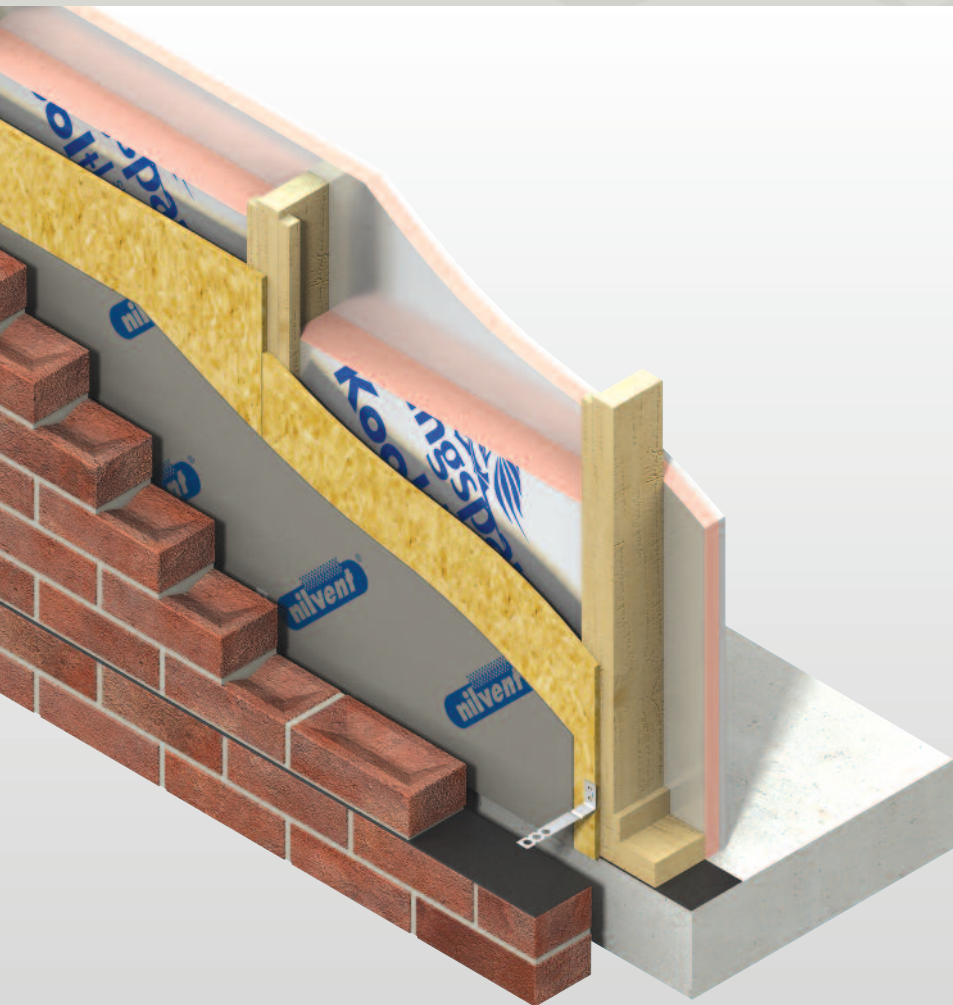




Kooltherm® K12 Framing Board

INSULATION FOR TIMBER AND STEEL
FRAMING SYSTEMS



- Premium performance rigid thermoset insulation – thermal conductivities as low as 0.020 W/m·K
- Class 0 fire rated insulation core
- Negligible smoke obscuration
- Can be used between studs or as an insulating sheathing
- Suitable for use with timber frame and steel frame wall construction
- Unaffected by air infiltration
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build or refurbishment
- Non-deleterious material
- Manufactured with a blowing agent that has zero ODP and low GWP



*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.



Unless otherwise stated both the timber and steel frame U-values quoted are based on an internal construction comprising a 3 mm plaster skim on 15 mm plasterboard. The external finishes are as specified in the examples themselves.

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. The effect of fixings for Kingspan Kooltherm® K18 Insulated Plasterboard has been ignored in these calculations, as the insulation layer penetrated is not the main insulation layer. For the purposes of timber frame calculations which feature insulating sheathing, the use of stainless steel fasteners of cross sectional area 7.45 mm² has been assumed at a density of 4.4 per m². For steel frame calculations featuring insulating sheathing, the use of carbon steel fasteners of cross sectional area 14.8 mm² has been assumed at a density of 4.5 per m².

NB For calculations which feature insulation between timber frame studs / timber battens, a 15% bridging factor has been assumed. The thermal conductivity of the timber has been assumed to be 0.12 W/m.K.

NB Calculations assume that a foil faced breathable membrane yields an airspace thermal resistance of 0.54 m².K/W. Calculations assume that a 4 mm foil faced bubble breathable membrane yields a combined product and airspace thermal resistance of 0.79 m².K/W.

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, please consult the Kingspan Insulation Technical Service Department for assistance (see rear cover).

U-value Table Key

Where an **X** symbol is shown, the U-value is higher than the worst of the maximum new build area weighted average / refurbishment (as applicable) U-values allowed by the 2010 Editions of Approved Documents L to the Building Regulations (England & Wales), the 2010 Editions of Technical Handbooks Section 6 (Scotland), the 2006 Editions of Technical Booklets F (Northern Ireland), or the 2008 Editions of Technical Guidance Documents L* (Republic of Ireland).

* Excluding Change of Use and Material Alterations.

Where an **♦** is shown, the combination of insulation products may result in an interstitial condensation risk and so the calculations have been excluded.

Refurbishment - Internal Dry Lining

Insulation Between, and Insulated Plasterboard Fixed to, Timber Framework on Solid Brick Wall

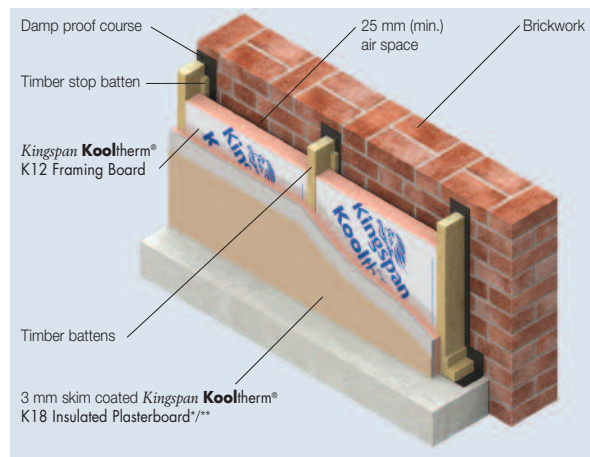


Figure 1

U-values (W/m².K) for Various Thicknesses of Insulation, Timber Depths, and Brickwork Thicknesses

Thickness of Kingspan Kooltherm® K12 Framing Board Between Timbers (mm)	Product Thickness of Kingspan Kooltherm® K18 Insulated Plasterboard*** Fixed to Timbers (mm)	Brickwork Thickness (mm)	
		102.5	215
75 mm Deep Timbers			
50	0*	X	X
50	32.5	0.29	0.28
50	37.5	0.27	0.26
50	42.5	0.25	0.24
50	52.5	0.22	0.21
50	62.5	0.20	0.19
50	67.5	♦	♦
100 mm Deep Timbers			
70	0*	X	X
75	0*	X	0.30
75	32.5	0.24	0.23
75	37.5	0.22	0.21
75	42.5	0.21	0.20
75	52.5	0.19	0.18
75	62.5	0.17	0.16
75	72.5	0.15	0.15
75	77.5	♦	♦

* Calculations which feature insulation between studwork only, assume the use of 15 mm plasterboard and a polythene sheet vapour control layer in order to minimise the risk of condensation (see 'Design Considerations - Water Vapour Control').

** Kingspan Kooltherm® K18 Insulated Plasterboard contains an integral vapour control layer in order to minimise the risk of condensation (see 'Design Considerations - Water Vapour Control').

*** Product thicknesses = insulant thickness + 12.5 mm plasterboard.

Timber Frame Wall with 102.5 mm Brickwork Outer Leaf

Insulation Between Timber Frame Studs with *Kingspan Kooltherm®* K18 Insulated Plasterboard Fixed Internally

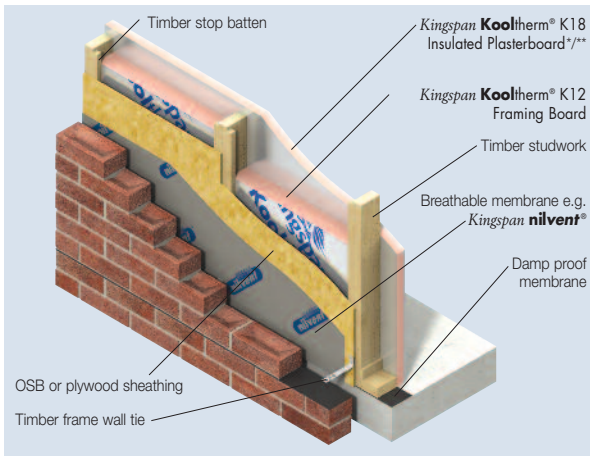


Figure 2

Insulation Between Timber Frame Studs and Insulated Sheathing

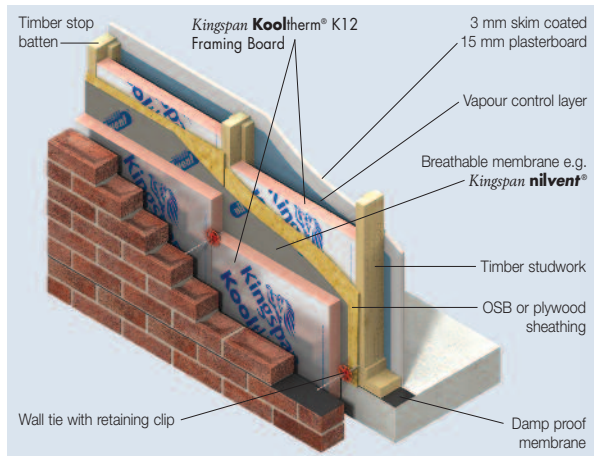


Figure 3

U-values (W/m²·K) for Various Thicknesses of Insulation, Stud Depths, and Breathable Membranes

Thickness of <i>Kingspan Kooltherm®</i> K12 Framing Board Between Studs (mm)	Product Thickness of <i>Kingspan Kooltherm®</i> K18 Insulated Plasterboard*** Inside Studs (mm)	Breathable Membrane Type		
		Standard	Foil Faced	Foil Faced Bubble
89 mm Deep Timber Studs				
25	0*	X	X	X
30	0*	X	X	0.35
35	0*	X	X	0.33
40	0*	X	0.35	0.32
45	0*	X	0.32	0.30
50	0*	0.35	0.31	0.29
60	0*	0.32	0.29	0.27
70	0*	0.30	0.27	0.25
70	32.5	0.23	0.21	0.20
70	37.5	0.22	0.20	0.19
70	42.5	0.20	0.19	0.18
70	52.5	0.18	0.17	0.17
70	62.5	0.17	0.16	0.15
70	72.5	0.15	0.14	0.14
140 mm Deep Timber Studs				
25	0*	X	X	X
30	0*	X	X	0.34
35	0*	X	0.35	0.32
40	0*	X	0.33	0.31
45	0*	0.35	0.31	0.29
50	0*	0.33	0.30	0.28
60	0*	0.30	0.27	0.25
70	0*	0.28	0.25	0.24
75	0*	0.27	0.24	0.23
80	0*	0.26	0.24	0.22
90	0*	0.24	0.22	0.21
100	0*	0.23	0.21	0.20
110	0*	0.22	0.20	0.19
120	0*	0.22	0.20	0.19
120	32.5	0.17	0.16	0.15
120	37.5	0.16	0.15	0.15
120	42.5	0.15	0.15	0.14

U-values for Various Thicknesses of Insulation and Stud Depths

Thickness of <i>Kingspan Kooltherm®</i> K12 Framing Board (mm)	U-values (W/m ² ·K)
89 mm Deep Timber Studs	
20 + 20	X
20 + 25*	0.28
25 + 25	0.26
30 + 30	0.24
40 + 40	0.20
50 + 50	0.17
60 + 60	0.15
140 mm Deep Timber Studs	
20 + 20	0.30
25 + 25	0.26
30 + 30	0.24
40 + 40	0.20
50 + 50	0.17
60 + 60	0.15

* First thickness refers to the insulation between studs, second thickness to the sheathing. The thermal resistance of the sheathing must be \geq that of the insulation between the studs in order to avoid condensation.

* Calculations which feature insulation between studwork only, assume the use of 15 mm plasterboard and a polythene sheet vapour control layer in order to minimise the risk of condensation (see 'Design Considerations – Water Vapour Control').

** *Kingspan Kooltherm®* K18 Insulated Plasterboard contains an integral vapour control layer (see 'Design Considerations – Water Vapour Control').

*** Product thicknesses = insulant thickness + 12.5 mm plasterboard.

Typical Constructions and U-values

Timber Frame Wall with 10 mm Polymer Rendered 100 mm Dense Blockwork Outer Leaf*

Insulation Between Timber Frame Studs with *Kingspan Kooltherm® K18* Insulated Plasterboard Fixed Internally

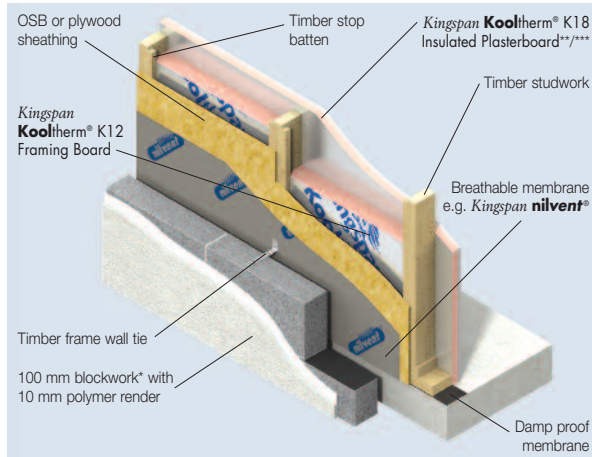


Figure 4

Insulation Between Timber Frame Studs and Insulated Sheathing

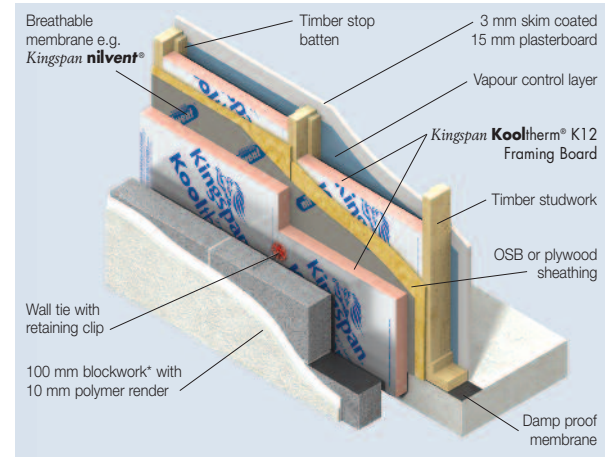


Figure 5

U-values (W/m ² ·K) for Various Thicknesses of Insulation, Stud Depths, and Breathable Membranes				
Thickness of <i>Kingspan Kooltherm® K12</i> Framing Board Between Studs (mm)	Product Thickness of <i>Kingspan Kooltherm® K18</i> Insulated Plasterboard*** Inside Studs (mm)	Breathable Membrane Type		
		Standard	Foil Faced	Foil Faced Bubble
89 mm Deep Timber Studs				
25	0**	X	X	X
30	0**	X	X	0.34
35	0**	X	X	0.33
40	0**	X	0.34	0.31
45	0**	X	0.32	0.29
50	0**	0.35	0.31	0.28
60	0**	0.32	0.28	0.26
70	0**	0.30	0.27	0.25
70	32.5	0.23	0.21	0.20
70	37.5	0.21	0.20	0.19
70	42.5	0.20	0.19	0.18
70	52.5	0.18	0.17	0.16
70	62.5	0.16	0.16	0.15
70	72.5	0.15	0.14	0.14
140 mm Deep Timber Studs				
20	0**	X	X	X
25	0**	X	X	0.35
30	0**	X	X	0.33
35	0**	X	0.34	0.32
40	0**	X	0.33	0.30
45	0**	0.35	0.31	0.28
50	0**	0.33	0.29	0.27
60	0**	0.30	0.27	0.25
70	0**	0.28	0.25	0.23
75	0**	0.27	0.24	0.23
80	0**	0.26	0.23	0.22
90	0**	0.24	0.22	0.21
100	0**	0.23	0.21	0.20
110	0**	0.22	0.20	0.19
120	0**	0.21	0.20	0.19
120	32.5	0.17	0.16	0.15
120	37.5	0.16	0.15	0.14
120	42.5	0.15	0.14	0.14

U-values for Various Thicknesses of Insulation and Stud Depths	
Thickness of <i>Kingspan Kooltherm® K12</i> Framing Board (mm)	U-values (W/m ² ·K)
89 mm Deep Timber Studs	
20 + 20	0.30
25 + 25	0.26
30 + 30	0.24
40 + 40	0.20
50 + 50	0.17
60 + 60	0.15
140 mm Deep Timber Frame Studs	
20 + 20	0.30
25 + 25	0.26
30 + 30	0.23
40 + 40	0.20
50 + 50	0.16
60 + 60	0.14

* Calculations assume dense block of λ -value 1.13 W/m·K.

* Calculations assume dense block of λ -value 1.13 W/m·K.

** Calculations which feature insulation between studwork only, assume the use of 15 mm plasterboard and a polythene sheet vapour control layer in order to minimise the risk of condensation (see 'Design Considerations – Water Vapour Control').

*** *Kingspan Kooltherm® K18* Insulated Plasterboard contains an integral vapour control layer (see 'Design Considerations – Water Vapour Control').

**** Product thicknesses = insulant thickness + 12.5 mm plasterboard.

Timber Frame Wall with Ventilated Cladding

Insulation Between Timber Frame Studs with *Kingspan Kooltherm® K18* Insulated Plasterboard Fixed Internally

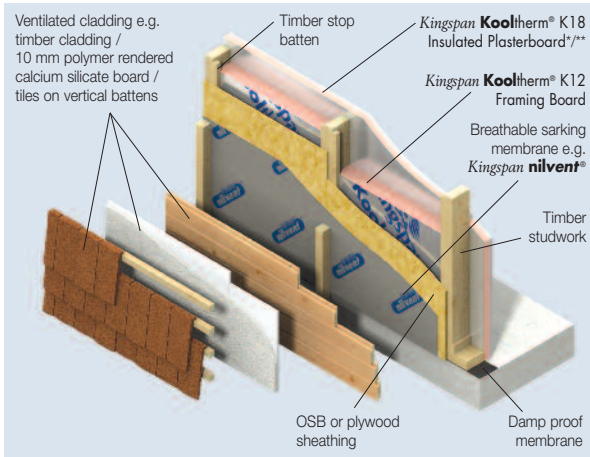


Figure 6

U-values for Various Thicknesses of Insulation, Stud Depths, and Breathable Membranes		
Thickness of <i>Kingspan Kooltherm® K12</i> Framing Board (mm)	Product Thickness of <i>Kingspan Kooltherm® K18</i> Plasterboard*** (mm)	U-values (W/m ² ·K)
89 mm Deep Timber Studs		
55	0*	X
60	0*	0.35
65	0*	0.34
70	0*	0.32
70	32.5	0.25
70	37.5	0.23
70	42.5	0.21
70	52.5	0.19
70	62.5	0.17
70	72.5	0.16
70	82.5	0.15
140 mm Deep Timber Studs		
50	0*	X
55	0*	0.34
60	0*	0.33
70	0*	0.30
75	0*	0.29
80	0*	0.28
90	0*	0.26
100	0*	0.25
110	0*	0.24
120	0*	0.23
120	32.5	0.18
120	37.5	0.17
120	42.5	0.16
120	52.5	0.15

* Calculations which feature insulation between studwork only, assume the use of 15 mm plasterboard and a polythene sheet vapour control layer in order to minimise the risk of condensation (see 'Design Considerations - Water Vapour Control').

** *Kingspan Kooltherm® K18* Insulated Plasterboard contains an integral vapour control layer (see 'Design Considerations - Water Vapour Control').

***Product thicknesses = insulant thickness + 12.5 mm plasterboard.

Insulation Between Timber Frame Studs and Insulated Sheathing

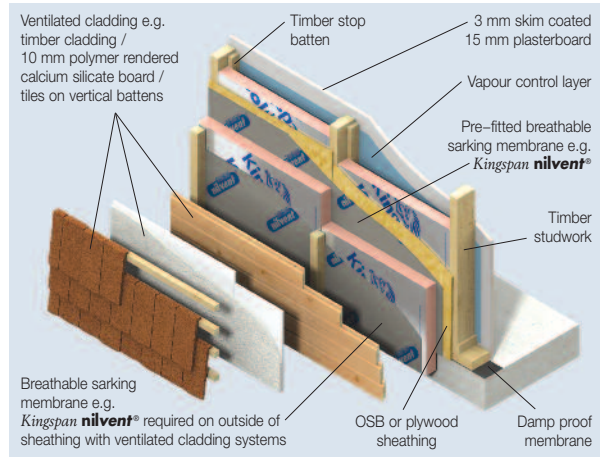


Figure 7

U-values for Various Thicknesses of Insulation and Stud Depths	
Thickness of <i>Kingspan Kooltherm® K12</i> Framing Board (mm)	U-values (W/m ² ·K)
89 mm Deep Timber Studs	
20 + 20	X
20 + 25*	0.34
25 + 25	0.32
30 + 30	0.29
40 + 40	0.23
50 + 50	0.19
60 + 60	0.17
70 + 70	0.15
140 mm Deep Timber Studs	
20 + 20	X
20 + 25*	0.34
25 + 25	0.32
30 + 30	0.28
40 + 40	0.23
50 + 50	0.19
60 + 60	0.16
70 + 70	0.14

* First thickness refers to the insulation between studs, second thickness to the sheathing. The thermal resistance of the sheathing must be ≥ that of the insulation between the studs in order to avoid condensation.

Typical Constructions and U-values

Insulated Sheathing

Insulated Sheathing on Steel Frame

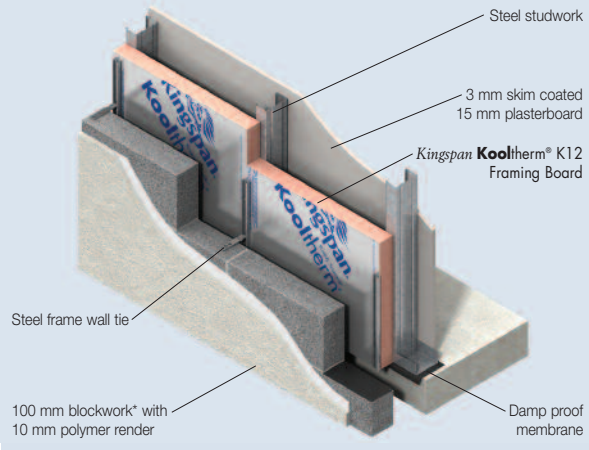


Figure 8

Insulated Sheathing on Timber Frame

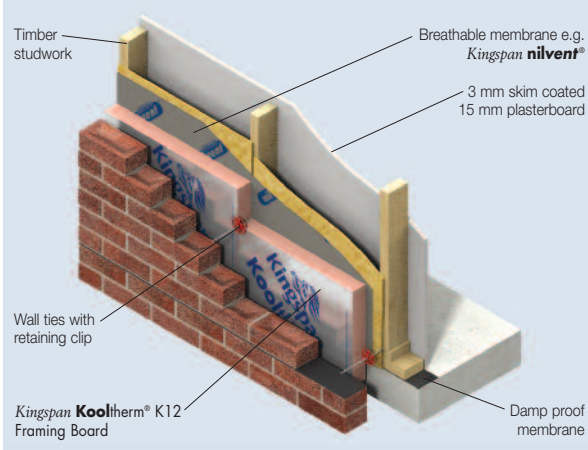


Figure 9

U-values (W/m ² ·K) for Various Thicknesses of Insulation, Stud Depths, and External Masonry Types		
Thickness of Kingspan Kooltherm® K12 Framing Board (mm)	External Masonry	
	102.5 mm Brickwork	Rendered 100 mm Medium Dense Block*
100 mm Deep Steel Frame at 600 centres		
25	X	X
30	X	0.34
35	0.33	0.32
40	0.31	0.30
50	0.27	0.26
60	0.24	0.23
70	0.22	0.21
75	0.21	0.20
80	0.20	0.19
90	0.18	0.18
100	0.17	0.16
110	0.16	0.15
120	0.15	0.14
150 mm Deep Steel Frame at 600 centres		
25	X	X
30	0.35	0.34
40	0.31	0.30
50	0.27	0.26
60	0.24	0.23
70	0.22	0.21
75	0.21	0.20
80	0.20	0.19
90	0.18	0.18
100	0.17	0.16
110	0.16	0.15
120	0.15	0.14

* Calculations assume medium dense block of λ-value 0.51 W/m·K, with 10 mm polymer render.

U-values (W/m ² ·K) for Various Thicknesses of Insulation, Stud Depths, and External Masonry Types		
Thickness of Kingspan Kooltherm® K12 Framing Board (mm)	External Masonry	
	102.5 mm Brickwork	Rendered 100 mm Medium Dense Block*
89 mm Deep Timber Studs		
25	X	X
30	X	0.34
35	0.33	0.31
40	0.31	0.29
50	0.26	0.25
60	0.23	0.22
70	0.21	0.20
75	0.20	0.19
80	0.19	0.18
90	0.17	0.17
100	0.16	0.15
110	0.15	0.14
140 mm Deep Timber Studs		
25	X	X
30	X	0.34
35	0.33	0.31
40	0.30	0.29
50	0.26	0.25
60	0.23	0.22
70	0.20	0.20
75	0.19	0.19
80	0.19	0.18
90	0.17	0.17
100	0.16	0.15
110	0.14	0.14

* Calculations assume medium dense block of λ-value 0.51 W/m·K, with 10 mm polymer render.

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® K12 Framing Board** produced at Kingspan Insulation's Pembridge 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® K12 Framing Board produced at Kingspan Insulation's Pembridge and Castleblayney manufacturing facilities is manufactured under a management system certified to BS / I.S. EN ISO 14001: 2004. The principle polymer component of the product produced at these facilities is also manufactured under a management system certified to BS EN ISO 14001: 2004.

NB The above information is correct at the time of writing. Please confirm at the point of need by contacting Kingspan Insulation's Technical Services Department (see rear cover), from which copies of Kingspan Insulation and its suppliers' ISO 14001 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; 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 is available at www.kingspaninsulation.co.uk/sustainabilityandresponsibility.

Specification Clause

Kingspan Kooltherm® K12 Framing Board should be described in specifications as:-

The stud wall insulation shall be **Kingspan Kooltherm® K12 Framing Board** ___ mm thick: comprising a premium performance rigid thermoset insulation core faced on both sides with a low emissivity composite foil 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 BS / I.S. EN ISO 9001: 2008, BS / I.S. EN ISO 14001: 2004 and BS / I.S. OHSAS 18001: 2007; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

NBS Specifications

Details also available in NBS Plus.

NBS users should refer to clause(s):

F30 155, P10 210, K11 495

(Standard and Intermediate)

F30 12, P10 40 (Minor works)



Repeating Thermal Bridges

When insulation is installed between timber studwork, the effects of repeating thermal bridges, caused by the studwork and noggins, must be taken into account. In most cases, this can represent up to or over 15% of the internal surface area of the building, which will significantly affect the overall U-value. This problem can be avoided by installing an additional layer of insulation either outside, or inside, the studwork.

Water Vapour Control / Condensation

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

Condensation can be controlled, in constructions containing **Kingspan Kooltherm® K12 Framing Board**, by ensuring there is a layer of high vapour resistance on the warm side of the insulation layer. If required, the vapour resistance of the wall lining can be increased by the use of a vapour check plasterboard*, the use of **Kingspan Kooltherm® K18 Insulated Plasterboard** which contains an integral vapour control layer*, the use of a layer of polythene sheeting*, or by the application of two coats of Gyproc Drywall Sealer.

** With appropriate detailing at joints, penetrations and wall perimeters.*

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). The Kingspan Insulation Technical Service Department (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.

Lightning Protection

Building designers should give consideration to the requirements of BS / I.S. EN 62305: 2006 (Protection against lightning).

Sitework

Introduction

- Installation advice, for different applications of *Kingspan Kooltherm*® K12 Framing Board, is listed below. Where constructions include a combination of applications, e.g. 'Insulation Between Timber Frame Studs and Insulated Sheathing', refer to both relevant sections. Regardless of whether insulation is being installed between and outside, or between and inside timber studs, the two layers should always be fixed so that there are no air spaces between them in construction.

External Masonry

Timber Frame Wall with Insulation Between Studs

- ***If insulation boards are to be fitted so that they are flush with the inside surface of the timber studs,*** nail treated softwood battens to the side of the studs, to provide a 'stop' to prevent the insulation boards from moving within the stud cavity.
- This 'stop' should be positioned to allow the insulation boards to finish flush with the inside surface of the studs.
- Insulation boards may be temporarily held to the 'stop' battens with large headed clout nails.
- The boards will be further restrained by the plasterboard / insulated plasterboard lining, fixed to the inside face of the studs.
- ***If the insulation boards are to be fitted so that they are flush with the outside surface of the timber studs,*** tight up against the pre-installed OSB or plywood sheathing, insulation boards must be cut and fitted in the spaces between the studs.
- Once the boards are fitted in place, nail treated softwood battens to the side of the studs, to provide a 'stop' to prevent the insulation boards from moving within the stud cavity.
- ***When utilising Kingspan Kooltherm*® K12 Framing Board between studwork with no insulated sheathing, a vapour control layer should be installed. This can be provided by vapour check plasterboard*, *Kingspan Kooltherm*® K18 Insulated Plasterboard*, the use of a layer of polythene sheeting*, or by the application of two coats of Gyproc Drywall Sealer.
* With appropriate detailing at joints, penetrations and wall perimeters.**
- ***In all cases,*** measure the distance between studs before cutting *Kingspan Kooltherm*® K12 Framing Board to size, as spacings can vary.
- Ensure there is a tight fit between the boards and the adjoining studs and other timbers, and fill all gaps with expanding urethane sealant.
- Ensure that the boards are lightly butted, and continuity of insulation is maintained.
- The outer leaf of masonry may be constructed in the conventional manner, using appropriate wall ties to hold the two wall leaves together.

Timber Frame Wall with Insulating Sheathing

- *Kingspan Kooltherm*® K12 Framing Board should be fixed to the external surface of the timber frame structure (outside of any breathable membrane, OSB or plywood sheathing), and restrained in accordance with the timber frame manufacturers recommendations. However, in the absence of other guidance please note the following.
- Ensure that the boards are lightly butted and continuity of insulation is maintained.
- Large headed galvanised clout nails may be used as temporary fixings prior to the insulation boards being tied into the masonry leaf with an appropriate timber frame wall tie.
- Always ensure that fixings are coincident with the underlying timber studs, head rails and sole plates.
- The outer leaf of masonry may be constructed in the conventional manner, using appropriate wall ties to hold the two wall leaves together.

Timber Frame Wall Tie Manufacturers

Ancon Building Products	+44 (0) 114 275 5224
www.ancon.co.uk	
Cullen	+44 (0) 1592 771132
www.cullen-bp.co.uk	
Helifix Limited	+44 (0) 20 8735 5222
www.helifix.co.uk	
MAK Fasteners	+353 (0) 1 451 99 00
www.makfasteners.com	
Simpsons	+44 (0) 1827 255600
www.strongtie.co.uk	
Tech Fasteners	+353 (0) 1 457 33 00
www.techfasteners.ie	

Steel Frame Wall with Insulating Sheathing

- *Kingspan Kooltherm*® K12 Framing Board should be fixed to the outside of the steel frame construction, ensuring vertical board joints coincide with a vertical steelwork member.
- Fixings should be in accordance with the steel frame manufacturer's recommendations.
- Ensure that the boards are lightly butted and continuity of insulation is maintained.
- Advice should be sought from the appropriate steel frame manufacturer, for recommendations on suitable wall tie specification. In the absence of any other guidance refer to:

Ancon Building Products	+44 (0) 114 275 5224
www.ancon.co.uk	

Ventilated Cladding

Timber Frame Wall with Insulation Between Studs

- **If insulation boards are to be fitted so that they are flush with the inside surface of the timber studs,** nail treated softwood battens to the side of the studs, to provide a 'stop' to prevent the insulation boards from moving within the stud cavity.
- This 'stop' should be positioned to allow the insulation boards to finish flush with the inside surface of the studs.
- Insulation boards may be temporarily held to the 'stop' battens with large headed clout nails.
- The boards will be further restrained by the plasterboard / insulated plasterboard lining, fixed to the inside face of the studs.
- **If the insulation boards are to be fitted so that they are flush with the outside surface of the timber studs,** tight up against pre-installed OSB or plywood sheathing, insulation boards must be cut and fitted in the spaces between the studs.
- Once the boards are fitted in place, nail treated softwood battens to the side of the studs, to provide a 'stop' to prevent the insulation boards from moving within the stud cavity.
- **When utilising Kingspan Kooltherm® K12 Framing Board between studwork with no insulated sheathing,** a vapour control layer should be installed. This can be provided by vapour check plasterboard*, Kingspan Kooltherm® K18 Insulated Plasterboard*, the use of a layer of polythene sheeting*, or by the application of two coats of Gyproc Drywall Sealer.
* With appropriate detailing at joints, penetrations and wall perimeters.
- **In all cases,** measure the distance between studs before cutting Kingspan Kooltherm® K12 Framing Board to size, as spacings can vary.
- Ensure there is a tight fit between the boards and the adjoining studs and other timbers, and fill all gaps with expanding urethane sealant.
- A breathable membrane, e.g. Kingspan nilvent®, is fitted to the OSB or plywood sheathing / exterior of the insulated frame, and temporarily stapled or pinned in place.
- Preservative treated battens are fixed vertically to the wall structure, through the breathable membrane, ensuring that the battens and fixings are coincident with the underlying timber studs, head rails and sole plates.
- When selecting the type of fixing and fixing frequency for the battens, consideration must be given to the weight of cladding to be fixed to them.
- If the cladding system is to be tile hung, horizontal tiling battens can then fixed to the vertical battens, and the tiles fixed to them.

- Alternatively, timber cladding can be fixed directly to the vertical battens.
- If the cladding system is to be finished with render, the render carrier (e.g. calcium silicate board, expanded metal lath) can be fixed directly to the vertical battens.
- Installation advice should be sought from the breathable membrane manufacturer, and the ventilated cladding system should be secured in accordance with its manufacturer's recommendations.

Timber Frame Wall with Insulating Sheathing

- Kingspan Kooltherm® K12 Framing Board should be fixed to the external surface of the timber frame structure (outside of any breathable membrane, OSB or plywood sheathing), and restrained in accordance with the timber frame manufacturers recommendations. However, in the absence of other guidance please note the following.
- Ensure that the boards are lightly butted and continuity of insulation is maintained.
- Large headed galvanised clout nails may be used as temporary fixings for insulation boards.
- A breathable membrane, e.g. Kingspan nilvent®, is fitted over the insulation, and temporarily stapled or pinned in place.
- Preservative treated softwood battens are fixed vertically to the wall structure, through the insulation sheathing, and breathable membrane, ensuring that the battens and fixings are coincident with the underlying timber studs, head rails and sole plates.
- When selecting the type of fixing and fixing frequency for the battens, consideration must be given to the weight of cladding to be fixed to them.
- If the cladding system is to be tile hung, horizontal tiling battens can then fixed to the vertical battens, and the tiles fixed to them.
- Alternatively, timber cladding can be fixed directly to the vertical battens.
- If the cladding system is to be finished with render, the render carrier (e.g. calcium silicate board, expanded metal lath) can be fixed directly to the vertical battens.
- Installation advice should be sought from the breathable membrane manufacturer, and the ventilated cladding system should be secured in accordance with its manufacturer's recommendations.

Sitework

Internal Dry Lining with Insulation Between Timber Framework

- The timber framework, backed with strips of damp proof course (DPC), should be mechanically fixed to the masonry wall.
- The timbers should be deep enough to accommodate the required thickness of insulation and a 25 mm (min.) air space between the insulation and the masonry.
- To avoid insulation boards moving within the timber framework cavity, nail treated softwood battens to the side of the timber members to provide a 'stop'.
- This 'stop' should be positioned to allow the insulation boards to finish flush with the inner surface of the timbers.
- Measure the distance between timber members before cutting *Kingspan Kooltherm*® K12 Framing Board to size, as spacings can vary.
- Insulation boards may be temporarily held to the 'stop' battens with large headed clout nails.
- Ensure there is a tight fit between the boards and the adjoining timbers, and fill all gaps with expanding urethane sealant.
- The boards will be further restrained by the plasterboard / insulated plasterboard lining, fixed to the inside face of the timbers.
- When utilising *Kingspan Kooltherm*® K12 Framing Board between timbers, a vapour control layer should be installed. This can be provided by vapour check plasterboard*, *Kingspan Kooltherm*® K18 Insulated Plasterboard*, the use of a layer of polythene sheeting*, or by the application of two coats of Gyproc Drywall Sealer.

* With appropriate detailing at joints, penetrations and wall perimeters.

Inside Studs / Timbers Layer of Insulation

- Please refer to the literature for *Kingspan Kooltherm*® K18 Insulated Plasterboard for fixing instructions. This literature is available from the Kingspan Insulation Marketing Department or from the Kingspan Insulation website (see rear cover for details).

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*® K12 Framing Board is available through specialist insulation distributors and selected builders' merchants throughout the UK and Ireland.

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, outdoor 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.co.uk/safety or 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 Facings

Kingspan Kooltherm® K12 Framing Board is faced on both sides with a low emissivity composite foil, autohesively bonded to the insulation core during manufacture. This reflective, low emissivity surface improves the thermal resistance of any unventilated cavity adjacent to the board.

The Core

The core of *Kingspan Kooltherm*® K12 Framing Board is a premium performance rigid thermoset modified resin insulant manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).



Standards and Approvals

Kingspan Kooltherm® K12 Framing Board is manufactured to the highest standards under a management system certified to BS / I.S. EN ISO 9001: 2008 (Quality management systems. Requirements), BS / I.S. EN ISO 14001: 2004 (Environmental Management Systems. Requirements) and BS / I.S. OHSAS 18001: 2007 (Health and Safety Management Systems. Requirements).

The use of *Kingspan Kooltherm*® K12 Framing Board, produced at Kingspan Insulation's Pembridge manufacturing facility, is covered by BBA Certificate 08/4615, and that produced at Kingspan Insulation's Castleblayney manufacturing facility by NSAI Agrément Certificate 09/0329.



Standard Dimensions

Kingspan Kooltherm® K12 Framing Board is available in the following standard size(s):

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.

* *Kingspan Kooltherm*® K12 Framing Board is available in other widths subject to quantity. Extended lead times and price premiums will apply.

Compressive Strength

The compressive strength of *Kingspan Kooltherm*® K12 Framing Board typically exceeds 100 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 Resistance

Adjusted for the effect of board joints, the product typically achieves a resistance far greater than 100 MN·s/g, 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*® K12 Framing 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 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*® K12 Framing Board resist attack by mould and microbial growth, and do not provide any food value to vermin.

Product Details

Fire Performance

Kingspan Kooltherm® K12 Framing Board is Class 1, as defined by BS 476-7: 1997 (Fire tests on building materials and structures. Method of test to determine the classification of the surface spread of flame of products).

The rigid thermoset insulation core of *Kingspan Kooltherm*® K12 Framing Board is Class 0, as defined by the Building Regulations.

The rigid thermoset insulation core of *Kingspan Kooltherm*® K12 Framing Board, when subjected to the British Standard fire test specified in the table below, has achieved the result shown.

Test	Result
BS 5111-1: 1974 (Smoke Obscuration)	< 5% (Negligible smoke obscuration)

Kingspan Kooltherm® K12 Framing Board in the construction specified in the table below, when subjected to British Standard fire test BS 476-21: 1987 (Fire tests on building materials and structures. Methods for determination of the fire resistance of loadbearing elements of construction), has achieved the result shown.

Construction	Result
12.5 mm plasterboard, 75 mm <i>Kingspan Kooltherm</i> ® K12 Framing Board, 100 x 50 mm timber studs @ 600 mm centres with 9 mm OSB sheathing.	51 minutes integrity and load bearing capacity; 50 minutes insulation.

BRE Global has determined that *Kingspan Kooltherm*® K12 Framing Board, in the constructions specified in the table below, when assessed against the performance requirements of British Standard fire test BS 476-21: 1987 (Fire tests on building materials and structures. Methods for determination of the fire resistance of loadbearing elements of construction), will achieve the results shown.

Construction	Result
15 mm fire resistant plasterboard, 75 mm <i>Kingspan Kooltherm</i> ® K12 Framing Board, 100 x 50 mm timber studs @ 600 mm centres with 9 mm OSB sheathing	60 minutes integrity, insulation and load bearing capacity.
2 x 12.5 mm plasterboard, 75 mm <i>Kingspan Kooltherm</i> ® K12 Framing Board, 100 x 50 mm timber studs @ 600 mm centres with 9 mm OSB sheathing.	60 minutes integrity, insulation and load bearing capacity.

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 / I.S. EN 13166: 2008 (Thermal insulation products for buildings – Factory made products of phenolic foam (PF) – Specification).

Thermal Conductivity

The boards achieve a thermal conductivity (λ -value) of: 0.023 W/m·K (insulant thickness 15–24 mm); 0.021 W/m·K (insulant thickness 25–44 mm); and 0.020 W/m·K (insulant thickness \geq 45 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 (m²·K/W).

Insulant Thickness (mm)	Thermal Resistance (m ² ·K/W)
20	0.85
25	1.15
30	1.40
35	1.65
40	1.90
45	2.25
50	2.50
55	2.75
60	3.00
65	3.25
70	3.50
75	3.75
80	4.00
90	4.50
100	5.00
110	5.50
120	6.00

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

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

Products & Applications

Kingspan Insulation Ltd has a vast product range. Kingspan Insulation Ltd products are suitable for both new build and refurbishment in a variety of applications within both domestic and non-domestic buildings.

Insulation for:

- Pitched Roofs
- Flat Roofs
- Green Roofs
- Cavity Walls
- Solid Walls
- Timber and Steel Framing
- Insulated Cladding Systems
- Insulated Render Systems
- Floors
- Soffits
- Ductwork

Further Solutions:

- Insulated Dry-Lining
- Tapered Roofing Systems
- Cavity Closers
- **Kingspan KoolDuct**® Pre-Insulated Ducting
- **Kingspan nilventi**® Breathable Membranes
- **Kingspan TEK**® Building System

Insulation Product Benefits

Kingspan Kooltherm® K-range Products

- With a thermal conductivity of 0.020–0.023 W/m-K these are the most thermally efficient insulation products commonly used.
- The thinnest commonly used insulation products for any specific U-value.
- Rigid thermoset insulation core is Class 0, as defined by the Building Regulations in England, Wales & Ireland, and Low Risk, as defined by the Building Standards in Scotland.
- Rigid thermoset insulation core achieves the best possible rating of < 5% smoke obscuration when tested to BS 5111: Part 1: 1974.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan Therma™ Range Products

- With a thermal conductivity of 0.022–0.027 W/m-K these are amongst the more thermally efficient insulation products commonly used.
- Each product achieves the required fire performance for its intended application.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan Styrozone® Range Products

- Rigid extruded polystyrene insulation (XPS) has the necessary compressive strength to make it the product of choice for specialist applications such as heavy duty flooring, car park decks and inverted roofing.
- Each product achieves the required fire performance for its intended application.
- Manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP).

All Products

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

Contact Details

Customer Service

For quotations, order placement and details of despatches please contact the Kingspan Insulation Customer Service Department on the numbers below:

UK	- Tel:	+44 (0) 1544 388 601
	- Fax:	+44 (0) 1544 388 888
	- email:	customerservice@kingspaninsulation.co.uk
Ireland	- Tel:	+353 (0) 42 979 5000
	- Fax:	+353 (0) 42 975 4299
	- email:	info@kingspaninsulation.ie

Literature & Samples

Kingspan Insulation produces a comprehensive range of technical literature for specifiers, contractors, stockists and end users. The literature contains clear 'user friendly' advice on typical design; design considerations; thermal properties; sitework and product data.

Available as a complete Design Manual or as individual product brochures, Kingspan Insulation technical literature is an essential specification tool. For copies please contact the Kingspan Insulation Marketing Department, or visit the Kingspan Insulation website, using the details below:

UK	- Tel:	+44 (0) 1544 387 384
	- Fax:	+44 (0) 1544 387 484
	- email:	literature@kingspaninsulation.co.uk
	- www.kingspaninsulation.co.uk/literature	
Ireland	- Tel:	+353 (0) 42 979 5000
	- Fax:	+353 (0) 42 975 4299
	- email:	info@kingspaninsulation.ie
	- www.kingspaninsulation.ie/literature	

Tapered Roofing

For technical guidance, quotations, order placement and details of despatches please contact the Kingspan Insulation Tapered Roofing Department on the numbers below:

UK	- Tel:	+44 (0) 1544 387 383
	- Fax:	+44 (0) 1544 387 483
	- email:	tapered@kingspaninsulation.co.uk
Ireland	- Tel:	+353 (0) 42 975 4297
	- Fax:	+353 (0) 42 975 4296
	- email:	tapered@kingspaninsulation.ie

Technical Advice / Design

Kingspan Insulation supports all of its products with a comprehensive Technical Advisory Service for specifiers, stockists and contractors.

This includes a computer-aided service designed to give fast, accurate technical advice. Simply phone the Kingspan Insulation Technical Service Department with your project specification. Calculations can be carried out to provide U-values, condensation / dew point risk, required insulation thicknesses etc... Thereafter any number of permutations can be provided to help you achieve your desired targets.

The Kingspan Insulation Technical Service Department can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

The Kingspan Insulation British Technical Service Department operates under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U-value and Condensation Risk Calculations.



Please contact the Kingspan Insulation Technical Service Department on the numbers below:

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General Enquiries

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Ireland	- Tel:	+353 (0) 42 979 5000
	- Fax:	+353 (0) 42 975 4299
	- email:	info@kingspaninsulation.ie

Kingspan Insulation Ltd. 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 reference should be made to the current Kingspan Insulation price-list or advice sought from Kingspan Insulation's Customer Service Department (see above left). The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified for suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a Technical Advisory Service (see above), the advice of which should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of this literature is current by contacting the Kingspan Insulation Marketing Department (see left).

Kingspan Insulation Ltd is a member of:
The UK Timber Frame Association (UKTFA)



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