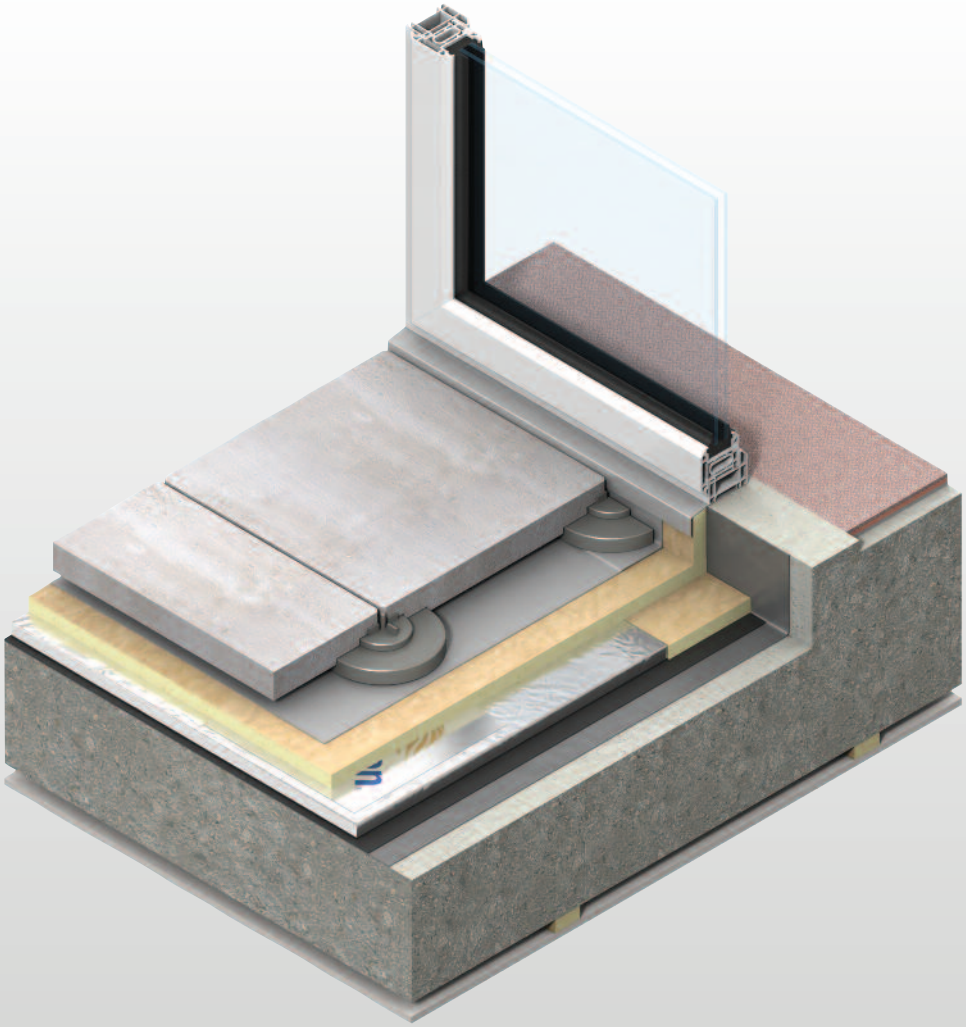
Insulation

First Issue July 2013

OPTIM-R™
Balcony & Terrace System

NEXT GENERATION INSULATION SOLUTION FOR BALCONIES AND TERRACES



- 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

Kingspan®

Low Energy – Low Carbon Buildings

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).

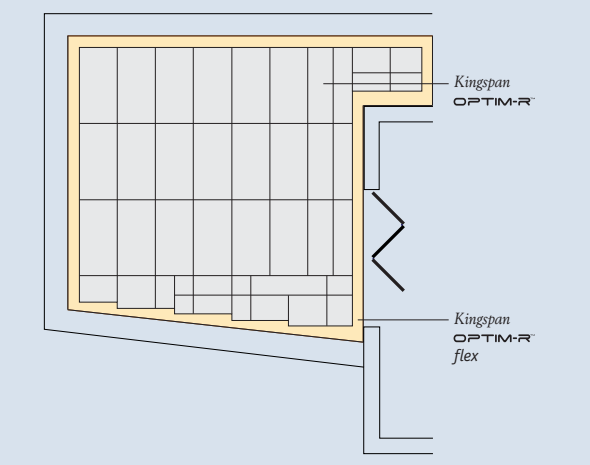


Figure 1

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.

BBA CERTIFICATE CS/1004-1
U Value Competency Scheme

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.

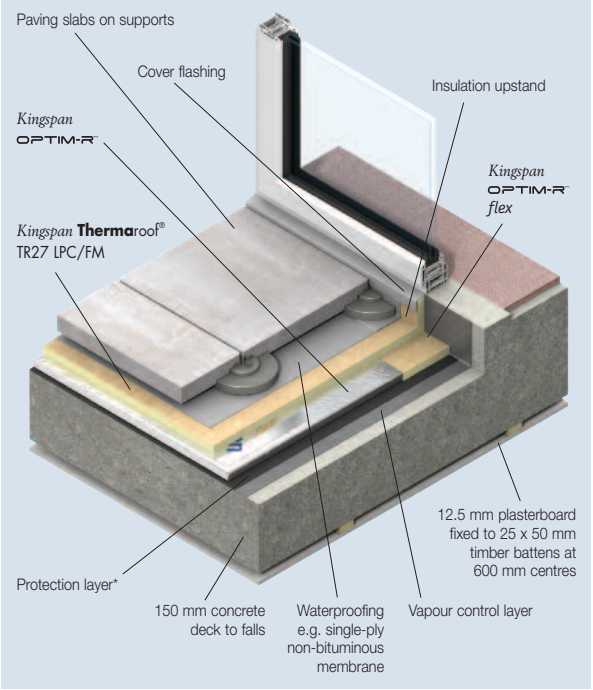
N.B. The figures quoted are for guidance only. A detailed U-value calculation together with condensation risk analysis should be completed for each individual project.

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 OPTIM-R™ **flex** has been taken to be 20%.*

Concrete Deck

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



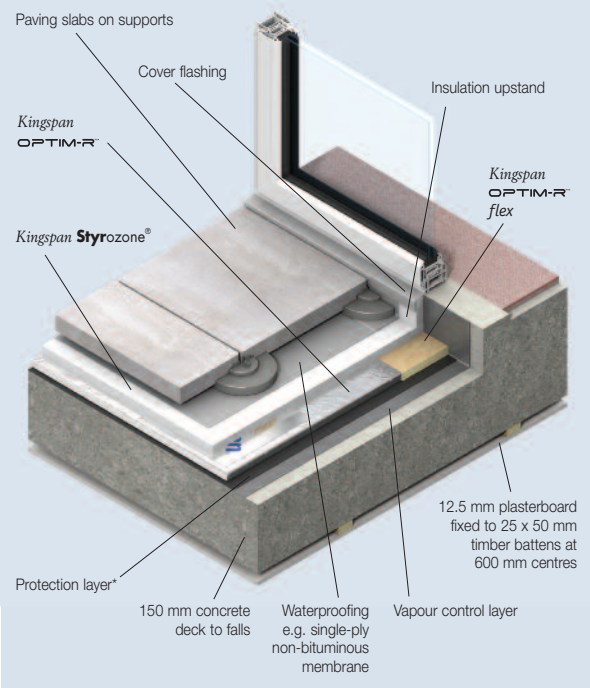
** Refer to Sitework*

Figure 2

Kingspan OPTIM-R™ Balcony & Terrace System thickness (mm)	*Kingspan* Thermaroof TR27 LPC/FM overlay thickness (mm)	U-values ($W/m^2 \cdot K$)
20	25	0.28
25	25	0.25
30	25	0.22
40	25	0.18
50	25	0.16
60	25	0.14
40 + 30	25	0.12
40 + 40	25	0.11
40 + 50	25	0.10
50 + 50	25	0.09

Typical Constructions and U-values

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



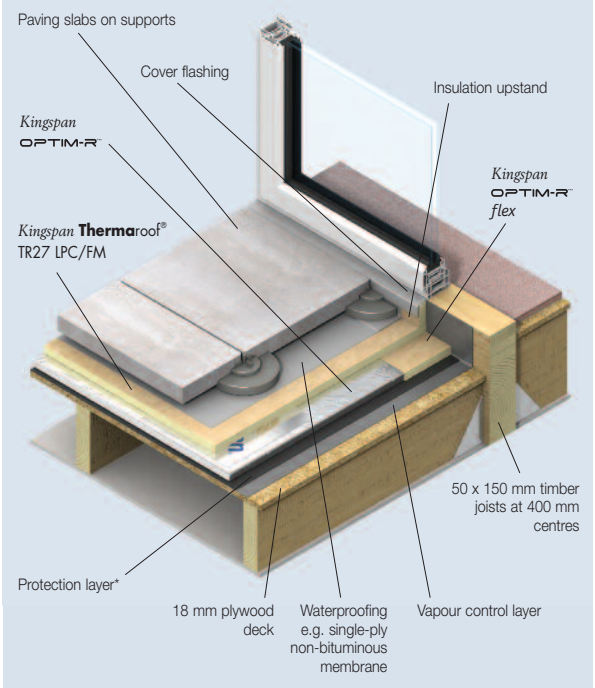
** Refer to Sitework*

Figure 3

Kingspan OPTIM-R™ Balcony & Terrace System thickness (mm)	*Kingspan* Styrozone® overlay thickness (mm)	U-values ($W/m^2 \cdot K$)
20	30	0.28
25	30	0.25
30	30	0.22
40	30	0.18
50	30	0.16
60	30	0.14
40 + 30	30	0.12
40 + 40	30	0.11
40 + 50	30	0.10
50 + 50	30	0.09

Timber Deck

Timber Deck with Plasterboard Ceiling and *Kingspan* Thermaroof® TR27 LPC/FM Overlay



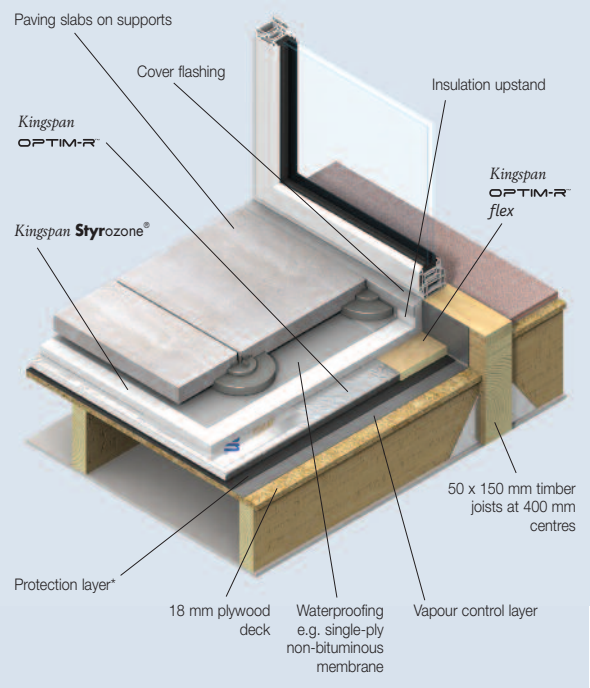
** Refer to Sitework*

Figure 4

Kingspan OPTIM-R™ Balcony & Terrace System thickness (mm)	*Kingspan* Thermaroof TR27 LPC/FM overlay thickness (mm)	U-values ($W/m^2 \cdot K$)
20	25	0.27
25	25	0.25
30	25	0.22
40	25	0.18
50	25	0.15
60	25	0.14
40 + 30	25	0.12
40 + 40	25	0.11
40 + 50	25	0.10
50 + 50	25	0.09

Design Considerations

Timber Deck with Plasterboard Ceiling and *Kingspan* Styrozone® Overlay (Heavy Traffic areas)



** Refer to Sitework*

Figure 5

Kingspan OPTIM-R™ Balcony & Terrace System thickness (mm)	*Kingspan* Styrozone® overlay thickness (mm)	U-values ($W/m^2 \cdot K$)
20	30	0.28
25	30	0.25
30	30	0.22
40	30	0.18
50	30	0.16
30 + 30	30	0.14
40 + 30	30	0.12
40 + 40	30	0.11
40 + 50	30	0.10
50 + 50	30	0.09

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**roof® TR27 LPC/FM or *Kingspan* **Styr**ozone®. Where upstands exist a minimum 25 mm thickness of *Kingspan* **Therma**roof® TR27 LPC/FM or *Kingspan* **Styr**ozone® 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* OPTIM-R™ **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.

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 BS 6399-2: 1997 (Loadings 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) 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* **Therma**taper® 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/m^2 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 Actions on structures. General Actions. Wind Actions).

When installing a loose-laid insulated green roof assembly, any insulation must be immediately over-laid 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 Sitework). 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* **Therma**roof® 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* **Therma**roof® 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* **Therma**roof® 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* **Therma**roof® 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* **Styr**ozone®, 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.

Sitework

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* **Styr**ozone® 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* **Styr**ozone® 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* **Styr**ozone® 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 & Flooring 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* **Styr**ozone® 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* **Styr**ozone® 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* **Styr**ozone® 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 or 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

The *Kingspan* OPTIM-R™ **Balcony & Terrace System** 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) and OHSAS 18001: 2007 (Health and Safety Management Systems. Requirements).

Standard Dimensions

The *Kingspan* OPTIM-R™ **Balcony & Terrace System** panels are available in the following standard size(s):

Nominal Dimension		Availability
Length	(mm)	300 – 1200
Width	(mm)	300 – 600
Insulant Thickness	(mm)	20 – 60

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.

Test	Result
BS 476-3: 2004 (External fire exposure roof test)	Dependent on single-ply membrane adopted

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.

Insulant Thickness (mm)	Thermal Resistance (m^2·K/W)
20	2.857
25	3.571
30	4.285
40	5.714
50	7.143
60	8.571

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
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– 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
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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.

BBA
CERTIFICATE CS/1004-1
U Value Competency Scheme

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

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General Enquiries

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