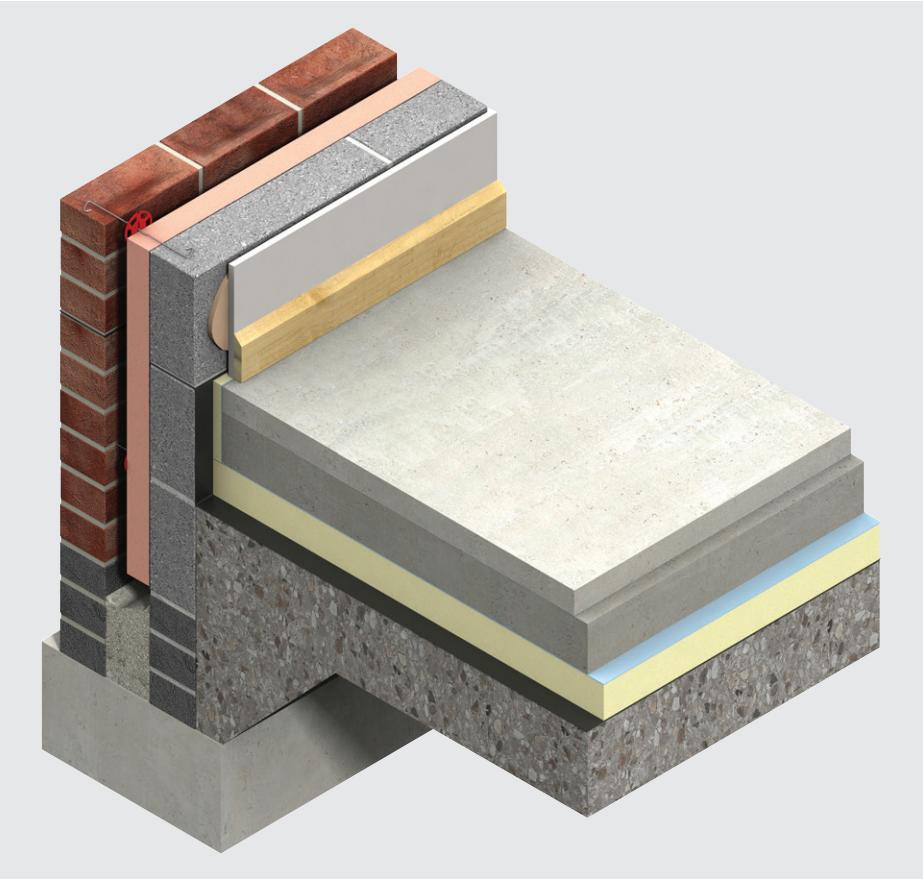
Tenth Issue | 10/2022

Thermafloor® TF70

Insulation for solid concrete and suspended ground floors



- High performance rigid thermoset insulation - thermal conductivity 0.022 W/mK
- Unaffected by air infiltration
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build and refurbishment
- Non-deleterious material
- Manufactured with a blowing agent that has zero ODP and low GWP

Fibre-free Core

Kingspan®

Typical constructions and U-values

Assumptions

The U-values in the tables that follow have been calculated using the method detailed in BS EN ISO 13370: 2017 (Thermal performance of buildings. Heat transfer via the ground. Calculation methods), and using the conventions set out in BR 443 (Conventions for U-value calculations). They are valid for the constructions shown in the details immediately above each table.

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

Floor dimensions should be measured between the finished internal surfaces of the external walls. Non-usable heated space such as ducts and stairwells should be included when determining the area of the floor. Unheated spaces outside of the insulated fabric, such as attached garages or porches, should be excluded when determining the area of the floor, but the length of the wall between the heated building and the unheated space should be included when determining the perimeter. The floor dimensions of semi–detached, terraced or other joined premises / dwellings can be taken either as those of the premises / dwelling itself or those of the whole building. Where extensions to existing buildings are under consideration, the floor dimensions should be taken as those of the extension.

If the exposed floor perimeter / area (P/A) ratio lies between two of the numbers shown in the tables that follow, for a safe estimate please use the P/A ratio shown that is the next highest i.e. for 0.57 use 0.6.

For buildings with relatively small ground floor areas (primarily domestic properties), if the ground floor is left uninsulated, the thermal performance will be poor. To enhance the thermal performance, complete insulation of the ground floor should be adopted (Figures 1 & 9).

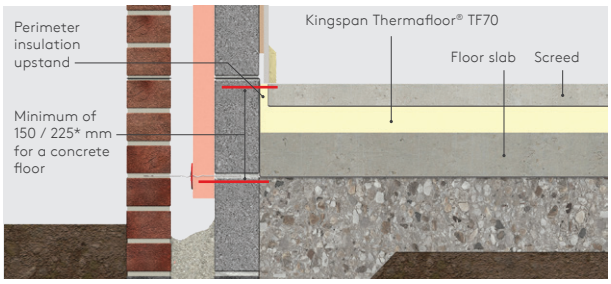


Figure 1 - Complete masonry floor insulation

For buildings with large ground floor areas (primarily non-domestic properties), complete insulation of the ground floor may be unnecessary. Insulating the perimeter may provide adequate thermal performance (Figure 2). For further advice on the width of the perimeter insulation please contact the Kingspan Insulation Technical Service Department.

Calculations in the tables that follow assume complete insulation of the floor area, please contact the Kingspan Insulation Technical Service Department for calculations with perimeter strip insulation only.

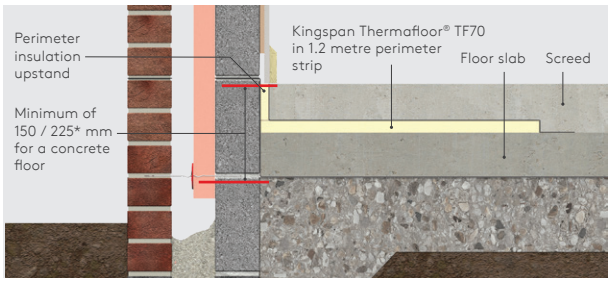


Figure 2 - Perimeter strip masonry floor insulation

NB The figures quoted are for guidance only. A detailed U-value calculation should be completed for each project.

NB For the purposes of these calculations, using the method as detailed in BS EN ISO 13370: 2017, the soil has been assumed to be sand or gravel, the wall insulation is assumed to overlap the floor insulation by minimum 150 / 225* mm for a concrete floor and 200 mm for a timber floor, and the standard of workmanship has been assumed good, and therefore the correction factor for air gaps has been ignored.

NB If your construction is different from those specified, and / or to gain a comprehensive U–value calculation for your project, please consult the Kingspan Insulation Technical Service Department for assistance (see rear cover).

* 150 mm applies to the UK and 225 mm to the Republic of Ireland.

U-value table key

Further information on the applicable notional and area weighted average limiting U-values is available in the relevant geographical documentation:

- Approved Documents L to the Building Regulations for England;
- Approved Documents L to the Building Regulations for Wales;
- Technical Handbooks Section 6 to the Building Standards for Scotland;
- Technical Booklets F1 & F2 to the Building Regulations for Northern Ireland; and
- Technical Guidance Document L (Dwellings) and Technical Guidance Document L (Buildings other than Dwellings) to the Building Regulations for the Republic of Ireland.

Typical constructions and U-values

Beam and dense* block ground floors

Insulation below the floor screed

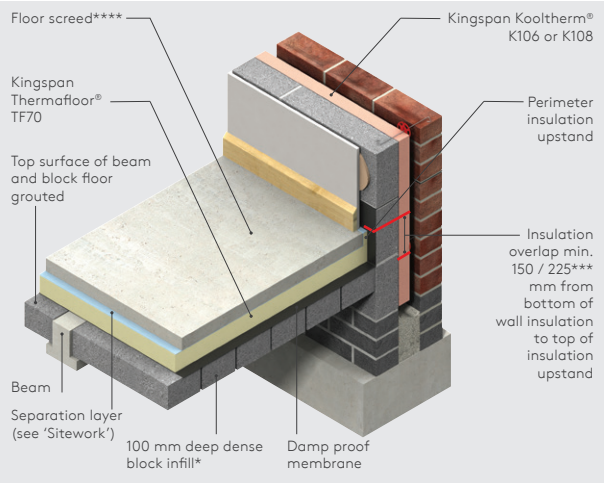


Figure 3

U-values (W/m²K) for various thicknesses of Kingspan Thermafloor® TF70 and floor perimeter / area ratios						
Insulant thickness (mm)	Perimeter / area (m⁻¹)					
	0.2	0.3	0.4	0.5	0.6	0.7
40	0.25	-	-	-	-	-
50	0.23	0.25	-	-	-	-
60	0.21	0.23	0.24	0.25	0.25	0.26
70	0.19	0.20	0.21	0.22	0.23	0.23
75	0.18	0.20	0.20	0.21	0.22	0.22
80	0.17	0.19	0.20	0.20	0.21	0.21
90	0.16	0.17	0.18	0.18	0.19	0.19
100	0.15	0.16	0.17	0.17	0.17	0.18
110	0.14	0.15	0.15	0.16	0.16	0.16
120	0.13	0.14	0.14	0.15	0.15	0.15
125	0.13	0.14	0.14	0.14	0.14	0.15
130	0.12	0.13	0.14	0.14	0.14	0.14
140	0.12	0.12	0.13	0.13	0.13	0.13
150	0.11	0.12	0.12	0.12	0.12	0.13
80 + 90**	0.10	0.11	0.11	0.11	0.11	0.11
75 + 100**	0.10	0.10	0.11	0.11	0.11	0.11
90 + 90	0.10	0.10	0.10	0.11	0.11	0.11
90 + 100**	0.09	0.10	0.10	0.10	0.10	0.10

* Calculations assume dense block infill of λ-value (1.13 W/mK).

** Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

*** 150 mm applies to the UK and 225 mm to the Republic of Ireland.

**** For the purposes of these U-value calculations, the floor screed was entered at 65 mm and the concrete slab at 150 mm.

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Suspended timber ground floors

Insulation between joists

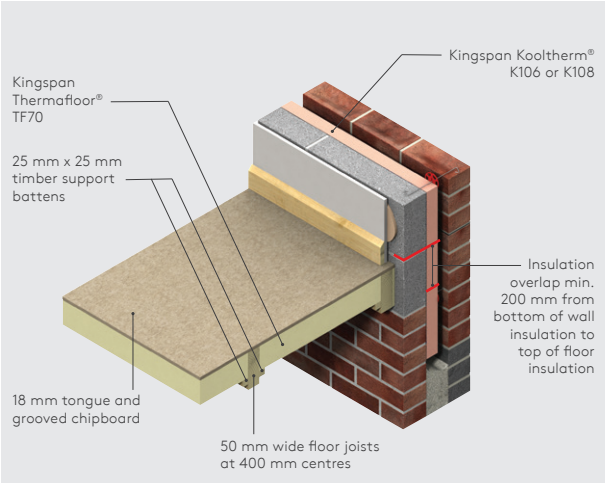


Figure 4

U-values (W/m²K) for various thicknesses of Kingspan Thermafloor® TF70 and floor perimeter / area ratios						
Insulant thickness (mm)	Perimeter / area (m⁻¹)					
	0.2	0.3	0.4	0.5	0.6	0.7
30	0.25	-	-	-	-	-
40	0.23	-	-	-	-	-
50	0.22	0.24	0.26	-	-	-
60	0.20	0.22	0.24	0.25	0.25	0.26
70	0.19	0.21	0.22	0.23	0.23	0.24
75	0.19	0.20	0.21	0.22	0.23	0.23
80	0.18	0.20	0.21	0.21	0.22	0.22
90	0.17	0.19	0.20	0.20	0.21	0.21
100	0.16	0.18	0.18	0.19	0.19	0.20
110	0.16	0.17	0.18	0.18	0.18	0.19
120	0.15	0.16	0.17	0.17	0.17	0.18
125	0.15	0.16	0.16	0.17	0.17	0.17
130	0.14	0.15	0.16	0.16	0.17	0.17
140	0.14	0.15	0.15	0.16	0.16	0.16
150	0.13	0.14	0.15	0.15	0.15	0.15
80 + 90*	0.12	0.13	0.13	0.14	0.14	0.14
75 + 100*/**	0.12	0.13	0.13	0.13	0.14	0.14

* Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

** Suspended timber ground floor joists are typically 200 mm deep and, therefore, U-values have been calculated with a maximum insulation thickness of 175 mm, in order to accommodate 25 x 25 mm timber support battens.

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Typical constructions and U-values

Solid concrete ground based floors

Insulation below the floor slab

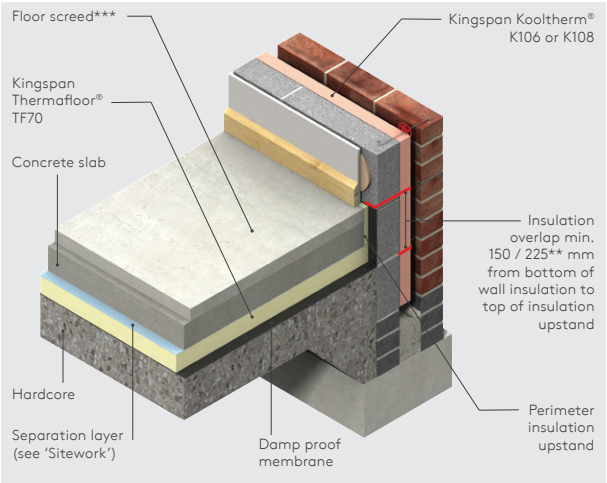


Figure 5

U-values (W/m²K) for various thicknesses of Kingspan Thermafloor® TF70 and floor perimeter / area ratios						
Insulant thickness (mm)	Perimeter / area (m⁻¹)					
	0.2	0.3	0.4	0.5	0.6	0.7
40	0.23	-	-	-	-	-
50	0.20	0.24	-	-	-	-
60	0.19	0.21	0.23	0.24	-	-
70	0.17	0.19	0.21	0.22	0.22	0.23
75	0.16	0.18	0.20	0.21	0.21	0.22
80	0.16	0.18	0.19	0.20	0.20	0.21
90	0.15	0.16	0.17	0.18	0.19	0.19
100	0.14	0.15	0.16	0.17	0.17	0.18
110	0.13	0.14	0.15	0.16	0.16	0.16
120	0.12	0.13	0.14	0.15	0.15	0.15
125	0.12	0.13	0.14	0.14	0.14	0.15
130	0.11	0.13	0.13	0.14	0.14	0.14
140	0.11	0.12	0.12	0.13	0.13	0.13
150	0.10	0.11	0.12	0.12	0.12	0.13
80 + 90*	0.09	0.10	0.11	0.11	0.11	0.11
75 + 100*	0.09	0.10	0.11	0.11	0.11	0.11
90 + 90	0.09	0.10	0.10	0.10	0.11	0.11
90 + 100*	0.09	0.09	0.10	0.10	0.10	0.10

* Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

** 150 mm applies to the UK and 225 mm to the Republic of Ireland.

*** For the purposes of these U-value calculations, the floor screed was entered at 65 mm and the concrete slab at 150 mm..

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Insulation below the floor screed

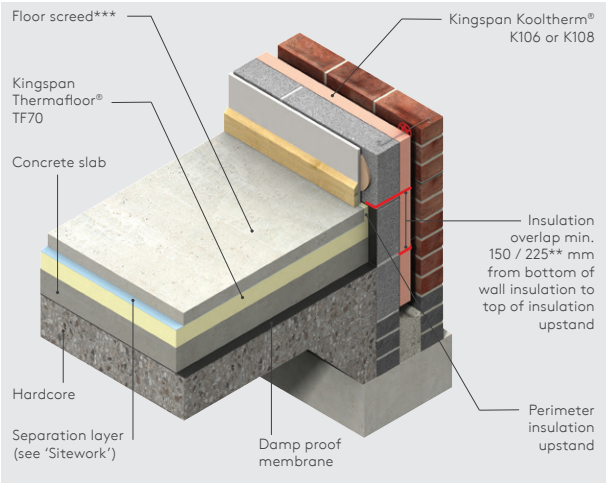


Figure 6

U-values (W/m²K) for various thicknesses of Kingspan Thermafloor® TF70 and floor perimeter / area ratios						
Insulant thickness (mm)	Perimeter / area (m⁻¹)					
	0.2	0.3	0.4	0.5	0.6	0.7
40	0.23	-	-	-	-	-
50	0.20	0.24	-	-	-	-
60	0.19	0.21	0.23	0.24	-	-
70	0.17	0.19	0.21	0.22	0.22	0.23
75	0.16	0.18	0.20	0.21	0.21	0.22
80	0.16	0.18	0.19	0.20	0.20	0.21
90	0.15	0.16	0.17	0.18	0.19	0.19
100	0.14	0.15	0.16	0.17	0.17	0.18
110	0.13	0.14	0.15	0.16	0.16	0.16
120	0.12	0.13	0.14	0.15	0.15	0.15
125	0.12	0.13	0.14	0.14	0.14	0.15
130	0.11	0.13	0.13	0.14	0.14	0.14
140	0.11	0.12	0.12	0.13	0.13	0.13
150	0.10	0.11	0.12	0.12	0.12	0.13
80 + 90*	0.09	0.10	0.11	0.11	0.11	0.11
75 + 100*	0.09	0.10	0.11	0.11	0.11	0.11
90 + 90	0.09	0.10	0.10	0.10	0.11	0.11
90 + 100*	0.09	0.09	0.10	0.10	0.10	0.10

* Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

** 150 mm applies to the UK and 225 mm to the Republic of Ireland.

*** For the purposes of these U-value calculations, the floor screed was entered at 65 mm and the concrete slab at 150 mm..

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Typical constructions and U-values

Timber floor on battens

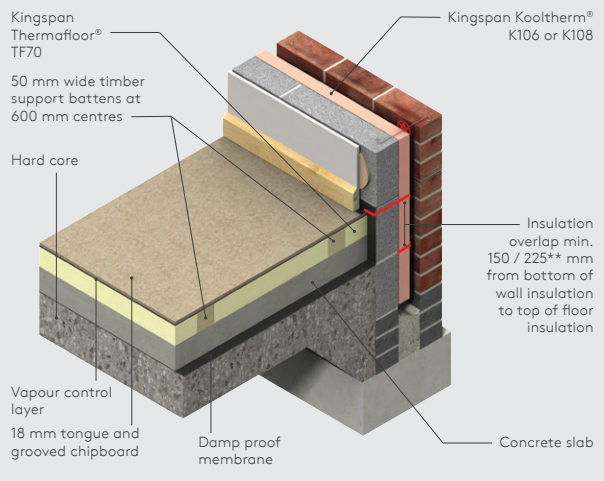


Figure 7

U-values (W/m²K) for various thicknesses of Kingspan Thermafloor® TF70 and floor perimeter / area ratios						
Insulant thickness (mm)	Perimeter / area (m⁻¹)					
	0.2	0.3	0.4	0.5	0.6	0.7
50	0.23	-	-	-	-	-
60	0.21	-	-	-	-	-
70	0.20	0.23	-	-	-	-
75	0.19	0.22	0.24	-	-	-
80	0.19	0.21	0.23	0.24	-	-
90	0.18	0.20	0.21	0.22	0.23	0.24
100	0.17	0.19	0.20	0.21	0.22	0.22
110	0.16	0.18	0.19	0.20	0.20	0.21
120	0.15	0.17	0.18	0.18	0.19	0.19
125	0.14	0.16	0.17	0.18	0.18	0.19
130	0.14	0.16	0.17	0.17	0.18	0.18
140	0.14	0.15	0.16	0.17	0.17	0.17
150*	0.13	0.14	0.15	0.16	0.16	0.16

* Timber support battens are typically 150 mm deep and the use of battens of greater depth would require the installation of timber cross noggings. The addition of timber cross noggings would increase the level of thermal bridging than has been accounted for in these calculations and therefore the insulation thickness has been capped at 150 mm.

** 150 mm applies to the UK and 225 mm to the Republic of Ireland.

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Timber floating floor

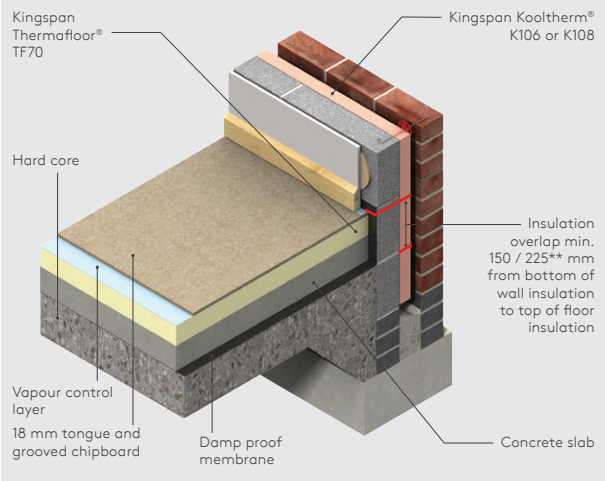


Figure 8

U-values (W/m²K) for various thicknesses of Kingspan Thermafloor® TF70 and floor perimeter / area ratios						
Insulant thickness (mm)	Perimeter / area (m⁻¹)					
	0.2	0.3	0.4	0.5	0.6	0.7
40	0.22	-	-	-	-	-
50	0.20	0.23	-	-	-	-
60	0.18	0.21	0.22	0.24	0.25	-
70	0.17	0.19	0.21	0.21	0.22	0.23
75	0.16	0.18	0.19	0.20	0.21	0.22
80	0.16	0.18	0.19	0.19	0.20	0.20
90	0.14	0.16	0.17	0.18	0.18	0.19
100	0.13	0.15	0.16	0.17	0.17	0.17
110	0.13	0.14	0.15	0.15	0.16	0.16
120	0.12	0.13	0.14	0.14	0.15	0.15
125	0.12	0.13	0.13	0.14	0.14	0.14
130	0.11	0.12	0.13	0.13	0.14	0.14
140	0.11	0.12	0.12	0.13	0.13	0.13
150*	0.10	0.11	0.12	0.12	0.12	0.12

* It is not recommended that two layers of Kingspan Thermafloor® TF70 be used under a floating floor and, therefore, U-values have been calculated with a maximum insulation thickness of 150 mm.

** 150 mm applies to the UK and 225 mm to the Republic of Ireland.

NB Some values may have been omitted from the table because they do not meet the most common minimum requirements.

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

Typical constructions and U-values

Heat loss and linear thermal bridging

Basic principles

Linear thermal bridging describes the heat losses that occur at junctions between elements, which is additional to the losses occurring through roofs, walls and floors. This heat loss is represented by the junction's psi (ψ) value. The lower the ψ-value, the better the performance of a junction detail. The ψ-values and lengths of linear thermal bridges are accounted for in whole building energy and carbon dioxide emissions calculations.

In a typical wall-to-ground floor junction the heat will flow through the easiest path, for example in a masonry cavity wall the linear thermal bridge is primarily the inner leaf of masonry and in a timber frame wall the linear thermal bridge is primarily the sole plate and the construction below it. These linear thermal bridges can be reduced by increasing the distance that the heat has to travel.

Approved details, such as the Acceptable Construction Details (Republic of Ireland) can uplift performance to provide a clear starting point towards achieving compliance, but can be limited in scope and applicability. Where applicable, the principles in these details are also considered good practice for refurbishment. Existing building junction losses are not typically accounted for in whole building heat loss calculations and only the risks of surface condensation and mould growth are considered.

The greatest opportunity for mitigating the impact of linear thermal bridges can come from following accurately 'modelled' details that take into account the following design considerations.

Reducing linear thermal bridging

Detailing at junctions to minimise the effects of thermal bridging and the associated risk of condensation or mould growth is important and there are some simple design considerations that can be adopted to help mitigate the risks and to reduce heat losses.

- For retrofit or refurbishment of existing buildings using Kingspan Thermafloor® TF70, achieving continuity of insulation is the best approach to limiting losses through the wall/floor junctions. If continuity between floor and wall insulation layers cannot be achieved, overlap of insulation layers and use of lower conductivity materials represents a good practice approach. However, where neither option is possible, the risk of surface condensation at the coldest points will require particular consideration in determining an appropriate approach. Details and designs should be considered in the context of the property, its construction, characteristics, condition and ventilation provisions.
- For new build applications, care is also required to ensure continuation of insulation wherever possible between the wall and floor for best thermal performance. Where this is not possible, the insulation should be overlapped and ideally, lower conductivity material introduced between.

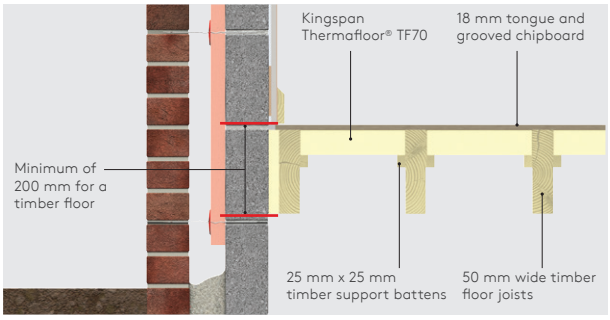


Figure 9 - Complete timber floor insulation

- In order to minimise cold bridging at the edge of the floor, the distance between the top surface of the floor insulation or perimeter insulation upstand, and the bottom of the wall insulation must be a minimum of 150 / 225* mm (see Figures 1 & 2) for a concrete floor and 200 mm for a suspended timber floor (see Figure 9). The further down the wall insulation extends past the floor insulation, the better the thermal performance of the junction between the wall and the floor.

  * 150 mm applies to the UK and 225 mm to the Republic of Ireland.

- Perimeter upstand insulation helps to reduce heat losses from the junction between the floor and external walls. The upstand insulation helps to increase the distance that the heat has to travel in order to escape through the junction, which therefore helps to reduce heat loss. Omitting this, or using a poorer performing insulation, can increase these losses.
- Using better thermally performing 'lightweight' aggregate blockwork for the inner leaf of cavity walls in adjacency to the junction with the floor can assist with lowering heat losses from the junction.
- An internal lining of insulation on the warm side of the construction can help to reduce the heat losses through the junction. The internal lining could be a wall lining for the whole wall area, such as Kingspan Kooltherm® K118 Insulated Plasterboard, or could be localised insulation behind the plasterboard to help reduce a junction's losses (and losses from any timber soleplate).
- One of the best approaches to minimising cold bridging is to use external wall insulation, making the whole wall and any junctions warm, with suitable wall insulation at the junction with the ground floor extending past the level of the floor insulation below ground level.

For further advice on details to reduce linear thermal bridging please contact the Kingspan Insulation Technical Service Department (see rear cover for details).

Design considerations

Environmental impact & responsible sourcing

Environmental Product Declaration

An Environmental Product Declaration (EPD), certified by BRE Global to the BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to BS EN 15804: 2012 + A1: 2013, has been created for Kingspan Thermafloor® TF70 produced at Kingspan Insulation's Pembridge (Herefordshire), Selby (North Yorkshire) and Castleblayney (Co. Monaghan) manufacturing facilities.

Responsible sourcing

Kingspan Thermafloor® TF70 produced at Kingspan Insulation's Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is certified to BES 6001 (Framework Standard for the Responsible Sourcing of Construction Products) 'Very Good'.

BES 6001
Responsible Sourcing
www.greenbooklive.com

Kingspan Thermafloor® TF70 produced at Kingspan Insulation's Pembridge, Herefordshire, Selby, North Yorkshire and Castleblayney, Co. Monaghan manufacturing facilities is manufactured under a management system certified to ISO 14001: 2015.

NB The above information is correct at the time of writing. Please confirm at the point of need by visiting the Kingspan Insulation website (see rear cover), from which copies of Kingspan Insulation's certificates can be obtained.

Sustainability & responsibility

Kingspan Insulation has a long-term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; as a substantial landholder; and as a key member of its neighbouring communities.

A report covering the sustainability and responsibility of Kingspan Insulation Ltd's operations at its Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is available at **www.kingspaninsulation.co.uk/sustainabilityandresponsibility**.

Specification clause

Kingspan Thermafloor® TF70 should be described in specifications as:–

The floor insulation shall be Kingspan Thermafloor® TF70 ____ mm thick: comprising a high performance fibre-free rigid thermoset insulation core faced on both sides with a low emissivity composite foil facing. The product shall be manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP); in accordance with the requirements of BS EN 13165: 2012 + A2: 2016; under a management system certified to ISO 9001: 2015, ISO 14001: 2015, ISO 45001: 2018 and ISO 50001: 2018; by Kingspan Insulation Limited; and installed in accordance with the instructions issued by them.

Product classifications

Uniclass UK

Pr_25_71_63_66 Polyisocyanurate (PIR) foam boards

CAWS

E20 200, K11 115, K11 125, K11 135, K11 145, K11 215, K11 225, K11 235, K11 245, M10 290, M13 260 and P10 250 (Standard and Intermediate)
E20 30, K11 20, K11 25, M10 40 and P10 10 (Minor Works)

Details also available at **source.thenbs.com**.

Building Information Modelling (BIM)

Kingspan Insulation's BIM objects can be downloaded in Revit and in IFC formats. For more information please visit **www.kingspaninsulation.co.uk/bim**.

Design standards

Consideration should be given to the recommendations of BS 8102: 2022 (Code of practice for protection of buildings against water from the ground), BS 8215: 1991 (Code of practice for design and installation of damp proof courses in masonry construction), and the information given in Building Research Establishment Digest 104 (Floor Screeds).

Compressive loads

Un-reinforced floor screeds can be used in conjunction with Kingspan Thermafloor® TF70 in most applications. The compressive strength of Kingspan Thermafloor® TF70 offers considerable advantages over some other floor insulants. Providing a minimum compressive strength of 140 kPa at 10% compression allows greater floor loads to be considered and therefore additional scope in the use of Kingspan Thermafloor® TF70. However, where floor loads are to be excessive, consideration should be given to the use of Kingspan GreenGuard® extruded polystyrene insulation which has greater compressive strength. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover).

Substrate

Kingspan Thermafloor® TF70 is not recommended for use in direct contact with subsoil and must be used over a DPM.

Lightning protection

Building designers should give consideration to the requirements of BS EN 62305-1: 2011 (Protection against lightning).

Design considerations

Underfloor heating systems

The constructions shown in the Typical Constructions and Uvalues section can be readily converted to accommodate underfloor heating systems.

For a solid concrete floor, the position of the insulation is important in either exposing the thermal mass of the concrete floor to the heat provided by the system, or isolating the thermal mass from it.

For a 24 hour heating cycle, allowing the heat from the underfloor heating system to penetrate the concrete slab will provide a more even heating regime over a 24 hour period (Figure 10).

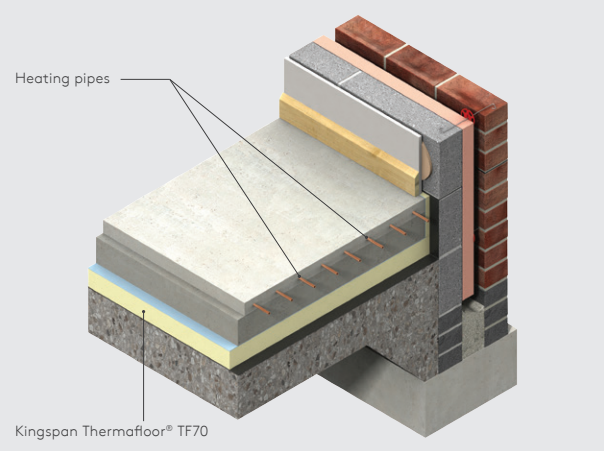


Figure 10 - 24 Hour heating applications - below the floor slab

For intermittent heating applications, where a fast response time is required, it is beneficial to have less thermal mass available to take up heat from the system and so placing the insulation layer below the screed (Figure 11) or timber floor (Figure 12) but above the concrete slab or beam and block floor (Figure 13) is the best solution.

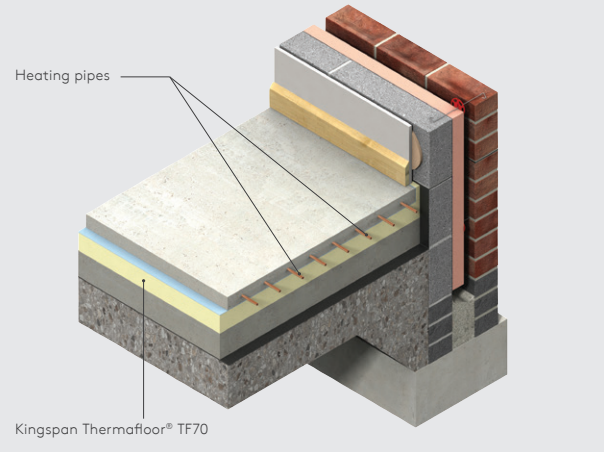


Figure 11 - Intermittent heating applications - below the floor screed

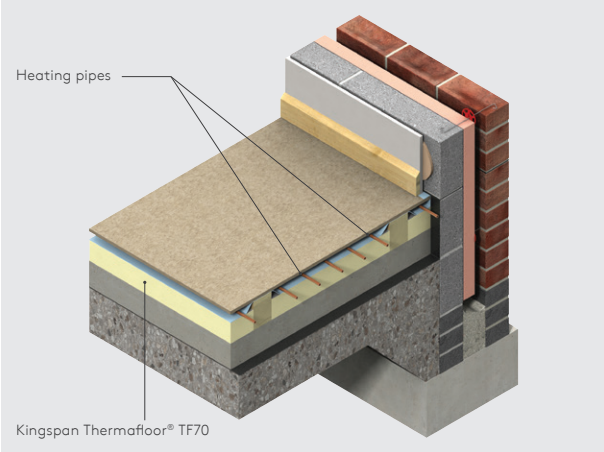


Figure 12 - Intermittent heating applications - timber floor on battens

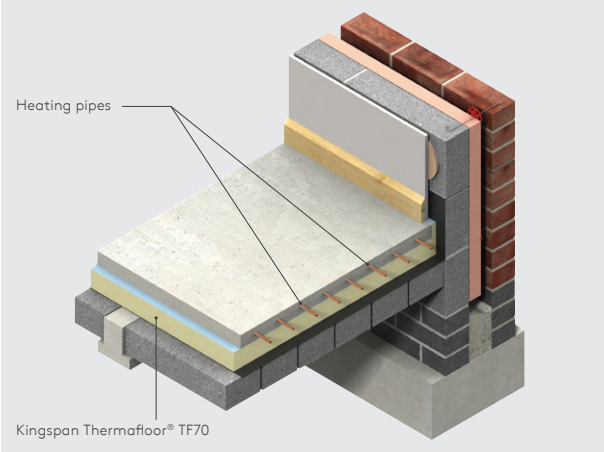


Figure 13 - Intermittent heating applications - beam and block floor

Underfloor heating systems can also be accommodated in suspended timber floors. This arrangement has low thermal mass and so is more suited to intermittent heating cycle applications (Figure 14).

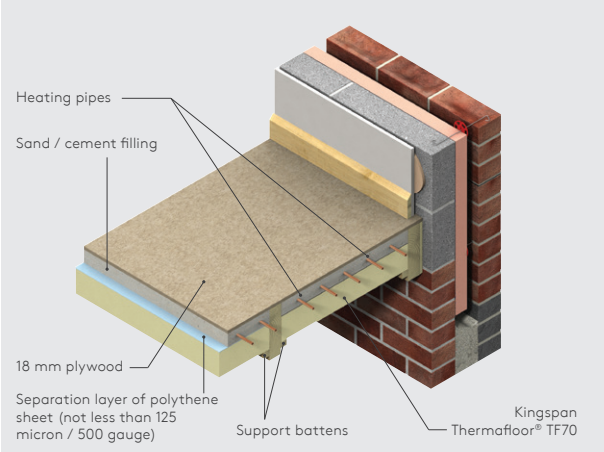


Figure 14 - Intermittent heating applications - suspended timber floor

Sitework

Installation below a floor slab

- The site should be prepared and foundations, where appropriate, built to damp proof course (DPC) level.
- A thin sand blinding may be used to achieve a continuous level surface, free from projections, over rolled hardcore.
- The damp proof membrane (minimum 300 micron / 1200 gauge polythene) should be laid with joints well lapped and folded, to prevent the passage of ground water, over well compacted hardcore, prior to laying the insulation boards.
- The membrane should be brought up the surrounding foundation walls until it is sufficiently above the height of the wall DPC so that it will connect with or form the DPC.
- The insulation boards should always be loose-laid break-bonded, with joints lightly butted.
- If two layers of insulation are required, they should be horizontally offset relative to each other so that, as far as possible, the board joints in the two adjacent layers do coincide with each other (see Figure 15).

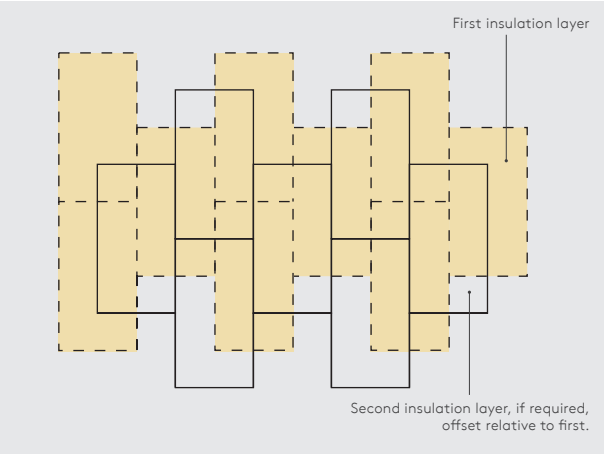


Figure 15 - Offsetting of multiple insulation yayers

- A strip of the insulation board (minimum 25 mm thick) should be placed vertically around the perimeter of the floor slab in order to prevent cold bridging. The top of the strip of insulation board should be level with the top of the floor screed and the bottom should be level with the bottom of the horizontal floor insulation, and closely butted up to it.
- Insulation boards should be overlaid with a polythene sheet (not less than 125 micron / 500 gauge), to prevent the wet concrete penetrating the joints between the boards, and to act as a vapour control layer. Ensure the polythene sheet has 150 mm overlaps, taped at the joints, and is turned up 100 mm at the walls.
- The subsequent installation of the concrete slab and screed or other flooring material is carried out in a manner similar to that for an un-insulated floor. The concrete slab and screed should be allowed to dry out prior to the installation of the floor finish.

Installation below a floor screed

- Concrete slabs should be allowed to dry out fully prior to the installation of the insulation boards (average 1 day per mm of slab thickness).
- The surface of the slab should be smooth, flat and free from projections. Beam and block floors should be level and grouted. Rough cast slabs should be levelled using a thin sand blinding to ensure boards are continuously supported.
- The damp proof membrane (minimum 300 micron / 1200 gauge polythene) should be laid with joints well lapped and folded, to prevent the passage of ground water, over the concrete floor slab, or beam and block floor, prior to laying the insulation boards.
- The membrane should be brought up the surrounding foundation walls until it is sufficiently above the height of the wall DPC so that it will connect with or form the DPC.
- The insulation boards should always be loose-laid break-bonded, with joints lightly butted.
- If two layers of insulation are required, they should be horizontally offset relative to each other so that, as far as possible, the board joints in the two adjacent layers do not coincide with each other (see Figure 15).
- A strip of the insulation board (minimum 25 mm thick) should be placed vertically around the perimeter of the floor slab in order to prevent cold bridging. The top of the strip of insulation board should be level with the top of the floor screed and the bottom should be level with the bottom of the horizontal floor insulation, and closely butted up to it.
- Insulation boards should be overlaid with a polythene sheet (not less than 125 micron / 500 gauge), to prevent the wet screed penetrating the joints between the boards, and to act as a vapour control layer. Ensure the polythene sheet has 150 mm overlaps, taped at the joints, and is turned up 100 mm at the walls.
- Use sand and cement screed laid to a minimum thickness of 65 mm for domestic construction and 75 mm elsewhere. Please refer to BS 8204 for guidance on screed specification and installation.

Installation in a suspended timber floor

Installation from above the floor joists

- The installation of Kingspan Thermafloor® TF70 in suspended floor constructions should be carried out before commencement of floor boarding.
- In order to ensure insulation boards are flush with the top surface of the joists, they should be supported on miminum 25 mm x 25 mm treated softwood timber battens, proprietary galvanised steel saddle clips, or galvanised nails partially driven into the side of the joists.
- Battens / nails should be placed at an appropriate height to suit the thickness of board being fitted, and nails should remain 40 mm proud of the joist.

- The insulation boards should then be fitted between the joists so that they are supported by the battens, saddle clips or nails.
- The insulation boards should be cut to fit snugly between the floor joists. Measure the distance between the joists prior to cutting the boards as spacings can vary.
- If two layers of insulation are required, they should be horizontally offset relative to each other so that, as far as possible, the board joints in the two adjacent layers do not coincide with each other.
- All board joints should be tightly butted.
- Ensure that insulation boards are fitted tightly between the joists, and any gaps are filled with expanding urethane sealant.
- Any narrow gaps between a joist and perimeter wall should be insulated by specially cut pieces of board which in turn should be supported on blocks nailed to the underside of the joists. Gaps less than 25 mm wide should be filled with expanding urethane sealant.
- Kingspan Thermafloor® TF70 is not suitable for installation directly over timber joists.

Installation from below the floor joists

- Floor boards should be fixed over joists prior to fitting Kingspan Thermafloor® TF70 from below.
- Push the cut insulation boards between the joists so they are flush with the underside of the floor boards.
- The insulation boards should be cut to fit snugly between the floor joists. Measure the distance between the joists prior to cutting the boards as spacings can vary.
- If two layers of insulation are required, they should be horizontally offset relative to each other so that, as far as possible, the board joints in the two adjacent layers do not coincide with each other.
- All board joints should be tightly butted.
- Ensure that insulation boards are fitted tightly between the joists, and any gaps are filled with expanding urethane sealant.
- Side-nail 25 mm x 25 mm timber battens to the joists or partially drive galvanised nails into the side of the joists in the appropriate position to hold the boards in place.
- Any narrow gaps between a joist and perimeter wall should be insulated by specially cut pieces of board which in turn should be supported on blocks nailed to the underside of the joists. Gaps less than 25 mm wide should be filled with expanding urethane sealant.

Installation between battens under a timber floor

- Concrete slabs should be allowed to dry out fully prior to the installation of the insulation boards (average 1 day per mm of slab thickness).
- The surface of the slab should be smooth, flat and free from projections. Beam and block floors should be level and grouted. A thin layer of cement / sand mortar, a levelling screed, or a proprietary levelling compound can be used to achieve a level surface, and provide continuous bearing support to the battens, if required. This should be allowed to set, harden and dry (approximately 1 day per mm) before proceeding further.
- If there is no damp proof membrane in the concrete floor, one (minimum 300 micron / 1200 gauge polythene) should be laid with joints well lapped and folded, to prevent the passage of ground water, over the concrete floor slab, or beam and block floor, prior to installing the battens.
- The membrane should be brought up the surrounding foundation walls until it is sufficiently above the height of the wall DPC so that it will connect with or form the DPC.
- Ensure battens are of the appropriate thickness, so that the insulation boards finish flush with their top surface (unless an underfloor heating system is to be used).
- The battens should be mechanically fixed down in accordance with the fixing manufacturer's instructions.
- The insulation boards should be cut to fit snugly between the 50 mm wide treated softwood timber battens. Measure the distance between the battens prior to cutting the boards as spacings can vary.
- All board joints should be tightly butted.
- Ensure that insulation boards are fitted tightly between battens, and any gaps are filled with expanding urethane sealant.
- Any narrow gaps between battens and perimeter wall should be insulated by specially cut pieces of board. Gaps less than 25 mm wide should be filled with expanding urethane sealant.
- Insulation boards and battens should be overlaid with a vapour control layer of polythene sheet (not less than 125 micron / 500 gauge), prior to installing the floor. Ensure the polythene sheet has 150 mm overlaps, taped at the joints, and is turned up 100 mm at the walls.

Installation below a floating timber floor

- Concrete slabs should be allowed to dry out fully prior to the installation of Kingspan Thermafloor® TF70 (average 1 day per mm of slab thickness).
- The surface of the slab should be smooth, flat and free from projections. Beam and block floors should be level and grouted. In accordance with BRE Good Building Guide 28 Part 1 (Domestic floors: construction insulation and damp-proofing), irregularities should not exceed 5 mm when measured with a 3 metre straight edge.

Sitework

- A thin layer of cement / sand mortar, a levelling screed, or a proprietary levelling compound can be used to achieve a level surface, if required. This should be allowed to set, harden and dry (approximately 1 day per mm) before proceeding further.
- If there is no damp proof membrane in the concrete floor, one (minimum 300 micron / 1200 gauge polythene) should be laid with joints well lapped and folded, to prevent the passage of ground water, over the concrete floor slab, or beam and block floor, prior to installing the insulation boards.
- The membrane should be brought up the surrounding foundation walls until it is sufficiently above the height of the wall DPC so that it will connect with or form the DPC.
- To comply with NHBC recommendations, preservative treated softwood timber battens should be positioned at doorways, access panels and to support partitions. The size of the battens selected should ensure that, when installed, the top surface of the insulation boards are flush with the top of the battens.
- The insulation boards should always be loose-laid break-bonded, with joints lightly butted.
- Insulation boards should be overlaid with a polythene sheet (not less than 250 micron / 1000 gauge), to act as a slip layer, and a vapour control layer. Ensure the polythene sheet has 150 mm overlaps, taped at the joints, and is turned up 100 mm at the walls.
- Timber floor boards e.g. tongue-and-groove 18 mm thick plywood, should then be laid over the insulation and battens with staggered cross-joints in accordance with DD ENV 12872 : 2000.
- An expansion gap of 2 mm per metre run of floor, or a minimum of 10 mm overall, whichever is the greater, should be provided between the floor boards and the perimeter walls.
- Where there are long (over 5 metres), uninterrupted lengths of timber floor boards, proprietary intermediate expansion joints should be installed on the basis of a 2 mm gap per metre run.
- Before the timber floor boards are interlocked, apply a continuous bead of waterproof wood grade PVA adhesive to the top and bottom of the tongue and groove joints.
- Once the timber floor boards have been laid, temporary wedges should be inserted between the walls and the floor, to maintain tight joints, until the adhesive has set.
- Once the wedges are removed, they are replaced with strips of cork or polyethylene foam to act as a compressible filler and to help prevent cold bridging. Skirtings may then be fixed.

Wheeled / foot traffic

- Ensure boards are protected during installation from wheeled / foot traffic by using scaffold planks or other protective measures.

Underfloor heating systems

- Please refer to the instructions of the specific underfloor heating system manufacturer.

General

Cutting

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

Daily working practice

- At the completion of each day's work, or whenever work is interrupted for extended periods of time, board edges and joints should be protected from inclement weather.

Availability

- Kingspan Thermafloor® TF70 is available through specialist insulation distributors and selected builders' merchants throughout the UK and Ireland.

Packaging and storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Ideally, boards should be stored inside a building. If, however, outside storage cannot be avoided, then the boards should be stacked clear of the ground and covered with an opaque polythene sheet or weatherproof tarpaulin. Boards that have been allowed to get wet should not be used.

Health and safety

- Kingspan Insulation products are chemically inert and safe to use.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website **www.kingspaninsulation.co.uk/safety** or **www.kingspaninsulation.ie/safety**.

Please note that the reflective surfaces on this product are designed to enhance its thermal performance. As such, they will reflect light as well as heat, including ultraviolet light. Therefore, if this product is being installed during very bright or sunny weather, it is advisable to wear UV protective sunglasses or goggles, and if the skin is exposed for a significant period of time, to protect the bare skin with a UV block sun cream.

The reflective facings used on this product can be slippery when wet. Therefore, it is recommended that any excess material should be contained to avoid a slip hazard.

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

Product details

The facings

Kingspan Thermafloor® TF70 is faced on both sides with a low emissivity composite foil, autohesively bonded to the insulation core during manufacture.

The core

The core of Kingspan Thermafloor® TF70 is manufactured with Nilflam® technology, a high performance fibre-free rigid thermoset polyisocyanurate (PIR) insulant manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Standards & approvals

Kingspan Thermafloor® TF70 is manufactured to the highest standards in accordance with BS EN 13165: 2012 + A2: 2016 (Thermal insulation products for buildings. Factory made rigid polyurethane foam (PU) products. Specification).

Kingspan Thermafloor® TF70 is also manufactured under a management system certified to ISO 9001: 2015 (Quality Management System), ISO 14001: 2015 (Environmental Management System), ISO 45001: 2018 (Occupational Health and Safety Management System) and ISO 50001: 2018 (Energy Management System).

The use of Kingspan Thermafloor® TF70 (in thicknesses of 20 - 150 mm) produced at Kingspan Insulation's Pembridge, Herefordshire and Selby, North Yorkshire manufacturing facilities is covered by BBA Certificate 14/5133, and that produced at Kingspan Insulation's Castleblayney manufacturing facility (in thicknesses of 25 - 150 mm) by NSAI Agrément Certificate 03/0196.

Standard dimensions

Kingspan Thermafloor® TF70 is available in the following standard size:

Nominal dimension		Availability
Length	(m)	2.4
Width	(m)	1.2
Insulant Thickness	(mm)	Refer to local distributor or Kingspan Insulation price list for current stock and non-stock sizes.

Compressive strength

The compressive strength of Kingspan Thermafloor® TF70 typically exceeds 140 kPa at 10% compression, when tested to BS EN 826: 2013 (Thermal insulating products for building applications. Determination of compression behaviour).

Water vapour resistance

The product achieves a resistance higher than 100 MNs/g, when tested in accordance with BS EN 12086: 2013 (Thermal insulating products for building applications. Determination of water vapour transmission properties).

Durability

If correctly installed, Kingspan Thermafloor® TF70 can have an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

Resistance to solvents, fungi & rodents

The insulation core is resistant to short-term contact with petrol and with most dilute acids, alkalis and mineral oils. However, it is recommended that any spills be cleaned off fully before the boards are installed. Ensure that safe methods of cleaning are used, as recommended by the suppliers of the spilt liquid. The insulation core is not resistant to some solvent–based adhesive systems, particularly those containing methyl ethyl ketone. Adhesives containing such solvents should not be used in association with this product. Damaged boards or boards that have been in contact with harsh solvents or acids should not be used.

The insulation core and facings used in the manufacture of Kingspan Thermafloor® TF70 resist attack by mould and microbial growth, and do not provide any food value to vermin.

Fire performance

For guidance regarding the routes to compliance for meeting the Building Regulations / Standards, refer to the relevant Technical Bulletins and links to Government websites at **www.kingspaninsulation.co.uk/fireregulations.**

Under System 4 AVCP, Kingspan Thermafloor® TF70 has a Euroclass rating of F.

Further details on the fire performance of Kingspan Insulation products may be obtained from the Kingspan Insulation Technical Service Department (see rear cover).

Product details

Thermal properties

The λ-values and R-values detailed below are quoted in accordance with BS EN 13165: 2012 + A2: 2016 (Thermal insulation products for buildings. Factory made rigid polyurethane foam (PU) products. Specification).

Thermal conductivity

The boards achieve a thermal conductivity (λ-value) of 0.022 W/mK.

Thermal resistance

Thermal resistance (R-value) varies with thickness and is calculated by dividing the thickness of the board (expressed in metres) by its thermal conductivity. The resulting number is rounded down to the nearest 0.05 (m^2K/W).

Insulant thickness (mm)	Thermal resistance (m^2K/W)
20	0.90
25	1.10
30	1.35
40	1.80
50	2.25
60	2.70
70	3.15
75	3.40
80	3.60
90	4.05
100	4.50
110	5.00
120	5.45
125	5.65
130	5.90
140	6.35
150	6.80

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

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