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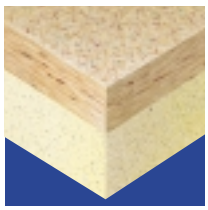
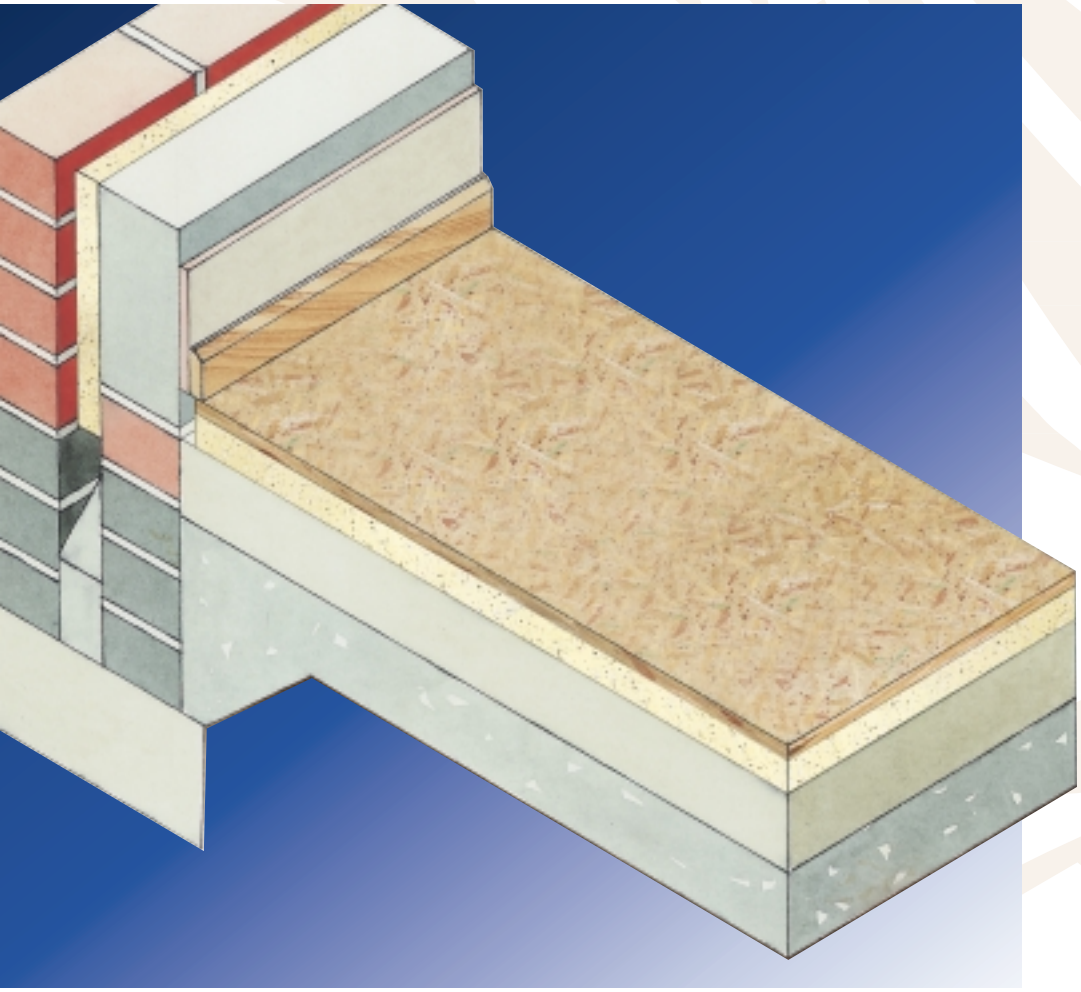
Fourth Issue November 2002



Kingspan® Insulation Solutions

Thermafloor TF73

INSULATION FOR FLOATING AND SUSPENDED FLOORS



- High performance rigid extruded polystyrene insulation – thermal conductivity 0.028 W/m.K bonded to T & G chipboard
- No requirement for a vapour control layer
- Eliminates the need for wet screeds
- Excellent compressive strength
- Easy to handle and install
- Ideal for newbuild and refurbishment
- CFC/HCFC-free with zero Ozone Depletion Potential (ODP)

BBA BRITISH BOARD OF AGREMENT CERTIFICATE 01/3813

BSI REGISTERED FIRM

BS EN ISO 9002 : 1994
Certificate No. FM 10697

zero o.d.p

Kingspan **Therma**floor TF73

TYPICAL DESIGN DETAIL

Figure 1 SOLID FLOATING GROUND FLOOR

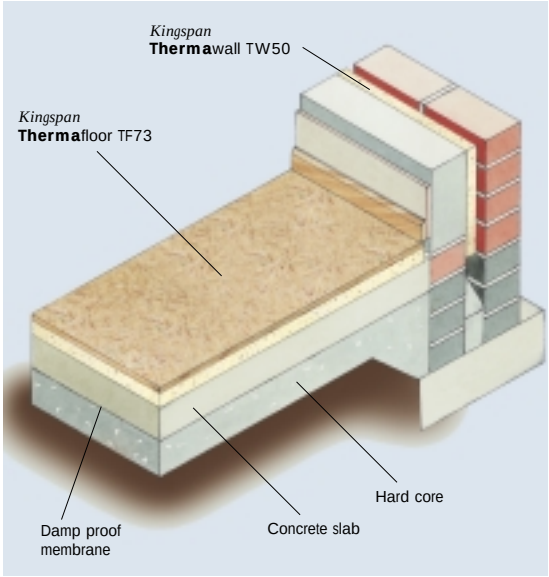
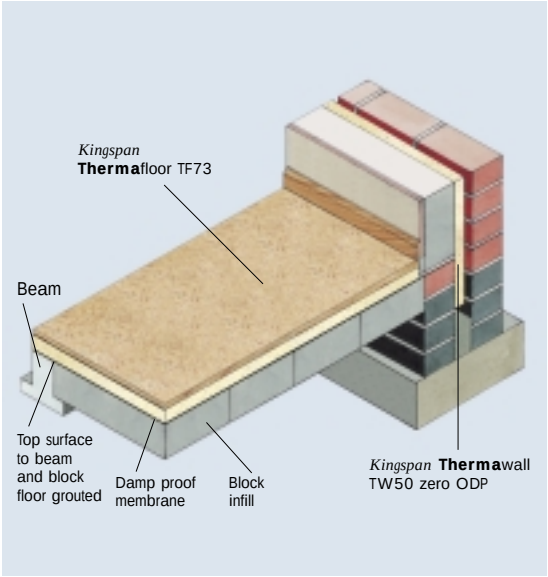


Figure 2 BEAM AND BLOCK FLOOR



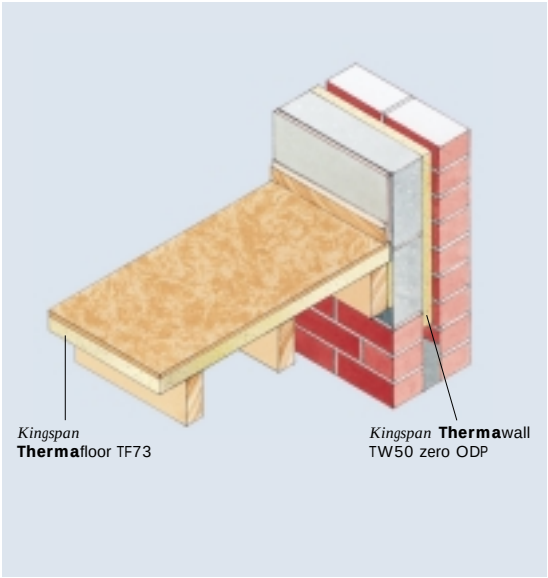
SPECIFICATION CLAUSE

Kingspan **Therma**floor TF73 should be described in specifications as:-

The floor insulation shall be *Kingspan* **Therma**floor TF73 ____mm thick HCFC / CFC-free rigid extruded polystyrene insulation bonded to an 18 mm moisture resistant flooring grade chipboard (V313) facing, 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):
K11 295 (Standard and Intermediate)

Figure 3 SUSPENDED TIMBER FLOOR



DESIGN CONSIDERATIONS

GENERAL

Consideration should be given to the information given in Building Research Establishment Digest numbers 145 (Heat Losses Through Ground Floors).

Where *Kingspan* **Therma**floor TF73 is to be laid over a site fabricated concrete slab, the floor slab should be is allowed to dry out fully prior to the application of *Kingspan* **Therma**floor TF73.

Kingspan **Therma**floor TF73 is not recommended for use in direct contact with subsoil. The surface of slabs should be smooth and free of projections. Beam and block floors should have a levelling screed. Rough cast slabs should be levelled using thin sand blinding to ensure boards are continuously supported.

HEAT LOSS

It has been well documented that heat loss through a ground floor consists of two components:

(a) heat loss through the floor perimeter, which is proportional to the length of perimeter and the temperature difference between inside and outside;

(b) heat loss through the ground which depends on the temperature difference between inside and outside and the overall floor area.

Figure 4 HEAT FLOW THROUGH SLAB

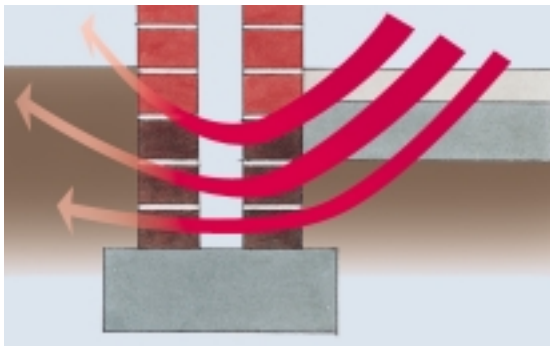
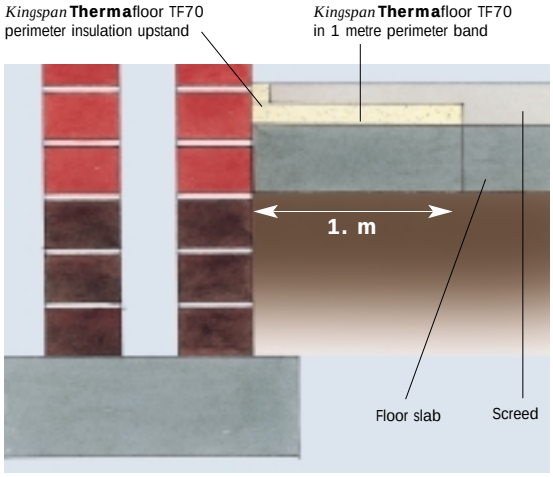


Figure 5 PERIMETER INSULATION



The greatest heat loss through an uninsulated floor is from the edges (Figure 4). Insulating the floor perimeter in a 1 metre band (Figure 5), will not only provide good insulating results but will also prevent the risk of cold bridging at the junction of the floor and external wall.

The thermal performance of an uninsulated domestic floor slab, however, is relatively poor. To enhance the thermal performance, complete rather than perimeter insulation may need to be adopted in domestic floor constructions.

Complete floor insulation offers significant advantages over perimeter insulation when considering the floor dimensions of typical dwellings, e.g. it provides quick response to heating.

THERMAL PROPERTIES

The R-values and λ-values quoted in this document 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 13164, using so called 90:90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

THERMAL CONDUCTIVITY

The thermal conductivity (λ-value) of the insulation component of *Kingspan* **Therma**floor TF73 is 0.028 W/m.K. The thermal conductivity of the chipboard should be taken as 0.14 W/m.K.

THERMAL RESISTANCES

Thermal resistance (R-value) varies with the thickness of each component and 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^2.K/W)
43	1.021
48	1.200
53	1.379
58	1.557
63	1.736
68	1.914
78	2.271
83	2.450
88	2.629
93	2.807
98	2.986
103	3.164

*Product thickness = insulant thickness + 18 mm chipboard

TYPICAL U-VALUES

U-VALUE CALCULATIONS

Unlike roofs, walls and intermediate floors, U-value calculations for ground floors cannot be calculated in the normal manner with reference to the construction detail alone. Heat loss from ground floors depends upon the ratio of exposed floor perimeter to total floor area.

The U-value of an uninsulated ground floor is calculated using the following equation:

$$U_0 = 0.05 + 1.65\left(\frac{P}{A}\right) - 0.6\left(\frac{P}{A}\right)^2$$

Where U_0 = U-value of uninsulated ground floor ($W/m^2.K$)
P = Exposed perimeter of floor (m)
A = Area of floor (m^2)

Dimensions for floors should be measured between finished internal faces of external elements of the building, including projections. With semi-detached, terraced buildings etc. the floor dimensions can be taken either as the premises themselves, or the whole building. Where extensions to existing buildings are necessary, the floor dimensions can be taken as those of the entire building, including extension, or the extension alone.

Unheated spaces outside the insulated fabric, such as attached garages or porches, should be excluded when determining the area but the length of the wall between the heated building and the unheated space should be included when determining the perimeter.

The table below has been derived from the (Uo) uninsulated ground floor U-value equation.
It applies to all types of uninsulated floors constructed next to the ground including slab-on-ground, concrete raft, suspended timber and beam-and-block.

U-values of Uninsulated Floors

Perimeter / Area Ratio $\frac{P\ (m)}{A\ (m^2)}$	U-value (W / m².K)
0.1	0.21
0.2	0.36
0.3	0.49
0.4	0.61
0.5	0.73
0.6	0.82
0.7	0.91
0.8	0.99
0.9	1.05
1.0	1.10

To establish the U-value for intermediate P / A ratios linear interpolation can be used as an alternative to calculation.

Should the U-value of the uninsulated floor be worse than that required, an additional layer of insulation may be required.

EASY GUIDE TO U-VALUES USING KINGSPAN THERMAFLOOR TF73

All of the U-values shown below were calculated using two methods, that detailed in BS / IS EN ISO 13370: 1998 (Thermal performance of buildings – Heat transfer via the ground- Calculation methods) and that detailed in BRE information paper 3 / 90. The method given in BS / IS EN ISO 13370: 1998 (Thermal performance of buildings – Heat transfer via the ground- Calculation methods) is required for compliance with Building Regulations / Standards revised after the year 2000.

BS / IS EN ISO 13370: 1998 Method - U-values were calculated using the method which has been / will be adopted to bring National standards in line with the European Standard calculation method. BS / IS EN ISO 13370: 1998 details methods for the calculation of U-values for solid and suspended ground floors, solid ground floors with edge insulation and basements.

BRE Information paper 3 / 90 / Proportional Area Method – BRE information paper 3 / 90 gives a calculation procedure for dense concrete ground floors where the insulation layer is unbridged. Where the insulation layer is bridged and / or the ground floor is not of dense concrete construction a combination calculation must be performed using either the proportional area method as detailed in The Chartered Institute of Building Services Engineers (CIBSE) Guide A3 (Thermal Properties of Building Structures).

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).

NB for the purposes of these calculations using the method as detailed in BS / IS EN ISO 13370: 1998, the soil has been assumed to be clay or silt, the wall insulation is assumed to overlap the floor insulation by 200 mm minimum and the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

The tables below details typical thickness of *Kingspan* **Therma**floor TF73 required to achieve respective U-values. This table is valid for the use of *Kingspan* **Therma**floor TF73 laid over a solid concrete floor.

SOLID CONCRETE GROUND FLOOR

Product Thickness* of *Kingspan* **Therma**floor TF73										
U-values	Perimeter Area Ratios (m^{-1})									
(W / m².K)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.70					43	43	43	43	43	43
0.60				43	43	43	43	43	43	43
0.45			43	43	43	43	48	48	48	48
0.37			43	43	48	53	58	58	63	63
0.27		43	58	68	73	78	83	88	88	88
0.25		43	63	73	83	88	93	93	98	98

* Product thickness = insulant thickness + 18 mm chipboard

This table is valid for the use of *Kingspan* **Therma**floor TF73 within a suspended timber ground floor.

SUSPENDED TIMBER GROUND FLOOR

Product Thickness* of *Kingspan* **Therma**floor TF73										
U-values	Perimeter Area Ratios (m^{-1})									
(W / m².K)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.70						43	43	43	43	43
0.60				43	43	43	43	43	43	43
0.45			43	43	43	43	43	48	48	48
0.37		43	43	48	53	53	58	58	58	63
0.27		53	63	73	78	83	83	88	88	88
0.25	43	58	73	83	88	88	93	93	93	98

* Product thickness = insulant thickness + 18 mm chipboard

This table is valid for the use of *Kingspan* **Therma**floor TF73 laid over dense beam and block ground floor.

BEAM AND DENSE BLOCK FLOOR

Product Thickness* of *Kingspan* **Therma**floor TF73										
U-values	Perimeter Area Ratios (m^{-1})									
(W / m².K)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0.70						43	43	43	43	43
0.60				43	43	43	43	43	43	43
0.45			43	43	43	43	43	48	48	48
0.37		43	43	48	53	53	58	58	58	63
0.27		53	63	73	78	83	83	88	88	88
0.25	43	58	73	83	88	88	93	93	93	98

* Product thickness = insulant thickness + 18 mm chipboard

SITEWORK

The building should be weathertight before fixing floors incorporating *Kingspan* **Therma**floor TF73.

CONCRETE FLOORS

The surface of the floor should be smooth and flat. Irregularities should not exceed 5 mm when measured with a 3 metre straight edge. Sand blinding may be used to achieve a totally level surface.

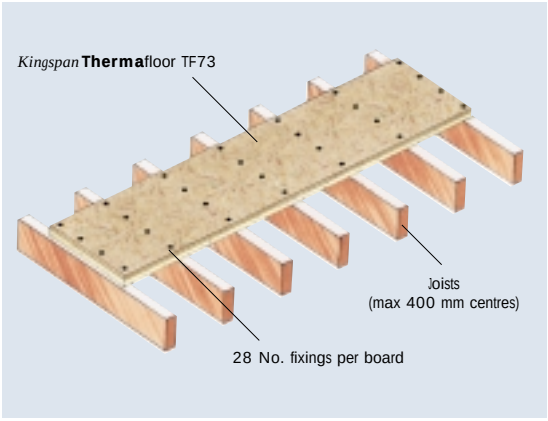
Boards should be laid loose with all joints glued utilising a waterproof, wood grade PVA adhesive applied continuously to the top and bottom of the chipboard joints. The board joints are then butted together. Boards should be positioned to ensure cross joints are staggered to produce a brick bond pattern.

Once the floor has been laid, temporary wedges are inserted between the walls and the floor until the adhesive has set. Once wedges are removed, they are replaced with pieces of rigid insulation to act as a compressible filler and to help prevent a cold bridge. Skirtings may then be fixed.

To comply with NHBC recommendations, preservative treated battens in accordance with BS 5268: Part 5: 1989 (1997) (Structural use of timber. Code of practice for the preservative treatment of structural timber) should be positioned at doorways, the foot of stairs and to support partitions, kitchen fittings, sanitary fittings etc. before laying *Kingspan* **Therma**floor TF73 boards (adequate time should be allowed for any harmful solvent-based preservatives to evaporate).

SUSPENDED FLOORS

Kingspan **Therma**floor TF73 should be laid at right angles to the floor joists (minimum width 50 mm), these being at maximum 400 mm centres. (Cross noggins should be provided where unsupported board edges abut a wall and at any cut board ends which overhang a joist).



Boards should be fixed with nails / screws at 400 mm centres into all joists providing a minimum 25 mm penetration into the 50 mm wide joist (28 fixings per board). Do not nail within 25 mm from board corners.

EXPANSION

Leave a minimum gap of 10 mm or 2 mm per metre run of floor (whichever is the greater), between the perimeter wall and abutments. When a large single run is designed (over 5 metres), it is necessary to incorporate intermediate expansion gaps of 2 mm per metre run to allow for possible movement.

Note: If adequate expansion gaps are not left, when the chipboard absorbs atmospheric moisture and expands, this can cause the boards to buckle.

AVAILABILITY

Kingspan **Therma**floor TF73 is available through specialist insulation distributors and selected builders merchants throughout the UK, Ireland and Europe.

PACKAGING

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

STORAGE

The packaging of *Kingspan* **Therma**floor TF73 should not be considered adequate for long term outside protection.

Kingspan **Therma**floor TF73 should be stored flat in a ventilated area and protected generally from accidental damage, contact with volatile solvents, flames and extended exposure to UV and sunlight. If it is stored outside for more than a few weeks, it must be covered with a pale pigmented plastic sheet.

Kingspan **Therma**floor TF73 should not left in the sun covered by either a transparent or a dark plastic sheet, since in both cases, board temperatures can build up to a level hot enough to appreciably alter their dimensions or warp them.

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 or by minimum 50 mm wide joists at maximum 400 mm centres.

Kingspan **Therma**floor TF73

PRODUCT DESCRIPTION

UPPER FACING

The upper facing of *Kingspan* **Therma**floor TF73 is an 18mm thick moisture resistant flooring grade chipboard (V313) tongue and grooved on all four edges, secondary bonded to the insulant backing.

THE INSULANT BACKING

The insulant backing of *Kingspan* **Therma**floor TF73 is a high performance rigid extruded polystyrene insulant of typical density 35 kg/m^3.

HCFC/CFC-FREE

Kingspan **Therma**floor TF73 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**floor TF73 is manufactured to the highest quality standards under a quality control system approved to BS EN ISO 9002: 1994 (Quality systems, Model for quality assurance in production, installation and servicing). Its use is covered by BBA Certificate 01/3813.

BS EN ISO 9002 : 1994
Certificate No. FM 10697

STANDARD DIMENSIONS

Kingspan **Therma**floor TF73 is available in the following standard sizes and thicknesses:

Nominal Dimension		Availability
Length	(m)	2.4
Width	(m)	0.6
Chipboard Thickness	(mm)	18
Insulant Thickness*	(mm)	25, 30, 35, 40, 45, 50, 60, 70, 75, 80, 85

*Other thicknesses are available subject to enquiry

INSULATION COMPRESSIVE STRENGTH

Typically exceeds 300 kPa at 10% compression when tested to BS 4370: Part 1: 1988 (1996) (Methods of test for rigid cellular materials).

In normal use *Kingspan* **Therma**floor TF73 is suited to applications where the intended loadings are associated with domestic or similar light duty applications. Where anticipated loadings exceed this usage, separate provision should be made to accommodate them.

THERMAL EXPANSION

The linear thermal expansion coefficient of *Kingspan* **Therma**floor TF73 is 0.07 mm/m.K when tested to BS 4370: Part 3: 1988 (1996) (Methods of test for rigid cellular materials).

WATER VAPOUR RESISTANCE

Modified to include board facings, the boards achieve a resistance greater than 350 MN.s/g when tested in accordance with BS 3837: Part 2: 1990 (1996) (Specification for extruded boards).

ABSORPTION OF MOISTURE

Kingspan **Therma**floor TF73 is not sensitive to moisture of any kind. Its surface is water-repellent and there is no capillary suction. The material is also not hygroscopic. Over a 28 day cycle with temperature fluctuating 20/40°C its water absorption is <0.5% when tested to BS 3837: Part 2: 1990 (1996) (Specification for extruded boards).

DURABILITY

If correctly applied, *Kingspan* **Therma**floor TF73 has an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

RESISTANCE TO SOLVENTS, FUNGI & RODENTS

The insulation backing 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**floor TF73. 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 backing and facing used in the manufacture of *Kingspan* **Therma**floor TF73 resist attack by mould and microbial growth and do not provide any food value to vermin.

FIRE PERFORMANCE

When the insulation backing of *Kingspan* **Therma**floor TF73 is tested in accordance with the requirements of DIN 4102: 1981-B1 is obtained - not readily ignitable.

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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Castleblayney, County Monaghan, Ireland

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