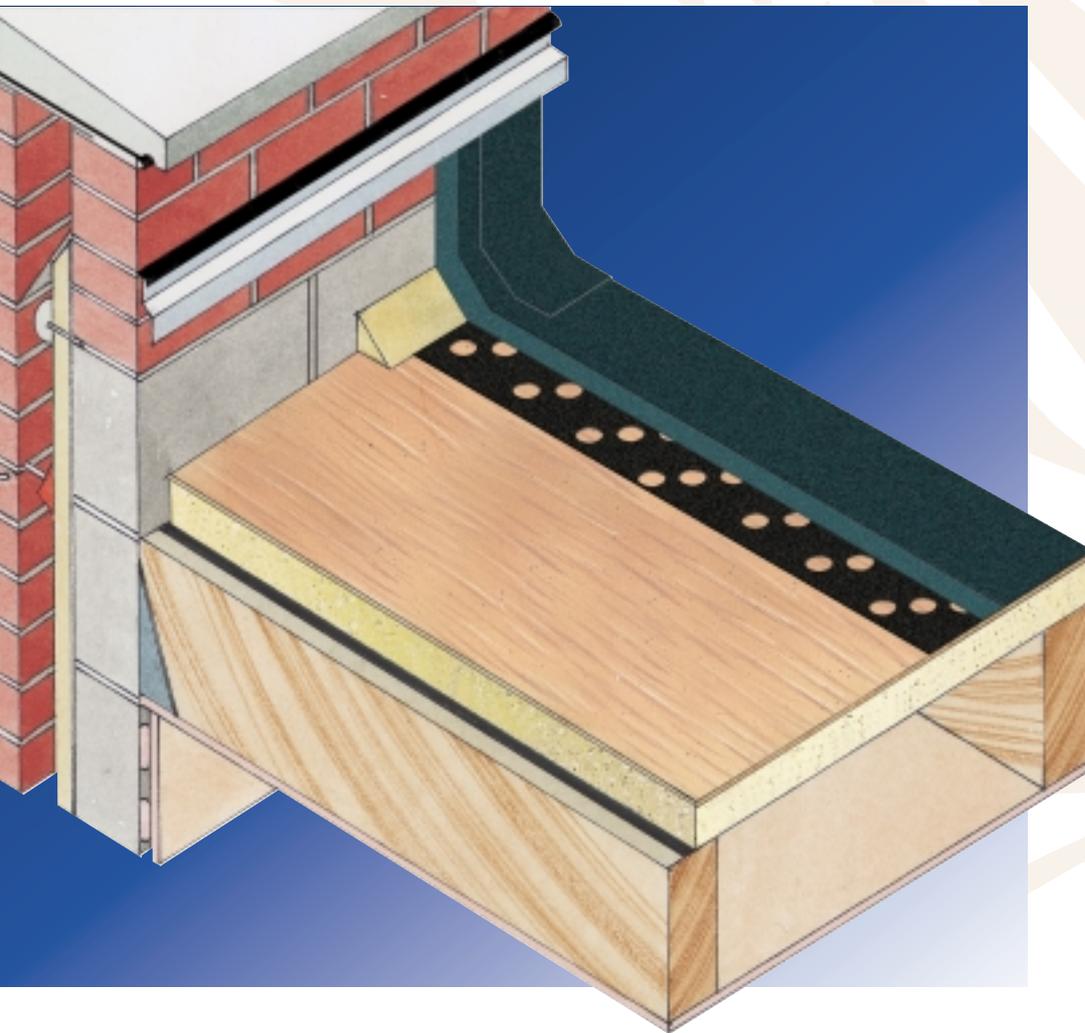




# Therma<sup>®</sup>roof TR31 zero ODP

STRUCTURAL 6mm PLYWOOD  
COMPOSITE INSULATION BENEATH  
PARTIALLY BONDED BUILT-UP FELT



- ▼ High performance rigid urethane insulation – thermal conductivity 0.022 W/m.K
- ▼ Insulation, vapour control layer and decking in one board
- ▼ Proven reputation as a quality composite roof deck
- ▼ Watertightness is achieved quickly
- ▼ Inexpensive installation costs
- ▼ Resistant to the passage of water vapour
- ▼ Easy to handle and install
- ▼ Ideal for newbuild and refurbishment
- ▼ CFC/HCFC-free zero Ozone Depletion Potential (ODP)

\*May also be used under fully bonded built-up felt, mastic asphalt and appropriate single-ply waterproofing systems



BS EN ISO 9002: 1994  
Certificate No. FM 10697

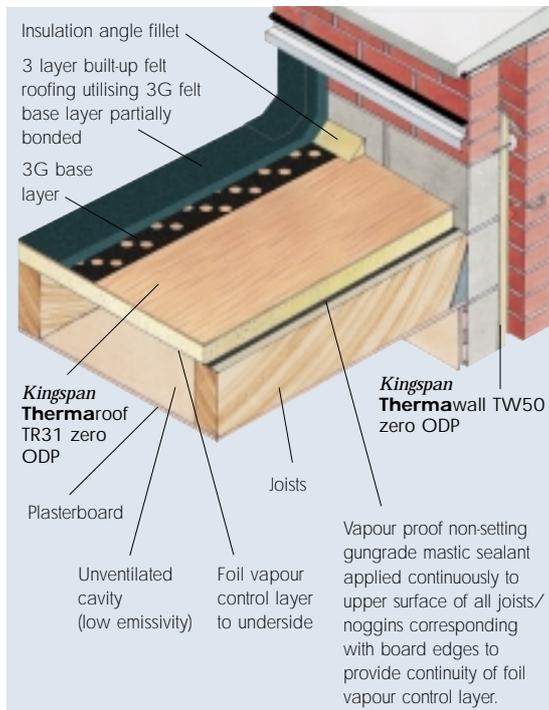


zero o.d.p.

# Kingspan **Therma**roof TR31 zero ODP

## TYPICAL DESIGN DETAIL

### 3 LAYER BUILT-UP FELT WATERPROOFING



### ROOF WATERPROOFING

**Kingspan Therma**roof TR31 zero ODP is suitable for use with built up felts, mastic asphalt and single-ply waterproofing (see 'Waterproofing', page 4). Consideration should be given to the recommendations of BS 8217: 1994 (Code of practice for built-up felt roofing) and BS 8218: 1998 (Code of practice for mastic asphalt roofing).

### FALLS

The falls on a flat roof should be smooth and steep enough to prevent the formation of rainwater pools. To ensure adequate drainage, BS 6229: 1982, recommends uniform gradients of not less than 1 in 80. However, because of building settlement, it is advisable to 'design in' even greater falls. The fall on a flat roof constructed using **Kingspan Therma**roof TR31 zero ODP is normally provided by the supporting structure being directed towards the rainwater outlets, e.g. by use of timber furrings.

### COLD BRIDGES

In order to avoid cold-bridging the design should ensure that roof-light or ventilator kerbs etc. are always insulated to a similar standard as the general roof area. It is also essential that the wall insulation around the perimeter of the roof is carried up to the underside of the insulated deck. It is not necessary to ventilate the void between the ceiling and the underside of the deck.

### WATER VAPOUR CONTROL

The use of **Kingspan Therma**roof TR31 zero ODP as the structural roof deck and insulation combined makes the provision of a separate vapour control layer unnecessary. By utilising the water vapour resistant characteristics of the board and combining these with the use of a suitable water vapour resistant mastic sealant applied to the upper surface of all supporting timbers, a perfectly adequate water vapour control layer can be formed, (see 'Vapour Control Layer', page 4).

### ROOF LOADING

**Kingspan Therma**roof TR31 zero ODP is suitable for use on maintenance access roofs subject to limited foot traffic. Supporting joists should be placed at maximum 600 mm centres and noggins should be provided to coincide with the board edges. Where regular foot traffic or excessive loadings are liable to occur it is recommended that the supporting roof joists are spaced at maximum 400 mm centres. Again noggins, as described above, should be provided. The surface of heavily trafficked roofs should be protected by promenade tiles. The roof should be adequately protected when building works are being carried out on or over the roof surface. This is best achieved by close boarding.

## SPECIFICATION CLAUSE

**Kingspan Therma**roof TR31 zero ODP should be described in specifications as:-

The roof insulation shall be **Kingspan Therma**roof TR31 zero ODP comprising a minimum 6 mm WBP exterior grade plywood upper facing bonded to a \_\_\_\_mm thick CFC/HCFC-free rigid insulation urethane core with a lower facing of low emissivity composite foil manufactured to BS EN ISO 9002: 1994 by Kingspan Insulation Limited and shall be applied in accordance with the instructions issued by them.

Details also available in NBS PLUS.  
NBS users should refer to clause(s):  
J41 130, J41 140 and J41 454  
(Standard and Intermediate)  
J41 10 (Minor Works)



## DESIGN CONSIDERATIONS

### DESIGN STANDARDS

Designs should be assessed in accordance with BS 6399: Part 2: 1997 (Code of practice for wind loads). Fixings should be specified as in 'Sitework', on pages 4 and 5.

### CEILING DETAILS

The underside of **Kingspan Thermaroom TR31 zero ODP** is not suitable to form a decorative internal finish to the roof. Therefore, it is recommended that **Kingspan Thermaroom TR31 zero ODP** should always be underdrawn by a separate ceiling such as plasterboard or similar fire resistant material. Where the roof joists are to be left exposed the plasterboard should be fixed so as to create a minimum 25 mm cavity between the **Kingspan Thermaroom TR31 zero ODP** and the ceiling.

### THERMAL PROPERTIES

The R-values and  $\lambda$ -values quoted in this document for rigid urethane insulation are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down in the harmonised European standard BS EN 13165, using so called 90:90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

### THERMAL CONDUCTIVITY

Thermal conductivity ( $\lambda$ -value) of the plywood component of **Kingspan Thermaroom TR31 zero ODP** should be taken as 0.14 W/m.K. The thermal conductivity of the insulation core of **Kingspan Thermaroom TR31 zero ODP** is 0.022 W/m.K.

### THERMAL RESISTANCES

Thermal resistance (R-value) varies with the thickness of each component. It is calculated by dividing the thickness of each component (expressed in metres) by its thermal conductivity and adding the resultant figures together.

*Product Thickness (mm)	Thermal Resistance (m <sup>2</sup> .K/W)
51	2.088
56	2.316
61	2.543
66	2.770
76	3.225
81	3.452
86	3.679
91	3.906
96	4.134
106	4.588
111	4.816
116	5.043
126	5.497
131	5.725
136	5.952
146	6.406
156	6.861
161	7.088
166	7.316

\*Product thickness = insulant thickness + 6 mm plywood

### TYPICAL U-VALUES

The following examples have been calculated using both the combined method and the proportional area method. The combined method is required for compliance with Building Regulations / Standards revised after the year 2000. These examples are based on the use of **Kingspan Thermaroom TR31 zero ODP** mechanically fixed to timber roof joists waterproofed using 3 layer partially bonded built-up bitumen felt waterproofing with the surface covered by mineral chippings. The ceiling is taken to be 12.5 mm plasterboard and the low emissivity cavity is unventilated. If your construction is any different, please consult our Technical Services Department.

Combined Method – U-values were calculated using the method which has been adopted to bring National standards in line with the European Standard calculation method, BS / IS EN ISO 6946: 1997 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation method).

Proportional Area Method – the U-values shown below were calculated using the proportional area method as detailed in The Chartered Institute of Building Services Engineers (CIBSE) Guide A3 (Thermal Properties of Building Structures).

NB when calculating U-values using the combined method as detailed in BS / IS EN ISO 6946: 1997, the type of mechanical fixing used may change the thickness of insulation. For the purpose of these calculations, the use of galvanised ring shank nail fixings with a cross sectional area of 10.75 mm<sup>2</sup> has been assumed for insulant thicknesses upto and including 50 mm. The use of low profile oval head fixings with a cross sectional area of 16.0 mm<sup>2</sup> has been assumed for insulant thicknesses over 50 mm. Please contact the Kingspan Insulation Technical Services Department (see rear cover) for project calculations.

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.

The figures below are for guidance only. A detailed U-value calculation together with a condensation risk analysis should be completed for each individual project. Please call our Technical Services Department for assistance (see rear cover).

### TIMBER DECK WITH PLASTERBOARD CEILING

Product Thickness* (mm)	U-value (W/m <sup>2</sup> .K)		
	Combined Method		Proportional Area Method
	Joists at 400 mm Cntrs	Joists at 600 mm Cntrs	
51	0.45	0.44	0.37
56	0.42	0.42	0.34
61	0.34	0.35	0.32
66	0.32	0.33	0.29
76	0.29	0.29	0.26
81	0.27	0.28	0.25
86	0.26	0.26	0.23
91	0.25	0.25	0.22
96	0.24	0.23	0.21
106	0.22	0.21	0.19
111	0.21	0.21	0.18
116	0.20	0.20	0.18
126	0.19	0.18	0.16
131	0.18	0.18	0.16
136	0.18	0.17	0.15
146	0.17	0.16	0.14
156	0.16	0.15	0.13
161	0.15	0.15	0.13
166	0.15	0.15	0.13

\*Product thickness = insulant thickness + 6 mm plywood

# Kingspan **Therma**roof TR31 zero ODP

## SITWORK

### FIXING

**Kingspan Therma**roof TR31 zero ODP, board size 2400 x 1200 mm should be fixed, plywood uppermost, directly onto minimum 50 mm wide joists set at 600 mm maximum centres for maintenance access purposes or 400 mm centres maximum where regular foot traffic is expected.

The board length should be laid along the joists. Board joints should be staggered (broken) and butted (approximately 2 mm gap) ensuring there is a minimum bearing of 20 mm per board edge over the supporting timber. In all cases, timber noggins (minimum 50mm x 50 mm) should be adopted to fully support all free edges that are unsupported e.g. short board edges, trimmers to openings etc.

Where two boards are secured to the same joist, nail/screws should be staggered.

### VAPOUR CONTROL LAYER

In an effort to maintain a continuous vapour control layer to the foil underside, a non-setting gun-grade mastic bead sealant, wide enough to accommodate two board edges butted side by side should be applied to the upper surface of all supporting joists and noggins.

### INSULANT THICKNESS 25-50 MM

**Kingspan Therma**roof TR31 zero ODP 25-50 mm insulant thickness should be fixed with suitable galvanised ring-shank nails. These are to be placed at 100 mm centres around the board edges and at 300 mm centres along any intermediate supporting timbers.

### INSULANT THICKNESS OVER 50 MM

**Kingspan Therma**roof TR31 zero ODP over 50 mm insulant thickness should be fixed with suitable low profile oval head screw fixings. These are to be placed at 200 mm centres around the board edges and at 300 mm centres along any intermediate supporting timbers.

The board fixings should be staggered and not less than 10 mm from board edges and not less than 50 mm from board corners. Fixings should penetrate supporting timbers by 35 mm depth minimum.

When securing boards, whether nailing or screwing, care must be taken not to over-drive/screw. Nails/screw heads should be flush with the plywood surface.

Care should be taken to ensure that the **Kingspan Therma**roof TR31 zero ODP is kept dry. Lay only as much board as can be reasonably waterproofed in the working day.

### WATERPROOFING

The plywood surface of **Kingspan Therma**roof TR31 zero ODP is suitable for the application of 3 layer partially bonded felts incorporating the 3G base layer to BS 747: 2000.

Where the intended waterproofing is to be 2 layer fully bonded felts or mastic asphalt, it is recommended that an overlay of a 13 mm bitumen impregnated fibre board to BS EN 622 (Fibre boards. Specifications) or approved overlay is fixed to the plywood surface of the **Kingspan Therma**roof TR31 zero ODP using hot bitumen bonding, or by felt nailing.

The fibreboard acts as a surface to allow fully bonding of 2 layer built-up felts or a heat soak for mastic asphalt.

Mastic asphalt should always be laid in accordance with BS 8218: 1998 (Code of practice for mastic asphalt roofing) over an isolating layer of type 4A sheathing felt to BS 747: 2000.

Where the intended waterproofing is to be a single-ply system, please contact Kingspan Insulation's Technical Services Department on 0800 610061.

### REFLECTIVE COATINGS

Bitumen based built-up waterproofing systems laid over **Kingspan Therma**roof TR31 zero ODP should always incorporate a solar reflective layer such as chippings or specialist coatings.

#### DAILY WORKING PRACTICE

*Kingspan Thermaroof* TR31 zero ODP should not be considered as temporary waterproofing. Boards should be waterproofed as soon as possible after fixing.

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

#### CUTTING

*Kingspan Thermaroof* TR31 zero ODP can be cut easily and cleanly with a fine toothed saw to fit roof openings and fixtures. Ensure accurate trimming to achieve close butting joints and continuity of insulation.

#### AVAILABILITY

*Kingspan Thermaroof* TR31 zero ODP is available through specialist insulation distributors and selected builders and roofing merchants throughout the UK, Ireland and Europe.

#### PACKAGING

The boards are supplied palletised in labelled packs shrinkwrapped in polythene.

#### STORAGE

The packaging of *Kingspan Thermaroof* TR31 zero ODP should not be considered adequate for long term outside protection. Ideally, boards should be stored inside a building. If, however, outside storage cannot be avoided, the boards should be stacked clear of the ground, and covered with a 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 leaflet on this topic which satisfies the requirements set out in the Control of Substances Hazardous to Health Regulations, 1988 (COSHH) is available from our Technical Services Department (see rear cover).

Please note that the reflective surface on this product is designed to enhance its thermal performance. As such, it will reflect light as well as heat, including ultraviolet light. Therefore, if this board 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.

Warning – do not stand on, or otherwise support your weight on this board, unless it is fully supported by a load bearing surface or by minimum 50 mm wide joists at maximum 600 mm centres.

# Kingspan **Therma**roof TR31 zero ODP

## PRODUCT DESCRIPTION

### THE UPPER FACING

The upper facing of **Kingspan Therma**roof TR31 zero ODP is a tough 6mm WBP exterior grade plywood.

### THE CORE

The core of **Kingspan Therma**roof TR31 zero ODP is a high performance CFC/HCFC-free rigid urethane insulant of typical density 32 kg/m<sup>3</sup>.

### THE LOWER FACING

The lower facing of **Kingspan Therma**roof TR31 zero ODP is a low emissivity composite foil which is highly resistant to the transmission of water vapour. This reflective, low emissivity surface effectively doubles the thermal resistance of the cavity in which the board is placed.

### CFC/HCFC-FREE

**Kingspan Therma**roof TR31 zero ODP is manufactured without the use of CFCs /HCFCs and has zero Ozone Depletion Potential (ODP).



## PRODUCT DATA

### STANDARDS AND APPROVALS

**Kingspan Therma**roof TR31 zero ODP is manufactured to the highest standards under a quality control system approved to BS EN ISO 9002: 1994 (Quality systems. Model for quality assurance in production, installation and servicing).



BS EN ISO 9002: 1994  
Certificate No. FM 10697

### STANDARD DIMENSIONS

**Kingspan Therma**roof TR31 zero ODP is available in the following standard sizes and thicknesses:

Nominal Dimension	Availability
Length (m)	2.4
Width (m)	1.2
Plywood Thickness (mm)	6
Insulant Thickness* (mm)	45, 50, 55, 60, 70, 75, 80, 85, 90, 100, 105, 110, 120, 125, 130, 140, 150, 155, 160

\* Other thicknesses are available subject to quantity.

### INSULATION COMPRESSIVE STRENGTH

Typically exceeds 150 kPa at 10% compression when tested to BS 4370: Part 1: 1988 (1996) (Methods of test for rigid cellular materials).

### WATER VAPOUR RESISTANCE

Modified to include board facings, the boards achieve a resistance greater than 100 MN.s/g when tested in accordance with BS 4370: Part 2: 1993. When the joints between boards are sealed by the application of a continuous mastic sealant to the whole of the upper surface of the joists and cross noggins, a vapour resistance greater than 1000 MN.s/g is achieved.

### DURABILITY

If correctly applied, **Kingspan Therma**roof TR31 zero ODP has an indefinite life. Its durability depends on the supporting structure, waterproofing and the conditions of its use.

### RESISTANCE TO SOLVENTS, FUNGI & RODENTS

The insulation core is resistant to dilute acids, alkalis, mineral oil and petrol. It 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 **Kingspan Therma**roof TR31 zero ODP. Boards which have been in contact with harsh solvents, petrol, mineral oil or acids, or boards that have been damaged in any other way should not be used.

The insulation core used in the manufacture of **Kingspan Therma**roof TR31 zero ODP resists attack by mould and microbial growth and does not provide any food value to vermin.

### FIRE PERFORMANCE

Flat roofs constructed with **Kingspan Therma**roof TR31 zero ODP, waterproofed using 3 layer partially bonded built-up felt, finished with 10 mm mineral chippings and subjected to British Standard fire tests, achieve the results given below. For specifications without the chippings please consult the manufacturer of the mineral surfaced cap sheet for their product fire classification details. Further details on the fire performance of Kingspan Insulation products may be obtained from our Technical Services Department (see rear cover).

Test	Result
BS 476: Part 3: 1975 (External fire exposure roof test)	FAA rating
BS 476: Part 7: 1997 (Surface Spread of Flame Test)	The foil facing achieves a Class 1 rating

## KINGSPAN INSULATION

Kingspan Insulation offers an extensive range of premium and high performance insulation products, breathable membranes and pre-fabricated / pre-insulated systems for the construction industry. Following an extensive investment programme, Kingspan Insulation is continuing to lead the insulation industry by manufacturing the majority of its insulation products with zero Ozone Depletion Potential (ODP) and quoting thermal performance data in accordance with the new harmonised European Standard.

Kingspan Insulation Limited specialise in the solution of insulation problems. Our range of insulation products which meet the exacting requirements of the construction industry are produced to the highest standards, including BS EN ISO 9002: 1994 and IS EN ISO 9002: 1994. Each product has been designed to fulfil a specific need and has been manufactured to precise standards and tolerances.

### INSULATION FOR:

- PITCHED ROOFS
- FLAT ROOFS
- CAVITY WALLS
- TIMBER AND STEEL FRAMING
- EXTERNALLY INSULATED CLADDING SYSTEMS
- FLOORS
- SOFFITS

### INSULATED DRY LINING

### TAPERED ROOFING SYSTEMS

### *Kingspan KoolDuct*® PRE-INSULATED DUCTING

### *Kingspan nilvent*™ BREATHABLE MEMBRANES

### *Kingspan TEK* Haus™ BUILDING SYSTEM

## THE KINGSPAN INSULATION PRODUCT RANGE

### THE KINGSPAN KOOLTHERM® K-RANGE

- With a thermal conductivity of 0.018 W/m.K rigid phenolic insulation is the most thermally efficient insulation product commonly available.
- Utilises the thinnest possible insulation board to achieve required U-values.
- Fire performance can be equivalent to mineral fibre.
- Achieves a Class O fire rating to the Building Regulations.
- Achieves the best possible rating of <5% smoke emission when tested to BS 5111: Part 1: 1974.
- CFC-free / available CFC/HCFC-free with zero Ozone Depletion Potential subject to enquiry.

### THE KINGSPAN THERMA ZERO ODP RANGE

- With a thermal conductivity of 0.022-0.026 W/m.K zero ODP rigid urethane insulation is one of the most thermally efficient insulation products commonly available.
- Easily achieves required U-values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC-free with zero Ozone Depletion Potential (ODP).

### THE KINGSPAN STYROZONE™ & PURLCRETE ZERO ODP RANGES

- Rigid extruded polystyrene insulation (XPS) has the highest compressive strength of any commonly available insulant.
- Ideal for specialist applications such as inverted roofing and heavy-duty flooring.
- Easily achieves required U-values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC-free with zero Ozone Depletion Potential (ODP).

### ALL PRODUCTS

- Their closed cell structure resists both moisture and water vapour ingress – problems which can be associated with open cell materials such as mineral fibre and which can result in reduced thermal performance.
- Unaffected by air movement – problems that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install – masks are not required, as Kingspan Insulation products do not produce loose dust or irritant fibres.
- Provide reliable long term thermal performance over the lifetime of the building.

## CUSTOMER SERVICE

For quotations, order placement and details of despatches please contact our Building Fabric Insulation Customer Services Department on the numbers below:

UK – Telephone: +44 (0) 870 850 8555  
– Fax: +44 (0) 870 850 8666  
– email: [commercial.uk@insulation.kingspan.com](mailto:commercial.uk@insulation.kingspan.com)  
Ireland – Telephone: +353 (0) 42 97 95000  
– Fax: +353 (0) 42 97 46129  
– email: [commercial.ie@insulation.kingspan.com](mailto:commercial.ie@insulation.kingspan.com)

## TECHNICAL ADVICE

Kingspan Insulation Ltd support all of their products with a comprehensive Technical Advisory Service for specifiers, stockists and contractors.

This includes a free computer-aided service designed to give fast, accurate technical advice. Simply phone our **TECHLINE** with your project specification and we can run calculations to provide U-values, condensation/dew point risk, required insulation thicknesses etc... Thereafter we can run any number of permutations to help you achieve your desired targets.

We can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

Please contact our Building Fabric Insulation Technical Services Department on the **TECHLINE** numbers below:



UK: – Telephone: +44 (0) 870 850 8555  
– Fax: +44 (0) 1544 387 278  
– email: [techline.uk@insulation.kingspan.com](mailto:techline.uk@insulation.kingspan.com)  
Ireland: – Telephone: +353 (0) 42 97 95032  
– Fax: +353 (0) 42 97 46129  
– email: [techline.ie@insulation.kingspan.com](mailto:techline.ie@insulation.kingspan.com)

## LITERATURE AND 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, on CD-ROM or as individual product brochures, Kingspan Insulation technical literature is an essential specification tool. For copies please contact our Marketing Department on the numbers below:

UK – Telephone: +44 (0) 1544 387 210  
– Fax: +44 (0) 1544 387 299  
– email: [literature.uk@insulation.kingspan.com](mailto:literature.uk@insulation.kingspan.com)  
Ireland – Telephone: +353 (0) 42 97 95038  
– Fax: +353 (0) 42 97 46129  
– email: [literature.ie@insulation.kingspan.com](mailto:literature.ie@insulation.kingspan.com)

## GENERAL ENQUIRIES

For all other enquiries contact Kingspan Insulation on the numbers below:

UK – Telephone: +44 (0) 870 850 8555  
– Fax: +44 (0) 870 850 8666  
– email: [info.uk@insulation.kingspan.com](mailto:info.uk@insulation.kingspan.com)  
Ireland – Telephone: +353 (0) 42 97 95000  
– Fax: +353 (0) 42 97 46129  
– email: [info.ie@insulation.kingspan.com](mailto:info.ie@insulation.kingspan.com)

*Kingspan Insulation reserve the right to amend product specifications without prior notice. 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 as to the suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a free Technical Advisory Service (see left) whose advice should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of the literature is current by contacting our Marketing Department (see above).*



### Kingspan Insulation

Pembridge, Leominster, Herefordshire HR6 9LA, UK  
Castleblayney, County Monaghan, Ireland

[www.insulation.kingspan.com](http://www.insulation.kingspan.com)