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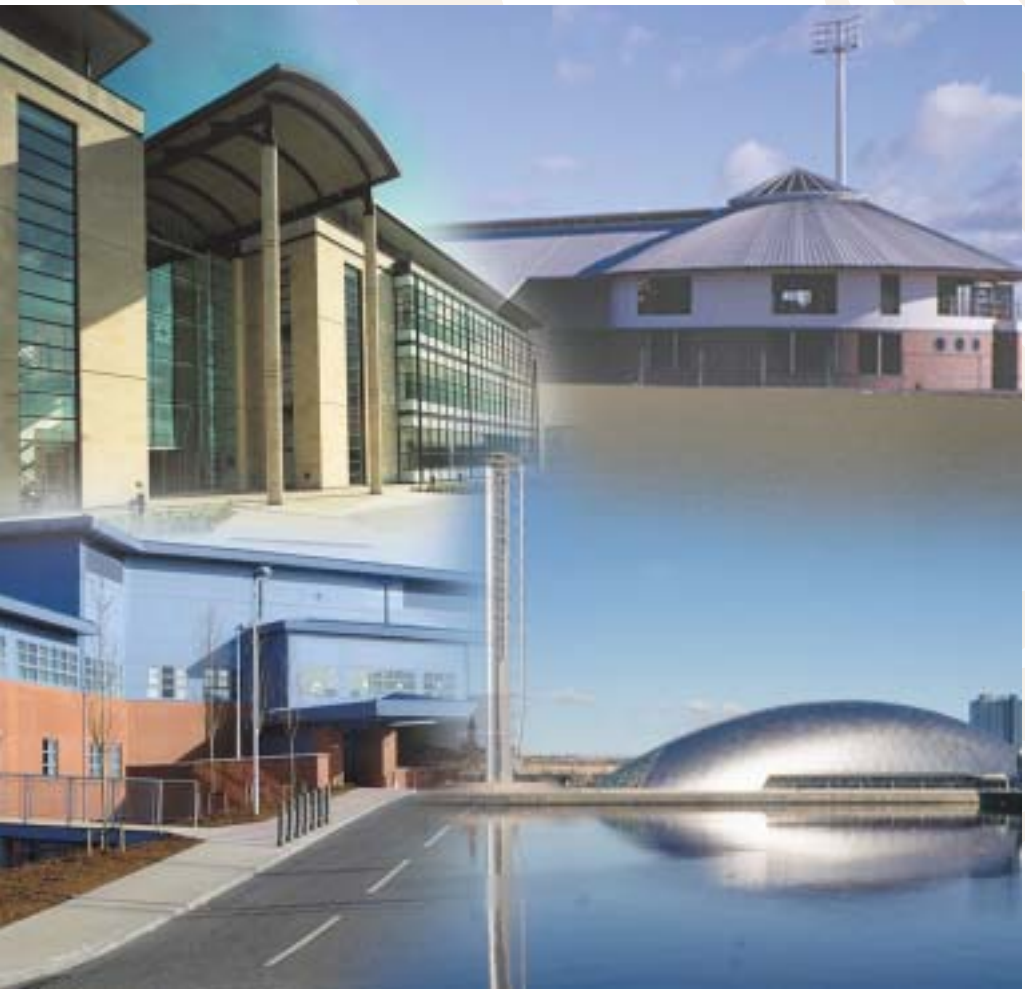
Kingspan® Insulation Solutions

Building Standards for the Conservation of Fuel and Power



Scottish Edition

Contents

Introduction

INTRODUCTION

This document is designed as a simple guide to the changing Building Standards (Scotland) Regulations 1990 as amended, Part J, Conservation of fuel and power, showing how to meet the requirements using Kingspan Insulation products.

Details are given of the content of Technical Standards Part J, the effects they will have on methods of roof, wall and floor construction and the thicknesses of Kingspan Insulation products required to achieve the new standards. The required thicknesses of other commonly used insulation materials are also shown for the purposes of comparison.

This document also addresses other issues that are currently changing the way the construction industry builds roofs, walls and floors.

Should you require further information about the new Technical Standards, or how Kingspan Insulation products can be used to comply with the changing standards, please contact Kingspan Insulation's Technical Services Department (see rear cover).

TECHNICAL STANDARDS FOR THE CONSERVATION OF FUEL & POWER

The requirements for thermal insulation (Conservation of fuel and power) in buildings in Scotland is detailed in Technical Standards Part J.

During the Autumn of 2001, the revised Technical Standards, Part J, (Conservation of fuel and power) was published. They came into effect on March 4th, 2002 and, from that date, all plans submitted for Building Control approval needed to comply with the new requirements.

NEW ELEMENTAL U-VALUE CALCULATION PROCEDURES

All U-values for walls and roofs have to be calculated by an entirely new method, the Combined Method, which has been adopted to bring Scotland in line with the European Standard calculation method, BS EN ISO 6946: 1997 (Building components and building elements. Thermal resistance and thermal transmittance. Calculation method). It takes all cold bridges into greater account than done by the old "Proportional Area Method", and may affect the U-value of such constructions.

All U-values for floors have to be calculated by another entirely new method, which has been adopted to bring Scotland in line with the European Standard calculation method, BS EN ISO 13370: 1998 (Thermal performance of buildings. Heat transfer via the ground. Calculation methods). The U-value of the floor is largely dependent upon the exposed perimeter of the floor and its area, although in some cases the structure of the floor is also involved. If the structure of the floor contains cold bridges, then this calculation method takes them into greater account than done by the old "BRE Information Paper IP 3/90 Method", and may affect the U-value of such constructions.

NB the above mentioned calculation procedures are not valid for constructions bridged by repeating metal elements e.g. spacers in twin skin metal construction. In these cases, the thermal bridging effect may be greater than predicted by the BS EN ISO 6946: 1997 or BS EN ISO 13370: 1998 methods, because the heat flow is very non-linear (the 'finning effect'). This non-linear heat flow can be calculated by finite element analysis, the details of which are beyond the scope of these pages.

Methods of Compliance – Dwellings

METHODS OF COMPLIANCE – DWELLINGS

THREE METHODS OF COMPLIANCE

There are three methods for dwelling designs to comply with the new requirements. These are detailed in Technical Standards Part J.

ELEMENTAL U-VALUE METHOD

The new requirements can be satisfied by the maximum Elemental U-values shown in Table 1. These Elemental U-values mark a significant tightening of standards over those allowed in the previous requirements. The amount of insulation needed to achieve all of these U-values is significantly increased.

Column A

U-value requirements for domestic properties with gas / oil / LPG central heating with respective boiler SEDBUK of 78 / 80 / 85 or greater.

Column B

U-value requirements for domestic properties with other gas / oil / solid fuel central heating or electric heating system.

Table 1

Maximum U-value (W/m².K)		
Element	A	B
Room–in–Roof	0.20	0.18
Lofts	0.16	0.16
Flat Roofs	0.25	0.22
Walls	0.30	0.27
Floors	0.25	0.22
Windows / Doors / Rooflights*	2.2 / 2.0	2.0 / 1.8

*depending on type of frame

The U-values shown in Table 1 for 'Windows / Doors / Rooflights' are the requirements for the average U-value of windows, doors and rooflights together. This value requires that the sum of the areas of these elements does not exceed 25% of the total floor area.

TARGET U-VALUE METHOD

An alternative, if more complex, procedure to demonstrate compliance will be the Target U-value Method. This requires that the average U-value of a dwelling must not exceed a calculated Target U-value.

The beneficial effect of solar gains and boiler efficiency can be incorporated into the calculation.

This method gives some flexibility, but under no circumstance can U-values be worse than those shown in Table 2.

Table 2

Element	U-values (W/m².K)
Roofs	0.35
Exposed Walls	0.70
Exposed / Ground Floors	0.70

CARBON INDEX METHOD

If the Carbon Index of a dwelling, calculated to the method given in SAP 2001, is 8.00 or greater, the design is deemed to comply. This method gives even greater flexibility, but under no circumstance can U-values be worse than those shown in Table 2.

OTHER REQUIREMENTS APPLICABLE TO ALL METHODS OF COMPLIANCE FOR DWELLINGS

The new Technical Standards Part J requires that reasonable provision is made to reduce unwanted air leakage. This can be achieved by constructing the dwelling in accordance with [Note 1] of Building Research Establishment (BRE) Report BR 262: "Thermal insulation, Avoiding risks", Second Edition, 1994.

The new Technical Standards Part J also has requirements for:

- limiting thermal bridging at junctions and around openings;
- space heating controls;
- hot water service controls;
- insulation of pipes, ducts and vessels;
- commissioning of building services;
- operating and maintenance instructions for installed building services;
- artificial lighting and
- conservatories.

ALTERATIONS AND EXTENSIONS

The application of the Building Standards Regulations to alterations and extensions sometimes presents difficulties. The basic principle is that the requirements apply to the alteration or extension but not to the existing unaffected parts of the building even where these do not comply with present regulations.

CHANGE OF USE

Change of use of a building or part of a building can bring into force all relevant regulations in the case of a building previously exempted, or additional or more onerous requirements in the case of a building already subject to the regulations. For example, if a house is split into flats the floor will become a separating floor and more fire resistance is required.

A building does not necessarily need to change from one purpose group to another to attract more onerous requirements. The local authority can advise on particular cases (section 6(2)(b) of the Act refers).

METHODS OF COMPLIANCE – NON-DOMESTIC

THREE METHODS OF COMPLIANCE

There are three methods for non-dwelling designs to comply with the new requirements. These are detailed in Technical Standards Part J.

ELEMENTAL U-VALUE METHOD

The new requirements can be satisfied by the maximum Elemental U-values shown in Table 3. These Elemental U-values mark a significant tightening of standards over those allowed in the previous edition of Technical Standards.

The amount of insulation needed to achieve all of these U-values is significantly increased.

Table 3

Maximum U-value (W/m².K)	
Element	
Room–in–Roof	0.20
Lofts	0.16
Flat Roofs	0.25
Walls	0.30
Floors	0.25
Windows / Doors / Rooflights*	2.2 / 2.0
Vehicle Access Doors	0.7

*depending upon type of frame

The U-values shown in Table 3 for 'Windows / Doors / Roof windows' are the requirements for the average U-value of windows, doors and roof windows together.

The sum of the areas of windows, doors and rooflights must not exceed those shown in Table 4.

Table 4

Building Type	Windows and Personnel Doors (% of Exposed Wall Area)	Vehicle Access Doors, Display Windows and Similar Glazing	Rooflights (% of Roof Area)
Residential Buildings (where people temporarily or permanently reside)	30%	as required	20%
Places of Assembly, Offices and Shops	40%	as required	20%
Industrial and Storage Buildings	15%	as required	20%

The Elemental Method of Compliance also has requirements for:

- heating system efficiency;
- limiting thermal bridging at junctions and around openings;
- space heating control systems;
- hot water systems and controls;
- insulation of pipes, ducts and vessels;
- lighting efficiency and controls and
- air-conditioning and mechanical ventilation systems.

HEAT LOSS METHOD

This method allows greater flexibility than the Elemental Method as U-values, areas of windows, doors and rooflights, may be more than those allowed in tables 3 and 4, provided they are traded off against other elements with lower values.

The total rate of heat loss through the envelope of the proposed building must not be more than that from a notional building of the same size and shape designed to comply with the Elemental Method and the U-value of any element must not be more than that shown in table 5.

Table 5

Exposed Building Element	Maximum Permissible U-value ($W/m^2.K$)
Roof	0.45
Wall or Floor	0.70
Windows, Doors and Rooflights	No Limit

CARBON EMISSIONS CALCULATION METHOD

This method allows a completely free design.
The carbon emissions for the proposed building calculated, using an acceptable method, must be no greater than those for a similar reference building designed to comply with the Elemental Method. However, under no circumstance can U-values be worse than those shown in Table 5.

OTHER REQUIREMENTS APPLICABLE TO ALL METHODS OF COMPLIANCE FOR NON-DOMESTIC BUILDINGS

The new Technical Standards Part J requires that extraneous air paths are limited as far as is reasonably practical, these requirements can be met by constructing the building in accordance with [Note 1] of BRE Report 256.

The Technical Standards also have a requirement for minimising thermal bridges and gaps in the insulation, these can be met by constructing the building in accordance with BRE Report 262: "Thermal insulation, Avoiding risks", second edition, 1994. Or by demonstrating through calculation that an equivalent performance has been achieved.

There are also requirements for:

- heating system efficiency;
- space heating controls;
- hot water service system controls;
- insulation of pipes, ducts and vessels;
- artificial lighting;
- building services and
- provision of a building log-book.

ALTERATIONS AND EXTENSIONS

The application of the Building Standards Regulations to alterations and extensions sometimes presents difficulties. The basic principle is that the requirements apply to the alteration or extension but not to the existing unaffected parts of the building even where these do not comply with present regulations.

CHANGE OF USE

Change of use of a building or part of a building can bring into force all relevant regulations in the case of a building previously exempted, or additional or more onerous requirements in the case of a building already subject to the regulations. For example, if a house is split into flats the floor will become a separating floor and more fire resistance is required.

A building does not necessarily need to change from one purpose group to another to attract more onerous requirements. The local authority can advise on particular cases (section 6(2)(b) of the Act refers).

Pitched Roofs – Assessment of Impact

GENERAL

U-VALUE REQUIREMENTS

The table below shows the range of U-values that are likely to be used following the introduction of the new Technical Standards Part J. The U-values shown apply to both dwellings and non-domestic buildings.

	Elemental U-value Required by Technical Standards Part J ($W/m^2.K$)
Lofts	0.16
Warm Roof / Room in Roof	0.20 / 0.18*

* Dependant on SEDBUK Rating

LOFTS

REQUIRED THICKNESSES

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

The thicknesses of loft insulation required to meet a U-value of 0.16 $W/m^2.K$, assuming 100 x 48 mm joists at 600 mm centres, are as follows: rock mineral fibre (0.037 W/m.K) requires 100 mm between joists and 125 mm over joists; glass mineral fibre (0.040 W/m.K) requires 100 mm between joists and 140 mm over joists. The two layers are installed in a cross-layered manner.

BLOCKED VENTILATION

- Ventilation paths can be vulnerable to blockage due to overfilling of the eaves with mineral fibre.
- This can lead directly to creation of condensation and onset of mould growth.
- The potential for degradation of roof timbers may be extremely high.
- As thicker mineral fibre is required to meet the provisions of Technical Standards Part J, the likelihood of blocked eaves ventilation may increase.

STORAGE

- Mineral fibre loft insulation may not be compatible with storage of items in the loft as the items being stored may compress the mineral fibre, which defeats the purpose of installing it.
- This may be more likely to be true as the thickness of mineral fibre needed to meet the requirements of Technical Standards Part J increases.

MISSING INSULATION

Studies have shown that missing loft insulation caused by poor installation could be regarded as causing:

- 57% increase in heat loss from Britains' roofs; which equates to the unnecessary release of
- 2,560 million kg of CO_2 equivalent emissions per year;
- 8,937 GW.h (million kW.h) of wasted heat loss per annum nationally (the equivalent of nearly three power stations!) and
- £199 million per year extra heating costs.

AIR MOVEMENT

- Mineral fibre can allow an unhindered path for air intrusion.
- Even the minimum air movement in lofts required by Technical Standards can dramatically reduce the thermal efficiency of mineral fibre.
- Air movement over mineral fibre as little as 1 m/s can lead to increases in heat loss of up to 100%.
- Air movement through mineral fibre can result in increases in heat loss of up to 500%.
- Air movement can result in increased heating cost and the risk of condensation and mould growth on ceilings.

HEALTH & SAFETY

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

THE NEED FOR SPACE

- 33% of homeowners would like an extra bedroom.
- 43% said they did not have enough storage space.
- 22% thought they had too few rooms in their house.

DoE Housing Attitudes Survey

OPTIMUM DENSITY

- It is, therefore, difficult to increase the overall plot size and add rooms 'horizontally'.
- It is easier to increase the living area 'vertically'.

In the face of all this mounting pressure, the use of rafter level insulation is rapidly increasing in creating a 'warm roof space', which may be used for a warm storage area or may be fully converted to a 'room in roof'.

WARM ROOF SPACE / ROOM IN ROOF

VALUE

- Valuable additional living space can easily be created with rafter level insulation.
- Creating a 'room in the roof' will virtually always increase sale value by significantly more than it costs.
- Creating a 'warm roof space' if not converted to a functional room, provides a warm storage area and avoids the need for pipework and tank insulation.

REQUIRED THICKNESSES

The following tables show the thicknesses of rafter level insulation required to meet required U-values.

NB when calculating U-values to BS EN ISO 6946: 1997, the type of mechanical fixing used may change the thickness of insulation required. The effect of fixings have been ignored for the purposes of these calculations. Please contact the Kingspan Insulation Technical Services Department (see rear cover) for project calculations.

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

Mineral fibre loft insulation blocking eaves ventilation

Condensation occurring on the underside of sarking felt

INSULATION BETWEEN & UNDER RAFTER – WARM ROOF SPACE / COLD RAFTER

- If a non-breathable roofing membrane is used, Technical Standards require a 50 mm ventilated air space above the insulation to remove any moisture vapour and avoid the risk of condensation formation.
- If a breathable roofing membrane e.g. *Kingspan* ***nilvent***™ is used, the need for roof space ventilation is negated.
- Eliminates the risk of cold bridging and condensation formation / pattern staining.
- The between rafter component must have a thermal resistance greater than, or equal to, the under rafter component to avoid the risk of condensation between the insulation layers.

Likely to be the most acceptable solution to achieving a U-value of 0.20 W/m².K or better as it minimises barge board depths and maximises headroom availability in the 'warm roof space'.

Insulant	Thickness (mm) Required to Achieve U-value of 0.20 W/m².K	Thickness (mm) Required to Achieve U-value of 0.18 W/m².K
Rigid Phenolic (0.018 W/m.K)*	70	40 + 40
Rigid Urethane (0.022 W/m.K)*	90	105
XPS (0.028 W/m.K)*	120	140
Rock Mineral Fibre (0.035 W/m.K)	150	175
EPS (0.037 W/m.K)*	160	180
Glass Mineral Fibre (0.040 W/m.K)	170	200

** calculations based on rafters being underlined with an insulated plasterboard comprising 12.5 mm plasterboard and 25 mm of the specified insulant with the specified thermal conductivity. Thickness shown in the table above is only the between rafter component. NB calculations assume 50 mm wide rafters at 600 mm centres, and a 20 mm (min.) unventilated airspace above the insulation between rafters.*

- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.
- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- If required, the 50 mm air gap for ventilation may be difficult to guarantee with non-rigid insulants such as glass wool or rock wool.
- The continuity of non-rigid insulation such as glass mineral wool or rock mineral wool may be difficult to guarantee between rafters.

Pitched Roofs – Assessment of Impact

INSULATION BETWEEN RAFTER – WARM ROOF SPACE / COLD RAFTER

- If a non-breathable roofing membrane is used, Technical Standards require a 50 mm ventilated air space above the insulation to remove any moisture vapour and avoid the risk of condensation formation.
- If a breathable roofing membrane e.g. *Kingspan* ***nilvent***™ is used, the need for roof space ventilation is negated.

Insulant	Thickness (mm) Required to Achieve U-value of 0.20 W/m².K	Thickness (mm) Required to Achieve U-value of 0.18 W/m².K
Rigid Phenolic (0.018 W/m.K)	55 + 60*	60 + 65*
Rigid Urethane (0.022 W/m.K)	130	150
XPS (0.028 W/m.K)	160	180
Rock Mineral Fibre (0.035 W/m.K)	190	215
EPS (0.037 W/m.K)	200	220
Glass Mineral Fibre (0.040 W/m.K)	210	235

NB calculations assume 50 mm wide rafters at 600 mm centres, and a 20 mm (min.) unventilated air space above the insulation.
** multiple layers required as maximum thickness exceeded. Thinnest layer should be the the innermost layer so as to avoid condensation.*

Project – Self-Build House Extension, Herefordshire
Products – Kingspan Thermapitch TP10 installed between rafters with a layer of 25 mm Kingspan Thermawall TW56 below rafters
External photograph courtesy of Graham Wilson

- The thinner the insulation the less the chance is of having to specify deeper than necessary rafters or batten out rafters in order to accommodate the insulation.
- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.
- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- If required, the 50 mm air gap for ventilation above the insulation may be difficult to guarantee with non-rigid insulants such as glass wool or rock wool.
- The continuity of non-rigid insulation, such as glass mineral wool or rock mineral wool, may be difficult to guarantee between rafters.

INSULATION OVER & BETWEEN RAFTER – WARM ROOF SPACE / WARM RAFTER

- Keeps the whole structure warm.
- Negates the need for roof space ventilation.
- Eliminates the risk of cold bridging and condensation formation / pattern staining.
- The over rafter component must have a thermal resistance greater than, or equal to, the between rafter component to avoid the risk of condensation between the insulation layers.

Insulant	Thickness (mm) Required to Achieve U-value of 0.20 W/m².K	Thickness (mm) Required to Achieve U-value of 0.18 W/m².K
Rigid Phenolic (0.018 W/m.K)	40 + 45*	50 + 50*
Rigid Urethane (0.022 W/m.K)	50 + 55*	60 + 60*
XPS (0.028 W/m.K)	115 + 30**	100 + 60
EPS (0.034 W/m.K)	145 + 30**	150 + 50
Rock Mineral Fibre (0.034 W/m.K between & 0.038 W/m.K over rafter)	100 + 75	150 + 60

** first thickness refers to thickness between rafters, second thickness over rafters. The thermal resistance of the over rafter layer must be ≥ that of the between rafter layer so as to avoid condensation.*
** these solutions are provided as a single top hat section piece of insulation. NB calculations assume 50 mm wide rafters at 600 mm centres, and a 20 mm (min.) air space below the between rafter insulation.*

- The thinner the over rafter insulation the shorter, cheaper and easier to use the fixings.
- The thinner the insulation the less the chance is of having to specify deeper than necessary rafters or batten out rafters in order to accommodate the insulation.
- The thicker insulation types may necessitate unacceptably deep bargeboards.
- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.
- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- The continuity of non-rigid insulation, such as glass mineral wool or rock mineral wool, may be difficult to guarantee between rafters.

Project – Rangers Training and Development Centre, Auchenhowie, Milngavie
Products – 4000 m² of Kingspan Thermapitch TP10
Client – Rangers Football Club and the Rangers Development Fund
Specifier – Garth Hutchinson and Partners

INSULATION OVER RAFTER – WARM ROOF SPACE / WARM RAFTER

- Keeps the whole structure warm.
- Negates the need for roof space ventilation.
- Eliminates the risk of cold bridging and condensation formation / pattern staining.

Insulant	Thickness (mm) Required to Achieve U-value of 0.20 W/m².K	Thickness (mm) Required to Achieve U-value of 0.18 W/m².K
Rigid Phenolic (0.018 W/m.K)	*	*
Rigid Urethane (0.022 W/m.K)	100	110
XPS (0.028 W/m.K)	125	150
EPS (0.034 W/m.K)	150	180
Rock Mineral Fibre (0.040 W/m.K)	175 †	210 †

** maximum available thickness exceeded, multi-layer insulation is not recommended in over rafter applications, use between and over rafter solution.*
† this thickness of product may not be available, in which case it may be more appropriate to use the between and over rafter solution.

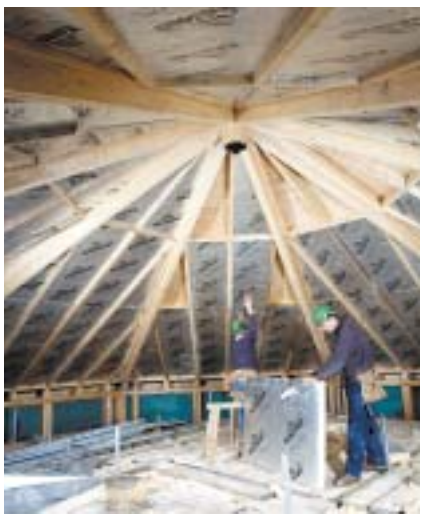
- The thinner the over rafter insulation the shorter, cheaper and easier to use the fixings.
- The thicker insulation types may necessitate unacceptably deep barge boards.
- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.
- Mineral fibre can be irritating to install, requiring special clothing and dust masks.

Project – Loft conversion
Product – Kingspan Thermapitch TP10

Whichever solution you pick to the question of where to place rafter level insulation, it is clear that rigid phenolic insulation or rigid urethane insulation provide the thinnest solutions to the requirements of Technical Standards Part J, thus providing the optimum solutions in terms of condensation risk reduction, headroom and bargeboard depth.

Kingspan pitched roof insulation boards *Kingspan* **Therma**pitch TP10 zero ODP (rigid urethane insulation) and *Kingspan* **Kool**therm® K7 Pitched Roof Board (rigid phenolic insulation):

- provide the best thermal performance of all commonly available insulants;
- can help you to achieve U-values required by Technical Standards Part J with minimal thickness;
- can provide maximum headroom;
- can minimise barge board depth;
- can help eliminate condensation risk;
- are non-fibrous and
- are unaffected by air movement.



Project – The Zethus Centre, Dartford
Products – Kingspan Thermapitch TP10 installed between rafters
Client – The Palmer Partnership
Specifier – The Palmer Partnership

Tapered Roofing – Assessment of Impact

GENERAL

PONDING

- Flat roofs may be subject to the development of ponding over their lifetime.
- Ponding may submit the roof to thermal shock, alkaline formation and mould growth - all of which will seriously decrease the design life of the roof.
- Ponding can significantly affect roof loading, causing deflection in the deck and even more serious problems with drainage.
- The best solution is to eliminate ponding by designing an adequate fall into the roof.

SCREED TO FALLS, TIMBER FIRRINGS TO FALLS OR TAPERED INSULATION

- With a flat deck, designing an adequate fall into the roof can be achieved by using screed to falls and a flat insulation board, timber firrings to falls and a flat insulation board or a tapered insulation system.
- An independent cost analysis has shown that tapered insulation is the most cost-effective method of introducing a fall into a flat roof.
- Tapered insulation is also significantly lighter than screed to falls solutions and does not suffer from lengthy drying times.

It is clear that tapered insulation is the most cost efficient solution to ponding problems for roofs with a flat deck.

U-VALUE REQUIREMENTS

The table below shows the range of U-values that are likely to be used following the introduction of the new Technical Standards Part J. The U-values shown apply to both dwellings and non-domestic buildings.

	Elemental U-value Required By Technical Standards Part J (W/m².K)
Flat Roofs	0.25 / 0.22*

* Dependant on SEDBUK Rating

Project – Dunsaughlin Civic Centre
Client – Meath County Council
Specifier – Grafton Architects
Contractor – John Sisk and Son Ltd
Product – Kingspan Thermataper TT46
Photography – ©Dennis Gilbert / View

REQUIRED THICKNESSES

The table below shows the average thicknesses of tapered insulation required to meet required U-values.

NB when calculating U-values to BS EN ISO 6946: 1997, the type of mechanical fixing used may change the thickness of insulation required. The effect of fixings has been ignored for the purposes of these calculations. Please contact the Kingspan Insulation Technical Services Department (see rear cover) for project calculations.

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

Insulant	Thickness (mm) Required to Achieve U-value of 0.25 W/m².K	Thickness (mm) Required to Achieve U-value of 0.22 W/m².K
Rigid Urethane (0.022 W/m.K)	85	95
XPS (0.028 W/m.K)	105	120
EPS (0.034 W/m.K)	130	145
Rock Mineral Fibre (0.040 W/m.K)	150	170

NB calculations assume metal deck and single ply membrane

Project – Parrswood Leisure Centre, Salford
Products – 2,000 m² of Kingspan Thermataper TT46
Client – MWB & Thornfield Developments
Specifier – Edward Kirby Associates

THICKNESS

- Rigid urethane systems may offer the thinnest solutions to the requirements of Technical Standards Part J.

DENSITY

- Rigid urethane systems have a typical density of 32 kg / m^3.
- Rock mineral fibre systems have a density of up to 180-200 kg / m^3.

STRUCTURAL CONCERNS

- Rigid urethane systems are therefore considerably lighter than rock mineral fibre systems, with potential implications for the structural design of buildings.

MANUAL HANDLING REGULATIONS

- The weight of individual boards in a rigid urethane system is less likely to contravene manual handling regulations than in a rock mineral fibre system.

Project – Stag Brewery, Mortlake, London
Products – 9,000 m^2 of Kingspan Thermataper TT42 and Kingspan Thermaroof TR22
Client – Budweiser Stag Brewing Company
Specifier – Baarco (a consortium of Midland Roofing and M&J Roofing)

THE EFFECTS OF WATER

- Water can enter a flat roof because of condensation, due to leaky vapour control layers or because of weathering membrane failure.
- Where water does enter a flat roof insulated with mineral fibre, it will be trapped in an almost impervious tank created by the vapour control layer and weathering membrane and it will be partially absorbed by the insulant.
- Research has shown that 'water repellent' mineral fibre can absorb water in quantities of up to 40% by volume under such pressure changes.
- Where there is a free supply of water to the warm side of the construction, as can be the case in flat roofs, 1% by volume of water can increase heat loss by 85%.
- If rigid urethane insulation has been installed, the water will not flow into the insulant and thus the area of ingress will be restricted.

Project – Trafford Centre, Manchester
Products – 11,000 m^2 of Kingspan Thermataper TT46
Client – The Trafford Centre Ltd
Specifier – Leach Rhodes Walker
Main Contractor – Bovis Construction Ltd
Roofing Contractor – Pitchmastic plc

HEALTH & SAFETY

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

Rigid urethane tapered roofing systems offer the lightest and thinnest solutions to the requirements of Technical Standards Part J.

Kingspan **Therma**taper zero ODP System:

- provide the best thermal performance of all commonly available insulants;
- can help you to achieve U-values required by Technical Standards Part J with minimal thickness;
- are lightweight and
- are non-fibrous.

Flat Roofing – Assessment of Impact

GENERAL

U-VALUE REQUIREMENTS

The table below shows the range of U-values that are likely to be used following the introduction of the new Technical Standards Part J. The U-values shown apply to both dwellings and non-domestic buildings.

	Elemental U-value Required By Technical Standards Part J (W/m².K)
Flat Roofs	0.25 / 0.22*

* Dependant on SEDBUK rating

Project – American Air Museum, Duxford
Products – 5,000 m² of Kingspan Thermaroof TR27
Client – Imperial War Museum
Specifier – Foster & Partners
Main Contractor – John Sisk & Son

REQUIRED THICKNESSES

The table below shows the thicknesses of flat roof insulation required to meet required U-values.

NB when calculating U-values to BS EN ISO 6946: 1997, the type of mechanical fixing used may change the thickness of insulation required. The effect of fixings has been ignored for the purposes of these calculations. Please contact the Kingspan Insulation Technical Services Department (see rear cover) for project calculations.

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

Insulant	Thickness (mm) Required to Achieve U-value of 0.25 W/m².K	Thickness (mm) Required to Achieve U-value of 0.22 W/m².K
Rigid Phenolic (0.018 W/m.K)	70	40 + 40*
Rigid Urethane (0.022 W/m.K)	85	95
XPS (0.028 W/m.K)	105	120
EPS (0.034 W/m.K)	130	145
Rock Mineral Fibre (0.040 W/m.K)	150	170

NB calculations assume metal deck and single ply membrane
** multiple layers required as maximum thickness exceeded.*

Project – Royal Bank of Scotland, Edinburgh
Products – Kingspan Styrozone N 300 R on a protected membrane roof

THICKNESS

- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.

DENSITY

- Rigid urethane systems have a typical density of 32 kg/m³.
- Rigid phenolic systems have a typical density of 60 kg/m³.
- Rock mineral fibre systems have a density of up to 180-200 kg/m³.

STRUCTURAL CONCERNS

- Rigid phenolic and rigid urethane systems are therefore considerably lighter than rock mineral fibre systems, with potential implications for the structural design of buildings.

MANUAL HANDLING REGULATIONS

- The weight of individual rigid phenolic or urethane boards is less likely to contravene manual handling regulations than individual rock mineral fibre boards.

THE EFFECTS OF WATER

- Water can enter a flat roof because of condensation due to leaky vapour control layers or because of weathering membrane failure.
- Where water does enter a flat roof insulated with mineral fibre, it will be trapped in an almost impervious tank created by the vapour control layer and weathering membrane and it will be partially absorbed by the insulant.
- Research has shown that 'water repellent' mineral fibre can absorb water in quantities of up to 40% by volume under such pressure changes.
- Where there is a free supply of water to the warm side of the construction, as can be the case in flat roofs, 1% by volume of water can increase heat loss by 85%.
- If rigid phenolic or rigid urethane insulation has been installed, the water will not flow into the insulant and thus the area of ingress will be restricted.

LONGEVITY

- Mineral fibre flat roof insulants may have the potential for incomplete recovery from repeated traffic.
- This can generate ponding, increasing the possibility of failure of the weathering membrane.
- This may also lead to fixings puncturing the waterproofing membrane as they stand proud of the degraded insulation.

HEALTH & SAFETY

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

Rigid phenolic or rigid urethane flat roofing insulants offer the lightest and thinnest solutions to the requirements of Technical Standards Part J whilst minimising the effects of traffic.

Kingspan **Kool**therm® and *Kingspan* **Therma**roof zero ODP flat roof insulation boards:

- are available for use with most waterproofing membranes;
- provide the best thermal performance of all commonly available insulants;
- can help you to achieve U-values required by Technical Standards Part J with minimal thickness;
- are lightweight;
- are less susceptible to the effects of traffic and
- are non-fibrous.

Project – ExCel, London
Products – 90,000 m² of Kingspan Thermaroof TR26
Specifier – Moxley Architects
Roofing Contractor – Hathaway Roofing Ltd

Timber Frame Walls – Assessment of Impact

GENERAL

RETHINKING CONSTRUCTION

- The Egan Report "Rethinking Construction" seeks to minimise on-site labour and waste, reduce the number of defects, optimise construction costs, and speed up the whole building process.
- Prefabricated timber framing is seen as one way of complying with this agenda.

TRADITIONAL PRACTICE

- Timber frame walls as traditionally constructed typically comprise 89 mm deep studs filled with 90 mm mineral fibre quilt / batts.
- This construction achieved the former elemental U-value requirement of 0.45 W / m².K using the previously applicable proportional area method of calculation.

U-VALUE REQUIREMENTS

The table below shows the range of U-values that are likely to be used following the introduction of the new Technical Standards Part J. The U-values shown apply to both dwellings and non-domestic buildings.

	Elemental U-value Required By Technical Standards Part J (W / m².K)
Walls	0.30 / 0.27*

* Dependant on SEDBUK rating

REQUIRED THICKNESSES

The table below shows the thicknesses of timber frame wall insulation required to meet required U-values.

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

INSULATION BETWEEN STUDS

Insulant	Thickness (mm) Required to Achieve U-value of 0.30 W / m².K	Thickness (mm) Required to Achieve U-value of 0.27 W / m².K
Rigid Urethane (0.022 W / m.K)	65*	75**
XPS (0.028 W / m.K)	95*	110**
EPS (0.037 W / m.K)	115*	130**
Rock Mineral Fibre*** (0.037 W / m.K)	125	140
Glass Mineral Fibre*** (0.040 W / m.K)	130	150

NB calculations assume 15 mm plasterboard, 15% framing factor with a rendered block externally (0.51 W / m².K).

* *assumes 20 mm (min.) airspace on warm side of insulation layer for service runs (89 mm stud).*

** *assumes 20 mm (min) airspace on warm side of insulation for service runs (95 mm stud).*

*** *assumes stud depth equal to thickness of insulation.*

THICKNESS

- The timber framing industry uses standard stud depths of 89 mm and 140 mm.
- In order to achieve a U-value of 0.30 W / m².K, 125 / 130 mm of mineral fibre quilt / batts of the type currently used may be required.
- This would require stud depths to be increased to 140 mm to accommodate the insulation.
- Mineral fibre in timber frames relies on friction to hold it vertical and so a slight over-thickness is normally used.
- Therefore, a standard insulation thickness of, say, 150 mm, would most likely be used.
- 65 mm of *Kingspan* **Therma**wall TW55 zero ODP between 89 mm deep studs will also achieve a U-value of 0.30 W / m².K.

Project – The Zethus Centre, Dartford
Products – 500 m² of Kingspan Kooltherm K12 Framing Board between studs
Client – The Palmer Partnership
Specifier – The Palmer Partnership

BUILD COSTS

- *Kingspan* **Therma**wall TW55 zero ODP is more expensive than mineral fibre quilt but 140 mm deep studs require more timber than 89 mm deep studs.
- A cost analysis shows that *Kingspan* **Therma**wall TW55 zero ODP offers the cheapest overall solution.
- The increase in cost for each solution compared with previous practice has been examined.
- The additional cost of the 65 mm *Kingspan* **Therma**wall TW55 zero ODP option is 16% lower than that for 150 mm thick mineral fibre and 140 mm deep studs.

DESIGN COSTS

- There is no need to change your building designs, just the insulation specification. The savings in design time costs are obvious.

TRANSPORT COSTS

- No change in transport costs. 140 mm deep studs would increase transport costs by approximately 50%.

HANDLING

- Handling 140 mm deep wall panels on site will incur additional cost because of the additional weight. *Kingspan* **Therma**wall TW55 zero ODP insulated panels maintain constant handling costs.

OPTIMUM DENSITY

- It is, therefore, difficult to increase the overall plot size and add rooms 'horizontally'.
- Greater wall thicknesses would impact on either the living space or on garden space.
- You do not need to compromise internal living space or footprint size for 50% additional wall thickness that might be a consequence of using mineral fibre quilt / batts.

SERVICE RUNS

- 65 mm of *Kingspan* **Therma**wall TW55 zero ODP in an 89 mm stud cavity allows 24 mm for service runs etc. without compromising the depth of the insulation layer.

INSULATION CONTINUITY

- There is no danger of slumping and sagging of insulation with *Kingspan* **Therma**wall TW55 zero ODP.

Project – Hairmyres District General Hospital, East Kilbride
Products – 8000 m² Kingspan Kooltherm K12 Framing Board
Client – NHS Lanarkshire Acute Trust
Main Contractor – Kier Group plc

Project – Playgroup Building, Almondbury Infant and Nursery, Huddersfield
Products – Kingspan Thermawall TW55

HEALTH & SAFETY

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

Rigid phenolic insulation or rigid urethane insulation can provide the thinnest solutions to the requirements of Technical Standards Part J, and can provide the optimum solution in terms of space, costs, transportation and handling.

Kingspan timber frame insulation boards *Kingspan* **Therma**wall TW55 zero ODP (rigid urethane insulation) and *Kingspan* **Kool**therm® K12 Framing Board (rigid phenolic insulation):

- provide the best thermal performance of all commonly available insulants;
- can help you to achieve U-values required by Technical Standards Part J with minimal thickness;
- can be used as an insulated sheathing board for timber framing as well as between timber frame wall studs;
- are available pre-cut to suit stud dimensions and centres;
- are unaffected by air movement or moisture;
- are lightweight and
- are non-fibrous.

Masonry Cavity Walls – Assessment of Impact

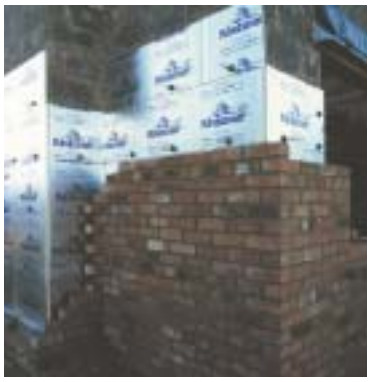
GENERAL

U-VALUE REQUIREMENTS

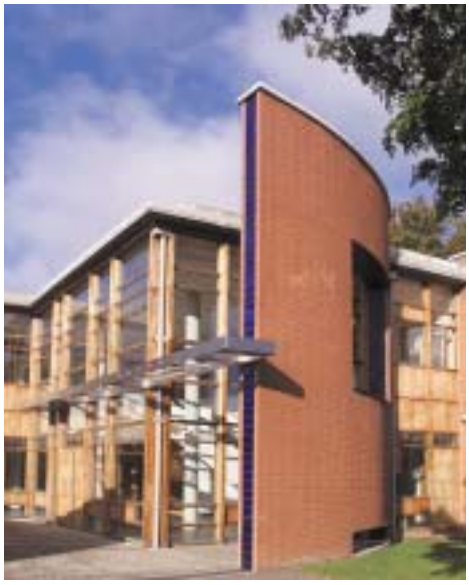
The table below shows the range of U-values that are likely to be used following the introduction of the new Technical Standards Part J. The U-values shown apply to both dwellings and non-domestic buildings.

	Elemental U-value Required By Technical Standards Part J ($W/m^2.K$)
Walls	0.35/0.27*

* Dependant on SEDBUK rating



Project – Self-Build House Extension, Herefordshire
Products – Kingspan Thermawall TW50 partial fill cavity wall insulation with a layer of Kingspan Thermawall TW52 insulated dry-lining board (not shown)
Specifier – Paul Hackett, Leominster



Project – Botanic Gardens, Dublin
Products – 2000 m^2 Kingspan Thermawall TW50
Specifier – Office of Public Works, Dublin
Main Contractor – Cleary & Doyle

**NB when calculating U-values to BS EN ISO 6946: 1997, the type of wall tie used may change the thickness of insulation required. These calculations assume a stainless steel double triangle tie 3.7 mm diameter, giving a cross sectional area of 10.75 mm^2. Please contact the Kingspan Insulation Technical Services Department (see rear cover) for project calculations.*

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

CAVITY WALLS FULLY FILLED WITH MINERAL FIBRE

*REQUIRED THICKNESSES - INJECTED FULL FILL MINERAL FIBRE

The thicknesses of injected full fill mineral fibre required to meet a U-value of 0.30 $W/m^2.K$, assuming 12.5 mm plasterboard on dabs lining a medium density block (0.510 W/m.K) inner leaf and brick outer leaf, are as follows. Rock mineral fibre (0.039 W/m.K) requires 105 mm, and glass mineral fibre (0.040 W/m.K) requires 105 mm.

The thicknesses of injected full fill mineral fibre required to meet a U-value of 0.27 $W/m^2.K$ assuming 12.5 mm plasterboard on dabs lining a medium density block (0.510 W/m.K) inner leaf and brick outer leaf, are as follows. Both rock mineral fibre (0.039 W/m.K) and glass mineral fibre (0.040 W/m.K) require 120 mm.

WORKMANSHIP - INJECTED FULL FILL MINERAL FIBRE

- Effective installation can be compromised by a variety of common occurrences.
- These include dirty ties and mortar snots, too narrow or variable width cavities, penetrations such as soil pipes or cables and unsuitable injection hole patterns.
- The result can be voids in the insulation coverage.

MISSING INSULATION - INJECTED FULL FILL MINERAL FIBRE

Studies have shown that missing injected full fill mineral fibre cavity wall insulation caused by poor installation could be regarded as causing:

- 67% increase in heat loss from the Britains' walls insulated with injected full fill mineral fibre cavity wall insulation; which equates to the unnecessary release of
- 473 million kg of CO_2 equivalent emissions per year;
- 1,651 GW.h (million kW.h) of wasted heat loss per annum nationally (the equivalent of over half a power station!) and
- £37 million per year extra heating costs.

HEALTH & SAFETY - INJECTED FULL FILL MINERAL FIBRE

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

*REQUIRED THICKNESSES - FULL FILL BATTS

The thicknesses of full fill batts required to meet a U-values of 0.30 W / m^2.K, 12.5 mm plasterboard on dabs lining a medium density block (0.510 W / m.K) inner leaf and brick outer leaf, are as follows: both rock mineral fibre (0.036 W / m.K) and glass mineral fibre (0.036 W / m.K) require 95 mm.

The thicknesses of full fill batts required to meet a U-value of 0.27 W / m^2.K assuming 12.5 mm plasterboard on dabs lining a medium density block (0.510 W / m.K) inner leaf and brick outer leaf, are as follows. Both rock mineral fibre (0.036 W / m.K) and glass mineral fibre (0.036 W / m.K) require 110 mm.

WORKMANSHIP - FULL FILL BATTS

- Due to its open fibrous structure, poor site practice can encourage water penetration into mineral fibre full fill batt cavity wall insulation.
- 1% moisture by volume in mineral fibre insulants can reduce thermal performance by between 75% and 105%.
- It has been shown that it would be reasonable to expect that a mineral fibre full fill batt cavity wall insulation moisture content of 1% by volume is prevalent for 9 months of the year in the UK.

WET INSULATION - FULL FILL BATTS

Studies have shown that wet mineral fibre full fill batt cavity wall insulation caused by poor installation could be regarded as causing:

- 30% increase in heat loss from the Britains' walls insulated with full fill mineral fibre batts; which equates to the unnecessary release of
- 505 million kg of CO_2 equivalent emissions per year;
- 1,764 GW.h (million kW.h) of wasted heat loss per annum nationally (the equivalent of over half a power station!) and
- £39 million per year extra heating costs.

HEALTH & SAFETY - FULL FILL BATTS

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

The concept of full fill cavity wall insulation overlooks the fundamental reason for the cavity being there in the first place – which is to allow an exit route for rain and moisture penetrating the outer leaf and for condensation. In the face of all of this mounting pressure the use of cavity walls with a residual empty cavity is rapidly increasing.

UNINSULATED CAVITY WALLS WITH A RESIDUAL EMPTY CAVITY

*REQUIRED THICKNESSES – LIGHTWEIGHT AERATED CONCRETE BLOCKS

A 400 mm lightweight aerated concrete block (0.11 W / m.K) would be required to meet a U-value of 0.30 W / m^2.K, assuming plaster lining, brick outer leaf and normal mortar joints. 350 mm would be required for the same but with thin joint mortar.

A 450 mm lightweight aerated concrete block (0.11 W / m.K) would be required to meet a U-value of 0.27 W / m^2.K, assuming plaster lining, brick outer leaf and normal mortar joints. 400 mm would be required for the same, but with thin joint mortar.

OPTIMUM DENSITY

- It is, therefore, difficult to increase the overall plot size and add rooms 'horizontally'.
- Greater wall thicknesses would impact on either the living space or on garden space.
- You do not need to compromise internal living space or footprint size for the additional wall thickness that will be a consequence of using lightweight aerated concrete blocks as the sole insulation layer.

The concept of cavity walls that rely entirely on a lightweight aerated concrete block for insulation is unlikely to survive the changes to the standards. The market is likely to favour solutions that use an additional insulation layer as a method of reducing overall wall thickness.

Project – Star City, Birmingham
Products – 11,000 m^2 of Kingspan Thermawall TW50
Client – Richardsons and Carillion plc
Specifier – Jerde Partnership International with Geoffrey Reid and Associates
Main Contractor – Carillion plc

INSULATED CAVITY WALLS WITH A RESIDUAL EMPTY CAVITY

*REQUIRED THICKNESSES

The tables below shows the thicknesses of masonry cavity wall insulation required to meet required U-values.

PARTIAL FILL CAVITY WALL INSULATION

Thickness (mm) Required to Achieve U-value of 0.30 W/m².K

Insulant	Block Thermal Conductivity (W/m.K)			
	1.13	0.51	0.15	0.11
Rigid Phenolic (0.018 W/m.K)	45	40	35	30
Rigid Urethane (0.022 W/m.K)	50	50	40	40
XPS (0.028 W/m.K)	75	70	60	55
Rock Mineral Fibre (0.033 W/m.K)	85	85	70	65
Glass Mineral Fibre (0.036 W/m.K)	95	90	75	70
EPS (0.037 W/m.K)	95	95	80	70

NB calculations assume 12.5 mm plasterboard on dabs lining a block inner leaf and brick outer leaf.

Thickness (mm) Required to Achieve U-value of 0.27 W/m².K

Insulant	Block Thermal Conductivity (W/m.K)			
	1.13	0.51	0.15	0.11
Rigid Phenolic (0.018 W/m.K)	50	50	40	40
Rigid Urethane (0.022 W/m.K)	60	60	50	45
XPS (0.028 W/m.K)	85	80	70	65
Rock Mineral Fibre (0.033 W/m.K)	100	95	80	75
Glass Mineral Fibre (0.036 W/m.K)	105	105	90	85
EPS (0.037 W/m.K)	110	105	90	85

NB calculations assume 12.5 mm plasterboard on dabs lining a block inner leaf and brick outer leaf.

Project – Glasgow Science Centre
Products – 1800 m² of Kingspan Kooltherm K8 cavity Board
Architect – Building Design Partnership
Main Contractor – Carillion

THICKNESS

- The thinner the insulation the shorter and cheaper the wall ties.
- The thicker insulation types may have knock on implications for the sizing of other components of the building e.g. footings.
- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.

OPTIMUM DENSITY

- It is, therefore, difficult to increase the overall plot size and add rooms 'horizontally'.
- Greater wall thicknesses would impact on either the living space or on garden space.

HEALTH & SAFETY

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

Rigid phenolic or rigid urethane insulants offer the thinnest partial fill cavity wall solutions to the requirements of Technical Standards Part J.

Kingspan partial full cavity wall insulation boards *Kingspan* **Therma**wall TW50 zero ODP (rigid urethane insulation) and *Kingspan* **Kool**therm® K8 Cavity Board (rigid phenolic insulation):

- provide the best thermal performance of all commonly available insulants;
- can help you to achieve U-values required by Technical Standards Part J with minimal thickness;
- are resistant to moisture penetration;
- are unaffected by air movement and
- are non-fibrous.

**NB when calculating U-values to BS EN ISO 6946: 1997, the type of wall tie used may change the thickness of insulation required. These calculations assume a stainless steel double triangle tie 3.7 mm diameter, giving a cross sectional area of 10.75 mm². Please contact the Kingspan Insulation Technical Services Department (see rear cover) for project calculations.*

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

CAVITY WALL WITH INSULATED DRY LINING

Thickness (mm) Required to Achieve U-value of 0.30 W/m².K

Insulant	Block Thermal Conductivity (W/m.K) 1.13	0.51	0.15	0.11
Rigid Phenolic (0.018 W/m.K)	50	45	40	35
Rigid Urethane (0.026 W/m.K)	70	65	55	50
XPS (0.028 W/m.K)	75	70	60	55
Glass Mineral Fibre (0.033 W/m.K)	85	85	70	65
Rock Mineral Fibre (0.034 W/m.K)	90	85	70	65
EPS (0.037 W/m.K)	95	95	80	70

NB calculations assume insulated plasterboard on dabs, block inner leaf and brick outer leaf.

Thickness (mm) Required to Achieve U-value of 0.27 W/m².K

Insulant	Block Thermal Conductivity (W/m.K) 1.13	0.51	0.15	0.11
Rigid Phenolic (0.018 W/m.K)	55	50	45	45
Rigid Urethane (0.026 W/m.K)*	75	70	60	60
XPS (0.028 W/m.K)	85	80	70	65
Glass Mineral Fibre (0.033 W/m.K)	100	95	80	75
Rock Mineral Fibre (0.034 W/m.K)	100	95	85	80
EPS (0.037 W/m.K)	110	105	90	85

NB calculations assume insulated plasterboard on dabs, block inner leaf and brick outer leaf.

THICKNESS

- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.

OPTIMUM DENSITY

- It is, therefore, difficult to increase the overall plot size and add rooms 'horizontally'.
- Greater wall thicknesses would impact on either the living space or on garden space.

Project – Bob Downes Memorial Hut, Derbyshire
Products – Kingspan Thermawall TW52
Client – The Climbers Club
Specifier – Craig Harwood Architectural Design

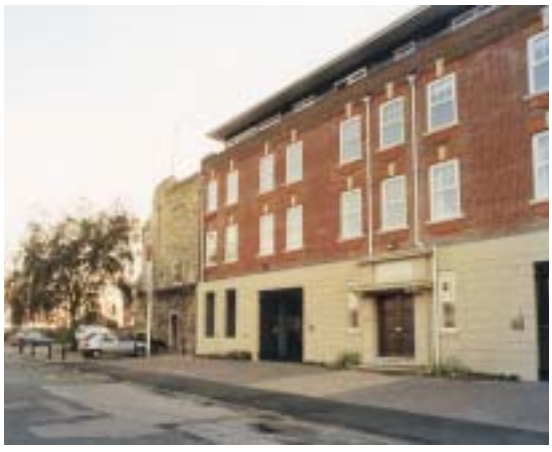
HEALTH & SAFETY

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

Rigid phenolic or rigid urethane insulants offer the thinnest insulated plasterboard solutions to the requirements of Technical Standards Part J.

The Kingspan insulated dry lining boards *Kingspan* **Therma**wall TW52 zero ODP and *Kingspan* **Therma**wall TW56 zero ODP (rigid urethane insulation):

- provide one of the best thermal performances of all commonly available insulants;
- can help you to achieve U-values required by Technical Standards Part J with minimal thickness;
- are resistant to moisture penetration;
- are unaffected by air movement and
- are non-fibrous.



Project – Monument Court, Lower Canal Walk, Southampton
Products – 600 m² of Kingspan Thermawall TW52
Client – Bayview Developments Ltd
Specifier – Tony Oldfield Architects
Contractor – Hood Properties Ltd

Floors – Assessment of Impact

FLOORS – ASSESSMENT OF IMPACT

U-VALUE REQUIREMENTS

The table below shows the range of U-values that are likely to be used following the introduction of the new Technical Standards Part J. The U-values shown apply to both dwellings and non-domestic buildings.

	Elemental U-value Required By Technical Standards Part J (W/m².K)
Floors	0.25/0.22*

* Dependant on SEDBUK rating

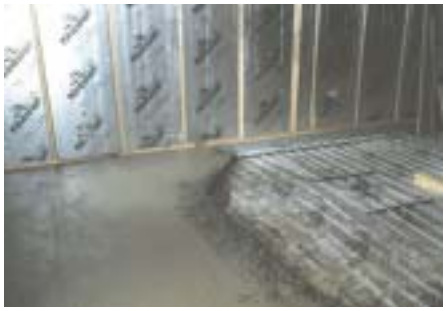
REQUIRED THICKNESSES

The table below shows the thicknesses of floor insulation required to meet required U-values.

NB for the purposes of these calculations the standard of workmanship has been assumed good and therefore the correction factor for air gaps has been ignored.

Insulant	Thickness (mm) Required to Achieve U-value of 0.25 W/m².K	Thickness (mm) Required to Achieve U-value of 0.22 W/m².K
Rigid Phenolic (0.018 W/m.K)	45	55
Rigid Urethane (0.022 W/m.K)	55	70
XPS (0.028 W/m.K)	70	85
Glass Mineral Fibre (0.031 W/m.K)	80	95
EPS (0.037 W/m.K)	95	115
Rock Mineral Fibre (0.038 W/m.K)	95	115

NB calculations assume 7 x 7 m solid concrete or beam and dense block floor. Area is 49 m². Perimeter is 28 m. P/A is 0.57.



Project – Self-Build House using Potton Timber Frame, Bodmin
Products – Kingspan Thermafloor TF70 under screed with an underfloor heating system

THICKNESS

- Rigid phenolic and rigid urethane insulation boards offer the thinnest solutions to the requirements of Technical Standards Part J.

Project – National Football Museum, Preston, Lancashire
Products – 2,000 m² of Kingspan Kooltherm K10 Soffit Board
Specifier – OMI Architects

COMPRESSIVE STRENGTH

- Rigid phenolic, rigid urethane and extruded polystyrene floor insulation boards have compressive strengths in excess of 150 kPa at 10% compression.
- That for standard mineral wool products can be considerably less e.g. less than 10 kPa at 10% compression.

Project – Office building car park.
Products – Kingspan Kooltherm K10 Soffit Board.

HEALTH & SAFETY

- Mineral fibre can be irritating to install, requiring special clothing and dust masks.
- There is a maximum exposure limit associated with the handling of mineral fibre.

Rigid phenolic or rigid urethane insulants offer the thinnest floor insulation solutions to the requirements of Technical Standards Part J.

The Kingspan floor insulation boards *Kingspan* **Therma**floor TF70 zero ODP (rigid urethane insulation), *Kingspan* **Therma**floor TF73 zero ODP (extruded polystyrene bonded to chipboard) and *Kingspan* **Kool**therm® *K3* Floorboard (rigid phenolic insulation):

- provide the best thermal performance of all commonly available insulants;
- can help you to achieve U-values required by Technical Standards Part J with minimal thickness;
- are unaffected by moisture;
- are lightweight and
- are non-fibrous.

References

The Building Standards 2001 Part J. Conservation of fuel and power.

- Kingspan Insulation recommends that you read the Technical Standards, 6th Amendment 2001, Part J, Conservation of fuel and power.

Air Movement and Mineral Fibre Loft Insulation

- Kingspan Insulation recommends that you read the reports Mineral Fibre Loft Insulation, Workmanship, Ventilation & Condensation and Mineral Fibre Performance available from Kingspan Insulation Marketing Department (see rear cover).

Workmanship and Missing Mineral Fibre Loft Insulation

- Kingspan Insulation recommends that you read the report Mineral Fibre Loft Insulation, Compaction, Settlement, Missing Mineral Fibre and Heat Loss available from Kingspan Insulation Marketing Department (see rear cover).

Pitched Roofing and the use of Rafter Level Insulation

- The case for using rafter level insulation is detailed in the report Pitched Roofing and the use of Rafter Level Insulation available from Kingspan Insulation Marketing Department (see rear cover).

Flat Roof Drainage – Rethinking Construction

- The case for using Kingspan Thermataper Systems to create a fall on roofs with a flat deck is given in Flat Roof Drainage – Rethinking Construction available from Kingspan Insulation Marketing Department (see rear cover).

Timber Frame Walls – Rethinking Construction - Scottish edition

- The case for using Kingspan Thermawall TW55 in timber frame walls is given in Timber Frame Walls – Rethinking Construction - Scottish edition available from Kingspan Insulation Marketing Department (see rear cover).

Injected Mineral Fibre Full Fill and Voids

- Kingspan Insulation recommends that you read the report Injected Mineral Fibre Full Fill Cavity Wall Insulation, Workmanship, Voids and Heat Loss available from Kingspan Insulation Marketing Department (see rear cover).

Mineral Fibre Full Fill Batts, Workmanship and Water

- Kingspan Insulation recommends that you read the report Mineral Fibre Full Fill Batt Cavity Wall Insulation, Workmanship, Water & Heat Loss available from Kingspan Insulation Marketing Department (see rear cover).

Mineral Fibre Partial Fill Slabs and Air Movement

- Kingspan Insulation recommends that you read the report Mineral Fibre Performance available from Kingspan Insulation Marketing Department (see rear cover).

Lifetime Energy, CO_2 and Financial Balances for Insulation Materials

- Kingspan Insulation recommends that you read the report Lifetime Energy, CO_2 and Financial Balances for Insulation Materials – Summary Version available from Kingspan Insulation Marketing Department (see rear cover).

CUSTOMER SERVICE

For quotations, order placement and details of despatches please contact our Building Fabric Insulation Customer Services Department on the numbers below:

UK – Telephone: +44 (0) 870 850 8555
– Fax: +44 (0) 870 850 8666
– email: commercial.uk@insulation.kingspan.com

Ireland – Telephone: +353 (0) 42 97 95000
– Fax: +353 (0) 42 97 46129
– email: commercial.ie@insulation.kingspan.com

TECHNICAL ADVICE

Kingspan Insulation Ltd support all of their products with a comprehensive Technical Advisory Service for specifiers, stockists and contractors.

This includes a free computer-aided service designed to give fast, accurate technical advice. Simply phone our *TECHLINE* with your project specification and we can run calculations to provide U-values, condensation / dew point risk, required insulation thicknesses etc… Thereafter we can run any number of permutations to help you achieve your desired targets.

We can also give general application advice and advice on design detailing and fixing etc… Site surveys are also undertaken as appropriate.

Please contact our Building Fabric Insulation Technical Services Department on the *TECHLINE* numbers below:

TECHLINE

UK: – Telephone: +44 (0) 870 850 8555
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LITERATURE AND 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, on CD-ROM or as individual product brochures, Kingspan Insulation technical literature is an essential specification tool. For copies please contact our Marketing Department on the numbers below:

UK – Telephone: +44 (0) 1544 387 210
– Fax: +44 (0) 1544 387 299
– email: literature.uk@insulation.kingspan.com

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GENERAL ENQUIRIES

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Kingspan Insulation reserve the right to amend product specifications without prior notice. The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described. Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable laws and regulations. For other applications or conditions of use, Kingspan Insulation offers a free Technical Advisory Service (see left) whose advice should be sought for uses of Kingspan Insulation products that are not specifically described herein. Please check that your copy of the literature is current by contacting our Marketing Department (see above).

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