

SYSTEM: TDS 4.8.01, TDS 4.8.02, TDS 4.8.03, TDS 4.8.04
FOAMGLAS® Inverted Roof System
FOAMGLAS® INVATHERM™ Loose Laid Non-Combustible Insulation on a continuous support

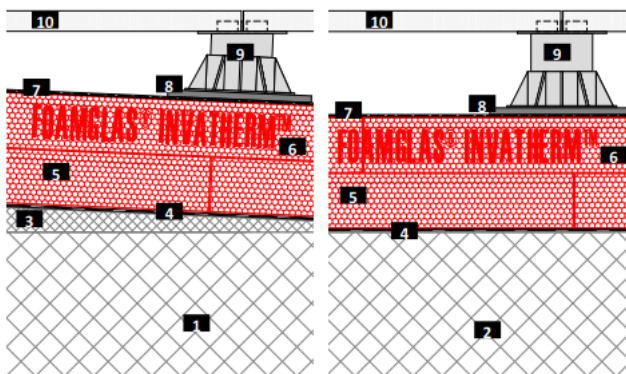
1. INTRODUCTION

Inverted roofs are designed with the waterproofing layer beneath the loose laid insulation. FOAMGLAS® Insulation is loose-laid upon the roof waterproofing and then overlaid with paving slabs on pedestals (TDS 4.8.02 and TDS 4.8.04), gravel ballast (TDS 4.8.01 and TDS 4.8.03) or extensive green roof (TDS 4.8.05). Depending upon the U value (thermal) performance required, a single insulation layer or double insulation layer is applied, the uppermost layer is always FOAMGLAS® INVATHERM™.

This insulation system is used in conjunction with a water flow reduction layer (WFRL), which is laid over the insulation system, and beneath the roof finishes. The WFRL minimises the quantity of rainwater which could flow into the insulation system leading to increased heat loss. Rain which falls upon the roof percolates down to the layer WFRL, and then drains away through rainwater outlets. The performance of the WFRL, and rainwater cooling effect is taken into consideration when determining the U-value of the roof.

Due to the characteristics of FOAMGLAS® cellular glass insulation, FOAMGLAS® INVATHERM™ is particularly suitable for an inverted roof design. FOAMGLAS® INVATHERM is Euroclass A1 rated, non-combustible, and in a fire situation does not contribute to the spread of flame.

This inverted roof insulation system is used for zero fall roofs (in compliance with BS6229:2018) with maintenance access; balconies and terraces with for pedestrian use. For more information regarding systems and applications please contact our Technical Department.



TDS 4.8.04:

1. Concrete roof deck,
2. Concrete roof deck level in compliance with BS6229:2018
3. Screed to fall
4. Waterproofing System
5. FOAMGLAS® T3+ slab
6. FOAMGLAS® INVATHERM™
7. Water Flow Reduction Layer
8. Support System Base
9. Support System
10. Paving or Tiles



2. DESIGN & INSTALLATION RECOMMENDATIONS

- Calculation of the thermal transmittance (U value) for the FOAMGLAS® inverted insulation system should be carried out in accordance with the local regulations.
- The roof must be designed with adequate falls. Reference should be made to the local regulations regarding Inverted Roofs. Zero pitch roofs in compliance with BS6229:2018 can be used with the FOAMGLAS® INVATHERM™ system.
- To avoid ponding and the subsequent risk of silt build up, it is essential that roof falls and drainage paths are correctly designed in compliance with BS6229:2018 or better. FOAMGLAS® INVATHERM™ inverted roof insulation system is designed for use upon buildings with an internal temperature of 5°C or higher
- In the case of a double layer insulation design, the thickness of the Base and Top layer should be in accordance with the FOAMGLAS® INVATHERM™ design guide (see our typical U-value charts for the FOAMGLAS® INVATHERM™ system)
- The flatness and the general conditions of the substrate are important criteria when using FOAMGLAS® INVATHERM™ under a straight edge of 2m length the deviation should be less than - 5mm Under a straight edge of 0.6m length the deviation should be less than - 3mm. For further guidance on the suitability of substrates please contact our Technical Department.
- Installers of the product must take care not to damage the roof waterproofing, where necessary protection boards must be used. If gravel ballast is to be applied the use of rounded gravel is very important - the ballast is laid upon a drainage layer, (see TDS data sheets).
- The ballast layer is installed to prevent wind uplift and to provide UV protection to the WFRL
- The design of ballast such as gravel or paving should meet the local regulations for wind uplift.
- Gravel ballast (rounded low fines of nominal size 16 mm to 32 mm) should be washed and laid to a minimum thickness of 50 mm in accordance with the local regulations. Paving ballast should also meet the local regulations
- When refurbishing a roof. Care must be taken to ensure that the roof is capable of carrying the increased load of the insulation system with its associated finishes.
- To prevent damage to the insulation top coating, adequate care and preparations must be taken during installation
- Point loads need to be avoided at all times particularly during installation of the finishes such as the WFRL, drainage membrane, pedestals, ballast etc. Where required a protective board should be used upon the FOAMGLAS® INVATHERM™ during the installation of the WFRL and finishes etc.

More information can be found in section 6. APPLICATION

3. MATERIALS



Picture 1: FOAMGLAS® T3+ slab



Picture 2: FOAMGLAS® INVATHERM™

FOAMGLAS® T3+ slab insulation (picture 1) is manufactured from graded recycled glass and natural raw materials. The insulation is totally inorganic, containing no ozone depleting propellants, flame resistant additives, binders, VOC or other volatile substances. The FOAMGLAS® T3+ product is only used as the base layer of a 2 layer inverted roof insulation system. For typical thickness see our U value chart for the FOAMGLAS® INVATHERM™ system.

FOAMGLAS® INVATHERM™ (picture 2) is a cellular glass insulation with a factory applied coating on the top surface. Both the core insulation material and the coating have an A1 - fire classification and are therefore non-combustible. FOAMGLAS® INVATHERM is always the top layer in the system, it is laid with the coating facing upward. Colour: Grey, the coating shade varies in each batch and therefore cannot be specified or guaranteed. The grey coating is pale and becomes darker when wet, returning to its original colouring as it quickly dries.

Both products are 60cm x 45cm. thicknesses is determined by the U-value for the roof system. For the overall Insulation thickness, and the thickness of each insulation layer. See our U value chart for the FOAMGLAS® INVATHERM™ system For recommendations and assistance please contact our Technical Department.

4. SAFETY MEASUREMENTS AND PPE

Both products are made of cellular glass insulation

Always wear the correct PPE required for the task being undertaken. When handling and cutting cellular glass insulation we recommend wearing suitable gloves and glasses, and when cutting large quantities of the insulation materials, use a dust mask.

FOAMGLAS® insulation, offcuts and dust is non-combustible and non-toxic.

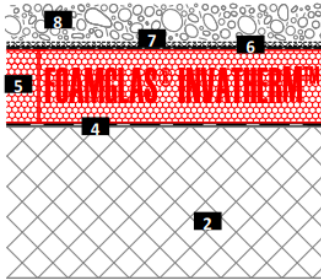
Always follow the safety instructions within our SDS.
Always follow the construction site safety instructions.



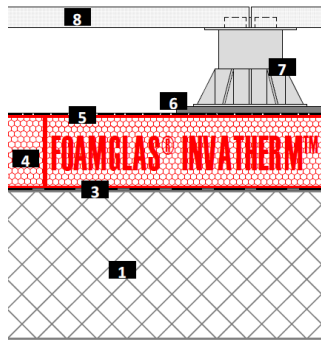
5. System Build-up cfr. Technical Data Sheets (TDS)

FOAMGLAS® Inverted Roof Systems with Non-Combustible Insulation on a Continuous Support.

5.1 One layer system TDS 4.8.1 & TDS 4.8.2



- 2 Concrete roof deck in compliance with BS6229:2018
- 4 Waterproofing membrane
- 5 FOAMGLAS® INVATHERM™
- 6 Water Flow Reduction Layer
- 7 Drainage composite layer (Enkadrain or similar)
- 8 Ballast (rounded gravel or paving slabs)

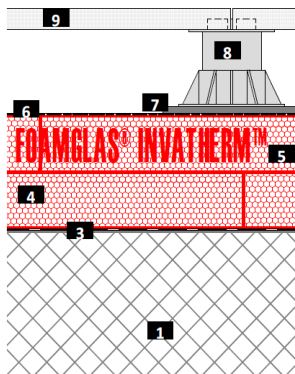


- 1 Concrete roof deck in compliance with BS6229:2018
- 3 Waterproofing membrane
- 4 FOAMGLAS® INVATHERM™
- 5 Water Flow Reduction Layer
- 6 Support Base
- 7 Supports
- 8 Paving or Tiles

5.2 Two layer system. TDS 4.8.3 & TDS 4.8.4



- 1 Concrete roof deck in compliance with BS6229:2018
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6. APPLICATION

6.1 Substrate

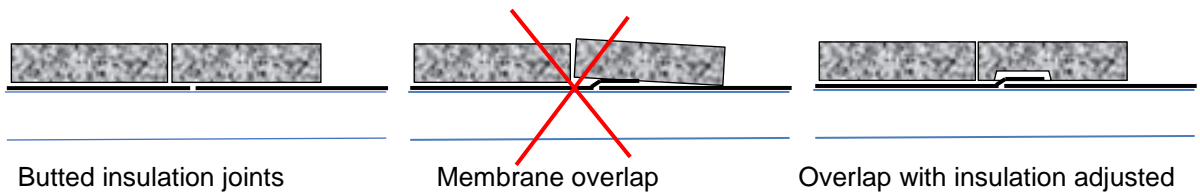
The roof structure should be prepared in compliance with BS6229:2018 or better. The flatness and the general conditions of the substrate are important criteria when using FOAMGLAS® INVATHERM™. Under a straight edge of 2m length the deviation should be less than - 5mm. Under a straight edge of 0.6m length the deviation should be less than - 3mm. for further guidance on the suitability of substrates contact our Technical Department

The waterproofing membrane must be clean and free from any extraneous matter (pieces of brick, gravel, plastics, screws and bolts, etc), This careful preparation will result in a stable and rigid insulation build-up.

The waterproofing membrane is installed with butted joints or with overlap joints, in accordance with the manufacturers recommendations. It is essential that the roof waterproofing has been installed correctly. The roof waterproofing system and detailing must be suitable for an inverted roof construction.

FOAMGLAS® INVATHERM™ must be evenly supported upon the substrate. When working with 2 layers of insulation, the FOAMGLAS® INVATHERM™ is entirely supported by the base layer of FOAMGLAS® T3+ slab, Therefore the FOAMGLAS® T3+ slab base layer must be laid correctly and evenly supported upon the substrate

To ensure the insulation is evenly supported, the underside can be abraded/sanded/trimmed to ensure full contact and support upon the substrate.



6.2 FOAMGLAS® Inverted Roof Insulation application

1 Layer system:

The FOAMGLAS® INVATHERM™ should always be installed with staggered joints. The joint overlap / stagger should be a minimum of 15cm.

To maximise insulating performance ALL abutments and insulation joints MUST be tightly butted up. If necessary re-measure, replace or cut / sand down and re-install any insulation which is not fitting correctly.

2 Layer system:

Each insulation layer is offset relative to the other, (see picture 3 & 4) with a minimum overlap / stagger of 15cm

The insulation Base Layer FOAMGLAS® T3+ slab should always be installed with staggered joints, with an overlap / stagger of minimum of 15cm. (picture 3 dotted line)

The insulation Top Layer FOAMGLAS® INVATHERM™ should always be installed with staggered joints, with an overlap / stagger of minimum of 15cm. (picture 3 black line)

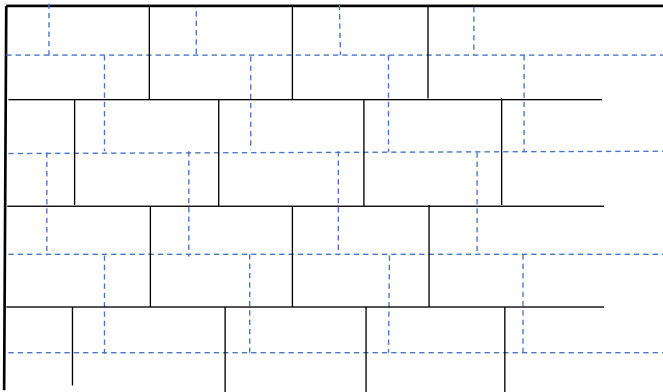
To maximise insulating performance ALL abutments and insulation joints MUST be tightly butted up. If necessary re-measure, replace or cut / sand down and re-install any insulation which is not fitting correctly

Optimising the Insulation Layout

Picture 3: All insulation materials shall have a minimum cut size of 15cm x 15cm

Picture 3 & 4 This base layer insulation layout ensures cutting and trimming of the top layer is minimised.

This simple method ensures a robust and stable insulation construction



Picture 3



Picture 4

6.3 Shaping of the insulation to suit the substrate and abutments

FOAMGLAS® insulation is easily trimmed and shaped, therefore if the substrate or abutment is uneven, it's easy to modify the insulation by abrading / sanding or cutting to fit. The FOAMGLAS® insulation layers must be fully supported upon the substrate with no rocking or movement. As described in section 4 always use the correct PPE. Sanding and cutting of the insulation will create offcuts and dust. To ensure the insulation is sitting correctly in position with closed joints and no rocking or movement, remove offcuts and dust from the area prior to laying the insulation

Typical tools:



Large sanding block



Grater

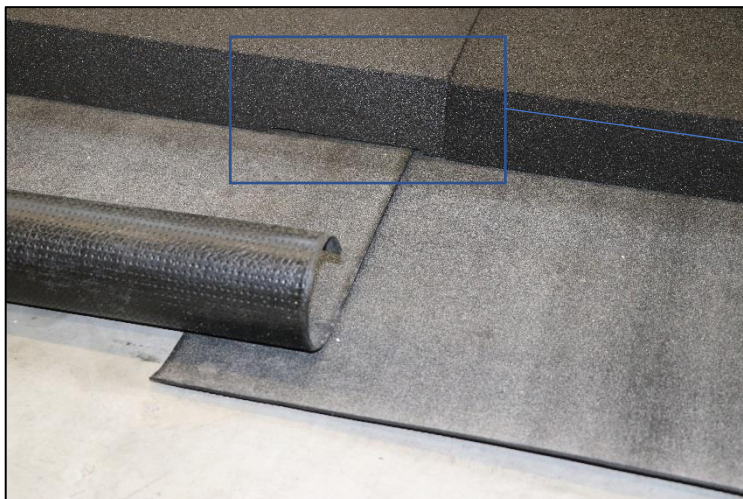


Spatula

Should you have difficulty in sourcing any of the above tools, please contact our sales or technical engineer.

Below: Examples of sanding the underside of FOAMGLAS® T3+ slab to ensure the insulation is fully supported on either side of the waterproofing overlap joint.

This sanding method can be used to overcome any unevenness in the substrate, or an abutment



6.4 Cutting and Sanding the FOAMGLAS® insulation

Many contractors will set up a working area with all the necessary marking out and cutting tools; this ensures all the offcuts and dust is in one working area. Regularly clear away the offcuts and dust to maintain a clear and dust free working and installation area.

Sanding / abrading is used to make small adjustments.

Cutting is used to trim down the insulation (minimum cut size 15 cm x 15cm) to create the staggered layout, and to fit neatly against the adjacent insulation and abutments. To maximise insulating performance ALL abutments and insulation joints MUST be tightly butted up. If necessary re-measure, cut and re-install any insulation which is not fitting correctly.

6.4.1 Cutting FOAMGLAS® insulation

A metal saw or hardpoint timber saw is used for cutting all FOAMGLAS® insulation. It is important to use a square edge, mark a line (pic 1), and make a clean and straight cut (pic 2). Prepare a robust, flat working surface which fully supports the insulation. This will ensure accurate, safe and easy cutting of the insulation material.



Cutting the insulation with a saw.

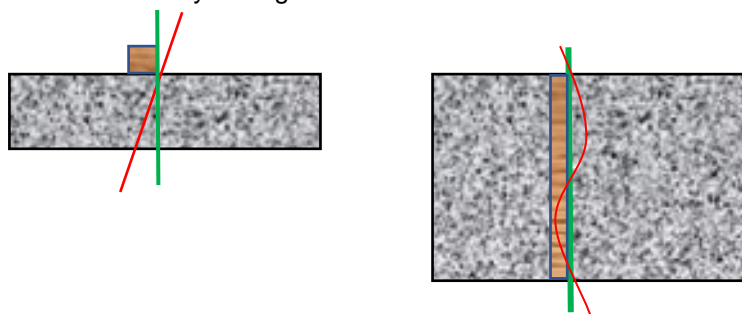
Make sure the insulation is fully supported and not rocking or moving. Saw on the downstroke, DO NOT saw on the upstroke, this will chip the insulation and surface coating.

Carefully saw in a straight line (green 😊) if you don't saw in a straight line (red 😞) you will have additional work to sand the insulation until you have a flat surface.

If a diagonal line is to be cut, measure and mark very carefully to ensure the angle is accurate. To ensure the insulation system is closed up tightly, where possible ensure that the factory machined edges of the insulation butt up against each other; and the cut edges are against an abutment such as a parapet, or roof light etc.

Ensure you saw in a straight line and cut vertically through the insulation.

(green 😊, red 😞)



6.4.2 Making holes in FOAMGLAS®

To cut round holes through the insulation place the insulation on a flat and stable surface. Select a thin walled tube with the correct external diameter. Using a rotating motion gradually press the tube through the FOAMGLAS®. In the case of the FOAMGLAS® INVATHERM™ always press from the coated side.,.

Large holes should be cut with a saw and neatly sanded to the desired shape.



Picture 8

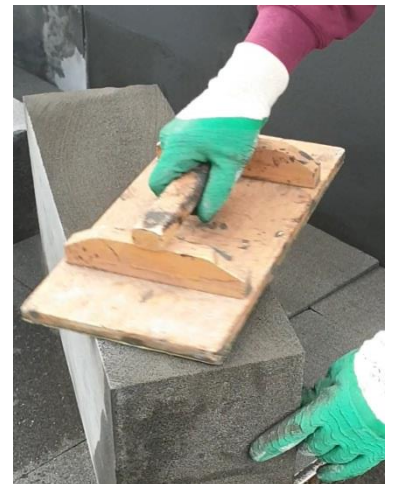


Picture 9

6.4.3 Sanding / Abrading FOAMGLAS® insulation

Use a sanding block to shape the underside of the insulation, to ensure a firm and stable contact with the substrate or an abutment.

Sanding the edge of FOAMGLAS® INVATHERM™: Start at the coating and sand with a downwards motion. Do not sand on the upward stroke, since this can possibly chip the insulation and coating (see Picture 10)



Picture 10

7. **SYSTEM INSTALLATION**

7.1 **One Layer system**

The waterproofing will already be installed as per the manufacturers specifications and recommendations. FOAMGLAS® INVATHERM™ is loosely laid with staggered joints on a flat substrate (see sections 6.1 and 6.2). After the insulation laid check it is fully supported upon the substrate with no rocking or movement. All insulation joints should be tightly butted together and tight against the abutments. If necessary remove and refit or replace any wrongly fitted insulation.

Walking over the FOAMGLAS® INVATHERM™ during installation is possible, but should be done with care. If required it's important to use "walking boards" to reach the areas where you want to bring all other materials such as WFRL, pedestals and paving, etc. Point loads upon the insulation surfaces are to be avoided, adequate preparation's and care should be taken at all times.

It is recommended to install WFRL over the FOAMGLAS® INVATHERM™ at the end of the working day. Where possible install the insulation, WFRL, and finishes such as pedestals and paving in one stage, gradually moving across the work area. This avoids the need for moving the protection boards around; and the finishes also protect the insulation system from damage by other trades.

7.2 **Two Layer system**

Base Layer

The waterproofing will already be installed as per the manufacturers specifications and recommendations. Using the setting out plan described in section 2 The FOAMGLAS® T3+ slabs are loosely laid with staggered joints on a flat substrate (see sections 6.1 and 6.2) Fit the FOAMGLAS® T3+ slabs individually ensuring they are all fully supported upon the substrate with no rocking or movement If the base layer insulation is firmly supported upon the substrate, but there are slight differences in the top surface level, this surface can be carefully sanded flat (see section 6.4.3)

Top layer

After the base layer is installed correctly you can start with the top layer of FOAMGLAS® INVATHERM™

Following the setting out plan described in section 2 lay the FOAMGLAS® INVATHERM™ in a staggered / offset pattern which is also offset from the insulation layer beneath. Joints in the top layer should not align with the base layer.

After the top layer of insulation has been laid, check it is fully supported upon the base layer with no rocking or movement. All insulation joints should be close butted together and tight against the abutments. If necessary remove and refit or replace any wrongly fitted insulation.

FOAMGLAS® INVATHERM™ can be cut, sanded and adjusted as described in 6.3 & 6.4.



7.3 Walking upon the FOAMGLAS® insulation

Walking upon the FOAMGLAS® insulation layers is possible during installation, and should be done with care. If required it's important to use "walking boards" to reach the areas where you want to bring all the other materials such as WFRL, pedestals and paving, etc. Point loads upon the insulation surfaces are to be avoided, adequate preparation's and care should be taken at all times.

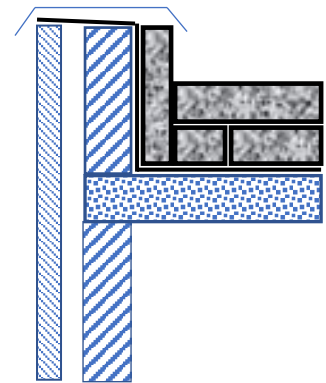
It is recommended to have the WFRL installed over the FOAMGLAS® INVATHERM™ at the end of the working day.

Where possible install the insulation, WFRL, and finishes such as pedestals and paving in one stage, gradually moving across the work area. This avoids the need for moving the protection boards around; and the finishes protect the insulation system from damage by other trades.

7.4 Parapet and upstands

FOAMGLAS® INVATHERM™ is applied vertically to the parapets before the horizontal insulation is laid.

Please contact the waterproofing manufacturer for all details relating to termination of the (vertical) waterproofing, and the weatherproof closure to the top edge of the upstand insulation



7.5 Small repairs of the FOAMGLAS® INVATHERM™ coating

Small damage to the FOAMGLAS® INVATHERM™ coating or small flakes chipped off, can be repaired using PC® SKYFIX A2 (Grey Colour to match the coating) or PC®164 (White Color)

To ensure a good quality install It is important to repair any damage to the coating. Should there be any major damage, the insulation should be replaced

The PC® SKYFIX A2 is a solvent-free 1-component synthetic resin paste which is purpose manufactured for the FOAMGLAS® INVATHERM™ coating. It is packed in 25 kg buckets and has a grey color.

The PC SKYFIX A2 is applied with a spatula. Apply the paste evenly and press it into the damaged area, finally smooth off with the spatula, and leave to dry. To prevent the mix drying out. Each time after use, replace the plastic film covering on the product before cleaning the edge of the pail and fitting the lid. . When the pail is closed correctly the paste will not dry out and will remain useable for a long time. For correct storage and expiry date see the PC SKYFIX A2 packaging and data sheets

Below: Using PC® SKYFIX A2 to repair to the edge of the FOAMGLAS® INVATHERM™ coating

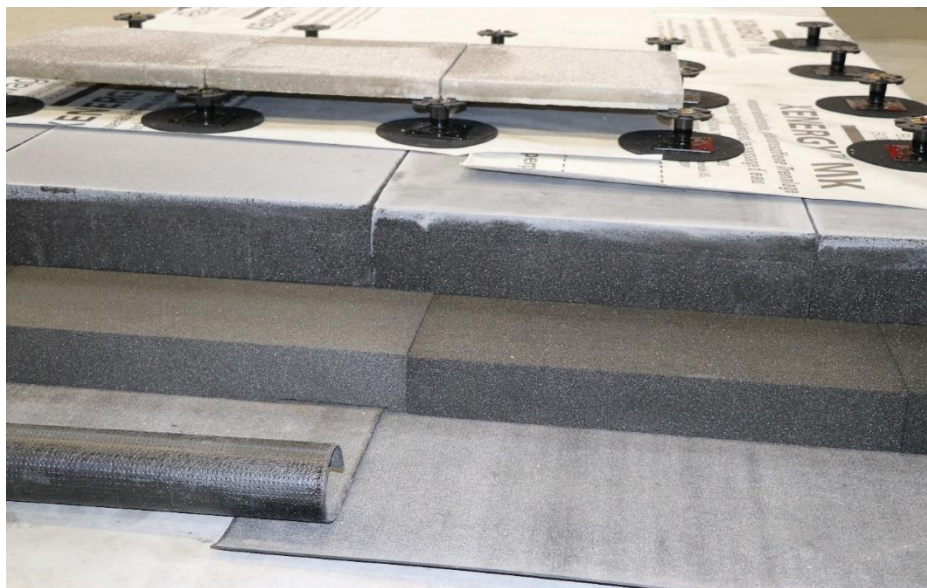


8. WATER FLOW REDUCTION LAYER (WFRL) AND FINISHING

Install the WFRL over the FOAMGLAS® INVATHERM™ following the manufacturer’s guidelines for all overlaps and necessary details. Further finishes over the WFRL such as pedestals / tiles / gravel / ballast are installed according to the manufacturers guidelines

The WFRL minimises the quantity of rainwater which could flow into the insulation system, leading to increased heat loss. Rain which falls upon the roof percolates down to the WFRL, and then drains away at the rainwater outlets. The performance of the WFRL, and subsequent rainwater cooling effect is taken into consideration when determining the U-value of the roof.

To ensure the insulation system performs as specified; the WFRL must have has the same or better performance as in the design specification.



9. IMPORTANT NOTES FOR INSTALLERS OF THE WFRL - PEDESTAL - PAVING

Installers of the WFRL and the finishing (gravel or paving) must take care not to damage the FOAMGLAS® insulation and the FOAMGLAS® INVATHERM™ coating.

Walking over the FOAMGLAS® insulation layers is possible during installation, and should be done with care. If required it’s important to use “walking boards” to reach the areas where you want to bring all other materials such as WFRL, pedestals and paving, etc. Point loads upon the insulation surfaces are to be avoided, adequate preparation’s and care should be taken at all times.

It is recommended to have the WFRL installed over the FOAMGLAS® INVATHERM™ at the end of the working day.

Where possible install the insulation, WFRL, and finishes such as pedestals and paving in one stage, gradually moving across the work area. This avoids the need for moving the protection boards around; and the finishes also protect the insulation system from damage by other trades.

If damaged the FOAMGLAS® INVATHERM™ insulation should be repaired or replaced. (see section 7.4)

The base of the pedestal support system should be smooth and flat to evenly spread the loads over the insulation system. A round pedestal base is preferable to a square or rectangular base.