RECTICEL insulation

Eurothane® GP

Product Guide

PIR Insulation for Pitched Roofing, Flooring and Framed Walls.

...a better way

Introduction

The Company.

Driven by a culture of innovation, technical competence and flair, Recticel Insulation Products is dedicated to raising the standard of quality of insulation products in the UK.

Recticel Insulation, based at its new state-of-the art facility in Stoke-on-Trent, is part of the International Recticel Group, one of the world's largest producers of PIR insulation products. At Recticel Insulation, quality is at the heart of everything we do. Striving for excellence in quality of both product and service, Recticel Insulation will raise the standards and product demands of the customer by delivering to the UK unparalleled PIR product and service quality. Our mission is, to demonstrate that, on all levels, Recticel Insulation will continue to deliver ***'a better way'*** of Insulation.

Multi Purpose Insulation.

Eurothane GP is a high performance rigid PIR foam board for use in Pitched Roofing, Flooring and Framed Wall applications. The board is suitable for use either between the studs or as an insulated sheathing.

Description.
Eurothane GP is a closed cell, CFC and HCFC-free (zero ozone depletion potential), rigid polyisocyanurate foam core faced, both sides, with a multi-layer coated aluminum foil. It has an exceptionally low thermal conductivity of 0.022 W/mK.

Product Benefits - Pitched Roofing Applications.

Eurothane GP is a high performance rigid PIR foam board for use in pitched roofing applications

Wider choice.
Eurothane GP, in a wide range of thicknesses, will assist in meeting the appropriate Building Regulation standard with any form of pitched roof construction.

Insulation savings.
It is possible to meet the Building Regulation 0.2 U-value requirement with a single layer of 150mm of Eurothane GP, or two layers, 90mm in between rafters and 30mm under, based upon 50mm wide rafters at 450mm centres.

Reduced risk of condensation.
Condensation within the roof structure is avoided as the timbers are maintained at the same temperature as the inside of the building.

Warm roof construction.
No requirement for roof space ventilation and, in domestic type applications, there is no need for a vapour control layer.

Increased usable space.
The roof void becomes part of the habitable accommodation.

Product Benefits - Flooring Applications.

Eurothane GP is a high performance rigid PIR foam board for use in ground and intermediate exposed floors.

Insulation savings.
It is possible to meet the new Building Regulation requirement in new housing with only 60mm of Eurothane GP refer to table on pages 24 and 25.

Ideal for heated floors.
Heated floors are fast gaining in popularity due to their efficiency and comfort level. The use of Eurothane GP boards will ensure optimum system efficiency.

Introduction

Product Benefits - Framed Wall Applications.

Wider choice.
Eurothane GP, in a wide range of thicknesses, will assist in meeting the appropriate Building Regulation standard with any form of timber or metal framed wall construction.

Insulation savings.
Used between studs in timber frame construction it is possible to meet the new Building Regulation requirement with only 90mm of Eurothane GP. Used as an insulated sheathing only 60mm of Eurothane GP is required.

Timber stud dimensions.
The excellent thermal performance of Eurothane GP allows the Building Regulation standard to be achieved using standard 89mm deep studs.

Adaptable.
Eurothane GP boards can be used with both timber and metal framed systems, either between the studs or as an insulated sheathing.

Sheathing system.
The use of Eurothane GP boards as an external sheathing creates a thermally efficient, insulated envelope avoiding the problems of thermal bridging by the timber or metal studs.

Reduced risk of condensation.
Walls constructed incorporating Eurothane GP boards create even warm conditions and incorporate vapour resistive surfaces so reducing the risk of condensation. The boards have a high resistance to the passage of moisture vapour.

Quality.

Outstanding product quality manufactured to ISO 9001 Quality Systems.
Recticel have attained ISO14001 certification.

References.

Pitched Roofing.

Agrément Certificate No. 02/3905.
The Building Regulations and supporting documents.
Thermal Insulation: avoiding risks.
Limiting Thermal Bridging and Air Leakage: Robust Construction Details for Dwellings and Similar Buildings (DTLR/DEFRA).
CIBSE Guide A3 - Thermal Properties of Building Structures.
BS 5250 Code of Practice for Control of Condensation in Buildings.
BS 6399 Loadings for Buildings.
BS 5534 Code of Practice for Slating and Tiling.
BS 8000 Workmanship on Building Sites. Part 6 Code of Practice for Slating and Tiling of Roofs and Claddings.
BRE Digests, Information Papers and Good Building Guides.

Floors.

Agrément Certificate No. 02/3905.
The Building Regulations and supporting documents.
Thermal Insulation: avoiding risks.
Limiting Thermal Bridging and Air Leakage:
Robust Construction Details for Dwellings and Similar Buildings (DTLR/DEFRA).
CIBSE Guide A3 - Thermal Properties of Building Structures.
BS 5250 Code of Practice for Control of Condensation in Buildings.
BS 6399 Loadings for Buildings.
CP 102 Code of Practice for Protection of Buildings Against Water From the Ground.
BS 8204 Screeds, Bases and In-Situ Floorings.
BS 8000 Workmanship on Building Sites.
BRE Digests, Information Papers and Good Building Guides.

Framed walls.

Agrément Certificate No. 02/3905.
The Building Regulations and supporting documents.
Thermal Insulation: avoiding risks.
Limiting Thermal Bridging and Air Leakage:
Robust Construction Details for Dwellings and Similar Buildings. (DLTR/DEFRA).
CIBSE Guide A3 - Thermal Properties of Buildings and Components.
BS 5250 Code of Practice for Control of Condensation in Buildings.
BS 5268 Structural Use of Timber.
Code of Practice for Timber Frame Walls.
BS EN 845-1 Specification for ancillary components for masonry. Ties, tension straps, hangers & brackets.
DD140 Wall Ties.
BRE Special Digest SD2 Timber frame dwellings:
U-values and the Building Regulations.
BRE Digest 465 U-values for light steel-frame construction.
BRE Digests, Information Papers and Good Building Guides.

Introduction

Environment.

By definition thermal insulation materials are beneficial for the environment - they help reduce our energy consumption and are an important tool in lowering carbon dioxide emissions and global warming. There are issues to consider however in the manufacture of these products.

Recticel products have been designed and are manufactured to result in the lowest environmental impact. This profiling drives our “A” rating within the 2008 Green Guide to Specification, allowing credits to be earned under the relevant sections of The Code For Sustainable Homes and BREEAM. As all of the Recticel products have a low GWP rating and are zero ODP rated further credits can also be gained in other relevant categories.

Recticel have attained ISO14001 certification. The aim of the standard is to reduce the environmental footprint of a business and to decrease the pollution and waste a business produces. The most recent version of ISO 14001 was released in 2004 by the International Organisation for Standardisation (ISO) which has representation from committees all over the world.

The major objective is "to promote more effective and efficient environmental management in organisations and to provide useful and usable tools - ones that are cost effective, system-based, flexible and reflect the best organisations and the best organisational practices available for gathering, interpreting and communicating environmentally relevant information". The intended end result is the improvement of environmental performance.

It offers source of guidance for introducing and adopting environmental management systems based on the best universal practices, in the same way that the ISO 9000 series on quality management systems, which is now widely applied, represents a tool for technology transfer of the best available quality management practices.

The ISO 14000 environmental management standards exist to help organisations minimise how their operations negatively affect the environment. In structure it is similar to ISO 9001 Quality Management and both can be implemented side by side. In order for an organization to be awarded an ISO 14001 certificate they must be externally audited.

Ozone Depletion.

Traditionally CFCs, and more recently HCFCs and HFCs, were used as the blowing agent for polyisocyanurate foams - they gave an excellent thermal performance and were very stable chemicals to process. The recognition of the damage that CFCs cause to the ozone layer lead to increasing environmental pressure in the 1990s to the point were CFC use was banned and later HCFC use was also banned. Recticel recognised that alternative blowing agents were required and were one of the first manufacturers to introduce CFC and HCFC-free products in the mid 1990s.

All of our products have zero ozone depletion potential.

Global Warming.

CFCs, HCFCs and HFCs are all powerful greenhouse gases. Pentane on the other hand satisfies the "Green Guide to Specification" and the Intergovernmental Panel on Climate Change (IPCC) confirming a Global Warming Potential of below 5.

All our products have a global warming potential of below 5.

Environmental Impact.

Pentane blown polyurethane / polyisocyanurate foams achieve an overall 'A' Rating in the Green Specification Guide.

The declared thermal conductivity value of 0.022 W/mK

Handling.

Eurothane GP is lightweight yet tough and resilient. It is easily cut using a knife or fine toothed saw.

Durability.

Eurothane GP is rot-proof, durable and maintenance free. All of our products carry the CE Mark to show compliance with the harmonised European Standard BS EN 13165.

Conclusions.

Recticel's polyisocyanurate foams have the benefits of an excellent thermal performance (thermal conductivity as low as 0.022 W/mK) and achieved at a very low density. This combination means that the energy input into the product is minimal especially when compared to materials such as bricks, blocks and cement. The energy used in the manufacture of polyisocyanurate foam is repaid many times over, once installed, during the lifetime of the building.

Pitched Roof

Design.

Description.
Eurothane GP is a high performance rigid PIR foam board for use in pitched roofing applications

Wider choice.
Eurothane GP, in a wide range of thicknesses, will assist in meeting the appropriate Building Regulation standard with any form of pitched roof construction.

Insulation savings.
It is possible to meet the Building Regulation 0.2 U-value requirement with a single layer of 150mm of Eurothane GP, or two layers, 90mm in between rafters and 30mm under, based upon 50mm wide rafters at 450mm centres.

Reduced risk of condensation.
Condensation within the roof structure is avoided as the timbers are maintained at the same temperature as the inside of the building.

Warm roof construction.
No requirement for roof space ventilation and, in domestic type applications, there is no need for a vapour control layer.

Increased usable space.
The roof void becomes part of the habitable accommodation.

Design.
Warm roof space principles - Insulation at rafter level has the distinct advantage of offering additional living or storage space without increasing the 'foot print' of the building. As the roof space is kept warm there is no need to provide additional insulation to water services within the void.

Thermal Bridging.
With increasing levels of insulation it is vitally important to ensure continuity of the insulation at the junction of elements. Care should be taken at the junction of the roof and the wall, packing the eaves with compressible mineral fibre insulation. The use of a lightweight insulating block cavity closer or extended cavity insulation can all help to reduce thermal bridging. At gable walls the insulation should be continued to the underside of the roof to ensure continuity of the wall and roof insulation.

Limiting Air Infiltration.
Ensure that the Eurothane GP boards are continuous and form a tight joint at details such as between rafters, at ridges, valleys and hips – if necessary an expanding foam filler should be used to seal any gaps. Where the timber floor meets the sloping ceiling or wall it is important to limit air infiltration by sealing around the perimeter of the floor at the skirting board. Expanding foam and/or mastic type sealants should be used under the skirting to seal the floor edge.

Wind Uplift.
The wind uplift force exerted on the roof will vary according to geographical location, site location and building height. Calculations relating to the fixing pattern and batten dimensions should be made with reference to BS 5534.

Sliding Loads.
Insulating over the rafters with a counter batten system means the fixings must resist the sliding load of the roof covering. A timber stop rail at the base of the roof slope and the correct fixing density will counter this effect.

Fire Performance.

When used within a pitched roof constructed in accordance with BBA Certificate 02/3905 Eurothane GP (Eurosarking) will not prejudice the fire resistance properties of the roof and adds no significant fire load to the building. The slate or tiled finish will give the required external fire rating, SAA, whilst 12.5mm plasterboard will ensure the necessary fire protection internally. Fire stopping in the form of mineral fibre insulation should be used at party walls.

Insulation at Rafter Level falls into three main categories.

Over Rafter Insulation.

A true warm roof construction that does not require ventilation but instead relies on the use of a vapour permeable sarking membrane. Insulation can be added between the timbers to avoid an excessively deep roof construction.

Between Rafter Insulation (Unventilated).

A cold roof construction allowing the full depth of the rafter to be used but requiring the use of a vapour permeable sarking membrane. Further insulation can be added under the rafters, ceiling height permitting, which masks the thermal bridge effect of the timbers thus reducing the possibility of pattern staining occurring.

Between Rafter Insulation (Ventilated).

A traditional cold roof using bitumen or polythene based sarking felt requiring both eaves to ridge ventilation (50mm minimum airspace) and a vapour control layer. Again insulation can be added under the rafters to mask the thermal bridge effect of the timbers.

Pitched Roof

Over Rafter Insulation.

The usual procedure for construction (Figures 1 & 2) is:

1. A treated timber stop rail, same thickness as the Eurothane GP boards, is nail or screw fixed to the rafters at the base of the roof slope. This forms a secure anchor for the counter battens.

2. Starting at eaves level, ensuring that they are tightly fitted, Eurothane GP boards are laid with long edges either parallel or normal to the rafters, preferably in a brick bond pattern. Expanding foam filler should be used to seal any gaps especially at the ridge, hips and valleys. If necessary temporarily secure using large headed nails before fixing the counter battens. Do not walk on the Eurothane GP boards or use them as a temporary work surface.

3. The Eurothane GP boards are secured using 38 x 50mm counter battens running down the line of each rafter. Nail the counter battens to the rafters at 300mm centres ensuring a minimum of 38mm penetration of the fixing into the rafter. The lower end of the counter batten is nailed directly to the stop rail. Pre drilling of the counter batten may be required to avoid splitting when using longer, large diameter nails. Alternatively consider the use of specialist helical skewer fixings that have better holding ability, reduce splitting of thin timbers and give a positive 'stand off' for the counter batten.

4. A breather type sarking membrane is laid over the counter battens. The membrane should extend over the fascia to ensure drainage of water into the gutter; a continuous timber fillet should be used to support the membrane.

5. An alternative detail is to lay the breather membrane directly onto the Eurothane GP boards (consult the membrane manufacturer for its suitability in this detail) before fixing the counter battens. This system has a slightly inferior thermal performance than that above.

6. The tiling battens, normally 50 x 25mm, may now be fixed, at a gauge to suit the slate or tile finish, by nailing into the counter batten.

7. The tiles are fixed in accordance with the recommendations in BS 5534. Stack tiles so that they bear directly over the rafters not between.

8. Further insulation may be added between the timbers to enhance the thermal performance and avoid an excessively deep roof construction. This second layer of Eurothane GP boards should be cut to size to slot tightly between the rafters and secured against the underside of the first layer of insulation using timber battens planted onto the sides of the rafters. The layer of over rafter insulation should always be of equal or greater thickness to avoid condensation problems.

9. A vapour control layer is not normally required with this form of roof construction but is recommended in high humidity applications such as swimming pools, commercial laundries, bakeries etc.

10. The plasterboard ceiling finish is fitted in the normal manner to the underside of the rafters. If required the rafters may be left exposed by either laying the plasterboard over the rafters prior to laying the Eurothane GP boards or by cutting the plasterboard to size to slot between the rafters and fixing to battens planted onto the rafters.

Over Rafter Insulation - Figure 1.

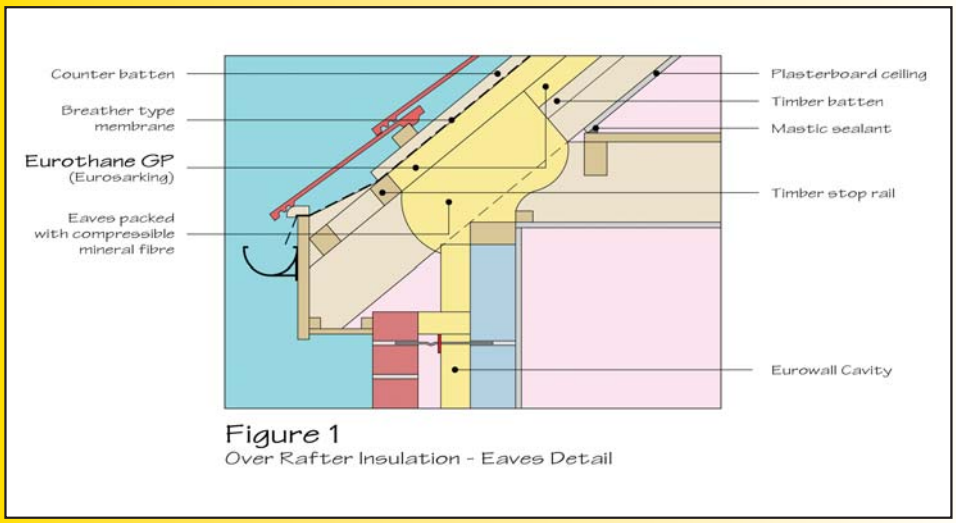

Figure 1
Over Rafter Insulation - Eaves Detail

Over Rafter Insulation - Figure 2.

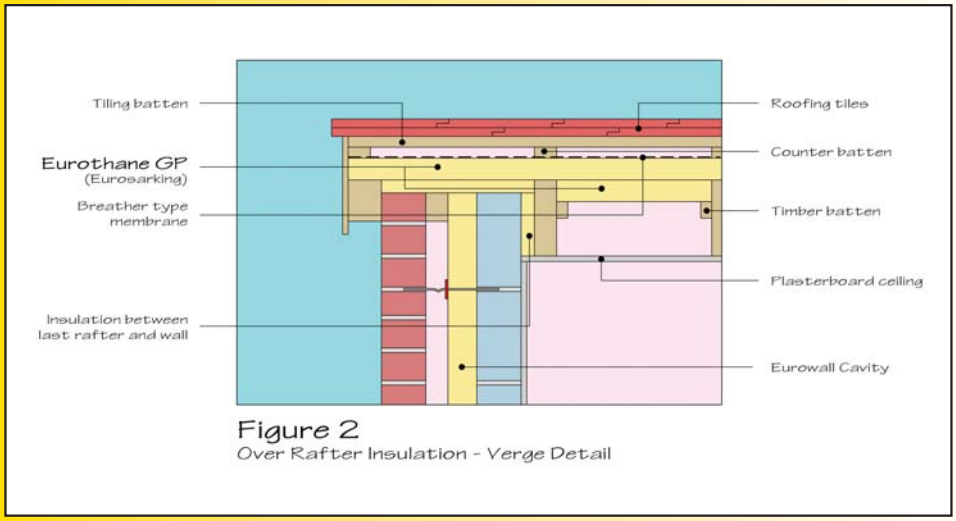

Figure 2
Over Rafter Insulation - Verge Detail

Pitched Roof

Between Rafter Insulation (Unventilated) - Figure 3.

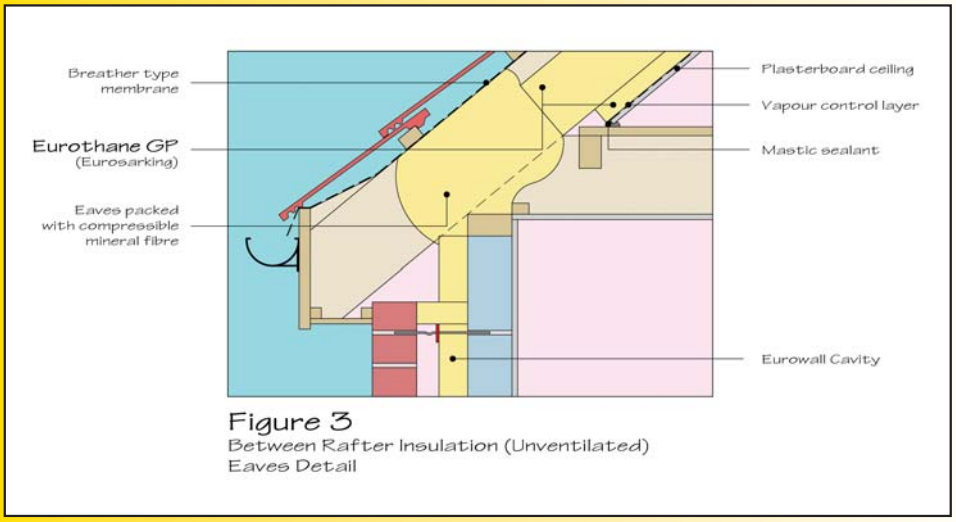

Figure 3
Between Rafter Insulation (Unventilated) Eaves Detail

Option 1 – the procedure for construction (Figure 3) is:

1. Plant 25 x 25mm timber battens on the sides of the rafters flush with the top edge - this ensures the drape of the breather membrane for drainage.

2. Complete the tiling, battening and felting in the normal manner using a British Board of Agrément approved breather type sarking membrane.

3. Cut the Eurothane GP boards to ensure a tight fit between the roof timbers and slot between the timbers against the timber battens. Expanding foam filler should be used to seal any gaps especially at the ridge, hips and valleys.

4. If necessary further insulation may be added below the roof timbers to both enhance the thermal performance and to mask the thermal bridge effect of the timbers. This layer of Eurothane GP boards may be secured temporarily using large headed nails prior to fixing the ceiling finish.

5. A vapour control layer is normally required with this form of roof construction; this may be either polythene sheet or a foil-backed plasterboard.

6. The plasterboard ceiling finish is fitted in the normal manner though longer fixings are required when using the two-layer system.

Between Rafter Insulation (Unventilated) - Figure 4.

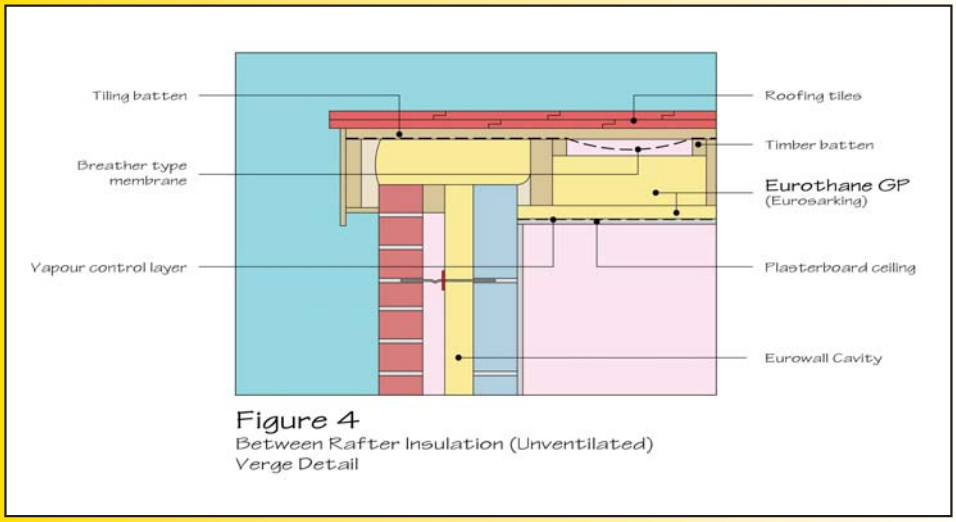

Figure 4
Between Rafter Insulation (Unventilated)
Verge Detail

Option 2 – the procedure for construction (Figure 4) is:

1. Install a British Board of Agrément approved breather type sarking membrane pulled taut over the rafters. Counter battens, 38 x 50mm, are nailed to the rafters at 300mm centres ensuring a minimum of 38mm penetration of the fixing into the rafter. The tiling battens and tiles are then installed in the normal manner.

2. Cut the Eurothane GP boards to ensure a tight fit between the roof timbers and slot between the timbers to fully fill the depth of the rafter. Expanding foam filler should be used to seal any gaps especially at the ridge, hips and valleys.

3. If necessary further insulation may be added below the roof timbers to both enhance the thermal performance and to mask the thermal bridge effect of the timbers. This layer of Eurothane GP boards may be secured temporarily using large headed nails prior to fixing the ceiling finish.

4. A vapour control layer is normally required with this form of roof construction; this may be either polythene sheet or a foil-backed plasterboard.

5. The plasterboard ceiling finish is fitted in the normal manner though longer fixings are required when using the two-layer system.

Pitched Roof

Between Rafter Insulation (Ventilated) - Figure 5.

Figure 5
Between Rafter Insulation (Ventilated)
Eaves Detail

The usual procedure for construction (figures 5 & 6) is:

1. Complete the tiling, battening and felting in the normal manner using standard bitumen or plastic based sarking felt. Ensure that provision is made for eaves to ridge ventilation in accordance with BS 5250.

2. Plant timber battens on the sides of the rafters 50mm from the top edge – this ensures that the Eurothane GP boards are held securely in place and will not block the ventilated airspace.

3. Cut the Eurothane GP boards to ensure a tight fit between the roof timbers and slot between the timbers against the timber battens. Expanding foam filler should be used to seal any gaps especially at the ridge, hips and valleys.

4. If necessary further insulation may be added below the roof timbers to both enhance the thermal performance and to mask the thermal bridge effect of the timbers. This layer of Eurothane GP boards may be secured temporarily using large headed nails prior to fixing the ceiling finish.

5. A vapour control layer is required with this form of roof construction; this may be either polythene sheet or foil-backed plasterboard.

6. The plasterboard ceiling finish is fitted in the normal manner though longer fixings are required when using the two-layer system.

Between Rafter Insulation (Ventilated) - Figure 6.

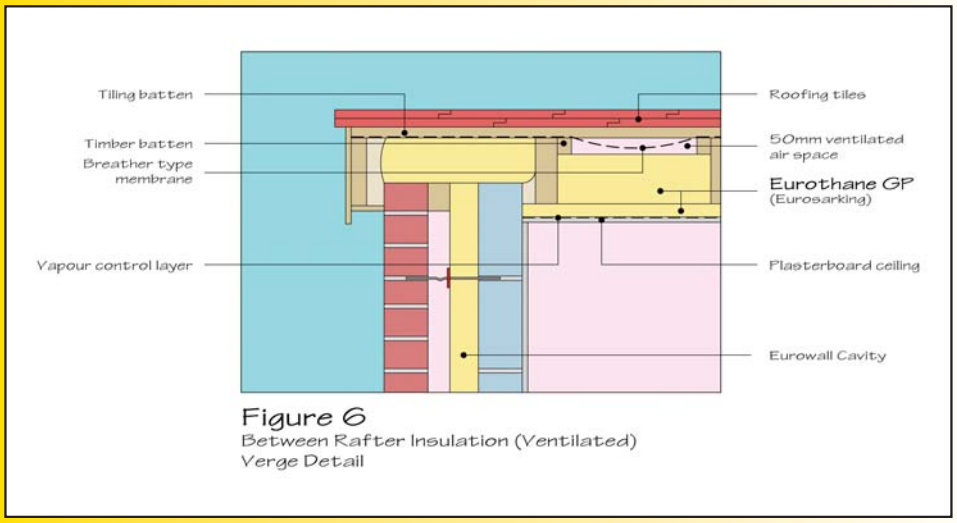

Figure 6
Between Rafter Insulation (Ventilated)
Verge Detail

Pitched Roof

Heat Loss Calculations.

The method of calculating U-values is the Combined Method (see BS EN ISO 6946) which as well as assessing the thermal bridge effect of mortar joints, timber studs etc also accounts for air gaps in the insulation and mechanical fasteners penetrating the insulation.

The Building Regulations no longer use the Elemental U-value Method as a means of showing compliance. In new build a U-value in the region of 0.16 W/m^{2}K will help ensure compliance whilst in extensions and refurbishment work a U-value of 0.20 W/m^{2}K is required.

In each example the rafters are assumed to be 50mm wide at 450mm centres. The ceiling finish is 12.5mm plasterboard and skim.

Over Rafter Insulation	
Eurothane GP Thickness (mm)	U-Value (W/m^{2}K)
25/25	0.33
30/30	0.29
35/35	0.26
40/40	0.24
45/45	0.22
50/50	0.21
55/55	0.19
60/60	0.18
65/65	0.17
70/70	0.16
75/75	0.15
80/80	0.14
90/90	0.13
100/100	0.12

Please contact Recticel Technical Services Department for a project specific U-Value calculation and condensation analysis.

Typical Construction:
Tiles • Battens • Vapour permeable Membrane • 50mm Batten cavity • S/Steel fixing 17W/mK, 6.7 per m^2, 7.45mm Cross section • Insulation - Over rafter • Insulation - Inbetween rafter 50x150mm @ 450mm centres • Cavity • 12.5mm Plasterboard • Skim.

Between Rafter Insulation (Unventilated)	
Eurothane GP Thickness (mm)	U-Value (W/m^{2}K)
50	0.41
60	0.37
70	0.33
75	0.32
80	0.31
90	0.29
100	0.27
120	0.23
150	0.20
50/30	0.25
50/50	0.21
70/30	0.23
70/50	0.19
90/30	0.20
90/50	0.17
100/30	0.19
100/50	0.16
120/30	0.17
120/50	0.15
150/30	0.15
150/50	0.13
150/60	0.13
150/70	0.12
150/80	0.11
150/100	0.10

In two layer options the first figure is the between rafter thickness, the second the under rafter thickness. The additional later of Eurothane GP boards under the rafter increases the thermal performance, masks the thermal bridge effect of the timbers and helps reduce the incidence of pattern staining.

Typical Construction:
Tiles • Battens • Vapour permeable membrane • Low e cavity - Min 25mm • Insulation - Inbetween Rafter 50x175mm @ 450mm centres • Insulation - Under rafter • 12.5mm Plasterboard • Skim.

Pitched Roof

Between Rafter Insulation (Ventilated)	
Eurothane GP Thickness (mm)	U-Value (W/m^{2}K)
50	0.52
60	0.45
70	0.40
75	0.37
80	0.37
90	0.33
100	0.30
120	0.26
150	0.22
50/30	0.30
50/50	0.24
70/30	0.26
70/50	0.21
90/30	0.22
90/50	0.19
100/30	0.21
100/50	0.18
120/30	0.19
120/50	0.16
150/30	0.16
150/50	0.14
150/60	0.13
150/70	0.13
150/80	0.12
150/100	0.11

In two layer options the first figure is the between rafter thickness, the second the under rafter thickness. The additional layer of Eurothane GP boards under the rafter increases the thermal performance, masks the thermal bridge effect of the timbers and helps reduce the incidence of pattern staining.

Typical Construction:
Tiles • Battens • Type 1F felt • Ventilated Cavity Min 50mm • Insulation - Inbetween Rafter 50x175mm @ 450mm centres • Insulation - Under rafter • 12.5mm Plasterboard • Skim


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Flooring

Design.

Description.
Eurothane GP is a high performance rigid PIR foam board for use in ground and intermediate exposed floors.

Wider choice.
Eurothane GP, in a wide range of thicknesses, will assist in meeting the appropriate Building Regulation standard with any form of floor construction.

Insulation savings.
It is possible to meet the new Building Regulation requirement in new housing with only 60mm of Eurothane GP refer to table on pages 24 and 25.

Ideal for heated floors.
Heated floors are fast gaining in popularity due to their efficiency and comfort level. The use of Eurothane GP boards will ensure optimum system efficiency.

Thermal bridging:
With increasing levels of insulation it is vitally important to ensure continuity of the insulation at the junction of elements. At the junction of the floor and the wall continue the wall cavity insulation below the top of the floor insulation and incorporate edge insulation to the floor slab. The use of lightweight blocks on the inner leaf will also assist in minimising thermal bridging at the floor/wall junction.

Edge Insulation.
The pattern of heat loss from a ground floor is very complex depending upon its size, shape, edge conditions and the type of soil under the building. The heat loss is at its greatest around the perimeter of the floor and decreases with increasing depth below ground level. As floors get larger their overall heat transmittance reduces so that particularly large floor areas may meet the Building Regulation requirement with only minimal additional insulation (see Heat Loss Calculations later in this brochure). In all instances floors will benefit from incorporating a vertical section of edge insulation, it minimises thermal bridging at the floor/wall junction and gives an appreciable reduction in the calculated U-value of the basic floor with only horizontal insulation.

Limiting Air Infiltration.
In suspended timber floors it is important to limit air infiltration by sealing around the perimeter of the floor at the skirting board. Expanding foam and/or mastic type sealants should be used under the skirting to seal the floor edge.

Heating Regime.
If possible the Eurothane GP boards should be positioned within the floor structure to reflect the heating regime. If the building is to be heated continuously the insulation should be positioned below the concrete slab. This will increase the thermal capacity of the building allowing the stored heat energy to be utilised when the heating system is off or on a lower setting. Conversely intermittently heated buildings should have the Eurothane GP boards positioned below a screed or chipboard floor covering to give a rapid thermal response.

Fire Performance.
When used within a ground or intermediate exposed floor constructed in accordance with Recticel Insulation Products instructions Eurothane GP will not prejudice the fire resistance properties of the floor and adds no significant fire load to the building.

Insulation Below the Slab - Figure 1.

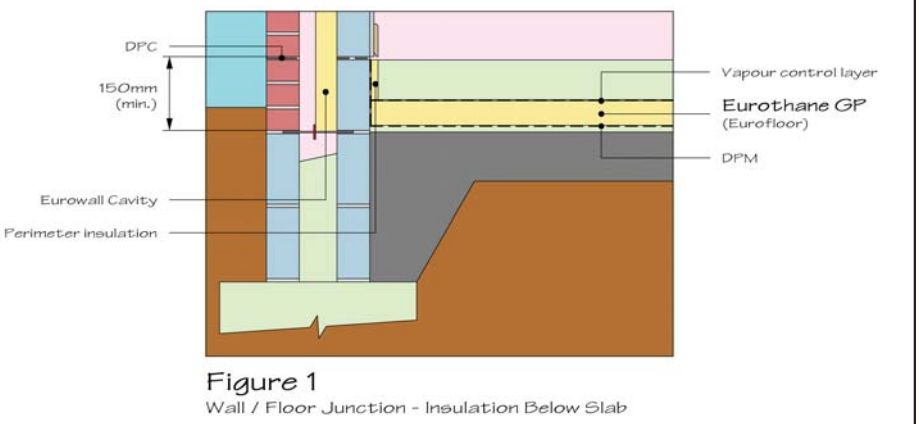


Figure 1
Wall / Floor Junction - Insulation Below Slab

Insulating below the slab allows its full thermal mass to be utilised however its thermal response will be slow and is more suited to a continuous heating regime.

The procedure for construction (Figure 1) is:

1. Build the perimeter walls to DPC level. Lay, level and compact the hardcore before applying a sand blinding. This base should be level to within 5mm along any 3m straight edge.

2. The damp proof membrane, normally 1200g polythene sheet, is laid over the blinding with suitably lapped and sealed joints. Extend the DPM to connect with the DPC.

3. The Eurothane GP boards should then be laid, tightly butt jointed in a brick bond pattern.

4. The boards may be cut into strips and placed vertically around the perimeter in order to minimize thermal bridging. Ensure that the vertical edge insulation is no thicker than the thickness of the plaster and skirting combined (a minimum 25mm thick perimeter insulation board is used).

5. The Eurothane GP boards are overlaid with a light gauge polythene sheet, minimum 500g, to prevent the loss of grout or fines between the board joints and to act as a vapour control layer.

6. The concrete slab is placed and compacted in the normal manner.

7. If required the floor heating system, normally in the form of plastic pipe work, may be clipped to the Eurothane GP boards prior to placing the concrete.

Flooring

Insulation Above the Slab - Figure 2.

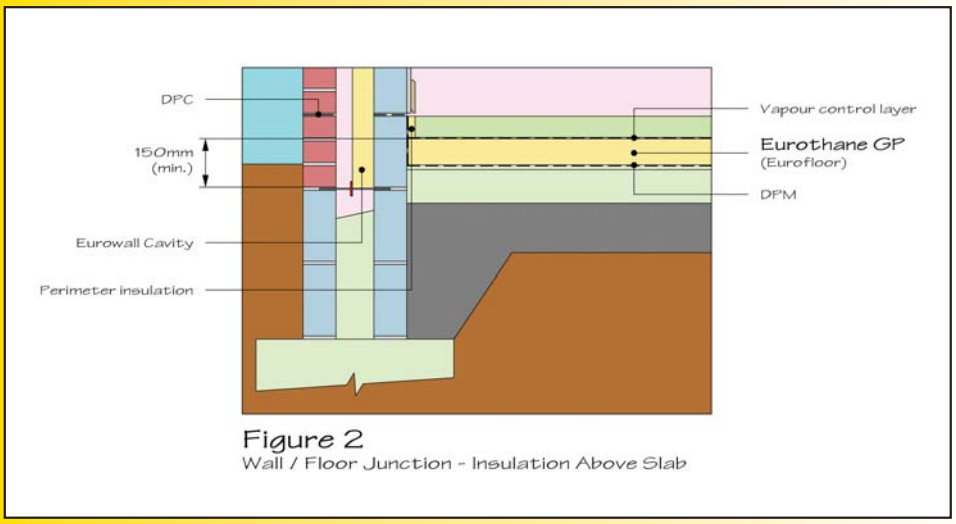


Figure 2
Wall / Floor Junction - Insulation Above Slab

Insulating above the slab allows a rapid thermal response and is more suited to an intermittent heating regime. This method of construction is equally suited to cast in-situ concrete floors, beam and block floors and pre-cast concrete floor units.

The procedure for construction (Figure 2) is:

1. The concrete slab is poured in the normal manner incorporating a DPM either below or over the slab. The slab should already incorporate some edge insulation within its depth. Pre-cast systems should be installed to the manufacturer's recommendations, normally protected from dampness by a DPC/DPM and a ventilated void below.

2. The base should be level to within 5mm along any 3m straight edge, this may require a sand blinding on tamped concrete or a thin leveling screed or grout on pre-cast floors.

3. The Eurothane GP boards should then be laid, tightly butt jointed in a brick bond pattern.

4. The boards may be cut into strips and placed vertically around the perimeter in order to minimize thermal bridging (a minimum 25mm thick perimeter insulation board is used).

5. The Eurothane GP boards are overlaid with a light gauge polythene sheet, minimum 500g, to prevent the loss of grout or fines between the board joints and to act as a vapour control layer.

6. The sand/cement screed may then be laid and thoroughly compacted. The minimum screed thickness is 65mm for domestic applications and 75mm for others. Light mesh reinforcement should be used at the mid depth of the screed.

7. If required the floor heating system, normally in the form of plastic pipe work, may be clipped to the Eurothane GP boards prior to placing the screed.

Chipboard Overlay - Figure 3.

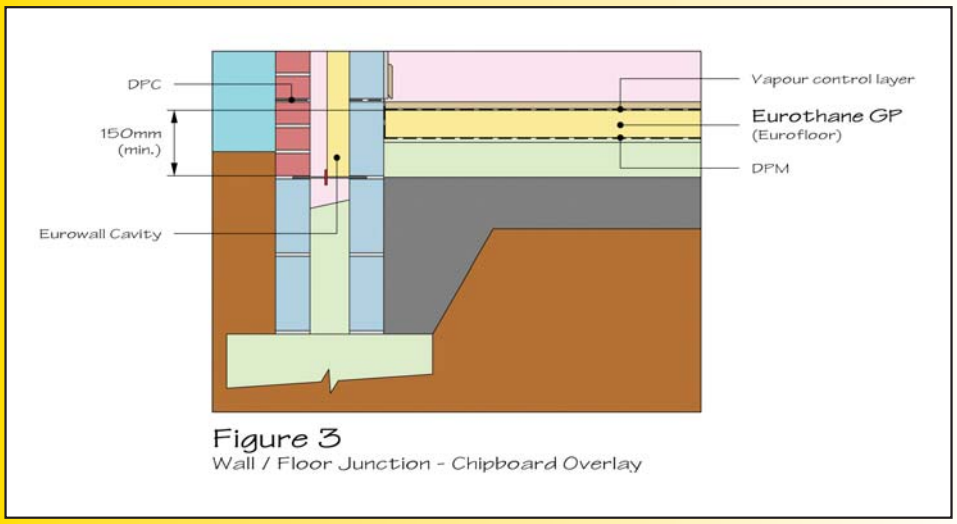


Figure 3
Wall / Floor Junction - Chipboard Overlay

The procedure for construction (Figure 3) is:

1. The concrete slab is poured in the normal manner incorporating a DPM either below or over the slab. The slab should already incorporate some edge insulation within its depth. Pre-cast systems should be installed to the manufacturer's recommendations, normally protected from dampness by a DPC/DPM and a ventilated void below.

2. The base should be level to within 5mm along any 3m straight edge, this may require a thin leveling screed or grout on pre-cast floors.

3. The Eurothane GP boards should then be laid, tightly butt jointed in a brick bond pattern.

4. The insulation is overlaid with a light gauge polythene sheet, minimum 500g, to act as a vapour control layer.

5. The tongue and groove chipboard is then laid with all edges glued. Leave an expansion gap around the floor perimeter of approximately 12mm. Cut edges of boards at doorways or when forming access traps for pipe work should be supported by treated timber battens. Internal stud partitions should also be supported on timber battens.

6. Heated floor systems are installed by slotting the Eurothane GP boards between timber battens. The battens should be sufficiently over sized to accommodate the pipe work between the Eurothane GP boards and the chipboard.

Flooring

Timber Floor - Figure 4.

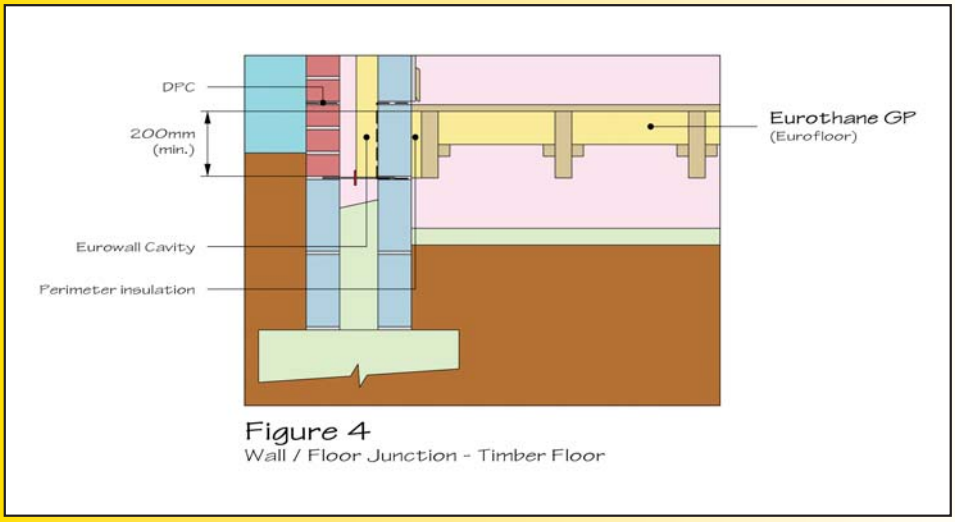


Figure 4
Wall / Floor Junction - Timber Floor

Insulating below a timber floor allows an extremely rapid thermal response and is more suited to an intermittent heating regime.

The procedure for construction (Figure 4) is:

1. The floor joists are installed in the normal manner including any bracing.

2. To support the Eurothane GP boards fix 50x25mm treated timber battens on to the sides of the joists leaving sufficient depth for the insulation and a minimum 25mm airspace (for an enhanced thermal performance or greater if a heated floor system is to be installed).

3. The Eurothane GP boards should be cut to size and slotted between the joists ensuring a tight fit between the joists and between other boards.

4. Ensure that any gaps between the perimeter wall and the first joist are insulated using cut pieces of board.

5. The chipboard or timber floor boarding is then laid and fixed in the normal manner directly to the joists.

6. A vapour control layer is not required with this form of construction. The sub floor void should, however, be adequately ventilated.

7. Heated floor systems are installed by ensuring the timber battens are positioned to accommodate the pipe work between the insulation and the chipboard / timber flooring.

Heat Loss Calculations:

Description.

The method of calculating U-values is the Combined Method (see BS EN ISO 6946) which as well as assessing the thermal bridging effect of mortar joints, timber studs etc also accounts for air gaps in the insulation and mechanical fasteners penetrating the insulation. In ground floors the heat loss cannot be estimated in the normal manner. Rather than depending upon the exact construction of the floor the U-value calculation is based upon the size, shape and edge conditions of the slab, along with whether it is ground bearing or suspended and the soil type below the building. The first step in the calculation is to assess the P/A ratio, where P is the total exposed perimeter of the floor (m) and A is the total floor area (m^2). The Building Regulations no longer use the Elemental U-value Method as a means of showing compliance. In new build a U-value in the region of 0.17 W/m^2K will help ensure compliance whilst in refurbishment work a U-value of 0.22 W/m^2K is required.

Heat Loss Figures: Eurothane GP thickness (mm) to achieve 0.25 W/m^2k			
P/A	Solid Ground Floor	Suspended Ground Floor (Beam & Dense Block)	Suspended Ground Floor (Timber)*
0.1	0	0	25
0.2	25	30	45
0.3	30	40	60
0.4	40	50	70
0.5	45	50	80
0.6	50	55	80
0.7	50	55	85
0.8	55	60	85
0.9	55	60	90
1.0	55	60	90

* Assumes 48mm timber floor joists at 400mm centres.

Heat Loss Figures: Eurothane GP thickness (mm) to achieve 0.22 W/m^2k			
P/A	Solid Ground Floor	Suspended Ground Floor (Beam & Dense Block)	Suspended Ground Floor (Timber)*
0.1	0	0	25
0.2	25	45	65
0.3	35	55	85
0.4	50	60	90
0.5	55	65	95
0.6	60	65	100
0.7	60	70	105
0.8	65	70	105
0.9	65	70	105
1.0	70	70	110

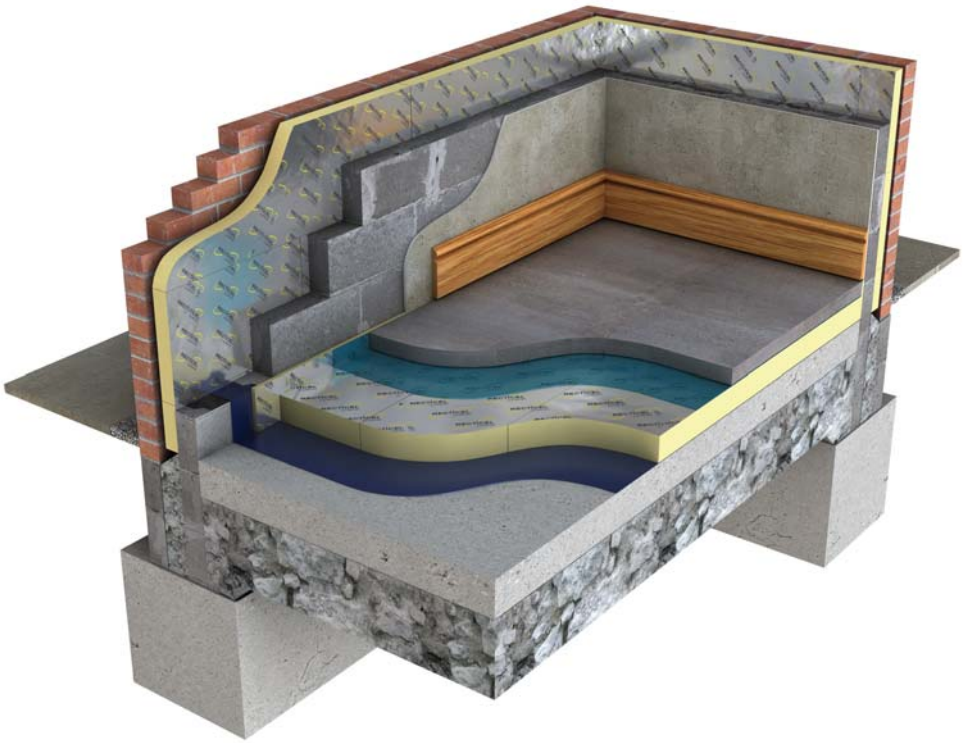
* Assumes 48mm timber floor joists at 400mm centres.
60mm Screed, VCL, Insulation, DPM.

Flooring

Heat Loss Figures: Eurothane GP thickness (mm) to achieve 0.20 W/m²k			
P/A	Solid Ground Floor	Suspended Ground Floor (Beam & Dense Block)	Suspended Ground Floor (Timber)*
0.1	25	25	30
0.2	30	55	80
0.3	50	65	95
0.4	60	70	105
0.5	65	75	115
0.6	70	75	115
0.7	70	75	120
0.8	75	80	120
0.9	75	80	120
1.0	85	80	125

* Assumes 48mm timber floor joists at 400mm centres.

**Solid Ground Floor: 100mm Concrete Slab, VCL, Insulation, DPM, 50mm Sand Blinding, 150mm Hardcore.
**Suspended Ground Floor: (Beam & Dense Block): 60mm Screed, VCL, Insulation, DPM, Deck, 200mm Vented Cavity.
**Suspended Ground Floor: (Timber): Timber Deck, VCL, Insulation Inbetween Joists.
***25mm Perimeter Insulation Included.




RECTICEL
insulation

Framed Walls

Design.

Description.

Eurothane GP is a high performance rigid PIR foam board for use in timber and metal framed wall construction.

Wider choice.

Eurothane GP, in a wide range of thicknesses, will assist in meeting the appropriate Building Regulation standard with any form of timber and metal framed wall construction.

Thermal Bridging.

Insulation installed between studs will introduce both a series of repeating thermal bridges plus the effect of lintels, noggins and sole and top plates. This can significantly affect the calculated U-value as the framing accounts for up to 20% of the wall area; the Building Regulations recommend a general standard of 15% framed area for calculation purposes. The use of an insulated sheathing is more thermally efficient as it eliminates these causes of thermal bridging. With increasing levels of insulation it is vitally important to ensure continuity of the insulation at the junction of elements and around door and window openings. At the junction of the floor and the wall a vertical section of insulation at the floor edge or extending the sheathing insulation below the floor level can reduce thermal bridging. (See Figures 6,7,8,9) Around door and window openings careful detailing of the insulation along with the use of proprietary insulated cavity closers can help to reduce thermal bridging. (See Figures 10, 11 & 12) In a cold roof construction the gable wall sheathing insulation should extend above the ceiling line, the top edge being protected by the use of a cavity closer. At gable walls with warm roof construction the insulation should be continued to the underside of the roof to ensure continuity of the wall and roof insulation. (See Figures 13 & 14).

Limiting Air Infiltration.

Ensure that the Eurothane GP boards are continuous and form a tight joint at details such as corners – if necessary expanding foam filler should be used to seal any gaps. Where a timber floor meets the wall it is important to limit air infiltration by sealing around the perimeter of the floor. Expanding foam and/or mastic type sealants should be used under the sole plate to seal the floor edge. The use of a polythene vapour control layer creates an additional air infiltration barrier.

Wall Width.

The use of very high efficiency insulation has benefits when achieving high standards of insulation without a great increase in the overall wall thickness. Standard 89mm deep timber studs may be used whilst still achieving the current Building Regulation standard.

Condensation.

A vapour control layer is generally required when insulating between the studs, this can either be a Polythene sheet (minimum 500g) and/or a foil-backed plasterboard. When using sheathing insulation the structural frame is maintained at the same temperature as the inside of the building and a vapour control layer is not required. Surface condensation is generally not a problem with the correct choice of insulation thickness, heating system and ventilation.

Rainwater Penetration.

Projections and discontinuities within the cavity such as changes in wall thickness or beams will require the use of a cavity tray. When using sheathing insulation in conjunction with a cold pitched roof (insulation at horizontal ceiling level) the top edge of the boards should be protected by the use of a cavity closer.

Fire Performance.

When used within a timber or metal framed wall constructed in accordance with this brochure Eurothane GP will not prejudice the fire resistance properties of the wall. Cavity barriers should be installed in accordance with Building Regulation or Building Standard requirements.

Construction Methods.

Description.

There are three main forms of framed construction depending upon the position of the insulation:

Cold frame.

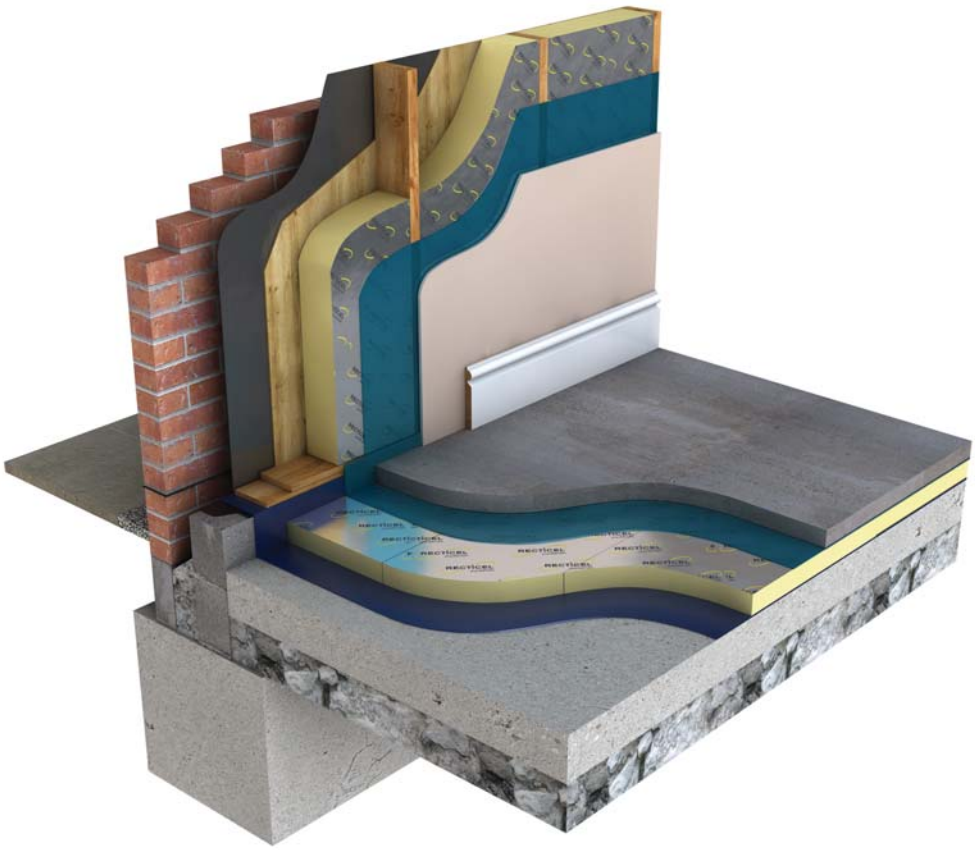
All of the insulation is fitted within the depth of the studs which results in the timber/steel bridging the insulation. It is possible to add an insulated lining internally to both improve the thermal performance and mask the thermal bridge effect. (See Figure 1)

Warm frame.

The insulation is fitted external to the framing as a sheathing to give a continuously insulated envelope. This form of construction has the advantages of preventing the thermal bridge problem and being inherently safe from harmful condensation risk. (See Figure 2)

Hybrid.

The insulation is fitted between the studs with an additional layer on the outside to reduce thermal bridging. Careful choice of the ratio of thermal resistances of each layer is required to avoid interstitial condensation. (See Figures 4 & 5)



Framed Walls

Insulation Between Timber Studs - Figure 1. (Cold Frame Construction)

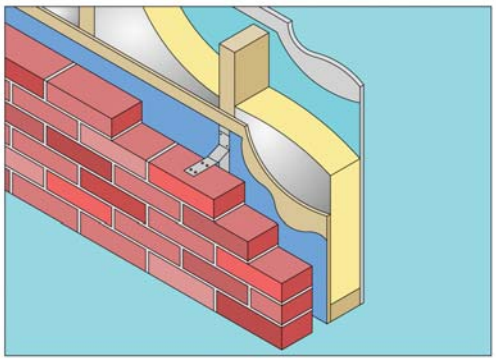


Figure 1
Insulation Between Timber Studs
(Cold Frame Construction)

The procedure for construction (Figure 1) is:

1. The timber frame, OSB or plywood sheathing, breather membrane etc are all installed in the normal manner.

2. The Eurothane GP boards are cut to fit tightly between the studs and fitted in the void against the sheathing.

3. To ensure that the Eurothane GP boards do not move within the stud cavity a timber batten should be nail fixed to the sides of the studs.

4. Seal any gaps between boards or between the boards and timber members using expanding foam filler.

5. The void between the Eurothane GP boards and the internal face of the studs may be used to route services if required.

6. The internal lining of vapour control layer and plasterboard are then fixed in the normal manner.

7. The external finish of brickwork, tile hanging or external render is then installed.

Insulated Sheathing on Timber Frame - Figure 2. (Warm Frame Construction)

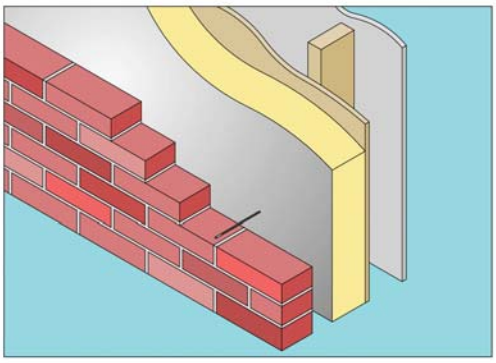


Figure 2
Insulated Sheathing on Timber Frame
(Warm Frame Construction)

The procedure for construction (Figure 2) is:

1. The timber framing and OSB sheathing are installed in the normal manner.
2. The Eurothane GP boards are fixed to the sheathing using galvanised clout nails at 300mm centres around the perimeter of the board and at 400mm centres along any intermediate timbers. There is no need to tape the board joints.
3. Ensure that all Eurothane GP boards are tightly fitted especially at corners. If necessary expanding foam filler may be used to seal any gaps.
4. Install proprietary horizontal and vertical fire stops at centres in accordance with the Building Regulations.
5. Helical stainless steel wall ties are then driven through the insulation into the timber studs ensuring that they slope down toward the outer leaf.
6. The external brickwork leaf may then be built.
7. Alternatively tile hanging may be installed by fixing vertical timber battens using helical fixings nailed through the insulation into the timber studs.
8. A breather type membrane is installed over the vertical battens prior to installing the tiling battens and tiles in the normal manner.

Framed Walls

Insulated Sheathing on Metal Frame - Figure 3. (Warm Frame Construction)

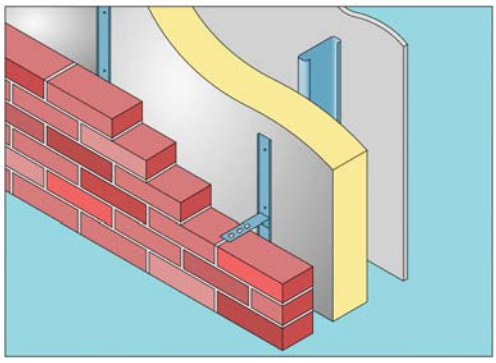


Figure 3
Insulated Sheathing on Metal Frame
(Warm Frame Construction)

The procedure for construction (Figure 3) is:

1. The metal framing is installed in accordance with the manufacturer's instructions.

2. The Eurothane GP boards are fitted to the studs ensuring that vertical board joints coincide with the studs. There is no need to tape the board joints.

3. Ensure that all Eurothane GP boards are tightly fitted especially at corners; if necessary expanding foam filler may be used to seal any gaps.

4. Install proprietary horizontal and vertical fire stops at centres in accordance with the Building Regulations.

5 The Eurothane GP boards are restrained using the vertical metal channel section of the wall tie system.

6. The wall ties are clipped into the metal channel and the external brickwork leaf built.

7. Alternatively tile hanging may be installed by fixing vertical timber battens using screw fixings through the insulation into the metal studs.

8. A breather type membrane is installed over the vertical battens prior to installing the tiling battens and tiles in the normal manner. Other forms of external finish such as render, timber weatherboarding, PVC-U cladding etc are also suitable and should be fixed in accordance with the manufacturer's instructions

Hybrid Construction, Timber Frame - Figure 4.

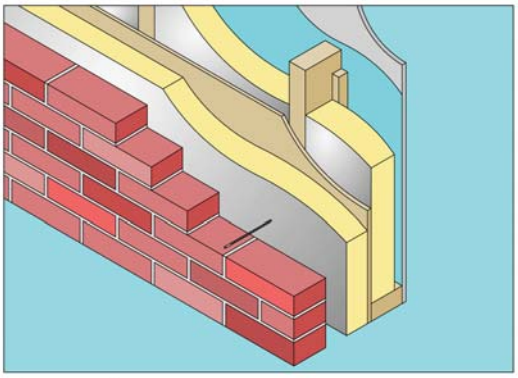


Figure 4
Hybrid Construction, Timber Frame

Hybrid Construction, Metal Frame - Figure 5.

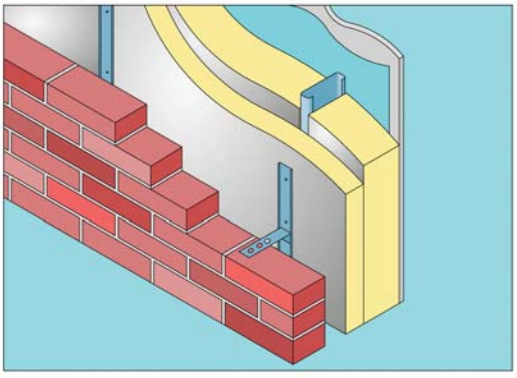


Figure 5
Hybrid Construction, Metal Frame

Framed Walls

Floor Junction, Insulation Below Slab - Figure 6.

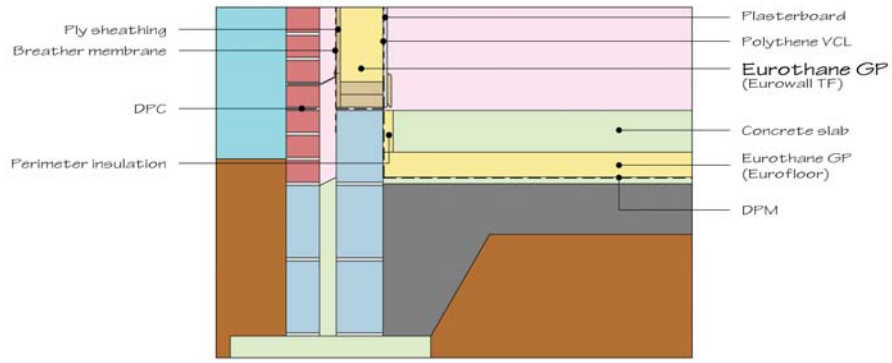


Figure 6
Wall / Floor Junction - Insulation Below Slab

Floor Junction, Insulation Above Slab, Timber Floor - Figure 7.

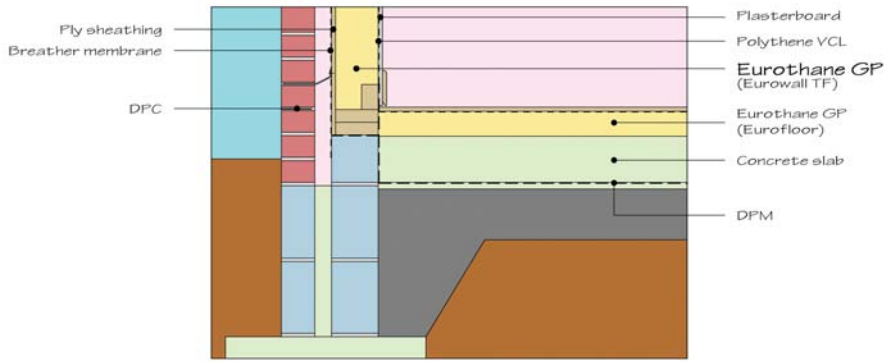


Figure 7
Wall / Floor Junction - Insulation Above Slab, Timber Floor

Floor Junction, Insulation Above Slab, Sceed - Figure 8.

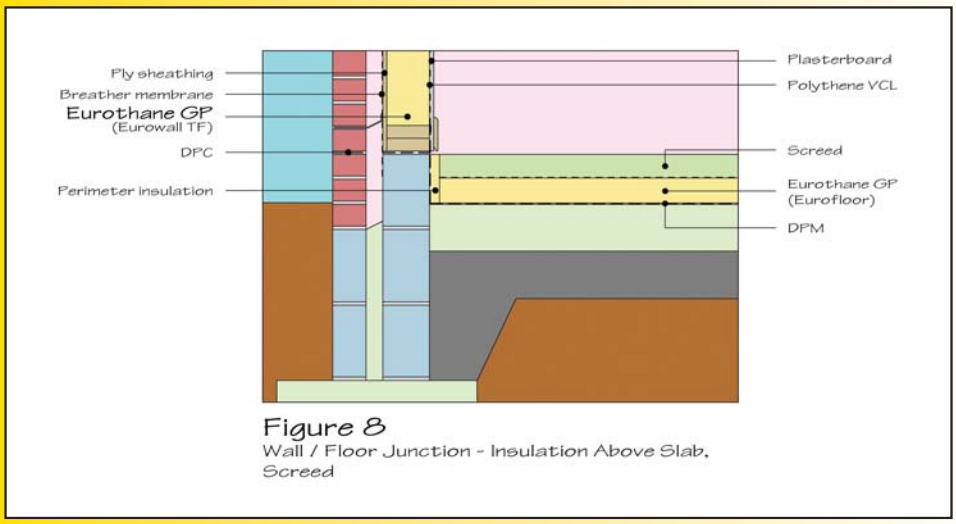


Figure 8
Wall / Floor Junction - Insulation Above Slab, Screed

Floor Junction, Timber Floor - Figure 9.

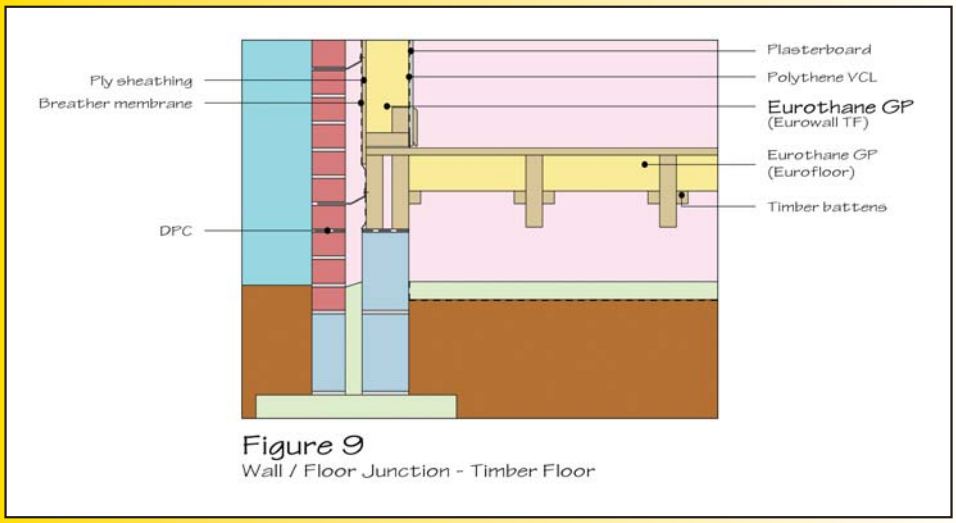


Figure 9
Wall / Floor Junction - Timber Floor

Framed Walls

Head Detail - Figure 10.

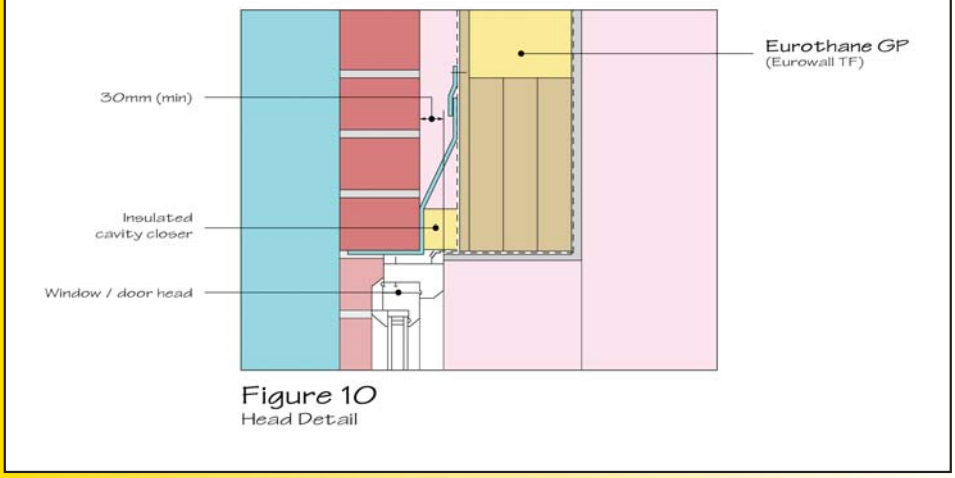


Figure 10
Head Detail

Sill Detail - Figure 11.

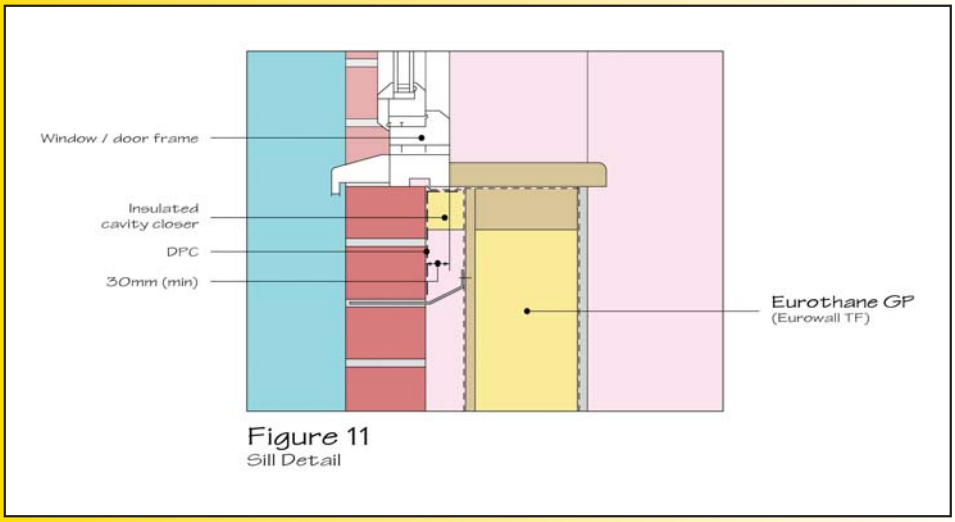


Figure 11
Sill Detail

Jamb Detail - Figure 12.

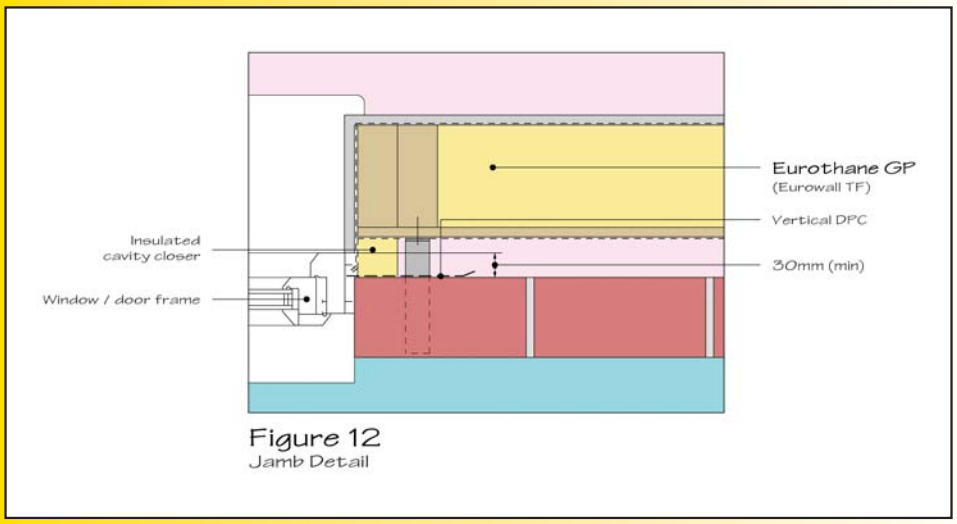


Figure 12
Jamb Detail

Warm Pitched Roof, Gable Verge Detail - Figure 13.

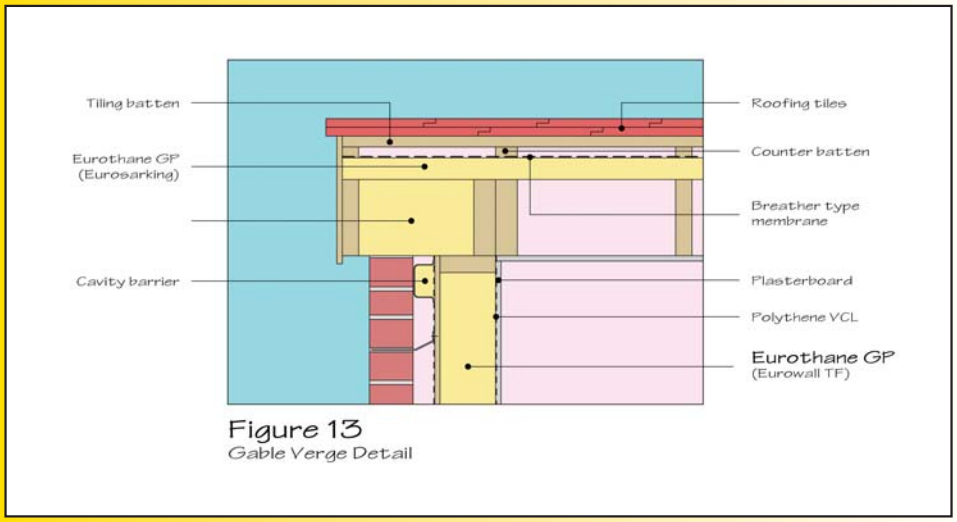


Figure 13
Gable Verge Detail

Framed Walls

Wall / Pitched Roof, Eaves Detail - Figure 14.

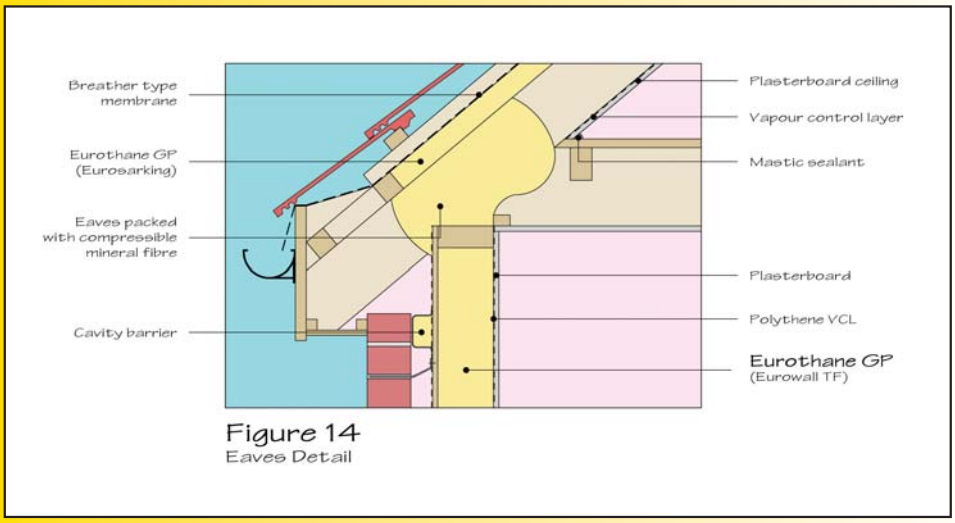


Figure 14
Eaves Detail

Heat loss calculations.

Description.

The method of calculating U-values is the Combined Method (see BS EN ISO 6946) which as well as assessing the thermal bridge effect of mortar joints, timber/metal studs etc also accounts for air gaps in the insulation and mechanical fasteners penetrating the insulation. The Building Regulations no longer use the Elemental U-value Method as a means of showing compliance. In new build a U-value in the region of 0.25 W/m^{2}K will help ensure compliance whilst in extensions and refurbishment work a U-value of 0.30 W/m^{2}K is required. The Building Regulations (Scotland) require a U-value of 0.27 W/m^{2}K.

Between Studs	
Eurothane GP Thickness (mm)	U-Value (W/m^{2}K)
60	0.34
70	0.31
80	0.29
90	0.27
100	0.25
120	0.22
140	0.19
160	0.18
175	0.17

Typical Construction:
103mm brick • 50mm clear cavity • Breather membrane • 9mm OSB sheathing • Recticel Eurothane GP 25mm (min.) stud cavity • 12.5mm plasterboard & Skim • Timber frame proportion of 15%

Insulated Sheathing - Timber Frame	
Eurothane GP Thickness (mm)	U-Value (W/m^{2}K)
30	0.37
40	0.32
50	0.28
60	0.26
70	0.23
80	0.21
90	0.19
100	0.18
110	0.17
120	0.16

Typical Construction:
103mm brick • 50mm clear cavity • Recticel Eurothane GP • 9mm OSB sheathing • Stud cavity 12.5mm plasterboard & Skim • Helical stainless steel wall ties

Insulated Sheathing - Metal Frame	
Eurothane GP Thickness (mm)	U-Value (W/m^{2}K)
30	0.39
40	0.33
50	0.29
60	0.27
70	0.24
80	0.22
90	0.20
100	0.19
110	0.17
120	0.16

Typical Construction:
103mm brick • 50mm clear cavity • Recticel Eurothane GP • Metal stud cavity • 12.5mm plasterboard & Skim • Stainless steel screws having a thermal conductivity of 17.0 W/mK, cross sectional area of 10.75mm^2 and fixed at a density of 4/m^2 are used to secure the wall ties.

Technical Details

Eurothane GP is available in the following dimensions:

Length (mm)	2400
Width (mm)	1200
Thickness (mm)	20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 100, 110, 120, 130, 140, 150

Some thicknesses may be subject to minimum order quantities. Other sizes and thicknesses are available on request. Please contact Recticel Customer Services for more information.

Technical Details.

Specification Clause - Eurothane GP Pitched Roofing.

(Eurothane GP Pitched Roof thermal insulation boards for warm pitched roofs) The pitched roof insulation shall be Recticel Eurothane GP ..... mm thick manufactured to BS EN 13165 by Recticel Insulation, comprising a CFC/HCFC free rigid Polyisocyanurate (PIR) core faced on both sides with a bright, gas tight and multi-layered complex of kraft and metal foil. The Eurothane GP pitched roof insulation shall be installed in accordance with manufacturer's recommendations.

(Make reference to NBS clause P10 140, K11 695, K11 55)
Insulation: Polyisocyanurate (PIR) Rigid Foam
Certification: BBA 02/3905
Manufacturer: Recticel Insulation Products
Enterprise Way
Meir Park
Stoke on Trent
Staffordshire ST3 7UN
United Kingdom

Specification Clause - Eurothane GP Flooring.

(Eurothane GP Floors thermal insulation boards for ground and intermediate exposed floors) The floor insulation shall be Recticel Eurothane GP ..... mm thick manufactured to BS EN 13165 by Recticel Insulation, comprising a CFC/HCFC free rigid Polyisocyanurate (PIR) core faced on both sides with a bright, gas tight and multi-layered complex of kraft and metal foil. The Eurothane GP floor insulation shall be installed in accordance with manufacturer's recommendations.

(Make reference to NBS clause E20 200, E20 30)
Insulation: Polyisocyanurate (PIR) Rigid Foam
Certification: BBA 02/3905
Manufacturer: Recticel Insulation Products
Enterprise Way
Meir Park
Stoke on Trent
Staffordshire ST3 7UN
United Kingdom

Specification Clause - Eurothane GP Framed Walls.

(Eurothane GP Framed Walls thermal insulation boards for timber frame walls) The wall insulation shall be Recticel Eurothane GP ..... mm thick manufactured to BS EN 13165 by Recticel Insulation, comprising a CFC/HCFC free rigid Polyisocyanurate (PIR) core faced on both sides with a bright, gas tight and multi-layered complex of kraft and metal foil. The Eurothane GP wall insulation shall be installed in accordance with manufacturer's recommendations.

(Make reference to NBS clause F30 155, K10 15, K10 205, P10 210)
Insulation: Polyisocyanurate (PIR) Rigid Foam
Certification: BBA 02/3905
Manufacturer: Recticel Insulation Products
Enterprise Way
Meir Park
Stoke on Trent
Staffordshire ST3 7UN
United Kingdom

Compressive Strength.
Compressive strength exceeds 140 kPa at yield.

Thermal Conductivity.
The declared thermal conductivity, λD-value, of Eurothane GP is 0.022 W/mK when tested using BS EN 13165: 2001.

Moisture Vapour Transmission.
The foil faces of the Eurothane GP board give it an almost infinite water vapour resistance value. The joints between boards however will facilitate the passage of moisture vapour under normal conditions of temperature and humidity; a practical value for the moisture vapour resistance of the system is 100 MNs/g.

Specific Heat Capacity.
The specific heat capacity is 1.4 kJ/kgK.

Durability.
When correctly installed, Eurothane GP board is maintenance free and has an indefinite life at least equal to that of the building.

Storage.
Eurothane GP boards are supplied wrapped in polythene to provide short term protection. On site the boards should be stored in dry conditions, clear of the ground, on a clean level surface.

Reaction to Fire.
Euroclass F (BS EN 13501-1)
Class 1 (BS 476, Part 7)

Health and Safety.

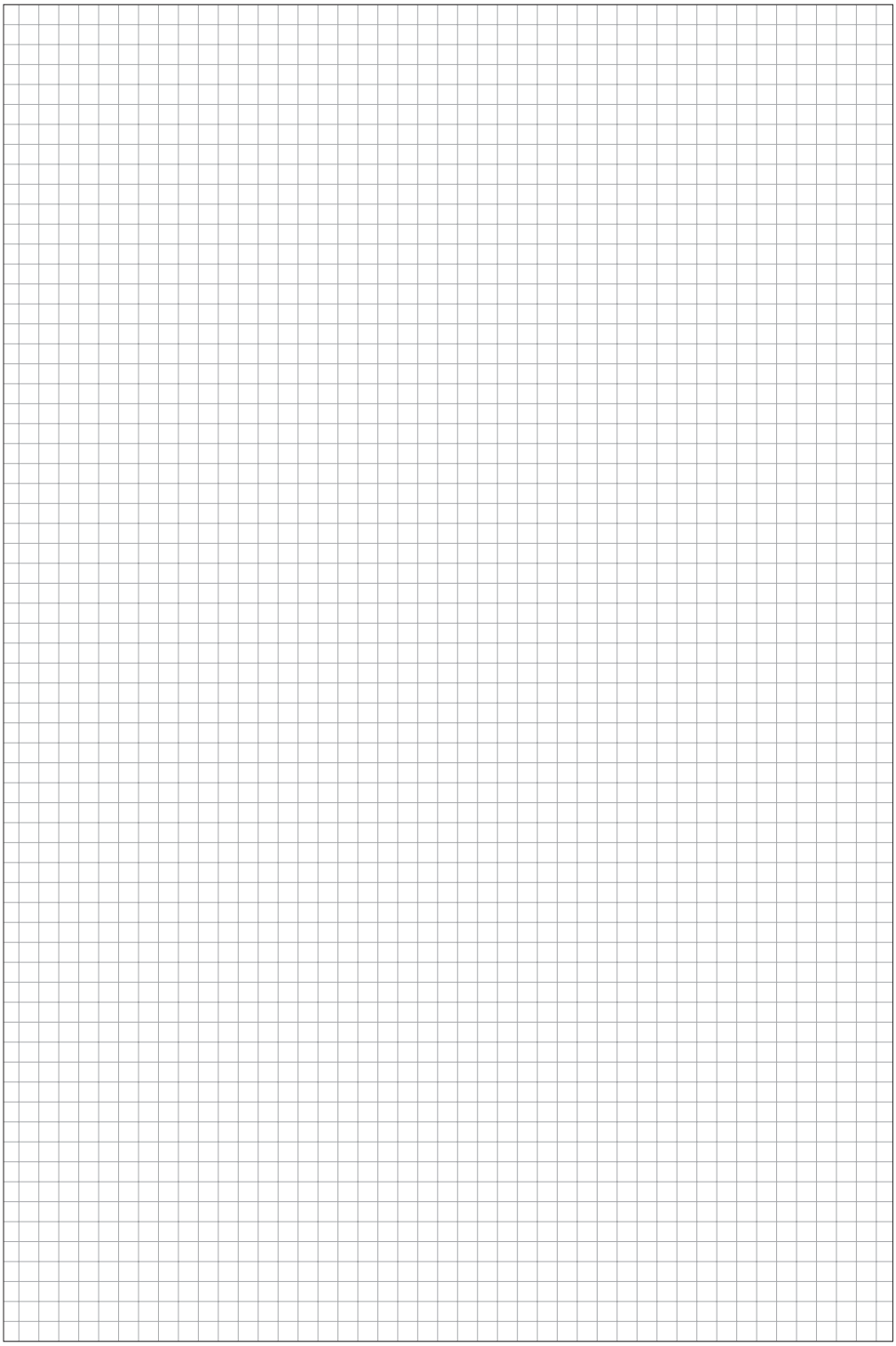
Eurothane GP Insulation boards are inherently safe to handle. During cutting or machining any dust generated is of nuisance value only. Large scale machining should be connected to a dust extraction system. Please note that the reflective surface on this product is designed to enhance its thermal performance. As such, it will reflect light as well as heat, including ultraviolet light. Therefore, if this board is being installed during bright weather, it is advisable to wear UV eye protection, and if the skin is exposed for a significant period of time, to protect the bare skin with a high SPF sun cream. The reflective facing used on this product can become slippery when wet. Ensure care is taken to avoid skin and eye contact with any sharp edges. Do not stand on or otherwise support your weight on this board unless it is fully supported by a load bearing surface.

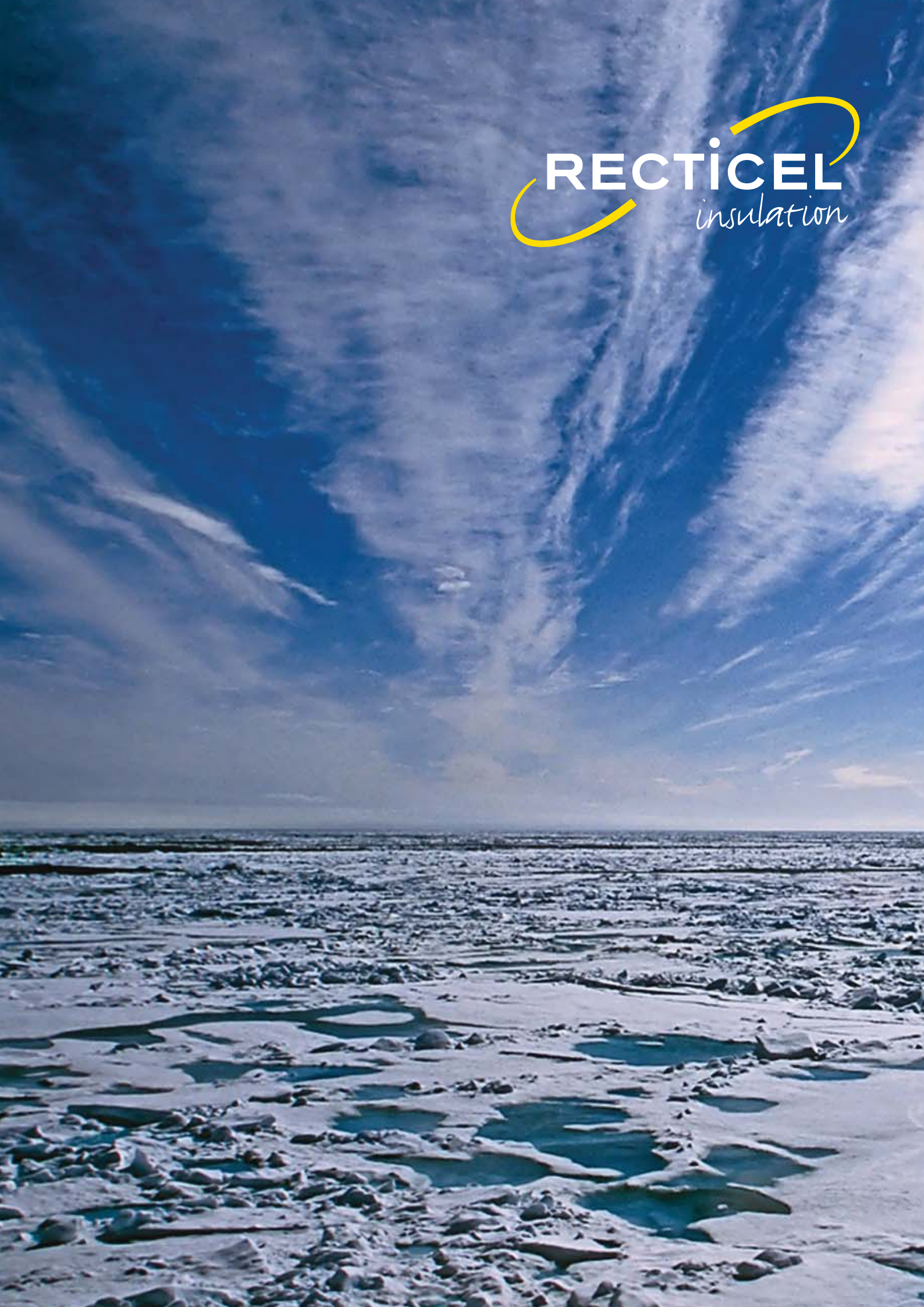
A comprehensive health and safety data sheet is available from Recticel Insulation Products upon request.

Contact Details.

Technical Desk Freephone 0800 0854079
Email:technicalservices@recticelinsulation.com

Notes

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