Second Nature UK Ltd
INSULATION WITH INTEGRITY

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Room in a Roof Application Notes

Introduction

This application guidance is aimed at ensuring you make the best use of the Thermafleece range of insulation when used in 'room in a roof' situations. Thermafleece products are suitable for installation within existing roof spaces, converted spaces and new "room in the roof" applications. This guidance illustrates a number of ways to cater for different rafter depths present in new-build and refurbishment projects in listed buildings or barn conversions.

Our room in a roof guidance is intended to meet the requirements of:

Building Regulations Part L
Code for Sustainable Homes
Standard and non standard centre of rafters
Oak rafter with King "A" truss and purling designs
Breathing roof requirements
Engineered "I" beam roof systems
Acoustic requirements

Factors to Consider

Insulation materials
Performance requirements
Installation
Ventilation and condensation

Insulation Materials

The Thermafleece range of insulation utilises the unique functional properties of sheep's wool and can be installed in rafters of depths greater than 50mm.

Thermafleece

Thermafleece has been the UK's first choice of sheep's wool insulation since it was launched in 2001. Thermafleece is a high density, wool rich insulation that is the first choice when maximum thermal and acoustic performance and breathability are required or in space limited situations. Thermafleece contains 85% British sheep's wool.

Thermafleece PB20

Thermafleece PB20 is a lower density, compressed roll insulation that is easy to handle and install in confined spaces such as lofts. Thermafleece PB20 contains 60% British sheep's wool.

Our insulation range is suitable for timber rafter depths from 50mm upwards to suit the depth of void to be insulated.

Other products within the Thermafleece range can be included to suit your design, subject to volume and performance requirements

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Performance Requirements

When insulating a new building or when renovating a building, the required insulation performance (U Value) is covered by Building Regulation Part L 2006. In addition the Code for Sustainable Homes was introduced in May 2008 which requires a higher standard of insulation performance depending on the code level required. For further information on U Values and Code for Sustainable Homes, please contact Second Nature's Technical department for more advice.

K Values

Type	Thickness	Length	Width	K Value W/mK
Thermafleece	50mm	1200mm	600 & 400mm	0.038 W/mK
Thermafleece	75mm	1200mm	600 & 400mm	0.038 W/mK
Thermafleece	100mm	1200mm	600 & 400mm	0.038 W/mK
Thermafleece PB20	70mm	7600mm	570mm	0.039 W/mK
Thermafleece PB20	100mm	5300mm	570 & 370mm	0.039 W/mK

Typical U Values

The overall insulation values being considered will determine the overall depth of Thermafleece or Thermafleece PB20 required. To achieve Building Regulation or better, the following thicknesses are required:

Thermafleece Product	Overall Thickness	Between Rafter	Over Rafter	U Value W/m^{2}K
Thermafleece	175mm	125mm	50mm	0.24
Thermafleece PB20	180mm	125mm	55mm	0.24
Thermafleece	200mm	150mm	50mm	0.21
Thermafleece PB20	195mm	140mm	55mm	0.22
Thermafleece	225mm	150mm	75mm	0.19
Thermafleece PB20	210mm	140mm	70mm	0.21
Thermafleece	250mm	150mm	100mm	0.17
Thermafleece PB20	240mm	140mm	100mm	0.18
Thermafleece	300mm	150mm	150mm	0.15
Thermafleece PB20	295mm	140mm	155mm	0.15
Thermafleece	325mm	150mm	175mm	0.14
Thermafleece PB20	310mm	140mm	170mm	0.14

Specific U Value are developed based on the construction required via our Technical support team.

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INSTALLATION

Guidance is provided for the following situations, where:

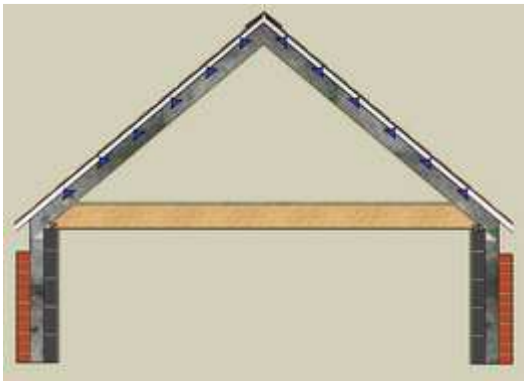
Insulation is installed at rafter level (new and existing roofs).
Insulation is installed between and under rafter.
Insulation is installed over-rafter.
Insulation is used in conjunction with 'I' beams.
Eaves detailing for 'room in a roof'

RAFTER LEVEL INSULATION

The way the insulation is installed can vary depending on the application, for instance upgrading an existing roof, breathing roof design or ventilated roof design.

RAFTER LEVEL INSULATION FOR AN EXISTING ROOF

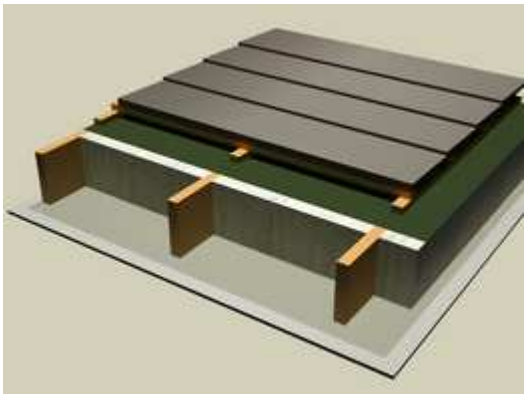
The insulation is fitted under the sarking membrane, the counter battens and tiles which will usually remain in place during installation. Installation of the insulation will depend on the type of roofing membrane in place.



If a high vapour resistance (HR) membrane is used, the insulation should be installed leaving a ventilation space between the insulation and the membrane. The ventilation openings should be continuously provided at each and every rafter spacing to be filled, from the eaves to the ridge, with a ventilation opening equivalent to a 50mm continuous gap. Ventilation opening at the eaves of 25mm is required, and 5mm continuous gap each side of the ridge. Obstructions to the roof plain such as rooflights and dormers should have ventilated air spaces both to the top and bottom of each rafter to maintain the air flow in the rafter.

If a low vapour resistance (LR) membrane is used, the insulation can fully fill the rafter space between the breather membrane, the counterbattens and tiles without the need for ventilation over the insulation.

RAFTER LEVEL INSULATION FOR A NEW ROOF



The insulation can fully fill the rafter space in a new 'room in roof' application using a LR membrane underlay because there is no requirement for a ventilated air space between the insulation and the membrane. The space created by the counter-battens allows the diffusion of any moisture vapour that passes through the LR breather membrane. In all cases, particularly where the roof covering is sealed, eaves ventilation above the breather membrane is recommended, please obtain advice from the manufacturer of the roof covering material if you are in doubt.

You can install a breather membrane without counter battens if it is draped below the top of the rafters and the drape can be maintained for the entire fall of the roof to allow water to drain away to the eaves. Consideration should be given to ensure that the roof tiles have an open area high enough to allow sufficient air circulation maintaining the vapour permeability of breather membrane.

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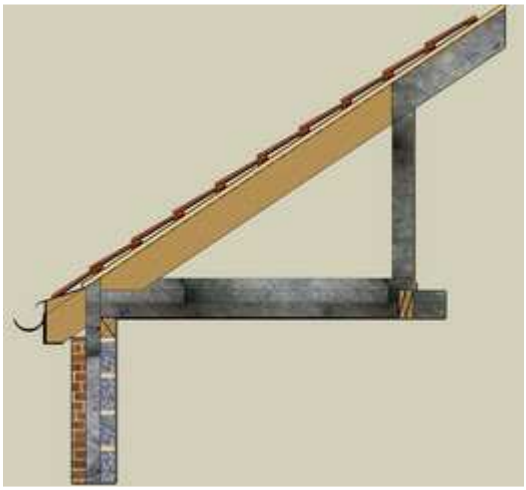
If sarking felt (HR underlay) is in place, a vapour control layer should be placed on the warm side of the insulation to reduce the quantity of water vapour passing through the structure. However, this is optional if you are creating a breathing roof or have used a breathable membrane on the roof. Please seek advice from Second Nature's Technical Department on dewpoint conditions within your structure.

Service voids with a plasterboard lining or other suitable lining (where cables and piped services are to be installed) can be incorporated by battening out to provide a service zone. Were possible, the services should be installed on the warm side of the vapour control layer to avoid puncturing the vapour control layer.



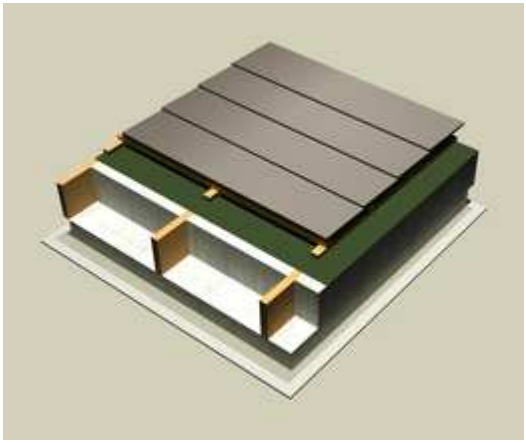
If the 'room in a roof' has dwarf side walls, the vapour control layer must be constructed to the same standard adopted for the ceiling.

Between and under rafter insulation

Where additional insulation is needed to comply with Building Regulations or if additional insulation is added to improve thermal performance there will be a need to install insulation between and under the rafters.

As is the case with rafter level insulation, fully filling the rafter space depends on the membrane installed on the roof. There are two methods of installing under rafter insulation depending on your requirements.

Option 1.



Fix a natural insulation board to the underside of the rafter using specialist fixings that screw into the timber rafter holding the natural insulation board in place. A vapour check layer or duplex plasterboard is then fitted and fixed through to the timber rafter. If a service void is required the natural insulation board should be fixed to the timber rafters using timber battens to create a service void where cables and piped services are to be installed. Alternatively a low emissivity insulated service void can be included to provide a clear cavity for services, but also having the added benefit to provide a vapour control, airtight seal and reflective insulated void within the construction. Please ask our technical support team for advice on this application. A plasterboard lining or other suitable lining can then be fitted. The services should be installed on the warm side of the vapour control layer to avoid puncturing the vapour control layer.

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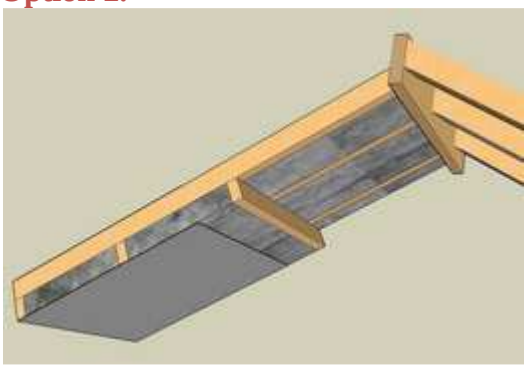
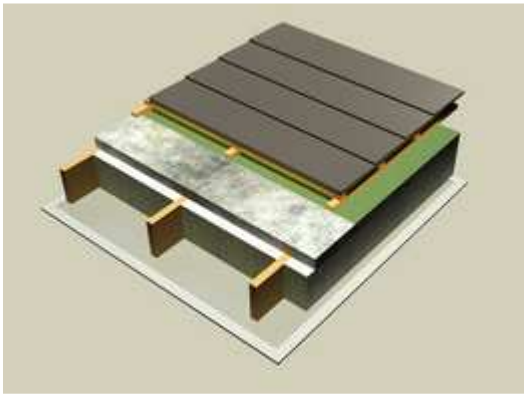
Option 2.



Place a timber counter batten against the underside of the timber rafter to the required depth of insulation and install Thermafleece or a natural insulation board between the battens. If the 'room in roof' has dwarf side walls, the vapour control layer must be constructed to the same standard adopted for the ceiling.

OVER RAFTER INSULATION



Overlaying the timber rafters with insulation completely insulates the external envelope of the roof, maximising the usable space within the 'room in a roof'. Insulating over the rafter increases the insulation value of the roof and reduces the impact of solar gain through the roof structure by increasing the 'thermal mass' of the construction. Thermal mass is the ability of the insulation to trap and store energy from the sun's heat, reducing heat fluctuation within the 'room in a roof' and creating a more comfortable living space.

Natural insulation boards are laid across the rafters ensuring that there are no gaps in the insulation layer and no ventilation pathways from the outside into the rafter.

The breather membrane is applied to the surface of the natural insulation board with counter-battens fixed through the insulation boards into the timber rafters.

Where the natural insulation board is greater than 50mm thick, consideration should be given to the fixings and method of fixing used. Thermafleece insulation is placed between the rafters to achieve the required thermal performance.

The application of a vapour control layer on the warm side of the insulation board onto the rafters may not be required in certain instances. If a breathing roof condition is designed which utilises the vapour resistivity of natural insulation such as Thermafleece, the application of an effective vapour control layer can be counterproductive.

If a vapour control layer is preferred this can be achieved under the rafters using a Duplex 12.5mm plasterboard, or similar, which will also provide the required fire protection.

Service voids, where cables and piped services are to be installed can be incorporated by battening out to provide a service zone from the underside of the timber rafter. Were possible, the services should be installed on the warm side of the vapour control layer to avoid puncturing the vapour control layer. Alternatively a low emissivity insulated service void can be included to provide a clear cavity for services, but also having the added benefit of providing a vapour control, airtight seal, and reflective insulted void within the construction. Please ask our technical support team for advice on this application.

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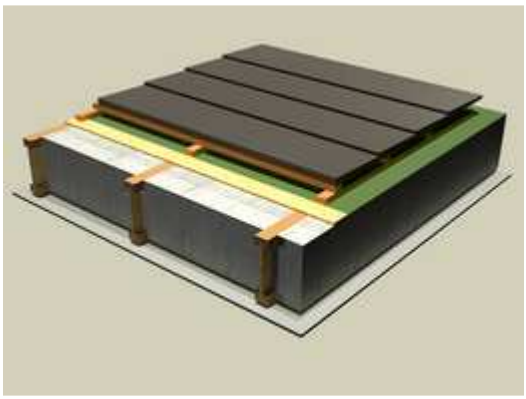
Engineered "I" Beam Rafters



The structure of engineered "I" Beam rafters decreases the thermal bridging of a roof section and increases the spanning capacity of the roof. As a consequence they are often used on low pitched roofs, or where a green roof construction is being considered.

The information within this section is based on general applications. The construction of the roof is controlled by the structural performance required.

Thermafleece insulation fits between the rafters supported on a breathable racking board, OSB or plywood sheets fixed to the flange of the lower "I" Beam component.

The breathable racking board will allow vapour to pass through, where the OSB or plywood acts as a vapour check. However, an additional vapour control layer can be installed below the OSB or plywood fixed to the flange of the lower "I" Beam component. Alternatively, a vapour check plasterboard can be used. The installation of the vapour control layer to the lower face of the OSB or plywood must have all joints taped to ensure its integrity is maintained.

Install Thermafleece from the top between the "I" Beam rafters. A second, sarking or racking board layer of OSB or plywood, is fixed to the top of the flange of the "I" Beam engineered timber, with counter battens placed on top of a breather membrane laid across the OSB or plywood, with tiles or slates on battens.

If the roof is installed first, to provide a watertight construction, the application of the sarking or racking board layers is fixed to the top flange of the "I" Beam engineered timber, with tiles or slates on battens placed with the breather membrane laid across. The Thermafleece is then friction fitted from below. The insulation should be butt jointed and continuous with the roof insulation to avoid thermal bridging.

Fix the vapour control layer to the underside of the "I" Beam engineered timber rafters, and then fix the OSB or plywood lining.

Where a service void is required, a plasterboard lining or other suitable lining can be incorporated by battening out to provide a service zone from the underside of the "I" Beam rafter. Were possible, the services should be installed on the warm side of the vapour control layer to avoid puncturing the vapour control layer.

Care is needed when dormer windows, roof lights or other elements disrupt the ventilation space. Ventilation to the outside must be provided at the top and bottom of each space between the rafters. The breather membrane should drape at least 10mm between the rafters to avoid the need for counter battens. A vapour control layer must be applied to the warm side of the insulation unless you are creating a breathing wall condition.

This can be achieved by fixing a breather membrane to the widths of the rafter opening, to provide the pre-determined ventilation space between the insulation and the outer finish.

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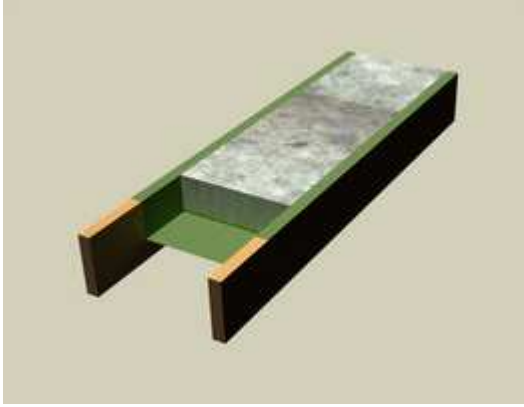
The method of applying the breather membrane would be to fix the membrane to the face of the first rafter, fold the membrane to the inside of the first rafter to the required thickness of insulation, while maintaining the required ventilation of 50mm, loosely stretching the membrane across the width of the opening, to provide a 5 - 10mm draping effect in the void, so that once the insulation is in, it tightens the membrane, returning the membrane up the inside face of the other second rafter to the required depth of insulation, while maintaining the ventilation gap, continuing the process along the total roof. (see sketch).



Additional widths of breather membrane, required down the slope of the rafter, must be overlapped by at least 150mm inside the first layer, so that water does not run backwards into the insulation.

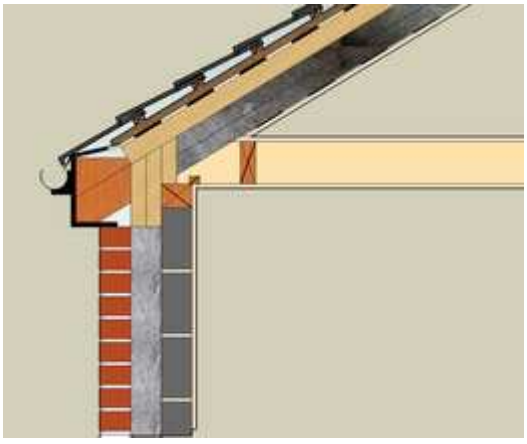
This method of application will ensure that you do not close the ventilation air gap. It will also provide a water repellent surface to the insulation because the breather membrane will not allow water to pass back through the structure.

A vapour control layer should be applied to the structure which must be over lapped by 150mm on all joints and taped.

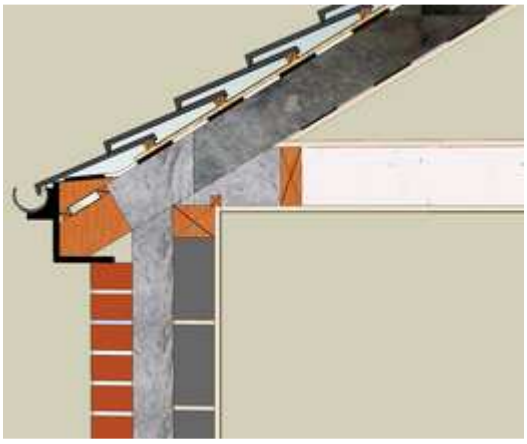
Where a lined service void is required, the plasterboard lining or other suitable lining can be incorporated by battening out to provide a service zone from the underside of the timber rafter or stud work. Were possible, the services should be installed on the warm side of the vapour control layer to avoid puncturing the vapour control layer.

Eaves Detailing

Detailing at the eaves is important to ensure that the insulation continues into the wall section ensuring cold bridging cannot occur.



Detailing for eaves using an over-rafter insulation application



Detailing for eaves using insulation between rafters