Building Standards for the Conservation of Fuel and Power
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</tbody>
</table>
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

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>
<thead>
<tr>
<th>Element</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room–in–Roof</td>
<td>0.20</td>
<td>0.18</td>
</tr>
<tr>
<td>Lofts</td>
<td>0.16</td>
<td>0.16</td>
</tr>
<tr>
<td>Flat Roofs</td>
<td>0.25</td>
<td>0.22</td>
</tr>
<tr>
<td>Walls</td>
<td>0.30</td>
<td>0.27</td>
</tr>
<tr>
<td>Floors</td>
<td>0.25</td>
<td>0.22</td>
</tr>
<tr>
<td>Windows/Doors/Rooflights*</td>
<td>2.2 / 2.0</td>
<td>2.0 / 1.8</td>
</tr>
</tbody>
</table>

*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>
<thead>
<tr>
<th>Element</th>
<th>U-values (W / m².K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs</td>
<td>0.35</td>
</tr>
<tr>
<td>Exposed Walls</td>
<td>0.70</td>
</tr>
<tr>
<td>Exposed/ Ground Floors</td>
<td>0.70</td>
</tr>
</tbody>
</table>

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 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.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
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).
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

<table>
<thead>
<tr>
<th>Element</th>
<th>Maximum U-value (W/m².K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room-in-Roof</td>
<td>0.20</td>
</tr>
<tr>
<td>Lofts</td>
<td>0.16</td>
</tr>
<tr>
<td>Flat Roofs</td>
<td>0.25</td>
</tr>
<tr>
<td>Walls</td>
<td>0.30</td>
</tr>
<tr>
<td>Floors</td>
<td>0.25</td>
</tr>
<tr>
<td>Windows/Doors/Rooflights*</td>
<td>2.2/2.0</td>
</tr>
<tr>
<td>Vehicle Access Doors</td>
<td>0.7</td>
</tr>
</tbody>
</table>

* 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

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

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
- airconditioning 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

<table>
<thead>
<tr>
<th>Exposed Building Element</th>
<th>Maximum Permissible U-value (W / m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof</td>
<td>0.45</td>
</tr>
<tr>
<td>Wall or Floor</td>
<td>0.70</td>
</tr>
<tr>
<td>Windows, Doors and Rooflights</td>
<td>No Limit</td>
</tr>
</tbody>
</table>

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).

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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.

<table>
<thead>
<tr>
<th>Element</th>
<th>Elemental U-value Required by Technical Standards Part J (W/m².K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lofts</td>
<td>0.16</td>
</tr>
<tr>
<td>Warm Roof/Room in Roof</td>
<td>0.20 / 0.18*</td>
</tr>
</tbody>
</table>
* 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/m².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 Britain’s roofs; which equates to the unnecessary release of
- 2,560 million kg of CO₂ equivalent emissions per year;
- 8,937 GWh (million kWh) 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’.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
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.

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’.

<table>
<thead>
<tr>
<th>Insulant</th>
<th>Thickness (mm) Required to Achieve U-value of 0.20 W/m².K</th>
<th>Thickness (mm) Required to Achieve U-value of 0.18 W/m².K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid Phenolic</td>
<td>70</td>
<td>40 + 40</td>
</tr>
<tr>
<td>Rigid Urethane</td>
<td>90</td>
<td>105</td>
</tr>
<tr>
<td>XPS</td>
<td>120</td>
<td>140</td>
</tr>
<tr>
<td>Rock Mineral Fibre</td>
<td>150</td>
<td>175</td>
</tr>
<tr>
<td>EPS</td>
<td>160</td>
<td>180</td>
</tr>
<tr>
<td>Glass Mineral Fibre</td>
<td>170</td>
<td>200</td>
</tr>
</tbody>
</table>

* 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.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
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.

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

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.

**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.

<table>
<thead>
<tr>
<th>Insulant</th>
<th>Thickness (mm) Required to Achieve U-value of 0.20 W/m².K</th>
<th>Thickness (mm) Required to Achieve U-value of 0.18 W/m².K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid Phenolic (0.018 W/m.K)</td>
<td>40 + 45*</td>
<td>50 + 50*</td>
</tr>
<tr>
<td>Rigid Urethane (0.022 W/m.K)</td>
<td>50 + 55*</td>
<td>60 + 60*</td>
</tr>
<tr>
<td>XPS (0.038 W/m.K)</td>
<td>115 + 30**</td>
<td>100 + 60</td>
</tr>
<tr>
<td>EPS (0.034 W/m.K)</td>
<td>145 + 30**</td>
<td>150 + 50</td>
</tr>
<tr>
<td>Rock Mineral Fibre (0.038 W/m.K)</td>
<td>100 + 75</td>
<td>150 + 60</td>
</tr>
</tbody>
</table>

* 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.

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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.
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- 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

For more information on Kingspan Insulation visit www.barbourproductsearch.info
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 Thermapitch TP10 zero ODP (rigid urethane insulation) and Kingspan Kooltherm® 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.

<table>
<thead>
<tr>
<th>Insulant</th>
<th>Thickness (mm) Required to Achieve U-value of 0.20 W/m²K</th>
<th>Thickness (mm) Required to Achieve U-value of 0.18 W/m²K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid Phenolic (0.018 W/m·K)</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Rigid Urethane (0.022 W/m·K)</td>
<td>100</td>
<td>110</td>
</tr>
<tr>
<td>XPS (0.028 W/m·K)</td>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td>EPS (0.034 W/m·K)</td>
<td>150</td>
<td>180</td>
</tr>
<tr>
<td>Rock Mineral Fibre (0.040 W/m·K)</td>
<td>175 †</td>
<td>210 †</td>
</tr>
</tbody>
</table>

* 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.

**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.

- 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.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
Tapered Roofing – Assessment of Impact

GENERAL

PO NdIN G
- 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.

S CREE D TO F A L L S , T IM BER F IRRIN G S TO F A L LS OR T A PERED I NS ULAT ION
- 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-V ALUE R E QUIREM EN TS
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.

<table>
<thead>
<tr>
<th>Insulant</th>
<th>U-value of 0.25 W/m².K</th>
<th>U-value of 0.22 W/m².K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock Mineral Fibre (0.040 W/m.K)</td>
<td>150</td>
<td>170</td>
</tr>
<tr>
<td>XPS (0.028 W/m.K)</td>
<td>105</td>
<td>120</td>
</tr>
<tr>
<td>Rigid Urethane (0.022 W/m.K)</td>
<td>85</td>
<td>95</td>
</tr>
<tr>
<td>EPS (0.034 W/m.K)</td>
<td>130</td>
<td>145</td>
</tr>
</tbody>
</table>

N.B. 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.

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

NB calculations assume metal deck and single ply membrane

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

<table>
<thead>
<tr>
<th>Insulant</th>
<th>Required to Achieve U-value of 0.25 W/m².K</th>
<th>Required to Achieve U-value of 0.22 W/m².K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid Urethane</td>
<td>85</td>
<td>95</td>
</tr>
<tr>
<td>XPS</td>
<td>105</td>
<td>120</td>
</tr>
<tr>
<td>EPS</td>
<td>130</td>
<td>145</td>
</tr>
</tbody>
</table>

For more information on Kingspan Insulation visit www.barbourproductsearch.info

For more information on Kingspan Insulation visit www.barbourproductsearch.info

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

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

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/m³.
- Rock mineral fibre systems have a density of up to 180-200 kg/m³.

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.

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 Thermapaper 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.

<table>
<thead>
<tr>
<th>Elemental U-value Required By Technical Standards Part J (W/m².K)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat Roofs</td>
<td>0.25 / 0.22*</td>
</tr>
<tr>
<td>* Dependant on SEDBUK rating</td>
<td></td>
</tr>
</tbody>
</table>

**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.

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

* multiple layers required as maximum thickness exceeded.

**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 contravenes manual handling regulations than individual rock mineral fibre boards.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
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 Kooltherm® and Kingspan Thermaroof 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

For more information on Kingspan Insulation visit www.barbourproductsearch.info
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.

<table>
<thead>
<tr>
<th>Element</th>
<th>Elemental U-value Required By Technical Standards Part J (W/m².K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>0.30/0.27*</td>
</tr>
</tbody>
</table>

* Dependant on SEDBUK rating

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

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

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

**INSULATION BETWEEN STUDS**

<table>
<thead>
<tr>
<th>Insulant</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingspan ThermaWall TW55 zero ODP</td>
<td>65 mm</td>
</tr>
</tbody>
</table>

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.

**BUILD COSTS**
- Kingspan ThermaWall 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 ThermaWall 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 ThermaWall 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 TW 55 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 TW 55 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 TW 55 zero ODP.

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 TW 55 zero ODP (rigid urethane insulation) and Kingspan Kooltherm 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.

Project – Playgroup Building, Almondbury Infant and Nursery, Huddersfield
Products – Kingspan Therma wall TW 55 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

For more information on Kingspan Insulation visit www.barbourproductsearch.info
Masonry Cavity Walls – 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.

<table>
<thead>
<tr>
<th>Elemental U-value Required By Technical Standards Part J (W / m².K)</th>
<th>Walls</th>
<th>0.35/0.27*</th>
</tr>
</thead>
</table>

* Dependent 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

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 / m².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 120 mm.

W O R K M A N S H I P - 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.

M I S S I N G I N S U L A T I O N - 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 Britain's walls insulated with injected full fill mineral fibre cavity wall insulation; which equates to the unnecessary release of
- 473 million kg of CO₂ equivalent emissions per year;
- 1,651 G.W.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.

GENERAL

*NB when calculating U-values to BS EN ISO 6946: 1997, the type of wall tie be 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.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
**UNINSULATED CAVITY WALLS WITH A RESIDUAL EMPTY CAVITY**

**REQUIRED THICKNESSES - FULL FILL BATTs**

The thicknesses of full fill batts required to meet a U-values of 0.30 W / m².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 / m².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 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 IN SU LATION - 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 CO₂ equivalent emissions per year;
- 1,764 G.W.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.
Masonry Cavity Walls – Assessment of Impact

**INSULATED CAVITY WALLS WITH A RESIDUAL EMPTY CAVITY**

*REQUIRED THICKNESSES*

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

**PARTIAL FILL CAVITY WALL INSULATION**

<table>
<thead>
<tr>
<th>Insulant</th>
<th>Block Thermal Conductivity (W/m.K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rigid Phenolic (0.018 W/m.K)</td>
<td>45 40 35 30</td>
</tr>
<tr>
<td>Rigid Urethane (0.022 W/m.K)</td>
<td>50 50 40 40</td>
</tr>
<tr>
<td>XPS (0.028 W/m.K)</td>
<td>75 70 60 55</td>
</tr>
<tr>
<td>Rock Mineral Fibre (0.033 W/m.K)</td>
<td>85 85 70 65</td>
</tr>
<tr>
<td>Glass Mineral Fibre (0.036 W/m.K)</td>
<td>95 90 75 70</td>
</tr>
<tr>
<td>EPS (0.037 W/m.K)</td>
<td>95 95 80 70</td>
</tr>
</tbody>
</table>

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

**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 ThermaWall TW 50 zero ODP (rigid urethane insulation) and Kingspan Kooltherm® KB 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 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.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
CAVITY WALL WITH INSULATED DRY LINING

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

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

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

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 ThermaWall TW 52 zero ODP and Kingspan ThermaWall TW 56 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.

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.

For more information on Kingspan Insulation visit www.barbourproductsearch.info
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.

<table>
<thead>
<tr>
<th>Elemental U-value Required By Technical Standards Part J (W/m².K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floors</td>
</tr>
<tr>
<td>0.25/0.22*</td>
</tr>
<tr>
<td>* Dependant on SEDBUK rating</td>
</tr>
</tbody>
</table>

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

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

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.

**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.

**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 insulators offer the thinnest floor insulation solutions to the requirements of Technical Standards Part J.

The Kingspan floor insulation boards Kingspan Thermafloor TF70 zero O DP (rigid urethane insulation), Kingspan Thermafloor TF73 zero O DP (extruded polystyrene bonded to chipboard) and Kingspan Kooltherm K3 Floorboard (rigid phenolic insulation):
- provide the best thermal performance of all commonly available insulators;
- 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.

**FLOORS - ASSESSMENT OF IMPACT**

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

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

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

For more information on Kingspan Insulation visit www.barbourproductsearch.info
References

The Building Standards 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 TW 55 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, CO₂ and Financial Balances for Insulation Materials

- Kingspan Insulation recommends that you read the report Lifetime Energy, CO₂ and Financial Balances for Insulation Materials - Summary Version available from Kingspan Insulation Marketing Department (see rear cover).

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

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            - email: commercial.ie@insulation.kingspan.com

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.

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           - Fax: +353 (0) 42 97 46129
           - email: literature.ie@insulation.kingspan.com

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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.

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