826: 1996 (Thermal insulating products for building applications. Determination of compression behaviour).

Water Vapour Resistivity

The product typically achieves a resistivity greater than 300 MN·s/g·m, when tested in accordance with BS EN 12086: 1997 / I.S. EN 12086: 1998 (Thermal insulating products for building applications. Determination of water vapour transmission properties).

Durability

If correctly installed, *Kingspan Kooltherm™ K5 External Wall Board* can have an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

Resistance to Solvents, Fungi & Rodents

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

The insulation core and facings used in the manufacture of *Kingspan Kooltherm™ K5 External Wall Board* resist attack by mould and microbial growth and do not provide any food value to vermin.

Fire Performance

The rigid thermoset insulation core of *Kingspan Kooltherm™ K5 External Wall Board*, when subjected to the American Standard fire test specified in the table below, has achieved the result shown.

Test	Result
UL 723 (Surface Burning Characteristics)	Flame Spread Index of ≤25 Smoke Developed Index (SDI) of ≤50 Class 1/A

Table 5: UL 723 result of the insulation core of *Kingspan Kooltherm™ K5 External Wall Board*.

Kingspan Kooltherm™ K5 External Wall Board, when subjected to the American Standard fire test specified in the table below, has achieved the result shown.

Test	Result
ASTM E 84 (Surface Burning Characteristics)	Flame Spread Index (FSI) of 25, Smoke Developed Index (SDI) of 50. Class 1 (A)

Table 6: ASTM E 84 result of *Kingspan Kooltherm™ K5 External Wall Board*.

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

Thermal Properties

The λ -values and R-values detailed below are quoted in accordance with ASTM C 518.

Thermal Conductivity

The boards achieve a thermal conductivity (λ -value) of 0.020 W/m·K at 23°C mean temperature.

Thermal Resistance

Thermal resistance can be expressed in either metric or imperial measurement. Using the imperial measurement, the boards achieve a thermal resistance (R-value) per inch of thickness of 7.21 ft²·hr·°F/Btu.

The metric measurement of 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 (m²·K/W).

Insulant Thickness (mm)	Thermal Resistance (m ² ·K/W)
25	1.25
30	1.50
35	1.75
40	2.00
45	2.25
50	2.50
55	2.75
60	3.00
65	3.25
70	3.50
75	3.75
80	4.00
85	4.25
90	4.50
95	4.75
100	5.00

NB Kingspan Insulation's maximum available single insulation thickness is subject to alteration without notice. Contact Kingspan Insulation (see rear cover) for current stock and non-stock sizes.

Table 7: Thermal Resistance of Differing Thicknesses of *Kingspan Kooltherm™ K5 External Wall Board*.

[illegible]

[illegible]

Kingspan Insulation LLC reserves the right to amend product specifications without prior notice. Product thicknesses shown in this document should not be taken as being available ex-stock and advice should be sought directly from Kingspan Insulation LLC. The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described herein. Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable codes, laws and regulations. For other applications or conditions of use, contact Kingspan Insulation LLC. Advice should be sought for uses of Kingspan Insulation products that are not specifically described herein. The fire tests referenced in this literature and the assigned results are not intended to reflect hazards presented by the materials and products described herein under actual fire conditions. Please check that your copy of the literature is current by visiting www.kingspaninsulation.com.



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Countries comprise: the Middle East as far North and East as (and including) Turkey, Iran and Oman and as far South and West as (and including) Saudi Arabia and Yemen

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