DUPONT
Tyvek.

PROVIDING PROTECTION IN CONSTRUCTION

Technical guide: roofs

www.tyvek.co.uk
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DuPont™ Tyvek® membranes Providing protection

Contents

in construction

Introduction

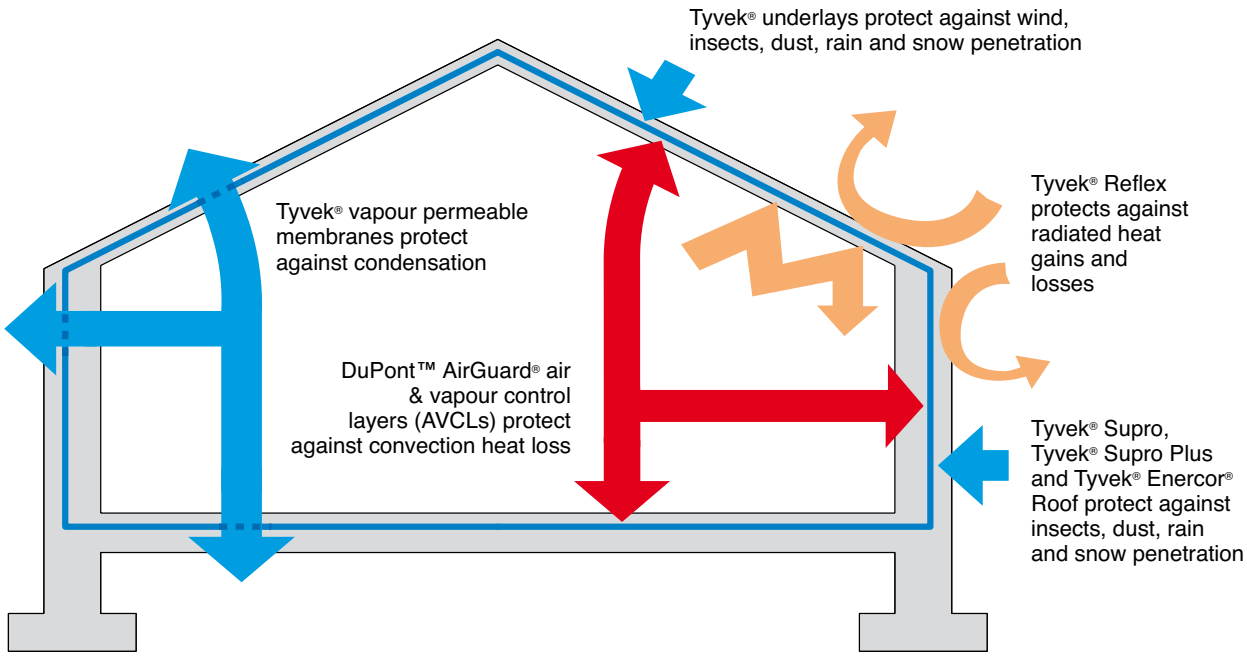
The DuPont™ Tyvek® family of membranes have been developed by DuPont to provide protection against the hazards associated with the construction and use of buildings; the principle hazards are:

- **climatic conditions**
  rain, snow, hail, wind, ground moisture
- **condensation**
  occurring on and within the building fabric

Protection in construction

Tyvek® membranes are engineered for the purposes of providing protection to buildings and their occupants from external climatic conditions and from the effects of condensation. This technical manual contains detailed information specifically on the use of Tyvek® membranes in **pitched roof construction**. By controlling the movements of heat, air and moisture through the building envelope Tyvek® membranes can make a major contribution to protecting the environment by improving the energy efficiency of buildings.

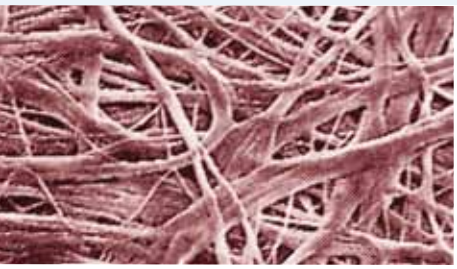
To achieve the required internal conditions with optimum efficiency it is essential to consider air flow and moisture movement together with all aspects of heat transfer, not only by conduction, but also by convection and radiation. The reduction of air leakage, the avoidance of damaging condensation and the provision of thermal insulation must all be considered together to ensure the protection and wellbeing of the occupants and the long term protection of the building fabric.



For information on Tyvek® membranes for protection against external moisture and condensation please contact:
01275 337660

DuPont™ Tyvek® product range and applications

Roofing products



Tyvek® Supro
BBA certificate: 08/4548

Multi-purpose, heavyweight, reinforced Tyvek® grade for use in all supported and unsupported pitched roof applications, including warm, hybrid and cold roofs. Also suitable for Scottish sarking board systems, low pitched metal roofs as well as wall and floor applications.

Roll sizes:
1 m x 50 m and 1.5 m x 50 m.
Horizontal lap: 150 mm.

Tyvek® Supro Plus
BBA certificate: 08/4548

As **Tyvek® Supro** but with integral adhesive lap tape for use in the "Tyvek® sealed roof system". Sealing all horizontal laps will contribute to the system's thermal efficiency by reducing air infiltration.

Roll size: 1.5 m x 50 m.
Horizontal lap: 150 mm (sealed).

Tyvek® Metal

Metal roof breather membrane incorporating a supportive polypropylene drainage mesh for use beneath all rigid sheet metal roof systems. Allows condensate which can form beneath stainless steel, copper and zinc roofs to drain away. Membrane should be installed over softwood boarding. Integral lap tape provided.

Roll size: 1.5 m x 25 m.
Horizontal lap: 100 mm (sealed).

Tyvek® Enercor® Roof

A vapour open roof underlay with a metallised low emissivity surface, which blocks radiant heat in summer and reduces radiated heat loss in winter.

Roll size 1 m x 50 m.

DuPont™ AirGuard® Control
BBA certificates: 08/4548 and 90/2548

Air & vapour control layer (AVCL) with limited vapour transmission for roofs, walls and floors. Primary function is to reduce convective heat losses but also provides highly engineered vapour control for breathing systems.

Roll sizes: 1.5 m x 50 m.
Lap: 100 mm.

NEW: DuPont™ AirGuard® Smart

A variable vapour control layer which adapts to changes in humidity. It has an extreme span of sd-values from 0.05m to more than 30m, therefore highly adaptable, which allows a maximum protection against structural damage. Independent from room humidity, insulation- or air humidity DuPont™ AirGuard® Smart will adapt to the different conditions and minimizes or increases the water vapour transmission rate. It combines a drying-out and vapour control function in one layer.

Roll size: 1.5m x 50m

DuPont™ AirGuard® Reflective
BBA certificate: 08/4548 and 90/2548

A 100% airtight, high resistance vapour control layer featuring a metallised surface with a very low emissivity, which combined with a non-ventilated airspace significantly boosts thermal insulation in a building.

Roll size: 1.5 m x 50 m.

Tyvek® Eaves Carrier

Pre-formed black semi-rigid eaves protection sheet installed over the fascia board under lapping the Tyvek® membrane by 150 mm. Recommended for long term durability against UV degradation from direct sunlight whilst offering support to the membrane to eliminate ponding at the tilt position.

Sheet size: 220 mm x 1.3 m.
Vertical lap: 100 mm.

Tyvek® Tape 2060B

Single-sided tape for sealing overlaps and making good around penetrations, pipes and windows. Recommended for DuPont™ AirGuard® AVCLs, and suitable for all Tyvek® membranes. Made of Tyvek® and acrylic adhesive for durable and long lasting bonding.

Roll sizes: 75mm x 25m.

Tyvek® Butyl Tape

Double sided butyl based sealant, used to form a moisture and airtight seal between a Tyvek® membrane or a DuPont™ AirGuard® AVCL and most commonly used building materials. The product is compatible with brickwork, blockwork, masonry, timber, metalwork and most plastic products. Tyvek® Butyl Tape is most effective when used under compression, eg. under a timber batten and is recommended for use at perimeters, chimneys, abutments and for sealing nail penetrations and around electrical sockets.

Roll sizes: 20mm x 30m and 50mm x 30m.

Tyvek® Metallised Tape

Single-sided reflective tape for sealing laps in Tyvek® Enercor® Roof and Tyvek® Reflex and DuPont™ AirGuard® Reflective. Ideal for making good around penetrations, pipework, windows and doors. Made of metallised Tyvek® and acrylic adhesive. Provides durable and long-lasting bond once cured.

Roll sizes: 75mm x 25m.

Tyvek® Double-sided Tape

Double-sided acrylic tape ideal for sealing overlaps and bonding Tyvek® membranes to smooth surfaces. Excellent adhesion properties under extreme humidity conditions. Strong initial tack. Recommended for Tyvek® UV Facade, and suitable for all Tyvek® membranes.

Roll sizes: 50mm x 25m.

DuPont™ FlexWrap NF

DuPont™ FlexWrap NF is a stretchable and flexible tape made up of 3 components: a crimped DuPont™ Tyvek® top sheet providing a water tight layer, the butyl mass as an adhesion layer and a paper release liner. It provides excellent watertight adhesion to all Tyvek® breather membranes around complicated penetrations, such as dormers, door sills, chimney breasts, pipe penetrations and any custom shapes.

Roll size: 150mm x 22.9m

Wall and floor products

Tyvek® Housewrap
BBA certificate: No 90/2548

Highly water resistant and lightweight (63g/m²) vapour permeable membrane suitable for use as the secondary protection layer in timber frame, steel frame and concrete wall systems. Membrane should be surface applied, fixed directly to ply/OSB sheathing board or blockwork.

Roll sizes:
1.4m x 100m and 2.8m x 100m.
Horizontal lap: 100mm.
Vertical lap: 150mm.

Tyvek® Soft

A vapour open breather membrane with a functional layer being equal to product thickness. A microporous HD-PE flash-spun-bond product for use in timber frame applications.

Roll sizes:
1.4 m x 100 m and 2.7 m x 100 m.
Horizontal lap: 100 mm.
Vertical lap: 150 mm.

Tyvek® UV Facade

An advanced protective membrane specifically designed to meet the needs of open cladding constructions.

Roll size: 1.5 x 50m, 3.0 x 50m.

Tyvek® Reflex
BBA certificates: 90/2548 and 08/P002

A vapour open wall membrane with a metallised low emissivity surface, which reflects radiant heat in summer and reduces radiated heat loss in winter.

Roll size: 2.8 x 50m.

Tyvek® UV Facade Tape

Black single sided acrylic tape with high UV resistance and excellent bonding properties. Especially designed for sealing Tyvek® UV Facade overlaps, penetration and joints in a durable and non-contrasting manner. Excellent aging and outdoor performance.

Roll size: 75mm x 25m.

Product selector membrane applications

Tyvek® Grade	Warm Pitched Roofs	Cold Pitched Roofs	Metal Clad Industrial Roofs	Scottish boarded Roofs	Walls	Suspended timber floors
Tyvek® Supro	●	●	●	●	●	●
Tyvek® Supro Plus	●	●	●	●	●	●
Tyvek® Metal			●			
Tyvek® Enercor® Roof	●	●	●	●		
Tyvek® Housewrap					●	
Tyvek® Soft					●	
Tyvek® Reflex					●	
Tyvek® UV Facade					●	
DuPont™ AirGuard® Control	●	●	●	●	●	●
DuPont™ AirGuard® Smart	●	●	●	●	●	●
DuPont™ AirGuard® Reflective	●	●	●	●	●	●

Please note: DuPont™ AirGuard® Control, Smart and DuPont™ AirGuard® Reflective are for internal use only

Tyvek® membranes - Wall and floor applications
All Tyvek® membranes and ancillary products for use in roof and wall applications available in the Tyvek® construction membrane range are listed here. However, Tyvek® membranes used in wall and floor applications are covered in a separate technical manual.

Tyvek® membranes: Pitched roof applications

Roofing underlay

Tyvek® Supro and Tyvek® Supro Plus are extremely durable flexible sheet materials for use as roofing underlays in pitched roof construction. They can be incorporated into all tiled or slated pitched roofs, whether they be new-build or refurbishment projects. As a secondary water shedding layer a Tyvek® membrane will provide a barrier to minimize the wind load acting on the slates and tiles and will adequately resist wind blown snow and dust from entering the roof construction.

Tyvek® membranes are suitable for use as roofing underlays as defined in BS5534:2003 and ICP2:2002.

Tyvek® membranes are also suitable for use in metal clad industrial roofs.

Insulation - Condensation

Tyvek® membranes offer benefits over traditional impermeable roofing underlays by minimising the risk of interstitial condensation occurring within roof constructions:

Over the last 30 years or so, as we have become more aware of the need to conserve energy, the required levels of insulation within roofs have become greater. This has had the effect of increasing the likelihood of condensation forming on the underside of the roofing felt. Prior to the introduction of modern vapour permeable membranes, the only way of reducing this risk was to introduce ventilation openings in the roof to effectively "change the air". In order to ensure that a sufficient amount of ventilation was provided to prevent condensation, Building Regulations and Standards were amended.

Satisfying the Building Regulations

Approved Documents contain practical guidance on how to meet the requirements of the Building Regulations. Part C covers Resistance to moisture under C2.

The requirement is as follows:

Resistance to moisture

C2. The floors, walls and roof of the building shall be designed and constructed as to prevent the passage of moisture to the inside of the building or damage to the fabric of the building.

b) precipitation and wind driven spray.

c) interstitial and surface condensation; and,

d) spillage of water from or associated with sanitary fittings or fixed appliances.

Protection from external moisture and condensation will ensure the structural performance of a roof construction and thermal performance of the insulation will not be compromised.

The Tyvek® Solution

Tyvek® is a vapour permeable material which, as a roofing underlay, will offer a low resistance to the passage of vapour. A Tyvek® underlay will allow water vapour within the roof space to permeate through to the batten space. Natural air movement through the roof covering will subsequently allow any moisture-laden air to escape to atmosphere.

The ability of Tyvek® membranes to provide this function of -condensation control eliminates the need to ventilate between the underlay and the -insulation.

The requirement of Approved Document C2 will be met by utilising a non-ventilated pitched roof system using Tyvek® as the roofing underlay. Adopting this method will prevent excessive condensation to the extent that **eaves and ridge ventilation will not be required.**

BBA Approvals

In order to determine the risk of condensation in non-ventilated pitched roof constructions using Tyvek® as the roofing underlay, the British Board of Agrément (BBA) conducted a long term research programme. The exhaustive research covered a wide range of pitched roofs, typical to the UK, varying in pitch from 12.5° to 70°, in different locations throughout the country, using various roof coverings. The tests were conducted over two winter periods and data collated and assessed using sophisticated computer modelling. More than 100 cases were analysed using readings taken from sites in Wiltshire and Glasgow, which were selected to reflect the prevailing weather patterns in these regions.

The results from the research were very successful, with insignificant amounts of condensation recorded, especially in the sealed roof systems. The results were further verified by additional measured data that had been gathered from other previous site monitoring.

Not surprisingly, the BBA granted approval in the form of certificate 08/4548 for the use of Tyvek® membranes in **non - ventilated** and **sealed** cold pitched roofs.

Together with the warm roof approvals granted originally in 1991 and most significantly in 1994 and 2004, DuPont now have universal approval for the use of Tyvek® membranes in pitched roof constructions.

Non-ventilated vs ventilated

BBA certificate 08/4548 states that with Tyvek®, "the risk of condensation is equivalent to, or less than, that attending current conventionally ventilated cold roof systems. "The certificate also states that Tyvek® membranes may be used in "dwellings of any conventional plan and of any size." This documentation is sufficient to satisfy current legislative requirements: Building Regulations Approved Document C2.

The solution of ventilating roof constructions in order to prevent excessive condensation beneath impermeable underlays is often regarded as "the traditional way" of meeting the regulations. However, traditional methods of construction and practices are often superceded by more efficient and effective solutions. From an energy conservation perspective, introducing cold external air into roofs can be to the detriment of the construction by:

- reducing the effectiveness of fibrous insulation.
- promoting warm air leakage from the building into the roof space.
- Increasing air infiltration into the heated building.
- Introducing dirt, dust and insects into the roof construction.
- Introducing external moisture laden air into the construction.

A non-ventilated Tyvek® system will not only prevent excessive condensation, as required, but will also offer substantial gains in energy efficiency by reducing these factors.

Non-ventilated or Sealed roofs?

DuPont currently promote two methods of application for Tyvek® membranes in pitched roof construction. This reflects the in-depth research that DuPont has undertaken to ascertain the most effective ways of not only controlling condensation, but also improving energy efficiency in roof construction. Extensive monitoring of test houses incorporating Tyvek® membranes at the BRE's test facilities also confirm the benefits of using Tyvek® non-ventilated and sealed roof systems.

Non-ventilated roofs

Roofs with no provision for airflow beneath the underlay will be more energy efficient than conventional, ventilated roofs.

Sealed roofs

Roofs with no airflow beneath the underlay and with all air leakage paths sealed will be more energy-efficient than non-ventilated roofs and will provide a higher degree of comfort.

Results from tests carried out on the non-ventilated systems showed this to be an efficient form of construction. However, further improvements were indicated in tests carried out on the sealed roofs.

Non-ventilated systems

This is where a Tyvek® membrane is laid over the roof, parallel to the eaves, as in traditional practice. A horizontal lap of 150mm minimum is maintained between each consecutive Tyvek® run. No ventilation is incorporated at eaves or ridge.

Sealed roof systems

A Tyvek® membrane is laid over the roof in a taut condition, parallel to the eaves and counter battened. A horizontal lap of 150mm minimum is maintained between each consecutive Tyvek® run. All membrane laps, junctions, pipe penetrations, rooflights and perimeters are sealed with an appropriate sealing tape. No ventilation is incorporated at eaves or ridge.

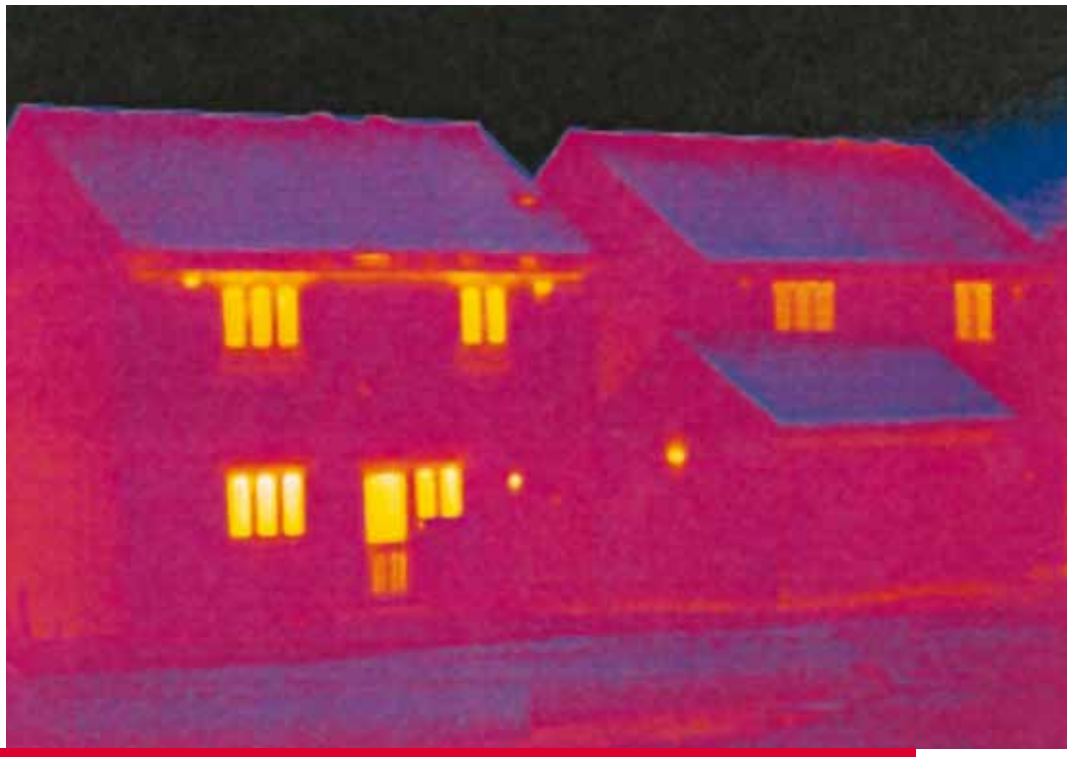
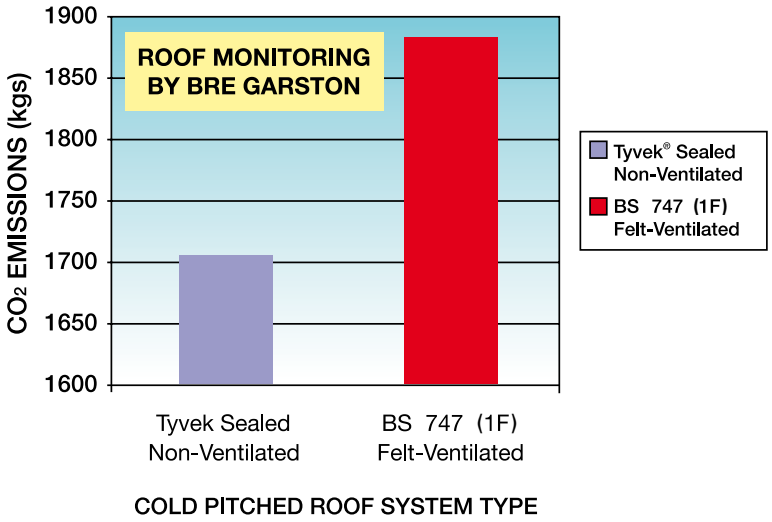


Fig. 3 - An infrared thermography was carried out on two UK matched pair houses at BRE Watford to corroborate the test findings.

Benefits of the Tyvek® sealed roof system

Tyvek® non-ventilated roofs will significantly reduce the likelihood of condensation, have less air leakage and are more energy efficient than conventionally ventilated roofs. However, they are still subject to air infiltration at laps, perimeters and penetrations. Air movement through those gaps can result in significant heat losses. Adopting the Tyvek® sealed roof system will not only reduce the risk of condensation, but will also minimise the heat losses caused by air infiltration.

ANNUAL CO_2 EMISSIONS OF A TYPICAL UK HOUSE **Fig. 4**



Eliminating air movement substantially improves energy efficiency

The Tyvek® Sealed Roof System was extensively researched during early studies by the BRE and VTT. Further tests were carried out by the BBA for the purposes of independent accreditation. The following results and conclusions were achieved:

- a signifi cant reduction in air leakage
- a 7.1% reduction in overall energy consumption
- 25% saving in heat lost through the roof when compared to a typical ventilated system
- an air leakage rate as low as 2ach.

These test results are indicative of the following energy savings:

- a 3.2kWh saving in energy consumption per day
- a 700kWh saving in energy consumption over a full heating season
- a 135kg reduction in CO2 emissions over a full heating season If correct and thorough sealing work is carried out to the roof construction further improvements in energy savings can be made:
- 4.2kWh saving in energy consumption per day*
- 927kWh saving in energy consumption over a full heating season*
- 179kg reduction in CO_2 emissions over a full heating season*
- Air leakage rate as low as 1.7ach*.

* Data obtained from additional tests after extensive sealing work was carried out.

Please note: It is of benefi t to recognise the importance of making internal linings convection tight when considering the need to reduce uncontrolled air leakage. This is particularly relevant for the purposes of complying with the air permeability requirements of Approved Document L.

The conditions of BBA certificate 08/4548 should be referred to when sealing work is to be carried out.

With a lower risk of condensation in comparison with a standard roof using a traditional felt underlay and a ventilated loft space.

In addition to this the BBA have concluded: *"In conventionally ventilated roof constructions energy loss by ventilation can account for up to 25% of the total heat lost through the roof. The Tyvek® non-ventilated roof system will substantially reduce this mechanism of heat loss."*

To gain maximum benefit an air & vapour control layer (AVCL) should be installed above the ceiling. DuPont™ AirGuard® Control, Reflective and Smart are available for this purpose.

Agrément certificate coverage

Agrément certificate coverage

BBA certificate 08/4548 state is that Tyvek® underlays are suitable for use in dwellings.

Due to the wide range of conditions that they offer, dwellings are used by the BBA for the purposes of assessing product performance. The test environments include appropriate temperature and humidity levels which prevail within bathrooms and kitchens. It is generally accepted that the majority of commercial and industrial buildings will present safer conditions within which the membrane is to perform. An office for instance will generally have lower temperature and humidity levels than a domestic dwelling. Tyvek® membranes can therefore be incorporated into domestic, industrial and commercial specifications.

Previous certification was restricted, in that the BBA approved the use of Tyvek® membranes only in roofs of simple plan rectangular shapes. Certification now allows for typical roof detailing such as lean-to roofs, valleys, dormers and Scottish boarded roofs.

Certificate 08/4548 approves the use of Tyvek® membranes in both **warm and cold** pitched roof construction. These are categorised according to the positioning of the insulation:

Cold roofs (Fig. 5)

This is where the insulation is installed at joist level with a cold loft - space (attic) between the insulation and roofing underlay. In the main, quilt insulation is laid between and over ceiling joists.

Warm roofs (Fig. 6)

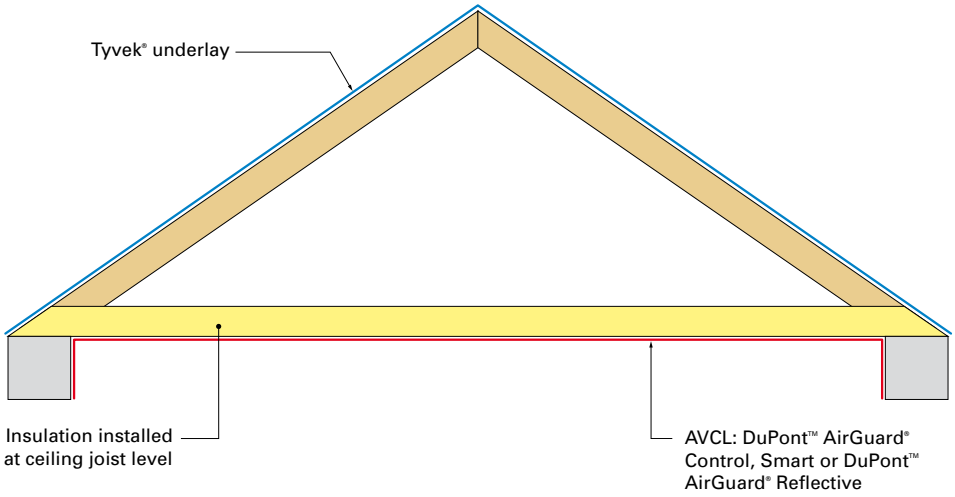
This is where the insulation is installed at rafter level using rigid and/or semi rigid insulation. The insulation would ideally be positioned in a continuous layer above the rafters so that the roof structure is situated in a "warm" environment. However, certain roof specifications can result in the insulation being installed over rafters, between rafters or under rafters. With increasing thermal requirements it is quite common for a combination of these options to be employed.

Room in the roof applications (Fig. 7)

The BBA have assessed room in the roof applications as included in Agrément certificate 08/4548. Tyvek® membranes may therefore be installed into this form of construction without ventilation at eaves or ridge.

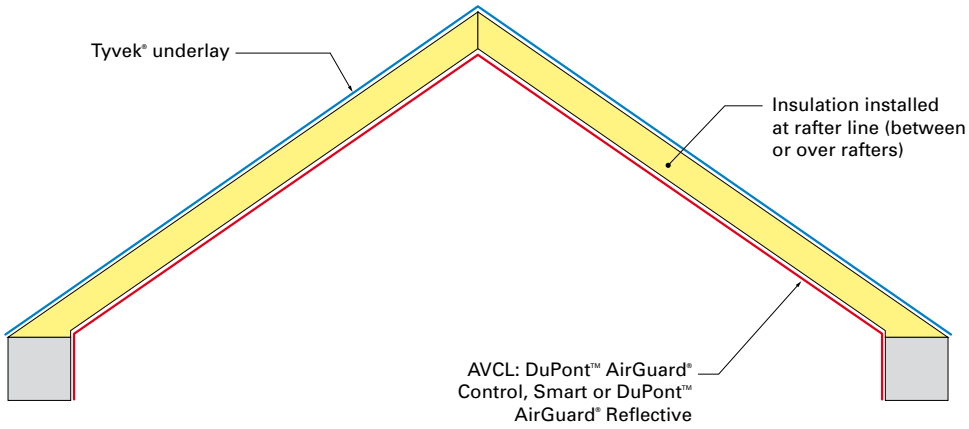
Room in the roof constructions very often incorporate a combination of both warm and cold roof constructions, employing varying types of insulation. Cold roof areas usually include "vapour open" fibrous insulation such as mineral wool quilt, whereas the sloping ceiling areas include closed cell or foil backed rigid board insulants, of which the majority are highly vapour resistant. This variation in vapour resistance can result in an imbalance in vapour drive. To equalise the internal vapour resistances throughout the construction it is recommended that a AVCL such as DuPont™ AirGuard® Control, Smart or DuPont™ AirGuard® Reflective be installed beneath the "vapour open" quilt insulation.

Fig. 5 - Cold roof



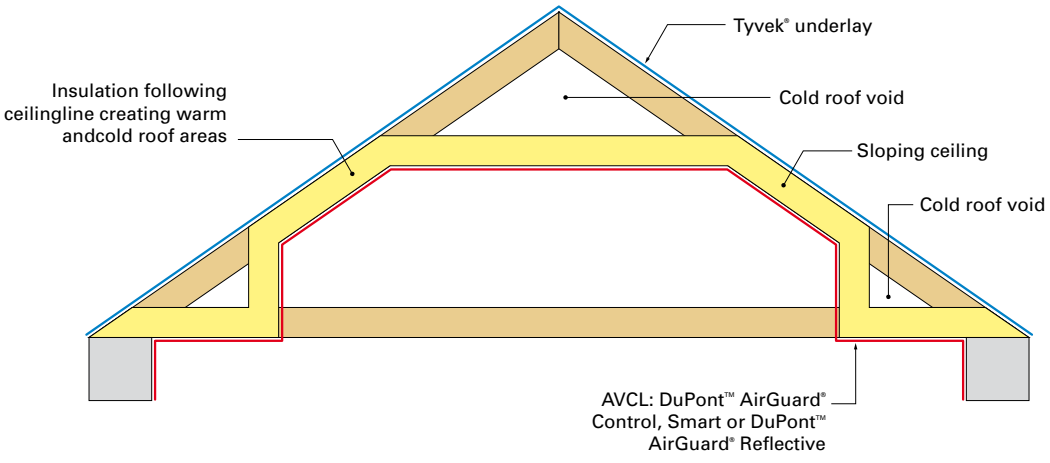
BBA certificate 08/4548

Fig. 6 - Warm roof



BBA certificate 08/4548

Fig. 7 - Room in the roof



BBA certificate 08/4548

Tyvek® roofing applications can be broken down into two main categories:

1. SUPPORTED APPLICATIONS
2. UNSUPPORTED APPLICATIONS

The application category will determine which membrane is suitable and how it is to be installed.

1. SUPPORTED APPLICATIONS
Tyvek® Supro - Tyvek® Supro Plus

This is where the Tyvek® membrane is laid directly over a supporting layer such as timber boarding or flexible/rigid insulation. In this condition counter battens over the membrane will be required to lift the tiling battens off the membrane and create an effective drainage path to the eaves.

Fig. 8

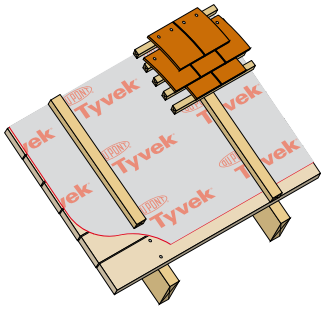


Fig. 9

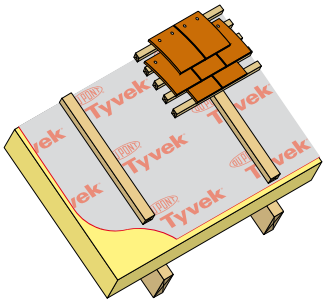
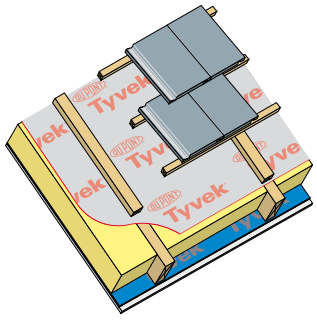


Fig. 10



Scottish boarded roofs are also categorized as supported applications but battens are normally omitted and the slates are nailed directly through the membrane and into the boarding. Recommended grade: Tyvek® Supro.

Fig. 11

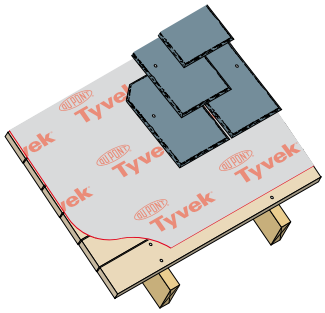
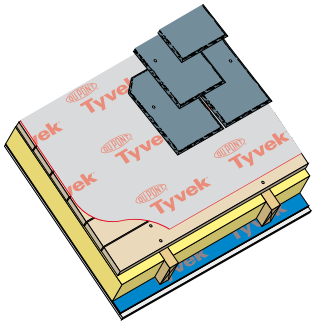


Fig. 12



Sealed Roof System - The supported application gives the end-user the option to upgrade the system to a sealed roof by taping all laps and penetrations in the membrane. Tyvek® Supro Plus is most suitable for this purpose as an integral sealing tape is provided.

Fig. 13

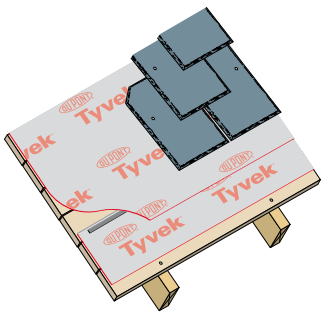


Fig. 14

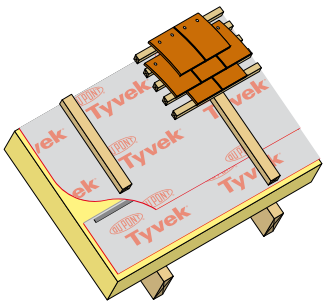
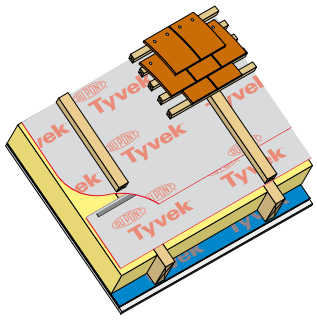


Fig. 15



2. UNSUPPORTED APPLICATIONS
Tyvek® Supro - Tyvek® Supro Plus

Over rafters (the traditional method) - The Tyvek® membrane is laid over rafters and allowed to drape slightly for drainage beneath tiling battens. To accommodate the drape an airspace of approx 10mm beneath the membrane will be required. In order to prevent the risk of wind uplift a maximum drape of 10mm in the membrane is recommended. No counter battens will be required over the membrane in this application. Recommended grade: **Tyvek® Supro.**

Fig. 16

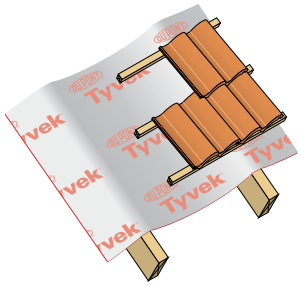


Fig. 17

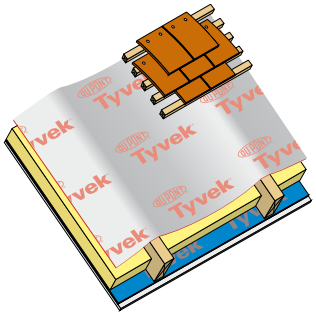
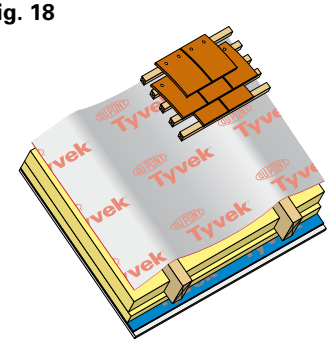


Fig. 18



Over counter battens - Tyvek® can also be draped over counter battens that are installed over timber boarding or rigid insulation. This represents the most practicable approach to on-site membrane installation and corresponds with the majority of rigid insulation manufacturers recommendations. Recommended grade: **Tyvek® Supro.**

Fig. 19

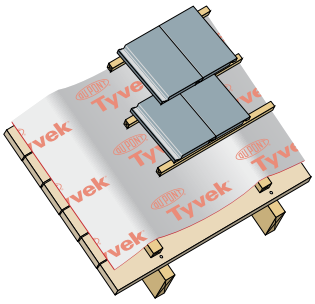


Fig. 20

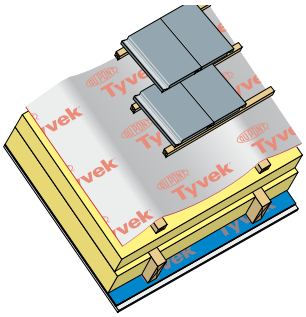
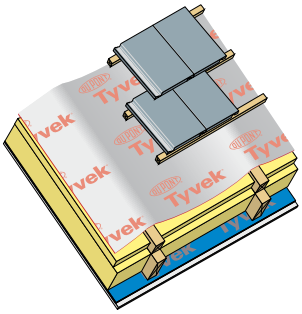


Fig. 21



Sealed Roof System - Tyvek® can also be installed over rafters in a taut condition with counter battens fixed over. This method is normally adopted when a sealed system is specified. Tyvek® Supro Plus is most suitable for this purpose as an integral sealing tape is provided.

Fig. 22

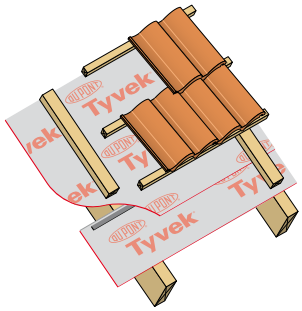


Fig. 23

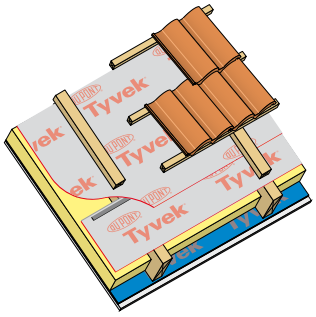
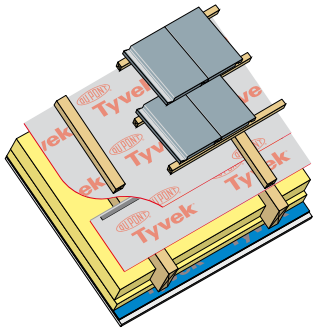


Fig. 24



Agrément certificate 08/4548 covers the use of Tyvek® membranes in non-ventilated and sealed pitched roofs.

Tyvek® membranes Installation in pitched roofs

The following pages contain information on how best to install Tyvek® membranes in pitched roof constructions. No provision for ventilation at eaves or ridge is included in these recommendations. BBA references are included where appropriate.

Eaves

In keeping with current good roofing practice, the installation of a "proprietary eaves protection device" is recommended prior to the installation of the Tyvek® membrane.

This takes the form of a durable perimeter trim such as **Tyvek® Eaves Carrier** which is fixed over the fascia board or rafter feet and dressed into the gutter. **Tyvek® Eaves Carrier** is a rigid black PVC sheet which will provide a long term solution to ultra violet degradation of the underlay that can occur as a result of long term exposure to direct sunlight.

The installation procedure for **Tyvek® Eaves Carrier** is as follows:

1. Fix **Tyvek® Eaves Carrier** to the rafters at the eaves of the roof, using rust resistant, large headed clout nails. Maintain a vertical lap of 100mm between each sheet.

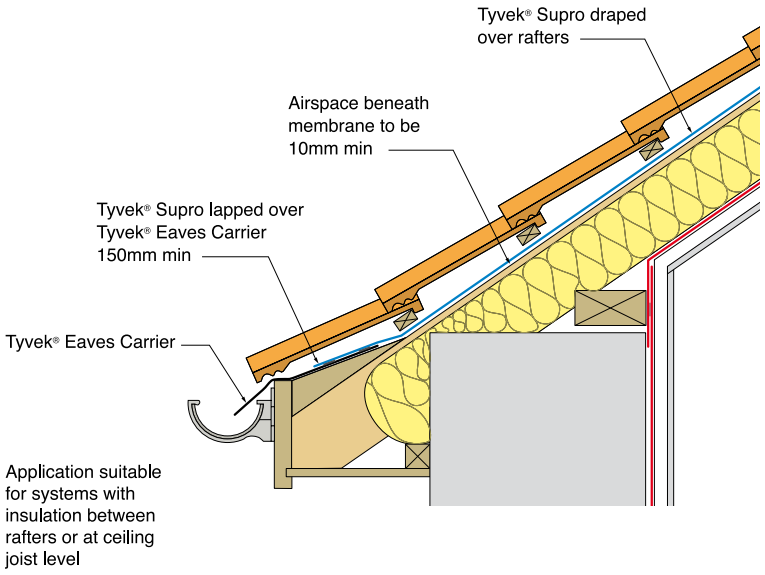
2. Apply **Tyvek® Double-sided Tape (acrylic)** to the **Eaves Carrier** rebate.

3. Lay the Tyvek® underlay horizontally across the rafters, lap onto the **Tyvek® Eaves Carrier** and finish over the taped rebate. Peel the backing paper from the **Tyvek® Double-sided Tape (acrylic)** and bond the membrane to the **Tyvek® Eaves Carrier**.

4. The tiling/slating battens or counter battens (which ever is appropriate) are fixed over the membrane as required.

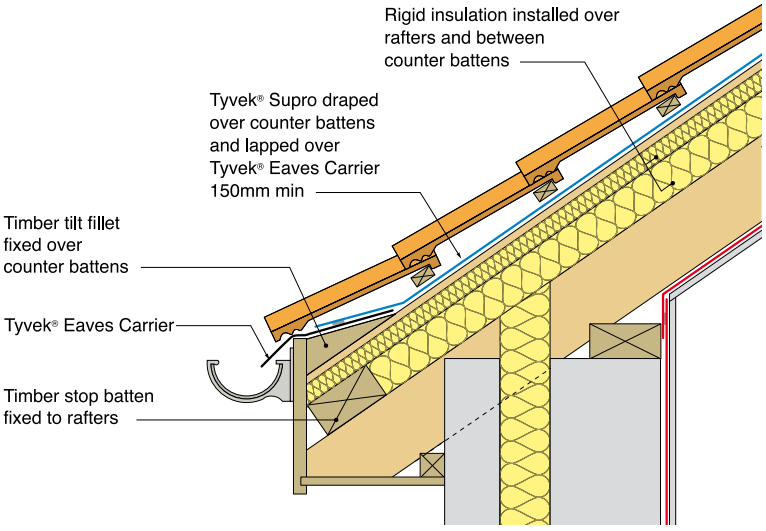
Eaves Detailing

Fig. 25 - Membrane unsupported over rafters



Tyvek® Enercor® Roof also suitable for this method of applications with minimum 23mm airspace beneath

Fig. 26 - Membrane unsupported over counter battens



Tyvek® Enercor® Roof also suitable for this method of applications with minimum 23mm airspace beneath

In both of these details, **Tyvek® Supro** is installed in a draped condition over rafters or counter battens.

A recommended drape in the membrane of maximum 10mm is recommended to allow sufficient drainage beneath tiling/ slating battens.

The membrane may come into contact with the insulation with no risk of tenting (capillary action).

Air infiltration beneath the membrane should be prevented by ensuring air-tightness at the fascia and soffit locations. Insulation pushed up to the underside of the membrane will also be effective, but may obstruct the drainage of moisture over the membrane.

Fixing

For guidance on fixing procedure please refer to the specification notes on page 39.

Eaves Detailing

Fig. 27 - Membrane unsupported over rafters (sealed)

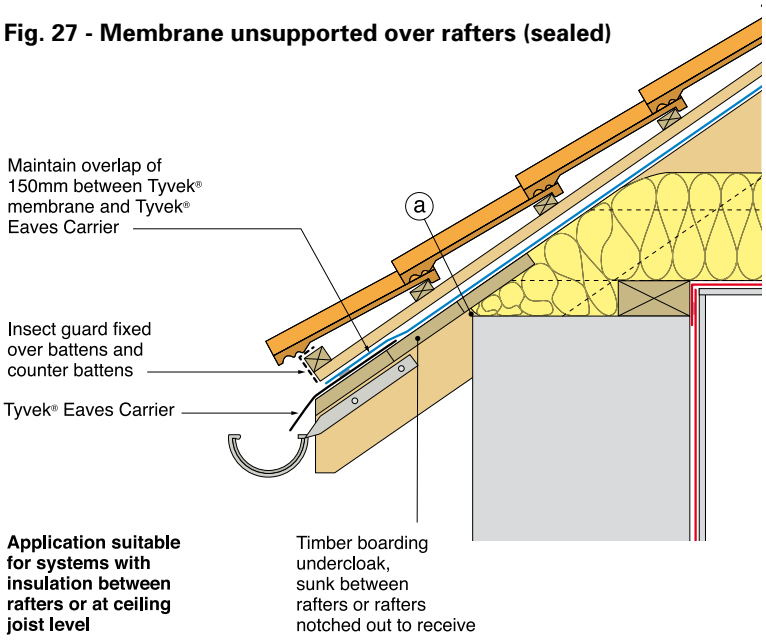
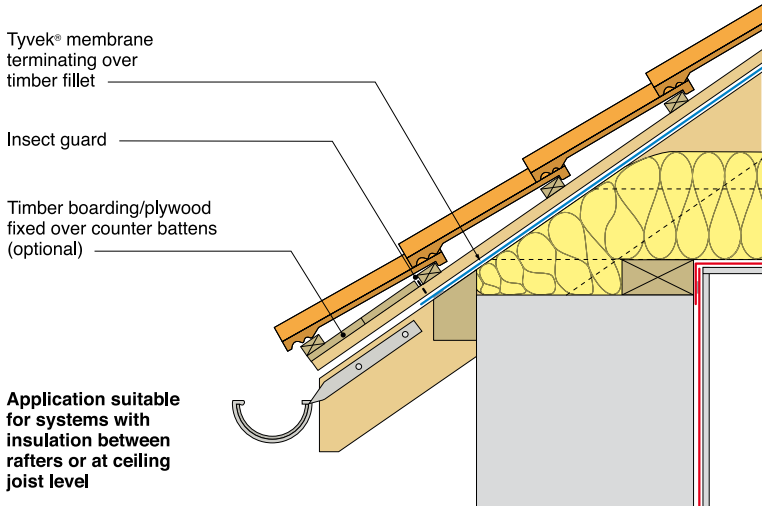


Fig. 28 - Membrane unsupported over rafters (sealed)



Both of these details show **Tyvek® Supro** or **Tyvek® Supro Plus** installed unsupported over rafters. The membrane is laid in a taut condition with counter battens fixed over. Sealing the system is easily achieved by taping the laps.

An insect mesh should be fixed at the eaves to prevent intrusion into the batten zone.

Both details include no fascia board or soffit:

Fig. 27 includes a timber undercloak at the overhang with the membrane unsupported over rafters (sealed) membrane dressed onto a **Tyvek® Eaves Carrier**.

Fig. 28 is an alternative arrangement showing the Tyvek® membrane terminating before the gutter.

Air infiltration beneath the membrane should be prevented by ensuring air-tightness at ⓐ.

Counter battens

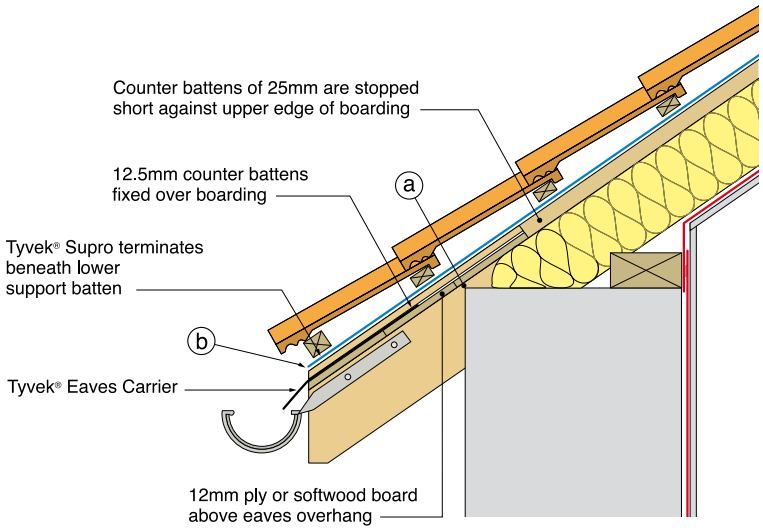
Please refer to note on counter battens on page 40.

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

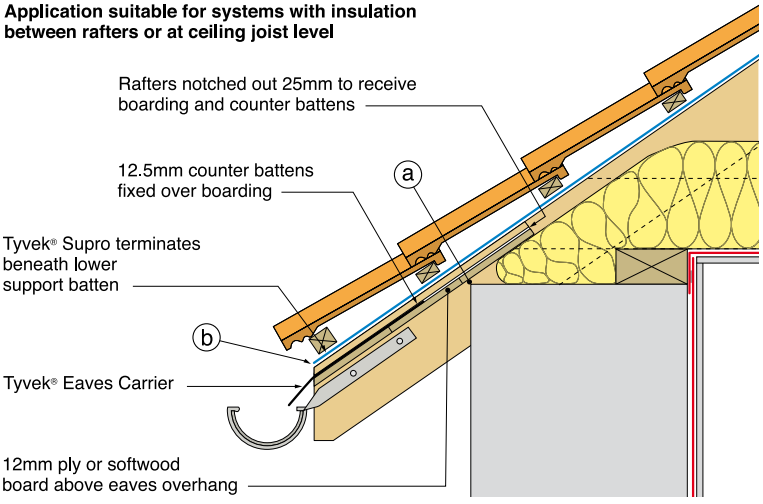
Eaves Detailing

Fig. 29 - Membrane unsupported over counter battens



Tyvek® Enercor® Roof also suitable for this method of applications with minimum 23mm airspace beneath

Fig. 30 - Membrane unsupported over rafters



Tyvek® Enercor® Roof also suitable for this method of applications with minimum 23mm airspace beneath

These details illustrate **Tyvek® Supro** installed in a draped condition and are suggested in order to overcome detailing of the timber undercloak. Once again, both details include no fascia board or soffit:

Fig. 29 includes a timber undercloak fixed over rafters.

Fig. 30 shows the timber undercloak notched into the rafter.

In both instances a small counter batten or lathe is fixed over the boarding to ensure continuous drainage to the eaves is maintained.

Air infiltration beneath the membrane should be prevented by ensuring air-tightness at ⓐ.

Preventing air infiltration beneath the membrane at ⓑ may be difficult to achieve. Attention at these locations should therefore be paid to minimise air ingress.

Fixing

For guidance on fixing procedure please refer to the specification notes on page 39.

Eaves Detailing

Fig. 31 - Membrane supported over timber sarking

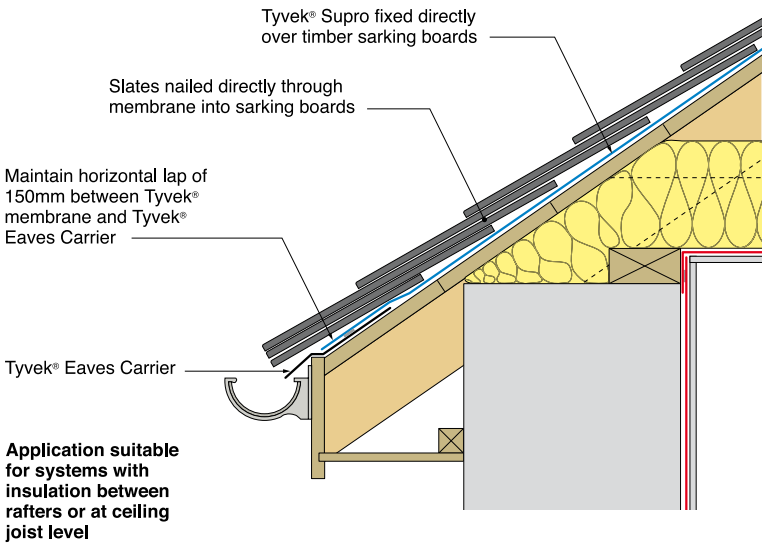
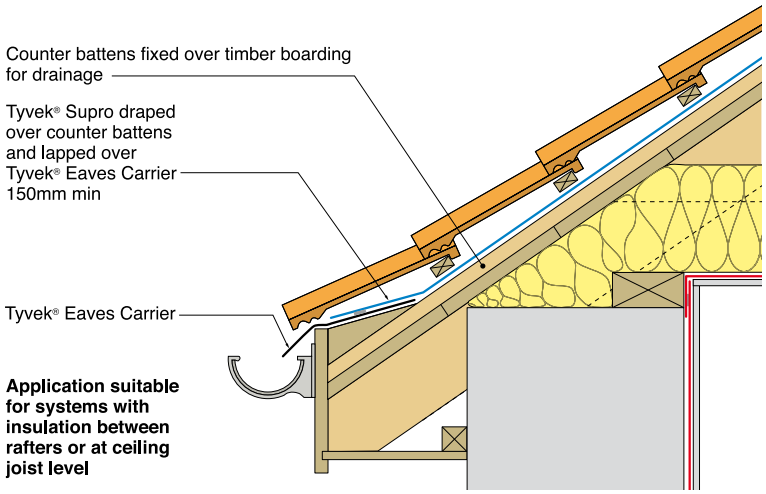


Fig. 32 - Membrane unsupported over timber sarking



Tyvek® Enercor® Roof also suitable for this method of applications with minimum 23mm airspace beneath

Boarded roofs are common to geographical locations that experience high exposure to driving rain, typically Scotland.

Tyvek® Supro should be laid directly onto the boarding or draped over a counter batten.

Fig. 31 illustrates typical Scottish practice where the roofing underlay is laid over the sarking board. Slates are then secured directly over the membrane with no battens or counter battens included.

Fig. 32 incorporates battens and counter battens and is applicable to systems with slates or tiles.

A sealed roof system can be achieved with both methods of application by specifying Tyvek® Supro Plus and taping all laps in the membrane. This is feasible only when the membrane is laid in direct contact with the boarding.

Air infiltration beneath the membrane should be prevented by ensuring air-tightness at the fascia and soffit locations. Insulation pushed up to the underside of the sarking board will also be effective.

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Eaves Detailing

Fig. 33 - Membrane unsupported over rafters (sealed)

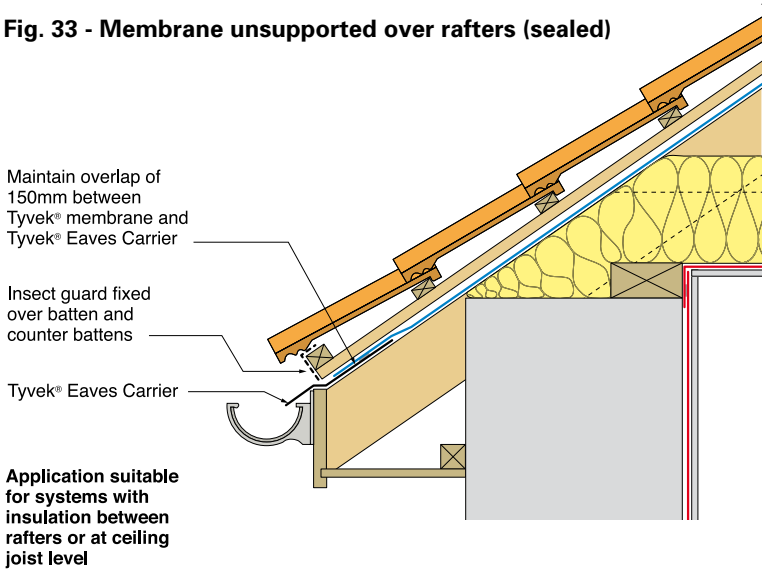
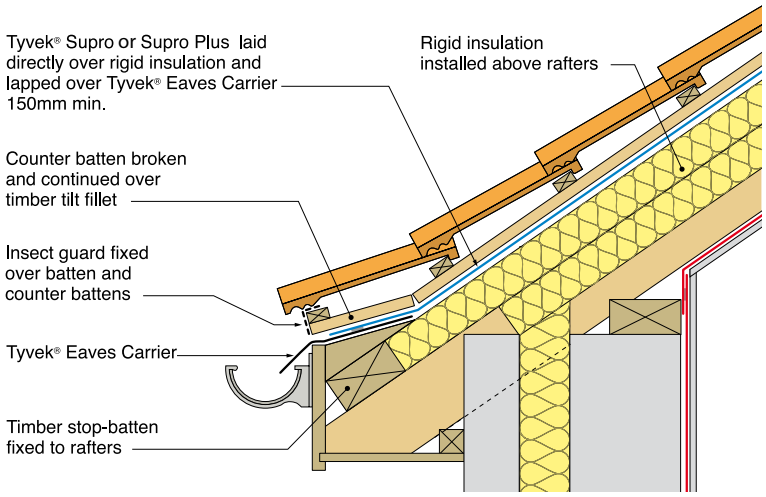


Fig. 34 - Membrane supported over insulation (sealed)



Both of these details are suitable if a sealed system is required, as the membrane is laid in a taut condition with counter battens fixed over. Sealing the system is achieved by taping all horizontal laps.

An insect mesh should be fixed at the eaves to prevent intrusion into the batten zone.

Fig. 33 illustrates **Tyvek® Supro** or **Tyvek® Supro Plus** laid taut over rafters with counter battens fixed over. The membrane runs down the full length of the rafter and is dressed onto a Tyvek® membrane supported over insulation (sealed) Eaves Carrier.

Air infiltration beneath the membrane should be prevented by ensuring air-tightness at the fascia and soffit locations. Insulation pushed up to the underside of the membrane will also be effective, but may obstruct the drainage of moisture over the membrane.

Fig. 34 is an alternative arrangement showing **Tyvek® Supro or Supro Plus** dressed over a timber tilt fillet. In this case a warm roof with insulation over the rafters is shown.

Counter battens

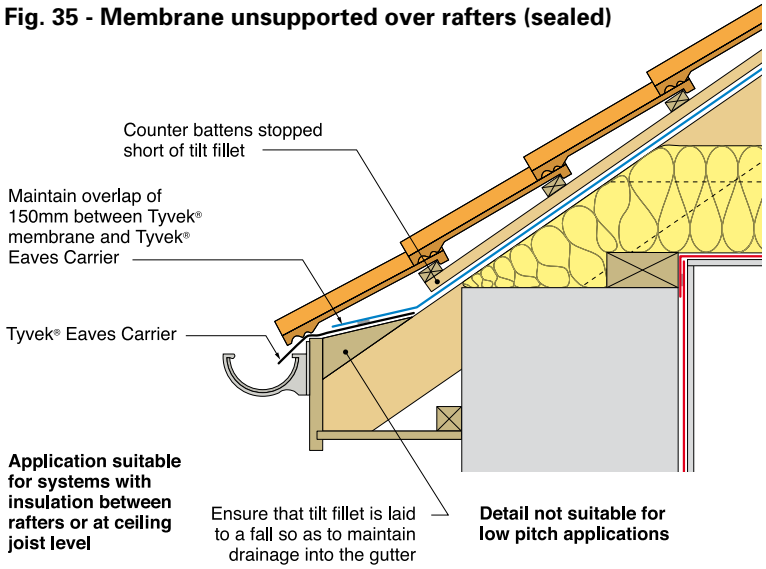
Please refer to note on counter battens on page 40.

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Detailing

Fig. 35 - Membrane unsupported over rafters (sealed)



EAVES DETAILING - GENERAL COMMENTS

We have tried to be thorough with the eaves details illustrated in this technical guide in an attempt to match a variety of individual roof specifications. However, it will not always be possible to achieve complete coverage of all roof designs. Care should therefore be taken if adapting a detail to suit certain design parameters. It is most important to ensure that the Tyvek® membrane can adequately shed any water to the eaves efficiently and without risk of penetration into the structure.

Ponding of water on the membrane and back-falls on timber tilt fillets should be avoided.

This is a slight variation on the sealed roof details illustrated on page 17 Again **Tyvek® Supro** or **Supro Plus** is laid in a taut condition with counter battens fixed over. The laps can then be sealed using adhesive tape.

In this detail the counter batten is stopped short of an enlarged tilt fillet which supports the tiles/slates.

Air infiltration beneath the membrane should be prevented by ensuring airtightness at the fascia and soffit locations. Insulation pushed up to the underside of the membrane will also be effective, but may obstruct the drainage of moisture over the membrane.

Counter battens

Please refer to note on counter battens on page 40.

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Detailing

Fig. 36 - Membrane unsupported over rafters

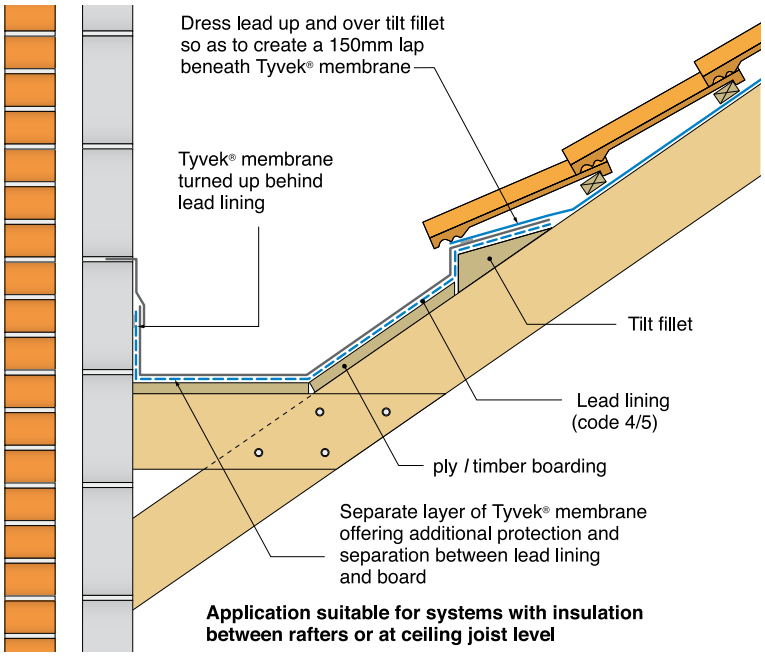
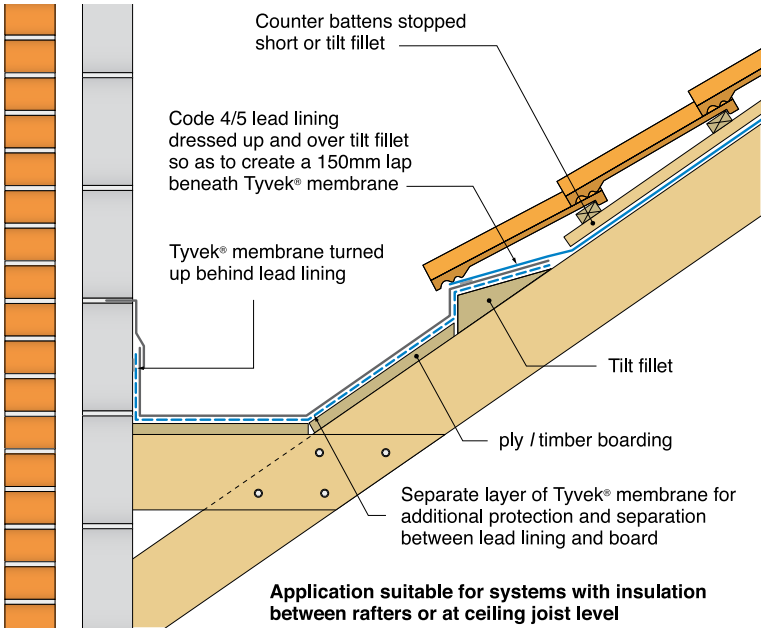


Fig. 37 - Membrane unsupported over rafters (sealed)



Lead lined gutters

A separate layer of Tyvek® beneath a lead lined gutter will provide additional protection against water ingress. As a separation layer the membrane will allow movement to occur between the lead and the supporting board as a result of thermal expansion.

Parapet (Fig. 36)

Lay a strip of Tyvek® over the timber/ply board extending up and over the timber tilt fillet/edge batten. Dress the Tyvek® membrane up the face of the parapet wall to terminate behind the lead flashing.

The roofing underlay should be dressed over the gutter lining with a 150mm min overlap.

Parapet (Fig. 37)

Similar detail includes a counter batten over the underlay.

Counter battens

Please refer to note on counter battens on page 40.

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Detailing

Fig. 38 - Membrane unsupported over rafters

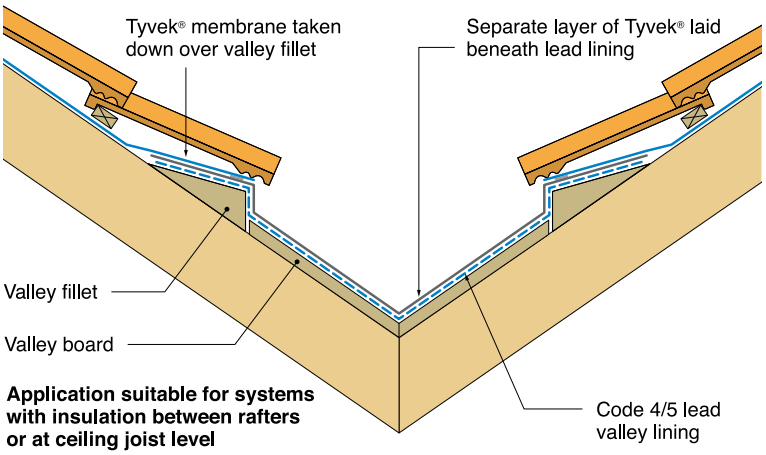
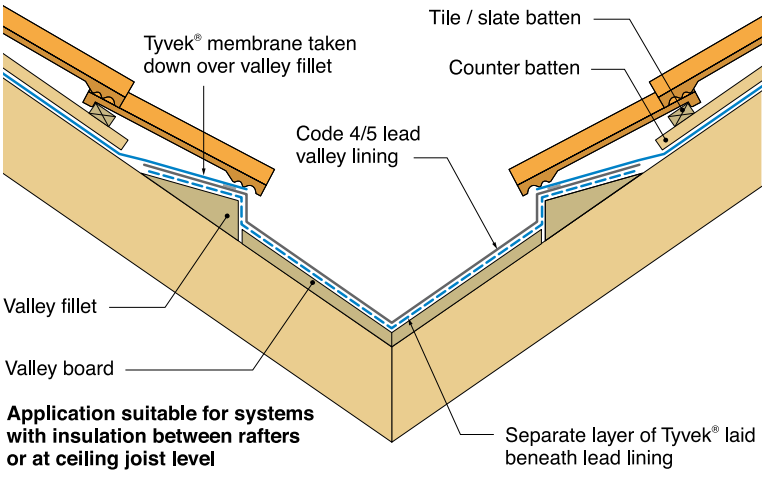


Fig. 39 - Membrane unsupported over rafters (sealed)



Valley (Fig. 38)

Lay a strip of Tyvek® over the timber/ply board extending up and over the timber valley fillets on each side, prior to the application of the lead or GRP lining.

Terminate the main roofing layer of Tyvek® over the valley fillet, maintaining a 150mm lap over the valley lining.

Valley (Fig. 39)

Similar detail includes a counter batten over the underlay.

Sealed Systems

The Tyvek® underlay can be sealed to the lead lining by using **Tyvek® Butyl Tape** (double sided).

Tiled valley

As an alternative to using a separate Tyvek® strip, the main roofing layers may be taken into the valley from both sides, beyond the centre-line and up the opposite slope by a minimum of 300mm. A double layer of Tyvek® at the valley will then be achieved.

Counter battens

Please refer to note on counter battens on page 40.

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Detailing Non-ventilated and sealed systems

Fig. 40 - Duo-pitch ridge

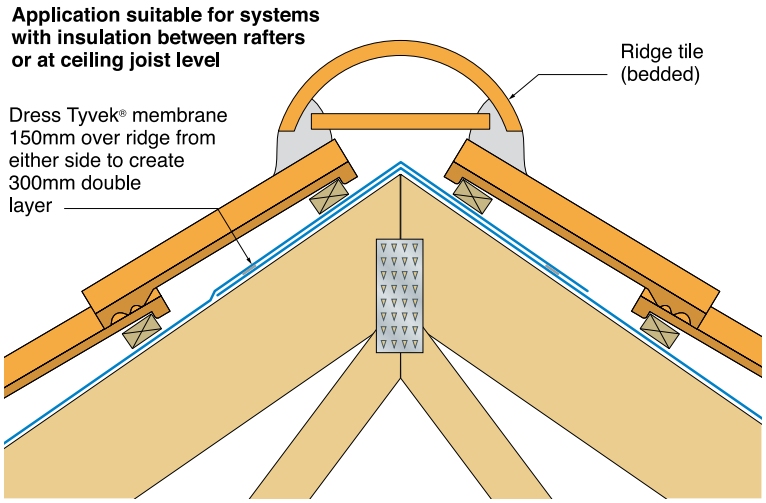
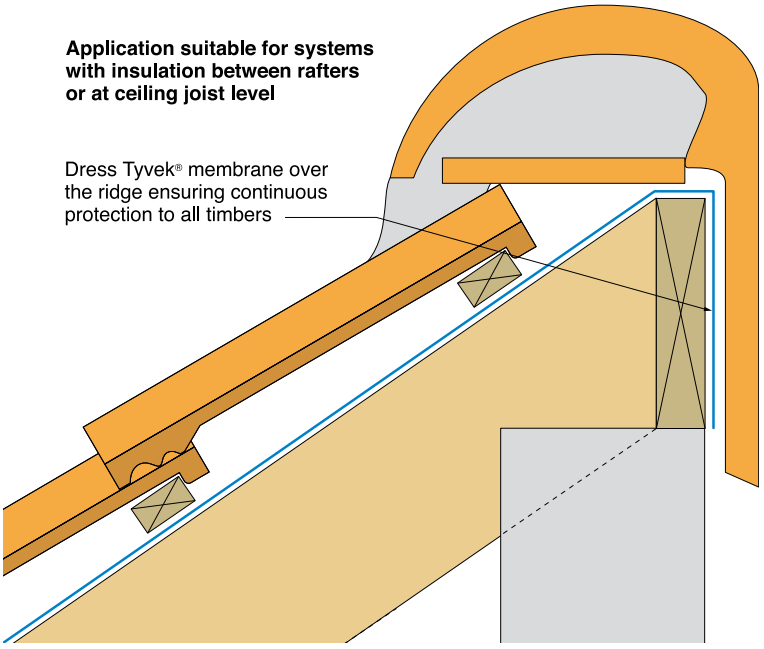


Fig. 41 - Mono-pitch ridge



Ridges

As roof ventilation is not required when using a Tyvek® vapour permeable underlay, it will not be necessary to form a "break" at the ridge. The underlay should therefore continue past the detail helping to maintain a continous secondary water shedding layer across the entire roof area.

Duo-pitch (Fig. 40)

Extend the Tyvek® membrane over the ridge by 150mm either side. A "double felted" layer of min. 300mm will then be achieved.

Mono-pitch (Fig. 41)

Dress the Tyvek® membrane over the ridge batten, offering maximum protection to the roof structure, by extending the Tyvek® underlay behind the monoridge tile.

Sealed Systems

The Tyvek® underlay can be sealed at laps and perimeters by using **Tyvek® Tape 2060B** (single sided) or **Tyvek® Double-sided Tape** (acrylic).

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Detailing Non-ventilated and sealed systems

Fig. 42 - Verge

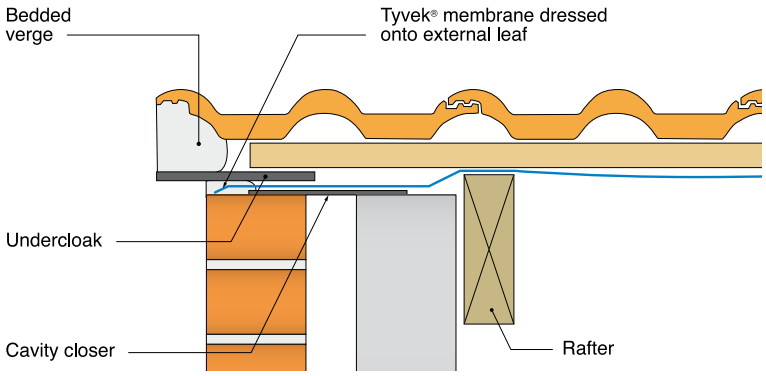


Fig. 43 - Abutment

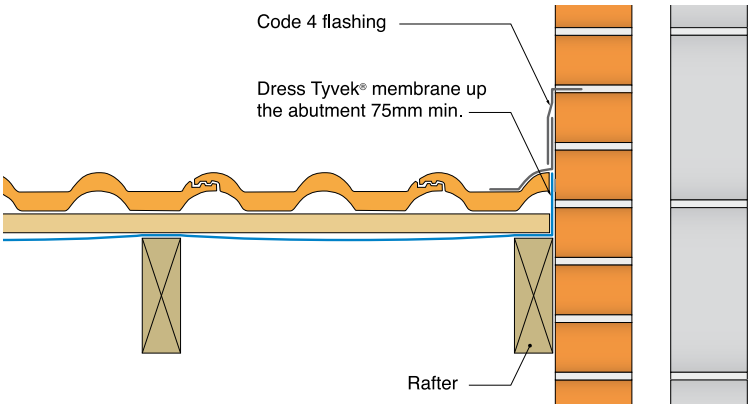
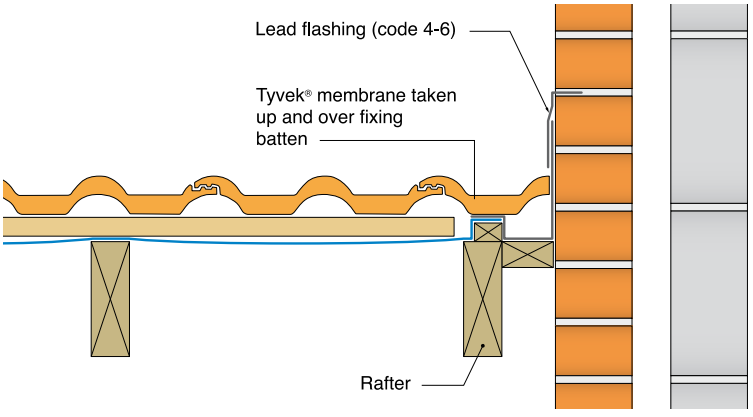


Fig. 44 - Abutment (secret gutter)



Verge (Fig. 42)

It is important to ensure that the Tyvek® membrane is dressed so as to prevent moisture ingress into the roof system. The membrane should be extended to the external face of the wall and secured with a timber batten or dressed into mortar. If a fascia or barge board is being used, terminate the membrane against the rear face.

Abutment (Fig. 43)

The Tyvek® underlay should be taken up the wall by at least 75mm or ideally behind the lead flashing.

Abutment (Fig. 44)

If a secret gutter is used terminate the membrane over the fixing batten.

Sealed Systems

To further improve the thermal efficiency of the construction the Tyvek® underlay can be sealed at the perimeters by using **Tyvek® Butyl Tape** (double sided) or **Tyvek® Double-sided Tape.**

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Detailing Non-ventilated and sealed systems

Fig. 45 - Soil vent pipe

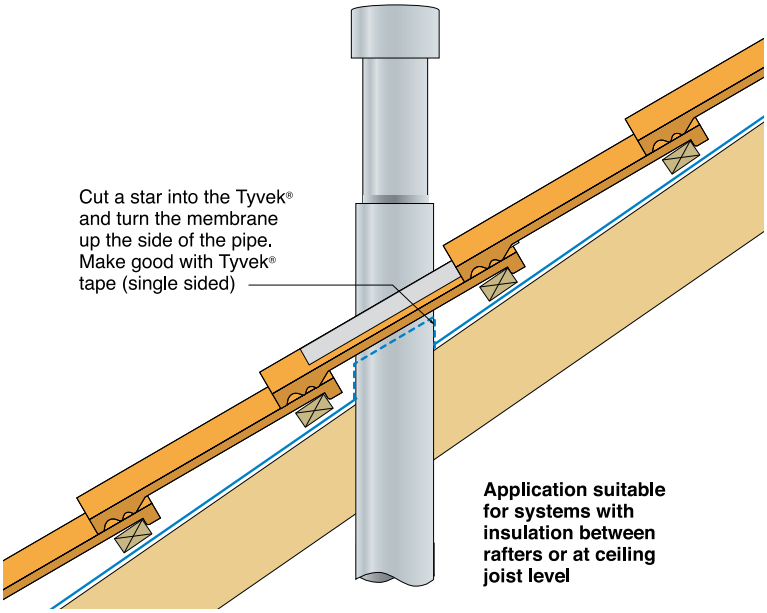
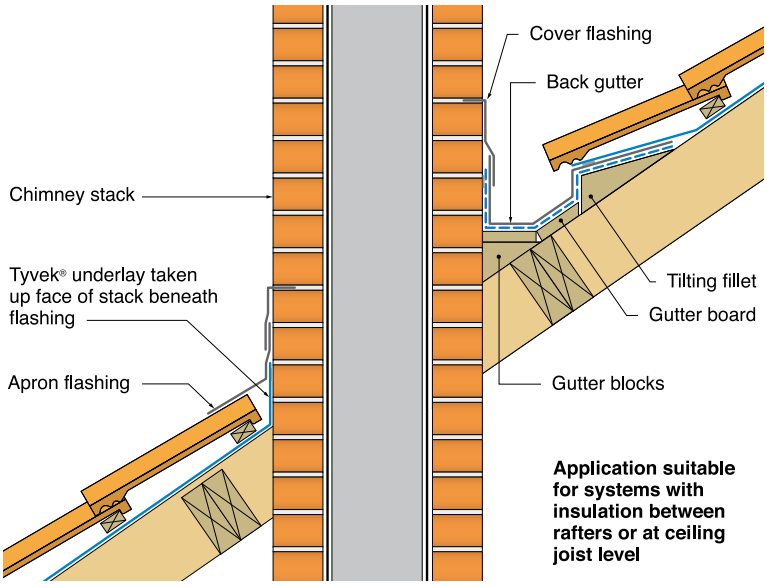


Fig. 46 - Chimney stack



Penetrations

As with all roofing underlays, any surface water should be directed around all penetrations that occur.

Soil vent pipe (Fig. 45)

An "asterisk" or "star" shaped cut should be formed in the membrane and triangular flaps folded upwards. The underlay should then be made good with **Tyvek® Tape 2060B** (single sided).

Chimney (Fig. 46)

For all intents and purposes the chimney detail incorporates an abutment detail and a parapet gutter, the recommendations for which can be used here.

The main layer of Tyvek® should be taken over the tilt fillet to achieve a 150mm lap over the gutter lining. A separate strip of Tyvek® should be included beneath the gutter lining for thermal movement.

Dress the membrane up the sides of the stack a minimum of 75mm.

At the apron, extend the membrane up the stack and finish behind the flashing.

Fixing

For guidance on fixing procedure please refer to the specification notes on page 40.

Detailing Non-ventilated and sealed systems

Fig. 47

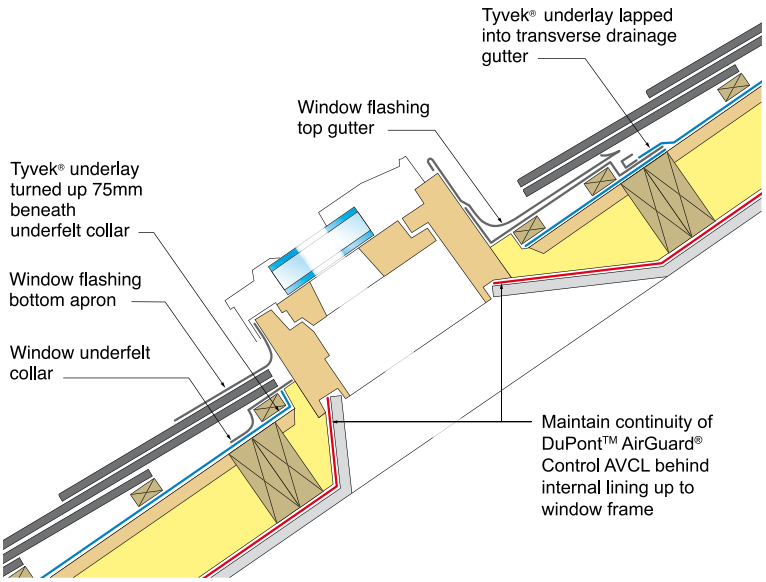
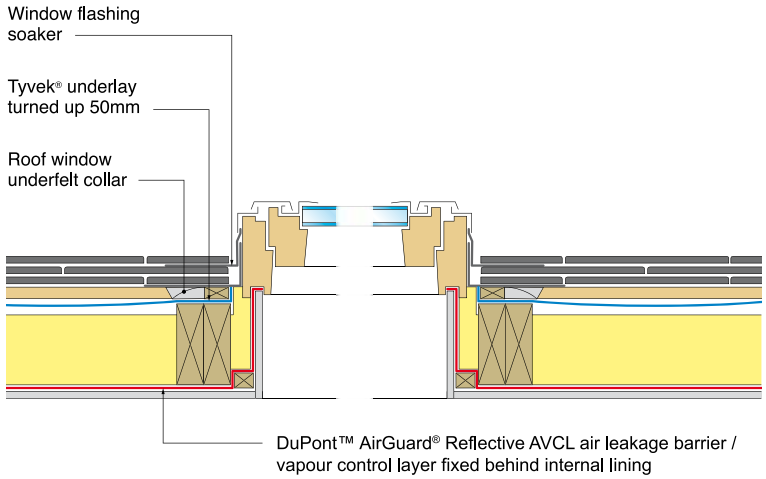


Fig. 48



Roof windows

The criterion when laying an underlay in conjunction with roof windows is the same as for other penetration details, ie. surface water should be directed around the detail.

Top

The Tyvek® underlay should be lapped into transverse drainage gutter above the roof window.

Sides

Turn the membrane up the sides of the window by a minimum of 75mm beneath the underfelt collar. Secure a fixing batten over.

Bottom

Dress the membrane so that it finishes beneath the window's underfelt collar, turning 75mm up a fixing batten if practicable.

Tyvek® Tape 2060B (single sided) may be used for making good to corners and junctions and / or when a sealed system is required.

The recommendations given here represent general advice for laying the Tyvek® underlay around a typical roof window.

Example roof detail is based on Velux GGL centre pivoted roof window by kind permission Velux Company Ltd. For guidance regarding installation of the roof window, the window manufacturer's instructions should be sought.

Vapour control layer

DuPont™ AirGuard® Control or AirGuard® Smart may be installed as the internal AVCL in these details.

Recommendation: Spacing the internal lining off the AVCL with a batten will help maintain the membrane's integrity, as well as to provide a services void for wiring. Please see pages 34 - 37 for details.

Fixing

For guidance on fixing procedure please refer to the specification notes on pages 39 & 40.

Restricted details

It is accepted that certain roofing elements will not permit the free passage of moisture laden air to outside atmosphere. Such details will include vapour resistant outer surfaces such as dormer cheeks and valleys clad with lead, and flat roofs with built-up roofing systems.

Whilst these details cannot be regarded as breathable, it is acceptable for them to be incorporated into a non-ventilated Tyvek® system, provided that they represent a relatively small proportion of the roof area.

Fig. 49 - Lead clad "vapour closed" wall system

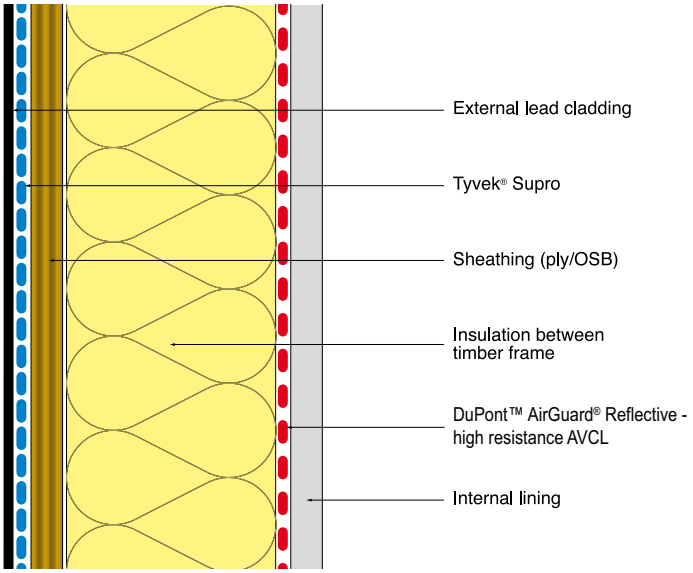
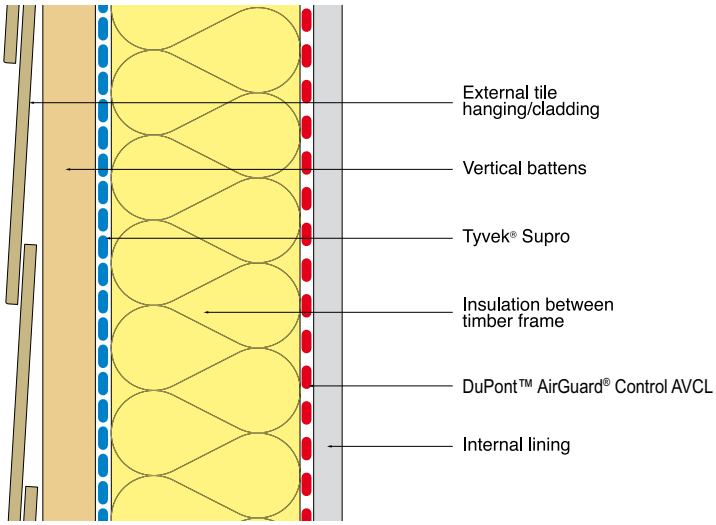


Fig. 50 - External weatherboarding "Breathing wall"



Lead clad dormer cheeks (Fig. 49)

A Tyvek® membrane is suitable for use as a "separation layer" between lead and ply sheathing as commonly used in this type of construction. As with timber frame construction however, it is important to ensure that the passage of vapour through the system is controlled by installing an air & vapour control layer (AVCL) on the warm side of the insulation, such as DuPont™ AirGuard® Reflective. The effectiveness of this AVCL is wholly dependant on the standard of its installation, and penetrations through the AVCL should be kept to a minimum. Any laps in the AVCL should be sealed with a suitable sealing tape.

Dormer cheeks with external cladding or tile hanging and no external ply sheathing can be regarded as breathing systems. (Fig. 50)

Dormer roofs

Recommendations for dormer roofs clad with lead should follow those of lead clad dormer cheeks by using a suitable VCL.

In addition, the condensation risk in flat roofs can be further reduced by specifying a warm roof detail, ie. insulation installed over the joists or above the decking.

Dormer cheeks and/or roofs clad with copper, stainless steel or zinc outer sheeting may be detailed with Tyvek® Metal.

Restricted details

Adjoining ventilated roof constructions

It is acceptable and quite common for Tyvek® membranes to be used in refurbishment or building extension projects in a non-ventilated situation. Invariably, the existing construction will incorporate traditional roofing materials with a ventilated roof space. Air movement from the adjoining roof space will introduce air and external humidity which will reduce the roof space temperature and reduce insulation performance. In these circumstances it is important to ensure that any adjoining ventilated roof spaces are isolated from the non-ventilated Tyvek® system.

In order for the membrane to perform its function as a vapour permeable layer, an airtight dividing partition will need to be constructed between the two types of system, so that no common roof space exists.

In a combined system the membrane will provide a similar function to that of a traditional felt, in which case full ventilation should be provided. Installing a Tyvek® underlay in a fully ventilated roof will not be detrimental to the function of the membrane. Its suitability as a secondary water shedding layer will be similar to that of other traditional roof tile underlays.

Below pitch roof constructions

Jan 2012

It has been accepted for quite some time for Tyvek® to be installed in two layers with staggered laps to accommodate roof systems that are built below the minimum pitch for the tile or slate. This originated in the 90's as a solution for projects where a building or design constraint existed and has been widely accepted by local authorities throughout the UK. Understandably the 'double felt' method has been implemented widely within the industry to overcome low pitch problems.

The 'double felt' solution has proven to be particularly useful for roofs that commonly suffer from height restrictions such as on single storey lean-to extensions. It is quite common for these roofs to present a relatively small area and are therefore ideal for this method as they would be expected to discharge only a limited amount of rainfall. Whilst this method is very effective it's use is limited in main roofs, especially ones of two storey height. However, this method may be considered depending on the proposed pitch, location data and slate/tile selection.

Wherever possible, our standard pitched roof underlay Tyvek® Supro should be laid at a pitch suitable for the slate or tile that is being used. However, we will accept the 'double felt' method using the following rules as a general guide:

Tile/slate min pitch	Double felt allowance
14° - 19°	- 2°
20° - 29°	- 3°
30° - 39°	- 4°
40° +	please contact us

Following this system will ensure that the absolute minimum pitch allowed with two layers of Tyvek® Supro is 12° (for a tile which has a minimum pitch of 14°). Please note that our recommendations for metal clad industrial roofs are unaffected.

Attention must be paid to details such as hips, valleys and large tilt fillets (eaves sprockets). These are considered 'weak points' in the system as they incorporate lower pitches than that of the main roof areas. Rafter length should not exceed 9m for areas of normal exposure to driving rain and 6m for areas of high exposure. Additional factors to be considered are topography and detailing such as eaves sprockets and rooflight flashings. These factors all govern the risk of water penetration onto the roof underlay. In all cases the underlay must be laid to a fall with no ponding of water on the underlay under any circumstances.

This policy is not entirely rigid and approval may be given for pitches lower than those stipulated above, according to specific data associated with the proposal. In these cases details such as roof area, height and location would need to be considered.

Our warranty for Tyvek® Supro is applicable to the double felting method, provided it is installed in accordance with these guidelines.

For further advice on the use of Tyvek® membranes please contact DuPont™ Tyvek® Technical Support on 01275 337660 (select option 2)

Nick Williams, DuPont Building Innovations - Building Envelope Technical Manager UK & Ireland

Note: "Double felting" with a Tyvek® underlay will not be detrimental to the overall vapour permeability of the construction.

Detailing Non-ventilated metal roof systems

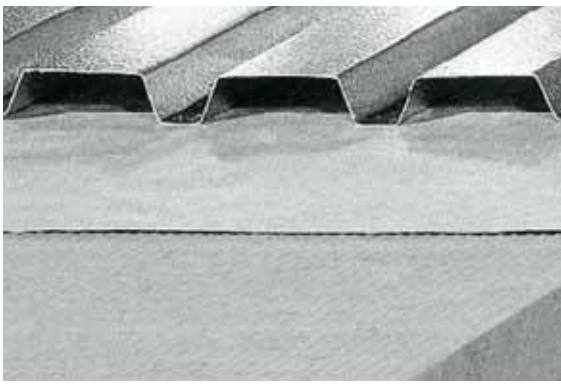
The risks

A potential exists for condensation to form beneath metal clad roofs due to the high vapour resistance of the sheet materials employed in this type of construction.

Water vapour that migrates into the roof construction via the internal lining and insulation can condense on the underside of the outer sheets. If allowed to buildup, there is a risk that this condensation will drip back onto the insulation and affect the layer's thermal performance. Metal fixings, the internal lining and indeed the structure are then at risk of suffering from deterioration as a result.

The cycle of events that can occur as a result of night sky radiation can also present a potential risk for roof components and materials to degrade; the temperature drop that occurs during the night increases the risk of condensation forming on the underside of the outer metal sheeting. It is quite common for this moisture to freeze during very cold periods. When the temperature rises the following day, the trapped moisture thaws and saturates the construction once more. The moisture is trapped within the construction and goes through cycles of evaporation and saturation.

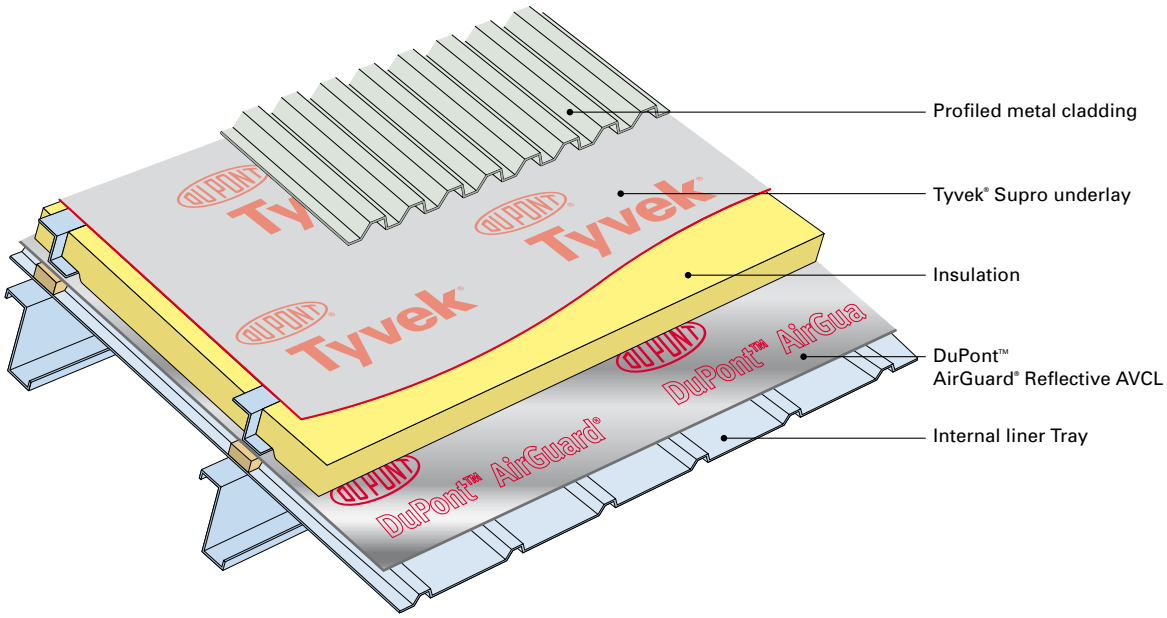
Over time, the weatherproof properties of profiled metal cladding can be compromised by natural weathering and/or the effects of thermally induced movement. This can displace waterproof seals between laps in the sheeting and enlarge penetration points where the sheets are fixed. The risk of moisture ingress, especially as a result of driving rain is increased.



Tyvek® Protection from condensation

The performance of a profiled metal roof can be significantly improved by installing a Tyvek® membrane over the structure and the insulation layer. The high vapour permeability of the Tyvek® membrane will permit the release of vapour through and away from the insulation. The high water resistance of the Tyvek® membrane will prevent any condensed moisture beneath the outer cladding to re-enter the construction, thus ensuring that the insulation operates in a dry environment.

Fig. 51



Detailing Non-ventilated metal roof systems

Tyvek® Protection From external moisture

As a secondary water shedding layer, the Tyvek® membrane will protect the insulation and structure from external precipitation. Any moisture that penetrates the roof system as a result of deterioration in the outer cladding will be safely channelled to the eaves. The long term durability of the construction is then assured.

The recommended membrane for low pitch metal clad roof is:

- **Tyvek® Supro**

Fully supported rigid metal sheet roofs

This section deals with roof constructions clad with fully supported rigid metal sheeting, such as zinc, stainless steel and copper. These rigid sheet materials form the outer weatherproof covering, which is also impervious to water vapour, presenting a potential for condensation to form on their underside. Research has shown that metals will corrode rapidly from the effects of wetting from condensate. It is therefore important to ensure that any condensation build-up beneath rigid metal sheeting can drain safely away and not be trapped within the construction layers.

Tyvek® Metal

Tyvek® Metal can be termed a "metal roof drainage membrane" and consists of a Tyvek® breather membrane (Supro) bonded to an open mesh of polypropylene strands approximately 8mm deep. It is suitable for use as a separation layer beneath standing seam metal roofs of zinc, stainless steel and copper. The open mesh will provide adequate support for the rigid sheeting, whilst maintaining an airspace to allow any condensate which forms beneath to drain away. The Tyvek® membrane that is bonded to the mesh is highly water resistant.

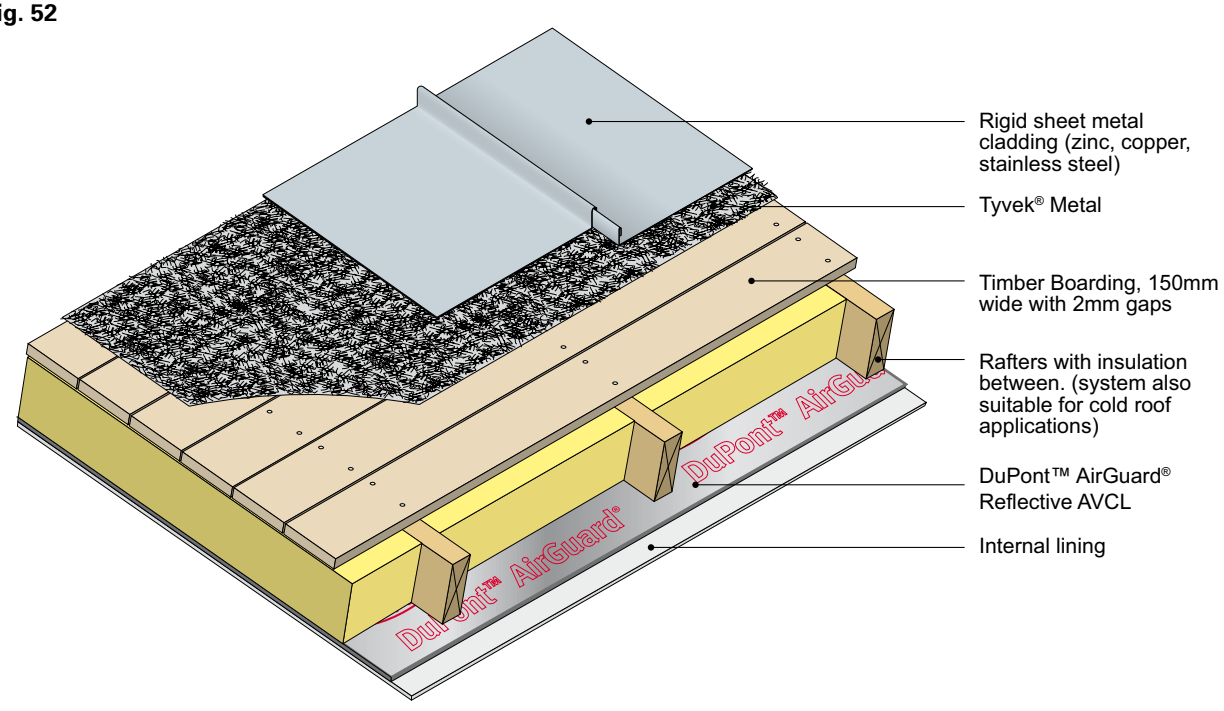
Tyvek® Metal will allow movement between the steel sheet and the timber boarding and will offer a reduction in sound transmission normally generated by structure borne sounds such as rain-clatter.

Air & vapour control layer

A batten is recommended between the AVCL and the internal lining to help maintain the membrane's integrity against penetrations. The batten space will also serve as a service void for wiring.

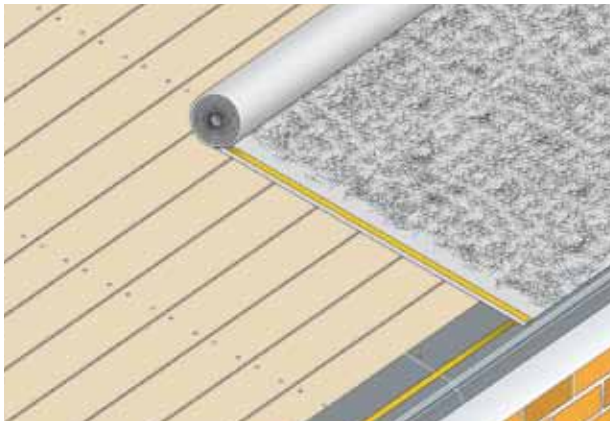
Please note: DuPont™ AirGuard® Smart may also be installed as the AVCL in this application.

Fig. 52

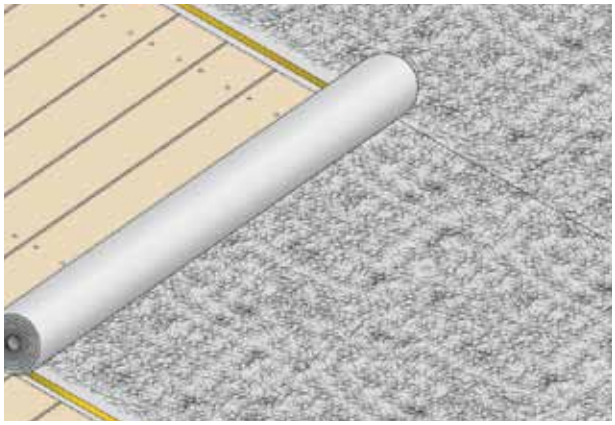


Detailing Non-ventilated metal roof systems

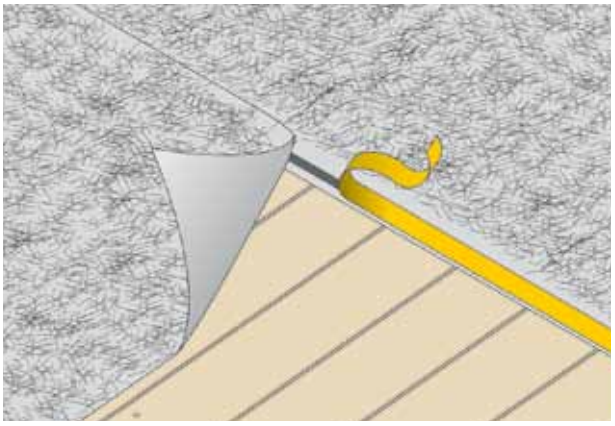
Tyvek® Metal: The installation procedure is as follows:



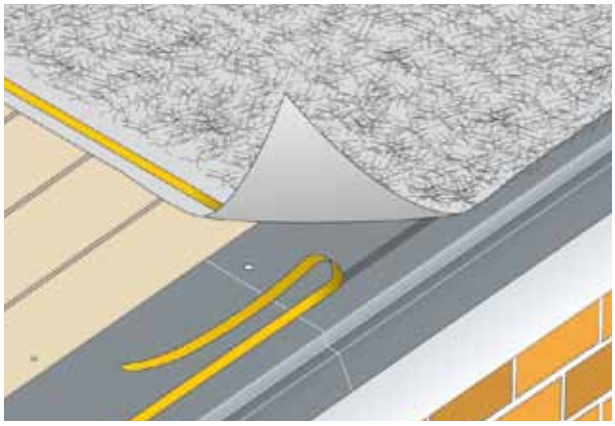
1. Install **Tyvek® Eaves Carrier** as detailed on page 12. Lay the first run of **Tyvek® Metal** up-and-over the roof, with the bottom edge lapping on to the Eaves Carrier. Fix into the board with stainless steel staples or large headed galvanised steel clout nails.



2. Lay the next run of **Tyvek® Metal**, lapping it 100mm onto the mesh-free selvedge of the first run.



3. Peel the backing paper from the self adhesive tape and press the lap down firmly to form a good seal ; between each sheet…



4. …and over the **Tyvek® Eaves Carrier.**

Drainage of moisture from **Tyvek® Metal** may also be achieved by forming a drainage slot into a soffit.

Tyvek® Metal Drainage of moisture from Tyvek® Proclad may also be achieved by forming a drainage slot into a soffit.

Please note: Tyvek® Metal is suitable only for use on a "vapour permeable" supporting layer such as timber boarding (timber planks nominally 150mm wide with a 2mm gap).

Detailing Non-ventilated and sealed systems

Fig. 53

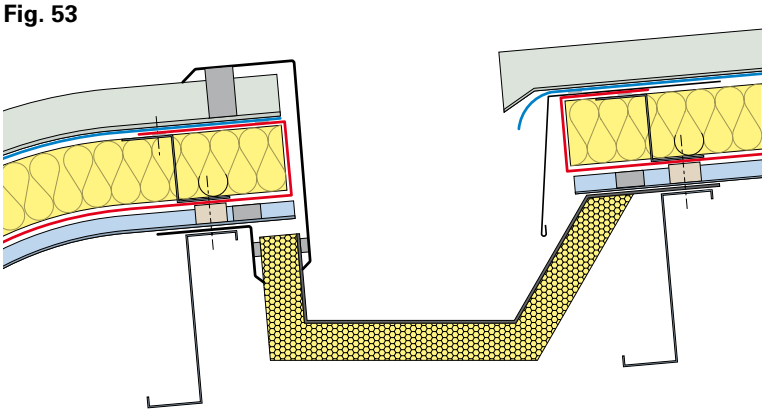


Fig. 54

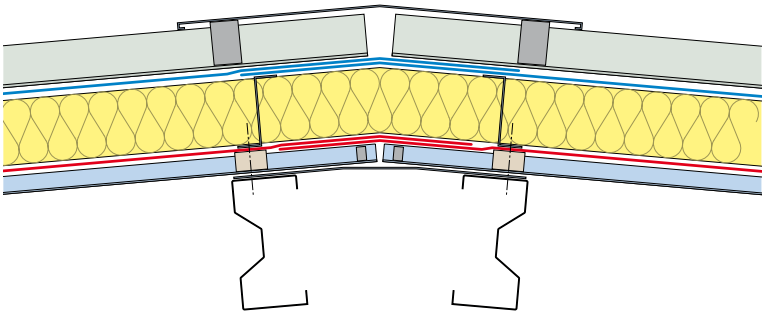
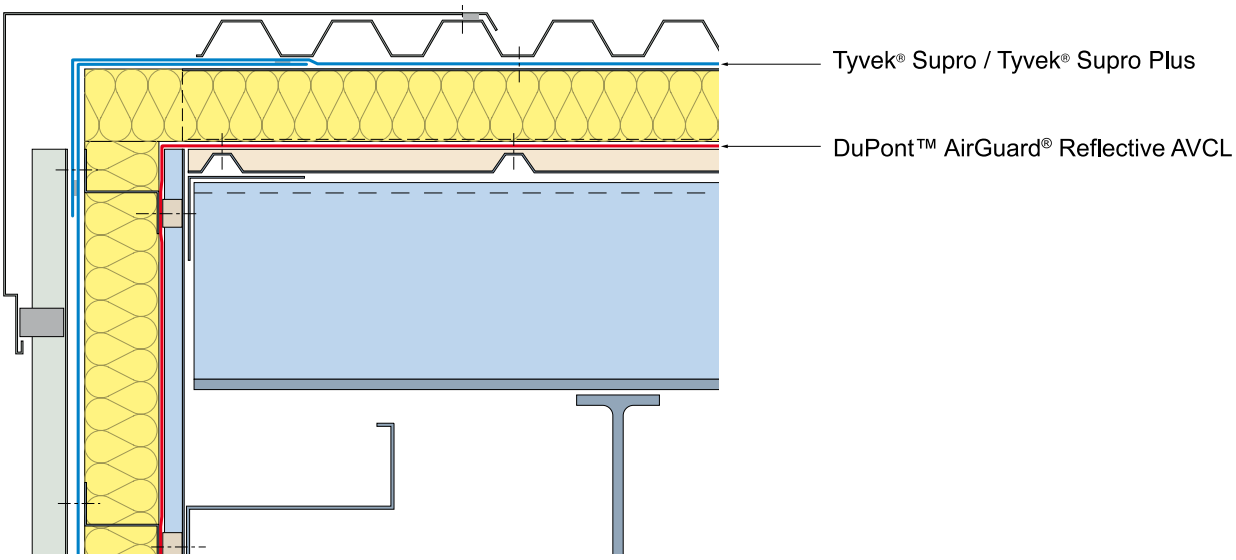


Fig. 55



Eaves (Fig. 53)

Where a Tyvek® membrane is used as the breather membrane in the wall it should be extended onto the roof slope by at least 300mm. The Tyvek® membrane on the roof should be lapped over it and dressed into the gutter. Ensure there is a clear drainage path at the end of the metal sheeting.

Ridge (Fig. 54)

Extend the Tyvek® membrane over the centre line of the ridge by 300mm from both sides, so a double strip of 600mm is formed.

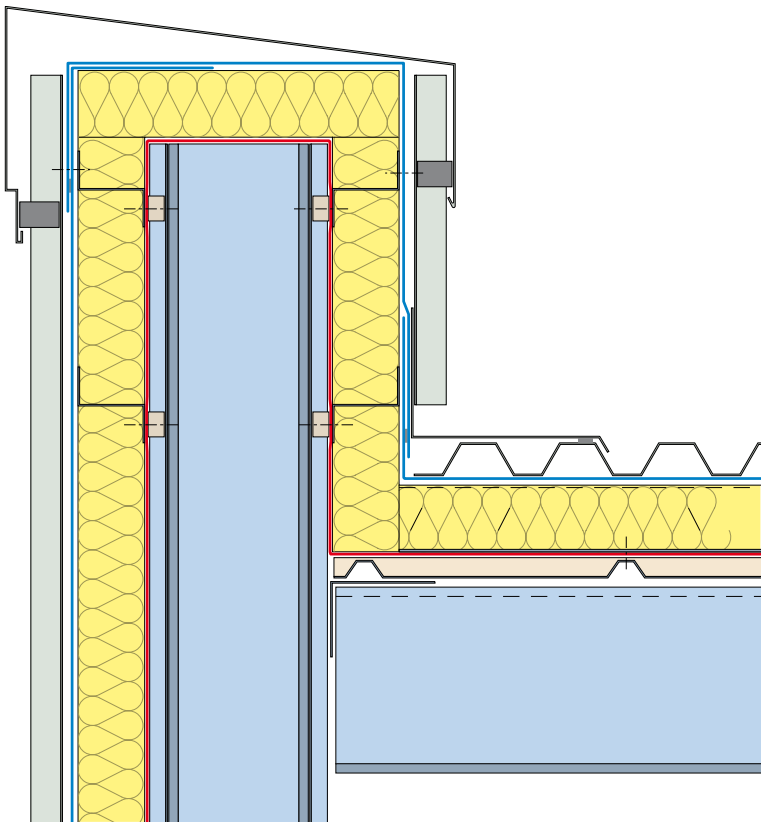
Verge (Fig. 55)

Extend the Tyvek® membrane from the walls 150mm onto the roof. Lap the Tyvek® membrane from the roof a minimum of 150mm over the wall membrane.

The recommended membranes for use in metal clad roof systems is: Tyvek® Supro

Detailing Non-ventilated and sealed systems

Fig. 56



Abutment / parapet (Fig. 56)

Dress the Tyvek® membrane up the face of the wall so as to finish 150mm above the surface of the roof. Lap with the Tyvek® membrane on the wall face.

Sealed Systems

To further improve the thermal efficiency of the construction, the laps in the Tyvek® membrane can be sealed by using **Tyvek® Tape 2060B** (single-sided) or **Tyvek® Double-sided Tape** (acrylic).

Penetrations through the membrane, roof windows and edge details can also be sealed using **Tyvek® Tape 2060B**, **Tyvek® Double-sided Tape** (acrylic) or DuPont™ FlexWrap NF.

Alternatively, **Tyvek® Supro Plus** which has an integral adhesive tape can be specified.

Specification

Specify the roof membrane as **Tyvek® Supro** or **Tyvek® Supro Plus** vapour permeable roof underlay as manufactured by DuPont.

Installation

The Tyvek® membrane should be laid as soon as possible after the insulation has been installed to ensure maximum protection from inclement weather.

On commercial buildings clad with metal sheeting, it is quite common for the membrane to be laid vertically from eaves to ridge, lapping successive runs by 150mm. The fully supported condition in which it is laid sometimes makes this a more practicable method of installation. **Tyvek® Supro Plus** is most appropriate for this application as the vertical laps in the membrane should be sealed.

The membrane can be taken over the ridge by 300mm or taken over the ridge and down the opposite slope in one run.

Internal Air & Vapour Control Layer

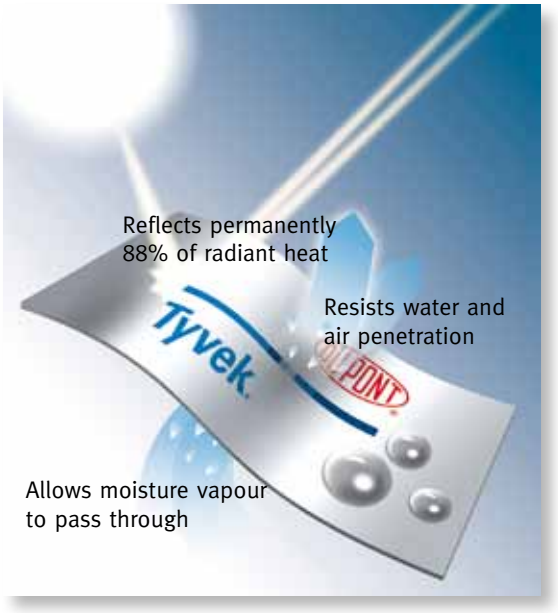
Install **DuPont™ AirGuard® Reflective** on the warm side of the thermal insulation. All laps in the membrane should be minimum 100mm. Seal all laps, penetrations and abutments with **Tyvek® Metallised Tape**

DuPont™ Tyvek® Enercor® Roof

The low emissivity reflective breather membrane for optimal thermal comfort and moisture management

Outstanding Properties

- Trusted performance and proven durability
- The first Reflective Breather Membrane for thermal management - successfully installed in the UK since 2002
- Suitable for all pitched roof types - warm and cold roof systems
- Saves money by providing a robust, durable solution to airtightness and energy efficiency
- Extremely diffusion open membrane with one of the lowest emissivities available on the market
- Improved durability due to less heat absorption of the metallised surface
- High resistance to oxidation due to additional lacquer (assured long term thermal performance)
- Fully BBA certified (No 08/4548, product sheet 7)



Calculation example for a typical hybrid/warm roof system

U-value of entire roof construction achieved with 150mm rafters (and 125mm insulation), to leave a 25mm non-ventilated airspace above. Beneath the rafters is an AVCL with a 12.5mm plasterboard lining and a 25mm service void between.

Insulation	λ (W/m K)	U-value (W/m² K)		
		Standard underlay + AVCL	Tyvek® Enercor® Roof + AVCL	+ DuPont AirGuard® Reflective
Mineral Batt	0.038	0.30	0.28	0.26
	0.037	0.29	0.27	0.26
	0.035	0.28	0.26	0.25
	0.032	0.26	0.25	0.23
PIR	0.022	0.20	0.20	0.19

Installation details

Unsupported Applications (fig. 1 and 2)

Tyvek® Enercor® Roof is installed with the metallised side facing the loft space. It is laid directly over the rafters and allowed to drape slightly for drainage beneath tiling battens. A non-ventilated airspace of nominal 25mm must be maintained between the membrane and the insulation to gain the full thermal benefit of the product's low emissivity surface. Counter battens will not be required in this application.

Fig. 1

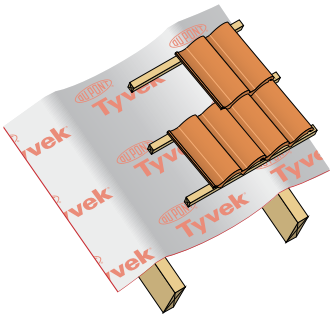
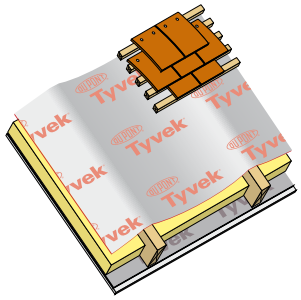


Fig. 2



Over counter battens (fig. 3 and 4)

Tyvek® Enercor® Roof can also be draped over counter battens that are installed over timber boarding or rigid insulation.

Fig. 3

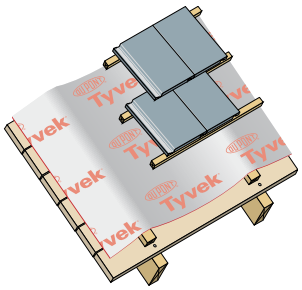
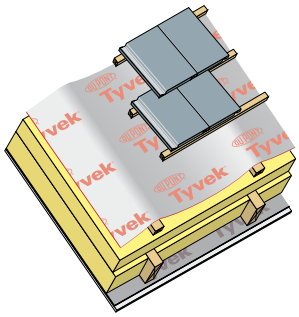


Fig. 4



Sealed roof system (fig. 5 and 6)

Tyvek® Enercor® Roof may also be installed in a fully supported condition with the low emissivity surface facing upwards and counter battens fixed over. This method can be adopted where a sealed system is specified to improve the energy effciency of the roof system. All laps and penetrations in the membrane must be sealed with Tyvek® Metallised Tape.

Fig. 5

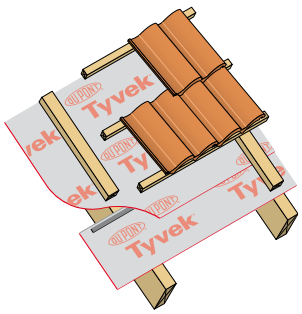
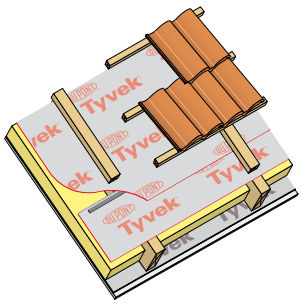


Fig. 6



Internal Lining

DuPont™ AirGuard® Control

In today's modern world, a greater emphasis is being placed on environmental issues and the need to significantly reduce CO2 emissions. It has been reported that buildings in the UK contribute 46% of CO2 emissions - 27% from housing alone. For the prevention of global warming and the benefit of future generations it is **our** obligation to improve the energy efficiency of buildings.

The Building Regulations are already addressing these issues in the form of Approved Documents and in particular Part L, The conservation of fuel and power, now separated into L1 (dwellings) and L2 (buildings other than dwellings). For many years this document has addressed heat loss by **conduction** and includes various solutions and calculation methods on how to meet current u-value requirements. The theory works, but in practice total continuity of insulation layers can be very difficult to achieve. In reality **air infiltration** and heat loss by **convection** will occur through gaps between and around insulation and through hairline cracks in plasterboard linings. These invariably occur during the building drying out process, but are also caused by settlement and thermal movement over the life of the building.

Building Regulations Approved Document L raises the issue of heat loss by **convection** and air infiltration under the heading "Limiting air leakage." It states that: "Reasonable provision should be made to reduce unwanted air leakage."

DuPont™ AirGuard® Control air & vapour control layer

DuPont™ AirGuard® Control has been specifically developed for use as a barrier to air leakage. As the majority of vapour transfer through the building envelope will be via convection the membrane may be termed as an AVCL in this regard. However, the membrane's vapour resistance at 10.5 MNs/g is relatively low and does not fall within the category of an AVCL to BS5250:2011. DuPont™ AirGuard® Control will therefore be an ideal choice for vapour open constructions where a high resistance AVCL is not appropriate. The membrane can be specified as the airtight layer in the ceilings of cold pitched roof systems, helping to reduce convective heat and vapour transfer into the cold loft space in accordance with BS9250:2007.

Recommendation: Installing a timber batten over DuPont™ AirGuard® Control will help maintain the integrity of the membrane as well as to provide a suitable void for services.

Air & Vapour control layer

DuPont™ AirGuard® Reflective may also be installed where Dupont™ AirGuard® Control is indicated. However, in order to benefit from the extra thermal resistance provided by its low emissivity surface a batten space will need to be incorporated.

DuPont™ AirGuard® Reflective - Air & Vapour Control layer (AVCL)

DuPont™ AirGuard® Reflective is a metallised reinforced polypropylene based membrane designed for use as a continuous air and vapour control layer in walls and warm roof systems. As an internal component the membrane is installed behind a plasterboard lining/ceiling to provide effective control against interstitial condensation both by diffusion and by convection. The membrane will reduce convective heat loss through the roof construction as well as retaining heat by reflecting it back in. DuPont™ AirGuard® Reflective has been tested in accordance with CE marking and is classified as airtight. The membrane has a very high vapour resistance at 20520 MNs/g, confirmed by the BBA in Agrement Certificate 08/4548 Product Sheet 4.

To benefit from the membrane's thermal attributes the reflective surface must face a minimum 15mm airspace - usually between the membrane and the plasterboard lining (values for smaller cavities can be established from BS6946). A standard 25mm batten would be ideal for this and will have the added benefit of providing a services void for electrical wiring and pipework. The batten space will also serve to minimise penetrations through the membrane from plasterboard fixings, light fittings, etc. Whilst this batten space is optional it is highly recommended, as the membrane's continuity is a principal factor in making the complete layer air and vapour tight. A high degree of workmanship is therefore key to a successful pressure test result.

Airtightness

DuPont™ AirGuard® Reflective is completely airtight and therefore will form an integral component in warm roof systems to reduce uncontrolled air leakage and subsequent heat loss. A correctly installed membrane will help to meet the requirements of Approved Document L by limiting the design air permeability well below the required **10m³/(h.m²) at 50 Pa**.

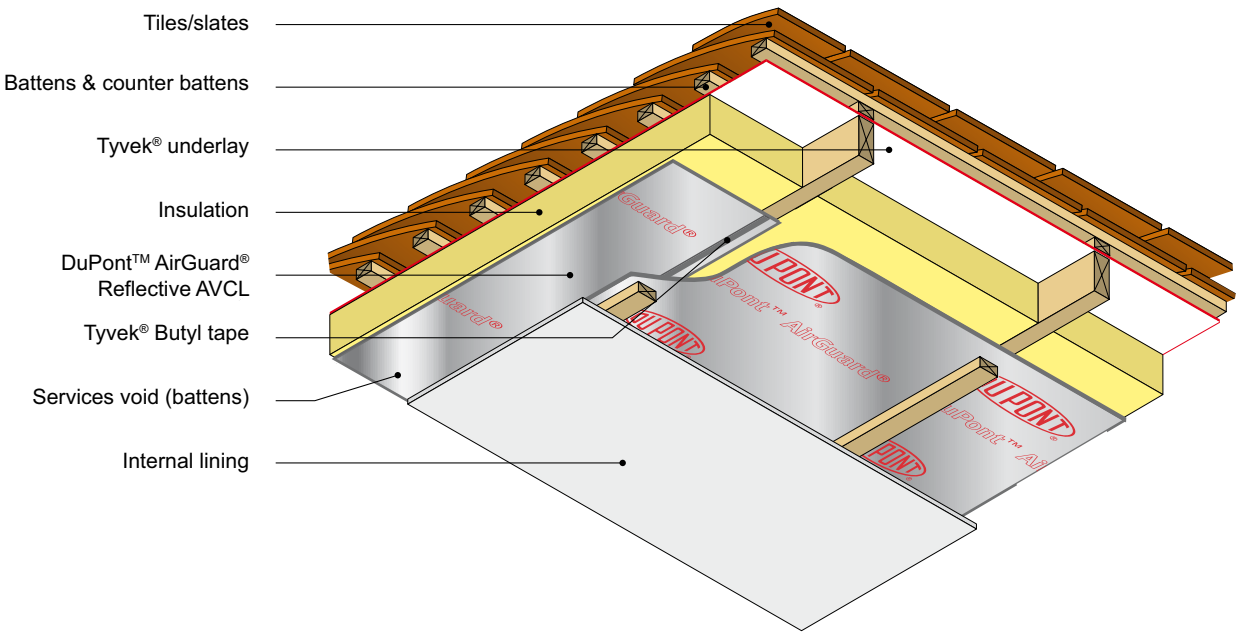
Vapour Control

DuPont™ AirGuard® Reflective provides high resistance to the passage of water vapour both by diffusion and convection. When installed continuously with all laps and penetrations sealed, the membrane will provide effective condensation control for warm roofs in all building types. This includes those of high humidity class, eg. swimming pools, textile factories, etc.

Thermal comfort

The metallised face of DuPont™ AirGuard® provides a low emissivity surface on the internal side of a warm roof construction. When used with a batten space the membrane will reflect internally generated heat back into the building providing a back-up to traditional insulation. This reduction in heat transmission allows the airspace resistance to be increased to **0.45 m²K/W**, which can be added to the overall U-value of the roof system.

Fig. 57



Please refer to page 37 for detailing

NEW DuPont™ AirGuard® Smart

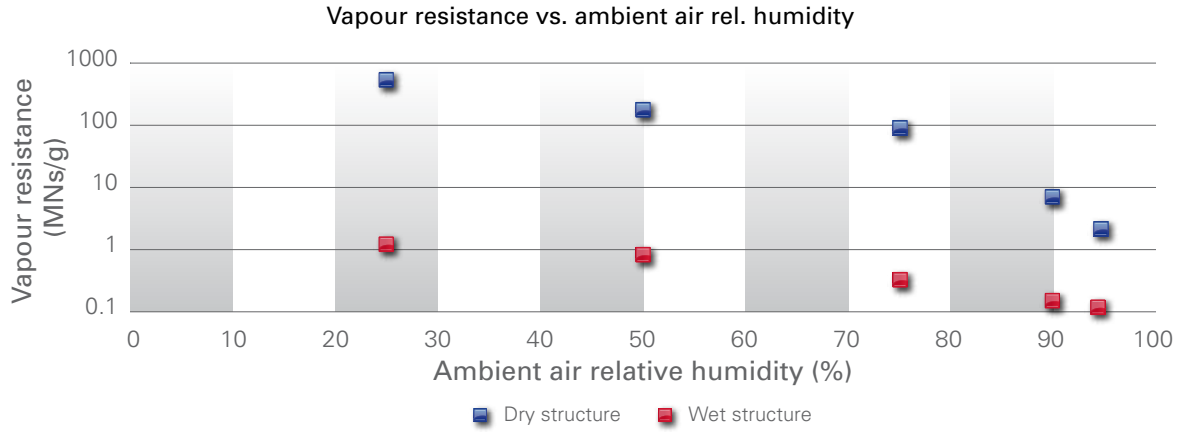
DuPont™ AirGuard® Smart is a strong and lightweight flexible membrane for use as an internally applied airtight vapour control layer (AVCL).

Outstanding properties:

- Extreme vapour resistance range from 0.26 MNs/g to more than 150 MNs/g, (Sd value 0.05 m - more than 30 m), therefore highly adaptable → one of the widest vapour resistance spans known in the market
- Combines drying-out and vapour control function in one layer
- High drying-out potential = maximum protection against structural damage
- High tensile strength offering superior insulation support/retention
- Very robust - offering versatility in site work
- Airtight
- Transparent allowing the timber members to be easily located for fixing
- Easy to install - suitable for use in roof or wall constructions

How DuPont™ AirGuard® Smart works

The graph shows 2 extreme examples:
1. Wet (100%) and 2. dry (0%) building envelope structure and corresponding vapour Rs (resistance) - depending on ambient air relative humidity. The actual vapour Rs is a combination of both the moisture content of the building envelope and relative humidity of the internal air. DuPont™ AirGuard® Smart provides traditional vapour control to the diffusion of vapour from the building interior, whilst offering a high drying-out potential of built-in moisture back into the building.



What happens just after a new build construction or after renovation?

New construction

Condition just after completion: Moisture is confined within the building envelope; damp timbers, insulation, etc, due mainly to wet building processes.

A new-build property will very often have a high relative humidity due to the rapid drying of the building fabric. Hence after completion, the owner has to adequately ventilate the building interior to expel the moisture rather than allow it to migrate through the construction where it can condense and cause harm. If needed the DuPont™ AirGuard® Smart allows moisture within the building fabric to migrate back into the building. Where the moisture content within the structure is high the vapour resistance of DuPont™ AirGuard® Smart will always be low This will allow the structural elements and the insulation to dry out towards the warm side of the building, in addition to the normal process of vapour diffusion through the external DuPont™ Tyvek® breather membrane.

Renovation

Condition just after completion: Building structure and insulation dry after brief humidity stabilisation.

In the case of a dry building structure, DuPont™ AirGuard® Smart acts as a traditional AVCL, providing effective condensation control and airtightness. Even in temporarily high air humidity zones water vapour diffusion is reduced*. The vapour resistance of DuPont™ AirGuard® Smart will be between 0.26 MNs/g and more than 150 MNs/g, (Sd value 0.5 m - more than 30 m). The migration of newly generated moisture through the construction will be significantly reduced.

*DuPont™ AirGuard® Smart is not suitable for places with permanent high ambient air humidity, such as saunas or swimming pools.

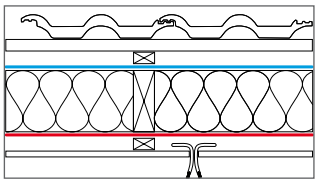
Installation: DuPont™ AirGuard® Control, DuPont™ AirGuard® Reflective, DuPont™ AirGuard® Smart

Product selection – roof applications

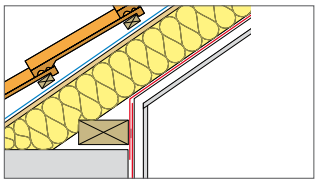
	DuPont™ AirGuard® Reflective	NEW: DuPont™ AirGuard® Smart	DuPont™ AirGuard® Control
Properties of high internal humidity	✔		
Warm pitched roofs	✔	✔	
Flat roofs	✔	✔	
Enhancing thermal performance	✔		
Existing properties with damp structure		✔	
New properties during drying out		✔	
Properties of low internal humidity		✔	✔
Cold pitched roofs			✔
Room-in-roof applications	✔	✔	✔

Installation

1 - Services void

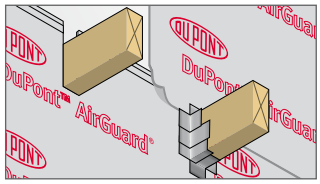


2 - Sloping ceiling/wall junction



3 - Flat ceiling/wall junction

4 – Making good around penetrations



Detailing

The integrity of a DuPont™ AirGuard® AVCL is essential for it to provide effective control to the passage of water vapour and convective heat loss. The internal lining (plasterboard, etc.) may be applied directly against the membrane if required, but for best practice fixing a batten over the membrane to create a services void is recommended. Please note: The reflective surface of DuPont™ AirGuard® Reflective must face a minimum 15mm airspace (1).

Continuity

Maximum coverage of a DuPont™ AirGuard® AVCL must be maintained at all junctions, including adjoining roofs and adjacent walls (2 & 3).

Penetrations and making good

Penetrations through the membrane should be kept to a minimum and any that are made should be sealed. Cuts in the membrane at details such as corners to roof windows and loft hatches should be made vapour and convection tight, as well as any penetrations for pipework, wiring and light fittings (4).

Product selection - roof applications

	Tyvek® Acrylic Tape 2060B	Tyvek® Metallised Tape	DuPont™ FlexWrap NF	Tyvek® Butyl Tape	Tyvek® Double-sided Tape
Membrane laps and making good to cuts and damage repair					
DuPont™ AirGuard® Control	✔				
DuPont™ AirGuard® Smart	✔				
DuPont™ AirGuard® Reflective		✔			
Making good around service pentrations and at corners of roof windows/loft hatches					
DuPont™ AirGuard® Control	✔				
DuPont™ AirGuard® Smart	✔		✔		
DuPont™ AirGuard® Reflective		✔			
Bonding to planed timber & metal framing					
All DuPont™ AirGuard® AVCL Membranes				✔	✔
Bonding to rough sawn timber & masonry					
All DuPont™ AirGuard® AVCL Membranes				✔	
Sealing nail and screw penetrations					
All DuPont™ AirGuard® AVCL Membranes				✔	

For further information on tape selection please refer to page 44

Non-ventilated and sealed systems

Underlay

Shall be **Tyvek® Supro** or **Tyvek® Supro Plus** vapour permeable roof underlay as manufactured by DuPont de Nemours (Luxembourg) Sàrl and supplied by DuPont™ Tyvek®, Hither Green Trading Estate Clevedon, North Somerset, BS21 6XU, Tel. 01275 337660, Fax: 01275 879033.

Storage

Rolls should be stored palletised or on their sides on a smooth clean surface, under cover and protected from direct sunlight.

Installation

General

Care should be taken when handling the membrane in order to prevent tears and punctures occurring. Any that do occur should be repaired with **Tyvek® Tape 2060B** (single sided).

Eaves

Tyvek® Eaves Carrier (PVC sheet 1300mm x 230mm) should be secured over the fascia board and rafters with felt nails and extended into the gutter. Install the first run of Tyvek® underlay parallel to the eaves so that the leading edge is in line with the rear of the fascia board, (the "pinch point."). The membrane should lap onto the Eaves Carrier by a minimum of 150mm.

Fixing: Supported applications - Non-ventilated

Tyvek® Supro or Tyvek® Supro Plus should be laid horizontally across the roof slope in a taut condition over insulation and secured with stainless steel staples or galvanised nails at maximum 300mm centres. Counter battens of minimum depth 12mm should be installed over the membrane. Horizontal laps in the membrane should be 150mm.

Note ⓐ **Tyvek® Supro** may also be laid over timber boarding.

Note ⓑ If the membrane is supported by insulation that is positioned over rafters (warm roofs), larger counter battens should be used to provide the required bearing for batten fixing.

Re: BBA certificate 08/4548,

Fixing: Supported applications - Sealed

Tyvek® Supro or Tyvek® Supro Plus should be laid horizontally across the roof slope in a taut condition over insulation and secured with stainless steel staples or galvanised nails at maximum 300mm centres. Counter battens of size: 25mm x 50mm should be installed over the membrane. Horizontal laps in the membrane should be 150mm and be sealed with adhesive tape:

- Laps in **Tyvek® Supro** should be sealed with **Tyvek® Tape 2060B** (single sided) or **Tyvek® Double-sided Tape** (acrylic)
- Laps in **Tyvek® Supro Plus** should be sealed with the integral adhesive tape provided.

Note ⓐ **Tyvek® Supro or Tyvek® Supro Plus** may also be laid over timber boarding.

Note ⓑ If the membrane is supported by insulation that is positioned over rafters (warm roofs), larger counter battens should be used to provide the required bearing for batten fixing.

Re: BBA certificate 08/4548,

Non-ventilated and sealed systems

Fixing: Scottish sarking applications - Non-ventilated / Sealed

Tyvek® Supro should be laid horizontally across the roof slope over 150mm wide timber boarding with 2mm gaps and secured with galvanised clout nails at maximum 300mm centres. Lay the slates directly onto the membrane and fix into the timber sarking as in traditional practice. Horizontal laps in the membrane should be 150mm.

A sealed system can be achieved by sealing the laps with adhesive tape:

- Laps in **Tyvek® Supro** should be sealed with **Tyvek® Tape 2060B** (single sided) or **Tyvek® Double-sided Tape** (acrylic).
- Laps in **Tyvek® Supro Plus** should be sealed with the integral adhesive tape provided.

Re: BBA certificate 08/4548.

Fixing: Unsupported applications - Non-ventilated

Tyvek® Supro should be laid horizontally across the roof slope and draped approx 10mm over rafters or counter battens. Membrane should be secured with stainless steel staples or galvanised nails at maximum 300mm centres. Horizontal laps in the membrane should be 150mm.

Re: BBA certificate 08/4548.

Fixing: Unsupported applications - Sealed

Tyvek® Supro or Tyvek® Supro Plus should be laid horizontally across the roof slope in a taut condition over rafters and secured with stainless steel staples or galvanised nails at maximum 300mm centres. Counter battens of size 25mm x 50mm should be installed over the membrane. Horizontal laps in the membrane should be 150mm and be sealed with adhesive tape:

- Laps in **Tyvek® Supro** should be sealed with **Tyvek® Tape 2060B** (single sided) or **Tyvek® Double-sided Tape** (acrylic).
- Laps in **Tyvek® Supro Plus** should be sealed with the integral adhesive tape provided.

Re: BBA certificate 08/4548.

Valleys - Lead / GRP (also applicable for parapet details)

Cover entirely the timber or ply valley board with a separate strip of Tyvek® underlay as a separation layer and for continuous protection against external moisture. Once the lead or GRP lining is installed, bring the main Tyvek® layers into the valley terminating over the tilt fillet/edge batten so that the membrane is not visibly exposed to direct sunlight. The edges of the Tyvek® separation layer should lap under the roof underlay by a minimum of 150mm.

Valleys - Tiled

Dress the Tyvek® underlay into the valley, beyond the centre-line by a minimum of 300mm either side so as to create a double layer of 600mm. Continue to lay the tiles over in the normal way.

Non-ventilated and sealed systems

Ridges (duo-pitch)

The underlay should lap at least 150mm down each side of the slope so that a 300mm wide double layer is formed over the centre-line of the ridge.

Ridges (mono-pitch)

Extend the underlay over the ridge batten and terminate on the external face of the wall behind the ridge tile/ fascia board.

Hips

The underlay should lap at least 300mm down each side of the hip so that a 600mm wide double layer is formed over the centre-line of the hip.

Verges

Terminate the underlay at the external face of the wall and secure with a timber batten or dress into mortar. If a fascia board is specified turn the membrane a minimum of 50mm up the board.

Abutments

Turn the underlay up the face of the wall a minimum of 75mm or terminate behind the lead flashing. Where a secret gutter is specified terminate the underlay over the fixing batten.

Penetrations

The underlay should be dressed so as to direct water away from all penetrations in the membrane. An upstand of 75mm min. should be formed around the penetration to prevent water ingress. Any cuts in the membrane at corners, junctions, etc., should be made good with **Tyvek® Tape 2060B** (single sided).

Sealing

A sealed system can be achieved by sealing all laps, penetrations, perimeters and abutments with **Tyvek® Tape 2060B** (single sided), **Tyvek® Double-sided Tape**. The Tyvek® membrane should be laid in a taut condition in order for the sealing tape to be applied to the laps. As part of the sealed roof system a counter batten should be fixed over the membrane.

Re: BBA certificate 08/4548.

Counter Battens

Where counter battens are installed over the membrane it is important to ensure that they are tightly secured in order to avoid water penetration through the fixing points.

Internal Air & Vapour Control Layer

Shall be **DuPont™ AirGuard® Control, Smart** or **DuPont™ AirGuard® Reflective** as manufactured by DuPont de Nemours (Luxembourg) Sàrl and supplied by DuPont™ Tyvek® Hither Green Estate, Clevedon, North Somerset, BS21 6XU
Tel.: 01275 337660
Fax: 01275 879033

Fixing

Install **DuPont™ AirGuard® Control, Smart** or **DuPont™ AirGuard® Reflective** on the warm side of the thermal insulation and fix to the underside of the rafters/ joists with stainless steel staples or galvanised nails at maximum 300mm centres. All laps in the membrane should be minimum 100mm. Seal all laps, penetrations and abutments with **Tyvek® Tape 2060B** (single sided) or **Tyvek® Double-sided Tape** (acrylic).

DuPont™ AirGuard® Reflective should be laid with the metallised surface facing inwards. A timber batten should be fixed over the membrane prior to the installation of the internal lining (plasterboad) to benefit from its thermal resistance value. Seal all laps of the membrane with **Tyvek® Metallised Tape. DuPont™ AirGuard® Reflective** is especially recommended for warm roof and **DuPont™ AirGuard® Control** is recommended for cold roofs.

Questions & Answers

Can a Tyvek® membrane be installed as a roofing underlay without ventilation?

Yes. Tyvek® underlays are BBA certified for non-ventilated applications. No eaves or ridge ventilation is necessary.

Can Tyvek® membranes be used on new build and refurbishment work without ventilation?

Yes, but care must be taken to ensure that all internal linings (ceilings) are intact so that adequate vapour control is provided.

Is an air & vapour control layer (AVCL) required when using a Tyvek® membrane in a non-ventilated application?

An AVCL should always be installed over areas of high humidity regardless of whether the system is ventilated or not. This would apply to bathrooms and kitchens but particularly to swimming pools and saunas. An AVCL may not be required over low humidity areas such as offices, but the efficiency of the system will always be improved if an AVCL is included. This applies to both vapour control and airtightness. Internal finishes such as suspended ceilings will not provide sufficient air & vapour control on
their own.

Do counter battens need to be installed when the Tyvek® membrane is laid over rafters in an unsupported condition?

No, provided that the Tyvek® membrane can be draped sufficiently between the rafters. Tyvek® Supro should be used here.

When laying Tyvek® unsupported how much airspace beneath is required to allow the membrane to drape?

Approximately 10mm.

Do counter battens need to be installed when the Tyvek® membrane is laid directly over insulation in a fully supported condition?

Yes. As with all roofing underlays a counter batten should be installed here.

Can Tyvek® be installed draped over counter battens?

Yes. Tyvek® Supro should be used for this method of application.

Can the Tyvek® membrane be installed beneath counter battens?

Yes. The membrane will then be laid in a taut condition which allows the laps to be sealed if required.

Can water permeate through the Tyvek® membrane when laid directly over insulation or timber boarding?

No. Tyvek® membranes do not "tent" water (capillary action). However, care should be taken to ensure that counter battens that are installed over the membrane are tightly secured.

What is the difference between a "nonventilated" system and a "sealed" system?

Both systems are non-ventilated, but the sealed system includes adhesive tape at all laps in the Tyvek® membrane, penetrations and edge details. A counter batten over the membrane is included in the Tyvek® sealed roof specification.

Does the Tyvek® membrane need to be sealed?

No. Sealing the Tyvek® membrane is optional and is specified where maximum thermal efficiency is required.

Can Tyvek® be used on a roof that has been constructed below the recommended minimum pitch of the tile or slate?

Yes, but the Tyvek® membrane should be installed in two layers (double felted) with staggered laps. Please refer to page 26 for details.

Can Tyvek® be laid directly over timber sarking without battens or counter battens as in traditional Scottish practice?

Yes. The slates may be secured through the membrane and into the boarding in the normal way. The sarking board will need to be timber boarding of 150mm wide with 2mm gaps.

Is ventilation to the batten space required when using Tyvek® in a nonventilated or sealed roof system ?

No. Natural air movement between tiles and slates will be sufficient to remove any water vapour from the batten space.

Can Tyvek® be dressed into the gutter as in traditional practice?

No. It is generally accepted as good practice for all roofing underlays to be stopped short of the gutter, overlapping a "proprietary eaves protection device" (BS5534). This is a UV resistant eaves sheet such as Tyvek® Eaves Carrier that replaces the underlay as the "drip" into the gutter. The roofing underlay should not be left permanently exposed to direct sunlight.

Can Tyvek® be left exposed temporarily, before the tiles/slates are installed?

Yes. The ultra violet stability of Tyvek® membranes allows them to be left exposed for a period not exceeding 4 months. However, this will only apply when the membrane is adequately secured.

Are Tyvek® membranes suitable for installation into non-ventilated flat roof systems?

No. Tyvek® membranes are suitable for non-ventilated pitched roof applications only. In flat roofing a Tyvek® membrane may only be used as a protection layer over insulation or as a separation layer between metal sheeting and a supporting deck.

Before any final decision is made with below pitched applications please contact the DuPont™ Tyvek® Technical service department for clarification
Tel.: 01275 337660

Product Data

			Tyvek® Supro / Supro Plus BBA Certificate 08/4548	Tyvek® Enercor® Roof BBA Certificate 08/P002
				
Composition			Spunbonded polyethylene and polypropylene / Tyvek® Supro Plus includes acrylic adhesive	Spunbonded polyethylene metallised and polypropylene
Thickness (mm)			0.45	0.45
Weight (g/m²)			145	148
Roll width (m)			1.0 1.5	1.0
Roll length (m)			50	50
Roll weight (kg)			8.5 12	8
Rolls per pallet / box			24	24
Performance characteristics		**Test Method**	**Tyvek® Supro / Supro Plus (2507B)**	**Tyvek® Enercor® Roof (2537M)**
Water vapour resistance (MN.s/g)		BS 3177:1959	0.22	0.13
Water vapour permeability (g/m²/day)	measured by **BBA**	BS 3177:1959	935	/
Sd (m)*		EN ISO 12572	0.015	0.025
Resistance to water penetration	measured by **BBA**	MOAT 27:5.1.4.2:1983 1.0m head of water	pass	pass
Head of water sustained with no penetration (m)		BS EN 20811:1992 (1996) (speed 60cm/min)	2.0	1.5
Resistance to penetration of air (m³/m²/hr at 50Pa)		EN 12114	≤0,25	≤0,15
Tensile strength (N/5cm)		EN 12311-1 MD/XD	300/255	245/205
Elongation (%)		EN 12311-1	13/22	10/18
Nail tear resistance (N)		EN 12310-1 MD/XD	175/190	175/195
Fire classification		EN-11925-2	E	E
Emissivity			/	0,15
CE Certification CE		EN 13859-1	Yes	Yes

Tyvek® Metal		DuPont™ AirGuard® Reflective BBA Certificates 90/2548 and 08/4548	DuPont™ AirGuard® Control BBA Certificates 90/2548 and 08/4548	New DuPont™ AirGuard® Smart
				
Spunbonded polyethylene and polypropylene with polypropylene mesh		Polyethylene, Polypropylene, Aluminum	DuPont™ Typar® spunbond & Ethylen-Butylacrylate Copolymer	DuPont™ Typar® (PP), Film, spunbond PP
7.4		0.43	0.3	0.4
350		149	108	139
1.5		1.5	1.5	1.5
25		50	50	50
11.5		12.0	8.5	11
8		24	24	24
Tyvek® Metal (2510B)	**Test Method**	**DuPont™ AirGuard® Reflective (5814X)**	**DuPont™ AirGuard® Control (8327AD)**	**DuPont™ AirGuard® Smart (8407A)**
/		20520	≥10.5	0.26 - 156
/		/	≤20	0.05 - 30
0.03	EN 1931	2000	2	13
pass	MOAT 27:5.1.4.2:1983 1.0m head of water	pass	pass	/
>2.0		/	/	/
≤0,1	ISO 5636/5 (Gurley)	>2000s	>2000s	>2000s
345/290	EN 12311-2	440/210	200/170	360/300
14/20	EN 12311-2	25/22	38/38	30/20
175/175	EN 12310-1 MD/XD	230/250	240/240	310/330
E	EN-11925-2	E **	E	E
/		0,05	/	/
Yes	EN 13984	Yes	Yes	Yes

* tested acc.to EN ISO 12572 climat C (multilayer method).
**installed on mineralwool.

Product Data

	DuPont™ Tyvek® Acrylic Tape (2060B)	DuPont™ Tyvek® Butyl Tape (1310B)	DuPont™ Tyvek® Double Sided Acrylic Tape (1310D)	DuPont™ Tyvek® Metallised Tape (2060M)	Tyvek® UV Facade Tape (1310F)	DuPont™ FlexWrap NF (FLEXNF)
						
Composition	Spunbonded polyethylene /single sided acrylic adhesive / paper release liner	100% butyl mass / paper release liner	PES/PVA-grid / acrylic adhesive / paper release liner	Spunbonded polyethylene /single sided acrylic adhesive / metallised paper release liner	Single-sided acrylic tape / high UV-stabilised Polypropylene / paper release liner	A crimped DuPont™ Tyvek® top sheet /butyl mass / paper release liner
Thickness (mm)	0.3	1.2	0.15	0.3		1.6
Weight (g/m²)	320	1560	220	320	410	1200
Roll width (mm)	75	50 20	50	75	75	150
Roll length (m)	25	30	25	25	20	22.9
Roll weight (kg)	0.7	2.5 1.0	0.3	0.7	0.7	4.5
Rolls per pallet/box	6	8	10	6	8	1

Applications	Tyvek® 2060B Tape	Tyvek® Metallised Tape	Tyvek® Double Sided Acrylic Tape	Tyvek® Butyl Tape	Tyvek® Flexwrap	Tyvek® UV Facade Tape
Roofing membranes						
Tyvek® Supro	✔		✔	✔	✔	
Tyvek® Enercor® Roof	✔	✔	✔	✔		
Tyvek® Metal			✔	✔		
Wall membranes						
Tyvek® Housewrap	✔		✔	✔	✔	
Tyvek® Soft	✔		✔	✔	✔	
Tyvek® UV Facade			✔	✔		✔
Tyvek® Reflex/Enercor® Wall		✔	✔	✔		
Internal AVCL's						
DuPont™ AirGuard® Control	✔		✔	✔	✔	
DuPont™ AirGuard® Reflective		✔	✔	✔		
DuPont™ AirGuard® Smart	✔		✔	✔	✔	
Materials						
Masonry/concrete/render (smooth)	✔	✔	✔	✔	✔	✔
Brick/block/concrete (rough)				✔	✔	
Plasterboard	✔	✔	✔	✔	✔	✔
Eaves Carrier			✔	✔		
Window/door frames	✔	✔	✔	✔	✔	✔
Metal surface	✔	✔	✔	✔	✔	✔
Timber (rough sawn)				✔	✔	
Timber (planed)	✔	✔	✔	✔	✔	✔
Details						
Pipe penetrations (plastic)	✔	✔			✔	✔
Pipe penetrations (metal)	✔	✔			✔	✔
Wiring/cable penetrations	✔	✔				✔
Chimneys				✔	✔	
Chimneys (making good corners)	✔	✔			✔	
Around electrical sockets	✔		✔	✔	✔	
Other						
Damage repair	✔	✔				✔
Nail penetration*				✔		
Making good	✔	✔				✔
Laps sealing	✔	✔	✔		✔	✔

*Under batten

Note: It is important to ensure that site conditions are appropriate when applying DuPont adhesive tapes. The efficiency of the adhesive to provide a suitable tack may be affected by low temperatures (below 5oC), contamination to bonding surfaces and the presence of moisture. More product specific information can be found on our website: construction.tyvek.co.uk

Tyvek® product range and applications

General Notes

Ordering, supply and delivery

DuPont™ Tyvek® membranes and accessories are supplied and technically serviced in the UK & Ireland and are available through most local and national roofing and builders merchants.

Packaging and identification

Rolls of Tyvek® membranes are individually wrapped and contain a label bearing the Tyvek® grade (eg. Tyvek® Supro), the company name, address and telephone number, together with fixing instructions. A printed overlap line is indicated on the top surface of the material together with a continuous identification legend: DuPont™ Tyvek®.

Damage

Whilst Tyvek® membranes are extremely durable there may be occasions when the membrane is damaged as a result of careless Minor damage can be easily repaired with a suitable single sided tape referred to on page 44. Areas of the membrane that suffer extensive damage should be replaced, or covered with a Tyvek® patch. In this case the affected area should be covered entirely, taking care to lap the sheets correctly by a minimum 150mm.

Fire

The products have similar properties in relation to those of traditional roof tile underlay. Tyvek® membranes will melt and shrink away from heat, but will burn in the presence of an ignition source. They will not give off any harmful gases.

Insect attack

Whilst wasps may occasionally pose a threat to Tyvek® membranes and other similar materials, the threat of attack by insects, birds or vermin generally is very rare.

Compatibility

Tyvek® membranes are compatible with most materials associated with the construction process, including sand / cement and lime rendering, silicone and bitumen. Fibre contraction within the membrane can sometimes occur when in contact with water or solvent based timber treatments, temporarily resulting in a slight loss of water resistance. This may apply to wet treatments, freshly applied or soaked by rainfall, or where spray applied micro emulsion treatments are retrospectively applied. Sufficient time must be allowed for timber treatments to dry before the installation of the Tyvek® membrane.

Health and safety

In normal installation and usage Tyvek® membranes do not present a hazard under the COSHH regulations. Handling single rolls of Tyvek® does not present a risk of injury, provided recommended safe practices in lifting and handling are followed. As with paper, freshly cut edges can be sharp, but cutting the material does not produce hazardous dust. COSHH information in accordance with directive 93/112/EC is available on request. Tyvek® membranes are 100% recyclable.

Durability

Tyvek® membranes will retain their durability at temperatures down to -40°C and up to 100°C. Properly secured Tyvek® membranes may be left exposed to the elements for a period not exceeding 4 months. Weak points such as nail holes, membrane laps, penetrations and other detailing should be considered for potential water ingress during this temporary exposure period.

Technical Support

DuPont™ Tyvek® offer a high level of technical support to assist with detailed proposals or specifications that include Tyvek® membranes. Full technical back up includes:

Telephone helpline:

discuss details and solutions with one of our technical consultants.

Written confirmation:

for assistance with Building Regulations applications, warranties, acceptance of proposals and suitability of applications.

Technical literature:

Agrément certificates, technical brochures and COSHH information.

Site assistance:

On-site technical liaison with one of our Regional Managers.

Seminars:

guidance on Tyvek® applications, control of condensation, energy efficiency and legislative compliance.

Condensation Risk Analysis:

to demonstrate compliance with the Approved Documents of the Building Regulations, condensation risk assessments to BS EN ISO 13788 are available on request. (See following page).

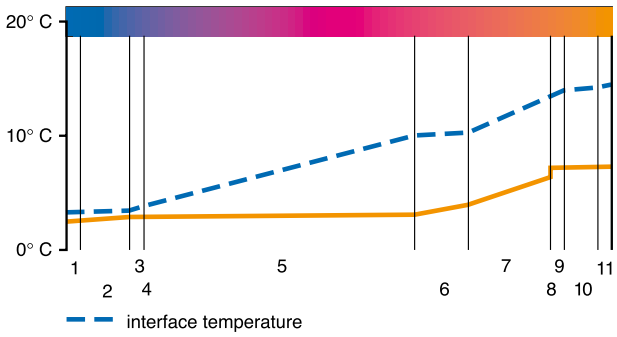
For information, please call our Technical Support Department:
01275 337660

General Notes

Condensation Risk Analysis

In order to assess the risk of interstitial condensation a free analysis can be carried out for proposed wall or floor constructions where a Tyvek® membrane is specified. The analysis uses the calculation method contained in BS EN ISO 13788, and as referred to within Annex D of BS5250:2011.

Condensation Risk Graph



To obtain the analysis please complete this form and fax to Tyvek® Technical Support on: 01275 87 90 33

Name & address: ..... **Tel:** .....

..... **Fax:** .....

..... **E-mail:** .....

Projet ref: .....

Building type

(please tick **one** only)

- ☐ Office / shop
- ☐ Domestic / residential
- ☐ Public / community building
- ☐ Church
- ☐ School
- ☐ Sports / activity
- ☐ Swimming pool
- ☐ Other .....

Pitched roof system

(please tick **one** only)

- ☐ Insulation at joist level (roof pitch .....)
- ☐ Insulation beneath rafters
- ☐ Insulation beneath & between rafters
- ☐ Insulation between rafters
- ☐ Insulation between and over rafters
- ☐ Insulation over rafters
- ☐ Insulation over rafters & between counter battens
- ☐ Other .....

Rafters / joists = ...mm x ..... mm @ .....centres

Exposure rating (please specify) ☐ sheltered ☐ normal ☐ exposed

Construction details (please list construction build-up starting with the external layers)

Outside 1. .....

2. .....

3. .....

4. .....

5. .....

6. .....

7. .....

8. .....

Inside 9. .....

Typical example:

Tiles / slates
25 x 38mm battens
Tyvek® Supro
25mm airspace
100mm PIR Insulation
DuPont™ AirGuard® Control
12,5mm plasterboard.

Tyvek® membranes wall and floor applications

British & European Standards

BS3177: 1959 (95)	Method for determining the permeability to water vapour of flexible sheet materials used for packaging
BS2782: Pt 3 1976 (96)	Methods of testing plastics: Mechanical properties. Methods 320A-320F. Tensile strength, elongation and elastic modulus
BS4016: 1997	Specification for Flexible building membranes (breather type)
BS5250:2011	Code of practice for Control of condensation in buildings
BS EN ISO 13788: 2002	Calculation methods (Interstitial condensation)
BS5534: Part 1:1997	Code of practice for Slating and tiling
BS6399: Part 2:1997	Code of practice for wind loads
BS EN 20811: 1992 (96)	Textiles - Determination of resistance to water penetration. Hydrostatic pressure tests
Moat No.27: 1983	General Directive for the Assessment of Roof Waterproofing Systems
BS EN 12114: 2000	Thermal performance of buildings - Air permeability of building components and building elements - Laboratory test method
EN 12311-1: 2000	Flexible sheets for waterproofing - Determination of tensile properties - Part 1 - Bitumen sheets for roof waterproofing
EN ISO 11925-2: 2002	Reaction to fire tests - Ignitability of building products subjected to direct impingement of flame - Single-flame source test
EN ISO 12572: 2001	Hygrothermal performance of building materials and products - Determination of water vapour transmission properties
EN 13859-1 (Feb 2005)	Flexible sheets for water proofing - Part 1: Underlays for discontinuous roofing
EN 13984 (Dec 2004)	Plastic and rubber vapour control layers
ISO 9001: 2000	Quality systems - Model for quality assurance in design, development, production, installation and servicing
ISO 14001: 1994	Implementation of an Environmental Management System (EMS)

Regulations and Technical References

- Building Regulations 2000 (as amended)
  Approved Document L (L1A, L1B, L2A, L2B)
- Building Regulations 2000 (as amended)
  Approved Document C (C2)
- Building (Scotland) Regulations 2004 The Scottish Building Standards:
  > Section 3.10.1 Precipitation - General Provisions (G3.1)
  > Section 3.15.4 Condensation - Interstitial Condensation (G4.1)
  > Section 6.2.1 Building Insulation Envelope - Elemental Method (J3.2, J8.3)
- TRADA Wood Information Sheet 1-35
- TRADA Technology, Timber Frame Construction
  (4th Edition 2007)
- CIBSE Guide A: Environmental Design (7th Edition 2006).

About DuPont

DuPont Luxembourg site

DuPont is a science company. Founded in 1802, DuPont puts science to work by solving problems and creating solutions that make people's lives better, safer and easier. Operating in more than 70 countries, the company offers a wide range of products and services to markets including agriculture, nutrition, electronics, communications, safety and protection, home and construction, transportation and apparel. Recognized as the number 1 for scientifically driven solutions, DuPont is the world's leading company in chemical technology and innovation, with more than 200 years of experience in developing and introducing very successful products (such as Corian®, Teflon®, Kevlar®, Nomex®, SentryGlas®), which have changed the lives of millions of people.

In the world of construction, DuPont developed Tyvek® 50 years ago and has more than 40 years experience in the market with Tyvek® construction membranes, which are used extensively today in the protection of roofs and walls of millions of homes all over the world. Since its first installation, more than 15 million buildings have been protected with Tyvek® membranes worldwide. This shows that Tyvek® membranes have a well-established pedigree and are fit for purpose over the entire lifetime of the building. As part of DuPont's company culture and core values of safety and protection, DuPont protects buildings and their occupants through the use of unique and highly advanced technological materials such as Tyvek®. At the same time, DuPont also protects the environment for future generations, as Tyvek® roofs and walls are extremely efficient - cutting energy consumption, heating bills and greenhouse gas emissions to the atmosphere, and thus reducing the risk of global warming.

With one of the best R&D capabilities in the world, DuPont has an outstanding track record as a strong and reliable manufacturer with a long standing commitment to sustainable growth, meeting the specific needs and requirements of all customers, such as architects, designers, specifiers, builders, roofing contractors, etc.

DuPont is the world's largest manufacturer of breather membranes for construction. The company carries out exhaustive market research and listens to the market, applying continuous technological improvement and focusing on market development.

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