KNAUF INSULATION

August 2008: Issue 1

Non - Residential New Build
4.2.4 Flat Roofs

energy saving warmth quietness fire protection sustainability

Non-residential New Build

Flat Roof - Contents

Flat roofs

Solution optimiser and pathfinder

Advantages of flat roofs

Although many older flat roofs have often suffered a short life and high maintenance costs, if properly designed, using quality materials and installed by competent contractors flat roofs can offer a wide range of benefits that cannot be achieved with a traditional pitched roof:

- Flexibility of design
- Opportunities for recreational use and/or car parking
- The option of installing a green roof
- Accommodation of and access to plant

Flat roofs are defined as roofs with a pitch not exceeding 10° that have a continuously supported weatherproof finish. The choice of weatherproof finish includes single ply membranes, mastic asphalt and built-up roofing.

However, material choice is only one factor in the long-term performance of flat roofing. Experience has shown that the quality of design and workmanship play a critical role in the durability of flat roofs.

Key

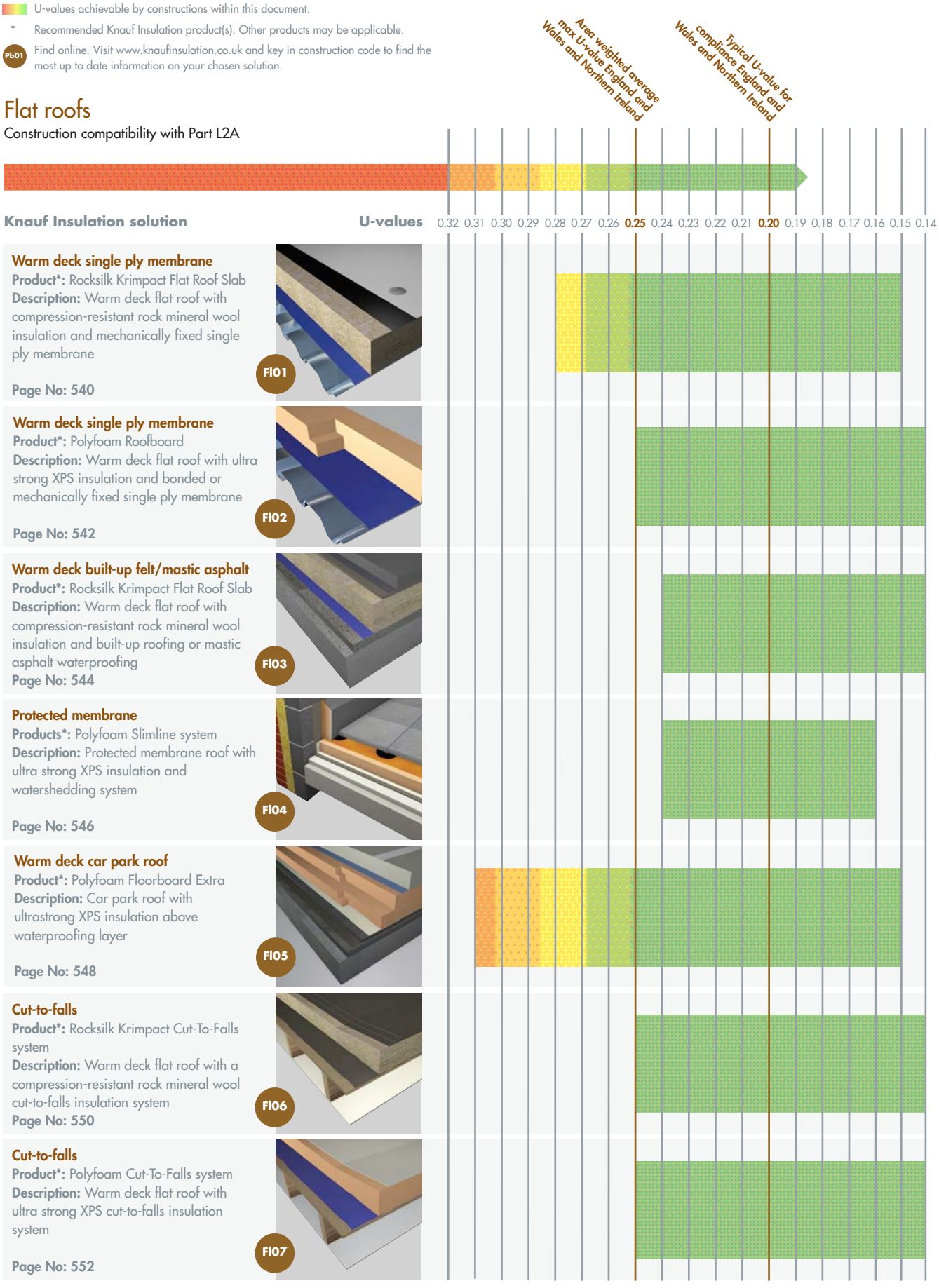
U-values achievable by constructions within this document.

* Recommended Knauf Insulation product(s). Other products may be applicable.

Pb01 Find online. Visit www.knaufinsulation.co.uk and key in construction code to find the most up to date information on your chosen solution.

Flat roofs

Construction compatibility with Part L2A



Knauf Insulation solution **U-values**

Warm deck single ply membrane
Product*: Rocksilk Krimpact Flat Roof Slab
Description: Warm deck flat roof with compression-resistant rock mineral wool insulation and mechanically fixed single ply membrane
Page No: 540

Warm deck single ply membrane
Product*: Polyfoam Roofboard
Description: Warm deck flat roof with ultra strong XPS insulation and bonded or mechanically fixed single ply membrane
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Warm deck built-up felt/mastic asphalt
Product*: Rocksilk Krimpact Flat Roof Slab
Description: Warm deck flat roof with compression-resistant rock mineral wool insulation and built-up roofing or mastic asphalt waterproofing
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Protected membrane
Products*: Polyfoam Slimline system
Description: Protected membrane roof with ultra strong XPS insulation and watershedding system
Page No: 546

Warm deck car park roof
Product*: Polyfoam Floorboard Extra
Description: Car park roof with ultrastrong XPS insulation above waterproofing layer
Page No: 548

Cut-to-falls
Product*: Rocksilk Krimpact Cut-To-Falls system
Description: Warm deck flat roof with a compression-resistant rock mineral wool cut-to-falls insulation system
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Cut-to-falls
Product*: Polyfoam Cut-To-Falls system
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Flat roofs

Flat roof design

For practical and cost reasons, flat roofs are a common type of roof construction for most non-residential buildings. A range of flat roof construction methods are available which provide thermal performance along with both acoustic and fire protection.

Knauf Insulation provide solutions for a wide range of flat roof systems, giving options that will comply with the Building Regulations and the required level of thermal performance. These systems include Single Ply, Built-Up Felt, Inverted/Protected Membrane and Cut-To-Falls and can be used with timber, metal and concrete decks.

Condensation

Thermal insulation and the flow of heat and water vapour through a construction are inextricably linked. The position of thermal insulation, vapour control layer and the need for ventilation must all be considered together. The likelihood of condensation occurring will depend on the U-value of the construction, the relative humidity and temperature of the internal environment and whether an effective vapour control layer has been provided. To prevent surface condensation, the roof must be kept above the dew point of the internal air with an appropriate thickness of insulation, correctly located. To prevent interstitial condensation, an effective vapour control layer must be provided on the warm side of the insulation.

Warm and cold roofs

The position of the thermal insulation related to the structural roof deck has created two basic categories of roof design:

- Warm roofs
- Cold roofs

A warm roof has the insulation above the structural deck, which is thus kept warm. The waterproof covering is above the insulation and a vapour control layer is placed below the insulation.

An inverted/protected membrane roof is a form of warm roof in which the insulation is placed above the waterproof covering (which also acts as a vapour control layer).

A cold roof has the insulation placed below the structural deck, which thus remains cold. This construction relies on a vapour barrier working effectively in tandem with a continuous flow of ventilation air to disperse the water vapour before it reaches the cold deck.

This section only considers warm roofs as follows:

- Warm roof with built-up felt or mastic asphalt roof covering
- Warm roof with single ply membrane
- Inverted/protected membrane roof

Roof loadings

The roof structure must be capable of supporting all of the associated loadings.
In addition, the wind pressure acting on the roof should be assessed in accordance with BS 6399: Part 2: 1997.

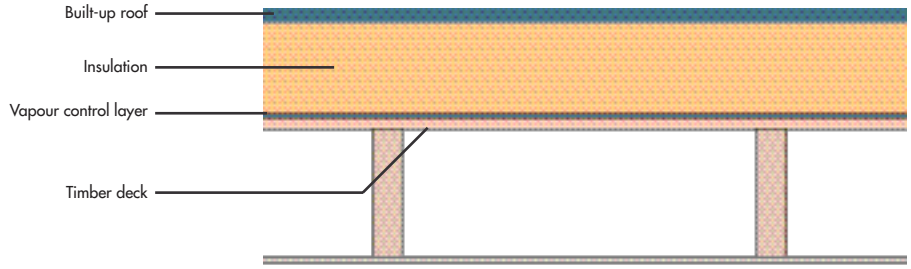
Drainage

Guidance on the number and size of rainwater outlets can be obtained from BS EN 12056-Part 3: 2000. The drainage and edge details should be installed as per the waterproofing membrane manufacturer's instructions.

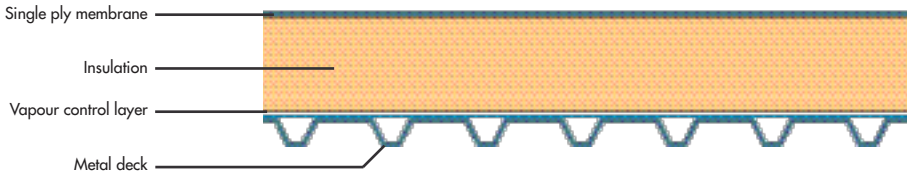
design detail finder
Knauf Insulation solutions for these types of construction can be found on pages 540-557

The three types of warm deck considered in this section

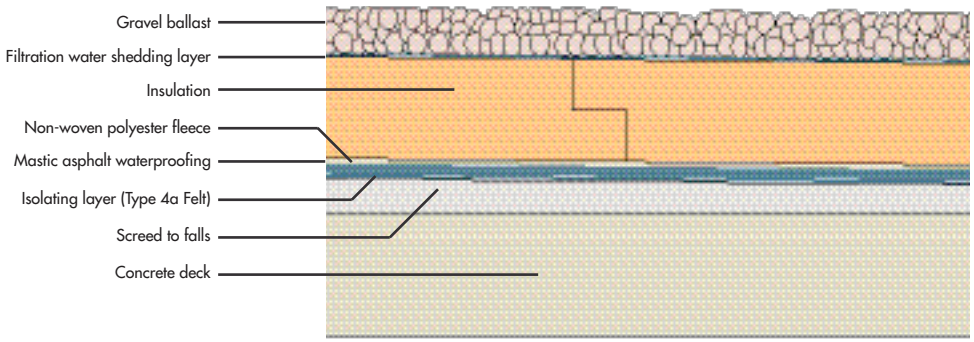
1. Warm deck – built-up roof



2. Warm deck – single ply membrane



3. Inverted/protected membrane roof – mastic asphalt waterproofing



Flat roofs

Flat roof design

Built-up felt/mastic asphalt

Concrete, timber and metal deck flat roofs can all be designed as warm roofs with a built-up felt or mastic asphalt roof covering. Installation of the roof covering should be in accordance with the manufacturer's instructions with due consideration being taken of fixing methods and wind uplift.

An integral part of a warm deck flat roofing system is the installation of the vapour control layer on the warm side of the insulation.

Single ply

Concrete, metal and timber deck flat roofs can all be designed as flat roofs with a single ply roof covering. Installation of the roof covering should be in accordance with the manufacturers instructions with due consideration being taken of fixing methods and wind uplift.

An integral part of a warm deck flat roofing system is the installation of the vapour control layer on the warm side of the insulation.

When insulation is placed over the deck, an insulant with a low rate of thermal expansion should be selected with adequate mechanical strength to resist the compressive and tensile loads during installation and in service. Differential movement can be avoided by laying a single ply waterproof membrane and mechanically fixing it through the insulation to the deck, using an approved fully bonded system or leaving the membrane loose and covering with ballast.

Refer to the Single Ply Roofing Association (SPRA) Design Guide for Single Ply Roofing for advice on alternative fixing methods.

Fixing of insulation/single membrane

Where the insulation is mechanically fixed rather than bonded to the roof deck, the wind uplift capability of the roof finish depends entirely on the mechanical fixing.

When mechanically fixed, the roof membrane may be temporarily lifted by wind suction.

It is advisable with mechanically fixed membranes, to ensure that all boards are fixed to the structural deck to avoid the boards moving out of place.

When mechanically fixing or fully bonding the membrane the systems should be designed to withstand the wind loadings calculated in accordance with BS 6399:2:1997.

Suitable mechanical fixings and adhesives are readily available for use with all types of deck.

PVC single ply membranes

Where extruded polystyrene insulation boards are used with a PVC membrane, a separating layer must be placed between the PVC membrane and the insulation to prevent plasticiser migration out of the membrane. This may take the form of a glass fibre or polyester fleece with a minimum density of 100 g/m^2, or a foil facing to the insulation board. An alternative is to use a membrane with an integrally bonded fleece backing. EPDM and polyolefin membranes do not require a separating layer.

Vapour control layers

The vapour control layer may take the form of a bitumen bonded felt, a nailed felt layer or a reinforced polyethylene sheeting. If in doubt please contact our Technical Advisory Centre on 01744 766666.

Protection of insulation during installation

To prevent moisture entrapment on or in the insulation boards it is essential to protect them during laying, before the application of the roof waterproofing, or to lay the roof covering at the same time as the board.

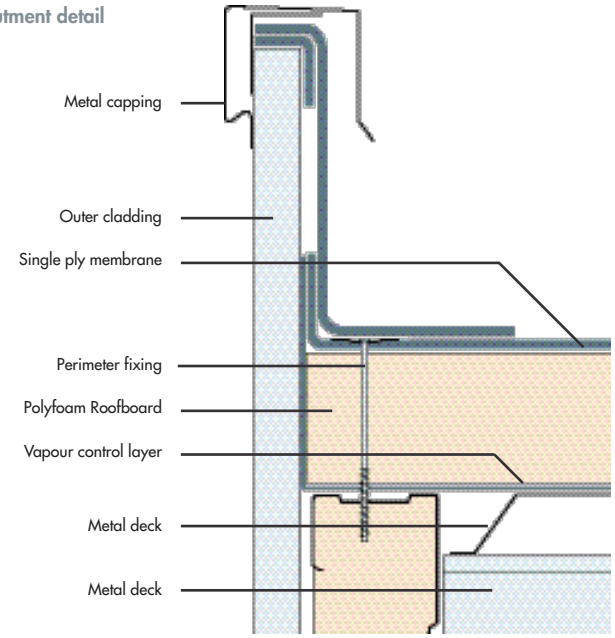
Standards

BS 6229:2003 is the code of practice for flat roofs with continuously supported coverings. It recommends these are inspected at least twice a year in spring and autumn as a minimum and also after events which may have had a detrimental effect on the roof covering, such as violent storms Workmanship is covered by BS 8000: Part 4: 1989.

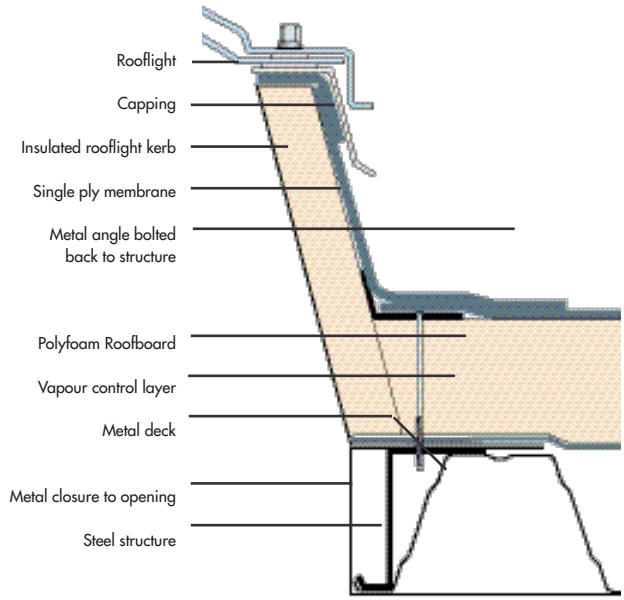
design detail finder
Knauf Insulation solutions for these types of construction can be found on pages 540-557

Example details for warm deck single ply roofs

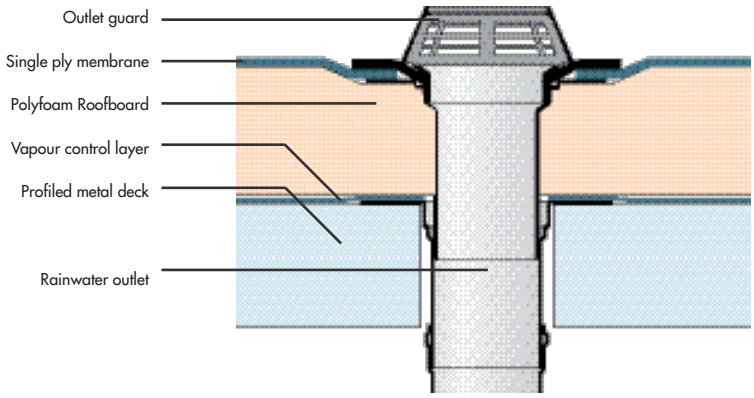
Abutment detail



Rooflight kerb detail



Drain outlet detail



Specify SPRA

The Single Ply Roofing Association (SPRA) represents membrane manufacturers, associated component manufacturers and specialist sub contractors and aims to ensure the delivery of best value single ply roofing systems, through a quality assured partnership.

By specifying products and specialist installation by SPRA members you can be assured that all parties meet strict quality criteria. Compliance with these criteria and with the Code of Conduct is assessed at application, by annual audit and by random spot checks. For further information and to obtain copies of the SPRA Design Guide and other documents visit www.spra.co.uk

SPRA Associate Member

Flat roofs

design detail finder
Knauf Insulation solutions for these types of construction can be found on pages 540-557

Flat roof design

Protected membrane /inverted roofs

With insulation placed above the waterproof membrane the latter is protected from extremes of temperature and thus shielded from excessive thermal stress, this will normally result in an extended life. An inverted/protected membrane roof places additional requirements on the thermal insulation which needs to have the following properties:

- Low water absorption in service (including freeze/thaw cycles)
- High compressive strength to withstand ballast load and support surface traffic

BS 6229:2003 recommends a minimum finished fall of 1:60 or 1:80 dependent on the waterproofing covering. In the absence of detailed analysis a fall equal to twice that of the minimum finished fall should be assumed for design purposes.

For roofs with slopes below 1:80 the asphalt waterproofing must be tanking grade and a separating membrane placed between the waterproofing and the insulation.

Where the filter membrane above the insulation also forms a water resistant layer, as in the Polyfoam Slimline system, there is an increase in run-off of surface water above the insulation. Care should be taken to ensure that the capacity and location of gulleys and outlets is sufficient. Further details can be found in BS EN 12056: Part 3.

Roof loadings

Inverted/protected membrane roofs can be constructed on concrete, timber or metal decks. The structure must be capable of supporting the weight of the loading layer to the satisfaction of the structural engineer.

The loading layer can be provided by washed, graded and rounded gravel of nominal diameter 20-40mm free from fines, or by dense concrete paving slabs or by a green/garden roof system.

A loading layer is necessary to prevent the insulation boards being lifted by high winds or floating as water drains from the roof. It also protects the insulation from the effects of UV light and contributes towards the roof fire rating. For heavily trafficked areas, concrete paving slabs should be used to form the loading layer.

Where gravel ballast is used paving slabs are required at exposed edges (i.e. edges without upstands or abutments) to negate the risk of wind uplift or wind scour (as shown in the design details overleaf).

Ballast depths can vary according to the insulation used in some systems. Table 3 sets out typical loadings for roofs insulated with the Polyfoam Slimline system.

For further details on dead and imposed loads refer to BS 6399-1: 1996. For wind loads refer to BS 6399-2: 1997.

Filter layer

A filter layer should be placed between the insulation and ballast layer to prevent fine grit being washed down to the waterproof membrane. The incorporation of the Polyfoam Slimline membrane layer improves the performance of the roofing system by restricting the flow of water below the insulation. This improves the thermal performance and has the added benefit of reducing the potential for insulation flotation which allows the thickness of the ballast layer to be reduced, thus reducing the overall weight of the roof.

Roof maintenance

As with all other types of roof the inverted/protected membrane roof will benefit from a regular schedule of inspection and routine maintenance. Areas of special concern are the membrane, rainwater outlets, gutters, flashings and other detail work.

The inspection should also include checks to ensure that the insulation and its loading layer are still positioned as installed. Weed growth should be eradicated with a water based weed killer.

Table 3: Weight and thickness of ballast with Polyfoam Slimline system

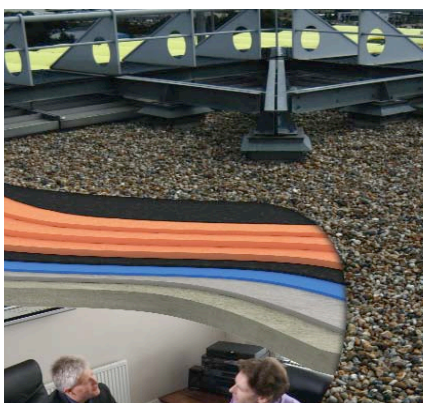
Ballast type	Thickness (mm)	Weight (kg/m²)
Gravel	50	80
Concrete slabs	50	125

Control of condensation in protected membrane roofs

Because the roof structure and membrane are both kept warm in an inverted/protected membrane roof, the risk of condensation is virtually eliminated. Nevertheless, condensation might occur on the underside of the deck if the deck is thin and has been cooled by water run-off during heavy and continuous rain or melting snow. This condensation will disperse when the heating system overcomes the temperature difference.

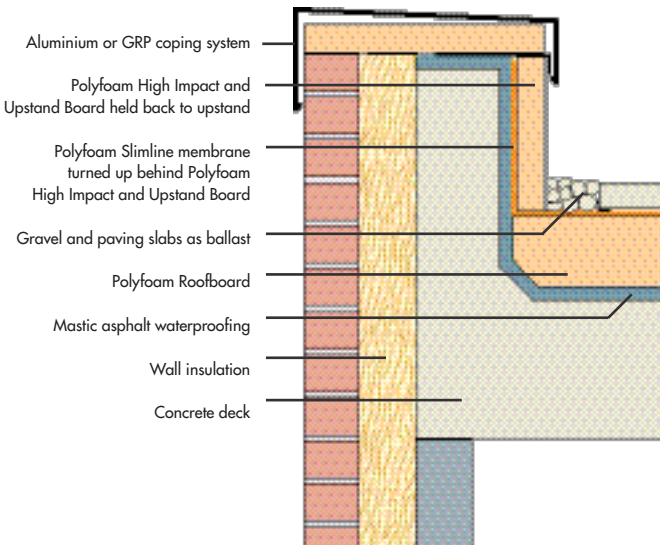
To help prevent the condensation from occurring ensure that the deck has a minimum R-value of 0.15 m²K/W. If the deck has a high thermal capacity it will not be rapidly cooled by rainwater. The proposed design should be assessed for condensation risk using the methods and information given in BS 6229: 1982 and BS 5250: 2002.

The Polyfoam Slimline system will shed the rainwater to the gutters before it can penetrate through the insulation layer to the waterproofed deck, therefore the condensation risk is considerably reduced if this system is adopted.

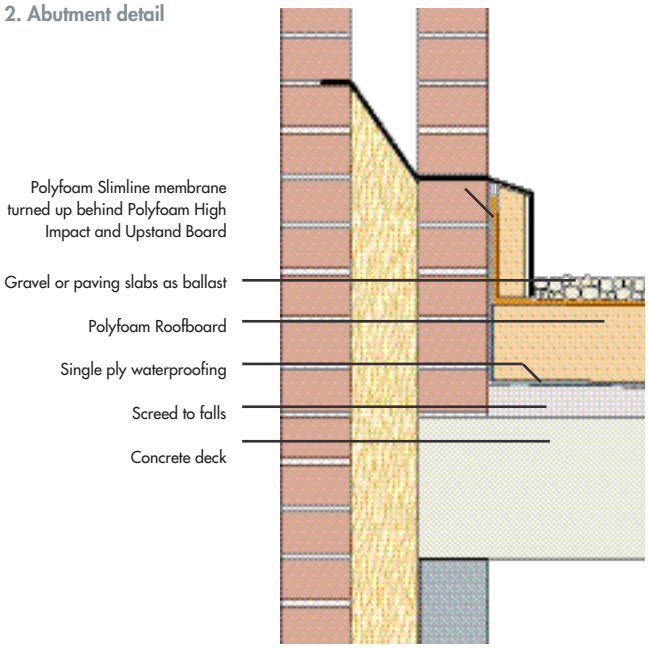


Example details for protected membrane roofs

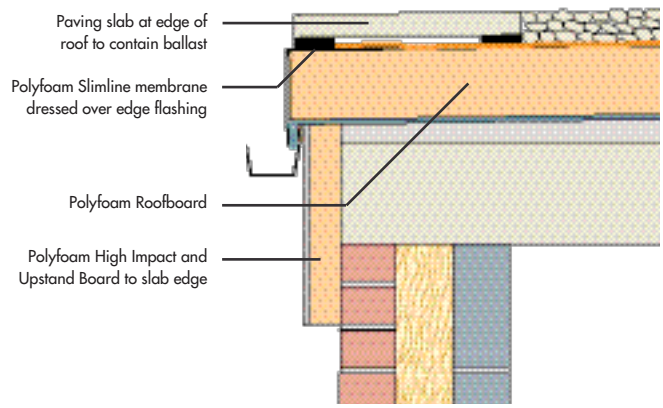
1. Parapet detail



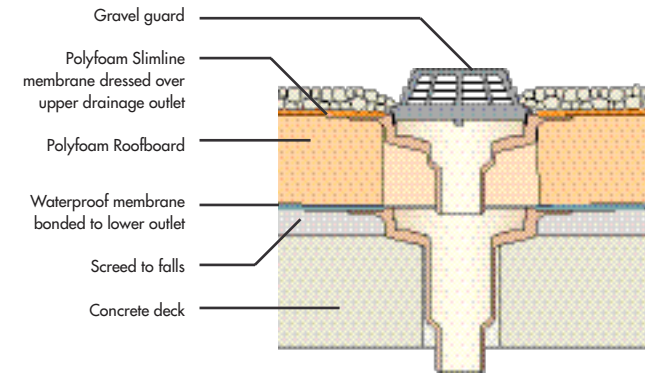
2. Abutment detail



3. Edge detail



4. Drain outlet detail



U-value calculations of inverted/protected membrane roofs

U-value calculations for inverted roofs must be corrected to allow for the impact of rainwater flowing between the insulation and the waterproofing membrane. This correction should be applied as set out in BS EN ISO 6946 Annex D.

The following procedures are applicable only to insulation made from extruded polystyrene (XPS). Refer to 'Symbols and units' for an explanation of the components considered in the following formula.

Correction due to water flowing between the insulation and the waterproofing membrane:

$$\Delta U = pfx \frac{(Ri)^2}{(Rt)^2}$$

ΔU is calculated to two decimal places.

ΔU less than 0.01 is considered as zero.

The correction is applied to the U-value which is calculated according to the conventions as set out in BR443 'Conventions for U-value calculations' BRE 2006 by subtracting the ΔU-value from the calculated U-value.

For the Polyfoam Slimline system using a single layer of insulation above the membrane with an open covering such as gravel f·x = 0.001.

This value is the tested and certified value of the Polyfoam Slimline system, any other solution would require material and system specific results to have comparable performance. Otherwise a value of 0.04 for f·x should be used for a single layer of insulation with open covering.

The Polyfoam Slimline system is third party certified by the British Board of Agrément.

BBA CERTIFICATE No 07/4418

Polyfoam Slimline System

Symbols and units

- f Drainage factor giving the fraction of p reaching the waterproofing membrane
- p Average rate of rain during the heating season, based upon data relevant for the location, eg, weather station, or given through local, regional or national regulation (unit: mm/day)
- x Factor for increased heat loss caused by rainwater flowing on the membrane (unit: (W·day)/(m^2K·mm)
- Ri Thermal resistance of the layer of Polyfoam insulation above the waterproofing membrane (unit: m^2K/W)
- Rt Total thermal resistance of the construction (unit: m^2K/W)
- ΔU Correction to the calculated U value of the construction, to take into account the extra heat loss caused by rainwater flowing through joints in the insulation and reaching the waterproofing membrane (unit: W/m^2K)

Flat roofs

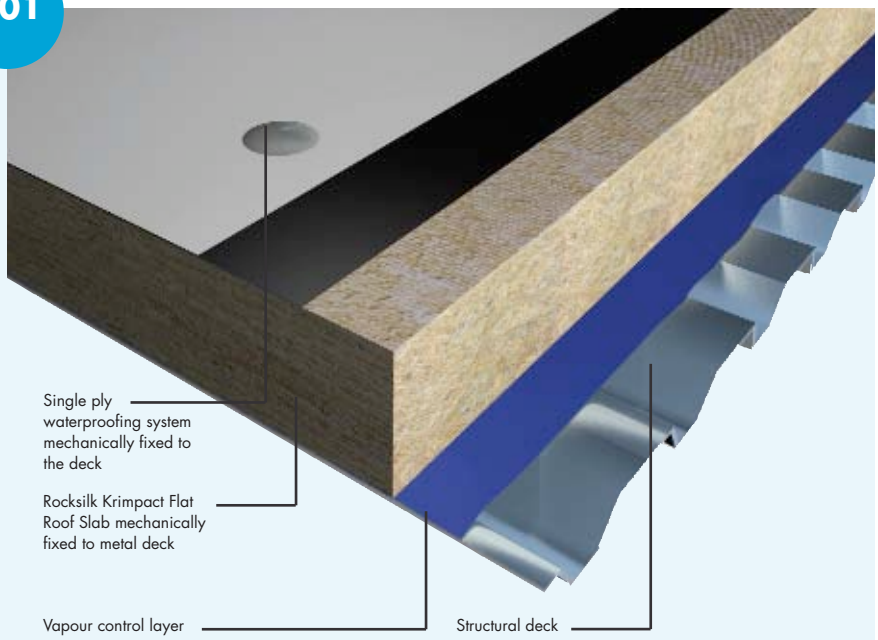
Warm deck single ply membrane

Rocksilk Krimpact Flat Roof Slab

FI01

Advantages

- ✓ **Compatible with all single ply membranes**
- ✓ **No requirement for separating layer with PVC single ply membranes**
- ✓ **Significantly improves acoustic performance of timber and metal decks and reduces the drumming effect of rainwater on lightweight roofs**
- ✓ **Non-combustible product with highest Euroclass A1 rating, enhancing the fire performance of the roof**
- ✓ **Interlocking nature of mineral wool ensures slabs knit together at joints ensuring no loss of thermal performance**



Products

Rocksilk Krimpact Flat Roof Slab is a high strength, consistent density, rigid, glass tissue faced rock mineral wool slab manufactured using Krimpact technology and specifically designed for use in flat roofing.

Rocksilk Krimpact Flat Roof Slab has sufficient compressive strength to be used where occasional loading and impact resistance is required.

Typical construction

Rocksilk Krimpact Flat Roof Slab is suitable for use on all types of roof deck. The slabs are laid over a vapour control membrane and mechanically fixed to the deck. The insulation is overlaid with a single ply membrane which is mechanically fixed.

Rocksilk Krimpact Flat Roof Slab is compatible with most PVC, EPDM and other types of mechanically fixed single ply waterproofing membrane systems. The advice of the single ply membrane manufacturer should be sought to confirm compatibility with specific membranes.

Installation

The vapour control layer should be laid over the structural deck and all joints lapped and bonded. Rocksilk Krimpact Flat Roof Slab is then laid in a staggered pattern from one corner of the roof. The orientation of the slabs is unimportant provided the constraints on spanning metal profiled decks are followed. The slabs and membrane should be mechanically fixed to the deck using specialist fixings such as those available from Ejot*. Typically two fixings equally spaced along the length and in the centre of each slab are required to secure the system in place.

*For information on EJOT fixings, contact 01977 687040

Performance

Standards

Rocksilk Krimpact Flat Roof Slab has been tested to the UEAtc Technical Guidelines MOAT No 50: 1992, Thermal insulation systems intended for supporting waterproofing membranes on flat and sloping roofs. It is classified B for mechanical performance – roof only accessible for purpose of maintenance and may be used without any restrictions.

Compressive resistance

Rocksilk Krimpact Flat Roof Slab has a compressive strength in excess of 75 kPa.

Thermal performance

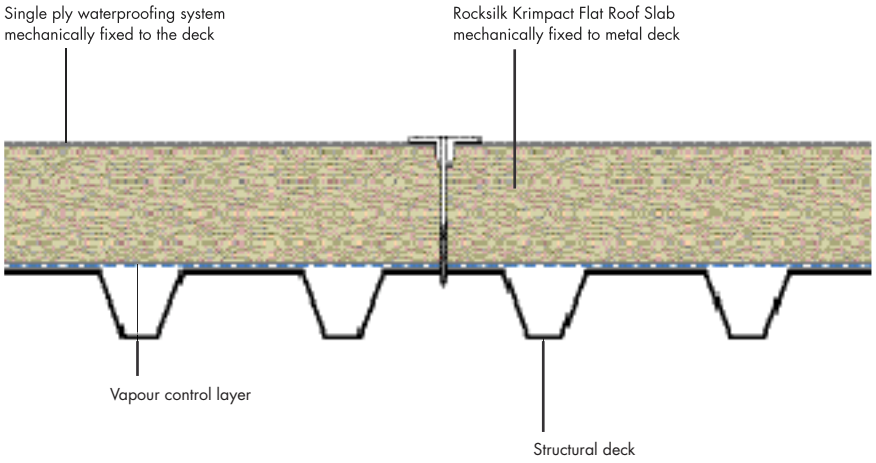
The thermal conductivity of Rocksilk Krimpact Flat Roof Slab is 0.038 W/mK.

Table 20 gives U-values for typical constructions insulated with Rocksilk Krimpact Flat Roof Slab.

Fire performance

Rocksilk Krimpact Flat Roof Slab is classified as A1 to BS EN ISO 13501-1, the best fire performing insulation. Rocksilk Krimpact Flat Roof Slab has a melting point of over 1000°C. In the event of fire it will emit negligible quantities of smoke and fumes. The heat emission from the products is insignificant.

Typical section



Typical specification

The vapour control membrane and Rocksilk Krimpact Flat Roof Slab, thickness .....mm to be mechanically fixed to the roof deck.
(*delete as required)

The single ply membrane should be applied over the insulation in accordance with the appropriate manufacturer's recommended specification.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J42, it contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Table 20: Typical U-values of warm deck single ply membrane roofs

Product		U-values (W/m²K)		
	Thickness (mm)	150mm concrete 40mm screed 13mm plaster	Profiled metal deck	19mm chipboard timber joists 12.5mm plasterboard
Rocksilk Krimpact Flat Roof Slab	245 (145 + 100)	0.15	0.15	0.15
	230 (130 + 100)	0.16	0.16	0.15
	225 (150 + 75)	0.16	0.17	0.16
	210 (130 + 80)	0.17	0.18	0.17
	200 (2 x 100)	0.18	0.19	0.17
	195 (145 + 50)	0.16	0.19	0.18
	180 (100 + 80)	0.20	0.21	0.19
	160	0.22	0.23	0.21
	150	0.23	0.25	0.22
	145	0.24	0.25	0.23
	130	0.26	0.28	0.25

Note: The U-values have been calculated to BS EN ISO 6946:1997.
For project specific calculations contact our Technical Advisory Centre on 01744 766666.

Flat roofs

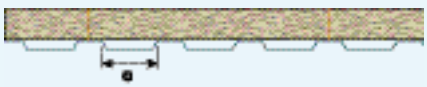
The profiles of metal deck roofs need to provide sufficient support for the insulation. The greater the thickness of insulation, the greater the span it can accommodate on profiled metal decks. Where the butt joint of Krimpact Flat Roof Slabs occurs along the top of the profiles then the maximum allowable span is (a), as shown in the table. Where the butt joint occurs over the troughs of the profiles then the maximum allowable span is (b), as shown in the table.

Note: Polyfoam solutions will perform at least as well as Rocksilk Krimpact Flat Roof Slab.

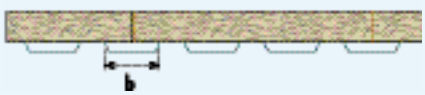
Table 20a: Maximum allowable span

Insulation thickness (mm)	Max span a (mm)	Max span b (mm)
140	400	280
120	360	240
100	300	200
70	170	140
50	170	120

Insulation slabs butt along tops of profiles



Insulation slabs butt over troughs



Flat roofs

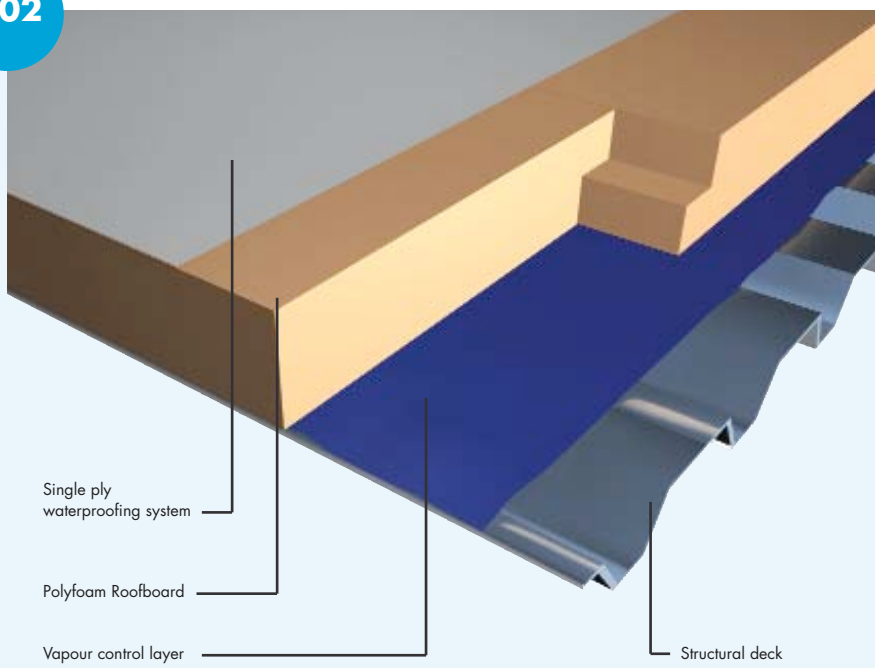
Warm deck single ply membrane

Polyfoam Roofboard

FI02

Advantages

- ✓ **Compressive strength of Polyfoam Roofboards offer future use potential for roof**
- ✓ **Rebated edges provide support across spans in profiled roof decks**
- ✓ **Rigid support of the water proofing membrane, reduces the risk of puncture on site**



Products

Polyfoam Roofboard Standard is 100% ozone friendly, extruded polystyrene, rigid board insulation it is lightweight, yet has excellent structural strength and long term effectiveness. It is supplied with interlocking rebated edges and is suitable for lightly trafficked flat roofs.

Polyfoam Foil Faced Roofboard is supplied foil faced on one side, for use where separation from the membrane is necessary.

Polyfoam Roofboard Extra is for use in medium trafficked flat roofs and in green and garden roofs - see pages 588-561.

Typical construction

Polyfoam Roofboards and Polyfoam Foil Faced Roofboards are suitable for use on all types of roof deck. The boards are laid over a vapour control layer and either mechanically fixed or bonded to the vapour control layer.

The insulation is overlaid with a single ply membrane which can be fully adhered to the insulation or mechanically fixed to the deck.

When using partially or fully bonded membrane systems, Polyfoam Roofboards should be mechanically fixed to the deck to withstand the calculated wind load. The waterproof membrane may then be bonded to the insulation using a polyurethane based adhesive in accordance with the membrane manufacturer's instructions. The advice of the waterproofing membrane manufacturer will be required for the precise fixing specification.

When using mechanically fixed membranes, Polyfoam Roofboards should be mechanically fixed to the deck.

Polyfoam Roofboards are suitable for use with most PVC (provided there is a separation layer between the board and membrane), EPDM and other types of single ply waterproof membrane systems. The advice of the single ply membrane manufacturer should be sought to confirm compatibility with specific membranes. Polyfoam Foil Faced Roofboard has been developed to eliminate the risk of plasticiser migration when a PVC membrane is used. It also provides protection for the insulation when solvent or heat welded membrane systems are used.

Installation

The vapour control layer should be laid over the structural deck and all joints lapped and bonded. If a PVC membrane is being used, Polyfoam Foil Faced Roofboard, or a suitable separating fleece layer, should be used.

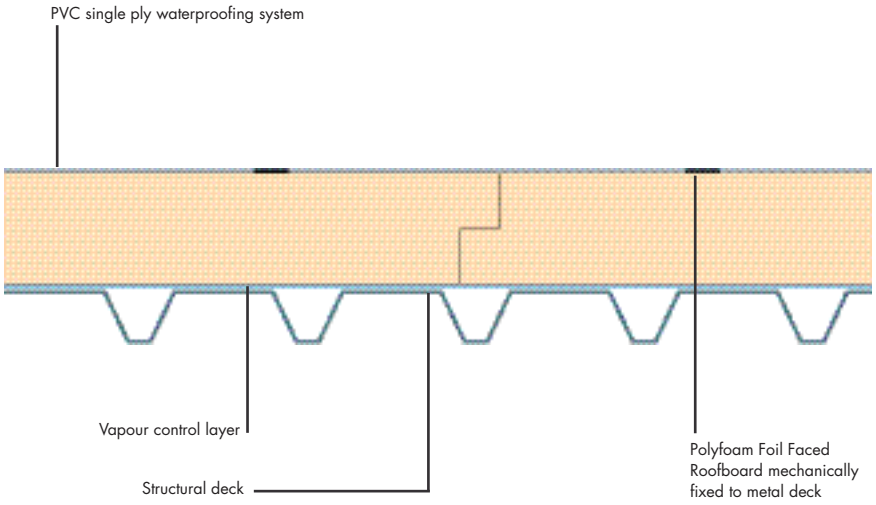
The boards are then laid in a staggered pattern from one corner of the roof.

In a bonded membrane system, each layer of Polyfoam Roofboard must be bonded as well as the waterproof membrane itself. A polyurethane based adhesive is recommended.

When a mechanically fixed membrane is being used, the Polyfoam Roofboard should be mechanically fixed to the deck with two centrally placed fixings in each board to secure the boards in place before the membrane is fixed.

When installing double layers of Polyfoam Roofboard, the second layer should be installed transversely to the first layer in order to minimise the number of coincident joints between the insulation boards. If required, one centrally placed mechanical fixing can be installed in the first layer prior to the installation and final fixing of the second layer. Both insulation layers should be laid in a staggered stretcher brick bond pattern.

Polyfoam Foil Faced Roofboard below a mechanically fixed single ply membrane



Typical specification

The vapour control layer and Polyfoam Roofboard Standard*/Polyfoam Roofboard Extra/ Polyfoam Foil Faced Roofboard*, ...mm thick, to be mechanically fixed*/adhered* to the roof deck

(*Delete as appropriate)

The single ply membrane should be applied over the insulation in accordance with the appropriate manufacturer's recommended specification.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J42 It contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Performance

Thermal performance

Polyfoam Roofboard Extra, Polyfoam Roofboard Standard and Polyfoam Foil Faced Roofboard have a thermal conductivity of 0.029W/mK up to a thickness of 120mm and 0.031W/mK above this. The actual performance in use is outlined in table 21.

Compression resistance

Polyfoam Roofboards are highly resistant to compression and withstand both occasional and long term static loads.

Knauf Insulation recommends a factor of safety of 3 for occasional loading (5 for long term static loads) is applied to the compressive strength of the product.

Moisture resistance

In many applications, Polyfoam Roofboards are installed above the waterproofing layer and thus exposed to rainwater, either in service or during construction. Polyfoam Roofboards are highly resistant to moisture and can be laid in standing water or up against wet concrete with negligible impact on the performance of the product.

Fire performance

When Polyfoam Roofboards are installed in a roof construction they will not contribute to the development stages of a fire.

Table 21: Typical U-values of warm deck single ply membrane roofs

Product	U-values (W/m²K)		
Thickness (mm)	150mm concrete 40mm screed 13mm plaster	Profiled metal deck	19mm chipboard timber joists 12.5mm plasterboard
Polyfoam Roofboard Standard/Extra and Polyfoam Foil Faced Roofboard			
200	0.15	0.15	0.14
190	0.15	0.16	0.15
180	0.16	0.17	0.16
170	0.17	0.18	0.17
160	0.18	0.19	0.18
150	0.19	0.20	0.19
140	0.20	0.22	0.20
130	0.22	0.23	0.21
120	0.22	0.23	0.22
110	0.24	0.25	0.23

Note: The U-values have been calculated to BS EN ISO 6946: 1997.

Flat roofs

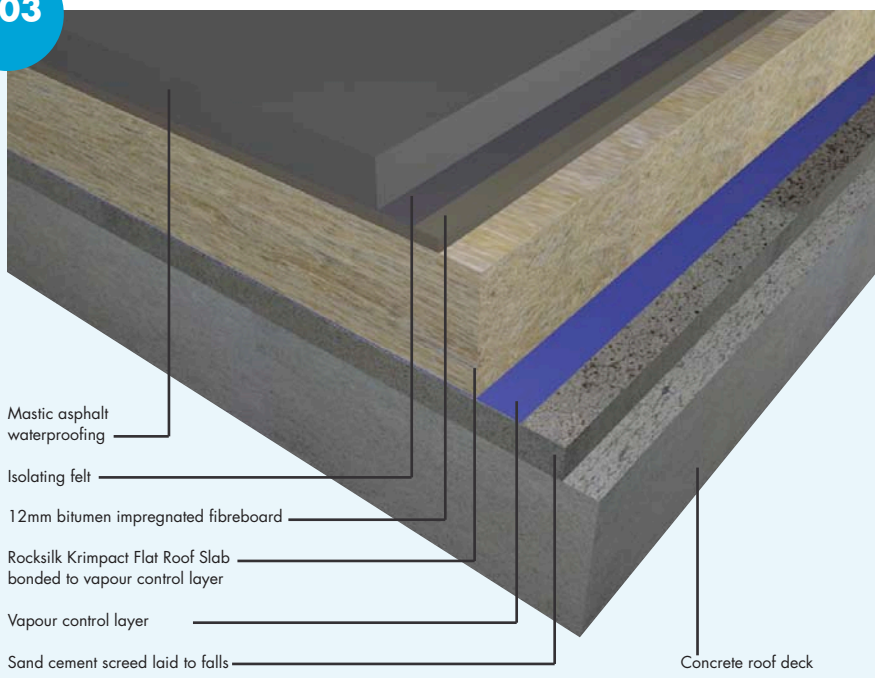
Warm deck built-up felt/mastic asphalt

Rocksilk Krimpact Flat Roof Slab

FI03

Advantages

- ✓ Improves acoustic performance
- ✓ Non-combustible product with highest Euroclass A1 rating
- ✓ Robust, consistent density solution
- ✓ Consistent compressive strength



Products

Rocksilk Krimpact Flat Roof Slab is a high strength, consistent density, rigid, glass tissue faced rock mineral wool slab manufactured using Krimpact technology and specifically designed for use in flat roofing.

Rocksilk Krimpact Flat Roof Slab has sufficient compressive strength to be used where occasional loading and impact resistance is required.

Typical construction

Rocksilk Krimpact Flat Roof Slab is suitable for use on all types of roof deck. The insulation slabs are laid staggered bond, butt jointed and bonded to the deck. The insulation is overlaid with a waterproof membrane consisting of either a fully bonded built-up bitumen roofing system, or mastic asphalt. When used with mastic asphalt, the insulation is overlaid with 12mm bitumen impregnated fibreboard and an isolating felt.

Installation

The vapour control layer and Rocksilk Krimpact Flat Roof Slab are both fully bonded in hot bitumen and then waterproofed.

Built-up felt membranes

High performance bitumen membrane systems are fully bonded in hot bitumen to the tissue faced Rocksilk Krimpact Flat Roof Slab using traditional roll and pour methods. Rocksilk Krimpact Flat Roof Slab is not suitable for the direct application of torch-on roofing felts.

Mastic asphalt surface

Rocksilk Krimpact Flat Roof Slab provides a stable base for mastic asphalt. The slabs should be overlaid with a 12mm layer of bitumen impregnated fibreboard. A bitumen felt (low grade is satisfactory) should be loose laid and bonded to the fibre board prior to the application of the mastic asphalt.

Performance

Standards

Rocksilk Krimpact Flat Roof Slab has been tested to the UEAtc Technical Guidelines MOAT No 50: 1992, Thermal insulation systems intended for supporting waterproofing membranes on flat and sloping roofs. It is classified B for mechanical performance – roof only accessible for purpose of maintenance and may be used without any restrictions.

Thermal performance

The thermal conductivity of Rocksilk Krimpact Flat Roof Slab is 0.038 W/mK.

Table 22 gives U-values for typical constructions insulated with Rocksilk Krimpact Flat Roof Slab.

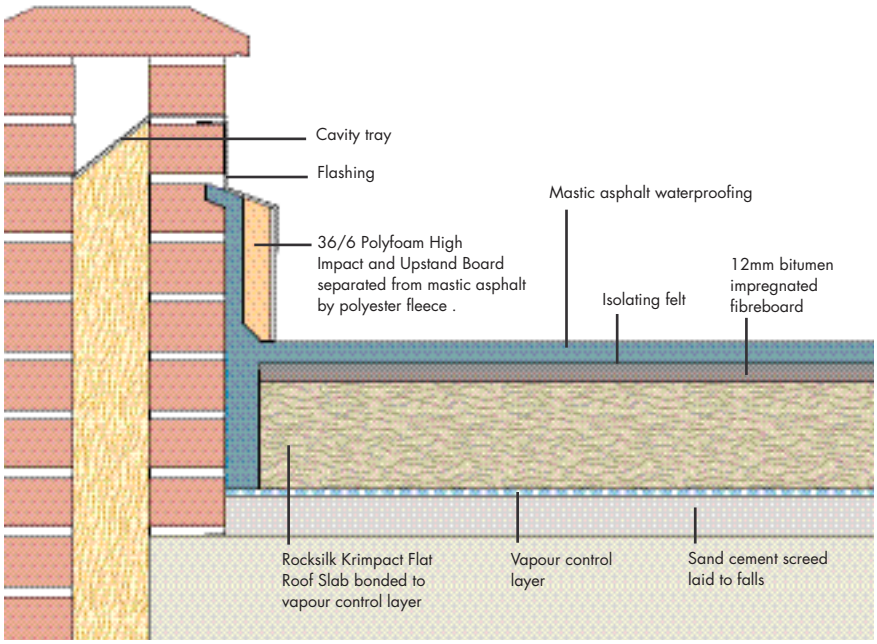
Compressive resistance

Rocksilk Krimpact Flat Roof Slab has a compressive strength in excess of 75 kPa.

Fire performance

Rocksilk Krimpact Flat Roof Slab is classified as Euroclass A1 to BS EN ISO 13501-1. Rocksilk products have a melting point of over 1000°C. In the event of fire they will emit negligible quantities of smoke and fumes. The heat emission from the products is insignificant.

Typical parapet



Typical specification

The vapour control layer and Rocksilk Krimpact Flat Roof Slab,.....mm thick to be fully bonded, with hot bitumen. (*Delete as appropriate) The waterproof membrane should be applied in accordance with the appropriate manufacturer's recommended specification.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J42, it contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Table 22: Typical U-values of flat roofs insulated with Rocksilk Krimpact Flat Roof Slab

	U-values (W/m²K)		
Thickness (mm)	150mm concrete 40mm screed 13mm plaster	Profiled metal deck	19mm chipboard timber joists 12.5mm plasterboard
230 (130 + 100)	0.15	0.15	0.15
220 (145 + 75)	0.16	0.16	0.15
210 (130 + 80)	0.16	0.17	0.16
200 (2 x 100)	0.17	0.18	0.17
195 (145 + 50)	0.18	0.18	0.17
180 (100 + 80)	0.19	0.19	0.18
160	0.22	0.23	0.21
150	0.23	0.25	0.22
145	0.24	0.25	0.23
130	0.26	0.28	0.25

Flat roofs

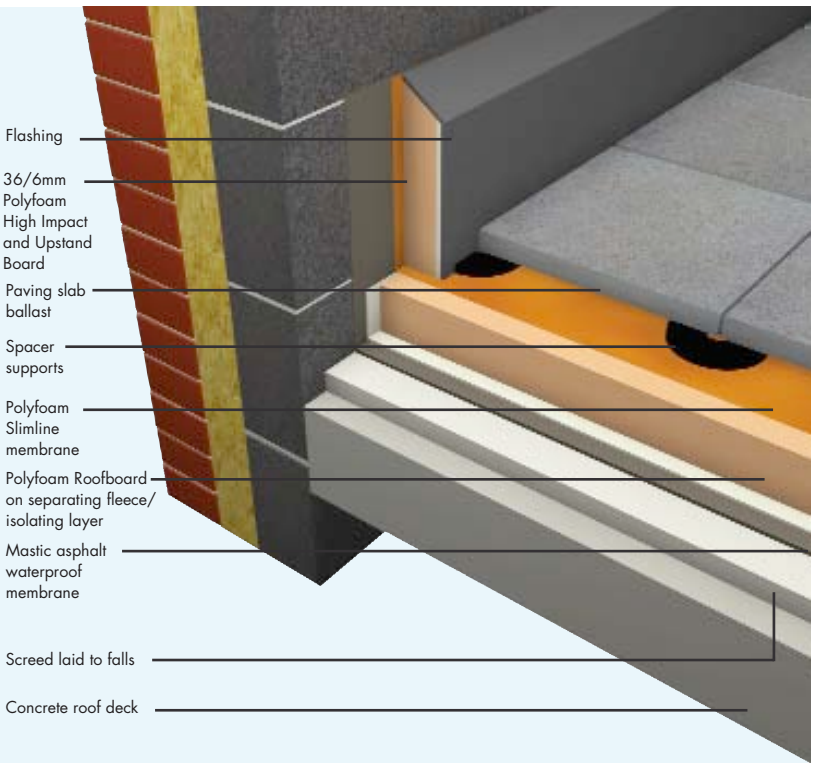
Protected membrane

Polyfoam Slimline System

FI04

Advantages

- ✓ **Polyfoam Slimline System achieves superior thermal performance compared to systems with a standard filtration membrane**
- ✓ **Protected membrane flat roofs using the Polyfoam Slimline system are lighter as less ballast is required**
- ✓ **Protects waterproofing membrane from UV degradation and temperature extremes increasing the membrane's in-service life**
- ✓ **Polyfoam Slimline System's thermal performance is unaffected by moisture**
- ✓ **Highly cost effective solution with high compressive strength, Extra grade able to support loading of paving slab supports**
- ✓ **Allows the creation of patios, roof terraces and balconies**
- ✓ **Polyfoam High Impact and Upstand Board supports this system with a simple, one-piece, easy cut upstand insulation solution**



Products

Polyfoam Roofboard is a range of 100% ozone friendly, extruded polystyrene, rigid insulation boards that are lightweight, yet have excellent structural strength and moisture resistance.

Polyfoam Slimline membrane is a high performance, non woven polypropylene geotextile membrane that prevents the passage of water and is vapour permeable.

Polyfoam High Impact and Upstand Board is a laminate of Polyfoam, extruded polystyrene, rigid board insulation and a tough, weather resistant fibre reinforced cement facing board. It provides a tough faced solution suitable for exterior use. Polyfoam High Impact and Upstand Board is square edged.

Typical construction

Protected membrane roof with ballast of gravel or paving slabs and the Polyfoam Slimline membrane in place of the standard filtration membrane. Polyfoam Slimline membrane:

- is water resistant, preventing cold rainwater reaching the waterproof membrane and so improving thermal performance
- allows water vapour from below to evaporate through the membrane
- reduces flotation, less ballast is required

Installation

The waterproofing membrane is laid on the roof deck in accordance with manufacturers instructions. The waterproofing membrane can be either reinforced bitumen membrane, polymeric single ply membrane, mastic asphalt or hot melt waterproofing system. The waterproof membrane must be free of loose gravel and grit before the insulation boards are laid.

On existing roofs, any existing chippings should be covered with a polyethylene cushion layer, such as Floorfoam.

For all mastic asphalt applications, a separating non woven polyester fleece – as defined in BS 8218:1998, and for PVC single ply membranes, a similar fleece or other approved separating layer, should be laid immediately below the insulation and turned up at all upstands to the top of any upstand insulation to isolate the Polyfoam from the waterproofing layer. If in doubt regarding the compatibility of the insulation and membrane contact Knauf Insulation Technical Advisory Centre or the membrane manufacturer.

The insulation boards should be laid in a staggered pattern from the point of access across the roof. It is important that all joints between boards are tight fitting and there are no gaps at the junctions with rooflights, upstands etc.

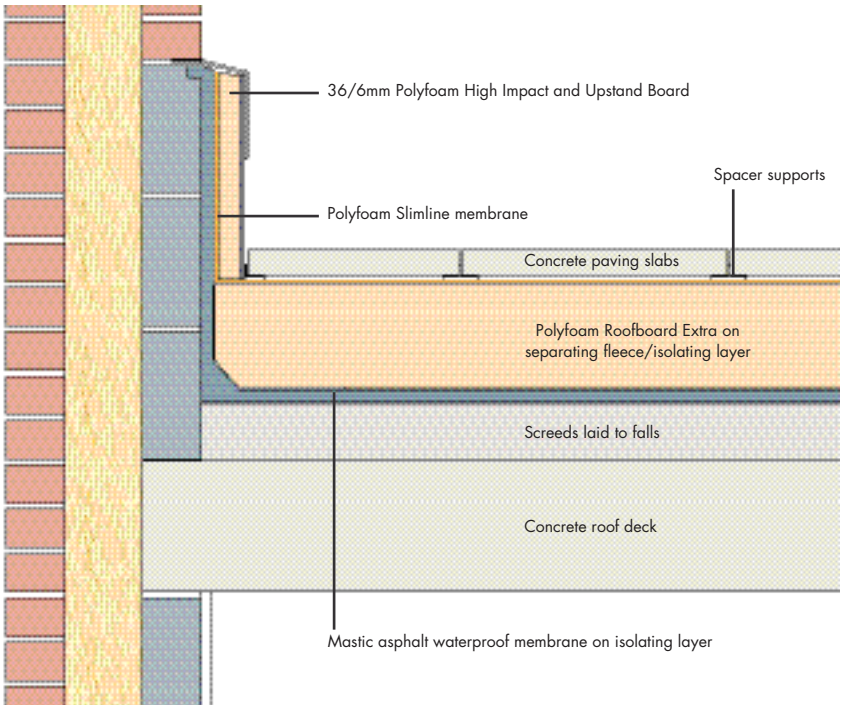
The Polyfoam Slimline membrane is loose laid over the insulation, at right angles to the slope, with 300mm side laps. At all upstands and penetrations, turn the membrane up so it finishes above the ballast level.

Gravel ballast is laid (using 20-40mm diameter gravel at 50mm depth) to prevent wind uplift. To create a roof terrace/patio area, paving slabs at 50mm thick are an alternative to gravel ballast – Polyfoam Roofboard Extra should be used for this application.

Each layer is laid on an advancing front in order to protect the membrane from mechanical damage as the materials are transported across the roof.

At upstands, fix Polyfoam High Impact and Upstand Board to the abutment using a suitable mechanical fixing or adhesive. Ensure the top exposed edge of insulation is protected from UV degradation using a suitable UV resistant flashing.

Typical detail with concrete paving ballast



Typical specification

The whole of the roof area, lined with a waterproof membrane to be insulated with Polyfoam Roofboard Standard*/Extra*/ Super*, ...mm thick. The insulation to be overlaid with Polyfoam Slimline membrane and covered with gravel ballast.*/ minimum 50mm thick paving slabs on spacers*.

The gravel to be washed, rounded and graded, free from sand and grit with a nominal diameter of 20 to 40mm and a minimum of 50mm deep.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J21, J41 or J42. It contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Performance

Compression resistance

Polyfoam Roofboards are highly resistant to compression and withstands both occasional and long term static loads.

Knauf Insulation recommends a factor of safety of 3 for occasional loading (5 for long term static loads) is applied to the compressive strength of the product.

The facing material of Polyfoam High Impact and Upstand Board is highly resistant to impact damage, offering an excellent robust lining.

Polyfoam Roofboard Extra or Super must be used in trafficked areas and where paving slabs are laid on spacers.

Moisture resistance

Polyfoam Roofboards are highly resistant to moisture and can be laid in standing water or up against wet concrete with negligible impact on the performance of the product.

The facing material of Polyfoam High Impact Board is moisture resistant.

Thermal performance

Polyfoam Roofboard Standard has a thermal conductivity of 0.029 W/mK.

Polyfoam Roofboard Extra up to 120mm thick has a thermal conductivity of 0.029 W/mK, and 0.031 W/mK above this.

Fire performance

When Polyfoam Roofboards are installed in a roof construction they will not contribute to the development stages of a fire.

Polyfoam High Impact and Upstand Board is faced with a 6mm fibre reinforced cement board which offers excellent fire performance as a facing material and Polyfoam insulation which contains a flame retardant to inhibit localised ignition.

The facing board is classified as Class 1 Surface Spread of Flame to BS 476: Part 7: 1987.

Table 24: Typical U-values of protected membrane roofs using Polyfoam Slimline System

Product	Thickness (mm)	U-values (W/m²K) 150mm concrete 40mm screed 13mm plaster
Polyfoam Roofboard Standard	170 (120 + 50)	0.16
Polyfoam Roofboard Extra	160 (110 + 50)	0.17
	150 (2 x 75)	0.18
	140	0.19
	130	0.21
	120	0.22
	110	0.24

Note: The U-values have been calculated to BS EN ISO 6946: 1997. For project specific calculations contact our Technical Advisory Centre on 01744 766666.

Flat roofs

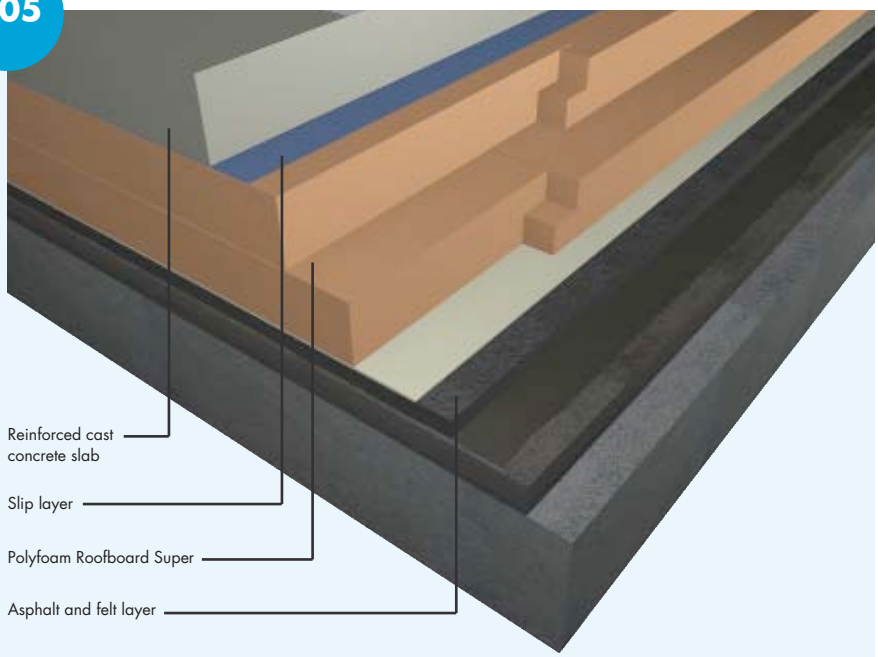
Warm deck car park roof

Polyfoam Roofboard

FI05

Advantages

- ✓ **Ultra strong Polyfoam Roofboard Super Insulation has the compressive strength to support the loads associated with a car park roof**
- ✓ **Protects waterproofing membrane during concrete casting, increasing its in-service life**
- ✓ **Thermal performance of Polyfoam Roofboard Super is unaffected by moisture**
- ✓ **Polyfoam Roofboard Super is lightweight so adds minimal weight to the roof**



Products

Polyfoam Roofboard Super is a 100% ozone friendly, extruded polystyrene, rigid board insulation. It is lightweight, yet has excellent structural strength and long term effectiveness. It is supplied with interlocking rebated edges

Typical construction

A structural concrete deck designed as a car park roof is to be waterproofed. Polyfoam Roofboard Super sits on top of the waterproof layer and is then covered with a structural reinforced concrete slab to withstand heavy loading and traffic.

Installation

Cover the whole of the roof deck with a waterproofing layer. Lay Polyfoam Roofboard Super onto this layer (using a non woven polyester fleece separation layer if the waterproofing layer is PVC based or asphalt). Stagger the joints of the boards and ensure the interlocking rebates are tightly pushed together.

Cover the insulation with a slip layer and a reinforced cast concrete slab designed to withstand the expected load of vehicle traffic.

Finish slab as required for car park deck.

Performance

Compression resistance

All materials are compressed under load. If the roof is going to be transformed from a limited access waste of space into a useful space the insulation must be capable of accommodating applied loads.

Polyfoam Roofboard Super is highly resistant to compression and withstands both occasional and long term static loads.

Knauf Insulation recommends a factor of safety of 3 for occasional loading (5 for long term static loads) is applied to the compressive strength of the product.

Moisture resistance

In many applications, Polyfoam Roofboard Super is installed above the waterproofing layer and thus exposed to rainwater, either in service or during construction.

The board is highly resistant to moisture and can be laid in standing water or up against wet concrete with negligible impact on the performance of the product.

Thermal performance

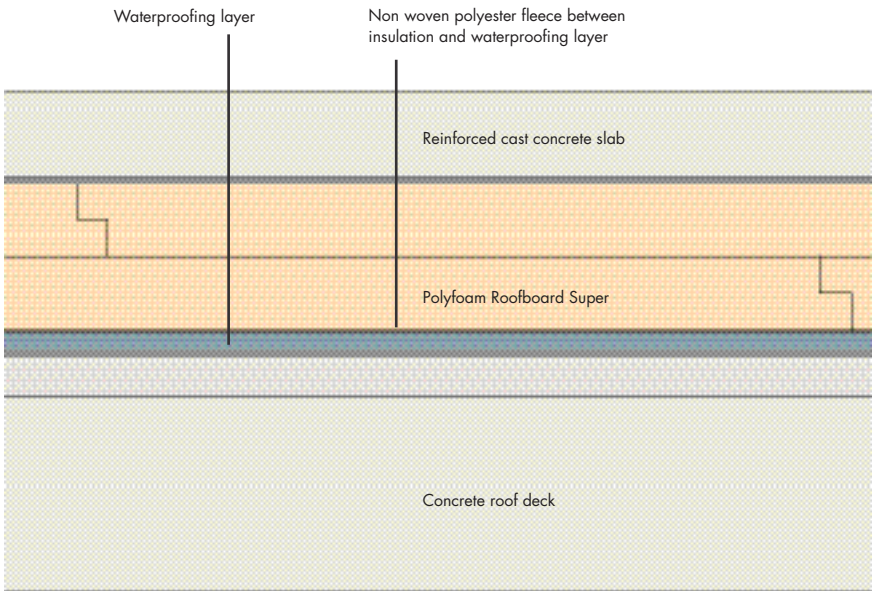
The thermal conductivity of Polyfoam Roofboard Super varies from 0.034 to 0.036 W/mK depending on thickness.

The actual performance in use is outlined in Table 25 (opposite).

Fire performance

When Polyfoam Roofboard Super is installed in a roof construction it will not contribute to the development stages of a fire.

Typical section



Typical specification

The whole of the roof area covered with a waterproofing layer to be insulated using Polyfoam Roofboard Super ....mm thick. The insulation to be covered with a .....mm reinforced concrete slab. Finish slab as required for car park deck.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J21, J41 or J42. It contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Table 25: Typical U-values of car park roofs

Product		U-values (W/m²K)
	Thickness (mm)	150mm concrete 40mm screed 13mm plaster
Polyfoam Roofboard Super		
	225 (3 x 75)	0.15
	200 (2 x 100)	0.17
	175 (100 + 75)	0.19
	150 (2 x 75)	0.21
	125 (75 + 50)	0.25
	100	0.31

Note: 100mm Cast concrete slab finish assumed. The U-values have been calculated to BS EN ISO 6946: 1997. For project specific calculations contact our Technical Advisory Centre on 01744 766666

Flat roofs

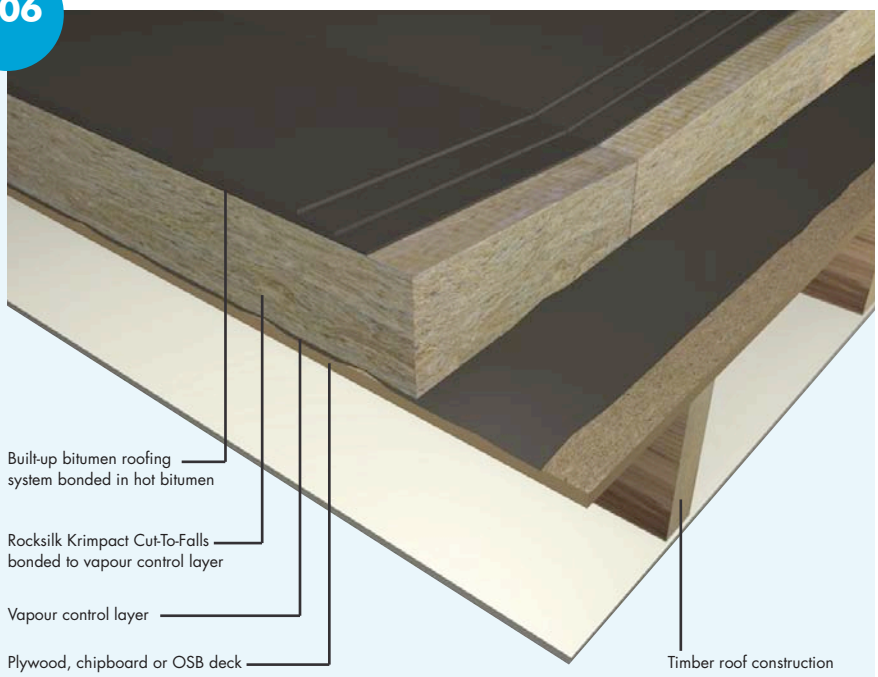
Cut-To-falls

Rocksilk Krimpact Flat Roof Slab

FI06

Advantages

- ✓ Provides for a fall either where deck was designed to be flat, or does not provide the designed fall when constructed.
- ✓ Ideal method for upgrading roofs with ponding problems
- ✓ Significantly improves acoustic performance of timber and metal decks and absorbs 'rainwater drumming' noise
- ✓ Non-combustible product with highest Euroclass A1 rating
- ✓ Supported by specialist design service and installation advice
- ✓ Bespoke system designed to meet the needs of each individual project



Products

Rocksilk Krimpact Cut-To-Falls is a system of tapered, pre-cut, compression resistant insulation slabs made from rock mineral wool. The slabs are supplied pre-cut to the required falls, normally 1:60 or 1:40 (BS 6229 requires a minimum fall of 1:80 to be achieved on built-up roofs, so normal practice is to design at a greater fall to allow for deflection of the deck or other site problems).

Typical construction

Rocksilk Krimpact Cut-To-Falls is suitable for use on all types of roof deck. The insulation slabs are laid over and fully bonded to a vapour control layer which is bonded to the roof deck. The insulation is overlaid with a waterproof membrane consisting of either a fully bonded built-up bitumen roofing system, a single ply membrane or mastic asphalt. When used with mastic asphalt, the insulation is overlaid with 12mm bitumen impregnated fibreboard and an isolating felt.

Installation

Rocksilk Krimpact Cut-To-Falls slabs are numbered and supplied with a laying scheme for their application. These will be produced by Knauf Insulation from scale drawings supplied by the client. Rocksilk Krimpact Cut-To-Falls is not just a product but a comprehensive service from design to delivery.

Timber decks

The vapour barrier can be either nailed to the timber deck as defined in BS 8217: 1994, or bitumen bonded using traditional techniques.

Built-up felt membranes

Where Rocksilk Cut-To-Falls is used in a bonded membrane system, tissue faced slabs should be used. High performance bitumen membrane systems are fully bonded in hot bitumen to the tissue faced Rocksilk Cut-To-Falls slabs using traditional roll and pour methods.

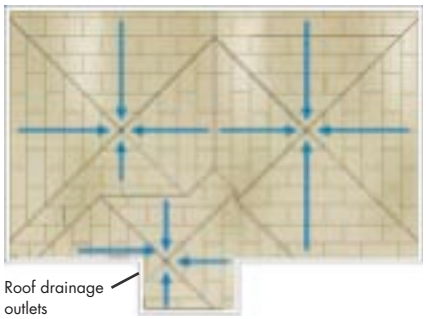
Mastic asphalt surface

Rocksilk Cut-To-Falls slabs provide a stable base for mastic asphalt. The slabs should be overlaid with a 12mm layer of bitumen impregnated fibreboard. A bitumen felt (low grade is satisfactory) should be loose laid without bonding onto the fibreboard prior to the application of the mastic asphalt.

Single ply membranes

These should be fixed in accordance with the manufacturer's recommendations.

Typical example of cut-to-falls plan



Performance

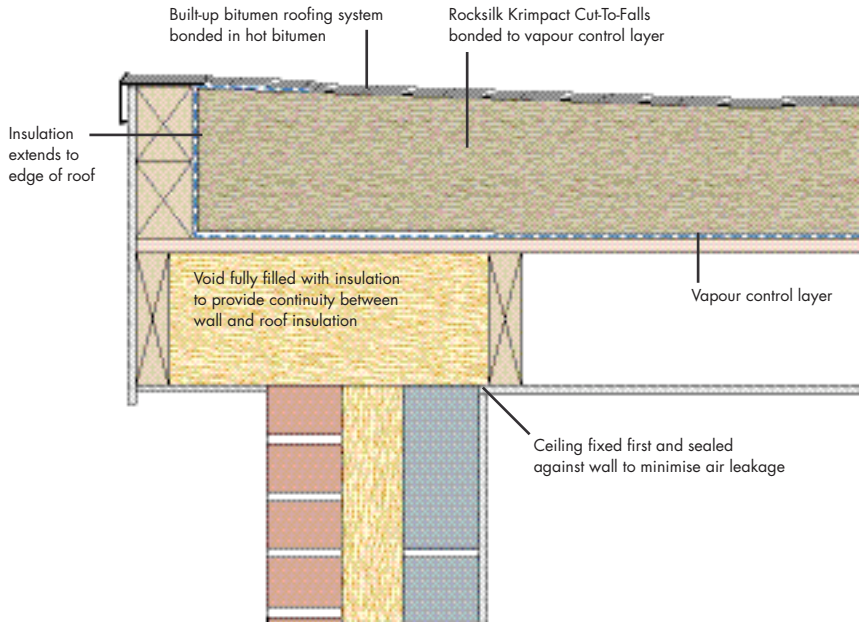
Standards

Rocksilk Krimpact Cut-To-Falls has been tested to the UEAtc Technical Guidelines MOAT No 50: 1992, Thermal insulation systems intended for supporting waterproofing membranes on flat and sloping roofs. It is classified B for mechanical performance – roof only accessible for purpose of maintenance and may be used without any restrictions.

Compressive resistance

Rocksilk Krimpact Cut-To-Falls has a compressive strength in excess of 75 kPa.

Typical verge detail



Typical specification

The vapour control layer and Rocksilk Krimpact Cut-To-Falls .....mm thick to be fully bonded, with hot bitumen. Rocksilk Krimpact Cut-To-Falls should be laid in accordance with the laying scheme supplied. The waterproof membrane should be applied in accordance with the appropriate manufacturer's recommended specification.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J41. It contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Thermal performance

The thermal conductivity of Rocksilk Krimpact Cut-To-Falls is 0.038 W/mK.

Table 26 (right) shows the U-values achieved for typical constructions insulated with various thicknesses of Rocksilk Cut-To-Falls Slabs. Because the thickness of insulation varies across the entire roof in cut to falls schemes, the U-value varies across the whole roof, being best and worse where the greatest and least thickness of insulation occurs, respectively. Every scheme is different and the average U-value for the entire roof can only be calculated when the scheme of falls has been designed. The cut to falls scheme designers will then set the minimum thickness so that the average U-value for the entire roof meets the designers or Building Regulations requirements. This table is a useful reference to determine what the highest possible minimum thickness of insulation would be to achieve a specific U-value, in reality it will be less. The thermal performance of a cut-to-falls roof is based on the overall U-value of the roof system, which is a function of the individual tapers and the respective areas as detailed in BS 6946:1997

Table 26: Typical U-values of flat roofs

Product	U-values (W/m²K)			
	Thickness (mm)	150mm concrete 40mm screed 13mm plaster	Profiled metal deck	19mm chipboard timber joists 12.5mm plasterboard
Rocksilk Krimpact Cut-To-Falls				
	245	0.15	0.15	0.14
	230	0.16	0.16	0.15
	215	0.17	0.17	0.16
	205	0.17	0.18	0.17
	190	0.19	0.19	0.18
	180	0.20	0.21	0.19
	170	0.21	0.22	0.20
	160	0.22	0.23	0.21
	150	0.23	0.24	0.22
	145	0.24	0.25	0.23

Note: U-value calculations based on the installation of a single ply membrane and are calculated for the specific indicated thickness of Rocksilk Krimpact Cut-to-Falls Slab.
For project specific calculations contact our Technical Advisory Centre on 01744 766666.

Fire performance

Rocksilk Cut-To-Falls is classified as Euroclass A1 to BS EN ISO 13501-1, this is the highest fire rating possible for an insulation product to achieve. Rocksilk products have a melting point of over 1000°C. In the event of fire they will emit negligible quantities of smoke and fumes. The heat emission from the products is insignificant.

For general technical enquiries on cut to falls roofing, contact the Knauf Insulation Technical Advisory Centre on 01744 766666. For a quotation on a specific project please contact Knauf Insulation Sales on 0844 800 0135.

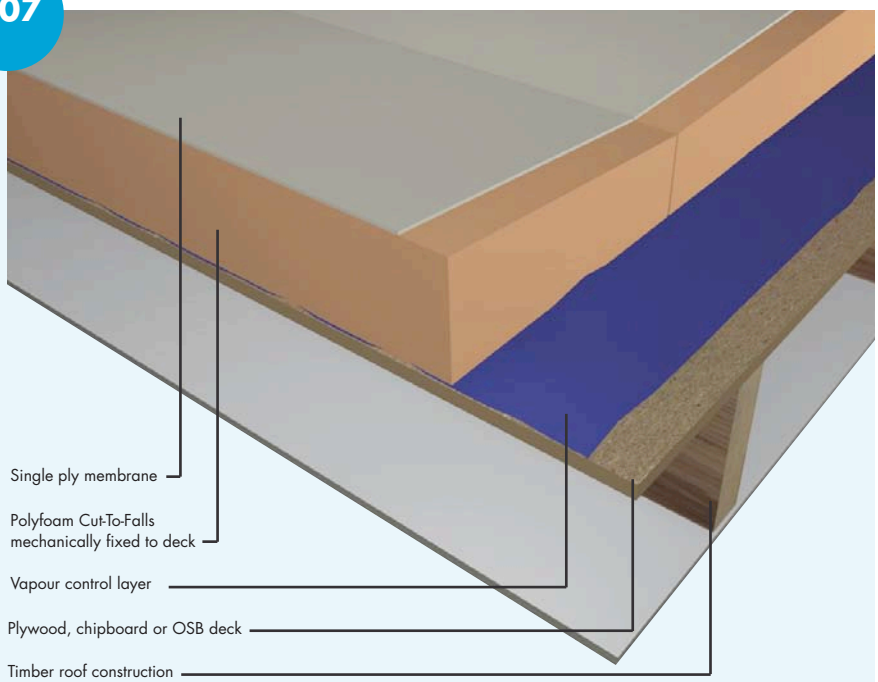
Flat roofs

Cut-To-falls

FI07

Advantages

- ✓ **Provides for a fall either where deck was designed to be flat, or does not provide the designed fall when constructed.**
- ✓ **Ideal method for upgrading roofs with ponding problems**
- ✓ **For a purpose-designed trafficked warm roof, Polyfoam Cut-To-Falls is the ideal robust insulant**
- ✓ **Supported by specialist design service with installation advice**
- ✓ **Bespoke system designed to meet the needs of each individual project**



Products

Polyfoam Cut-To-Falls is a specially designed system of pre-cut, tapered, 100% ozone friendly, extruded polystyrene rigid board insulation. Typical board sizes are 1200 x 600 mm and cut to suit any fall scheme, though most are either 1:40 or 1:60 (BS 6229 requires a minimum fall of 1:80 to be achieved on built-up roofs, so normal practice is to design at a greater fall to allow for deflection of the deck or other site problems).
The boards are straight edged and can be supplied with a foil facing to suit PVC single ply membrane applications.

Typical construction

Polyfoam Cut-To-Falls boards are suitable for use on all types of roof deck.

The boards are laid over a vapour control layer and mechanically fixed or bonded to the deck.

The insulation is overlaid with a single ply membrane which can be fully adhered to the insulation or mechanically fixed to the deck.

When using partially or fully bonded membrane systems, Polyfoam Cut-To-Falls boards should be mechanically fixed to the deck to withstand the calculated wind load.

The waterproof membrane may then be bonded to the insulation using a polyurethane based adhesive in accordance with the membrane manufacturer's instructions. The advice of the waterproofing membrane manufacturer will be required for the precise fixing specification.

When using mechanically fixed membranes, Polyfoam Cut-To-Falls boards should be mechanically fixed to the deck.

Polyfoam Cut-To-Falls is suitable for use with most PVC membranes (providing there is a separation layer between the board and the membrane), EPDM and other types of single ply waterproof membrane systems. The advice of the single ply membrane manufacturer should be sought to confirm compatibility with specific membranes. Polyfoam Foil Faced Cut-To-Falls has been developed to eliminate the risk of plasticiser migration when a PVC membrane is used.
It also provides protection for the insulation when solvent or heat welded membrane systems are used.

Installation

The vapour control layer should be laid over the structural deck and all joints lapped and bonded. Polyfoam Cut-To-Falls boards are numbered and supplied with a laying scheme for their application.

Each component will be marked on the diagram and should be laid as indicated starting at, and working away from, the drainage outlet.

In a bonded membrane system, each layer of the Polyfoam Cut-To-Falls scheme must be bonded as well as the waterproof membrane itself.

When a mechanically fixed membrane is being used, the Polyfoam Cut-To-Falls boards should be mechanically fixed to the deck with two centrally placed fixings in each board to secure the boards in place before the membrane is fixed.

Performance

Compression resistance

Polyfoam Cut-To-Falls is highly resistant to compression and can be specified to withstand both occasional and long term static loads.

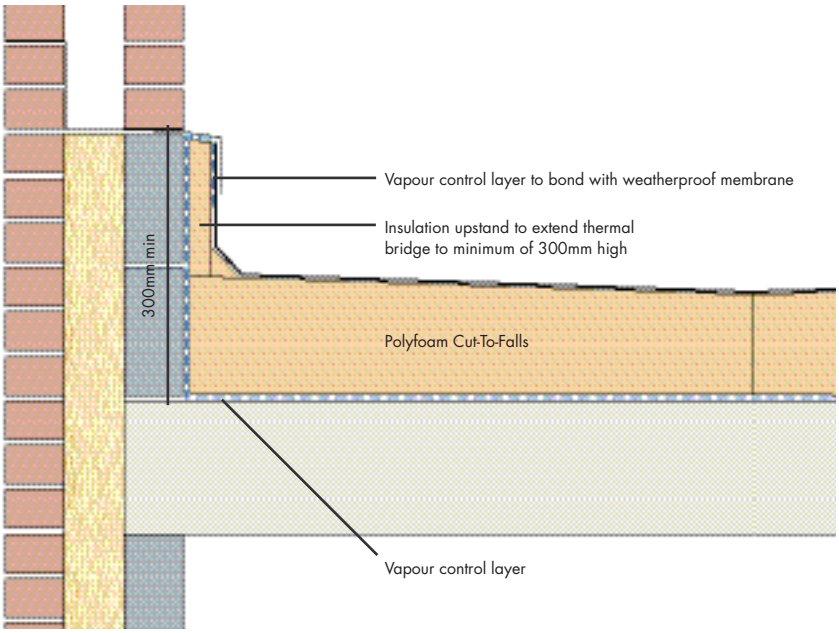
Moisture resistance

Polyfoam Cut-To-Falls boards are resistant to moisture absorption and can be laid in standing water or up against wet concrete with negligible impact on the performance of the product.

Thermal performance

Polyfoam Cut-To-Falls has a thermal conductivity of 0.029 W/mK.

Typical abutment detail with concrete deck



Typical specification

The vapour control layer and Polyfoam Cut-To-Falls to be mechanically fixed*/ adhered* to the roof deck.

(*delete as required)

Polyfoam Cut-To-Falls should be laid in accordance with the laying scheme supplied.

The waterproof membrane should be applied in accordance with the appropriate manufacturer's recommended specification.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J42. It contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Table 27 (right) shows the U-value achieved for typical constructions insulated with various thicknesses of Polyfoam Cut-To-Falls products. Because the thickness of insulation varies across the entire roof in cut to falls schemes the U-value varies across the whole roof, being best and worse where the greatest and least thickness of insulation occurs respectively. Every scheme is different and the average U-value for the entire roof can only be calculated when the scheme of falls has been designed. The cut-to-falls scheme designers will then set the minimum thickness so that the average U-value for the entire roof meets the designers or Building Regulations requirements. This table is a useful reference to determine what the highest possible minimum thickness of insulation would be to achieve a specific U-value, in reality it will be less.

The thermal performance of a cut-to-falls roof is based on the overall U-value of the roof system, which is a function of the individual tapers and the respective areas as detailed in BS 6946:1997.

Table 27: Typical U-values of flat roofs insulated with Polyfoam Cut-To-Falls

Product	U-values (W/m²K)		
Thickness (mm)	150mm concrete 40mm screed 13mm plaster	Profiled metal deck	19mm chipboard timber joists 12.5mm plasterboard
Polyfoam Cut-To-Falls			
190	0.14	0.15	0.14
180	0.15	0.16	0.15
170	0.16	0.17	0.16
160	0.17	0.18	0.17
150	0.18	0.19	0.18
140	0.19	0.20	0.19
130	0.21	0.22	0.20
120	0.22	0.23	0.21
110	0.24	0.25	0.23

Note: For project specific calculations contact our Technical Advisory Centre on 01744 766666

Fire performance

When Polyfoam Cut-To-Falls is installed in a roof construction it will not contribute to the development stages of a fire. When overlaid with a single ply membrane the performance of the finished roof will depend on the membrane used. Please consult the membrane supplier for further details.

For general technical enquiries on cut-to-falls roofing, contact the Knauf Insulation Technical Advisory Centre on 01744 766666. For a quotation on a specific project please contact Knauf Insulation Sales on 0844 800 0135.

Flat roofs

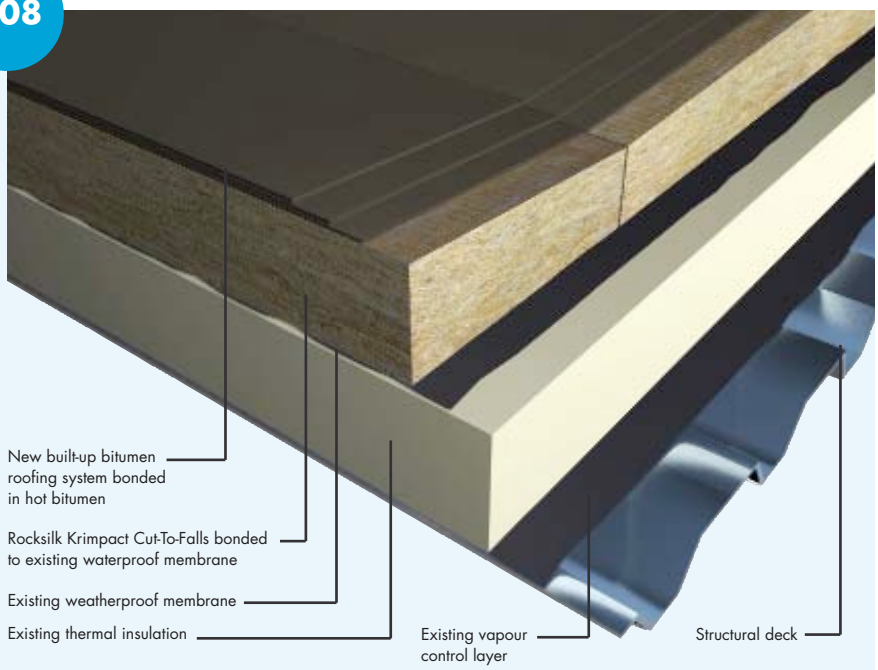
Existing warm roof cut-to-falls upgrade

Rocksilk Krimpact Flat Roof Slab

FI08

Advantages

- ✓ Ideal method for upgrading roofs with ponding problems
- ✓ Significantly improves acoustic performance of timber and metal decks
- ✓ Non-combustible product with highest Euroclass A1 rating
- ✓ Supported by specialist design and installation advice
- ✓ Bespoke system designed to meet the needs of each individual project



Products

Rocksilk Krimpact Cut-To-Falls is a system of pre-cut, tapered, high density insulation slabs made from rock mineral wool. The slabs are supplied pre-cut to the required falls, normally 1:60 or 1:40 (BS 6229 requires a minimum fall of 1:80 to be achieved on built-up roofs, so normal practice is to design at a greater fall to allow for deflection of the deck or other site problems).

Typical construction

Rocksilk Krimpact Cut-To-Falls can be used to both upgrade the thermal insulation of an existing roof and also provide improved drainage. A survey of the existing roof should establish whether the existing waterproof membrane and thermal insulation are in a suitable condition for retention, or if they need to be completely replaced. The existing roof structure should be checked to ensure that the additional loads can be supported safely. Knauf Insulation recommends that condensation analysis is carried out where any existing thermal insulation is retained.

Installation

The insulation slabs are laid over and fully bonded to either the existing roof membrane, or to a new vapour control layer. The insulation is overlaid with a waterproof membrane consisting of either a fully bonded built-up bitumen roofing system, single ply membrane or mastic asphalt.

Built-up felt membranes

Where Rocksilk Krimpact Cut-To-Falls Slab is used in a bonded membrane system, tissue faced slabs should be used. High performance bitumen membrane systems are fully bonded in hot bitumen to the tissue faced Rocksilk Krimpact Cut-To-Falls slabs using traditional roll and pour methods.

Mastic asphalt surface

Rocksilk Krimpact Cut-To-Falls Slabs provide a stable base for mastic asphalt. The slabs should be overlaid with a 12mm layer of bitumen impregnated fibreboard. A bitumen felt (low grade is satisfactory) should be loose laid without bonding onto the fibreboard prior to the application of two layers of mastic asphalt.

Single ply membranes

These should be fixed in accordance with the manufacturer's recommendations.

Performance

Standards

Rocksilk Krimpact Cut-To-Falls Slab has been tested to the UEAtc Technical Guidelines MOAT No 50: 1992, Thermal insulation systems intended for supporting waterproofing membranes on flat and sloping roofs. It is classified B for mechanical performance – roof only accessible for purpose of maintenance and may be used without any restrictions.

Compressive resistance

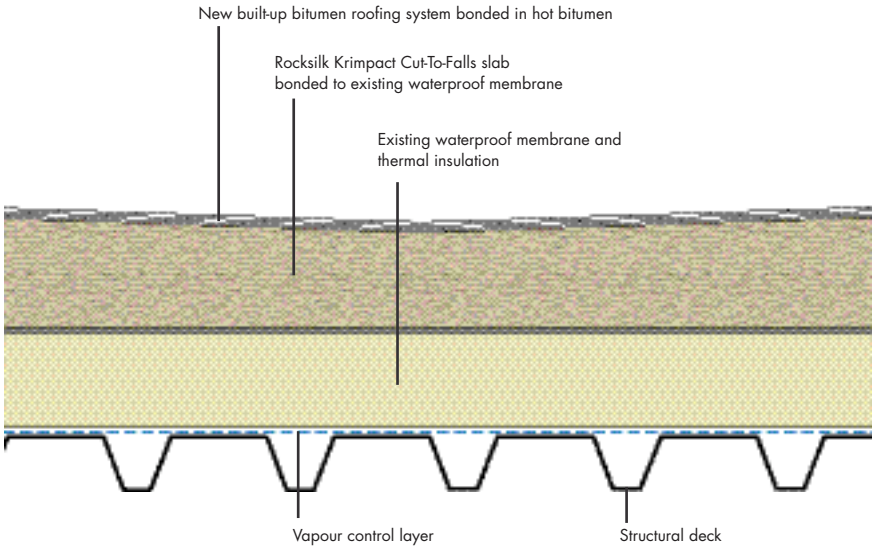
Rocksilk Krimpact Cut-To-Falls Slab has a compressive strength in excess of 75 kPa.

Thermal performance

The thermal conductivity of Rocksilk Krimpact Cut-To-Falls Slab is 0.038 W/mK.

Table 28 shows the U values achieved for typical constructions insulated with various thicknesses of Rocksilk Krimpact Cut-To-Falls Slab. Because the thickness of insulation varies across the entire roof in cut to falls schemes the U-value varies across the whole roof, being best and worse where the greatest and least thickness of insulation occurs respectively. Every scheme is different and the average U-value for the entire roof can only be calculated when the scheme of falls has been designed. The cut to

Typical section



Typical specification

Rocksilk Krimpact Cut-To-Falls .....mm thick to be fully bonded, with hot bitumen to the existing waterproof membrane*/ vapour control layer*. (*delete as required) Rocksilk Krimpact Cut-To-Falls should be laid in accordance with the laying scheme supplied.

The new waterproof membrane should be applied in accordance with the appropriate manufacturer's recommended specification.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J21 or J41, it contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

falls scheme designers will then set the minimum thickness so that the average U-value for the entire roof meets the designers or Building Regulations requirements. This table is a useful reference to determine what the highest possible minimum thickness of insulation would be to achieve a specific U-value, in reality it will be less. The U-values shown are calculated assuming the existing insulation has the same thermal performance as Rocksilk Krimpact Flat Roof Slab. The U-value will be achieved if the total thickness of insulation matches the thickness indicated. If the existing insulation is not Rocksilk Krimpact Flat Roof Slab contact Knauf Insulation Technical Advisory Centre for specific U-value calculations.

Fire performance

Rocksilk Krimpact Cut-To-Falls Slab is classified as Euroclass A1 to BS EN ISO 13501-1, this is the highest fire rating possible for an insulation product to achieve. Rocksilk products have an extremely high melting point of over 1000°C. In the event of fire they will emit negligible quantities of smoke and fumes. The heat emission from the products is insignificant.

Table 28: Typical U-values of flat roofs where existing warm roof is upgraded

Product		U-values (W/m²K)	
Thickness (mm)	150mm concrete 40mm screed 13mm plaster	Profiled metal deck	19mm chipboard timber joists 12.5mm plasterboard
Rocksilk Krimpact Cut-To-Falls			
245	0.15	0.15	0.14
230	0.16	0.16	0.15
215	0.17	0.17	0.16
205	0.17	0.18	0.17
190	0.19	0.19	0.18
180	0.19	0.20	0.19
170	0.21	0.22	0.20
160	0.22	0.23	0.21
150	0.23	0.24	0.22
145	0.24	0.25	0.23

Note: U-value calculations based on the installation of a single ply membrane and the existing insulation layer is deemed to be Rocksilk Flat Roof Slab Extra. The U-values have been calculated to BS EN ISO 6946:1997.
For project specific calculations contact our Technical Advisory Centre on 01744 766666.

For general technical enquiries on cut to falls roofing, contact the Knauf Insulation Technical Advisory Centre on 01744 766666. For a quotation on a specific project please contact Knauf Insulation Sales on 0844 800 0135

Flat roofs

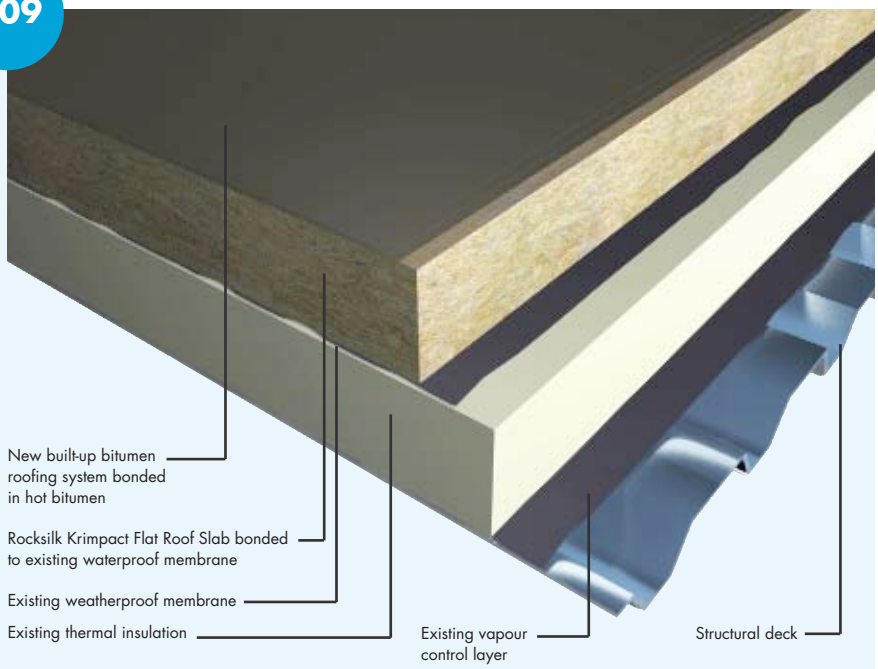
Existing warm roof upgrade

Rocksilk Krimpact Flat Roof Slab

FI09

Advantages

- ✓ Ideal method for upgrading roofs with ponding problems
- ✓ Significantly improves acoustic performance of timber and metal decks
- ✓ Non-combustible product with highest Euroclass A1 rating
- ✓ Supported by specialist design service and installation advice
- ✓ Bespoke system designed to meet the needs of each individual project



Products

Rocksilk Krimpact Flat Roof Slab is a high strength, consistent density, rigid, glass tissue faced rock mineral wool slab manufactured using Krimpact technology and specifically designed for use in flat roofing.

Typical construction

Rocksilk Krimpact Flat Roof Slabs can be used to upgrade the thermal insulation of an existing roof. A survey of the existing roof should establish whether the existing waterproof membrane and thermal insulation are in a suitable condition for retention, or if they need to be completely replaced. The existing roof structure should be checked to ensure that the additional loads can be supported safely. Knauf Insulation recommends that condensation analysis is carried out where any existing thermal insulation is retained.

Installation

The insulation slabs are laid over and fully bonded to either the existing roof membrane, or to a new vapour control layer. The insulation is overlaid with a waterproof membrane consisting of either a fully bonded built-up bitumen roofing system, single ply membrane or mastic asphalt.

Built-up felt membranes

High performance bitumen membrane systems are fully bonded in hot bitumen to the tissue faced Rocksilk Krimpact Flat Roof Slab using traditional roll and pour methods. High performance bitumen membrane systems are fully bonded in hot bitumen to the tissue faced Rocksilk Krimpact Flat Roof Slabs using traditional roll and pour methods.

Mastic asphalt surface

Rocksilk Krimpact Flat Roof Slabs provide a stable base for mastic asphalt. The slabs should be overlaid with a 12mm layer of bitumen impregnated fibreboard. A bitumen felt (low grade is satisfactory) should be loose laid without bonding onto the fibreboard prior to the application of two layers of mastic asphalt.

Single ply membranes

These should be fixed in accordance with the manufacturer's recommendations.

Performance

Standards

Rocksilk Krimpact Flat Roof Slab has been tested to the UEAtc Technical Guidelines MOAT No 50: 1992, Thermal insulation systems intended for supporting waterproofing membranes on flat and sloping roofs. It is classified B for mechanical performance - roof only accessible for purpose of maintenance and may be used without any restrictions.

Compressive resistance

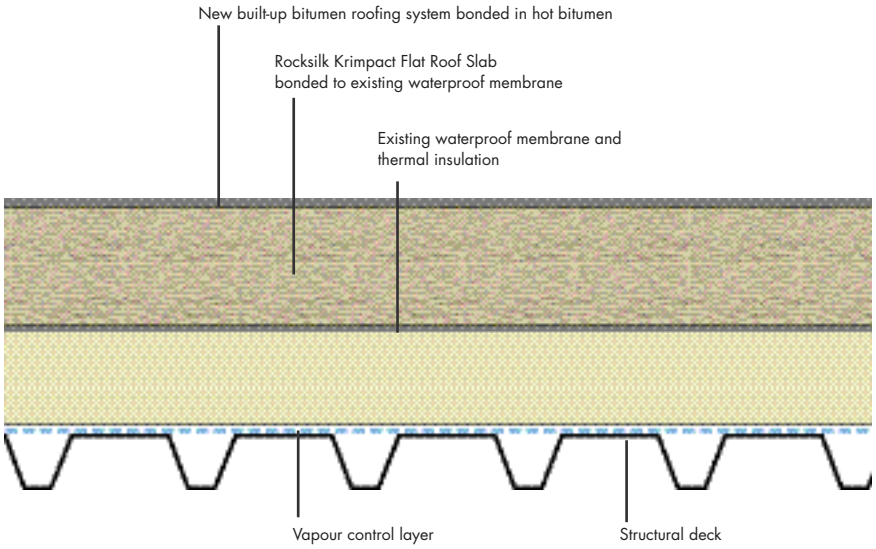
Rocksilk Krimpact Flat Roof Slab has a compressive strength in excess of 75 kPa.

Thermal performance

The thermal conductivity of Rocksilk Krimpact Flat Roof Slab is 0.038 W/mK.

The U-Values for typical constructions insulated with Rocksilk Krimpact Flat Roof Slab are given in table 29. These are calculated assuming the existing insulation has the same thermal performance as Rocksilk Krimpact Flat Roof Slab. The U-value will be achieved if the total thickness of insulation matches the thickness indicated. If the existing insulation is not Rocksilk Krimpact Flat Roof Slab contact Knauf Insulation Technical Advisory Centre for specific U-value calculations.

Typical section



Typical specification

Rocksilk Krimpact Flat Roof Slab, thickness .....mm thick to be fully bonded, with hot bitumen to the existing waterproof membrane*/ vapour control layer*. (*delete as required) The new waterproof membrane should be applied in accordance with the appropriate manufacturer's recommended specification.

Alternatively, consult the National Building Specifications (NBS) based on Standard Version J21 or J41, it contains a set of proprietary clauses, which are edited versions written by Knauf Insulation.

Fire performance

Rocksilk Krimpact Flat Roof Slab is classified as Euroclass A1 to BS EN ISO 13501-1. Rocksilk products have a melting point of over 1000°C. In the event of fire they will emit negligible quantities of smoke and fumes. The heat emission from the products is insignificant.

Table 29: Typical U-values of flat roofs where existing warm roof is upgraded

Product		U-values (W/m²K)	
Thickness (mm)	150mm concrete 40mm screed 13mm plaster	Profiled metal deck	19mm chipboard timber joists 12.5mm plasterboard
Rocksilk Krimpact Flat Roof Slab			
245 (145+100)	0.15	0.15	0.15
230 (130+100)	0.16	0.16	0.15
225 (150+75)	0.16	0.17	0.16
210 (130+80)	0.17	0.18	0.17
200 (2x100)	0.18	0.19	0.17
195 (145+50)	0.16	0.19	0.18
180 (100+80)	0.20	0.21	0.19
160	0.22	0.23	0.21
150	0.23	0.25	0.22
145	0.24	0.25	0.22
130	0.26	0.28	0.25

Note: U-value calculations based on the installation of a single ply membrane and the existing insulation layer is deemed to be Rocksilk Flat Roof Slab Extra. The U-values have been calculated to BS EN ISO 6946:1997.

For project specific calculations contact our Technical Advisory Centre on 01744 766666.

KNAUF INSULATION

Ref: KB57508

August 2008: Issue 1

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