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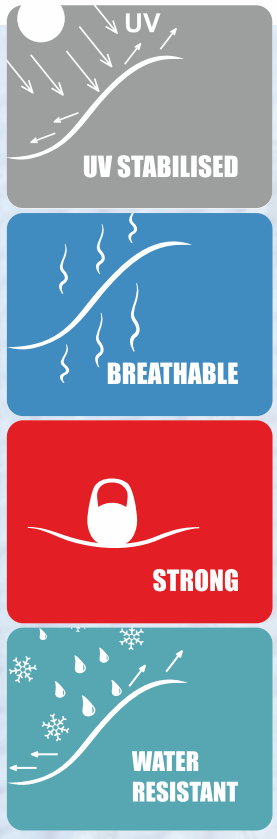
PERMAVENT



A Specifier's Guide

TO BREATHER MEMBRANES

PERMAVENT

eco

permavent

max

	eco	permavent	max
BASE WEIGHT, g/m² This indicates how much the product weighs in grams per metre squared. It does not indicate performance. NOTE: Performance is not determined by weight alone (in the same way that steel and tungsten compare).	90	115	140
TENSILE MD/CD, mean N This test shows how easy it is to rip the membrane. The higher the number the better the performance. NOTE: Tensile strength has to be matched by nail tear resistance to show true performance*.	161.5	208	254.5
ELONGATION MD/CD, mean% This test shows the percentage of flexibility before the membrane breaks and is a good indicator of how easy the membrane is to work with before failure occurs*.	70.5	111.5	93
NAIL TEAR STRENGTH MD/CD mean N This test shows the real strength of the product and indicates how much pressure is required to pull a nail through the membrane. It is measured in Newtons*.	159.5	161.5	180
MVTR, g/m²/24hr Water vapour permeability This test indicates how much moisture (under test conditions) can pass through 1m.sq in 24hrs which is the main function of a breather membrane. The higher the better.	1960	1373	1343
WATER TIGHTNESS, cm H_20 This test shows the membranes ability to keep water out of the roof (a pass means it was only tested to 100cm). This test indicatesr of how good the functional film is when compared with the vapour permeability (i.e lets moisture out yet stops water getting back in). Some air membranes can suffer from low water resistance!	527	>450	>600
VAPOUR RESISTANCE, MNs/g⁻¹ Because the results of the water vapour permeability test can vary (due to the conditions created) the government has chosen this more reliable test as its bench mark and all breathers must be below 0.25MNs/g⁻¹. Independent tests indicate that 0.16MNs/g⁻¹ should be achieved but generally the lower the better.	0.11	0.15	0.15

*** Tensile, Elongation and Nail Tear Strength properties are obtained by measuring along its length and across its width. This often gives two different results. To help with understanding this table we have added both of these readings together and divided by 2 to give a mean average. Both of these figures are easily obtainable at www.bbacerts.co.uk*

Content

A GUIDE FOR PROFESSIONALS

to be used when installing Permavent, Permavent-MAX and Permavent-ECO

Permavent is a three-layered non-woven polypropylene breather membrane used as a roofing underlay or as a house wrap. Permavent's market leading specification is widely used throughout Europe. It is designed using the latest technology, incorporating all the requirements of the harsh northern environment.

PERMAVENT BREATHER MEMBRANE

Available in 1.5 x 50 mtr (75m²) and 1.0 x 50 mtr (50 m²)

PERMAVENT-DRY

Vapour control barrier (VCB), cost effective, easily installed with the bright foil providing 'U' value gain

PERMAVENT-TRAY

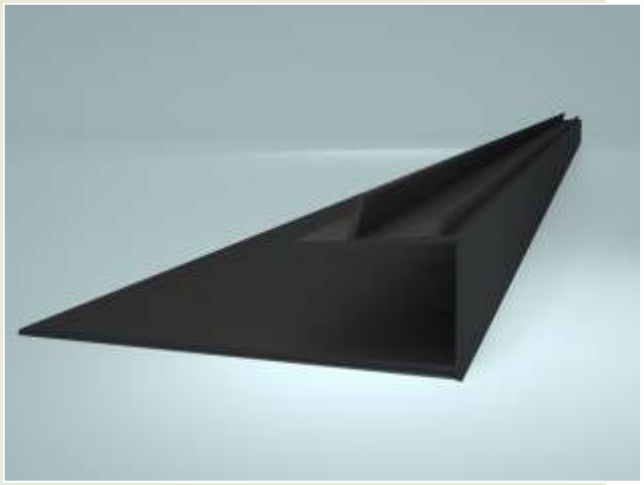
Black PVC eaves support tray (tilt fillet) to prevent membrane sag and provide gutter run-off

PERMAVENT-TAPE

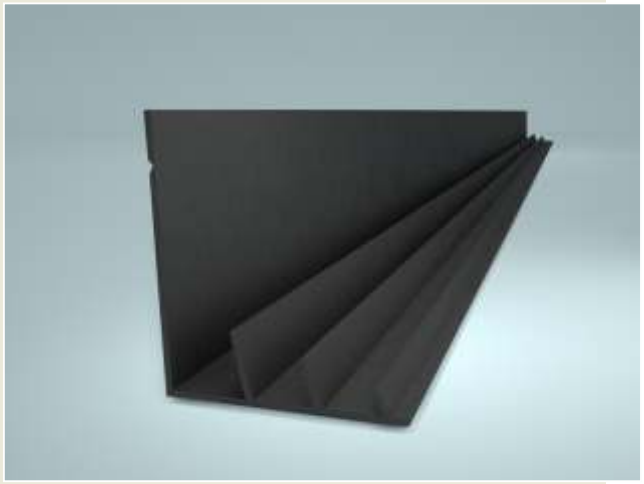
Transparent reinforced double-sided tape is specially designer to stick Permavent to itself or any other substrate

Also supply an exclusive range of ancillary products

such as



Easy Verge



Easy Soaker

Why use breathers?

Part 'E' of the approved documents (conservation of fuel and power) is fast becoming the governments political tool and pressure to save energy is becoming a main issue in modern building design.

The latest additions to the building regulations has seen the introduction of air testing modern buildings alongside building design changes such as requirements to cover the thermal bridge and avoid non-ventilated voids.

The use of Permavent breather membranes is now an important tool in modern construction.

The energy efficient cold non vented roof style can only be undertaken using breather membrane technology. By eliminating the drafts that are part of a traditional roof space the heat loss of the home can be reduced by up to 25%.

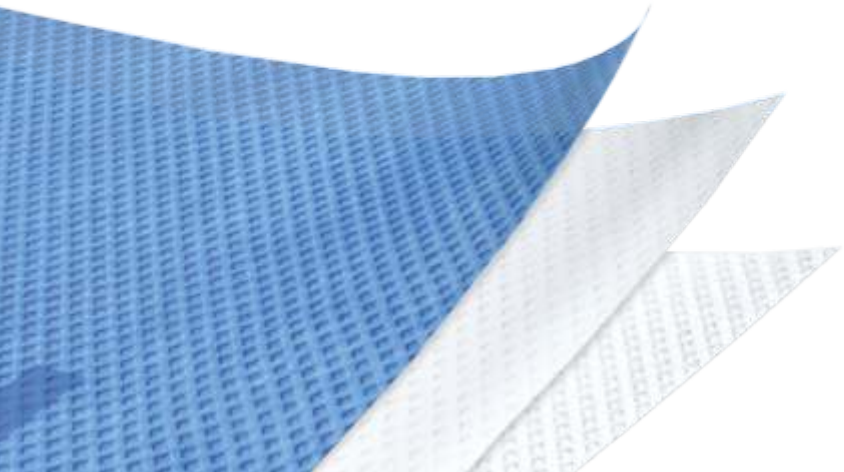
Almost all of the problems with new homes concern condensation and have come about through bad practise. It is critical that breather membranes are used correctly.

The correct use of Permavent breather membranes will drastically improve the impact of condensation in the new home.

Air permeable

Breather membranes first emerged in northern Europe about 15yrs ago and tended to be spunbond polyethylene membranes adhered to a strengthening layer. Following research by the BRE and BSi it was established that a requirement of vapour resistance of below 0.25MNs/g^{-1} would classify a true breather for use in warm deck and cold un-vented applications. These earlier membranes predominantly had a resistance of 0.23MNs/g^{-1}. and despite problems, such as de-bonding, they established themselves as market leaders. Because the performance of these membranes was just inside this requirement, poor detailing would overload these membranes and incidents of condensation have occurred with aftermarket ventilation then being the only remedy.

The early use of Polypropylene membranes involved running the membrane over a spiked roller and although this system is undeveloped, these membranes also remain popular as air permeable (or open air) membranes. Although these membranes allow the good transition of vapour through them, they could not achieve good water tight (head of water) results. They could also be affected by the reverse affect of interstitial condensation and some users were concerned that the holes would be blocked by slate debris.



Permavent membranes

The latest membranes from Permavent are three layered non woven polypropylene either side of a high tech micro-porous functional film. This functional film is specially treated to prevent rain and moisture from entering the roof when in use, yet allowing water vapour and condensation out of the roof space. Permavent combines performance with strength to produce strong, lightweight membranes that fight condensation.

Our versatile range for use as a roofing underlay's or as a house wrap on timber frame can also combine with 'Reflect' our very latest thermal conductive vapour control layer for great performance.

If a designer is to understand how to combat condensation then it is important to what it is and how it affects a dwelling.

Water vapour

When you heat water or anything that is damp you agitate the water molecules that are then released and float up into the air as water vapour, heat it quickly and the high amount of vapour will become visible as steam but usually 90% of vapour is invisible, you cannot watch the water rise as the sun dries a puddle. This vapour wants to form back into water again and because it is light it would naturally float into the sky where it cools and to form clouds that, when they get heavy, fall back to earth as rain.

When this vapour is trapped in the home it is attracted to the coldest areas, if you take a cold can from the fridge you will instantly see that the vapour in the air will turn back to water on the outside of the can. It is the same in the bathroom when there is so much vapour that it can run down the cold perimeter walls and windows but it will not be shown on things like internal walls or doors.

Vapour is present in all homes, especially the extreme amounts in the months following construction (it can take 20 buckets of water just to plaster a room that then takes 6 months to dry out). Our homes will never be rid of moisture vapour that is being constantly generated through cooking, kettles, showers, bathing, we even produce vapour when we breath, its natural.

Mould/fungi on timber stud in the cavity

Mould/fungi on plaster board

Vapour is so small that it will actually travel through masonry, timber and plasterboard etc. If you have a room with a cold corner (such as against a windy or shaded allyway) then the vapour is attracted to this cold spot and will start to travel to the cold. As it travels through the wall from the warm inside to the cold outside, it cools and starts to turn back into water inside the wall and the wall becomes wet (most common was for it to form on the cold metal wall ties and these would rust and expand and break down the walls, especially around kitchens and bathrooms) This condensation inside the structure is referred to as interstitial condensation and is often confused as a leak or rising damp. Vapour can contain bacteria (from cooking etc) and when it is held within the structure of the building, complications will arise such as mould growth and timber degradation that will cause serious damage as it can often go un-noticed. The coldest part of the home is often the roof space and this vapour will naturally rise through the dwelling as well as being attracted up and into the cold roof space.

Vapour will not however travel through metals (foils), plastics and glass. The use of Permavent Reflect vapour control layer is an essential tool in the battle against interstitial condensation. When installed just behind the plasterboard it will reflect all vapour from entering the wall and its bright foil will increase the thermal resistance and will help to reflect the warmth back into the room. Any residual moisture that is trapped in the wall (such as during construction drying out) will be released through the breather membrane.

1 Loft hatches

The type and position of the loft hatch should be considered. Air sealed and insulated loft hatches are readily available and should be used. Avoid positioning loft hatches in or adjacent to high moisture areas such as bathrooms.

2 Close the cavities

Heavy rain can saturate a brick wall with gallons of water. As the wall dries the vapour will also rise up through the cavity and thus enter into the roof space over the wall plate. The top of this cavity must be sealed to stop this excess vapour form entering the roof space. This can be simply done such as by extending the UPVC soffit across to meet the insulation.

3 Recessed Lighting

Open spotlights, such as in the bathroom ceiling, can allow large amounts of vapour to enter the roof space. In all cases only contained or sealed recessed lighting units should be used.

4 Thermal bridge

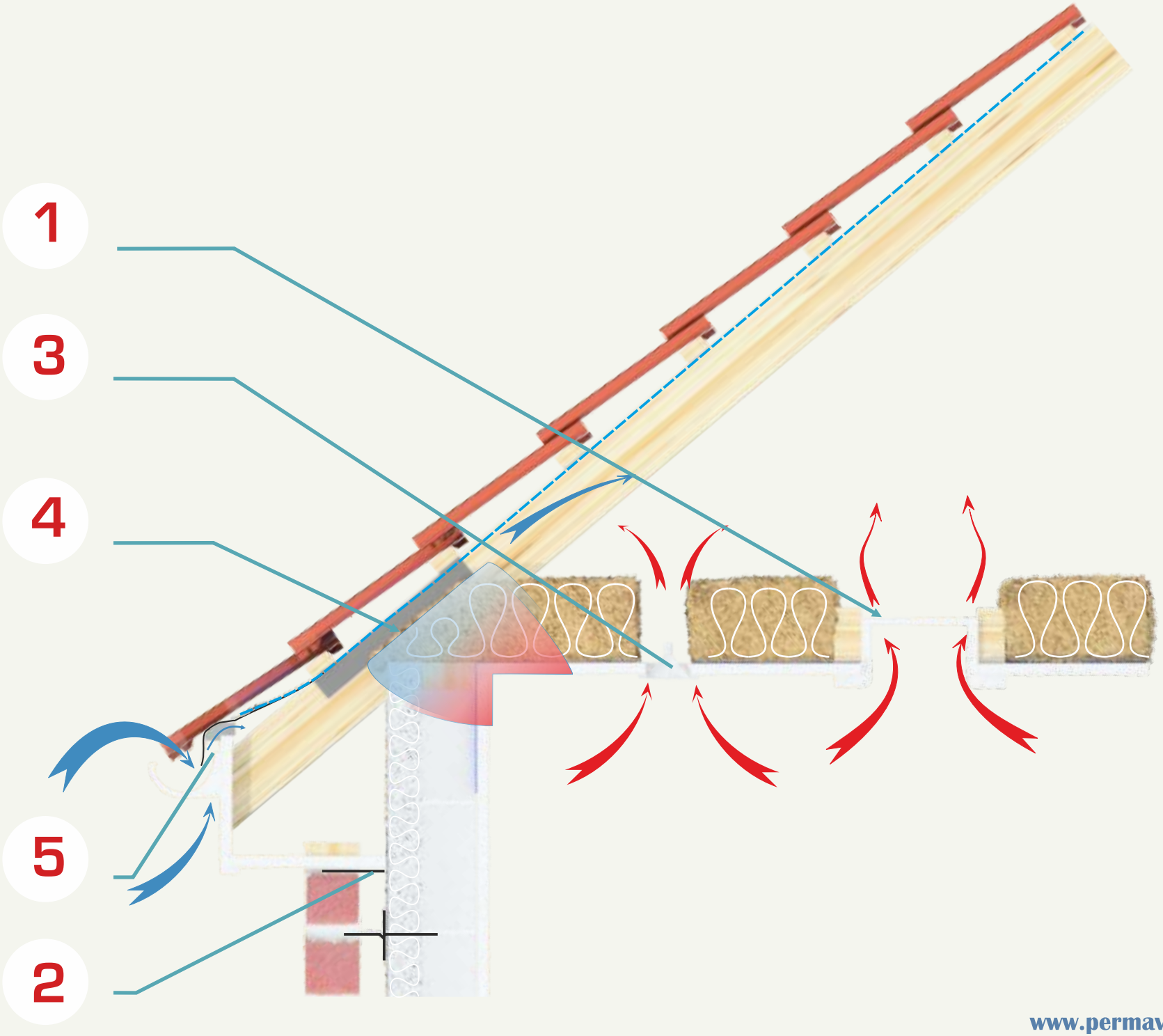
Modern insulation to the ceiling and walls is well detailed. The junction of the ceiling and wall is often only a gap that is in the region of 80mm high. If the free movement of air is required then this means that this junction will be under insulated. Together with the movement of cold air over the wall plate and through this point then a cold (or Thermal) bridge will form. A thermal bridge will cause severe condensation and mould growth and is not allowed under the building regulations. The thermal bridge can be often noticed as mildew that forms at the front ceiling corner in the bedroom or at the sides of the window. Good insulation detailing is essential to avoid the thermal bridge.

5 Eaves Guard

As the moisture passes through the breather membrane it would then condensate on the underside of a cold tile. This condensation would then drip back on to membrane and run down to the eaves. Without an eaves support tray (tilting fillet) the membrane sags behind the fascia board and the water will pond and leak through the vertical laps etc and cause damage. Although Permavent has special U.V additives its exposure to the sun should be kept to a minimum and Permavent should not be draped into the gutter. The leading edge of the membrane should be stuck to the to the eaves tray just above the fascia line using 'Permavent Tactape'.

Water tanks

It is essential that cold water storage tanks that are positioned in the roof space have a sealed lid. The roof will get very hot during the summer and would constantly evaporate the water in an open tank.


1
3
4
5
2

In all cases we recommend that;

Before installing the breather membrane and on the roof you should ensure that

- ✓ The ventilation requirements have been met.
- ✓ The top of the brickwork cavities are closed.
- ✓ The Insulation must be correctly installed at the wall plate in order to avoid a thermal bridge.
- ✓ The eaves guard is correctly installed.

During the installation you should ensure that;

When walking on the roof always step on the battens at the point where it is nailed to the rafter. As with all membranes avoid undue pressure on the laid breather felt. Moving the felt under the battens can stretch a hole in the felt around the nail. Although this does not affect the purpose or performance of the membrane this can cause a leak around the nails if it rains heavily before the roof is fully covered in. If it is critical to avoid this rare occurrence we recommend that 'Tactape' is first applied to the underside of a counter batten that is then nailed and adhered up each rafter.

Each roll has detailed fitting instructions included. The breather membrane must be installed with the writing on the outside of the building. When laid directly over the rafters Permavent should not be pulled taught but allowed to naturally sag a little (2-5mm) in order to allow moisture to run under the battens.

Care should always be taken when working at height. The safety of all working in construction is critical, above and below.

Overlaps and joins

Permavent has standard hatching that indicates a 100mm overlap. Overlaps should be increased on lower pitches up to as much as 200mm on shallow pitches below 20 degrees. Valleys and hips should be overlapped by at least 300mm.

Taping the overlaps and joins using Tactape on the breather felt will virtually eliminate the problems caused by wind uplift. It will also eliminate the rare occasions when

Wind driven rain can be forced under the overlaps if the roof is not yet covered in during a storm. Large volumes of rain will course down the membrane in sheets and capillary action can draw the rain between the un-taped overlaps. These laps can then blow open and the rain can enter the roof space.

Fixing

Permavent can be nailed or stapled above the overlap marking line at the top of the membrane. This will then be covered by the overlap of the next run of membrane that is joined and held in place using Tactape. Roofing battens will hold the membrane in place and allow the installer to work up the roof.

Exposure

Permavent is a high performance and technically advanced membrane that has been designed to combat condensation. The slate or tile covering is the protection against weather and Permavent should not be used a final roof covering. Although Permavent has special additives in order to protect it against the harmful effects of the sun, you should keep exposure to the sunlight to a minimum and limit exposure to not more than 3 months. Permavent should not be allowed to drape into the gutter but should be started just behind the fascia line.

Counter battens

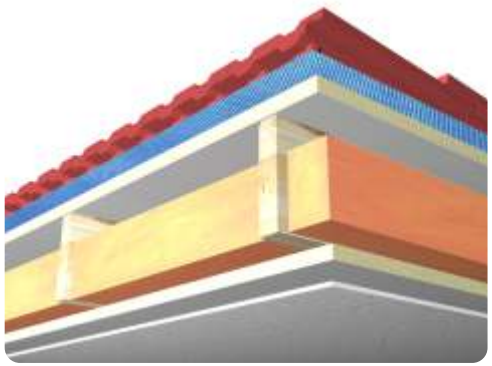
should be used for two reasons.

Firstly; if the roof is fully boarded using sarking or insulation boards in conjunction with traditional horizontal battens then a counter batten of minimum 10mm should be first laid vertically. This would allow any moisture (that would get trapped) to run under these battens and out into the gutter.

Secondly; if the space between the membrane and the roof covering requires ventilation then a counter batten of minimum 25mm when combined with a traditional 25mm batten will allow 50mm of free air space.

Insulation between the rafters

If do not want to use counter battens when designing a warm room that has insulation between the rafters you should ensure that a 10mm gap is left at the top of the insulation. This will allow the membrane to sag between the rafters (i.e max 90mm insulation fitted between 100mm rafters) and the insulation requirements can be fully met by completely insulating across the underside of the rafters.



Scottish Practice. This membrane is suitable for the Scottish practice of applying the slates directly onto the membrane that is laid without battens over a fully sarked (or boarded) roof. Sarking boards should incorporate a 2mm gap between each board. Some specially treated plywoods such as plastic coated or bitumen impregnated boards do allow vapour to pass through them and are therefore not suitable for the non ventilated use of breather membranes.

▲ cold vented

Most roofs can be split into four categories that are;

Ventilated roofs

1. Cold vented or conventional roof space (most common roof type used for many years).

2. Hybrid or habitable roof space (chalet bungalows, loft conversions etc).

Non-ventilated roofs

3. Warm roof (best performing although most expensive but now the preferred option for room in the roof).

4. Cold non-vented (the most cost efficient against performance).

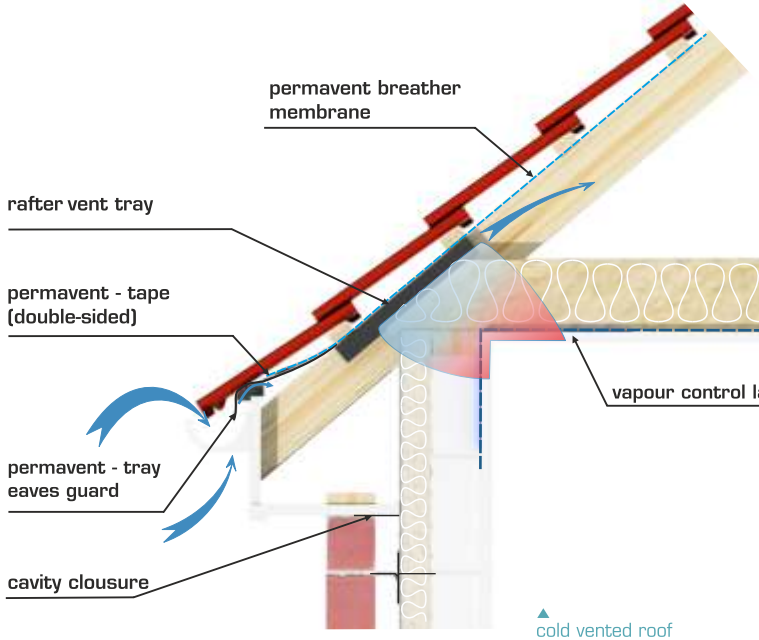
A designer should first establish the type of roof most suitable for the project (in depth on later pages).

Permavent Max, Permavent and Permavent Eco are suitable for all types of roofs.

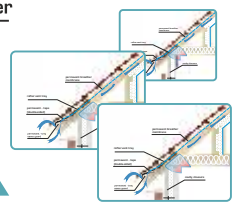
This is the most common type of roof space even though it encounters the most problems and is the most inefficient. You must provide adequately ventilation to this roof space as well as incorporate a high degree of insulation just above the ceiling level. Older roofs that are without a sarking membrane (roofing felt) do not suffer from condensation problems because they are so draughty that that vapour is dispersed through the tiles. Unfortunately they would also leak if a tile is lost as well as suffering a large degree of heat loss. The introduction of bitumous membranes reduced the heat loss but created condensation problems that lead to the ventilated roof space and the heat was lost again. Home owners would press insulation into the eaves of the roof 'to stop that nasty draft' and the cycle continues. The correct use of Permavent breather membranes will reduce heat loss and stop condensation problems.

Both the cold vented and hybrid roofs can be installed using most types of high resistance (HR) or low resistance (LR) roofing membrane. In both cases the use of Permavent will dramatically reduce the risk of future condensation problems.

Both of these roof types must be ventilated at eaves level by at least 10000mm/m^2 equiv 10mm continuous ventilator on smaller roofs or more commonly 25000mm/m^2 equiv 25mm continuous ventilator on standard roofs (ventilation volumes should be calculated on larger roofs such as public buildings). Ventilation can be achieved by many means but usually the use of soffit, eaves or over facia ventilators. These roofs must create cross ventilation to eliminate un-vented voids and this sometimes requires connecting to ventilation at the ridge. Ridge ventilators are usually 5000mm/m^2 min equiv 5mm continuous but care should be taken that they are not larger than the eaves ventilators or it can have a negative effect. Cross ventilation may also be achieved by using gable vents in the case of lean-to or tall roofs or over fascia vents above flat roof extensions (detailed).



▲ cold vented roof



▲ other

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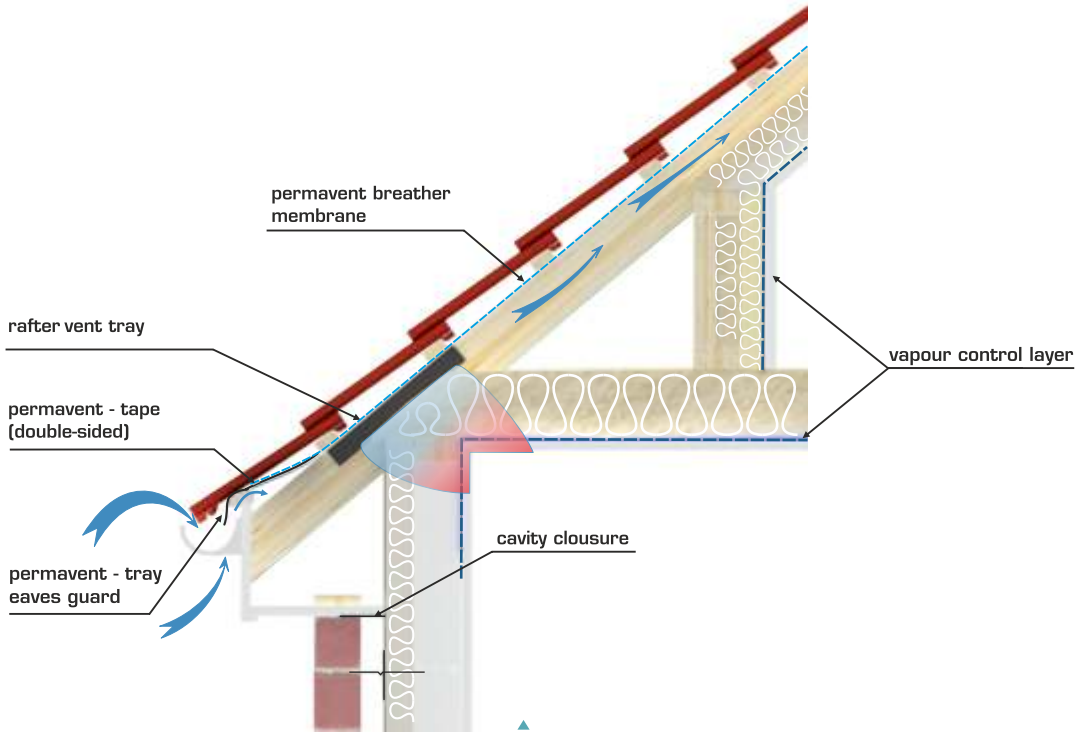
The ventilated hybrid roof is most commonly seen in remedial loft conversions. The free movement of air in a 50mm gap is used to clear any moisture that can collect under the roofing membrane. The introduction of a Vapour Control Layer (VCL) (usually foil backed plasterboard) was an important step in the design of this roof. However poor detailing of the VCL and areas that were not ventilated caused many early problems with condensation and mould growth around thermal bridges. Recent changes to the building regulations have seen dramatic increases in the amount of insulation and detailing care required for this roof. Head height requirements combine with ventilation difficulties (such as across hips and valleys) to make this type of roof difficult to design.



hybrid roof

Air Flow must be maintained and we recommend that;

- √ Eaves protectors are used above over fascia ventilators to prevent the membrane from 'sagging' behind and blocking the flow of air.
- √ Through ventilators are used over the wall plate (such as roll out rafter tray).
- √ The loft insulation to the ceiling is not allowed the block the flow of air at the eaves.

When insulating between the rafters for the Hybrid roof, special care should be taken;

- √ To ensure that 50mm of air flow is maintained above the insulation.
- √ Air flows across the hip ridge and valley boards and around roof windows.
- √ Air flows under the ridge or through a ridge ventilation system.
- √ Rafter lengths above 10mtrs long require increased or calculated air flow.

Cross ventilation (passive or natural ventilation) must be maintained and should be addressed at the design stage. The building will ventilate by using the positive and negative pressure that is created as air moves around it (this pressure is shown when a front or back door slams when there appears to be no wind). The negative pressure will draw air through the roof space as a draft. Complex buildings or roof designs can create voids that air will not be drawn through such as flying gables or dormer roofs. Condensation can form in these voids and they are now a detailed part of the approved documents and must be ventilated under the building regulations.

Wind uplift (zonal fixing). On rare occasions a strong negative pressure can form on the rear side (lee side) of the roof plane. If the roof is covered with tiles that allow air to move through them (such as plain tiles) then the negative pressure can draw air from the front ventilators, across the roof space and through the laps of the roofing membrane. This can cause the membrane to 'flap' and the tiles to 'chatter'. In extreme cases it can pull the tiles from the roof and has lead to the zonal fixing method being introduced. The correct taping of the lap joins using 'Permavent Tactape' during instillation will virtually eliminate the risk of this problem.

Non vented roofs

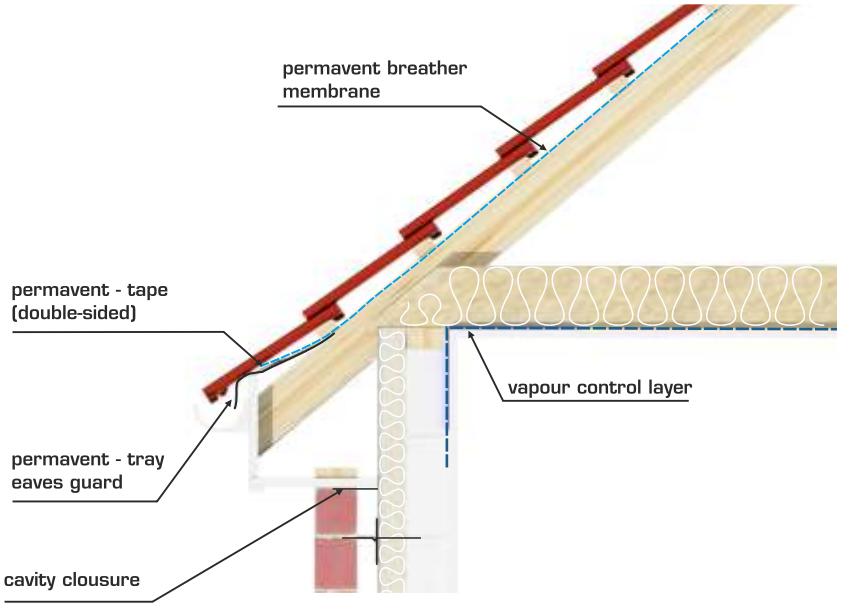
It is essential that a non-vented roof is installed as a system and the all the details referred to are implemented using good building practice.

Vapour control layer (VCL)

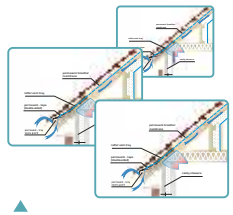
All non vented roofs must incorporate a VCL such as high performance Permavent Reflect. A VCL is usually positioned just behind the plaster board. BS:5250 recommends that a VCL should to be a minimum 500 gauge polythene (plastic DPM) sheeting and all corners and laps should be minimum 75mm and taped with 'Tactape'. With a warm roof it is acceptable to tape the joins of a foiled insulation with the appropriate foiled tape ensuring all joins and peripheral edges are sealed. Vapour will travel through or manifest itself in the joins of foil backed plasterboard if not detailed correctly. Given the difficult nature of vapour sealing foil backed plasterboard we do not recommend its exclusive use as a VCL. Care should be taken with cables and pipes that break the VCL.

Cold non vented

This most modern type of roof has only become possible through the introduction of breather membranes. Although cold non vented is not the best performing type of roof some changes to the building regulations, reducing the thermal bridge and heat loss, have made it the most cost efficient against performance. The elimination of cold air blowing through the roof space can reduce heat loss by up to 25%. The cold non vented roof can only be installed using breather membranes as part of roof design system incorporating vapour control layers etc.



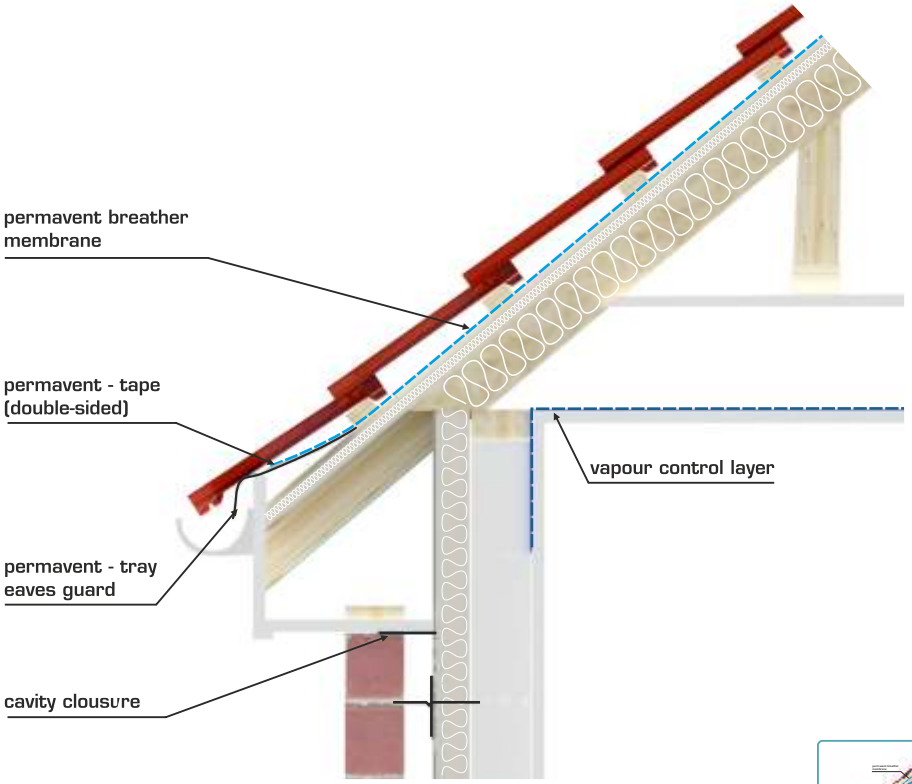
▲ cold non vented roof



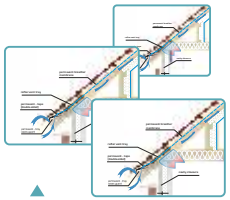
▲ other

Warm roof

This is the best performing roof type and can only be installed in conjunction with breather membranes. It is suited to most applications and is becoming widely used even though it is the most expensive. Because the insulation is installed on the outside of the building (like an overcoat) it eliminates the problems of heat loss and condensation that can occur in a cold roof space. The warm roof is mainly used when the roof space is originally designed as a habitable area and is now common place in flat roofing details. It does not however lend its self to the remedial re-roof as a vapour control layer is not used. It also requires the level of the roof to be raised when the insulation is installed on the outside of the rafter. More recent variations have seen insulation boards used between the rafters in addition to over or under the rafters.



▲ warm roof



▲ other www.permavent.co.uk

Air sealed roofs

If the dwelling is to be air tested then all laps and joins should be carefully taped and peripheral edges sealed. All pipes and apertures should be sealed and an air tight loft hatch used.

Air permeable roof coverings.

As vapour travels through Permavent it must then be released to the atmosphere. Most roof coverings (concrete, plain tiles etc) allow what is termed 'fortuitous ventilation' and are classed as air permeable roof coverings. This means that air can travel around them and vapour will not get trapped in the batten space between the breather membrane and tiles causing 'interstitial condensation'. Some metal sheet and man made slate roof coverings may not allow sufficient air circulation and the batten space should therefore incorporate additional ventilation such as counter battens with ridge and eaves ventilation.

Note... it is not recommended to remedially install a cold non-vented roof as a re roof of an existing especially older dwelling.

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