Optimum performance rigid vacuum insulation panel – aged design value thermal conductivity 0.007 W/m·K

Insulating performance up to five times better than other commonly available insulation materials

Ideal for constructions where a lack of construction depth or space is an issue

Certified by BDA Agrément® and LABC Registered Details

Vacuum insulation panels are over 90% (by weight) recyclable

Resistant to the passage of water vapour

Ideal for new build and refurbishment

Non-deleterious material
Introduction

The Problem
When constructing a rainscreen wall in new build situations or upgrading the thermal performance of walls in existing buildings there may be a requirement for both low U-values and the thinnest possible wall build-up.

For new-build applications, there are increasing regulatory requirements and economic reasons to improve energy efficiency. One of the more efficient approaches is to improve the thermal performance of the building fabric whilst keeping the overall construction as thin as possible. There are already high performance insulation products available that will fulfil some of these requirements, however in certain areas, for example where the design requirements are such, a new, thinner, product is needed.

In refurbishment there is arguably a greater need to keep wall build-ups as thin as possible. Space is already at a premium and there may be little space for installing new rainscreen cladding for example because of the available depth of eaves overhangs and encroachment into access routes. Deeper rainscreen cladding systems could necessitate extending eaves, longer and more costly fixings, trims and accessories, and may result in greater reveal depths, reducing natural daylight.

The Solution
The Kingspan OPTIM-R® Rainscreen System has been developed to help solve these problems. The Kingspan OPTIM-R® Rainscreen System is an optimum performance next generation insulation solution from Kingspan Insulation. It comprises of rigid vacuum insulation panels with a microporous core which is evacuated, encased and sealed in a thin, gas-tight envelope, giving outstanding thermal conductivity, and providing the thinnest possible solution to insulation problems.

The vacuum insulation panels are accompanied by premium performance rigid insulation infill strips which can be cut to fit around penetrations, brackets, reveals and where fixtures and fittings need to be installed.

In retrofit applications, the Kingspan OPTIM-R® Rainscreen System provides solutions for areas that previously could have remained un-insulated because of insufficient space available. In new constructions the Kingspan OPTIM-R® Rainscreen System can significantly enhance U-values in areas that would otherwise be accepted as denigrating the overall thermal performance.

With an aged design value thermal conductivity (λ) of 0.007 W/m-K, Kingspan OPTIM-R® panels provide an insulating performance that is up to five times better than other commonly available insulation materials.

Design Service

The Kingspan OPTIM-R® Rainscreen System comprises 2 elements: Kingspan OPTIM-R® panels and Kingspan OPTIM-R® flex infill strips. It comes with a supporting design service which ensures the ratio of Kingspan OPTIM-R® to Kingspan OPTIM-R® flex for each project is maximised. The panel layout will be designed quickly and effectively, ready for client approval. Each layout will illustrate the size, number and location of the Kingspan OPTIM-R® panels. It will also illustrate the size, number and location of any Kingspan OPTIM-R® flex strips required.

For more details please contact the Kingspan Insulation Technical Service Department (see rear cover).
Typical Constructions and U-values

Assumptions

Because rainscreen systems are proprietary and utilise different mechanisms for attaching cladding panels to the wall structure, it is advisable to contact the Kingspan Insulation Technical Service Department (see rear cover) for specific U-value calculations.

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 BR443 (Conventions for U−value calculations). They are valid for the constructions shown in the details immediately above each table.

For the structural masonry wall examples, the internal wall finish is taken as a 3 mm skim coated 12.5 mm plasterboard on dabs, with the structural masonry wall at 200 mm. For the steel frame examples, the internal wall finish is taken to be a 3 mm skim coated 12.5 mm plasterboard, with the calcium silicate board at 9 mm.

NB When calculating U-values to BS / I.S. EN ISO 6946: 2007, the type of discrete ‘helping hand’ bracket used may change the thickness of insulation required. Please contact the Kingspan Insulation Technical Service Department for assistance (see rear cover).

NB 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.

NB The figures quoted are for guidance only. A detailed U−value calculation should be completed for each individual project.

NB 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 Kingspan Insulation Technical Service Department for assistance (see rear cover).

NB For the purposes of these calculations, the bridging effect of Kingspan flex has been taken to be 30%.

Insulated Rainscreen Cladding Systems (terracotta clay tile external finish)

<table>
<thead>
<tr>
<th>Insulant Thickness</th>
<th>U-values (W/m²·K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>0.28</td>
</tr>
<tr>
<td>50</td>
<td>0.24</td>
</tr>
<tr>
<td>60</td>
<td>0.22</td>
</tr>
<tr>
<td>30 + 40</td>
<td>0.20</td>
</tr>
<tr>
<td>40 + 40</td>
<td>0.18</td>
</tr>
<tr>
<td>40 + 50</td>
<td>0.17</td>
</tr>
<tr>
<td>50 + 50</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Figure 1

Insulated Rainscreen Cladding Systems on Steel Frame

<table>
<thead>
<tr>
<th>Insulant Thickness</th>
<th>U-values (W/m²·K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>0.32</td>
</tr>
<tr>
<td>50</td>
<td>0.27</td>
</tr>
<tr>
<td>60</td>
<td>0.24</td>
</tr>
<tr>
<td>30 + 40</td>
<td>0.22</td>
</tr>
<tr>
<td>40 + 40</td>
<td>0.20</td>
</tr>
<tr>
<td>40 + 50</td>
<td>0.19</td>
</tr>
<tr>
<td>50 + 50</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Figure 2
Design Considerations

Responsible Sourcing

The Kingspan OPTIM-R® Rainscreen System is manufactured under a management system certified to ISO 14001: 2004.

Sustainability & Responsibility

Kingspan Insulation has a long-term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; as a substantial landholder; and as a key member of its neighbouring communities.

A report covering the sustainability and responsibility of Kingspan Insulation Ltd’s British operations is available at www.kingspaninsulation.co.uk/sustainabilityandresponsibility.

Specification Clause

Kingspan OPTIM-R® panels should be described in specifications as:-

The wall insulation shall be the Kingspan OPTIM-R® Rainscreen System ___ mm thick: comprising a rigid vacuum insulation panel with a microporous core which is evacuated, encased and sealed in a thin, gas-tight envelope. The product shall be manufactured under a management system certified to ISO 9001: 2008, ISO 14001: 2004, BS OHSAS 18001: 2007 and ISO 50001: 2011 and installed in accordance with the instructions issued by Kingspan Insulation Limited.

NBS Specifications

Details also available in NBS Plus.

NBS users should refer to clause(s):

H92 776 (Standard and Intermediate)

Cold Bridging

The use of a neoprene / plastic gasket, between the ‘helping hand’ bracket and the structure, will help to mitigate the effects of cold bridging. Please contact the Kingspan Insulation Technical Service Department (see rear cover) for further information.

Water Vapour Control / Condensation

Consideration should be given to the risk of condensation, when designing thermal elements.

A condensation risk analysis should be carried out following the procedures set out in BS 5250: 2002 (Code of practice for the control of condensation in buildings). The Kingspan Insulation Technical Service Department (see rear cover) can provide this service.

Fire Stops

Current Building Regulations / Standards should be considered with regard to the requirements for, and provision of, fire stops.

Glazed Curtain Walling Systems

Please contact the Kingspan Insulation Technical Service Department (see rear cover for details) for advice regarding the suitability of the Kingspan OPTIM-R® Rainscreen System in glazed applications.

Lightning Protection

Designers should give consideration to the requirements of BS / I.S. EN 62305: 2006 (Protection against lightning).
**Sitework**

**Installation**

- Because rainscreen cladding systems are proprietary and utilise different mechanisms for attaching cladding panels to the wall structure, installation guidance should be sought from the system manufacturer.

- However, in the absence of any other guidance the instructions laid out below may be followed.

- The substrate against which the *Kingspan OPTIM-R* Rainscreen System is to be installed should be clean, dry and free from protrusions.

- *Kingspan OPTIM-R* panels should be installed with board edges lightly butted. Remaining areas of wall around brackets, openings, and other details which can not be insulated with *Kingspan OPTIM-R* panels should be in-filled with *Kingspan OPTIM-R* flex. Each *Kingspan OPTIM-R* flex strip is to be the same thickness as the *Kingspan OPTIM-R* element of the Rainscreen System.

- *Kingspan OPTIM-R* flex should be cut neatly around fixings and brackets to avoid gaps.

- *Kingspan OPTIM-R* panels are to be installed with the film flaps against the substrate and should be restrained to the substrate using a suitable proprietary adhesive. For further guidance on the specification of the proprietary adhesive please consult the Kingspan Insulation Technical Service Department (see rear cover) for assistance. *Kingspan OPTIM-R* flex should be restrained using mechanical fixings.

- The adhesive specification, and fixing rate, will potentially vary with the geographical location of the building, the local topography, the height and width of the wall structure, and the type of mechanisms being used to attach the cladding system.

- *Kingspan OPTIM-R* flex strips less than 300 mm in width should utilise a single row of insulation fasteners (with a suitable head or washer plate) along the centre line of the strip. Fixings within the row should be evenly distributed along the strip and located at centres no greater than 1200 mm, with a fixing located within 150 mm of each end of the strip. The requirement for additional fixings would need to be assessed on an individual project basis in accordance with BS EN 1991-1-4: 2005 (National annex to Eurocode 1, Actions on structures, General Actions, Wind Actions).

- Mechanical fixings for *Kingspan OPTIM-R* flex should be located greater than 50 mm, but less than 150 mm from the strip edge.

- Joints of the *Kingspan OPTIM-R* panels, and at junctions between the *Kingspan OPTIM-R* panels and *Kingspan OPTIM-R* flex, should be taped using a minimum 75 mm wide self adhesive aluminium foil rainscreen cladding tape. In the absence of other protection, exposed edges of the *Kingspan OPTIM-R* Rainscreen System should be protected by a self adhesive aluminium foil tape, with a minimum 50 mm wide overlap onto the insulation board face.

- For further guidance on the specification of self adhesive tape and application guidance, please refer to:
  - Sika Limited +44 (0) 1707 394 444
  - [www.sika.com](http://www.sika.com)
  - Venture TapeEurope +44 (0) 1327 876 555
  - [www.venturetape.com](http://www.venturetape.com)
Fire Stopping

- Fire stopping systems are proprietary. Please contact the Kingspan Insulation Technical Service Department (see rear cover for details) for advice regarding the fire stopping strategy for your construction.

General

- Kingspan OPTIM-R™ panels should not be used in association with solvent-based adhesive systems.
- Kingspan OPTIM-R™ panels should not be exposed to naked flames or excessive heat.

Cutting

- Kingspan OPTIM-R™ panels should not be cut or penetrated. The substrate must be clean, dry and level, and free of sharp objects or edges.
- Cutting of Kingspan OPTIM-R™ flex should be carried out either by using a fine toothed saw, or by scoring with a sharp knife, snapping the board over a straight edge and then cutting the facing on the other side.
- Ensure accurate trimming of Kingspan OPTIM-R™ flex to achieve close-butting joints and continuity of insulation.

Daily Working Practice

- At the completion of each day's work, or whenever work is interrupted for extended periods of time, board edges and joints should be protected from inclement weather.

Availability

- Please contact Kingspan Insulation for availability of the Kingspan OPTIM-R™ Rainscreen System.

Packaging and Storage

- The packaging of the Kingspan OPTIM-R™ Rainscreen System should not be considered adequate for outdoor protection. The Kingspan OPTIM-R™ Rainscreen System should be stored inside a building and raised off the floor.

Health and Safety

- Kingspan Insulation products are chemically inert and safe to use.
- A Safety Information Data Sheet for this product is available from the Kingspan Insulation website www.kingspaninsulation.co.uk/safety or www.kingspaninsulation.ie/safety.

Please note that the reflective surfaces on this product are designed to enhance its thermal performance. As such, they will reflect light as well as heat, including ultraviolet light. Therefore, if this product is 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.
Product Details

Composition

*Kingspan OPTIM-R* panels comprise a rigid vacuum insulation panel with a microporous core which is evacuated, encased and sealed in a thin, gas-tight envelope.

*Kingspan OPTIM-R flex* comprises a premium performance rigid insulation faced on both sides with a composite foil facing.

Standards and Approvals


The use of the Kingspan *OPTIM-R* Rainscreen System is covered by BDA Agrément® Certificate BAE 15-035/01/C (thicknesses of 20 – 40 mm) and by LABC Registered Details Certificate No. EWW488. For more information please contact the Kingspan Insulation Technical Services Department (see rear cover).

Standard Dimensions

*Kingspan OPTIM-R* panels are available in the following standard size(s):

<table>
<thead>
<tr>
<th>Nominal Dimension</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>300 – 1200</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>300 – 600</td>
</tr>
<tr>
<td>Insulant Thickness (mm)</td>
<td>20 – 60</td>
</tr>
</tbody>
</table>

Other sizes may be available dependent on order quantity. Please contact Kingspan Insulation for more details.

Compressive Strength


Durability

If installed correctly and protected from damage and penetration, the *Kingspan OPTIM-R* Rainscreen System can provide reliable long-term thermal performance over the lifetime of the building.

Resistance to Solvents, Fungi & Rodents

The *Kingspan OPTIM-R* Rainscreen 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 *Kingspan OPTIM-R* Rainscreen System resist attack by mould and microbial growth, and do not provide any food value to vermin.

Fire Performance

The *Kingspan OPTIM-R* Rainscreen System can be used in multi storey buildings up to 18 metres in height. For buildings over 18 metres in height *Kingspan Kooltherm® K15 Rainscreen Board* can be used.

Details on the fire performance of Kingspan Insulation products may be obtained from the Kingspan Insulation Technical Service Department (see rear cover).

Thermal Properties

The *λ*-values and *R*-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**

*Kingspan OPTIM-R* panels achieve a thermal conductivity (*λ*-value) of 0.007 W/m-K (aged design value allowing for edge effect).

**Thermal Resistance**

Thermal resistance (*R*-value) of *Kingspan OPTIM-R* panels varies with thickness and is calculated by dividing the thickness of the panel (expressed in metres) by the thermal conductivity.

<table>
<thead>
<tr>
<th>Insulant Thickness (mm)</th>
<th>Thermal Resistance (m²-K/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2.857</td>
</tr>
<tr>
<td>25</td>
<td>3.571</td>
</tr>
<tr>
<td>30</td>
<td>4.285</td>
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<tr>
<td>40</td>
<td>5.714</td>
</tr>
<tr>
<td>50</td>
<td>7.143</td>
</tr>
<tr>
<td>60</td>
<td>8.571</td>
</tr>
</tbody>
</table>
Contact Details

Customer Service
For quotations, order placement and details of despatches please contact the Kingspan Insulation Customer Service Department on the numbers below:

UK  – Tel: +44 (0) 1544 388 601
    – Fax: +44 (0) 1544 388 888
    – email: customerservice@kingspaninsulation.co.uk

Ireland  – Tel: +353 (0) 42 979 5000
          – Fax: +353 (0) 42 975 4299
          – email: info@kingspaninsulation.ie

Literature & Samples
Kingspan Insulation produces a comprehensive range of technical literature for specifiers, contractors, stockists and end users. The literature contains clear ‘user friendly’ advice on typical design; design considerations; thermal properties; sitework and product data.

Available as a complete Design Manual or as individual product brochures, Kingspan Insulation technical literature is an essential specification tool. For copies please contact the Kingspan Insulation Marketing Department, or visit the Kingspan Insulation website, using the details below:

UK  – Tel: +44 (0) 1544 387 384
    – Fax: +44 (0) 1544 387 484
    – email: literature@kingspaninsulation.co.uk
    – www.kingspaninsulation.co.uk/literature

Ireland  – Tel: +353 (0) 42 979 5000
          – Fax: +353 (0) 42 975 4299
          – email: info@kingspaninsulation.ie
          – www.kingspaninsulation.ie/literature

Tapered Roofing
For technical guidance, quotations, order placement and details of despatches please contact the Kingspan Insulation Tapered Roofing Department on the numbers below:

UK  – Tel: +44 (0) 1544 387 383
    – Fax: +44 (0) 1544 387 483
    – email: tapered@kingspaninsulation.co.uk

Ireland  – Tel: +353 (0) 42 975 4297
          – Fax: +353 (0) 42 975 4296
          – email: tapered@kingspaninsulation.ie

Technical Advice / Design
Kingspan Insulation supports all of its products with a comprehensive Technical Advisory Service for specifiers, stockists and contractors. This includes a computer-aided service designed to give fast, accurate technical advice. Simply phone the Kingspan Insulation Technical Service Department with your project specification. Calculations can be carried out to provide U-values, condensation / dew point risk, required insulation thicknesses etc... Thereafter any number of permutations can be provided to help you achieve your desired targets.

The Kingspan Insulation Technical Service Department can also give general application advice and advice on design detailing and fixing etc... Site surveys are also undertaken as appropriate.

The Kingspan Insulation British Technical Service Department operates under a management system certified to the BBA Scheme for Assessing the Competency of Persons to Undertake U-value and Condensation Risk Calculations.

Please contact the Kingspan Insulation Technical Service Department on the numbers below:

UK  – Tel: +44 (0) 1544 387 382
    – Fax: +44 (0) 1544 387 482
    – email: technical@kingspaninsulation.co.uk

Ireland  – Tel: +353 (0) 42 975 4297
          – Fax: +353 (0) 42 975 4296
          – email: technical@kingspaninsulation.ie

General Enquiries
For all other enquiries contact Kingspan Insulation on the numbers below:

UK  – Tel: +44 (0) 1544 388 601
    – Fax: +44 (0) 1544 388 888
    – email: info@kingspaninsulation.co.uk

Ireland  – Tel: +353 (0) 42 979 5000
          – Fax: +353 (0) 42 975 4299
          – email: info@kingspaninsulation.ie

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

Kingspan Insulation Ltd is a member of:
The National Insulation Association (NIA)

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Castleblayney, County Monaghan, Ireland

www.kingspaninsulation.co.uk  www.kingspaninsulation.ie

*Certified for thicknesses of 20 - 40 mm

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