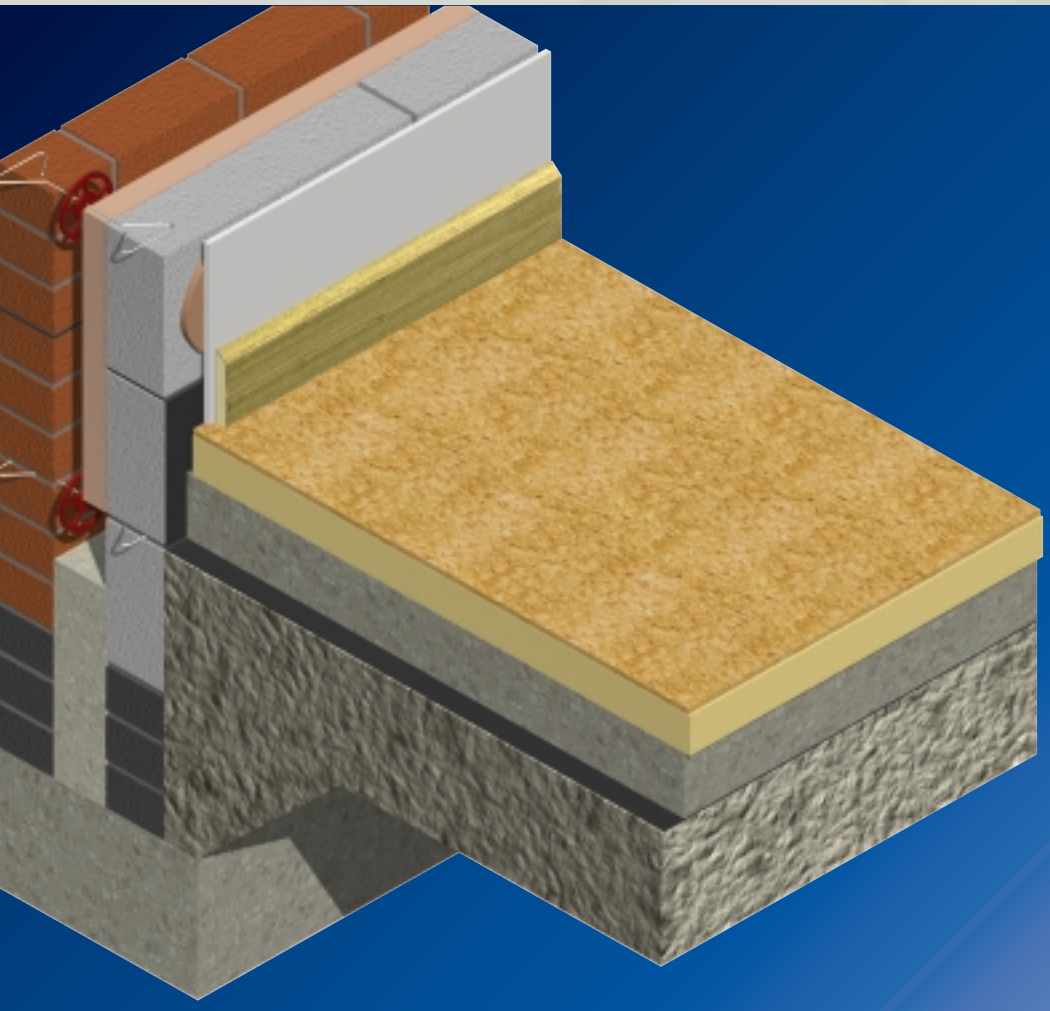
Cl/Sfb Rn7 M2
Sixth Issue November 2005

Thermafloor TF73

INSULATION FOR FLOATING AND SUSPENDED FLOORS



- High performance rigid extruded polystyrene insulation – thermal conductivity 0.029 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
- Non–deleterious material
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP)

zero o.d.p

BBA BRITISH BOARD OF AGRÉMENT CERTIFICATE 01/3813

FSC

Kingspan® Insulation Solutions

Thermafloor TF73

Typical Design Detail

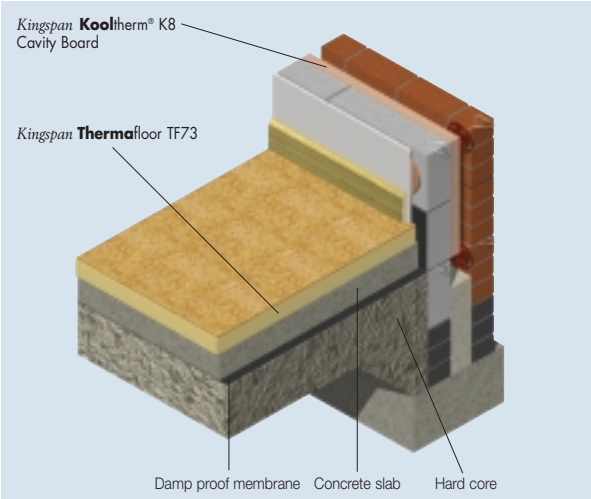


Figure 1 Solid Floating Ground Floor

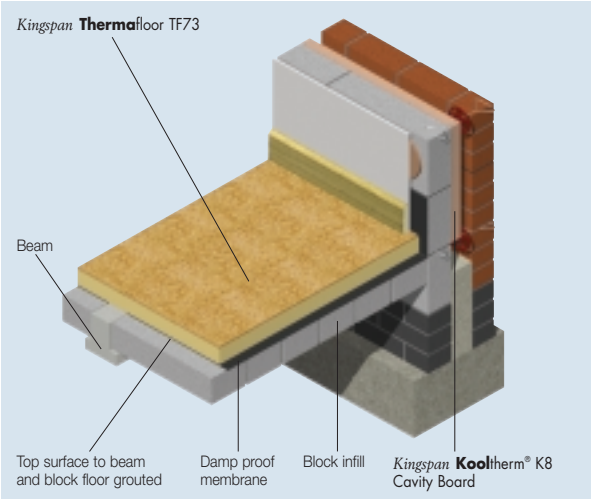


Figure 2 Beam and Block Floor

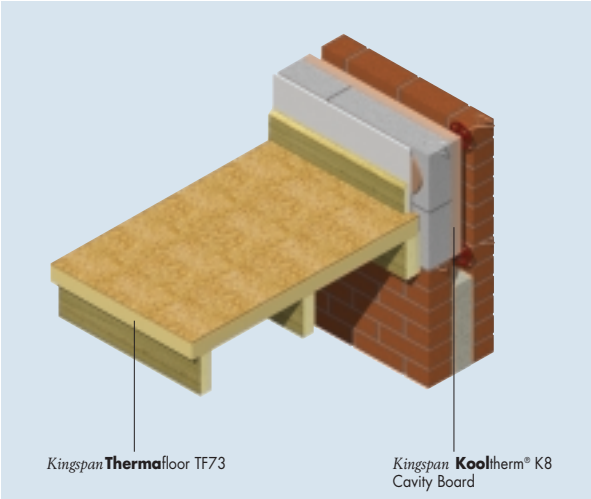


Figure 3 Suspended Timber Floor

Specification Clause

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

The floor insulation shall be *Kingspan* **Therma**floor TF73 ____mm thick CFC/HCFC–free rigid extruded polystyrene insulation bonded to an FSC approved 18 mm moisture resistant flooring grade chipboard (P5) facing, manufactured to the highest standards under quality control systems approved to BS EN ISO 9001: 2000 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)
K11 75 (Minor Works)

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 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.

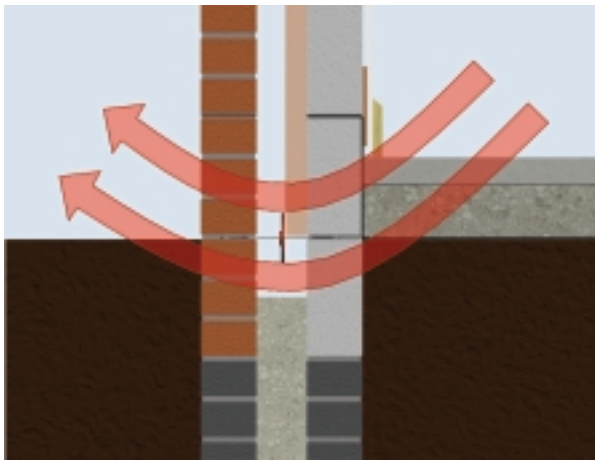


Figure 4 Heat Flow Through Slab

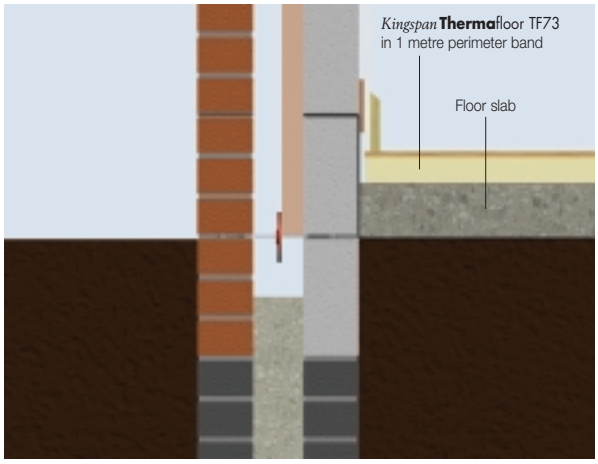


Figure 5 Perimeter Insulation

The greatest heat loss through an uninsulated floor is from the edges (Figure 4). Insulating the floor (Figure 5), it 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.

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.

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 (U^0) uninsulated ground floor U–value equation. The table below applies to uninsulated floors constructed next to the ground including slab–on–ground, concrete raft and solid floors.

U–values of Uninsulated Slab–on–ground, Concrete Raft and Solid Floors

Perimeter/Area Ratio $\frac{P\ (m)}{A\ (m^2)}$	U–value ($W/m^2 \cdot K$)
0.1	0.22
0.2	0.37
0.3	0.49
0.4	0.60
0.5	0.70
0.6	0.78
0.7	0.86
0.8	0.93
0.9	0.99
1.0	1.05

The table below applies to uninsulated suspended timber ground floors.

U–values of Uninsulated Suspended Timber Ground Floors

Perimeter/Area Ratio $\frac{P\ (m)}{A\ (m^2)}$	U–value ($W/m^2 \cdot K$)
0.1	0.26
0.2	0.41
0.3	0.52
0.4	0.61
0.5	0.69
0.6	0.75
0.7	0.80
0.8	0.85
0.9	0.89
1.0	0.92

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, the inclusion of insulation will be necessary.

Easy Guide to U-values Using *Kingspan* **Therma**floor TF73

All of the U–values shown below were calculated using the method that is detailed in BS/I.S. EN ISO 13370: 1998 (Thermal performance of buildings. Heat transfer via the ground. Calculation methods) which is required for compliance with Building Regulations/Standards revised after the year 2002.

BS/I.S. 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/I.S. 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.

NB for the purposes of these calculations using the method as detailed in BS/I.S. 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 figures quoted are for guidance only. A detailed U–value calculation together with a condensation risk analysis should be completed for each individual project. Please contact the Kingspan Insulation Technical Services Department for assistance (see rear cover).

The tables below details typical thickness of *Kingspan* **Therma**floor TF73 required to achieve respective U–values. The table below 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})									
($W/m^2 \cdot K$)	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
0.45			43	43	43	43	43	48	48	53
0.37			43	43	48	53	58	58	63	63
0.27		43	58	58	78	83	88	88	93	98
0.25		43	68	78	83	88	93	98	98	103
0.22		58	78	93	98	103	108	113	113	118

**Product thickness = insulant thickness + 18 mm chipboard*

The table below 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})									
($W/m^2 \cdot K$)	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
0.60					43	43	43	43	43	43
0.45			43	43	43	43	48	48	53	53
0.37		43	43	53	58	58	63	63	68	68
0.27		58	78	83	88	93	93	98	98	98
0.25	43	68	88	93	98	103	103	108	108	108
0.22	43	88	103	113	118	118	123	123	128	128

**Product thickness = insulant thickness + 18 mm chipboard*
NB Default figure of 0.2 W/m·K is taken for fixings

The table below 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})									
($W/m^2 \cdot K$)	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	43	48	48	48
0.37		43	43	48	53	58	58	58	63	63
0.27		53	68	73	78	83	88	88	88	93
0.25	43	58	78	83	88	93	95	98	98	98
0.22	43	73	88	98	103	108	108	113	113	113

**Product thickness = insulant thickness + 18 mm chipboard*

Sitework

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

Boards should be allowed to reach equilibrium by storing them under the atmospheric conditions in which they are to be used, for a minimum of 48 hours prior to laying.

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.

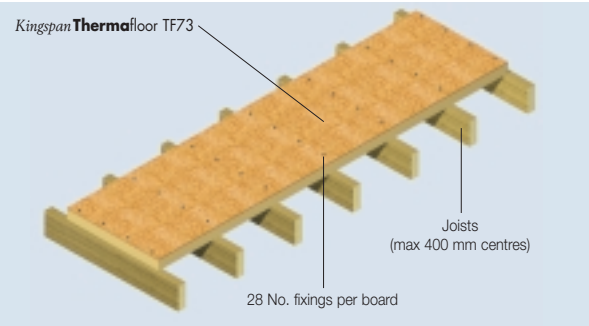
Boards should be laid loose with all joints glued utilising a waterproof, wood grade PVA adhesive applied continuously to the top and bottom of the chipboard joints. The board joints are then butted together. Boards should be positioned to ensure cross joints are staggered to produce a brick bond pattern.

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 5268–5: 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 the Kingspan Insulation Marketing 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.

Thermafloor TF73

Product Description

Upper Facing

The upper facing of *Kingspan* **Therma**floor TF73 is an FSC approved 18 mm thick moisture resistant flooring grade chipboard (P5) tongue and grooved on all four edges, secondary bonded to the insulant backing.

FSC
TT–COC–1545

The Insulant Backing

The insulant backing of *Kingspan* **Therma**floor TF73 is a high performance rigid extruded polystyrene insulant of typical density 30 kg/m^3.

CFC/HCFC–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 9001: 2000 (Quality management systems. Requirements). Its use is covered by BBA Certificate 01/3813.

Manufactured to BS EN ISO 9001: 2000
Certificate No. 388

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

Insulation Compressive Strength

Typically exceeds 350 kPa at 10% deflection when tested to BS EN 826: 1996 (Thermal insulating products for building applications. Determination of compression behaviour).

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 4370–3: 1988 (2002) (Methods of test for rigid cellular materials. Methods 12 and 13).

Water Vapour Resistivity

The boards achieve a resistivity greater than 350 MNs/gm when tested in accordance with BS EN 12086: 1997 (Thermal insulating products for building applications. Determination of water vapour transmission properties).

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 EN 12087: 1997 (Thermal insulating products for building applications. Determination of long term water absorption by immersion).

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 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 spilled 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 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.

Thermal Properties

The λ–values and R–values quoted are in accordance with the Harmonised European Standard BS EN 13164: 2001 (Thermal insulation products for buildings – Factory made products of extruded polystyrene (XPS) – Specification) 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 0.029 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	0.95
48	1.15
53	1.30
58	1.50
63	1.65
68	1.85
78	2.15
83	2.35
88	2.50
93	2.70
98	2.85
103	3.05

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

The Kingspan Insulation Product Range

The *Kingspan* **Kool**therm® **K–range**

- With a thermal conductivity of 0.021–0.024 W/m·K CFC/HCFC–free 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 and Low Risk rating for the Technical Standards in Scotland.
- Achieves the best possible rating of < 5% smoke obscuration when tested to BS 5111: Part 1: 1974.
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP).

The *Kingspan* **Therma Range**

- With a thermal conductivity of 0.022–0.028 W/m·K CFC/HCFC–free 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* **Styr**ozone® **& Purlcrete 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 – non–fibrous
- 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 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

Literature & Samples

Kingspan Insulation produce 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 on the numbers below:

UK – Telephone: +44 (0) 870 733 8333
– Fax: +44 (0) 1544 387 299
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Ireland – Telephone: +353 (0) 42 97 95038
– Fax: +353 (0) 42 97 46129
– email: literature.ie@insulation.kingspan.com

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 – Telephone: +44 (0) 870 761 7770
– Fax: +44 (0) 1544 387 289
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Ireland – Telephone: +353 (0) 42 97 95032
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– email: tapered.ie@insulation.kingspan.com

Technical Advice/Design

Kingspan Insulation Ltd support all of their 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 *TECHLINE* 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 Services Department can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

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

UK – Telephone: +44 (0) 870 850 8333
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– email: techline.ie@insulation.kingspan.com

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