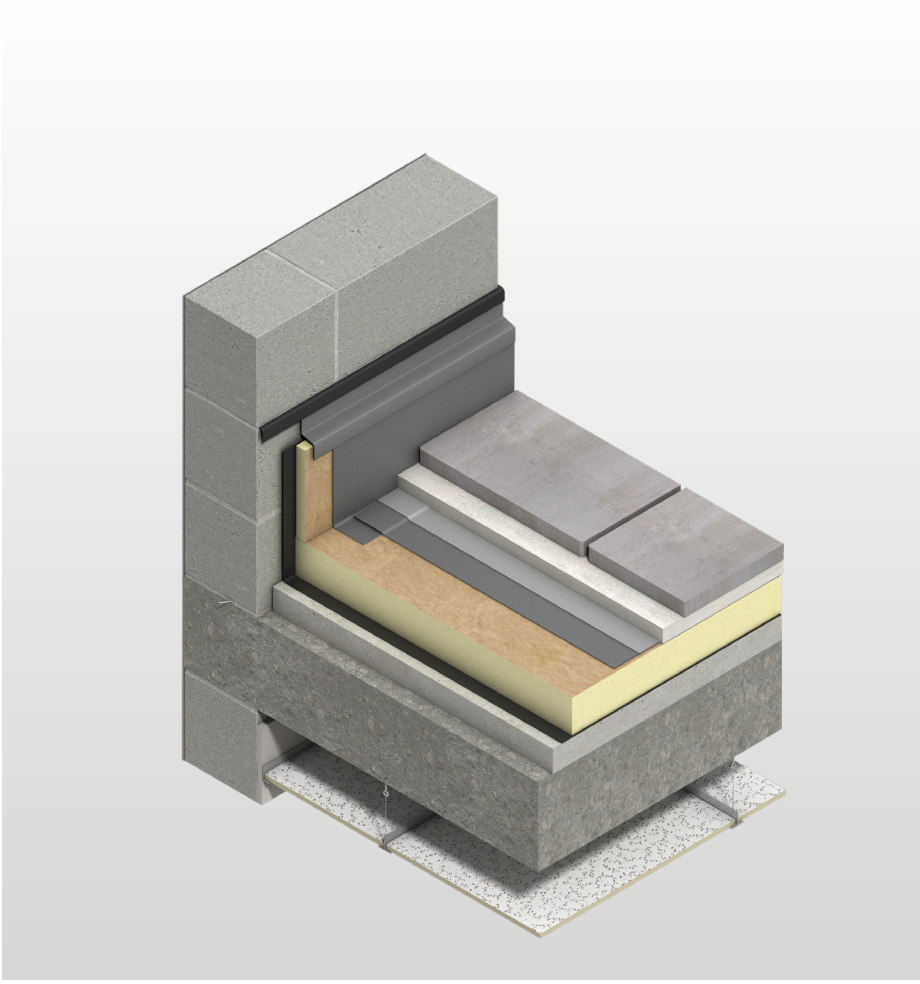
Insulation

# Therma™ TR27

## Insulation for Flat Roofs Waterproofed with Fully Adhered Single–Ply and Cold Liquid Applied Waterproofing



- Rigid thermoset insulation
- Fully compatible with most fully adhered single-ply waterproofing systems
- Ideal with most green roof systems
- Easy to handle and install
- Ideal for new build and refurbishment
- Manufactured with a blowing agent that has zero ODP (contains no CFC and HCFC) and GWP ≤5

Fibre-free Core

PRODUCT CONFORMITY

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 6946: 2017 (Building components and building elements. Thermal resistance and thermal transmittance. 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.

## Concrete Deck

### Dense Concrete Deck with Dropped Ceiling

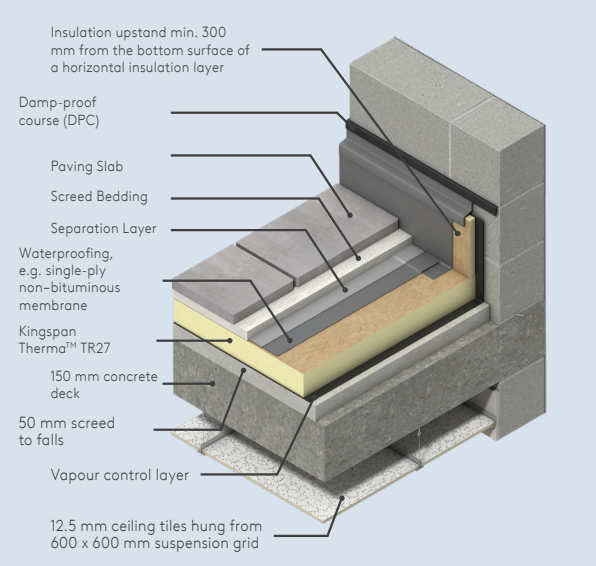



Figure 1

| U-values (W/m²·K) for Various Thicknesses of Kingspan Therma™ TR27 with Fully Adhered Single Ply/Cold Liquid Applied Waterproofing Systems | |
|---|---|
| Insulant Thickness (mm) | U-values (W/m²·K) |
| 50 | 0.39 |
| 60 | 0.33 |
| 70 | 0.29 |
| 80 | 0.26 |
| 90 | 0.23 |
| 100 | 0.21 |
| 110 | 0.19 |
| 120 | 0.18 |
| 130 | 0.16 |
| 140 | 0.15 |
| 150 | 0.14 |
| 80 + 80 | 0.13 |
| 80 + 90* | 0.12 |

Table 1: Thicknesses of Kingspan Therma™ TR27, installed within the construction shown in the image above to meet the associated U-value.
*Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

## Metal Deck

### Metal Deck with No Ceiling

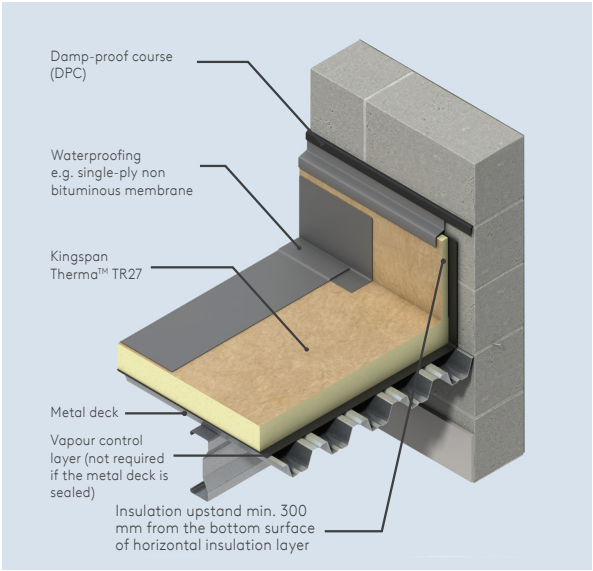



Figure 2

| U-values (W/m²·K) for Various Thicknesses of Kingspan Therma™ TR27 with Fully Adhered Single Ply/Cold Liquid Applied Waterproofing Systems | |
|---|---|
| Insulant Thickness (mm) | U-values (W/m²·K) |
| 50 | 0.41 |
| 60 | 0.35 |
| 70 | 0.30 |
| 80 | 0.26 |
| 90 | 0.24 |
| 100 | 0.21 |
| 110 | 0.19 |
| 120 | 0.18 |
| 130 | 0.17 |
| 140 | 0.15 |
| 150 | 0.14 |
| 80 + 80 | 0.13 |
| 80 + 90* | 0.12 |

Table 2: Thicknesses of Kingspan Therma™ TR27, installed within the construction shown in the image above to meet the associated U-value.
*Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

# Typical Constructions and U-values

## Green Roof Systems

### Extensive Green Roof Covering – Metal Deck with No Ceiling

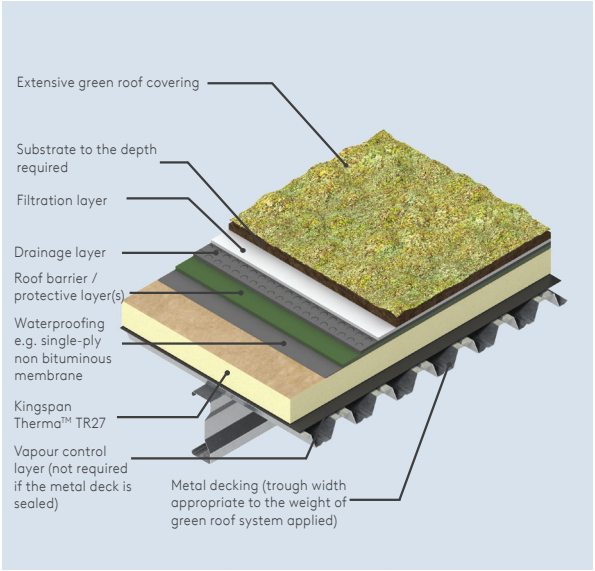



Figure 3

| U-values (W/m²·K) for Various Thicknesses of Kingspan Therma™ TR27 with Fully Adhered Single Ply/Cold Liquid Applied Waterproofing Systems | |
|---|---|
| Insulant Thickness (mm) | U-values (W/m²·K) |
| 50 | 0.41 |
| 60 | 0.35 |
| 70 | 0.30 |
| 80 | 0.26 |
| 90 | 0.24 |
| 100 | 0.21 |
| 110 | 0.19 |
| 120 | 0.18 |
| 130 | 0.17 |
| 140 | 0.15 |
| 150 | 0.14 |
| 80 + 80 | 0.13 |
| 80 + 90* | 0.12 |

Table 3: Thicknesses of Kingspan Therma™ TR27, installed within the construction shown in the image above to meet the associated U-value.
*Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

## Semi–intensive Green Roof Covering – Dense Concrete Deck with No Ceiling

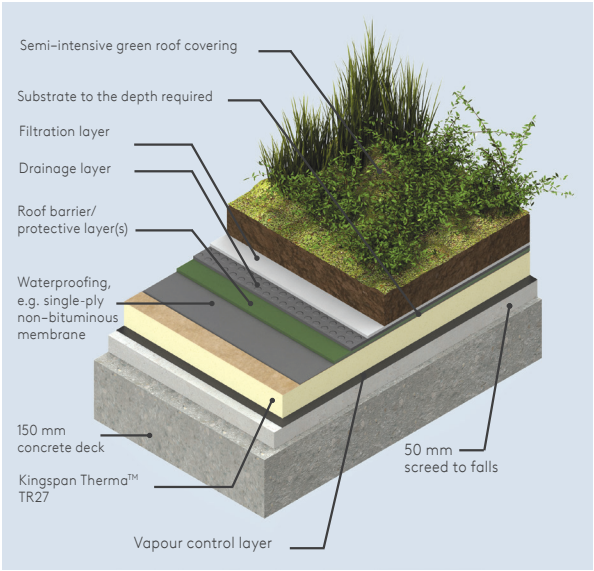



Figure 4

| U–values (W/m²·K) for Various Thicknesses of Kingspan Therma™ TR27 with Fully Adhered Single Ply/Cold Liquid Applied Waterproofing Systems | |
|---|---|
| Insulant Thickness (mm) | U–values (W/m²·K) |
| 50 | 0.39 |
| 60 | 0.33 |
| 70 | 0.29 |
| 80 | 0.26 |
| 90 | 0.23 |
| 100 | 0.21 |
| 110 | 0.19 |
| 120 | 0.18 |
| 130 | 0.16 |
| 140 | 0.15 |
| 150 | 0.14 |
| 80 + 80 | 0.13 |
| 80 + 90* | 0.12 |

Table 4: Thicknesses of Kingspan Therma™ TR27, installed within the construction shown in the image above to meet the associated U-value.
*Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.

# Design Considerations

## Linear Thermal Bridging

Linear thermal bridging describes the heat loss / gain that occurs at junctions between elements e.g. where an external wall meets the roof, or at junctions around openings in the building fabric where the thermal insulation layer is discontinuous e.g. sills, jambs and lintels.

Interruptions within the insulation layer by materials with poorer insulating properties can result in a thermal bridge, which in turn can lead to problems of condensation and mould growth, especially if there is a drop in surface temperature.

The heat flow at these junctions and opening locations, over and above that through the adjoining plane elements, is the linear thermal transmittance of the thermal bridge: measured in W/mK; referred to as a 'psi-value'; and expressed as a 'ψ-value'.

The lower the ψ-value, the better the performance. ψ-values are taken into account in the calculation methodologies e.g. the Standard Assessment Procedure (SAP), that are used to assess the operational CO2 emissions and, where applicable, the fabric energy efficiency of buildings, primary energy or delivered energy rates.

ψ-values can comprise either, or a combination of, calculated and assumed values.

### Responsible Manufacturing

Kingspan Therma™ TR27 is manufactured under a management system certified to ISO 9001: 2015, ISO 14001: 2015, ISO 45001:2018 and ISO 37301:2021.

## Sustainability & Responsibility

Kingspan Insulation has a long–term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; and as a substantial landholder.

## Specification Clause

Kingspan Therma™ TR27 should be described in specifications as:–

The roof insulation shall be Kingspan Therma™ TR27 ____mm thick: comprising a fibre–free rigid thermoset insulation core faced on both sides with a coated glass tissue facing. The product shall be manufactured: with a blowing agent that has zero Ozone Depletion Potential (ODP) and Global Warming Potential (GWP) ≤5; under a management system certified to ISO 9001: 2015, ISO 14001: 2015, ISO 45001: 2018, ISO 37301:2021; by Kingspan Insulation and installed in accordance with the instructions issued by them.

## Wind Loading

Wind loadings should be assessed in accordance with BS EN 1991-1-4: 2005 + A1: 2010 (National Annex to Eurocode 1 Actions on Structures. General Actions. Wind Actions) taking into account:

- length/width/height of the building;
- orientation of the building;
- wind speed;
- aspect (e.g. on a hillside); and
- topographical value of the surrounding area.

## Falls

The fall on a flat roof, constructed using Kingspan Therma™ TR27, is normally provided by the supporting structure being directed towards the rainwater outlets. The fall should be smooth and steep enough to prevent the formation of rainwater ponds. In order to ensure adequate drainage, BS 6229: 2018 (Flat roofs with continuously supported coverings. Code of practice) recommends uniform gradients of not less than 1 in 80. However, because of building settlement, it is advisable to design in even greater falls. These can be provided by a Kingspan Thermataper™ tapered roofing system (see below).

# Design Considerations

## Tapered Roofing

Kingspan Therma™ TR27 is also available in a tapered version, Kingspan Therma™ TT47, comprising a fibre–free rigid thermoset insulation core, manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP), faced on both sides with a coated glass tissue facing.

### The Problem

There are many critical factors which must be taken into consideration when designing a flat roof construction. Two of these factors, insulation and rainwater runoff, can be addressed with one product range: Thermataper™ from Kingspan Insulation.

### The Solution

Kingspan Therma™ TT47 Systems have been developed to help solve these problems. Kingspan Therma™ TT47 Systems comprise tapered Insulation boards, flat packer boards, pre– mitred hip and valley boards and a tapered roofing design service. Kingspan Therma™ products are designed: for use under most waterproofing membranes; to provide required roof falls, and to provide insulation to meet the requirements of Building Regulations/Standards.

### The Benefits

Simpler - on new roofs, the use of a Kingspan Therma™ TT47 System eliminates the need to incorporate a fall into the design of the roof deck. On existing roofs, a Kingspan Therma™ TT47 and a new waterproofing membrane can be laid on top of the original waterproofing. This eliminates the need for stripping down the roof to deck level, and the provision of a vapour control layer may not be required.

NB The existing insulation/substrate and waterproofing must be sound, in order to provide a satisfactory surface for the Kingspan Thermataper™ Systems, and the risk of interstitial condensation must be fully assessed.

Quicker - Kingspan Thermataper™ Systems avoid a wet trade and do not need time to dry out, saving time in the scheduling of a construction project.

Lighter - Kingspan Thermataper™ Systems are also a lighter weight alternative to screeding, and they do not present the risk of an overloaded structure due to excessive screed depths.

Less waste - pre–mitred boards reduce waste from the installation process. Insulation boards are cut in half by Kingspan Insulation in its factory to make mitred hip and valley boards.

These are single picked to match the tapered system design so as to reduce waste from cutting hips and valleys on site. Both (hip and valley) halves of the cut board are used, and the only waste is the dust generated by sawing. Whereas, when boards are cut on-site, up to 50% of the cut boards could be wasted, depending on the particulars of the specific board layout and falls design.

### Design Services

Kingspan Therma™ TT47 Systems come with supporting design service. This ensures that the most cost-effective solution for a roof is identified and that the end result is a tapered system design which meets the roof's rainwater runoff and insulation requirements.

Further details of Kingspan Therma™ TT47 are available from Kingspan Insulation and should be consulted as early as possible in the process of designing a roof.

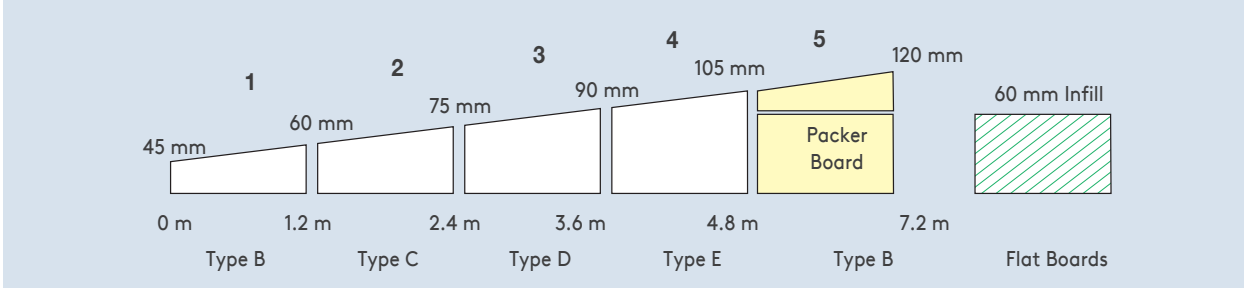



Figure 5

# Design Considerations

## Roof Waterproofing

Kingspan Therma™ TR27 is suitable for use with most fully adhered single–ply waterproofing membranes. When using Kingspan Therma™ TR27 with fully adhered single–ply waterproofing membranes, the joints between boards and cut edges, immediately below the waterproofing membrane, must be taped with a min. 50 mm wide foil tape. Please contact Kingspan Insulation to check waterproofing membrane and proprietary adhesive system compatibility. Advice should be sought, from the appropriate waterproofing membrane manufacturer, in relation to the requirement for the use of a fleece-backed membrane with the waterproofing membrane in question.

Kingspan Therma™ TR27 is also suitable for use with some cold liquid applied waterproofing systems. When using Kingspan Therma™ TR27 with cold liquid applied waterproofing systems, a carrier membrane for the waterproofing must be installed over the insulation boards. Advice should be sought, from the waterproofing system manufacturer, about the specification of the carrier membrane and the compatibility of the waterproofing system with Kingspan Therma™ TR27. For further advice, please contact Kingspan Insulation.

NB Kingspan Therma™ TR27 is also suitable for use with mechanically fixed single–ply waterproofing membranes.

## Water Vapour Control

Kingspan Therma™ TR27 should be installed over a separate vapour control layer, in new build roofs, unless it is being used in conjunction with a sealed metal deck. Regardless of the deck type, it is recommended that a condensation risk analysis is carried out for every project.

For refurbishment projects, involving the addition of insulation to existing insulated flat roofs, or roofs constructed of insulated steel faced composite panels, it is imperative that a U–value calculation and condensation risk analysis is carried out for every project, in order to ensure that the correct thickness of insulation is installed to achieve the required thermal performance, whilst avoiding interstitial condensation.

In refurbishment projects, where Kingspan Therma™ TR27 is to be installed over an existing bituminous waterproofing membrane, the membrane can be used as a vapour control layer, as long as it is in a good watertight condition. Where this is not the case, a separate vapour control layer should be installed.

The type of separate vapour control layer required will be dependent upon the chosen method of fixing the insulation boards.

For mechanically fixed applications, a minimum vapour control layer should consist of a 1000 gauge (250 microns) polythene sheet, with all joints lapped and then sealed with double-sided self-adhesive tape.

Where the separate vapour control layer is to be bonded, allowance should be made for adequate bonding of the vapour control layer to the substrate, so as to provide a suitable surface upon which to lay the insulation boards and sufficient resistance to wind uplift (see ‘Wind Loading’).

## Roof Loading / Traffic

Kingspan Therma™ TR27 is suitable for use on access roof decks subject to limited foot traffic.

Where inappropriate foot traffic is liable to occur, it is recommended that for roofs waterproofed with fully adhered single–ply or cold liquid applied waterproofing systems, the roof surface is protected by specially constructed walkways.

For further advice on the acceptability of specific foot traffic regimes, please contact Kingspan Insulation.

## Spanning on Metal Decks

Insulation boards should comply with the minimum thicknesses shown in the table below when used over metal decks with trough openings.

| Trough Opening (mm) | Minimum Insulant Thickness (mm) |
|---|---|
| ≤ 75 | 25 |
| 76–100 | 30 |
| 101–125 | 35 |
| 126–150 | 40 |
| 151–175 | 45 |
| 176–200 | 50 |
| 201–225 | 55 |
| 226–250 | 60 |

Table 5: Minimum thickness of Kingspan Therma™ TR27 when used over metal decks with trough openings.

## Green Roofs

Kingspan Therma™ TR27 is suitable for use under most green roof systems.

Green roof systems are a specialist design area. When designing a loose–laid insulated green roof assembly consideration needs to be given to the following.

Green roof systems are required to have a minimum dry weight of 80 kg/m2 to ballast the insulation boards beneath them. However, the total required dry weight will depend upon wind uplift, which in turn will vary with the geographical location of the building, local topography, and the height and width of the roof concerned. The necessity for any additional dry weight should be assessed in accordance with BS 6399–2: 1997 (Loading for Buildings. Code of practice for wind loads) or BS / I.S. EN 1991–1–4: 2005 (National Annex to Eurocode 1 Actions on structures. General Actions. Wind Actions).

When installing a loose–laid insulated green roof assembly, any insulation must be immediately overlaid with the green roof system, which must meet all of the requirements outlined above.

Where these requirements cannot be ensured, the insulation must be mechanically fixed (see Sitework). For further information, please contact Kingspan Insulation.

# Sitework

## Board Size Selection

- If consideration is being given to bonding Kingspan Therma™ TR27, either in hot bitumen or with the use of a suitable alternative proprietary adhesive system, it is recommended that 1.2 x 0.6 m boards or 1.2 x 1.2 m boards are used.
- All sizes of the board are suitable for mechanical fixing.

## Installing over Metal Decks

- Where an FM approved construction is required, please refer to 'FM Approval' on page 13.
- Metal decks should be clean, dry, without large projections, steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- If using a sealed metal deck there is no requirement for a separate vapour control layer.
- If the metal deck is not sealed, and the insulation boards are to be bonded down, in order to ensure an adequate bond between the metal deck and the vapour control layer, the metal deck should be suitably primed, in accordance with the primer manufacturer's instructions, prior to the application of the hot bitumen, or suitable alternative proprietary adhesive system, used to bond the vapour control layer to the deck.
- If the metal deck is not sealed, and the insulation boards are to be mechanically fixed, the vapour control layer should be loose–laid.
- Where one run of the specified vapour control layer laps another, there should be minimum 150 mm side and end overlaps, which should be adequately sealed.
- Turn up the vapour control layer at the edge of the roof to a height appropriate to the specified waterproofing membrane.
- Boards of Kingspan Therma™ TR27 should be secured to the deck using mechanical fixings, e.g. telescopic tube fasteners (see 'Mechanical Fixings').
- Alternatively, the insulation boards should be bonded down by laying into hot bitumen (max. temperature 240°C) mopped or poured over the vapour control layer / sealed metal deck, or with the use of a suitable alternative proprietary adhesive system.
- Insulation boards should always be laid break–bonded, either with their long edges at right angles to the trough openings, or diagonally across the corrugation line, and with joints lightly butted. There should be no gaps at abutments.
- Roof–light or ventilator kerbs etc. should always be insulated with the same thickness of Kingspan Therma™ TR27 as the general roof area.
- A 25 mm thick Kingspan Therma™ TR27 upstand should be used around the perimeter of the roof on the internal façade of parapets.
- A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

## Installing over Concrete Decks

- Concrete decks should be clean, dry, without large projections, steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- If the insulation boards are to be bonded down, in order to ensure an adequate bond between the vapour control layer and the concrete deck, the concrete or screeded surface should be suitably primed, in accordance with the primer manufacturer's instructions, prior to the application of the hot bitumen, or suitable alternative proprietary adhesive system, used to bond the vapour control layer to the deck.
- If the insulation boards are to be mechanically fixed, the vapour control layer should be loose–laid.
- Where one run of the specified vapour control layer laps another, there should be a minimum 150 mm side and end overlaps, which should be adequately sealed.
- Turn up the vapour control layer at the edge of the roof to a height appropriate to the specified waterproofing membrane.
- Boards of Kingspan Therma™ TR27 should be bonded down by laying into hot bitumen (max. temperature 240°C) mopped or poured over the vapour control layer, or with the use of a suitable alternative proprietary adhesive system.
- Alternatively, the insulation boards should be secured to the deck using mechanical fixings, e.g. telescopic tube fasteners (see 'Mechanical Fixings').
- Insulation boards should always be laid break–bonded, either with their long edges at right angles to the edge of, or diagonally across the roof, and with joints lightly butted. There should be no gaps at abutments.
- Roof–light or ventilator kerbs etc. should always be insulated with the same thickness of Kingspan Therma™ TR27 as the general roof area.
- A 25 mm thick Kingspan Therma™ TR27 upstand should be used around the perimeter of the roof on the internal façade of parapets.
- A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

# Sitework

## Installing over Existing Flat Roofs

- The existing waterproofing membrane surface should be clean, dry, without large projections, steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- Where the existing waterproofing membrane is not fit for purpose as a vapour control layer, and the new insulation boards are to be bonded down; a separate vapour control layer should be bonded to it with hot bitumen, or suitable alternative proprietary adhesive system. If the insulation boards are to be mechanically fixed, the vapour control layer should be loose–laid.
- Where one run of the specified vapour control layer laps another, there should be minimum a 150 mm side and end overlaps, which should be adequately sealed.
- Turn up the vapour control layer at the edge of the roof to a height appropriate to the specified new waterproofing membrane.
- Boards of Kingspan Therma™ TR27 should be bonded down by laying into hot bitumen (max. temperature 240°C) mopped or poured over the vapour control layer, or with the use of a suitable alternative proprietary adhesive system.
- Alternatively, the insulation boards should be secured to the deck using mechanical fixings, e.g. telescopic tube fasteners (see 'Mechanical Fixings').
- Insulation boards should always be laid break–bonded, either with their long edges at right angles to the edge of, or diagonally across the roof, and with joints lightly butted. There should be no gaps at abutments.
- Roof–light or ventilator kerbs etc. should always be insulated with the same thickness of Kingspan Therma™ TR27 as the general roof area.
- A 25 mm thick Kingspan Therma™ TR27 upstand should be used around the perimeter of the roof on the internal façade of parapets.
- A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

## Installing over Existing Composite Panel Roofs

- If the existing profile provides inadequate support for the insulation boards, the existing roof should be over–boarded, e.g. with plywood, prior to their installation.
- Boards of Kingspan Therma™ TR27 should be secured to the deck using mechanical fixings. Please refer to Kingspan Insulation for advice on fixing specification.
- Insulation boards should always be laid break–bonded and with joints lightly butted. There should be no gaps at abutments.

  If the existing roof has been over–boarded, then insulation boards should be laid with their long edges at right angles to the edge of, or diagonally across the roof. If not, they should be laid either with their long edges at right angles to the trough openings or diagonally across the corrugation line.
- Roof–light or ventilator kerbs etc. should always be insulated with the same thickness of Kingspan Therma™ TR27 as the general roof area.
- The waterproofing membrane is installed in accordance with the membrane manufacturer's instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

## Mechanical Fixings

- The number of mechanical fixings required to fix Kingspan Therma™ TR27 will vary with the geographical location of the building, the local topography, and the height and width of the roof concerned along with the deck type.
- A minimum of 4 fixings are required to secure 1.2 x 0.6 m boards of Kingspan Therma™ TR27 to the deck.
- A minimum of 5 fixings are required to secure 1.2 x 1.2 m boards of Kingspan Therma™ TR27 to the deck.
- A minimum of 6 fixings are required to secure 2.4 x 1.2 m boards of Kingspan Therma™ TR27 to the deck.
- The requirement for additional fixings should be assessed in accordance with BS 6399–2: 1997 (Loadings for buildings. Code of practice for wind loads) or BS / I.S. EN 1991–1.4: 2005 (National Annex to Eurocode 1. Actions on Structures, General Actions, Wind Actions).
- Mechanical fixings must be arranged in an even pattern.
- Fasteners at insulation board edges must be located > 50 and < 150 mm from edges and corners of the board and not overlap board joints.
- Please refer to page 11 for recommended fixing patterns.
- Each fixing should incorporate a square or circular plate washer (min. 50 x 50 mm or 50 mm diameter).
- If two layers of insulation are to be installed, the base layer should be mechanically fixed with minimum 1 No. fixing in the centre of the insulation board before fixing the top layer as described above.
- Where alternative mechanical fixing systems are specified, such as bar fixing systems, the specified system must give similar restraint to the insulation board as would be attained by the use of conventional telescopic tube fasteners.

# Sitework

## Installing in Two Layers

- In situations where two layers of insulation are required, both layers should be installed in the same manner, as detailed in the preceding sections. However, if mechanical fixing methods are to be employed, refer to 'Mechanical Fixings' for guidance on the number of fixings to be used in each layer.
- In all cases, the layers 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 6).

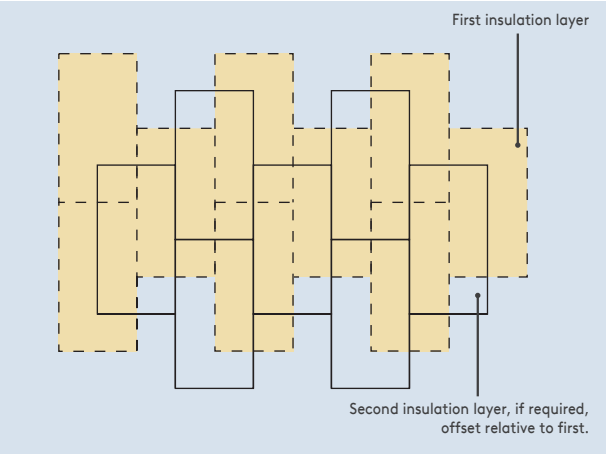



Figure 6

## General

### Following Trades

- The roof must be adequately protected when building works are being carried out on or over the roof surface. This is best achieved by close boarding. The completed roof must not be used for storage of heavy building components such as bricks or air conditioning equipment.

### Daily Working Practice

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

### 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.

### Availability

- Please contact Kingspan Insulation to enquire about the availability of Kingspan Therma™ TR27.

### 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

- Please refer MSDS, For more information contact Kingspan Insulation.

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

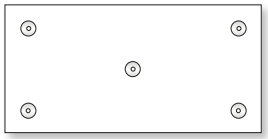
# Mechanical Fixing Patterns

## Recommended Fixing Patterns

The recommended fixing patterns for Kingspan Therma™ TR27 are shown below. The number of fixings necessary should be assessed in accordance with BS 6399–2: 1997 (Loadings for buildings. Code of practice for wind loads) or BS / I.S. EN 1991–1.4: 2005 (National Annex to Eurocode 1. Actions on structures, General Actions, Wind Actions).

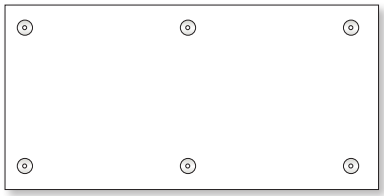
The images below show recommended fixing patterns, the number of fixings used and the resulting fixing density (number of fixings per m²).

4 No. per board
(1.2 x 0.6 m board – 5.55 fixings / m²)

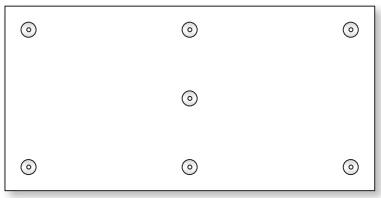


5 No. per board
(1.2 x 0.6 m board – 6.94 fixings / m²)
(1.2 x 1.2 m board – 3.47 fixings / m²)

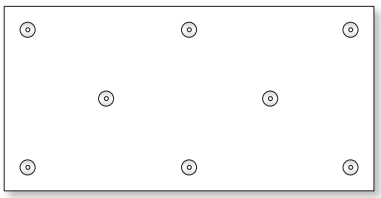
A minimum of 4 fixings are required to secure a 1.2 m x 0.6 m insulation board to the deck, a minimum of 5 fixings are required to secure a 1.2 x 1.2 m insulation board to the deck, and a minimum of 6 fixings are required to secure a 2.4 x 1.2 m insulation board to the deck. Therefore, of the two fixing patterns above, that on the left can only be applied for a 1.2 x 0.6 m insulation board and that on the right for a 1.2 x 0.6 m insulation board or a 1.2 x 1.2 m insulation board.



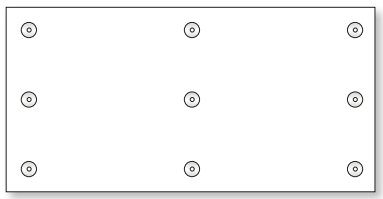
6 No. per board
(1.2 x 0.6 m board – 8.33 fixings / m²)
(1.2 x 1.2 m board – 4.16 fixings / m²)
(2.4 x 1.2 m board – 2.08 fixings / m²)



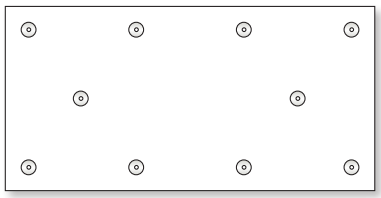
7 No. per board
(1.2 x 0.6 m board – 9.72 fixings / m²)
(1.2 x 1.2 m board – 4.86 fixings / m²)
(2.4 x 1.2 m board – 2.43 fixings / m²)



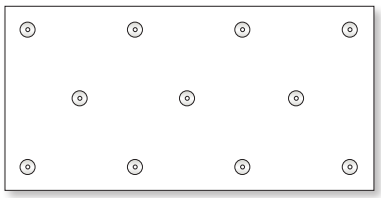
8 No. per board
(1.2 x 0.6 m board – 11.11 fixings / m²)
(1.2 x 1.2 m board – 5.55 fixings / m²)
(2.4 x 1.2 m board – 2.77 fixings / m²)



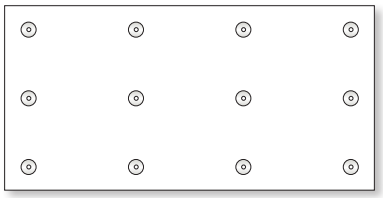
9 No. per board
(1.2 x 0.6 m board – 12.50 fixings / m²)
(1.2 x 1.2 m board – 6.25 fixings / m²)
(2.4 x 1.2 m board – 3.12 fixings / m²)



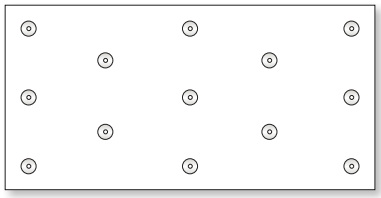
10 No. per board
(1.2 x 0.6 m board – 13.88 fixings / m²)
(1.2 x 1.2 m board – 6.94 fixings / m²)
(2.4 x 1.2 m board – 3.47 fixings / m²)



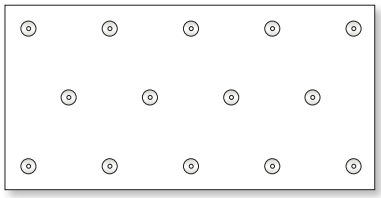
11 No. per board
(1.2 x 0.6 m board – 15.27 fixings / m²)
(1.2 x 1.2 m board – 7.63 fixings / m²)
(2.4 x 1.2 m board – 3.81 fixings / m²)



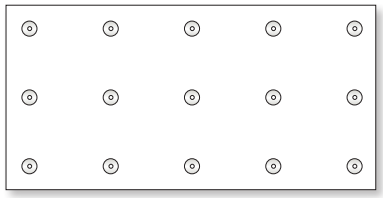
12 No. per board
(1.2 x 0.6 m board – 16.66 fixings / m²)
(1.2 x 1.2 m board – 8.33 fixings / m²)
(2.4 x 1.2 m board – 4.16 fixings / m²)



13 No. per board
(1.2 x 0.6 m board – 18.05 fixings / m²)
(1.2 x 1.2 m board – 9.02 fixings / m²)
(2.4 x 1.2 m board – 4.51 fixings / m²)



14 No. per board
(1.2 x 0.6 m board – 19.44 fixings / m²)
(1.2 x 1.2 m board – 9.72 fixings / m²)
(2.4 x 1.2 m board – 4.86 fixings / m²)



15 No. per board
(1.2 x 0.6 m board – 20.83 fixings / m²)
(1.2 x 1.2 m board – 10.41 fixings / m²)
(2.4 x 1.2 m board – 5.20 fixings / m²)

NB Mechanical fixings, e.g. telescopic tube fasteners, must be arranged in an even pattern. Fasteners at board edges must be located > 50 mm and < 150 mm from edges and corners of the board nd not overlap board joints.

# Product Details

## The Facings

Kingspan Therma™ TR27 is faced on both sides with a coated glass tissue, autohesively bonded to the insulation core during manufacture.

## The Core

The core of Kingspan Therma™ TR27 is of 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) ≤5.

## Standards and Approval

Kingspan Therma™ TR27 is manufactured to the highest standards 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 37301:2021 (Compliance Management System).

Kingspan Therma™ TR27 is approved by Dubai Central Laboratory

## Density

The apparent density of Kingspan Therma™ TR27 is 32 kg/m$^3$ when tested to BS EN 1602: 2013 (thermal insulating products for building application. Determination of the apparent density).

## Standard Dimensions

Kingspan Therma™ TR27 is available in the following standard size(s):

| Nominal Dimension | | Availability |
|---|---|---|
| Length* | (mm) | 2400 |
| Width* | (mm) | 1200 |
| Product Thickness* | (mm) | Refer to Kingspan Insulation for current stock and non stock sizes |

Table 6: *Standard manufacturing tolerance may apply, for more information contact Kingspan Insulation.

## Compressive Stress

The compressive stress of Kingspan Therma™ TR27 exceeds 100 kPa for thickness ≤120mm and exceeds 90kPa for thickness 120-150mm @ 10% compression, when tested to BS EN 826: 2013 (Thermal insulating products for building applications. Determination of compression behaviour).

## Durability

If correctly installed, Kingspan Therma™ TR27 can have an indefinite life. Its durability depends on the supporting structure and the conditions of its use.

# Product Details

## FM Approval

Kingspan Therma™ TR27 is certified to Examination Standard FM 4470 for flat roof solutions. Please contact the Kingspan Insulation for further confirmation. Not all thicknesses and sizes are covered by the FM Approval.

Further details of the FM examination listing for Therma™ TR27 are published on the FM Approvals website at: www.roofnav.com. To view the listing, search Keyword(s): Therma TR27.

## Thermal Properties

The λ–values and R-values detailed below are quoted in accordance with ASTM C518-21.

### Thermal Conductivity

The boards achieve a thermal conductivity (λ–value) of 0.022 W/m.K at 23°C mean temperature.

### Thermal Resistance

Thermal resistance can be expressed in either metric or imperial measurement. Using the imperial measurement, the boards achieve a thermal resistance (R-value) per inch of thickness is 6.55 $ft^2.hr.^0f/Btu$.

The metric measurement of 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 ($m^2.K/W$).

| Insulant Thickness (mm) | Thermal Resistance ($m^2 \cdot K/W$) | Approx Weight ($kg/m^2$) |
|---|---|---|
| 50 | 2.25 | 3.48 |
| 60 | 2.70 | 3.8 |
| 70 | 3.15 | 4.12 |
| 75 | 3.40 | 4.28 |
| 80 | 3.60 | 4.44 |
| 85 | 3.85 | 4.6 |
| 90 | 4.05 | 4.76 |
| 95 | 4.30 | 4.92 |
| 100 | 4.50 | 5.08 |
| 110 | 5.00 | 5.4 |
| 120 | 5.45 | 5.72 |
| 130 | 5.90 | 6.04 |
| 140 | 6.35 | 6.36 |
| 150 | 6.80 | 6.68 |

Table 7: Thermal Resistance of Differing Thicknesses of Kingspan Therma™ TR27.

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

*Not all thickness and size are covered by the FM Approval, for more information contact Kingspan Insulation.

# Contact Details

## Middle East

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## Technical Service

Kingspan Insulation has one of the most technically advanced support services in the industry offering a full spectrum of advice, free of charge for all types of design projects.

The Kingspan Insulation technical team are continually updating their knowledge on building regulations, best practise, construction methods and the development of building materials to ensure the advice and services provided are always one step ahead.

**Services available:**

- U-value calculations;
- condensation/dew point risk calculations;
- advice on product selection and product data for the full range of Kingspan Insulation products;
- installation and fixing advice on all applications and products;
- specification and construction advice; and
- Tapered Roofing Design service.

Email: technical@kingspaninsulation.ae



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