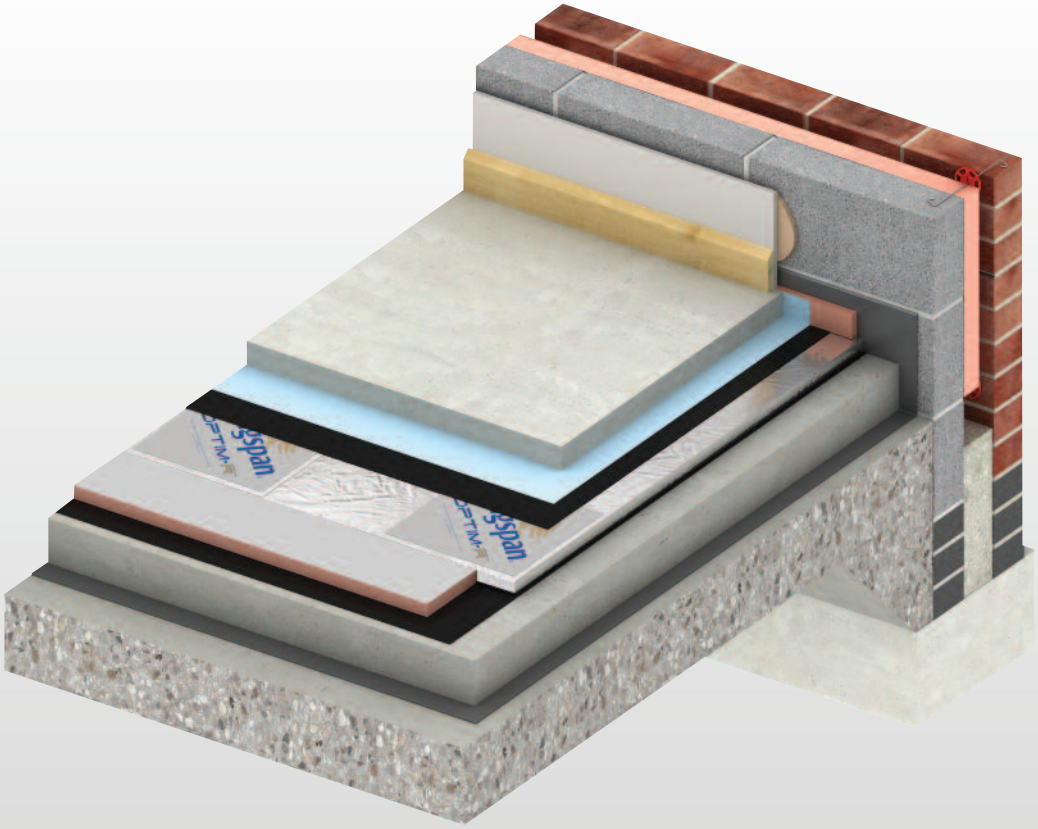
Insulation

First Issue April 2013

OPTIM-R™ Flooring System

NEXT GENERATION INSULATION SOLUTION FOR FLOORS



- 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
- 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 a floor in new build situations or replacing a floor in existing buildings there may be a requirement for both low U-values and the thinnest possible floor 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, for example where the design demands it, a new, thinner, product is needed.

In refurbishment there is arguably a greater need to keep floor build-ups as thin as possible. Space is already at a premium and there may be little space for installing new floor insulation. Greater thicknesses of floor insulation will necessitate the removal of a greater depth of material and may mean ground floor door lintels, radiators and skirting boards etc, all need to be raised. This could add to the cost and time of installing a replacement concrete floor.

The Solution

The *Kingspan* OPTIM-R™ **Flooring System** has been developed to help solve these problems. The *Kingspan* OPTIM-R™ **Flooring 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 with rigid thermoset insulation infill panels which can be used where the remaining dimension to infill is below 300 mm or can be cut to fit around problem areas such as penetrations or load bearing walls.

In retrofit applications, the *Kingspan* OPTIM-R™ **Flooring System** provides solutions for areas that previously would have remained un-insulated because of insufficient space available or because the excavation of material is impractical. In new constructions the *Kingspan* OPTIM-R™ **Flooring 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, the *Kingspan* OPTIM-R™ element of the Flooring System provides an insulating performance that is up to five times better than other commonly available insulation materials.

Design Considerations

Design Service

The *Kingspan* OPTIM-R™ **Flooring System** comes with a supporting design service which ensures the ratio of the *Kingspan* OPTIM-R™ element of the Flooring System to the *Kingspan* OPTIM-R™ **Flooring System** infill panel 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™ infill panels required.

Examples of a typical design layout can be seen in Figures 1 & 2.

For more details please contact the Kingspan Insulation Technical Service Department (see rear cover).

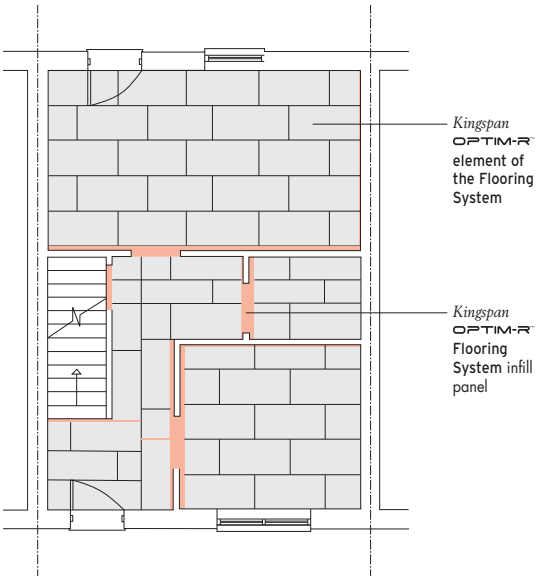


Figure 1: A typical terraced property with a solid concrete ground based floor

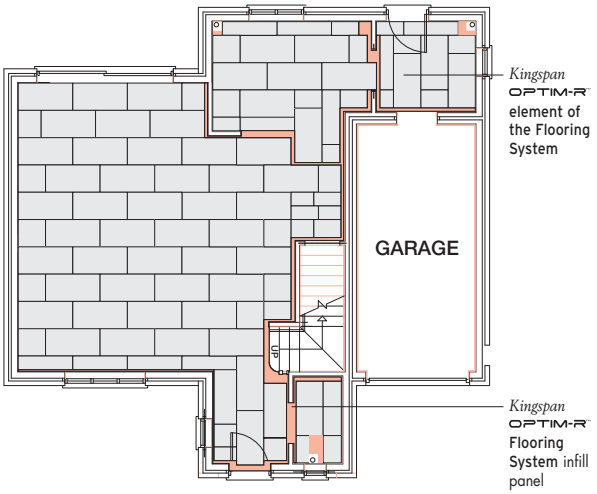


Figure 2: A typical property with a beam and dense block ground floor

Environmental Impact & Responsible Sourcing

Responsible Sourcing

The *Kingspan* OPTIM-R™ **Flooring System** is manufactured under a management system certified to EN 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.

NBS Specifications

Details also available in NBS Plus. NBS users should refer to clause(s): M10 40, M10 290, M13 40 and M13 260.

Design Standards

Consideration should be given to the recommendations of BS 8102: 1990 (Code of practice for protection of buildings against water from the ground), BS 8215: 1991 (Code of practice for design and installation of damp proof courses in masonry construction), and the information given in Building Research Establishment Digest 104 (Floor Screeds).

Substrate

The *Kingspan* OPTIM-R™ **Flooring System** is not recommended for use in direct contact with subsoil and must be positioned above the DPM.

Lightning Protection

Building Designers should give consideration to the requirements of BS / IS EN 62305:2006 (Protection against lighting).

Underfloor Heating Systems

The typical constructions shown in Figures 3 and 4 can be readily converted to accommodate underfloor heating systems. For further information 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 13370: 2007 (Thermal performance of buildings. Heat transfer via the ground. Calculation methods) 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.

Unlike roofs, walls and intermediate floors, U–value calculations for ground floors cannot be calculated with reference to the construction detail alone. Heat loss from ground floors depends upon the ratio of the exposed floor perimeter to the total floor area, the thickness of any basement wall and the depth of any basement.

Floor dimensions should be measured between the finished internal surfaces of the external walls. Non–usable heated space such as ducts and stairwells should be included when determining the area of the floor. Unheated spaces outside of the insulated fabric, such as attached garages or porches, should be excluded when determining the area of the floor, but the length of the wall between the heated building and the unheated space should be included when determining the perimeter. The floor dimensions of semi–detached, terraced or other joined premises / dwellings can be taken either as those of the premises / dwelling itself or those of the whole building. Where extensions to existing buildings are under consideration, the floor dimensions should be taken as those of the extension.

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

NB For the purposes of these calculations, using the method as detailed in BS / I.S. EN ISO 13370: 2007, the wall insulation is assumed to overlap the floor insulation by minimum 150 / 225 mm. The standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.*

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

** 150 mm applies to the UK and 225 mm to the Republic of Ireland.*

Typical Constructions and U-values

Solid Concrete Ground Based Floors

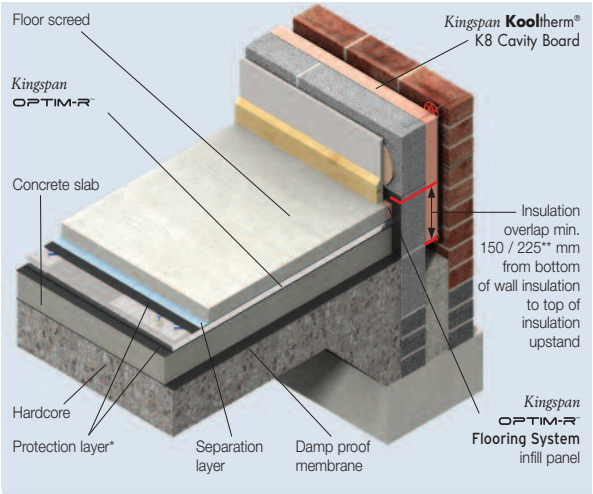


Figure 3

** Refer to Sitework*

*** 150 mm applies to the UK and 225 mm to the Republic of Ireland*

Insulant Thickness (mm)	U-values (W/m²·K)
20	0.20
25	0.17
30	0.16
40	0.13
50	0.11
30 + 30	0.09
30 + 40*	0.08
40 + 40	0.08

** Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.*

The U-values above are based on the following assumptions:

Exposed floor perimeter	10.66 m
Floor area	35.985 m²
P/A	0.296
Floor type	Solid ground floor
Earth conductivity	1.500 W/mK
Soil type	Clay or silt

For other constructions please contact the Kingspan Insulation Technical Service Department (see rear cover).

Beam and Dense Block Ground Floors

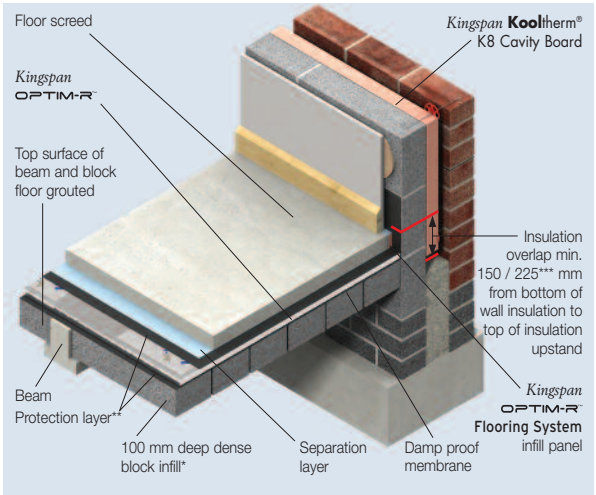


Figure 4

** Calculations assume dense block infill of λ–value (1.13 W/m·K)*

*** Refer to Sitework*

**** 150 mm applies to the UK and 225 mm to the Republic of Ireland*

Insulant Thickness (mm)	U-values (W/m²·K)
20	0.25
25	0.20
30	0.18
40	0.15
50	0.13
30 + 30	0.11
30 + 40*	0.09
40 + 40	0.08

** Where multiple layers of insulation of different thicknesses are used, the thickest layer should be installed as the outermost layer in the construction.*

The U-values above are based on the following assumptions:

Exposed floor perimeter	39.5 m
Floor area	56.39 m²
P/A	0.70
Floor type	Suspended beam and dense block
Earth conductivity	1.500 W/mK
Soil type	Clay or silt

For other constructions please contact the Kingspan Insulation Technical Service Department (see rear cover).

Sitework

Installation Below a Floor Screed

- Concrete slabs should be allowed to dry out fully prior to the installation of the *Kingspan* OPTIM-R™ **Flooring System** (average 1 day per mm of slab thickness).
- The surface of the slab should be smooth, flat and free from projections. Thorough cleaning of the floor and removal of all projections is essential. Beam and block floors should be level and grouted.
- If a damp proof membrane (minimum 300 micron/1200 gauge polythene) is required, it should be laid with joints well lapped and folded, to prevent the passage of ground water, over the concrete slab or beam and block floor prior to laying the *Kingspan* OPTIM-R™ **Flooring System** panels.
- The membrane should be brought up the surrounding foundation walls until it is sufficiently above the height of the wall DPC so that it will connect with or form the DPC.
- An optional protection layer may be used under the *Kingspan* OPTIM-R™ **Flooring System**. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover).
- The *Kingspan* OPTIM-R™ **Flooring System** panels should always be loose–laid, break bonded where practical, with all joints lightly butted.
- Starting at each external corner of the floor proceed to the lay the *Kingspan* OPTIM-R™ element of the Flooring System across the floor area in a break bond pattern with all panel joints lightly butted. Where runs of the *Kingspan* OPTIM-R™ element of the Flooring System do not accurately fit the dimension of the floor the use of *Kingspan* OPTIM-R™ **Flooring System** infill panels are required to make up this difference. It is envisaged that all *Kingspan* OPTIM-R™ **Flooring System** infill panels against an external wall should be in the centre of the run (please see example in Figure 1). Each *Kingspan* OPTIM-R™ **Flooring System** infill panel is to be the same thickness as the *Kingspan* OPTIM-R™ element of the Flooring System.
- A strip of *Kingspan* OPTIM-R™ **Flooring System** infill panel (minimum 25mm thickness) should be placed vertically around the perimeter of the floor slab in order to reduce cold bridging. The top of the vertical strip of the *Kingspan* OPTIM-R™ **Flooring System** infill panel should be level with the top of the floor screed and the bottom should be level with the bottom of the horizontal floor insulation and closely butted up to it.
- An optional protection layer may also be used over the insulation. For further information please contact the Kingspan Insulation Technical Service Department (see rear cover).
- Insulation panels (both the *Kingspan* OPTIM-R™ element of the Flooring System and any *Kingspan* OPTIM-R™ **Flooring System** infill panels used) should be overlaid with a separation layer (not less than 125 micron/500 gauge) to prevent the wet screed penetrating the joints between the boards. Ensure the separation layer has 150mm overlaps, taped at the joints and is turned up 100mm at the walls.
- Use sand and cement screed laid to a minimum thickness of 65mm for domestic constructions and 75mm in all other constructions.

Sitework

Wheeled / Foot Traffic

- The *Kingspan* OPTIM-R™ **Flooring System** should not be walked on. A protective foot or crawl board should be used during the installation process.

General

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

Cutting

- The *Kingspan* OPTIM-R™ element of the Flooring System should not be cut or penetrated.
- The substrate must be clean, dry and level, and free of sharp objects or edges.
- Cutting of the *Kingspan* OPTIM-R™ **Flooring System** infill panels 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 the *Kingspan* OPTIM-R™ **Flooring System** infill panels to achieve close–butting joints and continuity of insulation.

Availability

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

Packaging and Storage

- The packaging of the *Kingspan* OPTIM-R™ **Flooring System** should not be considered adequate for outdoor protection. The *Kingspan* OPTIM-R™ **Flooring 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 Flooring 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™ **Flooring System** infill panels comprise of a premium performance rigid thermoset modified resin insulant faced on both sides with a composite foil facing.

Standards and Approvals

The *Kingspan* OPTIM-R™ **Flooring 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™ **Flooring 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 – 40

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 Flooring 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™ **Flooring System** can provide reliable long–term thermal performance over the lifetime of the building.

Resistance to Solvents, Fungi & Rodents

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

Fire Performance

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 Flooring 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 Flooring 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

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
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– 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
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General Enquiries

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