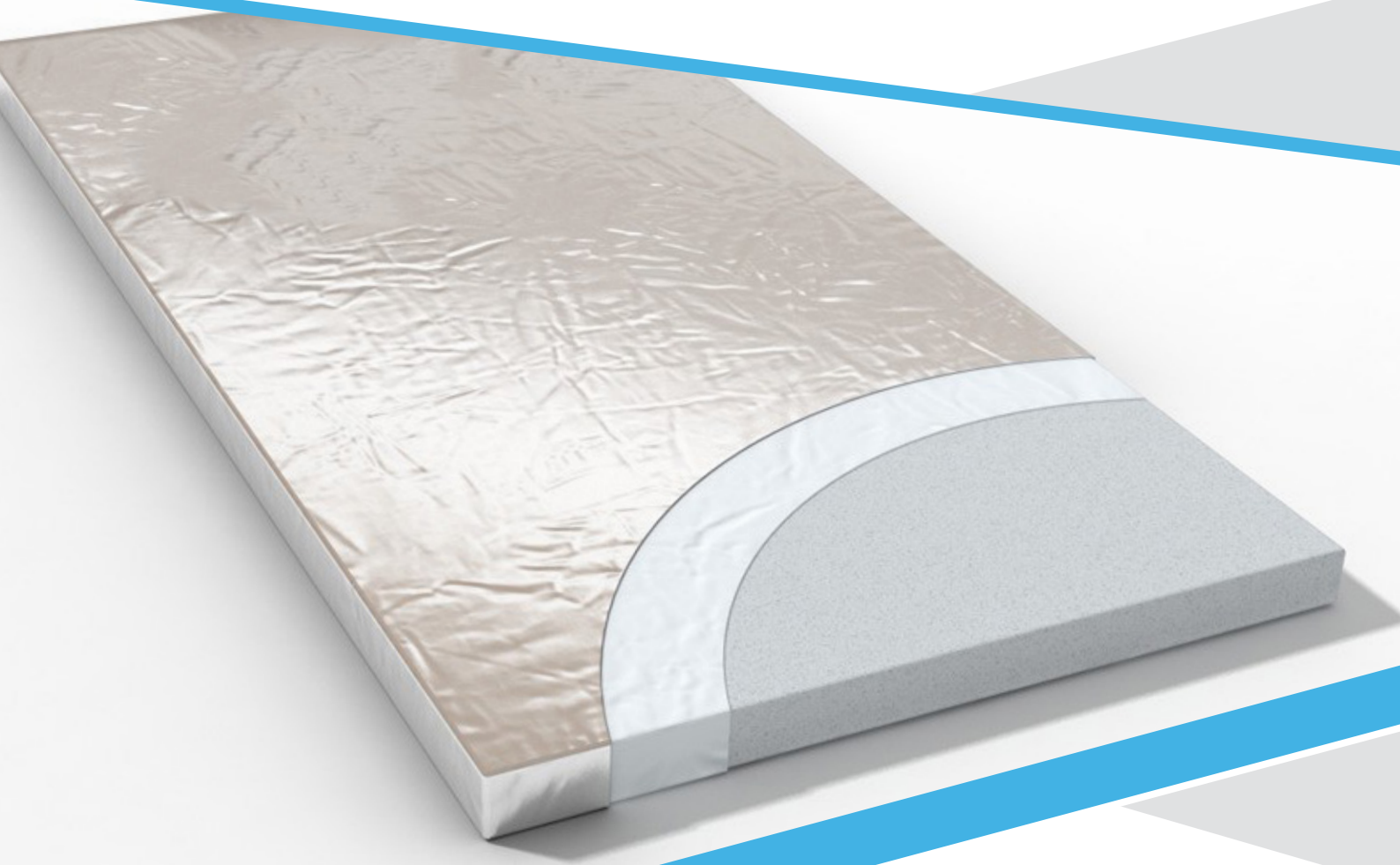
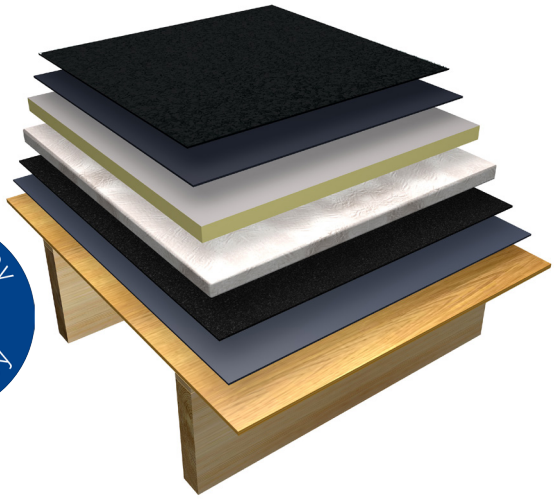
ALUMASC
ROOFING SYSTEMS

Alumasc Vtherm: Vacuum Insulated System for Warm Roof



Vtherm
VACUUM INSULATED SYSTEM

powered by Kingspan OPTIM-R powered by



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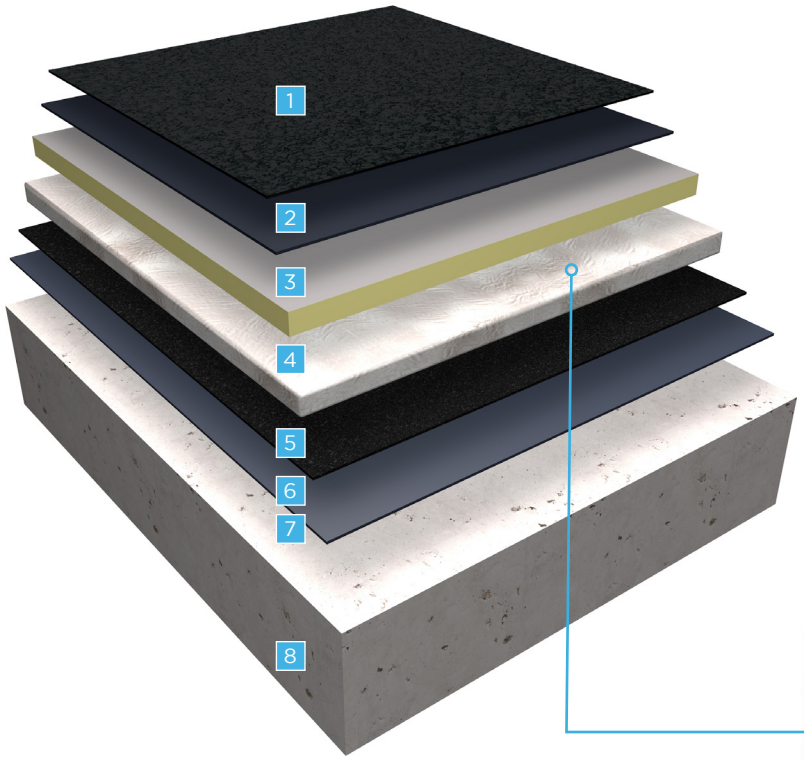
Vtherm
VACUUM INSULATED SYSTEM

NEW WAVE INSULATION SOLUTION FOR WARM ROOFS

- Rigid vacuum insulation panel with optimal performance – aged design value thermal conductivity 0.007 W/m.K
- Insulation performance up to five times greater than other widely available insulation materials
- Panels are over 90% recyclable (by weight)
- Resistant to the passage of water vapour
- Ideal for new build and refurbishment projects
- Inert non-reactive insulation material

TYPICAL SYSTEM BUILD UP OPTION

powered by Kingspan OPTIM-R powered by



1. Alumasc Waterproofing Cap Sheet
2. Alumasc Waterproofing Underlayer
3. Alumasc PIR Insulation
4. Kingspan Optim-R Vacuum Insulation Panel
5. Protective Rubbercrumb Layer (optional)
6. Euroroof Self-Adhesive or Thermo-Adhesive Vapour Barrier
7. Alumasc Bitumen Primer
8. Structural Concrete, Plywood or Profiled Metal Deck

INTRODUCTION

The Problem

Whether you are dealing with new build, or upgrading the roofs of existing buildings, there may be a requirement to achieve low U-values with the thinnest possible roof build-up.

With new build applications, regulatory requirements are ever more stringent, while economic factors and the need to conserve energy mean that energy efficiency is the highest priority. One of the more effective approaches is to improve thermal performance while keeping the overall construction as thin as practicable. High performance insulation products are available that fulfil some, but not all, of the regulatory and performance requirements, particularly in applications where there is call for a thinner insulation product.

In refurbishment projects, there is arguably an even greater need to keep roof build-ups as thin as possible. Internal space may be at a premium, or there may be little or no space available for installing new roof insulation - for example in buildings where there are planning height restrictions.

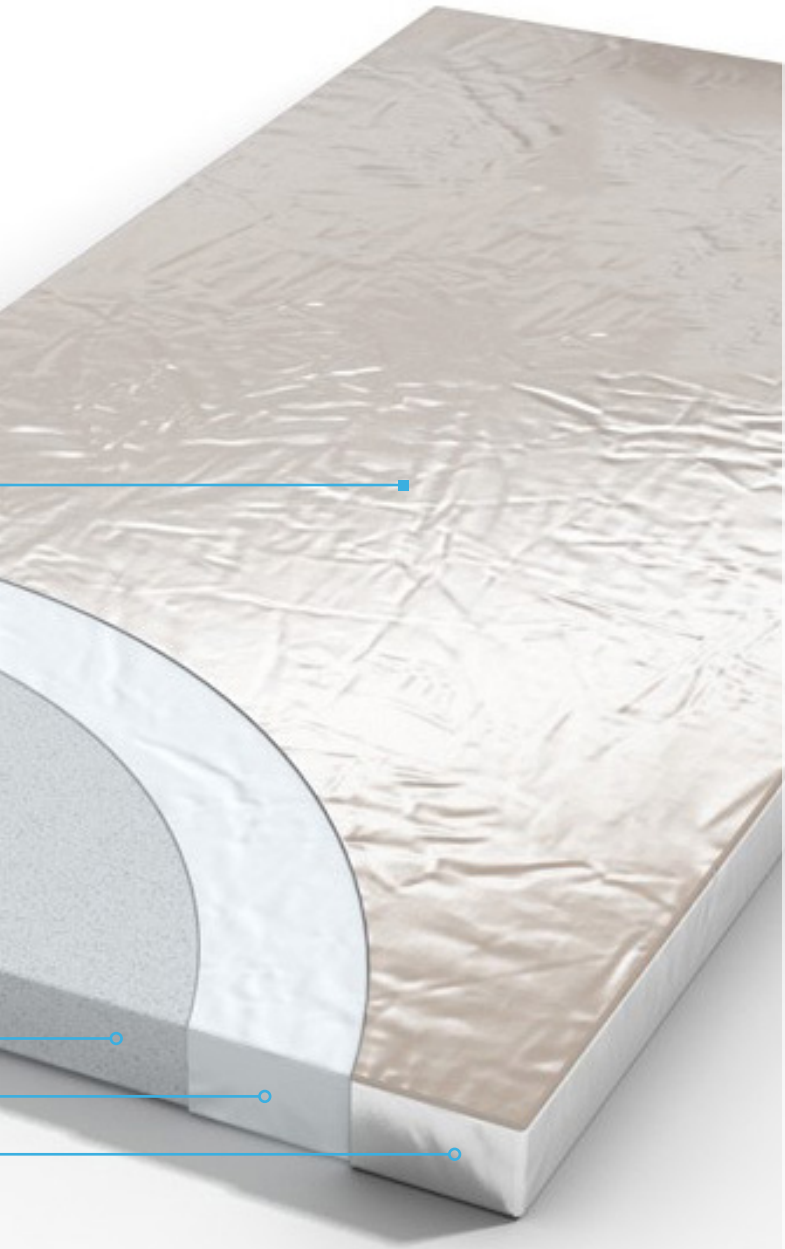
The Solution

Powered by Kingspan OPTIM-R, the Alumasc VTherm system is an optimum performance innovative insulation solution comprising rigid vacuum insulation panels with a microporous core, which is evacuated, encased and sealed in a thin, gas-tight envelope. The result is outstanding thermal conductivity in the thinnest possible insulation solution. The vacuum insulation panels in the VTherm System are augmented by rigid thermoset polyisocyanurate (PIR) insulation infill panels, which can be cut to fit around problem areas such as rooflights or ventilator kerbs.

In retrofit applications, the Alumasc VTherm Vacuum Insulated System is the ideal solution for areas where lack of space could prevent upgrading of the insulation. And in new construction, Alumasc VTherm can enhance U-values in areas where thermal performance would otherwise be diminished.

The insulation panels have an aged thermal conductivity of 0.007 W/m-K, and have an insulating performance up to five times greater than other commonly available insulation materials.

Above all, the Alumasc VTherm Vacuum Insulated System solves the problem of insulating areas where there is a lack of construction depth.



TYPICAL CONSTRUCTIONS AND U-VALUES

Assumptions

The U-values in the tables that follow have been calculated, under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U-value and Condensation Risk Calculations, using the method detailed in BS / I.S. EN ISO 6946: 2007 (Building Components and building elements. Thermal resistance and thermal transmittance. Calculation method), and using the conventions set out in BR 443 (Conventions for U-value calculations).

The ceiling, where applicable, is taken to be a 3 mm skim coated 12.5 mm plasterboard with a cavity between it and the underside of the deck.

Please Note:

- *For the purposes of these calculations the standard of workmanship has been assumed good, and therefore the correction factor for air gaps has been ignored.*
- *The figures quoted are for guidance only. A detailed U-value calculation and a condensation risk analysis should be completed for each project.*
- *If your construction is different from those specified, and / or to gain a comprehensive U-value calculation along with a condensation risk analysis of your project, please consult the Alumasc Technical Department for assistance (see rear cover).*
- *For the purposes of these calculations, the bridging effect of the infill panel has been taken to be 15%.*

Bespoke Project Design

Alumasc offers a full design service, which maximises the ratio of Vacuum Insulation Panels to infill panels. We will design the panel layout quickly and effectively, ready for client approval.

Each project-specific layout will show the size, number and location of the Vacuum Insulation Panels and similar data for any infill panels that may be required.

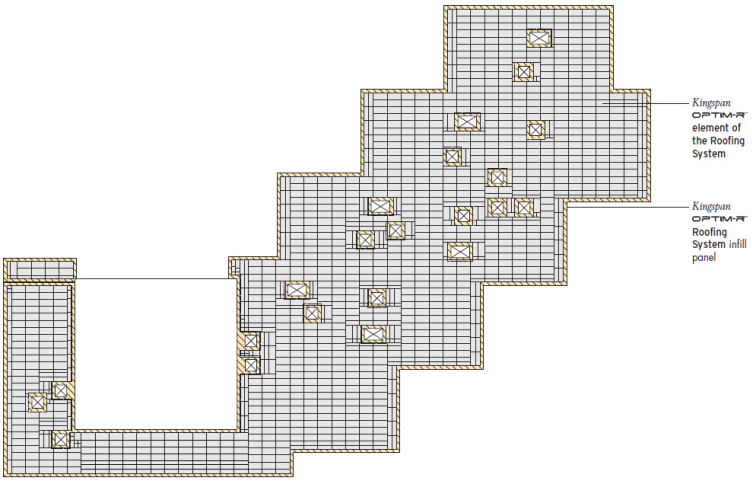
For more details please contact our technical team on 01744 648 400.

Condensation Risk Analysis

The design service includes condensation risk calculations in accordance with BS 5250: 2002 (Code of practice for control of condensation in buildings). This ensures that any predicted dew point is above the vapour control layer at the point of minimum thickness of the Alumasc VTherm, while also ensuring any condensation risk is within the limits given in BS 5250: 2002.

Figure 1

Typical roofing designs for the Alumasc VTherm Vacuum Insulated System



The Alumasc VTherm Insulated Roofing System, when laid out as shown in Figure 1, and installed on a dense concrete deck with plasterboard on timber battens can achieve U-Values as shown in the table below, assuming a combination of the Vacuum Insulation Panels and Alumasc PIR Insulation.

Alumasc VTherm Roofing System Thickness (mm)	Alumasc PIR Insulation Thickness	U-values (W/m2K)
40	25mm	0.16
50	25mm	0.14
50	30mm	0.13
30 + 30	25mm	0.12
40 + 30	25mm	0.11
40 + 30	30mm	0.10
40 + 40	25mm	0.09

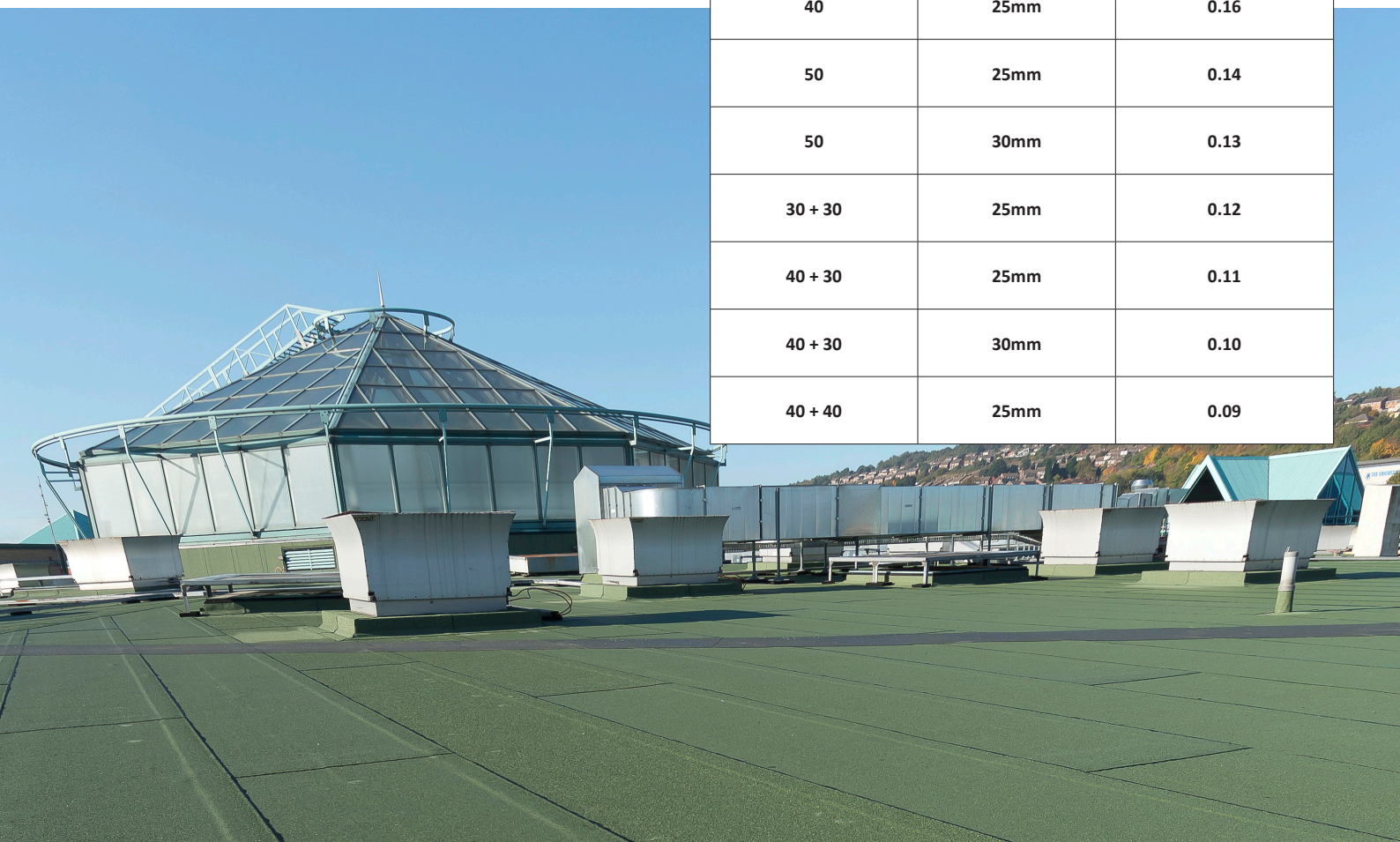
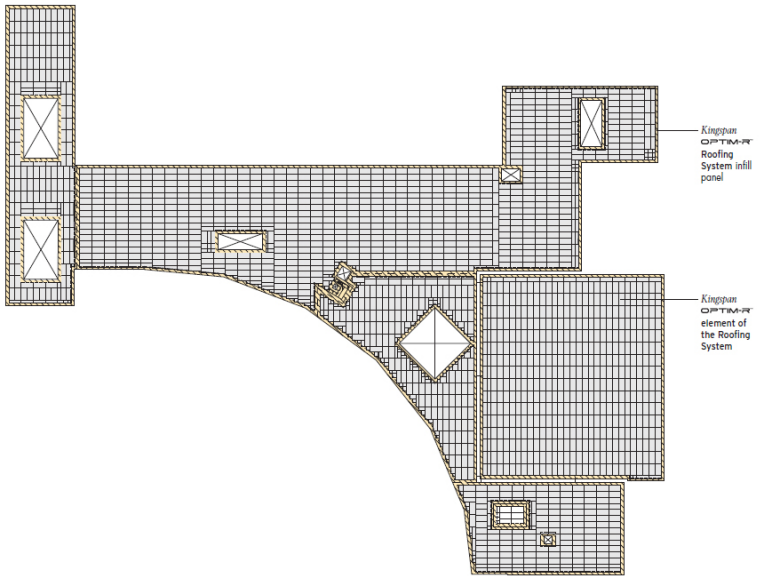


Figure 2
Roof layout – Timber deck



The Alumasc VTherm Insulated Roofing System, when laid out as shown in Figure 2, and installed on a timber deck with plasterboard on timber battens, can achieve U-Values as shown in the table below, assuming a combination of the Vacuum Insulation Panels and Alumasc PIR Insulation.

Alumasc VTherm Roofing System Thickness (mm)	Alumasc PIR Insulation Thickness	U-values (W/m2K)
40	25mm	0.16
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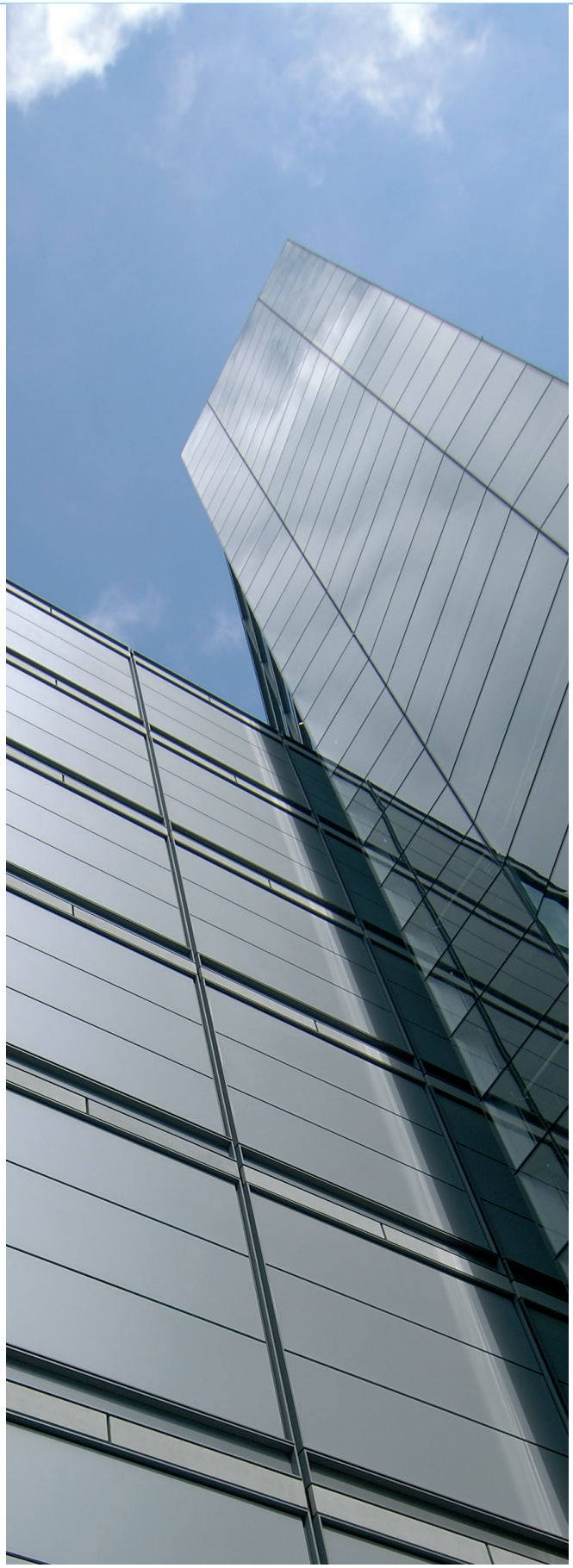
40 + 40	25mm	0.09



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DESIGN CONSIDERATIONS

Linear Thermal Bridging

Make reasonable provision to limit the effects of cold bridging. Ensure that roof-light or ventilator kerbs etc are insulated with a 25mm thick Alumasc PIR board - also around the perimeter of the roof on the internal face of parapets. Maintain a minimum distance of 300 mm should be between the top of the insulation upstand and the bottom of the horizontal roof insulation. Carry wall insulation up parapets as high as the flat roof insulation upstand.

Please contact the Alumasc Roofing Technical Services Department (see back cover) for further advice.

Environmental Management

The Alumasc VTherm Vacuum Insulated Roofing System is manufactured under a management system certified to ISO 14001: 2004.

Sustainability & Responsibility

At Alumasc Roofing we have a long-term commitment to sustainability and responsibility - as a manufacturer and supplier of insulation products; as an employer; and as a key stakeholder in our neigbouring communities.

Contact Alumasc Roofing or visit our website for more detail on our

Falls

The fall on a flat roof constructed using the Alumasc VTherm Vacuum Insulated Roofing System is normally achieved by the supporting structure directing rainwater towards the rainwater outlets. Ensure that the fall is smooth and sufficient to prevent ponding on the roof.

To ensure adequate drainage, BS 6229: 2003 (Flat roofs with continuously supported coverings. Code of practice) recommends uniform gradients of not less than 1 in 80. However, because of building settlement, it is advisable to design to achieve even greater falls. These greater falls can be achieved by the Alumasc VTherm Vacuum Insulated Roofing System, used with an overlay of Alumasc PIR.

Tapered Roofing

The Alumasc VTherm Vacuum Insulated Roofing System can also be used in a tapered roofing scheme. Alumasc Roofing offers a supporting design service, which ensures that the most cost effective solution for a roof is identified, and that the end result is the optimal solution to the rainwater run-off and insulation requirements of the roof.

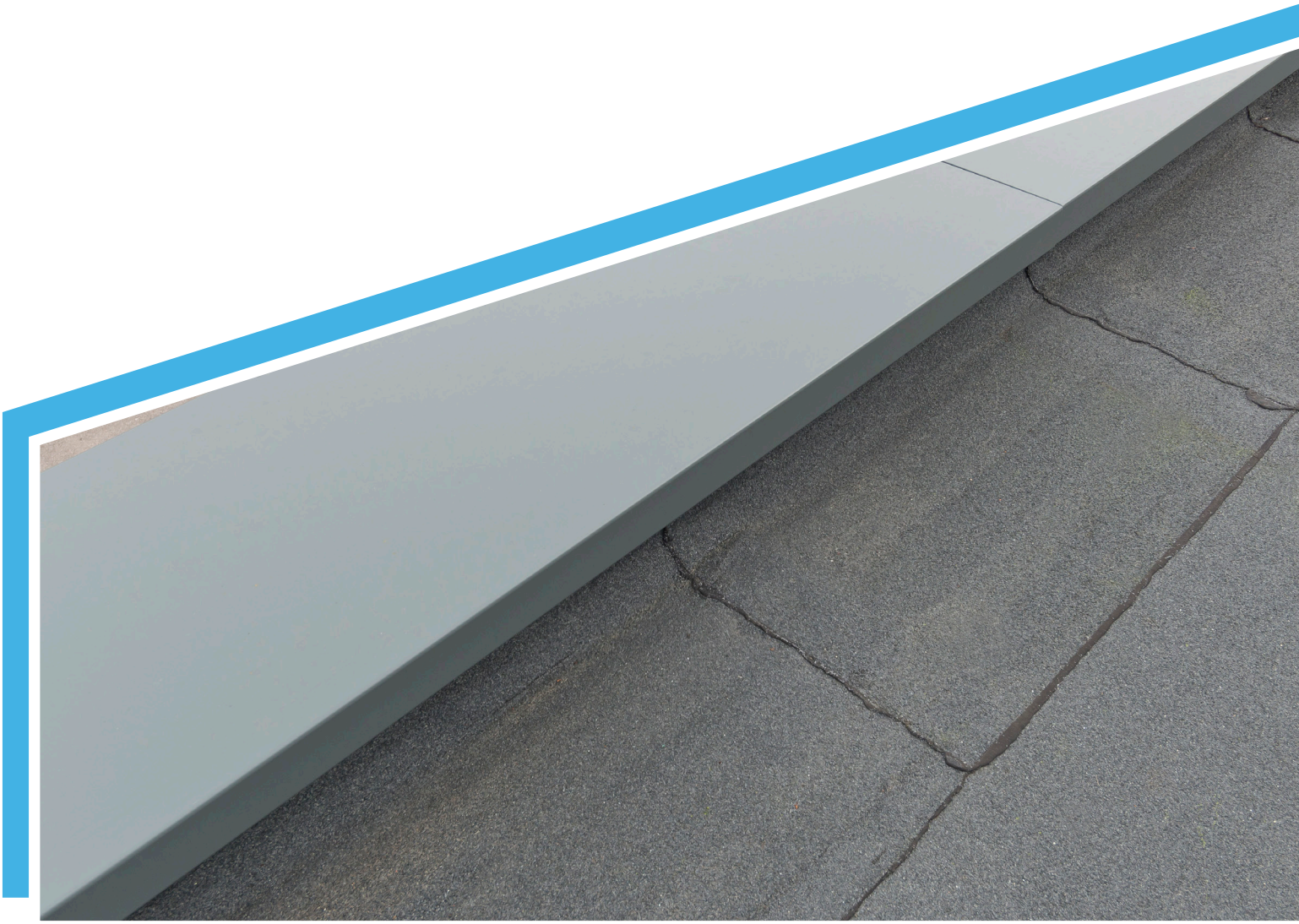
For more details please contact the Alumasc Roofing Technical Department (see back cover), which should be consulted as early as possible in the process of roof design.

Green Roofs

The Alumasc VTherm Vacuum Insulated Roofing System suitable for use under most warm green roof systems.

Green roofs are a specialist area or roof design. When designing a loose-laid insulated green roof assembly, ensure that careful consideration is given to the following.

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



WATERPROOFING

The Alumasc VTherm Vacuum Insulated Roofing System, when used in conjunction with an overlay of Alumasc PIR is suitable for use with all Alumasc Warm Roof Systems.

When using the Alumasc VTherm System with fully adhered waterproofing membranes, the joints between the Alumasc PIR, immediately below the waterproofing membrane, can be taped with a minimum 50 mm wide foil tape.

Please contact the Alumasc Roofing Technical Service Department (see back cover) to ensure that the waterproofing membrane and proprietary adhesive system are compatible.

The Alumasc VTherm Roofing System is, when used in conjunction with an overlay of Alumasc PIR, also suitable for use with Alumasc cold liquid applied waterproofing systems. When using the VTherm System with cold liquid applied

waterproofing systems, a carrier membrane for the waterproofing must be installed over the Alumasc PIR. For further advice please contact the Alumasc Roofing Technical Services Department (see back cover).

Water Vapour Control

Always install the Alumasc VTherm Vacuum Insulated Roofing System over a separate vapour control layer, adhered in P.U. Insulation adhesive.

To discuss vapour control layers, please contact the Alumasc Roofing Technical Service Department (see back cover).

It is important to ensure a secure bond to the substrate. This will provide a suitable surface on which to lay the insulation panels, and give sufficient resistance to wind up-lift (see ‘Wind Loading’).

Installation over Concrete Decks

- Make sure that concrete decks are clean and dry, and without projections (including fixing heads etc.), steps or gaps. Decks should to allow correct falls to all rainwater outlets.
- Prime the concrete deck with Alumasc Bitumen Primer to ensure an adequate bond between deck and the vapour control layer.
- Where one run of the vapour control layer laps another, ensure that there are 100 mm side and 150mm end overlaps, and that these are adequately sealed.
- Turn up the vapour control layer at the edge of the roof to a height appropriate to the specified waterproofing membrane.
- An optional rubbercrumb protection layer may be used under the Vacuum Insulation Panels. For further information please contact the Alumasc Roofing Technical Services Department (see back cover).
- Lay the Vacuum Insulation Panels strictly in accordance with the approved layout drawing with joints light lightly butted, ensuring that there are no gaps.
- Where runs of the Vacuum Insulation Panels do not fit the dimensions of the roof, use rigid thermoset polyisocyanurate (PIR) insulation infill panels to compensate. The infill panels are the same thickness as the Vacuum Insulated Panels.
- The Vacuum Insulation Panels and the infill panels should be bonded in position using a P.U. adhesive.
- Where upstands or roof penetrations occur (e.g. ventilator kerbs, rooflights), lay infill panels abutting such features in strips no less than 200 mm wide, to take account of building tolerances and any requirement for peel restraint mechanical fixing of the membrane. For further guidance, please contact the Alumasc Roofing Technical Services Department (see back cover).
- Lay any infill panels as soon as possible to avoid exposure of the vapour control layer to foot traffic.
- Bond the Alumasc PIR overlay to the upper surface of the Vacuum Insulated Panels using an P.U. adhesive system prior to the application of the waterproof covering.
- Subject to project requirements, a minimum 25 mm thick Alumasc PIR upstand should be used around the perimeter of the roof on the internal face of parapets.
- Maintain a minium distance of 300 mm between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- Install the waterproofing membrane over the whole insulated area (including any insulation upstands) in accordance with the Alumasc Specification as soon as possible after laying the insulation boards.

Installation over Plywood Decks

- Make sure that plywood decks are clean and dry, and without projections (including fixing heads etc.), steps or gaps. Decks should allow correct falls to all rainwater outlets.
- Prime the plywood deck with Alumasc Bitumen Primer to ensure an adequate bond between deck and the vapour control layer.
- Where one run of the vapour control layer laps another, ensure that there are 100 mm side and 150mm end overlaps, and that these are adequately sealed.
- Turn up the vapour control layer at the edge of the roof to a height appropriate to the specified waterproofing membrane.
- An optional rubbercrumb protection layer may be used under the Vacuum Insulation Panels. For further information please contact the Alumasc Roofing Technical Services Department (see back cover).
- Lay the Vacuum Insulation Panels strictly in accordance with the approved layout drawing with joints light lightly butted, ensuring that there are no gaps.
- Where runs of the Vacuum Insulation Panels do not fit the dimensions of the roof, use rigid thermoset polyisocyanurate (PIR) insulation infill panels to compensate. The infill panels are the same thickness as the Vacuum Insulated Panels.
- The Vacuum Insulation Panels and the infill panels should be bonded in position using a P.U. adhesive.
- Where upstands or roof penetrations occur (e.g. ventilator kerbs, rooflights), lay infill panels abutting such features in strips no less than 200 mm wide, to take account of building tolerances and any requirement for peel restraint mechanical fixing of the membrane. For further guidance, please contact the Alumasc Roofing Technical Services Department (see back cover).
- Lay any infill panels as soon as possible to avoid exposure of the vapour control layer to foot traffic.
- Bond the Alumasc PIR overlay to the upper surface of the Vacuum Insulated Panels using an P.U. adhesive system prior to the application of the waterproof covering.
- Subject to project requirements, a minimum 25 mm thick Alumasc PIR upstand should be used around the perimeter of the roof on the internal face of parapets.
- Maintain a minium distance of 300 mm between the top of the insulation upstand and the bottom of the horizontal roof insulation.
- Install the waterproofing membrane over the whole insulated area (including any insulation upstands) in accordance with the Alumasc Specification as soon as possible after laying the insulation boards.

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Installation over Metal Decks, Existing Flat Roofs and Existing Composite Roof Panels

- The Alumasc VTherm Vacuum Insulated Roofing System can be used over metal decks, existing flat roofs and existing composite roof panels. For further information, please contact the Alumasc Roofing Technical Services Department (see back cover).

Wheeled / Foot Traffic

- The Vacuum Insulation Panels must not be walked on. Always use a protective foot or crawl board during the installation process.
- Infill panels and the Alumasc PIR overlay may be walked on.

General

- Do not use Vacuum Insulation Panels with solvent-based adhesives.
- Do not expose Vacuum Insulation Panels to naked flame or excessive heat.

Cutting

- Do not cut or penetrate Vacuum Insulation Panels.
- Ensure that the substrate is clean, dry and level, and free of sharp projections or edges.
- When cutting infill panels, use a fine-toothed saw; or score the panel on one side with a sharp knife, snap the panel over a straight edge and cut the face on the other side.
- Carefully trim the infill panels to achieve close-butting joints and continuity of insulation.

Availability

- Please contact Alumasc Sales Department regarding availability of the Alumasc VTherm Vacuum Insulated Roofing System.

Packaging and Storage

- The packaging of the Alumasc VTherm Vacuum Insulated Roofing System should not be considered adequate for storage outdoors. The system should be stored indoors and raised off the floor.

Health and Safety

- Alumasc VTherm insulation products are chemically inert and safe to use.

The reflective surface of VTherm panels is designed to enhance thermal performance. As such, it will reflect light as well as heat, including ultraviolet light.

Consequently, if panels are being installed during very bright or sunny weather, it is advisable to wear UV protective sunglasses or goggles, and if the skin is exposed for a significant period of time, to protect the bare skin with a UV block sun cream.

The reflective facing used on this product can be slippery underfoot when wet, and care should therefore be taken in wet weather to avoid any slip hazard.

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PRODUCT DETAILS

Composition

The Vacuum Insulation Panels comprise a rigid vacuum insulation with a microporous core, which is evacuated, encased and sealed in a thin, gas-tight envelope.

The infill panels comprise a high-performance rigid extruded polystyrene insulation.

Standards and Approvals

The VIP Panel is manufactured to the highest standards under a management system certified to ISO 9001: 2008 (Quality Management Systems. Requirements), ISO 14001: 2004 (Environmental Management Systems. Requirements), BS OHSAS 18001: 2007 (Health and Safety Management Systems. Requirements) and ISO 50001: 2011 (Energy Management Systems. Requirements with Guidance for Use).

Standard Dimensions

The Vacuum Insulation Panels are available in the following standard size(s):

Nominal Dimension	Availability
Length	**300 - 1200 mm**
Width	**300 - 600 mm**
Insulant Thickness	**20 - 60 mm**

Other sizes may be available dependent on order quantity. Please contact Alumasc Roofing for more details.

Compressive Strength

The compressive strength of the Kingspan OPTIM-R panels typically exceeds 150 kPa at 10% compression when tested to BS / I.S. EN ISO 826: 1996 (Thermal insulating products for building application. Determination of compression behaviour).

Durability

If installed correctly and protected from damage and penetration, the Alumasc VTherm Vacuum Insulated System can provide reliable long-term thermal performance over the lifetime of the building.

Resistance to Solvents, Fungi & Rodents

The Alumasc VTherm Vacuum Insulated System should not be used in association with solvent-based adhesive systems. Damaged boards or boards that have been in contact with solvents or acids should not be used.

The insulation core and facings used in the manufacture of the Alumasc VTherm Vacuum Insulated System resist attack by mould and microbial growth, and do not provide any food value to vermin.

Fire Performance

The Alumasc VTherm Vacuum Insulated System, when subjected to the British Standard fire test specified in the table below, will achieve the result shown, when used in conjunction with Derbigum Mineral Cap Sheets.

Test	Result
BS 476–3: 2004 (External fire exposure roof test)	**Ext. FAA rating**

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

A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal roof insulation. Wall insulation should also be carried up into parapets as high as the flat roof insulation upstand. Please contact the Alumasc Technical Department (see back cover) for further advice.

Thermal Properties

The values detailed below are quoted in accordance with BS / I.S. EN 12667: 2001 (Thermal performance of building materials and products. Determination of thermal resistance by means of guarded hot plate and heat flow meter methods. Products of high and medium thermal resistance), with allowance for ageing and edge effect of the encapsulating film to form the design value.

Thermal Conductivity

The Vacuum Insulation Panels achieve a thermal conductivity (K-value) of 0.007 W/mK (aged design value allowing for edge effect).

Thermal Resistance

Thermal resistance (R-value) of the Vacuum Insulation Panels varies with thickness and is calculated by dividing the thickness of the panel (expressed in metres) by the thermal conductivity (K).

Insulant Thickness (mm)	R Value Thermal Resistance (m2-K/W)
20	**2.857**
25	**3.571**
30	**4.285**
40	**5.714**

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Tried, Tested, Trusted

Unrivalled roofing solutions with a proven track record

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