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Kingspan Insulation

Flat Roofing User Guide



Kingspan Insulation...
Building for the Future

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INTRODUCTION

This insulation guide provides comprehensive information on the extensive range of flat roofing products available from Kingspan Insulation. For each application in this guide you will find illustrated fixing details, product details and the correct thickness of insulation you will need to achieve the required U-values. As a comparison, we have also given you the equivalent thickness of mineral fibre (where possible) needed to achieve the same U-values.

Kingspan Insulation specialises in the solution of insulation problems and offers the widest range of premium and high performance insulants available from any UK or Irish manufacturer.

Kooltherm	premium performance CFC-free rigid phenolic insulation
Therma zero ODP	high performance CFC/HCFC-free rigid urethane insulation
Styrozone	high performance CFC/HCFC-free rigid extruded polystyrene insulation for specialist applications

TECHNICAL ADVISORY SERVICE

Kingspan Insulation offers a free Technical Advisory Service to all their customers. This computer aided service is designed to give fast, accurate answers and is available 5 days a week from 8.30 am to 5.00 pm.

- General application advice
- Fixing advice
- U-value calculations
- Assistance with Building Control approval
- Product advice
- Best practice
- Condensation risk analysis
- Equivalent specifications

Please contact our Technical Services Department on the **TECHLINE** numbers below:



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BUILDING REGULATIONS/STANDARDS FOR THE CONSERVATION OF FUEL AND POWER

The requirements for thermal insulation (Conservation of Fuel and Power) in buildings are detailed in the following Regulations/Standards. The aim of the regulations is to further promote the energy efficiency of buildings.

England & Wales

The Building Regulations 2001 (England and Wales) Approved Documents L1 & L2 (Conservation of fuel and power). The latest revision to these regulations came into effect April 1, 2002.

Scotland

The Building Standards (Scotland) Regulations 1990 Technical Standards Part J (Conservation of fuel and power). The latest revision to these regulations came into effect March 4, 2002.

KEY CHANGES

Thermal Efficiency – the standards of fabric insulation have been improved and in dwellings the methods of calculating U-values has been brought into line with those in the European Standards.

U-values have to be calculated using the new Combined Method. All the U-values in this booklet have been calculated using the Combined Method which has been adopted to bring National Standards in line with the European Standard calculation method BS EN ISO 6946: 1997 (Building components and building elements. Thermal resistance and thermal transmittance calculation method).

EASY GUIDE FOR SPECIFICATION OF FLAT ROOFS APPROVED DOCUMENT L1 & L2 (2001) / TECHNICAL STANDARDS PART J (2001)

England and Wales		Scotland	
0.25 W/m ² .K	Elemental Method for use in domestic and non-domestic dwellings	0.22 W/m ² .K	For domestic dwellings with other gas or oil central heating system, solid fuel central heating or undecided
0.35 W/m ² .K	Lowest permissible U-value when trading off using the Target U-value and Carbon Index Methods	0.25 W/m ² .K	For domestic dwellings with gas or oil central heating with boiler SEDBUK not less than 78 for gas and 85* for oil. (*82 for oil combi boilers)
		0.35 W/m ² .K	Poorest permissible U-value when using the Target U-value and Carbon Index Method
		0.45 W/m ² .K	Poorest permissible U-value when using the Carbon Emissions calculation method or when trading off elements in buildings other than domestic dwellings

PRODUCT SELECTOR

PRODUCT SELECTOR

Application		Product Name	Distinguishing factors in cases where there is more than one product for the application
Tapered Roofing Systems	Partially Bonded Built-up Felt Waterproofing	<i>Kingspan Thermalaper TT40 zero ODP</i>	
	Fully Bonded Built-up Felt and Mastic Asphalt Waterproofing	<i>Kingspan Thermalaper TT42 zero ODP</i>	
	Mechanically Fixed Single-Ply Membrane Waterproofing	<i>Kingspan Thermalaper TT46 zero ODP</i>	
	Fully Adhered Single-Ply Membrane Waterproofing Using Solvent Based Adhesives	<i>Kingspan Thermalaper TT47 zero ODP</i>	
	Miscellaneous	<i>Kingspan Thermacricquet Systems</i>	
Flat Roofing	Partially Bonded Built-up Felt and Mastic Asphalt Waterproofing (Other than insulated balconies waterproofed with mastic asphalt with a porous concrete promenade tile overlay)	<i>Kingspan TherमारooF TR21 zero ODP</i>	
	Partially Bonded Built-up Felt Waterproofing	<i>Kingspan TherमारooF TR31 zero ODP*</i>	A high performance rigid CFC/HCFC-free urethane/6 mm plywood composite roof decking
		<i>Kingspan Kooltherm K5 Roofboard</i>	A premium performance CFC-free phenolic insulation board with glass fibre tissue facings. The boards achieve a Class O Rating
	Fully Bonded Built-up Felt Waterproofing & Insulated Balconies Waterproofed with Mastic Asphalt with a Porous Concrete Promenade Tile Overlay	<i>Kingspan TherमारooF TR22 zero ODP</i>	A high performance CFC/HCFC-free rigid urethane with a 20 mm thick cork facing
		<i>Kingspan TherमारooF TR23 zero ODP</i>	A high performance rigid CFC/HCFC-free urethane/12 mm wood fibre roofboard composite
	Fully Bonded Torch-Applied Multi-layer Bituminous Felt Waterproofing	<i>Kingspan TherमारooF TR29 zero ODP</i>	
	Mastic Asphalt Waterproofing (Other than insulated balconies waterproofed with mastic asphalt with a porous concrete promenade tile overlay)	<i>Kingspan TherमारooF TR24 zero ODP</i>	
	Mechanically Fixed Single-ply Membrane Waterproofing	<i>Kingspan TherमारooF TR26 FM zero ODP</i>	A premium performance CFC/HCFC-free rigid urethane with low emissivity composite foil facings
		<i>Kingspan Kooltherm K1 Roofboard</i>	A premium performance CFC-free phenolic insulation board.
	Fully Adhered Single-ply Membrane Waterproofing Using Solvent Based Adhesives	<i>Kingspan TherमारooF TR27 FM zero ODP</i>	A high performance CFC/HCFC-free urethane with wet lay coated glass fibre tissue facings
		<i>Kingspan Kooltherm K2 Roofboard</i>	A premium performance CFC-free phenolic insulation board with a Class O rating
	Standard Protected Membrane Flat Roofs and Roof Gardens	<i>Kingspan Styrozone N 300</i>	A thermally superior CFC/HCFC-free rigid extruded polystyrene using a carbon dioxide blowing agent with a thermal conductivity of 0.034 W/m.K for thicknesses ≤ 60 mm and 0.037 W/m.K for > 60 mm
		<i>Kingspan Styrozone H 350</i>	A thermally superior CFC/HCFC-free extruded polystyrene board blown with an HFA blowing agent giving a thermal conductivity of 0.029 W/m.K
	Standard Protected Membrane Car Park Decks	<i>Kingspan Styrozone N 500 R</i>	A high density CFC/HCFC-free extruded polystyrene with a compressive strength of 500 kPa
		<i>Kingspan Styrozone N 700 R</i>	A high density CFC/HCFC-free extruded polystyrene with a compressive strength of 700 kPa
Lightweight Protected Membrane Roofs	<i>Kingspan Purlicretechevron</i>		
Pedestrian Areas & Terraces on Lightweight Protected Membrane Roofs	<i>Kingspan Purlicretepromenade</i>		

*May also be used under fully-bonded built-up felt, mastic asphalt and appropriate single-ply waterproofing

TAPERED ROOFING SYSTEMS

There are many critical factors that must be taken into consideration when designing a flat roof construction. Two of these factors – insulation and rainwater run-off can be addressed with one product range: **Kingspan Thermataper zero ODP Systems** from Kingspan Insulation Limited.

Kingspan Thermataper zero ODP Systems are available in a range of facings which means they can be used under most waterproofing systems.

A SOLUTION TO WATER PONDING

A high proportion of flat roof failures can be traced to the inability of the roof to shed rainwater from the surface, leading to the formation of water ponds. Ponding of rainwater can seriously decrease the design life of the roof by subjecting the membrane to attack from many sources such as:

- thermal stress;
- alkaline formation; and
- mould growth.

Excessive ponding can also increase roof loading, causing further deflection of the deck, which only adds to the problem of drainage. Patching is not a practical option: the only effective solution is to eliminate the ponding by designing an adequate fall into the roof.

Kingspan Thermataper zero ODP Systems have been developed to solve these problems. **Kingspan Thermataper zero ODP Systems** encompass a range of tapered insulation boards, which can be designed to provide adequate roof falls.

NEW FLAT ROOFS

On new roofs, a **Kingspan Thermataper zero ODP Systems** eliminate the need to incorporate a fall into the design of the structure, which can require complex structural supports (e.g. on metal roof decks or firrings).

Using **Kingspan Thermataper zero ODP Systems** to achieve the requirements of the new Building Regulations/Standards could yield a saving of at least 21% over the cost of using alternative methods to create a fall in a flat roof for drainage purposes.

Kingspan Thermataper zero ODP Systems are also a simpler alternative to screeding as they do not present the risk of an overloaded structure due to excessive screed depths, avoids a wet trade and avoids the need for the drying out of screeds.

Kingspan Thermataper zero ODP Systems are estimated to be as little as 1% of the weight of a solution using screed to falls with a flat insulation board.

Because **Kingspan Thermataper zero ODP Systems** do not need time to dry out, they save time in the scheduling of a construction project. A recent analysis of screed to falls systems shows that, in the examples analysed, they may require between 100 and 200 days to dry.

REFURBISHMENT OF EXISTING FLAT ROOFS

On existing roofs, **Kingspan Thermataper zero ODP System** and a new waterproofing system 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 check is not required.

The existing insulation/substrate and waterproofing must be sound to provide a satisfactory surface for the **Kingspan Thermataper zero ODP System**. In all cases, the risk of interstitial condensation must be fully assessed (for advice contact our Technical Services Department).

PARTIALLY BONDED BUILT-UP FELT WATERPROOFING

FROM CONCEPT TO COMPLETION IN 3 SIMPLE STEPS

- Roof Survey

On existing roofs a free survey will be carried out by one of our experienced surveyors to collect the required information. (On new roofs an architects drawing should suffice)

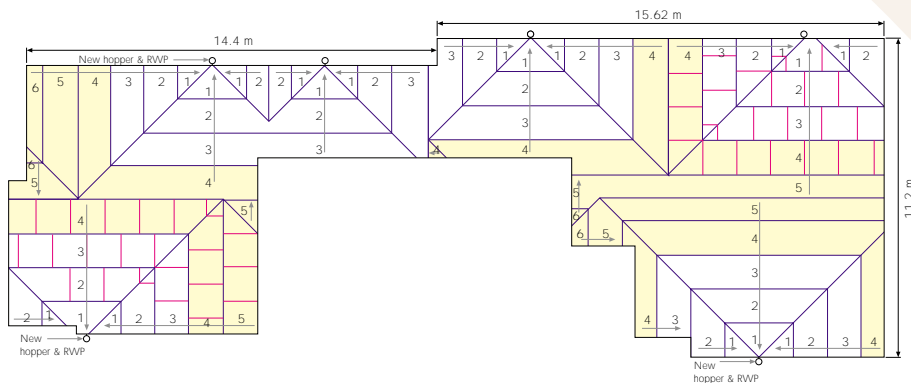
- Design

Utilising our CAD system, even the most complex tapered system can be designed quickly and effectively, ready for client approval. The design will illustrate the required direction of drainage and will also take into account U-value, condensation risk analysis and wind uplift requirements, as well as minimum/maximum rise restrictions. Amendments or revisions can be easily incorporated.

- Completion

Once the final design has been accepted by the client and the **Kingspan Thermataper zero ODP System** is ordered, a working drawing will be produced. This drawing will clearly set out the fall and direction of pitch and fixing of each board type. Installation of **Kingspan Thermataper zero ODP Systems** is simple using these easy to follow drawings and to facilitate laying each board type is packed separately in labelled shrink wrapped packs.

TYPICAL TAPERED ROOFING DESIGN



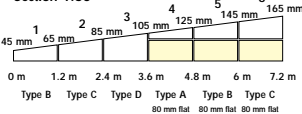
Components 1:60

TAPERED BOARDS				FLAT BOARDS
TYPE A	TYPE B	TYPE C	TYPE D	80 mm flat board 1200 x 600 mm
1200 x 1200 mm	1200 x 1200 mm	1200 x 1200 mm	1200 x 1200 mm	
25 mm	45 mm	45 mm	65 mm	80 mm
		65 mm	85 mm	
			85 mm	
			105 mm	

Kingspan Thermataper TT40 zero ODP

Kingspan Thermataper TT40 zero ODP roof insulation for use under most types of part bonded systems

Section 1:60



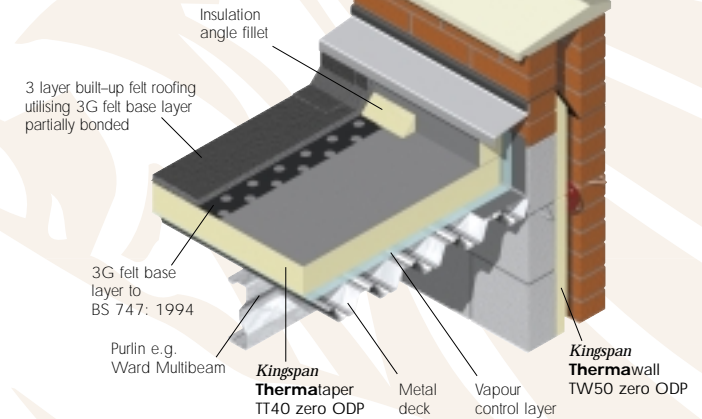
INTRODUCTION

Kingspan Thermataper TT40 zero ODP is recommended for use with partially bonded built-up felt tapered roofing systems.

Kingspan Thermataper TT40 zero ODP is a high performance rigid urethane insulant that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which can achieve an FAA fire rating and is compatible with most bitumen based waterproofing systems.

Ideal for both newbuild and refurbishment.

Figure 1



PRODUCT DATA

Kingspan Thermataper TT40 zero ODP	
Board Size (m)	1.2 x 1.2
Insulant Thickness (mm)	25 minimum ¹ unlimited maximum ²
Standard Falls	1:60, 1:80 and 1:120
Facings	Bitumen impregnated glass fibre tissue
Core	CFC/HCFC-free rigid urethane
Fire Performance ³	BS 476: Part 3: 1975 - FAA rating

ACHIEVING U-VALUES

Typical U-values ⁴		
U-value (W/m ² .K)	Kingspan Thermataper TT40 zero ODP (mm)⁵	Rock Mineral Wool (mm) ⁶
0.45	50	65/70
0.35	65	90/95
0.25	95	130/135
0.22	105	150/160
Thermal Conductivity (λ-value) ⁷	0.028 W/m.K	

1 On systems with a 1:120 fall the minimum thickness is 30 mm.

2 Packer boards will be required above a specific thickness.

3 With appropriate waterproofing and chippings.

4 Based on 3 layers of built-up felt with the surface covered in mineral chippings. Kingspan Thermataper TT40 zero ODP boards laid over a bitumen based vapour control layer fully bonded to the 150 mm concrete deck with a skim coated single layer of 12.5 mm plasterboard with an un-vented cavity between it and the deck creating a suspended ceiling. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

5 Average depth of insulation across roof.

6 Dependent on thermal performance of product specified.

7 The λ-value quoted for Thermataper TT40 zero ODP is based on the procedures for the determination of the aged value of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

For fixing details please refer to **Kingspan Thermaroof TR21 zero ODP** on page 17

FULLY BONDED BUILT-UP FELT & MASTIC ASPHALT WATERPROOFING

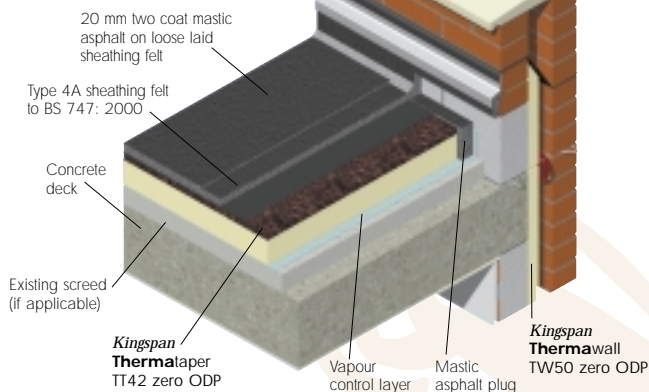
INTRODUCTION

Kingspan Thermataper TT42 zero ODP is recommended for use with fully bonded built-up felt and mastic asphalt tapered roofing systems.

Kingspan Thermataper TT42 zero ODP is a high performance rigid urethane insulant laminated to a 20 mm granulated cork roof board that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which can achieve an FAA fire rating, a patented glass tissue armature reinforcement increases its tensile strength and stability.

Ideal for both newbuild and refurbishment.

Figure 1



PRODUCT DATA

<i>Kingspan Thermataper TT42</i> zero ODP	
Board Size (m)	1.2 x 0.6
Insulant Thickness (mm)	30 minimum unlimited maximum ¹
Standard Falls	1:60, 1:80
Upper Facing (mm)	20 mm Cork ²
Core	CFC/HCFC-free rigid urethane
Lower Facing	Glass reinforced perforated cellulose
Fire Performance ³	BS 476: Part 3: 1975 - FAA rating

ACHIEVING U-VALUES

Typical U-values ⁴			
U-value (W/m ² .K)	<i>Kingspan Thermataper TT42</i> zero ODP (mm) ⁵	Rock Mineral Wool (mm) ⁶	
0.45	55	65/70	
0.35	70	90/95	
0.25	100	130/135	
0.22	110	150/160	
Thermal Conductivity (λ-value) - Cork		0.042 W/m.K	
Thermal Conductivity (λ-value) ⁷ - Core		0.027 W/m.K	

¹ Packer boards will be required above specific thickness.

² Cork thickness is 10 mm on the thinnest tapered board in a system.

³ With appropriate waterproofing and chippings.

⁴ Based on 2 layers of built-up felt with the surface covered in mineral chippings, Kingspan Thermataper TT42 zero ODP boards laid over a bitumen based vapour control layer fully bonded to the 150 mm concrete deck with a skim coated single layer of 12.5 mm plasterboard with an un-vented cavity between it and the deck creating a suspended ceiling. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

⁵ Average product thickness of Thermataper TT42 across roof (product thickness = insulant thickness + 20 mm cork).

⁶ Dependent on thermal performance of product specified.

⁷ The λ-values quoted for Thermataper TT42 zero ODP is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

For fixing details please refer to *Kingspan Therमारoo* TR22 zero ODP on page 25

MECHANICALLY FIXED SINGLE-PLY MEMBRANE WATERPROOFING

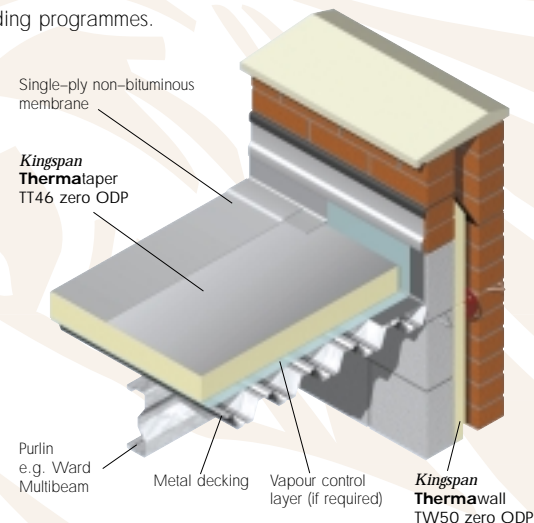
INTRODUCTION

Kingspan Thermataper TT46 zero ODP is recommended for use with mechanically fixed single-ply membrane roofing systems.

Kingspan Thermataper TT46 zero ODP is a high performance rigid urethane insulant that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which is compatible with most PVC and EPDM mechanically fixed single-ply systems. Its fire rating is dependent on the specification of the water proofing system.

Ideal for fast track building programmes.

Figure 1



PRODUCT DATA

<i>Kingspan Thermataper TT46</i> zero ODP	
Board Size (m)	1.2 x 1.2
Insulant Thickness (mm)	25 minimum ¹ unlimited maximum ²
Standard Falls	1:60, 1:80 and 1:120
Facings	Composite foil
Core	CFC/HCFC-free rigid urethane
Fire Performance	Dependent on waterproofing system

ACHIEVING U-VALUES

Typical U-values ³			
U-value (W/m ² .K)	<i>Kingspan Thermataper TT46</i> zero ODP (mm) ⁴	Rock Mineral Wool (mm) ⁵	
0.45	50	80/85	
0.35	70	105/110	
0.25	95	155/165	
0.22	110	180/190	
Thermal Conductivity (λ-value) ⁶		0.023 W/m.K	

¹ On systems with a 1:120 fall the minimum thickness is 30 mm.

² Packer boards will be required above specific thickness.

³ Therमारoo TT46 zero ODP waterproofed using a single-ply membrane. The board is positioned over a polythene vapour control layer laid directly over the metal deck. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

⁴ Average thickness of insulation across roof.

⁵ Dependent on thermal performance of product specified.

⁶ The λ-values quoted for Thermataper TT46 zero ODP is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

For fixing details please refer to *Kingspan Therमारoo* TR26 zero ODP on page 33

FULLY ADHERED SINGLE-PLY WATERPROOFING MEMBRANES

INTRODUCTION

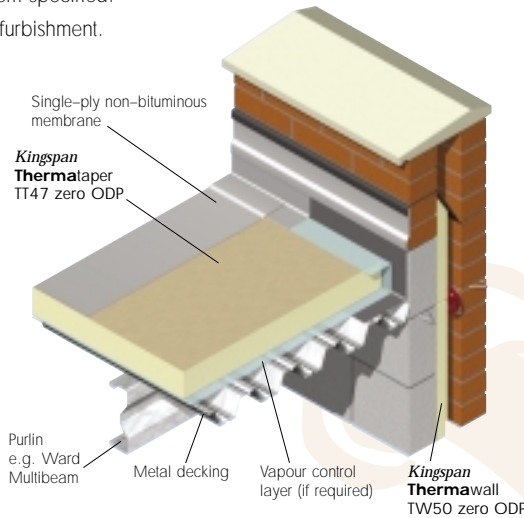
Kingspan Thermataper TT47 zero ODP is recommended for use in fully adhered single-ply tapered roofing systems using solvent based adhesives.

Kingspan Thermataper TT47 zero ODP is a high performance rigid urethane insulant that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which can be bonded to the existing deck/vapour control layer or mechanically fixed. The fire rating depends on the waterproofing system specified.

Ideal for newbuild and refurbishment.



Figure 1



PRODUCT DATA

<i>Kingspan Thermataper TT47 zero ODP</i>	
Board Size (m)	1.2 x 1.2
Insulant Thickness (mm)	25 minimum unlimited maximum ¹
Standard Falls	1:60 and 1:80
Facings	Wet lay coated glass fibre tissue
Core	CFC/HCFC-free rigid urethane
Fire Performance	Dependent on waterproofing system

ACHIEVING U-VALUES

Typical U-values ²		
U-value (W/m ² .K)	<i>Kingspan Thermataper TT47 zero ODP</i> (mm) ³	Rock Mineral Wool (mm) ⁴
0.45	55	75/80
0.35	70	100/105
0.25	100	140/150
0.22	110	160/170
Thermal Conductivity (λ-value) ⁵		0.027 W/m.K

¹ Packer boards will be required above specific thickness.

² Thermataper TT47 zero ODP waterproofed using a single-ply membrane. The board is positioned over a polythene vapour control layer laid directly over the metal deck. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

³ Average product thickness of insulation across roof. It is also assumed that no fixings have been used.

⁴ Dependent on thermal performance of product specified.

⁵ The λ-values quoted for Thermataper TT47 zero ODP is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

KINGSPAN THERMACRICKET SYSTEMS

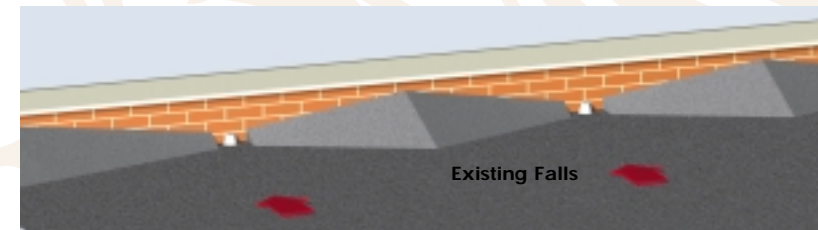
INTRODUCTION

Kingspan Thermacricket Systems (i.e. backfall systems) are available in the full tapered product range and can be installed to provide effective and economical drainage of localised roof areas. When correctly applied, *Kingspan Thermacricket Systems* will improve existing crossfalls or may be designed into a new construction in place of secret valley gutters.

FIXING DETAILS

Kingspan Thermacricket Systems can be mechanically fixed or bedded in a layer of hot bitumen applied direct to the existing roof, or to the vapour control layer and between layers in the system.

Figure 1



For further information, please contact our Technical Services Department

PARTIALLY BONDED BUILT-UP FELT & MASTIC ASPHALT ROOFING

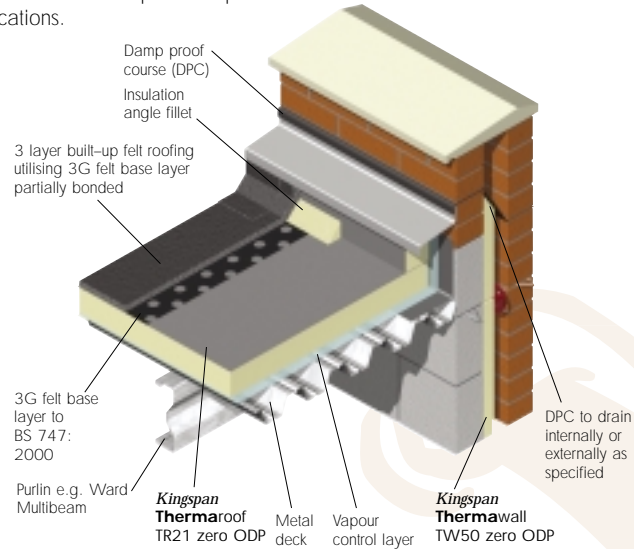
INTRODUCTION

Kingspan Thermaroof TR21 zero ODP is recommended for use in partially bonded built-up felt and mastic asphalt waterproofing systems.

Kingspan Thermaroof TR21 zero ODP is a multi-purpose high performance rigid urethane insulant that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which can achieve an FAA fire rating and is compatible with most bitumen based waterproofing systems.

Used in conjunction with a separate bituminous vapour control layer, warm roof insulation can be provided over roof decks up to 10° pitch. Ideal for both newbuild and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Thermaroof TR21 zero ODP	
Board Size (m)	1.2 x 0.6
Insulant Thickness ¹ (mm)	45, 50, 60, 65, 70, 75, 80, 85, 90, 100, 105
Facings	Glass reinforced perforated cellulose
Core	CFC/HCFC-free rigid urethane
Fire Performance ²	BS 476: Part 3: 1975 – FAA rating

¹ Other thicknesses are available subject to quantity.

² With appropriate waterproofing and chippings.

³ Based on 3 layers of built-up felt with the surface covered in mineral chippings. Kingspan Thermaroof TR21 zero ODP boards laid over a bitumen based vapour control layer fully bonded to the 150 mm concrete deck with a skim coated single layer of 12.5 mm plasterboard with an un-vented cavity between it and the deck creating a suspended ceiling. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

⁴ Dependent on thermal performance of product specified.

⁵ The λ -values quoted for Thermaroof TR21 zero ODP are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

ACHIEVING U-VALUES

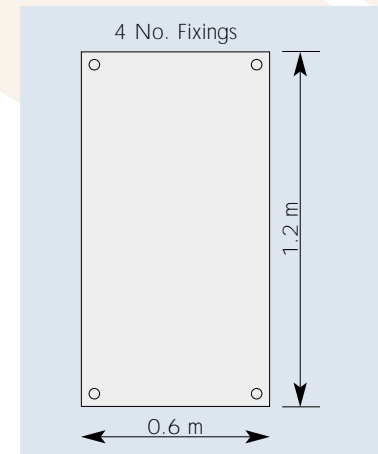
Typical U-values ³		
U-value (W/m ² .K)	Kingspan Thermaroof TR21 zero ODP (mm)	Rock Mineral Wool (mm) ⁴
0.45	45	65/70
0.35	65	90/95
0.25	90	130/135
0.22	105	150/160
Thermal Conductivity (λ -value) ⁵	<80 mm thickness, 0.027 W/m.K 80 to <120 mm, 0.026 W/m.K ≥120 mm, 0.025 W/m.K	

FIXING DETAILS

- The boards should be fully bedded in hot bitumen, (max. temp 240°C) over a bituminous vapour control layer previously attached to the roof deck. (Attachment of the vapour control layer will depend on the deck type. Please contact our Technical Services Department for further information).
- Alternatively the boards can be secured using mechanical fixing systems. The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 4 No. fixings should be placed within the individual board area giving a minimum fixing rate of 5.55 fixings per square metre (1.2 x 0.6 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- Laps at the edges of the roof should be sealed to provide an envelope, by turning the vapour control layer back onto the insulation board (dependant on whether built-up felt or mastic asphalt is specified).
- Where a vertical upstand detail exists the vapour control layer should be dressed accordingly to a minimum of 150 mm.
- A three layer built-up felt or two layer mastic asphalt system may now be laid.
- For a built-up felt specification, first layer should be a Type 3G (partially bonded) felt, loose laid, followed by two further layers of high performance felt fully bonded in hot bitumen.
- Mastic asphalt systems should always incorporate a type 3B bituminous felt to BS 747: 2000.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Please note that **Kingspan Thermaroof TR21 zero ODP** is not suitable for torch-on felt specifications.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



The 4 no. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board.

Ensure both fixings and washers are within the board area.

Typical Mechanical Fixing Pattern

FLAT ROOF INSULATION - COMPOSITE ROOF DECKS

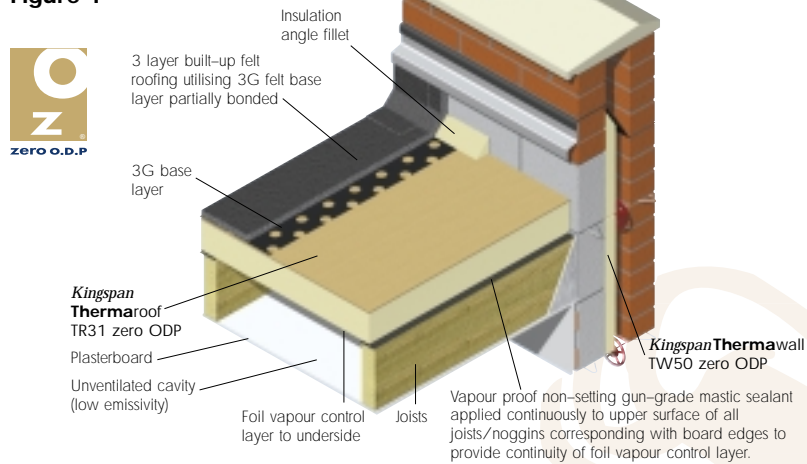
INTRODUCTION

Kingspan Thermaroof TR31 zero ODP is recommended for use directly over timber joists.

Kingspan Thermaroof TR31 zero ODP is a high performance rigid urethane insulant manufactured without the use of CFCs and HCFCs and has zero Ozone Depletion Potential (ODP). It is laminated during manufacture to a tough exterior grade 6 mm plywood. When used below built-up felt roofing systems the use of **Kingspan Thermaroof TR31 zero ODP** offers all the benefits of a warm roof whilst being quick and simple to install.

Ideal for fast track building programmes.

Figure 1



PRODUCT DATA

Kingspan Thermaroof TR31 zero ODP	
Board Size (m)	2.4 x 1.2
Insulant Thickness ¹ (mm)	45, 50, 55, 60, 70, 75, 80, 85, 90, 100
Upper Facing	6 mm WBP plywood
Core	CFC/HCFC-free rigid urethane
Lower Facing	Composite foil
Fire Performance ²	BS 476: Part 3: 1975 - FAA rating BS 476: Part 7: 1997 - Class 1

ACHIEVING U-VALUES

Typical U-values ³	Kingspan Thermaroof TR31 zero ODP (mm)⁴	
	Timbers @ 400 centres	Timbers @ 600 centres
U-value (W/m ² .K)		
0.45	56	51
0.35	61	61
0.25	91	91
0.22	96+20 ⁵	96+20 ⁵
Thermal Conductivity 0.140 W/m.K (λ-value) - Ply Thermal Conductivity 0.023 W/m.K (λ-value) ⁵ - Core		

¹ Thickness does not include 6 mm WBP Plywood.

² With appropriate waterproofing and chippings.

³ Based on 3 layers of partially bonded built-up felt with the surface covered in mineral chippings, a Kingspan Thermaroof TR31 zero ODP board is laid over the timber joists with a skim coated single layer of 12.5 mm plasterboard fixed to the underside. For the purpose of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

⁴ Product thickness = Insulant thickness + 6 mm ply

⁵ Due to limited lengths of fixings, 96 mm overall depth of Kingspan Thermaroof TR31 zero ODP is the maximum practical thickness. In order to achieve a U-value of 0.22 W/m².K 20 mm of Kingspan Thermapitch TP10 zero ODP is required between rafters.

⁶ The λ-values quoted for Thermaroof TR31 zero ODP is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- Suitable for use over joists at 400 mm and 600 mm centres.
- Lay boards, plywood facing upwards with long edges following joists and with board joints staggered see figure 2.



INSULANT THICKNESS 45-50 mm

- **Kingspan Thermaroof TR31 zero ODP** should be fixed with suitable galvanised ring shank nails. These are to be placed at 100 mm centres around the board edges and at 300 mm centres along any intermediate supporting timbers.
- All edges of the board should be supported. The use of 50 x 50 mm cross-noggins will ensure this along the boards shorter edges and where boards may be cut at openings or details.
- A wide bead of non-setting gun-grade mastic sealant, applied along the centre of the joists and cross-noggins will ensure a continuous vapour control layer on the foil underside of the boards. The mastic sealant must be wide enough to accommodate two board edges butted together see figure 3.
Refer: **Adsheed Ratcliffe & Co Ltd 01773 826661, C M Sealants 0208 519 6358.**
- Sheets should be lightly butted (approx. 2 mm gap) whilst maintaining a 20 mm bearing at edges over supporting timbers.
- Fixings should not be positioned within 10 mm of the board edges or within 50 mm of the corners.

INSULANT THICKNESS OVER 50 mm

- **Kingspan Thermaroof TR31 zero ODP** should be fixed with low profile oval head screw fixings. These are to be placed at 200 mm centres around the board edges at 300 mm centres along any intermediate supporting timbers.
Refer: **Fixfast 01306 880299**
SFS Intec Limited 01132 085500
- Care should be taken to keep the decking dry prior to waterproofing. Always utilise a type 3G felt as the base layer to a 3 layer felt system.
- To avoid cold bridging ensure the wall insulation around the roof perimeter is carried up to the underside of the insulated deck.
- This creates a warm roof construction, therefore ventilation is not necessary.
- Cutting should be carried out using a fine toothed saw.

Figure 2

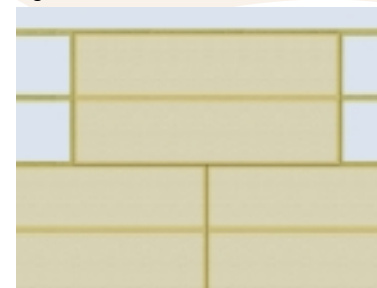
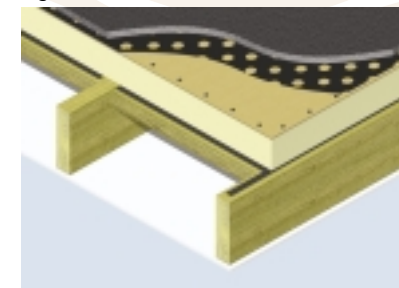


Figure 3



Staggered board joints over roof joists Boards laid into non setting mastic



PARTIALLY BONDED BUILT-UP FELT ROOFING

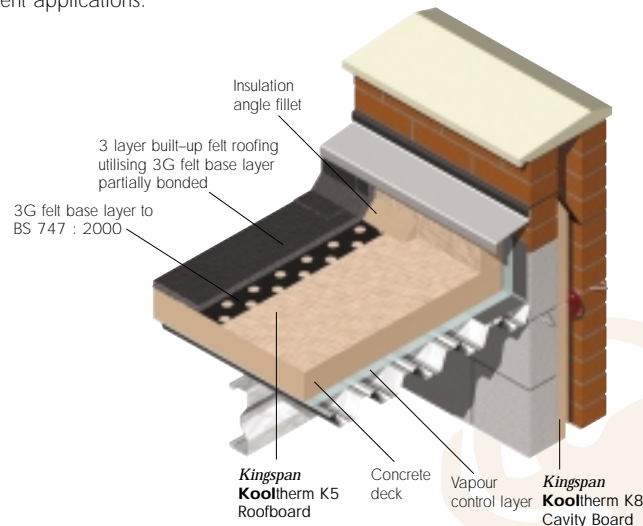
INTRODUCTION

Kingspan Kooltherm® K5 Roofboard is recommended for use in partially bonded built-up felt roofing systems where premium performance is required.

Kingspan Kooltherm® K5 Roofboard is a premium performance CFC-free rigid phenolic insulant that achieves a Class O rating and is compatible with most bitumen based waterproofing systems.

Used in conjunction with a separate bituminous vapour control layer, warm roof insulation can be provided over limited access roof decks. Ideal for both newbuild and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Kooltherm® K5 Roofboard	
Board Size (m)	1.2 x 0.6
Insulant Thickness (mm)	40, 45, 50, 60, 65, 70, 75, 80, 90
Facings	Glass fibre tissue
Core	CFC-free rigid phenolic
Fire Performance - FAA rating	BS 476: Part 3: 1975
	BS 476: Part 6: 1989 BS 476: Part 7: 1997 - Class 1 core and facings BS 5111: Part 1: 1974 - <5% smoke obscuration

ACHIEVING U-VALUES

Typical U-values ²		
U-value (W/m ² .K)	Kingspan Kooltherm® K5 Roofboard (mm)	Rock Mineral Wool (mm) ³
0.45	40	65/70
0.35	50	90/95
0.25	75	130/135
0.22	90	150/160
Thermal Conductivity (λ-value)	25 to <44 mm thickness 0.023 W/m ² .K ≥ 45 mm thickness 0.022 W/m ² .K	

¹ With appropriate waterproofing and chippings.

² Based on 3 layers of built up felt with the surface covered in mineral chippings, Kingspan Kooltherm K5 Roofboards laid over a bitumen based vapour control layer fully bonded to the 150 mm concrete deck with a skim coated single layer of 12.5 mm plasterboard with an un-vented cavity between it and the deck creating a suspended ceiling. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

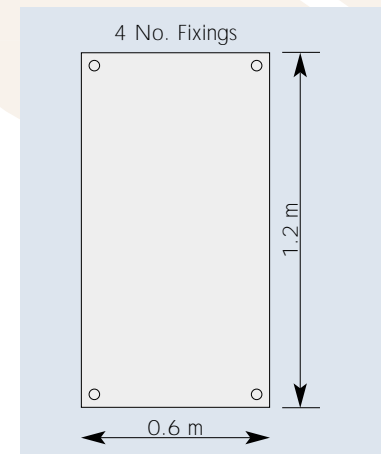
³ Dependent on thermal performance of product specified.

FIXING DETAILS

- The boards should be fully bedded in hot bitumen, (max. temp 240°C) over a bituminous vapour control layer previously attached to the roof deck. (Attachment of the vapour control layer will depend on the deck type. Please contact our Technical Services Department for further information).
- Alternatively the boards can be secured using mechanical fixing systems. The number of fixings required will vary with the geographical location of the building and the height and width of the roof. (Fixings should always be stainless steel or climaseal coated).
- A minimum of 4 No. fixings should be placed within the individual board area giving a minimum fixing rate of 5.55 fixings per square metre (1.2 x 0.6 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- Laps at the edges of the roof should be sealed to provide an envelope, by turning the vapour control layer back onto the insulation board.
- Where verge/eaves details exist, the vapour control layer should be dressed accordingly to a minimum of 150 mm.
- A three layer built-up felt system may now be laid.
- The first layer should be a Type 3G (partially bonded) felt, loose laid, followed by two further layers of high performance felt fully bonded in hot bitumen.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Please note that **Kingspan Kooltherm® K5 Roofboard** is not suitable for torch on felt specifications.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Typical Mechanical Fixing Pattern

The 4 No. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board.

Ensure both fixings and washers are within the board area.

FULLY BONDED BUILT-UP FELT & INSULATED BALCONIES WATERPROOFED WITH MASTIC ASPHALT WITH A POROUS CONCRETE PROMENADE TILE OVERLAY

INTRODUCTION

Kingspan Thermaroof TR22 zero ODP is recommended for use in fully bonded built-up felt and polymer modified asphalt roofing systems.

Kingspan Thermaroof TR22 zero ODP is a high performance rigid urethane insulant manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential (ODP) laminated to a 20 mm granulated cork roofboard. A patented glass tissue armature reinforcement increases the tensile strength and stability, and offers good resistance to foot traffic.

Ideal for both newbuild and refurbishment applications.

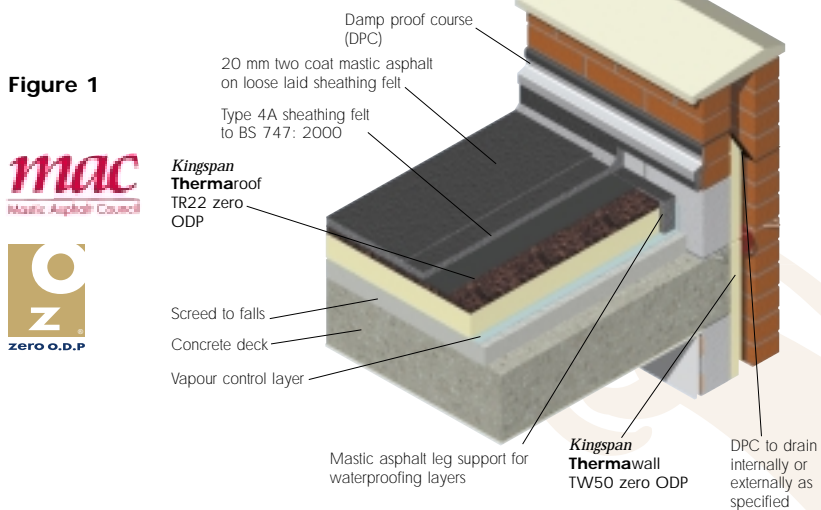


Figure 1



PRODUCT DATA

Kingspan Thermaroof TR22 zero ODP	
Board Size (m)	1.2 x 0.6
Insulant Thickness ¹ (mm)	30, 35, 40, 50, 55, 60, 70, 75, 80, 90, 95, 100, 110,
Upper Facing	20 mm cork roofboard
Core	CFC/HCFC-free rigid urethane
Lower Facing	Glass reinforced perforated cellulose
Fire Performance ²	BS 476: Part 3: 1975 - FAA rating

¹ Thickness does not include 20 mm cork roof board.

² With appropriate waterproofing and chippings.

³ Built-up felt with the surface covered in mineral chippings. A Thermaroof board laid over a bitumen based vapour control layer fully bonded to the 150 mm concrete deck with a single layer of 12.5 mm plasterboard with an un-vented cavity between it and the deck creating a suspended ceiling. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

⁴ Overall product thickness (Insulant thickness + 20 mm cork).

⁵ Dependent on thermal performance of product specified.

⁶ The λ -values quoted are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

THERMAL PERFORMANCE

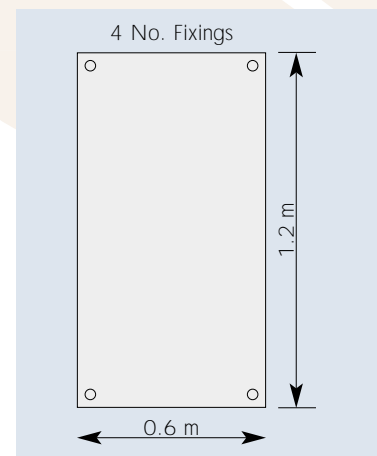
U-value (W/m ² .K) ³	Kingspan Thermaroof TR22 zero ODP Product Thickness (mm) ⁴	Rock Mineral Wool Thickness (mm) ⁵
0.45	55	65/70
0.35	70	90/95
0.25	100	130/135
0.22	110	150/160
Thermal Conductivity (λ -value) - Cork	0.042 W/m.K	
Thermal Conductivity (λ -value) ⁶ - Core	<80 mm thickness, 0.027 W/m.K 80 to <120 mm, 0.026 W/m.K ≥120 mm, 0.025 W/m.K	

FIXING DETAILS

- The boards should be fully bedded in hot bitumen, (max. temp 240°C) over a bituminous vapour control layer previously attached to the roof deck. (Attachment of the vapour control layer will depend on the deck type. Please contact our Technical Services Department for further information).
- Alternatively the boards can be secured using mechanical fixing systems. The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 4 No. fixings should be placed within the individual board area giving a minimum fixing rate of 5.55 fixings per square metre (0.6 x 1.2 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- Laps at the edges of the roof should be sealed to provide an envelope, by turning the vapour control layer back onto the insulation board (dependant on whether built-up felt or mastic asphalt is specified).
- Where a vertical upstand detail exists the vapour control layer should be dressed accordingly to a minimum of 150 mm.
- A two layer fully bonded built up felt system (3G ventilation layer not required) using high performance felt or a loose laid sheathing felt followed by 20 mm two coat mastic asphalt may now be laid.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Please note that **Kingspan Thermaroof TR22 zero ODP** is not suitable for torch-on felt specifications.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Typical Mechanical Fixing Pattern

The 4 no. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board.

Ensure both fixings and washers are within the board area.

Kingspan Thermaroof TR22 zero ODP is also available in a tapered version called **Kingspan Thermataper TT42 zero ODP**. See page 12

FULLY BONDED BUILT-UP FELT & INSULATED BALCONIES WATERPROOFED WITH MASTIC ASPHALT WITH A POROUS CONCRETE PROMENADE TILE OVERLAY

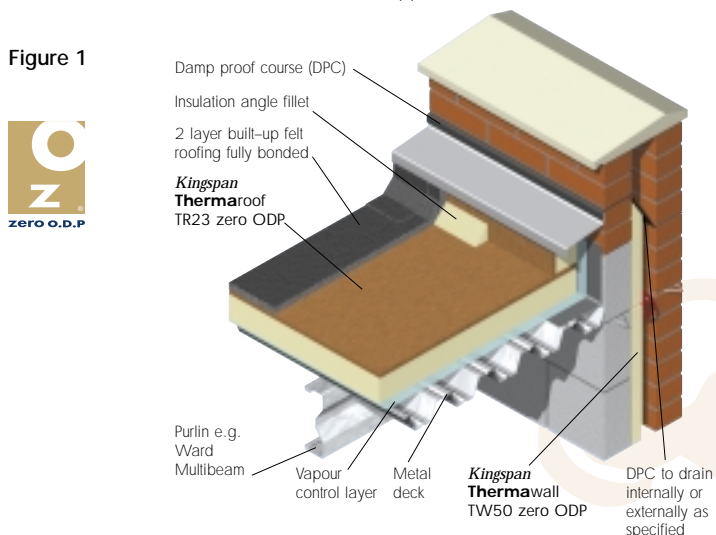
INTRODUCTION

Kingspan Thermaroof TR23 zero ODP is also recommended for use in most fully bonded built-up felt and mastic asphalt waterproofing systems.

Kingspan Thermaroof TR23 zero ODP is a high performance rigid urethane insulant manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential (ODP) laminated to a 12 mm wood-fibre roofboard. **Kingspan Thermaroof TR23 zero ODP** can achieve an FAA rating and offers good resistance to foot traffic.

Ideal for both newbuild and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Thermaroof TR23 zero ODP	
Board Size (m)	1.2 x 0.6
Insulant Thickness ¹ (mm)	50, 60, 70, 75, 80, 90, 100
Upper Facing	12 mm wood fibre roofboard
Core	CFC/HCFC-free rigid urethane
Lower Facing	Plain glass fibre tissue
Fire Performance ²	BS 476: Part 3: 1975 - FAA rating

THERMAL PERFORMANCE

U-value (W/m ² .K) ³	Kingspan Thermaroof TR23 zero ODP Product Thickness (mm) ⁴	Unfaced Rock Mineral Wool Thickness (mm) ⁵
0.45	62	70/80
0.35	82	100/105
0.25	102	140/150
0.22	122	160/170
Thermal Conductivity (λ-value) – Wood Fibre	0.050 W/m.K	
Thermal Conductivity (λ-value) ⁶ – Core	<80 mm thickness, 0.027 W/m.K 80 to <120 mm, 0.026 W/m.K ≥120 mm, 0.025 W/m.K	

¹ Thickness does not include 12 mm wood fibre board.

² With appropriate waterproofing and chippings.

³ Thermaroof TR23 zero ODP laid over a bitumen based vapour control layer that has been bonded to the metal deck with 2 layers of built-up felt or 2 layers of mastic asphalt, with the surface covered with mineral chippings. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is assumed that no fixings have been used.

⁴ Overall product thickness = Insulant thickness + 12 mm wood Fibre Board.

⁵ Dependent on thermal performance of product specified.

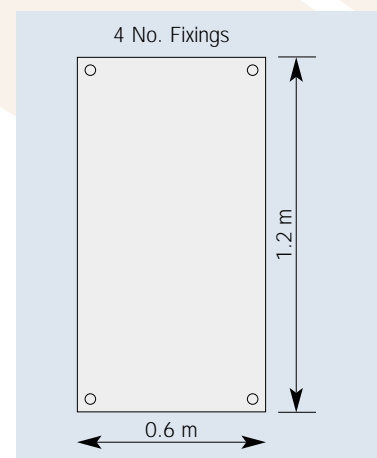
⁶ The λ-values quoted for Thermaroof TR23 zero ODP are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- The boards should be fully bedded in hot bitumen, (max. temp 240°C) over a bituminous vapour control layer previously attached to the roof deck. (Attachment of the vapour control layer will depend on the deck type. Please contact our Technical Services Department for further information).
- Alternatively the boards can be secured using mechanical fixing systems. The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 4 No. fixings should be placed within the individual board area giving a minimum fixing rate of 5.55 fixings per square metre (0.6 x 1.2 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- Laps at the edges of the roof should be sealed to provide an envelope, by turning the vapour control layer back onto the insulation board (dependant on whether built-up felt or mastic asphalt is specified).
- Where a vertical upstand detail exists the vapour control layer should be dressed accordingly to a minimum of 150 mm.
- A two layer fully bonded built up felt system (3G ventilation layer not required) using high performance felt or a loose laid sheathing felt followed by 20 mm two coat mastic asphalt may now be laid.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Please note that **Kingspan Thermaroof TR23 zero ODP** is not suitable for torch-on felt specifications.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



The 4 no. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board.

Ensure both fixings and washers are within the board area.

Typical Mechanical Fixing Pattern

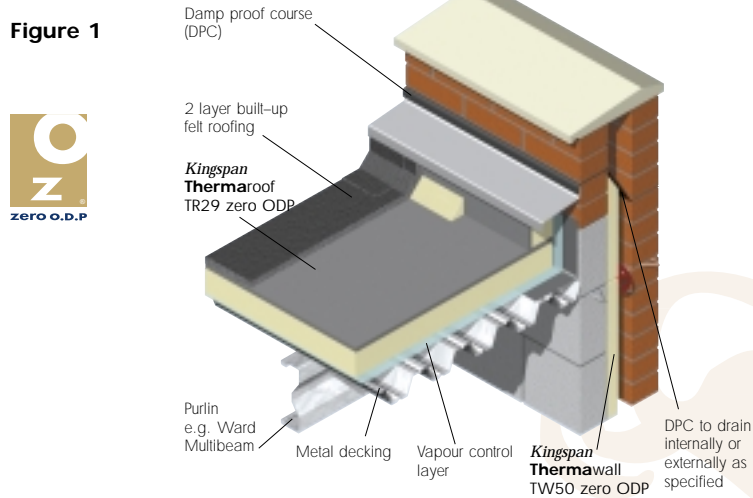
FULLY BONDED TORCH-APPLIED MULTI-LAYER BITUMINOUS FELT WATERPROOFING

INTRODUCTION

Kingspan Thermaroof TR29 zero ODP is recommended for use with fully bonded torch-applied multi-layer bituminous felt waterproofing systems.

Kingspan Thermaroof TR29 zero ODP is a high performance rigid urethane insulant manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential (ODP) laminated to a 15 mm bitumen coated perlite facing which can achieve an FAA fire rating and can be bonded to the existing deck/vapour control layer or mechanically fixed. Ideal for both newbuild and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Thermaroof TR29 zero ODP	
Board Size (m)	1.2 x 0.6
Insulant Thickness ¹ (mm)	45, 50, 60, 70, 75, 80, 85, 90, 100,
Upper Facing	15 mm bitumen coated perlite
Core	CFC/HCFC-free rigid urethane
Lower Facing	Perforated glass reinforced cellulose
Fire Performance ²	BS 476: Part 3: 1975 – FAA rating

THERMAL PERFORMANCE

U-value (W/m ² .K) ³	Kingspan Thermaroof TR29 zero ODP Product Thickness (mm) ⁴	Rock Mineral Wool Thickness (mm) ⁵
0.45	60	70/80
0.35	80	100/105
0.25	105	140/150
0.22	120	160/170
Thermal Conductivity (λ-value) ⁶ – Core	<80 mm thickness, 0.027 W/m.K 80 to <120 mm, 0.026 W/m.K ≥120 mm, 0.025 W/m.K	
Perlite	0.050 W/m.K	

¹ Thickness does not include 15 mm perlite facing.

² With appropriate waterproofing and chippings.

³ Thermaroof TR29 zero ODP laid over a bitumen based vapour control layer that has been bonded to the metal deck with 2 layers of built-up felt or 2 layers of mastic asphalt, with the surface covered with mineral chippings. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

⁴ Product thickness = Insulant thickness + 15 mm Perlite board.

⁵ Dependent on thermal performance of product specified.

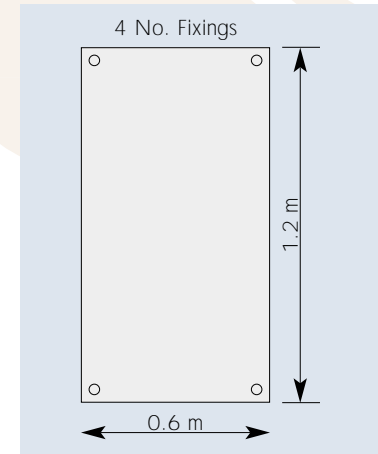
⁶ The λ-values quoted for Thermaroof TR29 zero ODP are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- The boards should be fully bedded in hot bitumen, (max. temp 240°C) over a bituminous vapour control layer previously attached to the roof deck. (Attachment of the vapour control layer will depend on the deck type. Please contact our Technical Services Department for further information).
- Alternatively the boards can be secured using mechanical fixing systems. The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 4 No. fixings should be placed within the individual board area giving a minimum fixing rate of 5.55 fixings per square metre (0.6 x 1.2 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- Laps at the edges of the roof should be sealed to provide an envelope, by turning the vapour control layer back onto the insulation board (dependant on whether built-up felt or mastic asphalt is specified).
- Where a vertical upstand detail exists the vapour control layer should be dressed accordingly to a minimum of 150 mm.
- A two layer fully bonded built up felt system (3G ventilation layer not required) using high performance felt may now be laid.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Typical Mechanical Fixing Pattern

The 4 no. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board.

Ensure both fixings and washers are within the board area.

POLYMER MODIFIED MASTIC ASPHALT ROOFING

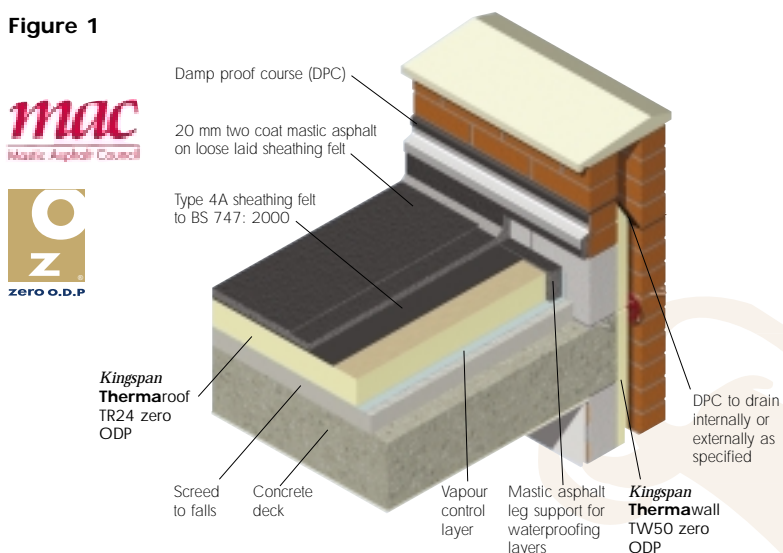
INTRODUCTION

Kingspan Thermaroof TR24 zero ODP is recommended for use with polymer modified mastic asphalt waterproofing systems.

Kingspan Thermaroof TR24 zero ODP is a high performance rigid urethane insulant that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which can achieve an FAA fire rating and is unaffected by temperatures associated with this application.

Ideal for both newbuild and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Thermaroof TR24 zero ODP	
Board Size (m)	1.2 x 0.6
Insulant Thickness (mm)	50, 60, 65, 70, 75, 80, 90, 95, 100, 105
Facings	Plain glass fibre tissue
Core	CFC/HCFC-free rigid urethane
Fire Performance ¹ – FAA rating	BS 476: Part 3: 1975

THERMAL PERFORMANCE

U-value (W/m ² .K) ²	Kingspan Thermaroof TR24 zero ODP Product Thickness (mm)	Rock Mineral Wool Thickness (mm) ³
0.45	50	65/70
0.35	65	90/95
0.25	95	130/135
0.22	105	150/160
Thermal Conductivity (λ-value) ⁴	<80 mm thickness, 0.027 W/m.K 80 to <120 mm, 0.026 W/m.K ≥120 mm, 0.025 W/m.K	

¹ With appropriate waterproofing and chippings.

² 2 layers of mastic asphalt covered in mineral chippings, Kingspan Thermaroof TR24 zero ODP boards are laid over a bitumen based vapour control layer fully bonded to the concrete deck with a skim coated single layer of 12.5 mm plasterboard with an un-vented cavity between it and the deck creating a suspended ceiling. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

³ Dependent on thermal performance of product specified.

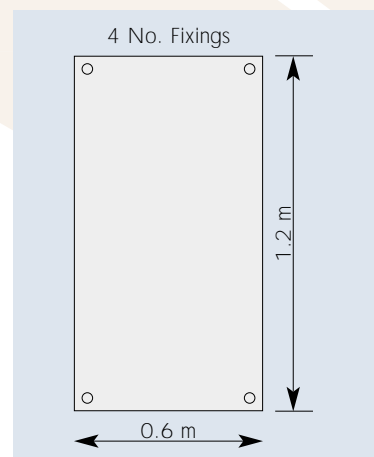
⁴ The λ-values quoted for Thermaroof TR24 zero ODP are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- The boards should be fully bedded in hot bitumen, (max. temp 240°C) over a bituminous vapour control layer previously attached to the roof deck. (Attachment of the vapour control layer will depend on the deck type. Please contact our Technical Services Department for further information).
- Alternatively the boards can be secured using mechanical fixing systems. The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 4 No. fixings should be placed within the individual board area giving a minimum fixing rate of 5.55 fixings per square metre (1.2 x 0.6 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- At roof edges, abutments and penetrations, the vapour control layer should be turned up and sealed with the roof covering to form an envelope. Where verge/eaves details exist the vapour control layer should be dressed accordingly to a minimum of 150 mm.
- A mastic asphalt system may now be laid utilising a loose laid sheathing felt followed by 20 mm two coat mastic asphalt.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Typical Mechanical Fixing Pattern

The 4 no. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board.

Ensure both fixings and washers are within the board area.

FM APPROVED MECHANICALLY FIXED SINGLE-PLY ROOFING

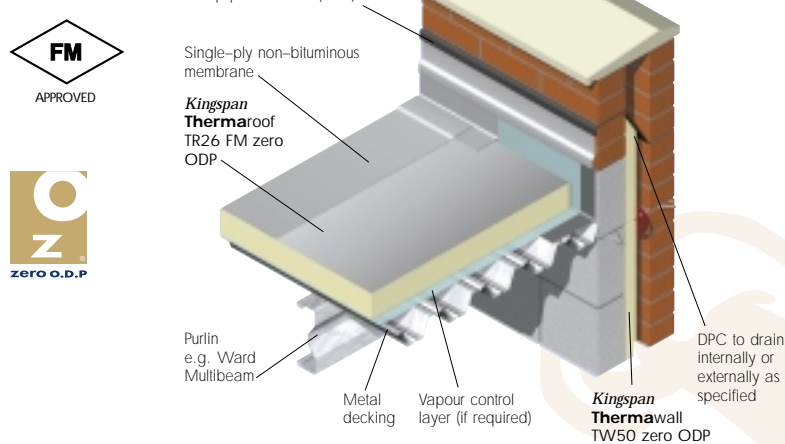
INTRODUCTION

Kingspan Thermoroof TR26 FM zero ODP is recommended for use in standard mechanically fixed single-ply waterproofing systems where Factory Mutual Approval is required.

Kingspan Thermoroof TR26 FM zero ODP is a high performance rigid urethane insulant that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which is compatible with most FM Approved PVC and EPDM mechanically fixed single-ply systems.

Ideal for fast track building programmes.

Figure 1



PRODUCT DATA

Kingspan Thermo roof TR26 FM zero ODP	
Board Size (m)	2.4 x 1.2
Insulant Thickness (mm)	50, 60, 65, 80, 90, 95, 100, 110
Facings	Composite foil
Core	CFC/HCFC-free rigid urethane
Fire Performance ¹	Meets FM requirements when used in conjunction with FM approved associated products

THERMAL PERFORMANCE

U-value (W/m ² .K) ²	Kingspan Thermo roof TR26 FM zero ODP Product Thickness (mm)	Rock Mineral Wool Thickness (mm) ³
0.45	50	80/85
0.35	65	105/110
0.25	95	155/165
0.22	110	180/190
Thermal Conductivity (λ-value) ⁴	0.023 W/m.K	

¹ Dependent on single-ply membrane.

² Kingspan Thermo roof TR26 FM zero ODP waterproofed using a single-ply membrane. The board is positioned over a polythene vapour control layer laid directly over the metal deck. When calculating U-values the combined method as detailed in BS/I.S. EN ISO 6946: 1997 a correction factor must be taken into account where mechanical fasteners penetrate the insulation layer. For the purposes of these calculations a default correction figure of 0.02 W/m².K has been taken from Table A4 of Approved Document L1 and L2.

³ Dependent on thermal performance of product specified.

⁴ The λ-values quoted for Kingspan Thermo roof TR26 FM are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

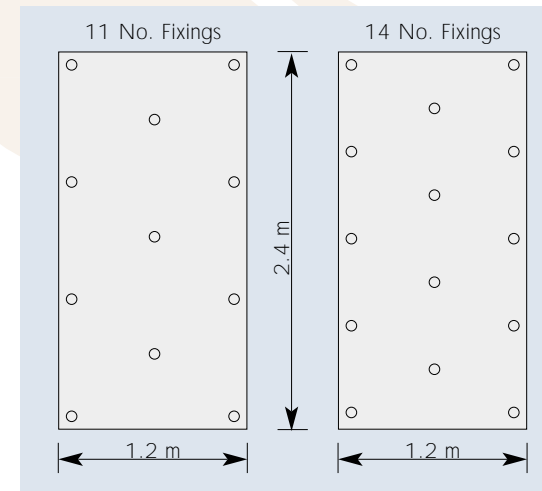
Kingspan Thermoroof TR26 zero ODP is also available in a tapered version called **Kingspan Thermo**taper TT46 zero ODP. See page 13

FIXING DETAILS

- **Kingspan Thermo**roof TR26 FM zero ODP should be fixed in accordance with the Factory Mutual specification for Class 1 steel deck constructions using other FM approved roof components.
- The boards should be laid over a non-bituminous vapour control layer (if required). Boards should be laid with edges butted and in a break bonded pattern laid at right angles to the edges of the roof or diagonally across the roof.
- Ensure that all joints are supported by the deck.
- Laps at all edges of the roof should be adequately sealed to provide an envelope by turning the vapour control layer back onto the insulation board.
- The boards are normally secured using mechanical fixing systems and washers appropriate to the substrate.
- The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 11 No. fixings should be placed within the individual board area giving a minimum fixing rate of 3.8 fixings per square metre (2.4 x 1.2 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- The waterproofing membrane (FM Approved) can now be laid over the boards in accordance with the manufacturers specification.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Fixings should be placed within the board area and be sited >50 mm and <150 mm from the edges and corners of the board. Ensure both fixings and washers are within the board area.

Typical Mechanical Fixing Pattern

MECHANICALLY FIXED SINGLE-PLY ROOFING

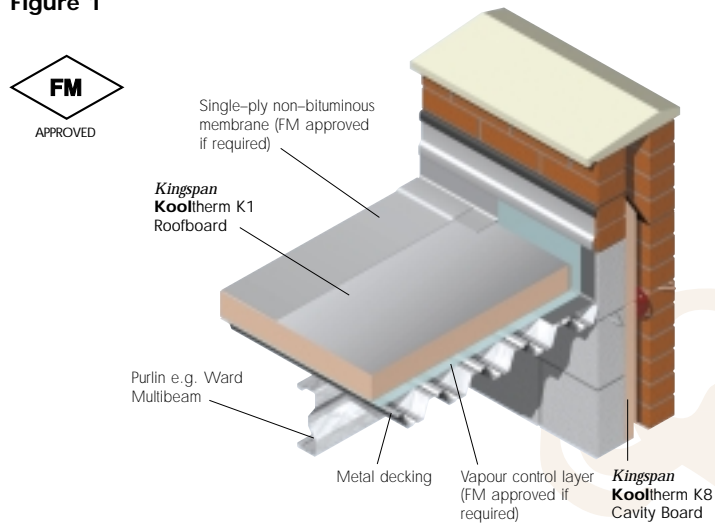
INTRODUCTION

Kingspan Kooltherm® K1 Roofboard is recommended for use in mechanically fixed single-ply non-bituminous roofing systems where premium performance is required.

Kingspan Kooltherm® K1 Roofboard is a premium performance CFC-free rigid phenolic insulant that achieves a Class O rating and is compatible with most PVC and EPDM mechanically fixed single-ply systems (including those requiring FM Approval).

Ideal for fast track building programmes.

Figure 1



PRODUCT DATA

Kingspan Kooltherm® K1 Roofboard	
Board Size (m) ¹	2.4 (1.2) x 1.2 (0.6)
Insulant Thickness (mm)	40, 45, 50, 60, 70, 75, 80, 85, 90, 100
Facings	Composite foil
Core	CFC-free rigid phenolic
Fire Performance	BS 476: Part 3: 1975 ² BS 476: Part 6: 1989 BS 476: Part 7: 1997 – Class 1 core and facings BS 5111: Part 1: 1974 – <5% smoke obscuration

ACHIEVING U-VALUES

Typical U-values ³		
U-value (W/m ² .K)	Kingspan Kooltherm® K1 Roofboard (mm)	Rock Mineral Wool (mm) ⁴
0.45	45	80/85
0.35	60	105/110
0.25	85	155/165
0.22	100	180/190
Thermal Conductivity (λ-value)	≥ 45 mm thickness 0.022 W/m ² .K	

¹ 1.16 m for insulant thicknesses over 50 mm.

² Dependent on single-ply membrane adopted.

³ Kooltherm® K1 waterproofed using a single-ply membrane. The board is positioned over a polythene vapour control layer laid directly over the metal deck. When calculating U-values the combined method as detailed in BS/ISO EN ISO 6946: 1997 a correction factor must be taken into account where mechanical fasteners penetrate the insulation layer. For the purposes of these calculations a default correction figure of 0.02 W/m².K has been taken from Table A4 of Approved Document L1 and L2.

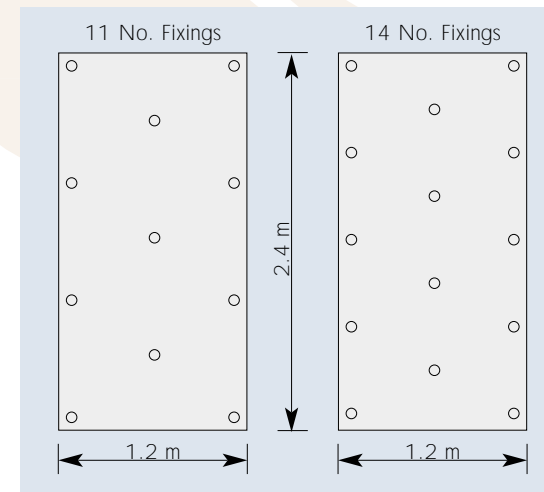
⁴ Dependent on thermal performance of product specified.

FIXING DETAILS

- The boards should be laid over a non-bituminous vapour control layer (if required). Boards should be laid with edges butted and in a break bonded pattern laid at right angles to the edges of the roof or diagonally across the roof.
- Ensure that all joints are supported by the deck.
- Laps at all edges of the roof should be adequately sealed to provide an envelope by turning the vapour control layer back onto the insulation board.
- The boards are normally secured using mechanical fixing systems and washers appropriate to the substrate.
- The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 11 No. fixings should be placed within the individual board area giving a minimum fixing rate of 3.8 fixings per square metre (2.4 x 1.2 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- The waterproofing membrane can now be laid over the boards in accordance with the manufacturers specification.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Fixings should be placed within the board area and be sited >50 mm and <150 mm from the edges and corners of the board. Ensure both fixings and washers are within the board area.

Typical Mechanical Fixing Pattern

FM APPROVED MECHANICALLY FIXED & FULLY ADHERED SINGLE-PLY ROOFING

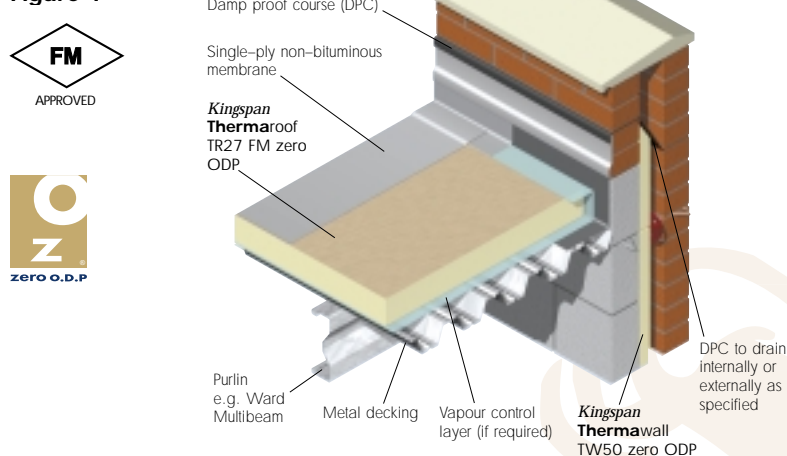
INTRODUCTION

Kingspan Thermoroof TR27 FM zero ODP is also recommended for use in mechanically and fully adhered single-ply waterproofing systems where Factory Mutual Approval is required.

Kingspan Thermoroof TR27 FM zero ODP is a high performance rigid urethane insulant that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential which is compatible with most FM Approved PVC and EPDM mechanically fixed single-ply systems.

Ideal for fast track building programmes.

Figure 1



PRODUCT DATA

Kingspan Thermo roof TR27 FM zero ODP	
Board Size (m)	2.4 (1.2) x 1.2 (0.6)
Insulant Thickness (mm)	60, 70, 75, 80, 90, 100, 105, 110, 120
Facings	Wet lay coated glass fibre tissue
Core	CFC/HCFC-free rigid urethane
Fire Performance	Meets FM requirements when used in conjunction with FM approved associated products

ACHIEVING U-VALUES

Typical U-values ¹		
U-value (W/m ² .K)	Kingspan Thermo roof TR27 FM zero ODP (mm)	Rock Mineral Wool (mm) ²
0.45	60	80/85
0.35	75	105/110
0.25	105	155/165
0.22	120	180/190
Thermal Conductivity (λ -value) ³	<80 mm thickness, 0.027 W/m.K 80 to <120 mm, 0.026 W/m.K ≥120 mm, 0.025 W/m.K	

¹ Kingspan Thermo roof TR27 FM zero ODP waterproofed using an FM approved single-ply membrane. The board is positioned over an FM approved polythene vapour control layer laid directly over the metal deck. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. When calculating U-values the combined method as detailed in BS/IS. EN ISO 6946: 1997 a correction factor must be taken into account where mechanical fasteners penetrate the insulation layer. For the purposes of these calculations a default correction figure of 0.02 W/m².K has been taken from Table A4 of Approved Document L1 and L2.

² Dependent on thermal performance of product specified.

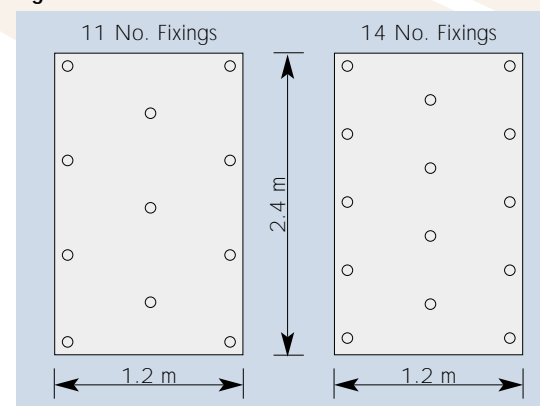
³ The λ -values quoted for Thermo roof TR27 FM zero ODP are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13165, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- **Kingspan Thermo**roof TR27 FM zero ODP should be fixed in accordance with the Factory Mutual specification for Class 1 Steel Deck constructions using other FM approved roof components.
- On metal decks the boards should be laid over the vapour control layer break-bonded with their long edges at right angles to the trough opening, or alternatively diagonally across the corrugation line. (Other types of deck may not conform to Factory Mutual Specifications. Please consult the Technical Services Department for advice on suitable decks).
- The joints should be lightly butted and all joints supported by the deck. Taping of the joints is not required.
- The boards should be laid over a non-bituminous vapour control layer (FM Approved if required).
- The vapour control layer should have a minimum 150 mm end and side laps which should be adequately sealed.
- The vapour control layer should also be turned up, but not sealed, to all vertical surfaces which abut the roof, to a minimum height of 250 mm and overhang the gutter by the same amount.
- Before applying the roof finish, the vapour control layer should be turned over the insulation and sealed to form an envelope.
- The boards are normally secured using mechanical fixings and washers.
- The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- A minimum of 11 No. fixings should be placed within the individual board area giving a minimum fixing rate of 3.8 fixings per square metre (2.4 x 1.2 mm boards) see figure 2.
- The waterproofing membrane (FM Approved) can now be laid over the boards in accordance with the manufacturers specification.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Fixings should be placed within the board area and be sited >50 mm and <150 mm from the edges and corners of the board. Ensure both fixings and washers are within the board area.

Typical Mechanical Fixing Pattern

FULLY ADHERED SINGLE-PLY WATERPROOFING

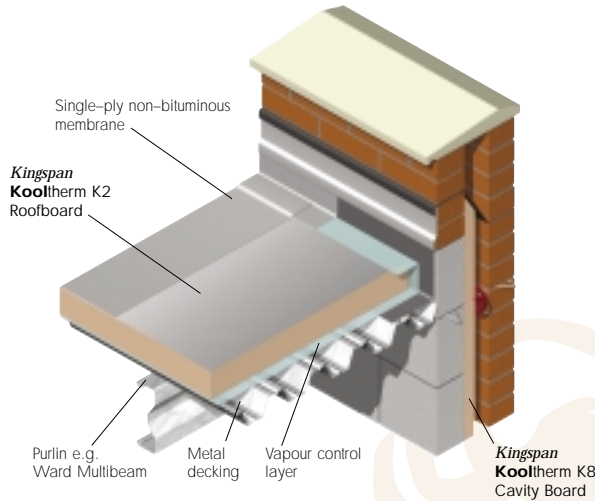
INTRODUCTION

Kingspan Kooltherm® K2 Roofboard is recommended for use in fully adhered single-ply waterproofing systems using solvent based adhesives where premium performance is required.

Kingspan Kooltherm® K2 Roofboard is a premium performance CFC-free rigid phenolic insulant that achieves a Class O rating that can be bonded to the existing deck/vapour control layer or mechanically fixed

Ideal for both newbuild and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Kooltherm® K2 Roofboard	
Board Size (m)	1.2 ¹ (2.4) x 0.6 (1.2 ¹)
Insulant Thickness (mm)	45, 50, 60, 70, 80, 85, 90, 100
Facings	Coated glass fibre tissue
Core	CFC-free rigid phenolic
Fire Performance	BS 476: Part 3: 1975 ² BS 476: Part 6: 1989 BS 476: Part 7: 1997 – Class 1 core BS 5111: Part 1: 1974 – <5% smoke obscuration

ACHIEVING U-VALUES

Typical U-values ³		
U-value (W/m ² .K)	Kingspan Kooltherm® K2 Roofboard (mm)	Rock Mineral Wool (mm) ⁴
0.45	45	75/80
0.35	60	100/105
0.25	85	140/150
0.22	100	160/170
Thermal Conductivity (λ-value)	≥ 45 mm thickness 0.022 W/m ² .K	

¹ 1.16 m for insulants thicknesses over 50 mm.

² Dependent on single-ply membrane adopted.

³ Kingspan Kooltherm® K2 Roofboard waterproofed using a single-ply membrane. The board is positioned over a bitumen based vapour control layer laid directly over the metal deck. It is also assumed that no fixings have been used. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

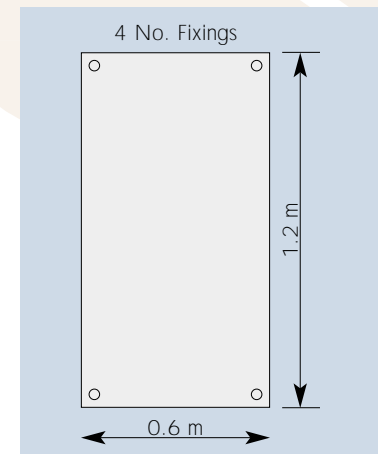
⁴ Dependent on thermal performance of product specified.

FIXING DETAILS

- The boards should be fully bedded in hot bitumen, (max. temp 240°C) over a bituminous vapour control layer (or existing bituminous waterproofing) previously attached to the roof deck. (Attachment of the vapour control layer will depend on the deck type. Please contact our Technical Services Department for further information).
- The boards are bedded into the hot bitumen, close butted with staggered end joints.
- On profiled metal decking, board end joints should be staggered ensuring board edges are fully supported on the crown flats.
- Ensure that all joints are supported by the deck.
- In all instances board joints and cut edges should be taped with a minimum 50 mm wide foil tape prior to the application of the waterproofing and adhesive system.
- Alternatively the boards can be secured using mechanical fixing systems. The number of fixings required will vary with the geographical location of the building and the height and width of the roof.
- A minimum of 4 No. fixings should be placed within the individual board area giving a minimum fixing rate of 5.55 fixings per square metre (1.2 x 0.6 m boards) see figure 2.
- Each fixing should incorporate a square or circular plate washer (70 mm x 70 mm or 75 mm diameter).
- The single-ply waterproofing and adhesive system should be applied strictly in accordance with the manufacturers recommendations.
- At the completion of each day's work, a night joint must be made to prevent water penetrating the roof construction.
- Boards should be cut using a sharp knife or a fine toothed saw.



Figure 2



Typical Mechanical Fixing Pattern

The 4 no. fixings should be placed within the individual board area and be sited >50 mm and <150 mm from the edges and corners of the board.

Ensure both fixings and washers are within the board area.

PROTECTED MEMBRANE FLAT ROOFS & ROOF GARDENS

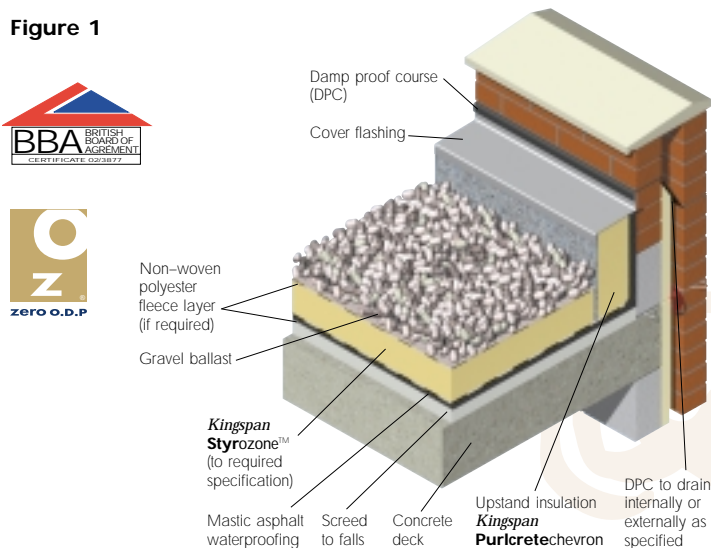
INTRODUCTION

Kingspan Styrozone™ H 350/N 300 are recommended for use in protected membrane flat roofs and roof gardens.

Kingspan Styrozone™ H 350/N 300 are high performance rigid extruded polystyrene insulants that are manufactured without the use of CFCs/HCFCs and have zero Ozone Depletion Potential (ODP). Their closed cell structure makes them ideal for these applications as rigid extruded polystyrene is the only material approved for use where it will be subject to freeze/thaw and wetting/drying cycles.

Ideal for both new build and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Styrozone™ H 350/N 300	
Board Size (m)	1.25 x 0.6 (R Grade) 2.50 x 0.6 (T Grade)
Insulant Thickness (mm)	60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 150, 160, 170, 175, 180
Core	CFC/HCFC-free rigid extruded polystyrene
Fire Performance	Dependent on application
Edge Profile	R Grade – rebated on all four edges T Grade – tongue and groove on all four edges

THERMAL PERFORMANCE

U-value (W/m ² .K) ¹	Kingspan Styrozone™ H 350	Kingspan Styrozone™ N 300
	Product Thickness (mm)	
0.45	60	75
0.35	80	100
0.25	120	160
0.22	140	190
Thermal Conductivity (λ-value) ² – N 300	60 <120 mm thickness, 0.037 W/m.K >140 mm thickness, 0.039 W/m.K	
	– H 350 0.029 W/m.K	

¹ 150 mm concrete deck, 50 mm screed and mastic asphalt waterproofing. Suspended ceiling made up of 12.5 mm plasterboard. It is also assumed that no fixings have been used. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

² The λ-values quoted for Styrozone N 300 and H 350 are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13164, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- Insulation boards may be laid directly over built-up felt, mastic asphalt or single-ply waterproofing membranes laid to the appropriate falls or outlets. (Where there may be a risk of plasticiser migration from the roof waterproofing an isolating layer of polypropylene or polyester plastic fibre sheet should be interposed between the roof covering and insulation boards. This provision is also applicable to mastic asphalt tanking specifications).
- Boards should be loose laid in a break bonded pattern, lightly butting the lapped edge joint detail.
- To prevent flotation, wind uplift and UV degradation, boards must be loaded with at least a 50 mm deep layer of washed rounded gravel nominal size 20 mm to 40 mm. Boards may be overlaid with a geotextile (a non-woven polyester or polypropylene with a minimum weight of 140 gm²) lapped 300 mm to allow the gravel ballast to be maintained at 50 mm. Without the inclusion of the geotextile the thickness of gravel ballast and **Styrozone™** board should be in the ratio of 1:1.
- Where concrete paving slabs are the preferred ballast these should be laid on cruciform supports (minimum base diameter 150 mm). Paviors 600 x 600 mm and 50 mm deep should be used for boards of all thicknesses.
- Where the possibility of flotation exists, every 10 mm increase in the insulant thickness above 40 mm should be reflected by a 5 mm slab thickness increase.
- A 75 mm peripheral margin of round washed pebbles should be allowed at parapet/roof projections when pavior ballast is adopted.
- Boards should be cut using a sharp knife or a fine toothed saw.
- **Kingspan Styrozone™ H 350/N 300** is also available for use in roof gardens and car park deck applications. For further details please contact our Technical Services Department.
- A 20% adjustment of thermal performance should be allowed for the cooling effect of rainwater draining beneath the boards in accordance with Section 3 BS 5250: 1989 (Control of Condensation in Buildings).



PROTECTED MEMBRANE CAR PARK DECKS

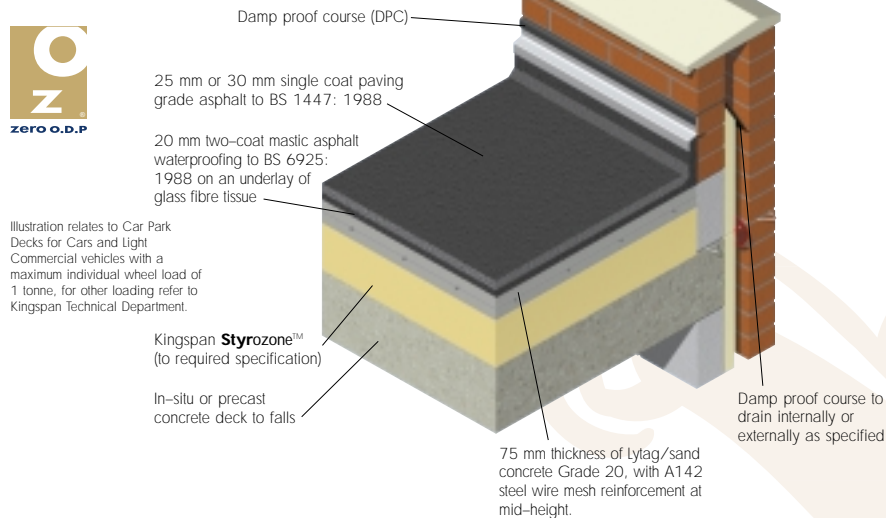
INTRODUCTION

Kingspan Styrozone™ N 500 R/N 700 R are recommended for use in protected membrane car park decks.

Kingspan Styrozone™ N 500 R/N 700 R are high performance rigid extruded polystyrene insulants that are manufactured without the use of CFCs/HCFCs and have zero Ozone Depletion Potential. The products have very high compressive strength and these closed cell structures makes them ideal for these applications as rigid extruded polystyrene is the only material approved for use where it will be subject to freeze/thaw and wetting/drying cycles.

Ideal for both new build and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Styrozone™ N 500 R/N 700 R	
Board Size (m)	1.25 x 0.6
Insulant Thickness (mm)	60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140,
Core	CFC/HCFC-free rigid extruded polystyrene
Fire Performance	Dependent on application
Profile	Rebated on all four edges

THERMAL PERFORMANCE

U-value (W/m ² .K) ¹	Kingspan Styrozone™ N 500 R	Kingspan Styrozone™ N 700 R
	Product Thickness (mm)	
0.45	75	75
0.35	100	100
0.25	160	160
0.22	190	190
Thermal Conductivity (λ-value) ² –	≤60 mm thickness, 0.034 W/m.K 60 < 120 mm thickness 0.037 W/m.K ≤140 mm thickness, 0.039 W/m.K	

¹ 250 mm concrete deck, insulation, 75 mm lytag/sand, concrete, mastic asphalt. Ceiling consists of skim coated single 12.5 mm layer of plasterboard with unvented cavity between it and the underside of the slab. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

² The λ-values quoted for Styrozone N 500 R / N 700 R are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13164, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- Before any work commences the concrete deck should be flat, free from ridges, hollows and indentations.
- Start laying boards from the point of access, the boards should be tightly butted with staggered joints leaving no gaps where they meet upstands i.e. rooflights.
- Lay 75 mm grade 20 concrete mix with A142 reinforcing mesh located mid depth.
- Overlay with glass tissue separating membrane.
- 20 mm two-coat mastic asphalt waterproofing to BS 6925: 1988.
- 25 mm or 30 mm single coat paving grade asphalt to BS 1447: 1988.



LIGHTWEIGHT PROTECTED MEMBRANE ROOFING (MAINTENANCE ACCESS)

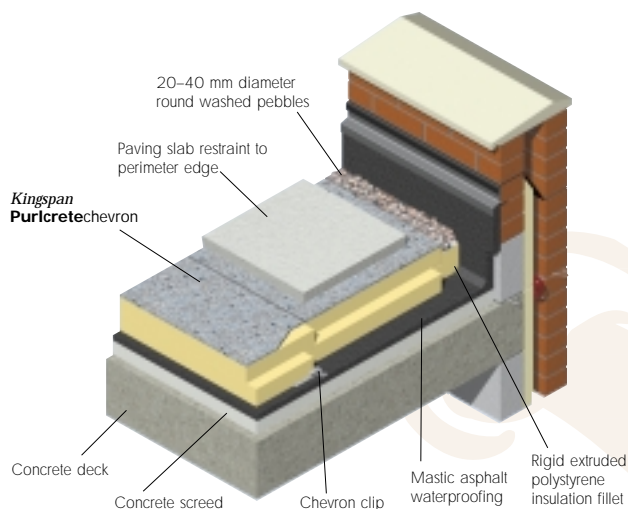
INTRODUCTION

Kingspan Purlcretechevron is recommended for use in lightweight protected membrane roofing where maintenance access is required.

A high performance rigid extruded polystyrene insulant/10 mm polymer fibre reinforced cementitious topped composite panel that is manufactured without the use of CFCs/HCFCs and has zero ODP. Weighing less than a quarter of the weight of traditional paving slabs (22–23 kg/m²) **Kingspan Purlcretechevron** ensures that roof loading is kept to a minimum. Achieving an FAA fire rating, the panels are rebated on all four edges offering excellent resistance to wind uplift.

Ideal for both new build and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Purlcretechevron	
Board Size (m)	1.20 x 0.6
Insulant Thickness ¹ (mm)	60, 70, 75, 80, 90, 100, 110, 120, 125, 130, 140, 145
10 mm Topping	10 mm Polymer fibre reinforced hydraulic cement
Core	CFC/HCFC-free rigid extruded polystyrene
Fire Performance	BS 476: Part 3: 1975 – FAA rating

THERMAL PERFORMANCE

U-value (W/m ² .K) ²	Kingspan Purlcretechevron ³ Product Thickness (mm)
0.45	70
0.35	90
0.25	130
0.22	150
Thermal Conductivity (λ-value) – Topping	1.4 W/m.K
Thermal Conductivity (λ-value) ⁴	0.029 W/m.K

¹ Thickness does not include 10 mm topping.

² 150 mm Concrete deck, 50 mm screed & mastic asphalt waterproofing. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

³ Product thickness = Insulant thickness + 10 mm topping.

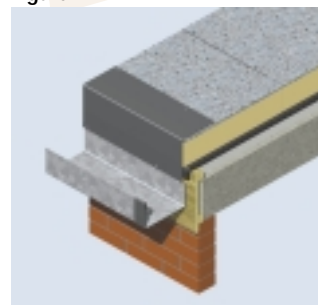
⁴ The λ-values quoted for Purlcretechevron are based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13164, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- Before any work commences the roof waterproofing should be completed and the roof completely watertight and wind stable. The roof should be graded to allow the correct falls to all rainwater outlets and the surface smooth without large projections steps or gaps.
- A full wind uplift calculation should be produced to verify the fixing specification over the roof. This should be assessed in accordance with BS 6399: Part 2: 1987 (Code of practice for wind loads). This service is available free of charge from our Technical Services Department.
- The design restraint of the **Kingspan Purlcretechevron** system when interlocked into an array can be up to five times the panel self weight. Please contact our Technical Services Department for further information.
- Full details of the laying procedure for this product should be obtained from our Technical Services Department.
- Double entry rainwater outlet or gullies should be specified to allow rainwater to be drained from the roof surface at both membrane and upper surface level.
- The boards have a pre-finished, durable, smooth upper surface and no further treatment is necessary, (suitable for maintenance access).
- To protect the upstand detail from UV light and thermal cycling Kingspan Purlcretechevron can be fitted vertically (see figure 2).
- The 75 mm peripheral margin should be insulated separately with extruded polystyrene and ballasted to prevent wind uplift.
- An allowance of 20% of the calculated thermal resistance should be made to compensate for saturated roofs during long periods of rain, in accordance with BS 5250: 1989 (Code of practice for control of condensation in buildings).
- Where the panels are perforated to allow pipes or other roof projections to pass through, holes should be cut cleanly using a masonry saw. If the stability of the roof is affected, additional restraint may be required.
- The roof deck should be close boarded to prevent any damage if used as a working platform after the system has been laid. On completion the roof should be swept clean and all debris removed.
- When ever work is interrupted free edges of the laid panels under which wind may be able to blow should be temporarily ballasted (if allowed) or adequately secured to avoid wind blow off of the partially completed roof area.



Figure 2



Alternative Upstand Detail

LIGHTWEIGHT PROTECTED MEMBRANE ROOFING (PEDESTRIAN ACCESS)

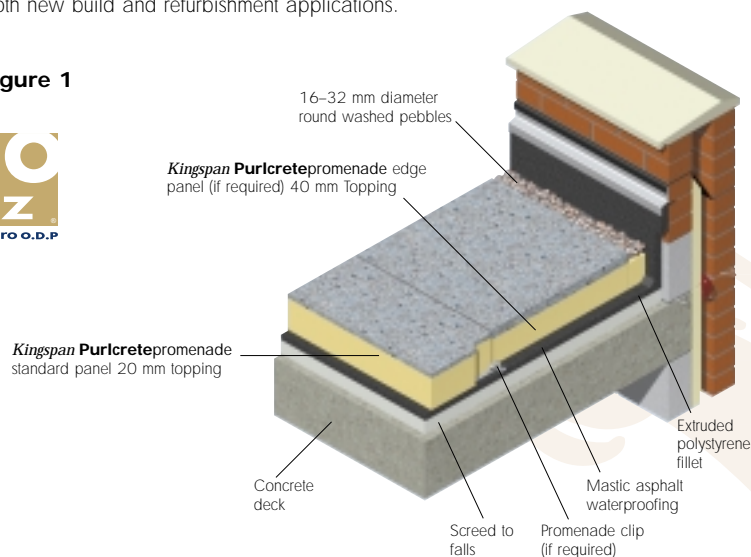
INTRODUCTION

Kingspan Purlcretepromenade is recommended for use in lightweight protected membrane roof constructions for pedestrian areas and terraces.

A high performance rigid extruded polystyrene insulant/20 mm polymer fibre reinforced cementitious topped composite panel that is manufactured without the use of CFCs/HCFCs and has zero Ozone Depletion Potential. Weighing less than half the weight of traditional paving slabs (41–43 kg/m³) **Kingspan Purlcretepromenade** ensures that roof loading is kept to a minimum. Achieving an FAA fire rating, the panels are rebated on all four edges offering excellent resistance to wind uplift.

With an attractive exposed aggregate finish **Kingspan Purlcretepromenade** is ideal for both new build and refurbishment applications.

Figure 1



PRODUCT DATA

Kingspan Purlcretepromenade	
Board Size (m)	0.6 x 0.6
Insulant Thickness ¹ (mm)	65, 70, 75, 80, 85, 90, 100, 110, 120, 130, 140, 145
20 mm Topping	20 mm polymer fibre reinforced hydraulic cement
Core	CFC/HCFC-free rigid extruded polystyrene
Fire Performance	BS 476: Part 3: 1975 – FAA rating

THERMAL PERFORMANCE

U-value (W/m ² .K) ²	Kingspan Purlcretepromenade ³ Product Thickness (mm)
0.45	85
0.35	110
0.25	145
0.22	165
Thermal Conductivity (λ-value) – Topping	1.4 W/m.K
Thermal Conductivity (λ-value) ⁴	0.029 W/m.K

¹ Thickness does not include 20 mm topping.

² 150 mm Concrete deck, 50 mm screed & mastic asphalt waterproofing. For the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored. It is also assumed that no fixings have been used.

³ Product thickness = insulant thickness + 20 mm topping.

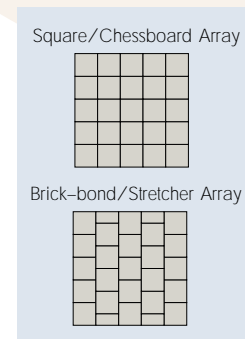
⁴ The λ-values quoted for Purlcretepromenade is based on the procedures for the determination of the aged values of thermal resistance and thermal conductivity, laid down by the harmonised European standard BS EN 13164, using so called 90/90 principles. Comparison with alternative products may not be appropriate unless the same procedures have been followed.

FIXING DETAILS

- Before any work commences the roof waterproofing should be completed and the roof completely watertight and wind stable. The roof should be graded to allow the correct falls to all rainwater outlets and the surface smooth without large projections steps or gaps.
- A full wind uplift calculation should be produced to verify the fixing specification over the roof. This should be assessed in accordance with BS 6399: Part 2: 1987 (code of practice for wind loadings). This service is available free of charge from our Technical Services Department.
- The design restraint of the **Kingspan Purlcretepromenade** system when interlocked into an array can be up to twice the panel self weight. Please contact our Technical Services Department for further information.
- The panels can be laid in either a square/chessboard array or a brick-bond/stretcher array see figure 2. Full details of the laying procedure for this product should be obtained from our Technical Services Department.
- Double entry rainwater outlet or gullies should be specified to allow rainwater to be drained from the roof surface at both membrane and upper surface level.
- The boards have a pre-finished, durable, smooth upper surface and no further treatment is necessary.
- **Kingspan Purlcretepromenade** is available in a range of colours subject to quantity. Please contact our Technical Services Department for further details.
- An allowance of 20% of the calculated resistance should be made to compensate for saturated roofs during long periods of rain, in accordance with BS 5250: 1989 (Control of Condensation in Buildings).
- The roof deck should be close boarded to prevent any damage if used as a working platform after the system has been laid. On completion the roof should be swept clean and all debris removed.
- The **Kingspan Purlcretepromenade** roofing system requires little or no maintenance. Periodic Clearance of gutter, rainwater outlet and removal of any build up of vegetation is good roofing practice.

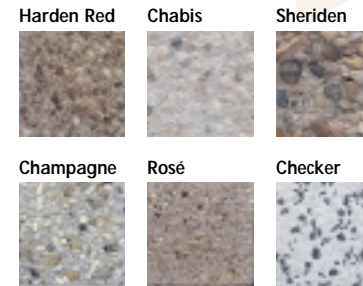


Figure 2



COLOUR AVAILABILITY

Kingspan Purlcretepromenade is available in the following range of colours subject to quantity. Please contact Kingspan Insulation for further information.



KINGSPAN INSULATION

Kingspan Insulation offers an extensive range of premium and high performance insulation products for the construction industry. Following an extensive investment programme, Kingspan Insulation is continuing to lead the insulation industry by manufacturing the majority of its insulation products with zero Ozone Depletion Potential (ODP) and quoting thermal performance data in accordance with the new harmonised European Standard.

Kingspan Insulation Limited specialise in the solution of insulation problems. Our range of insulation products which meet the exacting requirements of the construction industry are produced to the highest standards, including BS EN ISO 9002: 1994 and I.S. EN ISO 9001: 2000. Each product has been designed to fulfil a specific need and has been manufactured to precise standards and tolerances.

INSULATION FOR:

- | | |
|---|--|
| ● PITCHED ROOFS | INSULATED DRY LINING |
| ● FLAT ROOFS | TAPERED ROOFING SYSTEMS |
| ● CAVITY WALLS | <i>Kingspan KoolDuct</i> * |
| ● TIMBER AND STEEL FRAMING | PRE-INSULATED DUCTING |
| ● EXTERNALLY INSULATED CLADDING SYSTEMS | <i>Kingspan nilvent</i> [™]
BREATHABLE MEMBRANES |
| ● FLOORS | <i>Kingspan TEK</i> [™] BUILDING SYSTEM |
| ● SOFFITS | |

THE KINGSPAN INSULATION PRODUCT RANGE

THE KINGSPAN KOOLTHERM® K-RANGE

- With a thermal conductivity of 0.022–0.024 W/m.K rigid phenolic insulation is the most thermally efficient insulation product commonly available.
- Utilises the thinnest possible insulation board to achieve required U-values.
- Fire performance can be equivalent to mineral fibre.
- Achieves a Class O fire rating to the Building Regulations/Low risk.
- Achieves the best possible rating of <5% smoke emission when tested to BS 5111: Part 1: 1974.
- CFC-free/available CFC/HCFC-free with zero Ozone Depletion Potential subject to enquiry.

THE KINGSPAN THERMA ZERO ODP RANGE

- With a thermal conductivity of 0.022–0.028 W/m.K zero ODP rigid urethane insulation is one of the most thermally efficient insulation products commonly available.
- Easily achieves required U-values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC-free with zero Ozone Depletion Potential (ODP).

THE KINGSPAN STYROZONE™ & PURLCRETE ZERO ODP RANGES

- Rigid extruded polystyrene insulation (XPS) has the highest compressive strength of any commonly available insulant.
- Ideal for specialist applications such as inverted roofing and heavy-duty flooring.
- Easily achieves required U-values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC-free with zero Ozone Depletion Potential (ODP).

ALL PRODUCTS

- Their closed cell structure resists both moisture and water vapour ingress – problems which can be associated with open cell materials such as mineral fibre and which can result in reduced thermal performance.
- Unaffected by air movement – problems that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install – masks are not required, as Kingspan Insulation products do not produce loose dust or irritable fibres.
- Provide reliable long term thermal performance over the lifetime of the building.

NB

Kingspan Insulation reserve the right to amend product specifications without prior notice. Product thicknesses shown in this document should not be taken as being available ex-stock and reference should be made to the current Kingspan Insulation price-list or advice sought from Kingspan Insulation Sales department. The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a free Technical Advisory Service (see left) whose advice should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of the literature is current by contacting our Marketing Department (see above).