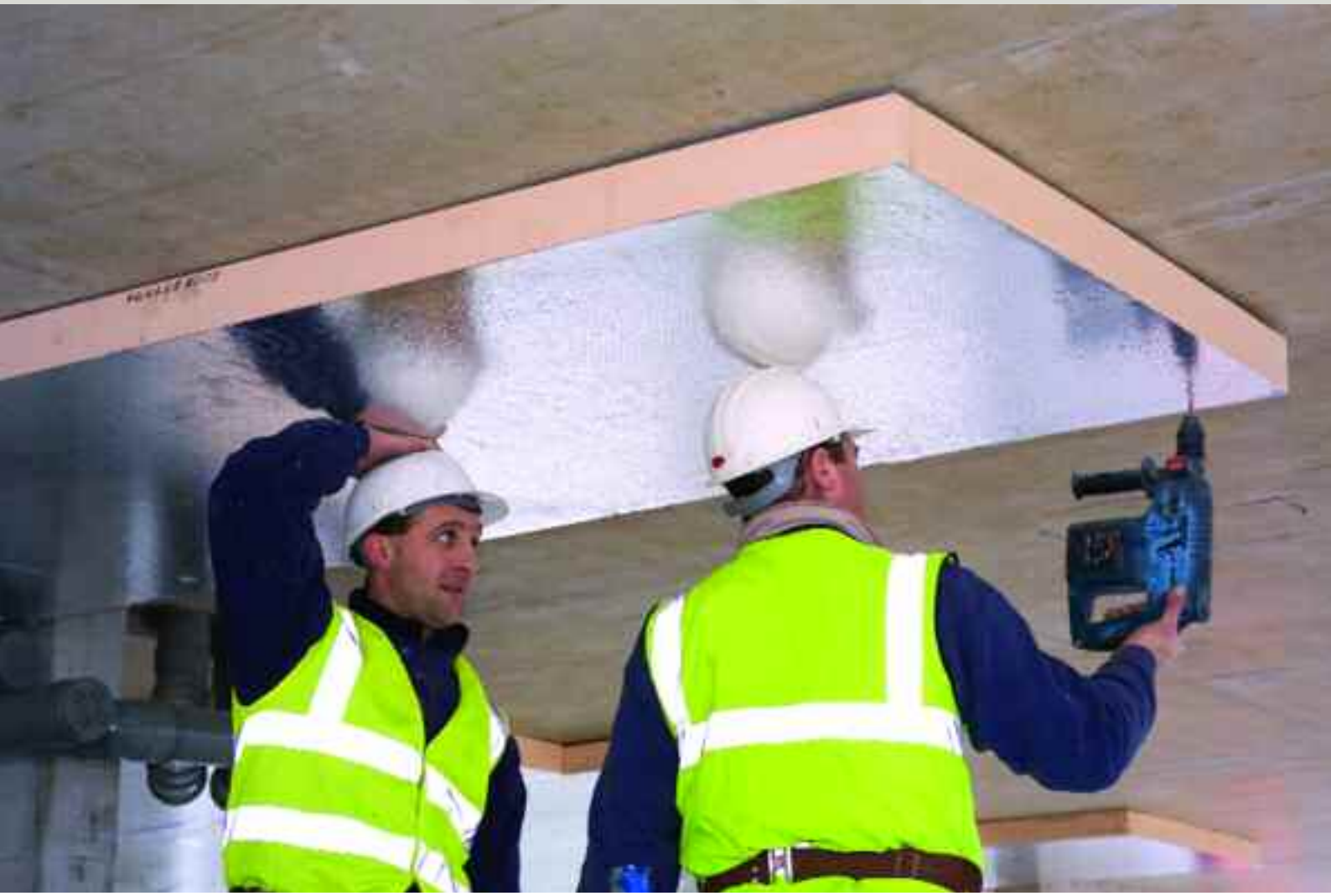
CI/sfb (23.9) Rn7 M2
Second Issue September 2013

Reduce Your Overheads?

AN INDEPENDENT ANALYSIS OF THE BENEFITS OF KINGSPAN KOOLTHERM® K10 SOFFIT BOARD



PREMIUM PERFORMANCE

Kingspan®

Low Energy –
Low Carbon Buildings

Contents

Executive Summary

Kooltherm® K10 Soffit Board, when compared with mineral fibre soffit insulation:

- has better thermal insulation properties;
- can be installed more quickly;
- is easier to handle and store on site;
- is less susceptible to damage; and
- is the preferred product of installers.

Current Practice & The Alternatives

Current Practice

Kooltherm® K10 Soffit Board is a rigid phenolic thermal insulation board designed to be fixed to the underside of floors (generally concrete) to achieve the U–value required by the project design. **Kool**therm® K10 Soffit Board can be fixed directly to the underside of the structural floor or to a supporting framework where the underside is uneven or otherwise unsuitable. The main competitor material to **Kool**therm® K10 Soffit Board is rock mineral fibre.

Review of the Alternatives

Rider Levett Bucknall were commissioned to undertake an independent research exercise to verify Kingspan Insulation Limited's view that **Kool**therm® K10 Soffit Board is a superior product in terms of its operational performance and that it is financially a more economic solution.

To undertake the task Rider Levett Bucknall reviewed a series of projects that had incorporated **Kool**therm® K10 Soffit Board. Data was collected through a series of telephone interviews of personnel from both main contractors and installation sub–contractors involved with the projects in question. The interviewees were familiar with **Kool**therm® K10 Soffit Board and its competitors.

Project types included offices, residential developments, educational establishments, and sporting venues. More detail of the projects reviewed is shown in the Case Studies section of this document.

To Achieve a U-value of 0.25 W/m²·K

Kingspan **Kool**therm® K10 Soffit Board	Rock Mineral Fibre Equivalent
Core Density = 35 kg/m³ 80 mm	Density = 100 kg/m³ 130 mm
Board size = 2,400 x 1,200 mm	Board size = 1,000 x 600 mm
Number of fixings per board = 11	Number of fixings per board = 5
Number of fixings per m² = 3.8	**Number of fixings per m² = 8.3**
Board weight = 8.55 kg	Board weight = 7.80 kg
Structural load = 3.0 kg/m²	**Structural load = 13.0 kg/m²**

Summary of Findings

Kooltherm® K10 Soffit Board is a highly efficient rigid phenolic insulation material that has a thermal conductivity some 38% better than its main rock mineral fibre competitor. This allows the same U–value to be achieved with a significantly thinner board. For example, to achieve a U–value of 0.25 W/m²·K with a 150 mm concrete soffit, an 80 mm thickness of **Kool**therm® K10 Soffit Board is required. In comparison a 130 mm thickness of rock mineral fibre is required. In situations where floor to ceiling heights are crucial the advantages of **Kool**therm® K10 Soffit Board may become significant.

Kooltherm® K10 Soffit Board is a much lighter material than its rock mineral fibre competitor. Its density of 35 kg/m³ is 65% less than that of its competitor.

"Reduced weight and volume combine to make the installation process for **Kool**therm® K10 Soffit Board easier and quicker and hence it is the product of choice for installation sub-contractors."

Research indicates that the speed of installation of **Kool**therm® K10 Soffit Board is at least 10% quicker than that for its rock mineral fibre competitor. This position is further enhanced by **Kool**therm® K10 Soffit Board being available in 2400 x 1200 mm sheets as standard compared with the 1000 x 600mm standard size of its rock mineral fibre competitor.

Because of the differentials in thermal performance and density, the volume and weight per unit area of **Kool**therm® K10 Soffit Board is only 62% and 22% respectively of that achieved with rock mineral fibre. During construction these differences can have a significant effect on the unloading and storage of materials and their subsequent distribution around the site.

Although **Kool**therm® K10 Soffit Board is lighter than rock mineral fibre insulation it actually has a compressive strength over six times greater. The result is a more robust material that is less susceptible to the risk of site damage. All insulation materials are prone to such damage; particularly during the subsequent installation of mechanical and electrical services.

Installation sub–contractors additionally report that the greater rigidity aids the handling and cutting of **Kool**therm® K10 Soffit Board, another factor that improves installation speeds.

Kooltherm® K10 Soffit Board's greater compressive strength minimises the risk of a reduction in the designed thickness during the construction period. This is a serious consideration where following trades commonly fix construction or services elements to soffits after the insulation is installed. Any compression of insulation, if not identified and rectified, can reduce its performance. Over the life of a building this reduction in performance can result in additional cost.

Although neither material is particularly susceptible to damage from water or general moisture the more open cell structure of rock mineral fibre makes it more likely to take up and retain water / moisture. Such circumstances may compromise the operational performance of the insulation through the increased thermal conductivity caused by retained moisture.

The research found little if any price difference between the two products. **Kool**therm® K10 Soffit Board has historically been slightly more expensive but recently the market conditions have generally removed the difference and, in some cases, **Kool**therm® K10 Soffit Board has been found to be slightly cheaper.

The main factor in selection appears to be the general ease of handling and installation.

Additional Considerations

In addition to the advantages set out in the last section, Rider Levett Bucknall looked at a number of other properties where the two thermal insulation products, **Kool**therm® K10 Soffit Board and rock mineral fibre, were either found to be equally fit for their purpose or there was insufficient comparative data to distinguish one product from the other. These properties included:

- combustibility;
- ozone depletion;
- surface finishes;
- fixing details;
- life cycle performance;
- ease / cost of recycling at end of life; and
- health and safety considerations.

With regard to the last item it was noted that rock mineral fibres have been classified as irritant and may cause transient mechanical skin irritation despite recommended maximum exposure criteria.

Case Studies

Case Study 1 – Emirates Stadium, London

Photography care of Hufton+Crow / HOK Sport

The new Emirates Stadium, home to Arsenal Football Club, has increased seating capacity for Arsenal Football Club's home games from 38,000 at Highbury to 60,000, making it the second largest stadium in the Premiership.

There have been a number of football venues built during the past two decades, and this £390 million development is one of the most ambitious to date. The project was completed early and within budget.

"**Kool**therm® K10 Soffit Board was not the soffit insulation originally specified. The installation sub-contractor proposed **Kool**therm® K10 Soffit Board as an alternative material that met the performance specification and which it felt was a better product."

System:	*Kingspan* **Kool**therm® K10 Soffit Board
Volume:	11,000 m²
Building Use:	Football Stadium
Client:	Arsenal Football Club
Architect:	HOK Sport
Main Contractor:	Sir Robert McAlpine
Installation Sub–contractor:	WRR (UK)

Case Study 2 – Baskerville House, Birmingham

Baskerville House on Centenary Square in the heart of Birmingham has been the focus of a major redevelopment project to provide almost 200,000 sq ft of Grade A contemporary office accommodation. One of Birmingham's landmark buildings, it has been the subject of a £30 million refurbishment.

The transformation of Baskerville House, included the complete internal renovation of the building while its exterior has been sympathetically returned to its original state. Formerly the site of the 18th century printer, John Baskerville's manor house, Baskerville House was designed by T. Cecil Howit and constructed in the early 1930's as a civic building. The building never became the city's main civic centre but did house council officials for many years.

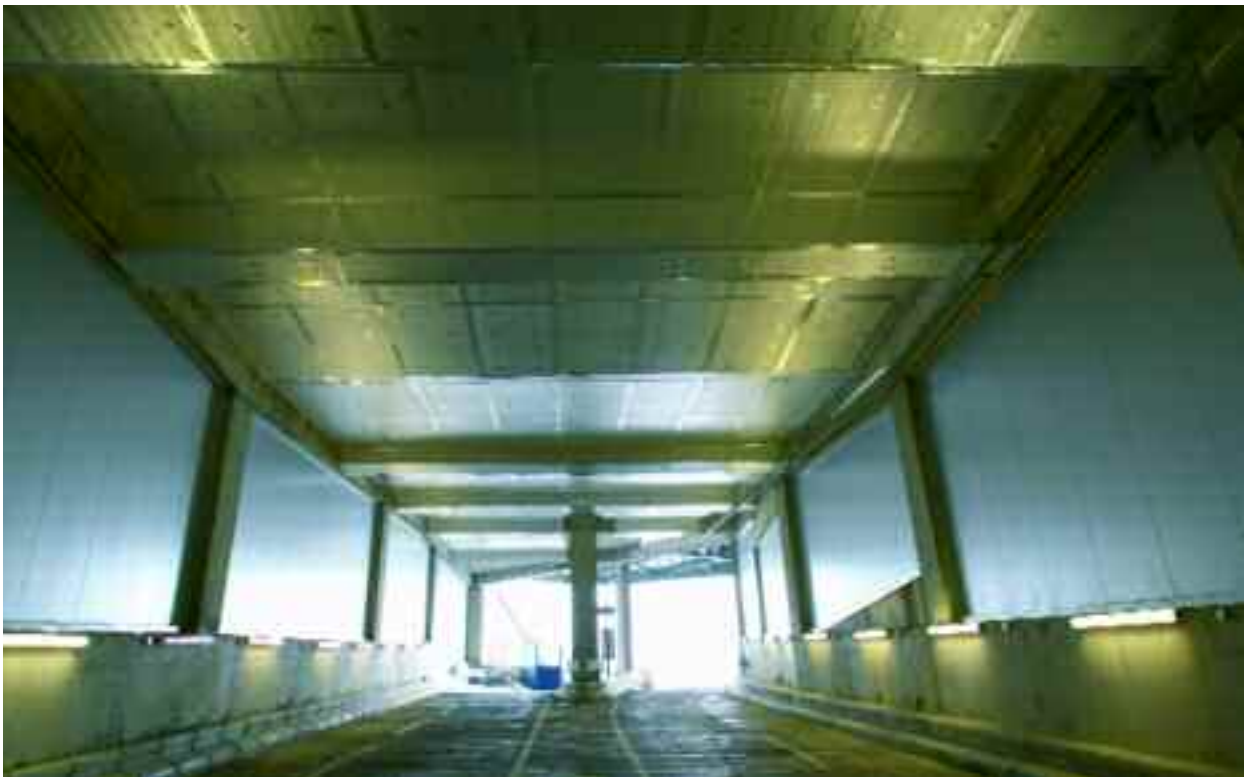
Kooltherm® K10 Soffit Board was installed in the lower ground floor of the building, which houses 27 secure car parking spaces.

"The contract contained a performance specification rather than a material specification. **Kool**therm® K10 Soffit Board was the preferred material of the insulation sub-contractor based on its "much easier" installation."

System:	*Kingspan* **Kool**therm® K10 Soffit Board
Volume:	1,100 m^2
Building Use:	Office Accomodation
Client:	The Targetfollow Group
Architect:	Rolf Judd Architecture
Main Contractor:	Alfred McAlpine
Installation Sub–contractor:	Aaronite Services Limited

Case Studies

Case Study 3 – Churchill Place, Canary Wharf, London



Canary Wharf Group plc is responsible for the redevelopment of this truly unique business and shopping development that currently comprises over 30 completed buildings and over 200 shops, bars and restaurants and 20 acres of landscaped open space.

The Canary Wharf estate has excellent transport links: Two Docklands Light Railway stations, an underground station on the jubilee line, bus stops and five public car parks in addition to car parking below the office buildings.

Kingspan **Kool**therm® K10 Soffit Board was installed on the ceiling of the underground car park to thermally insulate between the B1 car park level and the ground floor of this new building.

"The soffit insulation originally specified was a mineral fibre product rather than **Kool**therm® K10 Soffit Board. The installation sub-contractor proposed **Kool**therm® K10 Soffit Board as an alternative based on its experiences of the reduced weight, thickness and resultant installation advantages. The combination of these and the site specific consideration also resulted in a commercial advantage to using **Kool**therm® K10 Soffit Board."

System:	*Kingspan* **Kool**therm® K10 Soffit Board
Volume:	3,400 m²
Building Use:	Offices
Client:	Canary Wharfe Group plc
Architect:	HOK International
Main Contractor:	Canary Wharfe Contractors
Installation Sub–contractor:	Sharpfibre

Case Study 4 – City Lofts, Liverpool

System:
Kingspan **Kool**therm® K10 Soffit Board

Volume:
1,000 m²

Building Use:
Apartments

Client:
City Lofts Group Plc

Architect:
Conran & Partners

Main Contractor:
Carillion

Installation Sub–contractor:
Firesafe Installations

The City Lofts mixed–use development has become a key contributor to the major rejuvenation programme of the Liverpool Docklands area. The new build development, which is situated in a prime location overlooking the River Mersey and adjacent to the Royal Liver Building, comprises 162 one and two bedroom apartments within linked 20 storey and 10 storey towers.

Kingspan **Kool**therm® K10 Soffit Board was installed on the roof of the underground car park to thermally insulate between the car parking and the first floor.

"The contract contained a performance specification rather than a material specification. *Kingspan* **Kool**therm® K10 Soffit Board was the preferred material of the insulation sub-contractor based on its ease of installation and the significantly less cumbersome delivery issues."

Case Studies

Case Study 5 – The Foundation Building, University of Liverpool

System:
Kingspan **Kool**therm® K10 Soffit Board

Volume:
1,200 m²

Building Use:
University Headquarters

Client:
University of Liverpool

Architect:
Falconer Chester Architects

Main Contractor:
HBG Construction

Installation Sub–contractor:
Firesafe Installations

The Foundation Building which has become the new Headquarters for the University of Liverpool stands on the corner of Brownlow Hill and has created an elongated landscape courtyard opening up views of the Lutyens Crypt frontage. Although a modern design, it is composed of limestone and zinc to complement the Cathedrals design palette.

Kingspan **Kool**therm® K10 Soffit Board was installed on the ceiling of the underground car park to thermally insulate between the car parking, service/loading bays and the first floor.

"The contract contained a performance specification rather than a material specification. As with the City Lofts project **Kool**therm® K10 Soffit Board was the preferred material of the insulation sub-contractor based on its ease of installation and the significantly less cumbersome delivery issues."

General Information

Kingspan **Kool**therm® K10 Soffit Board

- Premium performance rigid phenolic insulation
- Unrivalled thermal performance – thermal conductivity as low as 0.021 W/m·K
- When fixed to an unscreeded 150 mm deep concrete soffit the following thicknesses of *Kingspan* **Kool**therm® K10 Soffit Board achieve the U-values shown.

Thickness	U-value
80 mm	0.24 W/m²·K
90 mm	0.22 W/m²·K
100 mm	0.20 W/m²·K

- Class 0 / Low Risk fire rating
- Negligible smoke obscuration
- Designed for use under structural ceilings e.g. concrete soffits
- Eliminates cold bridging
- Unaffected by air movement
- Resistant to the passage of water vapour
- Easy to handle and install
- Ideal for new build and refurbishment
- Non–deleterious material
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP)

The Kingspan Insulation Product Range

The *Kingspan* **Kool**therm® **K–range**

- With a thermal conductivity of 0.021–0.024 W/m·K CFC/HCFC–free rigid phenolic insulation is the most thermally efficient insulation product commonly available.
- Utilises the thinnest possible insulation board to achieve required U–values.
- Fire performance can be equivalent to mineral fibre.
- Achieves a Class 0 fire rating to the Building Regulations and Low Risk rating for the Technical Standards in Scotland.
- Achieves the best possible rating of < 5% smoke obscuration when tested to BS 5111: Part 1: 1974.
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP).

The *Kingspan* **Therma**™ **Range**

- With a thermal conductivity of 0.023–0.028 W/m·K CFC/HCFC–free rigid urethane insulation is one of the most thermally efficient insulation products commonly available.
- Easily achieves required U–values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP).

The *Kingspan* **Styr**ozone® **& Purlcrete**® **Ranges**

- Rigid extruded polystyrene insulation (XPS) has the highest compressive strength of any commonly available insulant.
- Ideal for specialist applications such as inverted roofing and heavy–duty flooring.
- Easily achieves required U–values with minimum board thickness.
- Achieves the required fire performance for the intended application.
- CFC/HCFC–free with zero Ozone Depletion Potential (ODP).

All Products

- Their closed cell structure resists both moisture and water vapour ingress – problems which can be associated with open cell materials such as mineral fibre and which can result in reduced thermal performance.
- Unaffected by air movement – a problem that can be experienced with mineral fibre and which can reduce thermal performance.
- Safe and easy to install – non–fibrous.
- Provide reliable long term thermal performance over the lifetime of the building.

Contact Details

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

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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.

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 on the numbers below:

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Tapered Roofing

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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.

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