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 height restrictions – can maintain an even transition between indoor and outdoor levels

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 balconies or terraces in new build situations or replacing them in existing buildings there may be a requirement for both low U-values and the thinnest possible build-up.

For new-build applications, there are increasing regulatory requirements and economic reasons to improve energy efficiency. One of the 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 the majority of these requirements, however in certain areas a new, thinner, product is needed. Balconies and terraces are such areas that may require both low U-values and a thin aesthetically-pleasing solution.

Existing balconies and terraces are often problem areas with little space for installing new insulation. In order to meet the required U-value, very often the insulation must be installed both on top of and on the underside of the balcony or terrace. Not only can this be time-consuming but it can also pose a condensation risk.

The Solution
The Kingspan OPTIM-R® Balcony & Terrace System has been developed to help solve these problems. The Kingspan OPTIM-R® Balcony & Terrace 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, with the thinnest possible solution to insulation problems. The vacuum insulation panels are accompanied by high performance rigid insulation infill panels which can be cut to fit around problem areas such as drainage gutters.

In retrofit applications, the Kingspan OPTIM-R® Balcony & Terrace System can be used to avoid height differences between the building interior and the balcony or terrace. In new constructions the Kingspan OPTIM-R® Balcony & Terrace System can significantly enhance U-values in an area 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, the Kingspan OPTIM-R® Balcony & Terrace System provides an insulating performance that is up to five times better than other commonly available insulation materials. The high level of thermal efficiency with minimal thickness, achieved by the Kingspan OPTIM-R® Balcony & Terrace System provides solutions for applications where a lack of construction depth or space is an issue.

Design Service

The Kingspan OPTIM-R® Balcony & Terrace System comprises 2 elements: Kingspan OPTIM-R® panels and Kingspan OPTIM-R® flex infill panels. It comes with a supporting design service which ensures the ratio of the Kingspan OPTIM-R® element of the Balcony & Terrace System 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 infill panels required. An example of a typical design layout can be seen below.

For more details please contact the Kingspan Insulation Technical Service Department (see rear cover).
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 BR443 (Conventions for U-value calculations). They are valid for the constructions shown in the details adjacent to each table.

N.B. 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.

N.B. The figures quoted are for guidance only. A detailed U-value calculation together with condensation risk analysis should be completed for each individual project.

N.B. To gain a comprehensive U-value calculation for your project please consult the Kingspan Insulation Technical Service Department for assistance (see rear cover).

N.B. For the purposes of these calculations, the bridging effect of Kingspan flex has been taken to be 20%.

Concrete Deck
Dense Concrete Deck with Suspended Ceiling and Kingspan Therma® TR27 LPC/FM Overlay

* Refer to Sitework

Figure 2

<table>
<thead>
<tr>
<th>Kingspan OPTIM-R® Balcony &amp; Terrace System thickness (mm)</th>
<th>Kingspan Therma® TR27 LPC/FM overlay thickness (mm)</th>
<th>U-values (W/m²·K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>25</td>
<td>0.28</td>
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<tr>
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<tr>
<td>50 + 50</td>
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<td>0.09</td>
</tr>
</tbody>
</table>
Typical Constructions and U-values

Dense Concrete Deck with Suspended Ceiling and Kingspan Styrozone® Overlay (Heavy Traffic areas)

- 150 mm concrete deck to falls
- Waterproofing e.g. single-ply non-bituminous membrane
- Vapour control layer

Timber Deck

- 18 mm plywood deck
- Waterproofing e.g. single-ply non-bituminous membrane
- Vapour control layer

<table>
<thead>
<tr>
<th>Kingspan OPTIM-R Balcony &amp; Terrace System thickness (mm)</th>
<th>Kingspan Styrozone® overlay thickness (mm)</th>
<th>U-values (W/m²·K)</th>
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</thead>
<tbody>
<tr>
<td>20</td>
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<td>0.28</td>
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<tr>
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<td>50 + 50</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Kingspan Thermaroof TR27 LPC/FM Overlay System thickness (mm)</th>
<th>Kingspan Thermaroof TR27 LPC/FM Overlay thickness (mm)</th>
<th>U-values (W/m²·K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
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</tr>
<tr>
<td>50 + 50</td>
<td>25</td>
<td>0.09</td>
</tr>
</tbody>
</table>
Design Considerations

**Linear Thermal Bridging**

Reasonable provision must be made to limit the effects of cold bridging. The design should ensure that roof-light or ventilator kerbs etc. are insulated with a 25 mm thick insulation board of *Kingspan Therma®* TR27 LPC/FM or *Kingspan Styrozone®*. Where upstands exist a minimum 25 mm thickness of *Kingspan Therma®* TR27 LPC/FM or *Kingspan Styrozone®* should also be used around the perimeter of the balcony or the terrace on the internal façade of the parapets. A minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal balcony or terrace insulation. Wall insulation should also be carried up into parapets as high as the flat roof insulation upstand.

Please contact the Kingspan Insulation Technical Service Department (see rear cover) for further advice.

**Responsible Sourcing**

The *Kingspan Balcony & Terrace 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](http://www.kingspaninsulation.co.uk/sustainabilityandresponsibility).

**Specification Clause**

The *Kingspan Optim-R®* element of the Balcony & Terrace System should be described in specifications as:-

The roof insulation shall be the *Kingspan Optim-R®* Balcony & Terrace 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: 2008 and OHSAS 18001: 2007, and installed in accordance with the instructions issued by Kingspan Insulation.
Design Considerations

NBS Specifications
Details also available in NBS Plus.
NBS users should refer to clause(s):
J42 420, J42 430, J31 335
(Standard and Intermediate)
J42 10, J31 10 (Minor Works).

Wind Loading
Wind loadings should be assessed in accordance with
wind loads) or BS / I.S. EN 1991-1-4: 2005 (National Annex
to Eurocode 1 Actions on Structures. General Actions. Wind Actions) taking into account:
- length / width / height of the building;
- orientation of the building;
- wind speed;
- aspect (e.g. on a hill side); and
- topographical value of the surrounding area.

Falls
The fall on a balcony or terrace, constructed using the
Kingspan OPTIM-R® Balcony & Terrace System is
normally provided by the supporting structure being directed
towards the rainwater outlets. The fall should be smooth and
steep enough to prevent the formation of rainwater ponds.
In order 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 in even greater falls. These can be provided by the
Kingspan OPTIM-R® Balcony & Terrace System when
used in conjunction with an overlay of Kingspan ThermaTaper®
TT47 LPC/FM (see below).

Tapered Roofing
The Kingspan OPTIM-R® Balcony & Terrace System
can also be used in a tapered scheme. The scheme comes
with a supporting design service. This ensures that the most
cost–effective solution for a balcony or terrace is identified and
that the end result is a tapered system design which meets a
balcony or terrace’s rainwater run–off and insulation
requirements. For more details please contact the Kingspan
Insulation Tapered Roofing Department (see rear cover), which
should be consulted as early as possible in the process of
designing a roof.

Roof Loading / Traffic
The insulation overlay used in the Kingspan OPTIM-R®
Balcony & Terrace System will depend on the specific foot
traffic regimes of the construction.
For further advice on the acceptability of specific foot traffic
regimes and different insulation overlay materials, please
contact the Kingspan Insulation Technical Service Department
(see rear cover).

Green Roof Terraces
The Kingspan OPTIM-R® Balcony & Terrace System is
suitable for use under most warm green roof terrace systems.
Green roof systems are a specialist design area. When
designing a loose-laid insulated green roof assembly
consideration needs to be given to the following.
Green roof systems are required to have a minimum dry weight
of 80 kg/m² to ballast the insulation boards beneath them.
However, the total required dry weight will depend upon wind
uplift, which in turn will vary with the geographical location of
the building, local topography, and the height and the width of
the roof concerned. The necessity for any additional dry weight
should be assessed 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
When installing a loose-laid insulated green roof assembly, any
insulation must be immediately overlaid with the green roof
system, which must meet all of the requirements outlined above.
Where these requirements cannot be ensured, the insulation
must be bonded down (see Site Work). For further information
please contact the Kingspan Insulation Technical Service
Department (see rear cover).
Roof Waterproofing

The Kingspan OPTIM-R® Balcony & Terrace System, when used in conjunction with an overlay of Kingspan ThermaRoof® TR27 LPC/FM, is suitable for use with most fully adhered single-ply waterproofing membranes. When using the Kingspan OPTIM-R® Balcony & Terrace System with fully adhered single-ply waterproofing membranes, the joints between the Kingspan ThermaRoof® TR27 LPC/FM, immediately below the waterproofing membrane, can be taped with a min. 50 mm wide foil tape (refer to the appropriate single-ply membrane manufacturer’s instructions). Please contact the Kingspan Insulation Technical Service Department (see rear cover) to check waterproofing membrane and proprietary adhesive system compatibility. Advice should be sought, from the appropriate waterproofing membrane manufacturer, in relation to the requirement for the use of a fleece backed membrane with the waterproofing membrane in question.

The Kingspan OPTIM-R® Balcony & Terrace System, when used in conjunction with an overlay of Kingspan ThermaRoof® TR27 LPC/FM, is also suitable for use with some cold liquid applied waterproofing systems. When using the Kingspan OPTIM-R® Balcony & Terrace System with cold liquid applied waterproofing systems, a carrier membrane for the waterproofing must be installed over the Kingspan ThermaRoof® TR27 LPC/FM. Advice should be sought, from the waterproofing system manufacturer, about the specification of the carrier membrane and the compatibility of the waterproofing system with the Kingspan OPTIM-R® Balcony & Terrace System. For further advice please contact the Kingspan Insulation Technical Service Department (see rear cover).

The Kingspan OPTIM-R® Balcony & Terrace System, when used in conjunction with an overlay of Kingspan Styrozone®, is suitable for use with most fleece backed single ply waterproofing membranes. The waterproofing membrane can be either fully adhered or loose laid when ballasted. Advice should be sought from the appropriate membrane manufacturer.

Water Vapour Control

The Kingspan OPTIM-R® Balcony & Terrace System must be installed over a separate vapour control layer. A minimum vapour control layer should consist of a coated roofing felt complying with Type 3B to BS 747: 2000 (Reinforced bitumen sheets for roofing. Specification), or S1P1 to BS 8747: 2007 (Reinforced bitumen membranes (RBMs) for roofing. Guide to selection and specification). Alternative vapour control layers should be discussed with the Kingspan Insulation Technical Service Department (see rear cover).

Where the separate vapour control layer is to be bonded, allowance should be made for adequate bonding of the vapour control layer to the substrate, so as to provide a suitable surface upon which to lay the insulation panels and sufficient resistance to wind up-lift (see ‘Wind Loading’).

Condensation Risk Analysis

Included in the design service is the calculation of condensation risk 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 Kingspan OPTIM-R® Balcony & Terrace System, whilst also ensuring any condensation risk is within the limits given in BS 5250: 2002.
Installing over Concrete Decks

- Concrete decks should be clean, dry, without projections (including fixing heads etc.), steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- In order to ensure an adequate bond between the concrete deck and the vapour control layer, the concrete deck should be suitably primed, in accordance with the primer manufacturer’s instructions, prior to the application of the adhesive system, used to bond the vapour control layer to the deck.
- Where one run of the specified vapour control layer laps another, there should be minimum 150 mm inside and end overlaps, which should be 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 protection layer may be used under the Kingspan OPTIM-R® Balcony & Terrace System. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover).
- The Kingspan OPTIM-R® element of the Balcony & Terrace System should be laid chessboard pattern where practical, with joints lightly butted. There should be no gaps at abutments.
- Where runs of the Kingspan OPTIM-R® element of the Balcony & Terrace System do not accurately fit the dimension of the balcony or terrace, the use of Kingspan OPTIM-R® flex boards are required to make up this difference. Each Kingspan OPTIM-R® flex board is to be the same thickness as the Kingspan OPTIM-R® element of the Balcony & Terrace System.
- Both the Kingspan OPTIM-R® and Kingspan OPTIM-R® flex elements of the Balcony & Terrace System should be bonded down using an appropriate proprietary adhesive system. For a loose laid ballasted system please contact the Kingspan Insulation Technical Service Department (see rear cover).
- At the perimeter of the balcony or terrace and where upstands or any other penetrations (e.g. drainage outlets) are present, Kingspan OPTIM-R® flex should be laid abutting these areas, in strips no less than 200 mm wide, to take account of building tolerances and to provide a zone to allow for peel restraint mechanical fixing of the membrane should it be required. Refer to the waterproofing manufacturer for guidance on appropriate peel restraint detailing.

- The Kingspan Therma® roof TR27 LPC/FM or Kingspan Styrozone® overlay should be laid as soon as possible to avoid exposure of the Kingspan OPTIM-R® element of the Balcony & Terrace System to direct foot traffic.
- The Kingspan Therma® roof TR27 LPC/FM or Kingspan Styrozone® overlay should be bonded to the upper surface of the Kingspan OPTIM-R® and Kingspan OPTIM-R® flex elements of the Balcony & Terrace System using an appropriate proprietary adhesive system prior to the application of the waterproof covering.
- Subject to project requirements, a minimum 25 mm thick Kingspan Therma® roof TR27 LPC/FM or Kingspan Styrozone® upstand should be used around the perimeter of the balcony or terrace on the internal façade of parapets.
- Where upstands exist, a minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal balcony or terrace insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer’s instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.
Installing over Plywood Decks

- Plywood decks should be clean, dry, without projections (including fixing heads etc.), steps or gaps, and should be graded to allow correct falls to all rainwater outlets.
- In order to ensure an adequate bond between the plywood deck and the vapour control layer, the plywood deck should be suitably primed, in accordance with the primer manufacturer’s instructions, prior to the application of the adhesive system, used to bond the vapour control layer to the deck.
- Where one run of the specified vapour control layer laps another, there should be minimum 150 mm inside and end overlaps, which should be adequately sealed.
- Turn up the vapour control layer at the edge of the balcony or terrace to a height appropriate to the specified waterproofing membrane.
- An optional protection layer may be used under the Kingspan OPTIM-R® Balcony & Terrace System. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover).
- The Kingspan OPTIM-R® element of the Balcony & Terrace System should be laid chessboard pattern where practical, with joints lightly butted. There should be no gaps at abutments.
- Where runs of the Kingspan OPTIM-R® element of the Balcony & Terrace System do not accurately fit the dimension of the balcony or terrace, the use of Kingspan OPTIM-R® flex boards are required to make up this difference. Each Kingspan OPTIM-R® flex board is to be the same thickness as the Kingspan OPTIM-R® element of the Balcony & Terrace System.
- Both the Kingspan OPTIM-R® and Kingspan OPTIM-R® flex elements of the Balcony & Terrace System should be bonded down using an appropriate proprietary adhesive system. For a loose laid ballasted system please contact the Kingspan Insulation Technical Service Department (see rear cover).
- At the perimeter of the balcony or terrace and where upstands or any other penetrations (e.g. drainage outlets) are present, Kingspan OPTIM-R® flex should be laid abutting these areas, in strips no less than 200 mm wide, to take account of building tolerances and to provide a zone to allow for peel restraint mechanical fixing of the membrane should it be required. Refer to the waterproofing manufacturer for guidance on appropriate peel restraint detailing.

Installing over Existing Flat Roofs

- The Kingspan Therma roof® TR27 LPC/FM or Kingspan Styrozone® overlay should be laid as soon as possible to avoid exposure of the Kingspan OPTIM-R® element of the Balcony & Terrace System to direct foot traffic.
- The Kingspan Therma roof® TR27 LPC/FM or Kingspan Styrozone® overlay should be bonded to the upper surface of the Kingspan OPTIM-R® and Kingspan OPTIM-R® flex elements of the Balcony & Terrace System using an appropriate proprietary adhesive system prior to the application of the waterproof covering.
- Subject to project requirements, a minimum 25 mm thick Kingspan Therma roof® TR27 LPC/FM or Kingspan Styrozone® upstand should be used around the perimeter of the balcony or terrace on the internal façade of parapets.
- Where upstands exist, a minimum distance of 300 mm should be maintained between the top of the insulation upstand and the bottom of the horizontal balcony or terrace insulation.
- The waterproofing membrane is installed in accordance with the membrane manufacturer’s instructions, over the whole insulated area including any insulation upstands, as soon as possible after laying the insulation boards.

Installing over Existing Flat Roofs

- The Kingspan OPTIM-R® Balcony & Terrace System is suitable for use over existing flat roofs. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover).
Sitework

Wheeled / Foot Traffic

- The Kingspan **OPTIM-R** element of the Balcony & Terrace System should not be walked on. A protective foot or crawl board should be used during the installation process.
- The Kingspan **OPTIM-R** flex element of the Balcony & Terrace System and the insulation overlay may be walked on.

General

- The Kingspan **OPTIM-R** element of the Balcony & Terrace System should not be used in association with solvent-based adhesive systems.
- The Kingspan **OPTIM-R** element of the Balcony & Terrace System should not be exposed to naked flames or excessive heat.

Cutting

- The Kingspan **OPTIM-R** element of the Balcony & Terrace System 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.

Availability

- Please contact Kingspan Insulation for availability of the Kingspan **OPTIM-R** Balcony & Terrace System.

Packaging and Storage

- The packaging of the Kingspan **OPTIM-R** Balcony & Terrace System should not be considered adequate for outdoor protection. The Kingspan **OPTIM-R** Balcony & Terrace 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](http://www.kingspaninsulation.co.uk/safety) or [www.kingspaninsulation.ie/safety](http://www.kingspaninsulation.ie/safety).

Please note that the reflective surface on this product is designed to enhance its thermal performance. As such, it will reflect light as well as heat, including ultraviolet light. Therefore, if this panel 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.

The reflective facing used on this product can be slippery underfoot when wet. Therefore, it is recommended that any excess material should be contained to avoid a slip hazard.
Product Details

Composition
The Kingspan OPTIM-R™ element of the Balcony & Terrace System comprises a rigid vacuum insulation panel with a microporous core which is evacuated, encased and sealed in a thin, gas-tight envelope.

The Kingspan OPTIM-R™ flex element of the Balcony & Terrace System comprises of a high performance rigid insulation faced on both sides with a coated glass tissue.

Standards and Approvals

Standard Dimensions
The Kingspan OPTIM-R™ Balcony & Terrace System 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
The compressive strength of the Kingspan OPTIM-R™ element of the Balcony & Terrace System typically exceeds 160 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 Kingspan OPTIM-R™ Balcony & Terrace System will provide reliable long-term thermal performance over the lifetime of the building.

Resistance to Solvents, Fungi & Rodents
The Kingspan OPTIM-R™ Balcony & Terrace 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™ Balcony & Terrace System resist attack by mould and microbial growth, and do not provide any food value to vermin.

Fire Performance
The Kingspan OPTIM-R™ Balcony & Terrace System, when subjected to the British Standard fire test, specified in the table below, will achieve the result shown, when waterproofed with a single-ply waterproofing membrane.

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS 476-3: 2004 (External fire exposure roof test)</td>
<td>Dependent on single-ply membrane adopted</td>
</tr>
</tbody>
</table>

Further 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
The Kingspan OPTIM-R™ element of the Balcony & Terrace System achieves 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 the Kingspan OPTIM-R™ element of the Balcony & Terrace System 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>
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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

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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.

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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:

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