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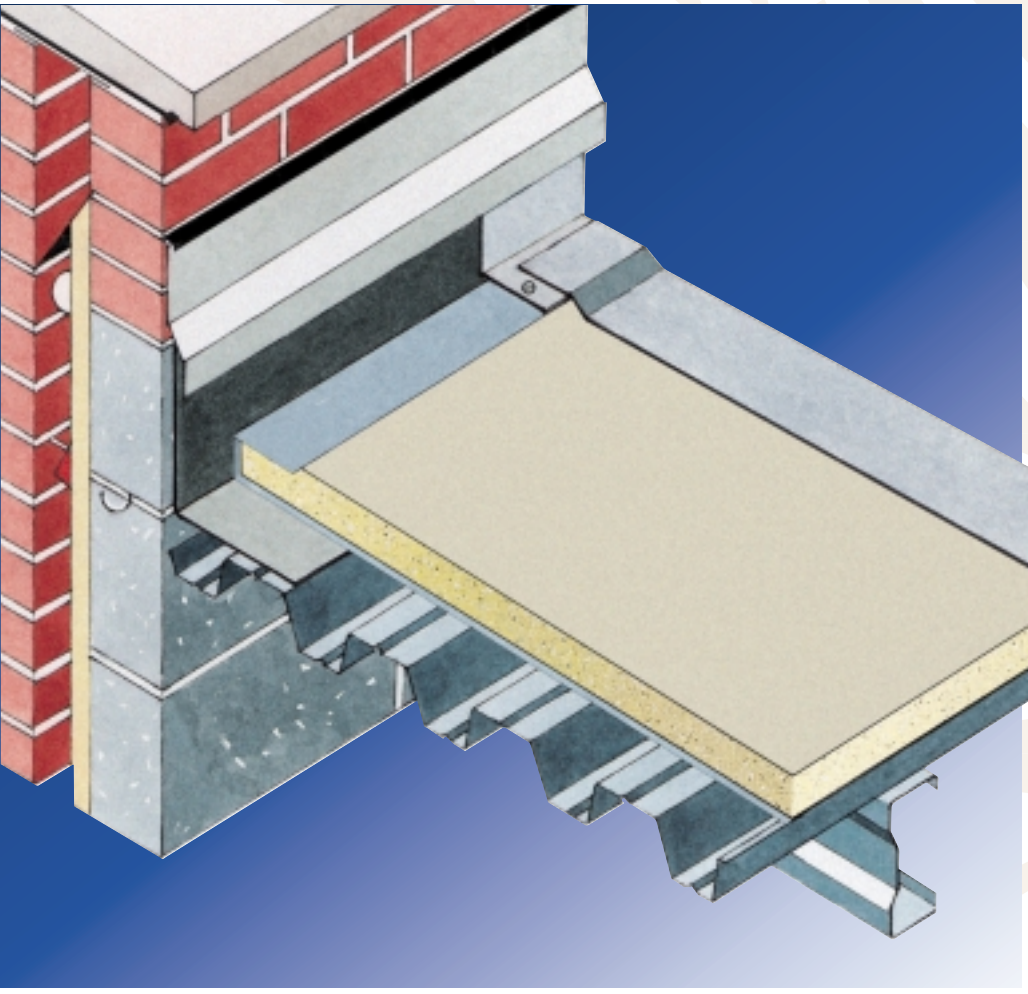
Thermaroof TR27 FM zero ODP

INSULATION BENEATH MECHANICALLY FIXED & FULLY ADHERED FM APPROVED SINGLE-PLY NON-BITUMINOUS WATERPROOFING



- High performance rigid urethane insulation – thermal conductivity 0.024-0.026 W/m.K
- Proven Class 1 Factory Mutual Research Corporation fire performance for steel deck roof assemblies
- Fully compatible with all mechanically fixed PVC and EPDM single-ply waterproofing systems
- Fully compatible with single-ply non-bituminous membranes that are fully bonded with solvent based adhesive systems.
- Installation technique is ideal for fast track building programmes
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for newbuild and refurbishment
- CFC / HCFC-free with zero Ozone Depletion Potential (ODP)

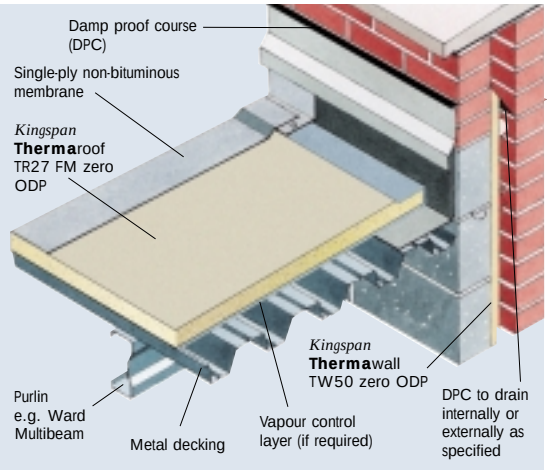
zero O.D.P

BS EN ISO 9002: 1994
Certificate No. FM 10697

FM APPROVED

Kingspan **Therma**roof TR27 FM zero ODP

TYPICAL DESIGN DETAIL



SPECIFICATION CLAUSE

Kingspan **Therma**roof TR27 FM zero ODP should be described in specifications as:-

The roof insulation shall be *Kingspan* **Therma**roof TR27 FM zero ODP ____mm thick, approved by Factory Mutual Research, USA, comprising a CFC / HCFC-free rigid urethane insulation core with autohesively bonded wet lay coated glass fibre tissue facings on both sides 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):
J42 454 and J42 110 (Standard and Intermediate)

DESIGN CONSIDERATIONS

WIND LOADINGS

Wind loadings should be assessed in accordance with BS 6399: Part 2: 1997 (Code of practice for wind loads). Mechanical fixings should be Factory Mutual approved.

ROOF WATERPROOFING

Kingspan **Therma**roof TR27 FM zero ODP is suitable for use with most mechanically fixed PVC or EPDM waterproofing membranes and fully adhered single layer roof waterproofing membranes using solvent based adhesives.

Please Note: *Kingspan* **Therma**roof TR27 FM zero ODP is not suitable for use with bitumen based built-up roofing systems or mastic asphalt.

FALLS

The fall 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. These can be provided by the use of Kingspan Insulation's Tapered Roofing Systems.

WATER VAPOUR CONTROL

The need for a separate vapour control layer with *Kingspan* **Therma**roof TR27 FM zero ODP in a warm roof construction should be assessed in accordance with BS 5250: 1989 (1995) and as defined in BS 6229: 1982. *Kingspan* **Therma**roof TR27 FM zero ODP should be installed over a suitable FM approved vapour control layer if one is required.

ROOF LOADING

Kingspan **Therma**roof TR27 FM zero ODP is suitable for use on access roof decks subject to limited foot traffic. Where continuous or excessive foot traffic is liable to occur it is recommended that the roof surface is protected by specially constructed walk-ways. The roof must be adequately protected when building works are being carried out on or over the roof surface. This is best achieved by close boarding. The completed roof must not be used for storage of heavy building components such as bricks or air conditioning equipment.

SPANNING ON METAL DECKS

The designer's attention is drawn to the requirement that insulation boards comply with the minimum thicknesses shown in the table below, when used over metal decks with trough openings as shown.

Trough Opening (mm)	Minimum Insulant Thickness (mm)
≤75	25
76-100	30
101-125	35
126-150	40
151-175	45
176-200	50

THERMAL PROPERTIES

The R-values and λ-values quoted in this document for the 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

The boards achieve a thermal conductivity (λ-value) of 0.026 W / m.K (thicknesses < 80 mm), 0.025 W / m.K (thicknesses from 80 mm to < 120 mm) and 0.024 W / m.K (thicknesses ≥ 120 mm).

THERMAL RESISTANCES

Thermal resistance (R-value) varies with thickness and is calculated by dividing the thickness of the board (expressed in metres) by its thermal conductivity.

Insulant Thickness (mm)	Thermal Resistance (m^2.K / W)
45	1.731
50	1.923
60	2.308
65	2.500
70	2.692
75	2.885
80	3.200
85	3.400
90	3.600
95	3.800
100	4.000
105	4.200
110	4.400
120	5.000
125	5.208
130	5.417
140	5.833

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* **Therma**roof TR27 FM zero ODP waterproofed using an FM approved single ply membrane. The board is laid over an FM approved vapour control layer laid directly over a metal deck. The suspended ceiling, where shown is taken to be 12.5 mm plasterboard with a cavity between it and the underside of the deck. If your construction is any different, please consult our Technical Services Department.

TYPICAL U-VALUES

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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 required. For the purposes of these calculations, the use of stainless steel screw fixings with a cross sectional area of 18.1 mm^2 has been assumed. 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 condensation risk analysis should be completed for each individual project. Please call our Technical Services Department for assistance (see rear cover).

METAL DECK WITH NO CEILING

Insulant Thickness (mm)	U-value (W / m^2.K)	
	Combined Method	*Proportional Area Method*
50	0.43	*0.43*
60	0.39	*0.39*
70	0.34	*0.34*
75	0.32	*0.32*
80	0.29	*0.29*
90	0.26	*0.26*
95	0.25	*0.25*
100	0.23	*0.23*
105	0.22	*0.22*
110	0.21	*0.21*
120	0.19	*0.19*
125	0.18	*0.18*
130	0.18	*0.18*
140	0.16	*0.16*

DENSE CONCRETE DECK WITH SUSPENDED CEILING

Insulant Thickness (mm)	U-value (W / m².K)	
	Combined Method	*Proportional Area Method*
45	0.45	*0.45*
50	0.41	*0.41*
60	0.36	*0.35*
65	0.33	*0.33*
70	0.31	*0.31*
75	0.30	*0.29*
80	0.27	*0.27*
90	0.24	*0.24*
100	0.22	*0.22*
110	0.20	*0.20*
120	0.18	*0.18*
125	0.18	*0.17*
130	0.17	*0.17*
140	0.16	*0.16*

SITEWORK

FM COMPLIANCE

Kingspan **Therma**roof TR27 FM zero ODP should be fixed in accordance with the Factory Mutual specification for Class 1 Steel Deck constructions using other FM approved roof components.

VAPOUR CONTROL LAYER

The specified vapour control layer should have a minimum 150 mm side and end laps which should be adequately sealed. The membrane should also be turned up, but not sealed, to all vertical surfaces which abut the roof, to a minimum height of 250 mm and should overhang the verge or gutter by the same amount. Before applying the roof finish, the projecting 250 mm of the vapour control layer should be turned over the insulation and sealed down to form an envelope.

FIXING OVER METAL DECKS

On metal decks, *Kingspan* **Therma**roof TR27 FM zero ODP should be laid over the vapour control layer. The boards are normally secured using mechanical fixings and washers. The waterproofing is also mechanically fixed (see 'Mechanical Fixings'). The *Kingspan* **Therma**roof TR27 FM zero ODP boards should be laid break-bonded with their long edges at right angles to the trough openings, or alternatively, diagonally across the corrugation line. Whichever system is chosen, care must be taken to ensure that all joints are supported by the deck. The joints should be lightly butted. Taping is not required.

FIXING OVER OTHER DECKS

Other types of deck may not conform to Factory Mutual specifications. Please consult our Technical Services Department (see rear cover) for advice on suitable decks. However, where a project does not call for a Factory Mutual approved deck *Kingspan* **Therma**roof TR27 FM zero ODP can be used in conjunction with most types of roof decks including timber and woodwool.

MECHANICAL FIXING

The number of mechanical fixings required to fix *Kingspan* **Therma**roof TR27 FM zero ODP will vary with the geographical location of the building, the topographical data, and the height and width of the roof concerned.

Each fixing should incorporate a square or circular plate washer, (70 mm x 70 mm or 75 mm diameter).

The requirements for securing the waterproofing membrane should be considered separately.

A minimum 11 No. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board giving a minimum fixing rate of 3.8 fixings per square metre: (2400 x 1200 mm boards).

The requirement for additional fixings should be assessed in accordance with BS 6399: Part 2: 1997 (Code of practice for wind loads).
(see Figure 1).

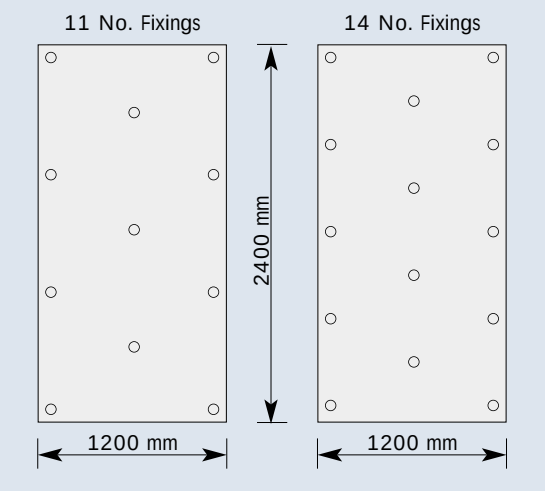

Figure 1 TYPICAL MECHANICAL FIXING PATTERNS

Where alternative mechanical fixing systems that do not rely on large washers are specified, such as bar fixing systems, the specified system must give similar restraint to the board as would be attained by the use of conventional washer and screw systems.

DAILY WORKING PRACTICE

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

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

AVAILABILITY

Kingspan **Therma**roof TR27 FM zero ODP is available through specialist insulation distributors and selected roofing merchants throughout the UK, Ireland and Europe.

PACKAGING

The boards are supplied in labelled packs shrinkwrapped in polythene.

STORAGE

The packaging of *Kingspan* **Therma**roof TR27 FM 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).

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

Kingspan **Therma**roof TR27 FM zero ODP

PRODUCT DESCRIPTION

Kingspan **Therma**roof TR27 FM zero ODP is faced on both sides with a wet lay coated glass fibre tissue autohesively bonded to the insulation core during manufacture.

THE CORE

The core of *Kingspan* **Therma**roof TR27 FM zero ODP is a high performance CFC / HCFC-free rigid urethane insulant of typical density 32 kg / m³. *Kingspan* **Therma**roof TR27 FM zero ODP is manufactured from trademarked **Nil**flam® technology.

CFC / HCFC-FREE

Kingspan **Therma**roof TR27 FM zero ODP is manufactured without the use of CFCs / HCFCs and has zero Ozone Depletion Potential (ODP).

zero O.D.P

PRODUCT DATA

STANDARDS AND APPROVALS

Kingspan **Therma**roof TR27 FM 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. 10697

STANDARD DIMENSIONS

Kingspan **Therma**roof TR27 FM zero ODP is available in the following standard sizes and thicknesses:

Nominal Dimension		Availability
Length	(m)	2.4 (1.2)
Width	(m)	1.2 (0.6)
Insulant Thickness*	(mm)	45, 50, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 120, 125, 130, 140

* 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).

INSURANCE RATING

Kingspan **Therma**roof TR27 FM zero ODP is approved by the Factory Mutual Research Corporation as a Class 1 Insulated Steel Roof Deck Construction for use with all FM approved single-ply waterproofing systems.

WATER VAPOUR RESISTANCE

Modified to include board facings, the boards achieve a resistance greater than 15 MN.s / g when tested in accordance with BS 4370: Part 2: 1993, *Kingspan* **Therma**roof TR27 FM zero ODP should be installed over a vapour control layer (see 'Water Vapour Control' page 2).

DURABILITY

If correctly applied, *Kingspan* **Therma**roof TR27 FM 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 TR27 FM 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 and facings used in the manufacture of *Kingspan* **Therma**roof TR27 FM zero ODP resist attack by mould and microbial growth, and do not provide any food value to vermin.

FIRE PERFORMANCE

Flat roofs insulated with *Kingspan* **Therma**roof TR27 FM zero ODP, when subjected to fire tests, achieve the following typical results. 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)	Dependent on single ply membrane adopted

INSURANCE RATING

Kingspan **Therma**roof TR27 FM zero ODP is certified by the Factory Mutual Research Corporation, USA as meeting the Factory Mutual Research Standard 4450 (1989) and 4470 (1986) Approval requirements for Class 1 Insulated Steel Deck Roofs with all FM approved single-ply waterproofing systems.

Factory Mutual Certificate Nos. J.I. 3002553.

FM
APPROVED

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 **Kool**Duct® 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 irritable 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

Ireland – Telephone: +353 (0) 42 97 95000
– Fax: +353 (0) 42 97 46129
– email: 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:

TECHLINE

UK: – Telephone: +44 (0) 870 850 8555
– Fax: +44 (0) 1544 387 278
– email: techline.uk@insulation.kingspan.com

Ireland: – Telephone: +353 (0) 42 97 95032
– Fax: +353 (0) 42 97 46129
– email: 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

Ireland – Telephone: +353 (0) 42 97 95038
– Fax: +353 (0) 42 97 46129
– email: 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

Ireland – Telephone: +353 (0) 42 97 95000
– Fax: +353 (0) 42 97 46129
– email: 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

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