

# NSAI

Agrément

## IRISH AGRÉMENT BOARD CERTIFICATE NO. 04/0157

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## DuPont Tyvek® SUPRO Vapour Permeable Roofing Underlays for Pitched Roofs Souscouche de couverture en tuiles Unterlage für Ziegeldach

**NSAI Agrément (Irish Agrément Board)** is designated by Government to carry out European Technical Assessments.

NSAI Agrément Certificates establish proof that the certified products are **'proper materials'** suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 to 2017**.



### PRODUCT DESCRIPTION:

This Certificate relates to Tyvek® SUPRO and SUPRO PLUS roof underlays for use in tiled or slated pitched roofs. Tyvek® SUPRO underlays are manufactured by using a flash spun-bonded HD-PE functional layer and a spun-bond polypropylene layer. The lamination is done by using adhesive and heat bonding to form a flexible sheet for use as an unsupported or supported underlay for tiled or slated roofs. Tyvek® SUPRO PLUS comes with the addition of an integral adhesive tape, which facilitates the formation of sealed laps when the underlay is installed on a roof.

This Certificate certifies compliance with the requirements of the Building Regulations 1997 to 2017.

### USE:

The material is manufactured for use under tiles or slates either draped or taut, on open rafter (unsupported) or fully supported pitched roofs. The membranes may be used in the following roof systems:

1. Cold roof - Ventilated or non-ventilated (Figure 1)
2. Cold roof - Non-ventilated & sealed draped (Figure 2)
3. Cold roof - Non-ventilated & sealed taut (Figure 3)
4. Warm roof - Ventilated or non-ventilated (vapour impermeable roof covering) (Figure 4)
5. Warm roof - Non-ventilated (Vapour Permeable covering) draped (Figure 5)

**Readers are advised to check that this Certificate has not been withdrawn or superseded by a later issue by contacting NSAI Agrément, NSAI, Santry, Dublin 9 or online at [www.nsaie.com](http://www.nsaie.com)**

6. Warm roof - Non-ventilated & sealed (Vapour impermeable covering) taut with counter batten (Figure 6)
7. Warm roof - Non-ventilated (vapour impermeable covering) (Figure 7)
8. Warm roof - Non-ventilated & sealed (vapour permeable covering) (Figure 8)

The installation of these roof systems using Tyvek® SUPRO roof underlays is described in Section 2.4 of this certificate.

Tyvek® SUPRO roof underlays provide a barrier which:

- Prevents the ingress of windblown rain, dust and snow.
- Minimises the effects of wind load generated under wind gusts acting on slates and tiles when installed in accordance with this Certificate.
- Offers superior resistance to tearing during installation.
- Remains flexible at low ambient temperatures.
- Facilitates the control of surface and interstitial condensation in the roof by allowing the safe dispersal of water vapour.
- Reduces heat loss caused by air movement through the attic space once installed with no ventilation.

This Certificate replaces IAB Certificate No. 02/0157 and is a confirmation of BBA Certificate No. 04/4101 issued by the British Board of Agrément, PO Box 195, Bucknalls Lane, Garston, Watford WD25 9BA.

**MANUFACTURE & MARKETING:**

The products are manufactured by:

DuPont de Nemours (Luxembourg) S.à r.l.,  
Rue General Patton,  
L-2984 Luxembourg.

## 1.1 ASSESSMENT

In the opinion of NSAI Agrément, Tyvek® SUPRO roof underlays if used in accordance with this Certificate can meet the requirements of the Building Regulations 1997 to 2017, as indicated in Section 1.2 of this Irish Agrément Certificate.

## 1.2 BUILDING REGULATIONS 1997 to 2017

### REQUIREMENTS:

#### **Part D – Materials and Workmanship**

**D3 – Tyvek® SUPRO roof underlays**, as certified in this Certificate, are comprised of 'proper materials' fit for their intended use (see Part 4 of this Certificate).

**D1 – Tyvek® SUPRO roof underlays**, as certified in this Certificate, meet the requirements of the building regulations for workmanship.

#### **Part A – Structure**

##### **A1 – Loading**

Tests indicate that roofs incorporating Tyvek® SUPRO roof underlays meet the requirements provided the installations comply with the conditions set out in Section 2.4 and Part 3 of this Certificate.

#### **Part B – Fire Safety**

##### **B4 – External Fire Spread**

Tyvek® SUPRO roof underlays will not prejudice the external fire resistance of the roof, as indicated in Section 4.1 of this Certificate.

#### **Part C – Site Preparation and Resistance to Moisture**

##### **C4 – Resistance to Weather and Ground Moisture**

Tyvek® SUPRO roof underlays meet the requirements when installed as indicated in Section 2.4 of this Certificate.

#### **Part F – Ventilation**

##### **F2 – Condensation in Roofs**

Tyvek® SUPRO roof underlays is classified as having a low vapour resistance and hence, movement of moisture vapour will take place through the underlay. As a result they can be treated as vapour permeable underlays when considering the ventilation requirements of the roof.

Where the Tyvek® SUPRO roof underlays are installed in a ventilated roof system, the design guidelines contained in Section 2 of the TGD to Part F of the Building Regulations 1997 to 2017

and BS 5250:2014+A1:2016 *Code of practice for control of condensation in buildings* must be met when installing this product.

In a non-ventilated or sealed roof system, Tyvek® SUPRO roof underlays must be installed in accordance with this Certificate and the manufacturer's instructions. In these circumstances it will be necessary to install an air and vapour control layer (AVCL) on the warm side of the insulation.

#### **Part L – Conservation of Fuel and Energy**

##### **L1 – Conservation of Fuel and Energy**

Based on the measured vapour resistance of the Tyvek® SUPRO roof underlays, roofs incorporating insulation can meet the requirements of Part L of the Building Regulations 1997 to 2017.

## 2.1 PRODUCT DESCRIPTION

Tyvek® SUPRO is a watertight, airtight, vapour permeable flexible underlay intended for use as a roof underlay on unsupported or supported pitched roofs, constructed in accordance with I.C.P. 2:2002 *Irish code of practice for slating and tiling*.

Tyvek® SUPRO PLUS incorporates along one edge an auto-adhesive tape protected by a release tape. The integral adhesive tape facilitates the formation of sealed laps when the Tyvek® underlay is installed on a roof.

### 2.1.1 Ancillary Products

- Tyvek® Acrylic Tape
- Tyvek® Butyl tape

## 2.2 MANUFACTURE

Tyvek® SUPRO underlays are manufactured by laminating a flash spun-bonded high density polyethylene (HDPE) functional layer and a spun-bond polypropylene layer.

The nominal characteristics of the underlays are given in Table 4 to Table 7 of this certificate.

### 2.2.1 Quality Control

Quality control checks are carried out on the incoming raw materials, during production and on the finished product. These checks include visual inspection and checks on dimensions (length, width), weight, tensile strength and elongation, tear resistance and hydrostatic head (water penetration resistance).

The management systems of DuPont de Nemours (Luxembourg) S.à r.l. have been assessed and registered as meeting the requirements of ISO 9001:2008 by DQS Deutsche Gesellschaft zur Zertifizierung von Qualitätssicherungssystemem GmbH (Certificate No. 000093 QM08).

## 2.3 DELIVERY, STORAGE AND MARKING

Tyvek® SUPRO roof underlays are supplied in 50 metre rolls placed on a pallet and shrink-wrapped. Each roll is labelled with a paper wrapper showing the manufacturer's name, product description and a production batch number identifying date and time of production. The name of the product is also printed on the surface of the material, which will appear uppermost when installed in a roof system. Every roll shows the NSAI Agrément logo and Certificate number and contains instructions on storage and installation.

Rolls should be stored on a flat level, smooth, clean, dry surface and be kept under cover to protect from long-term exposure to UV light. Care must be taken to avoid contact with solvents and with materials containing volatile organic components such as coal tar, and timbers newly treated with solvent based preservative (creosote). Reasonable precautions must be taken in handling the rolls to prevent damage, such as tears or perforations, occurring before and during installation, and prior to the application of the roof covering.

The rolls must not be exposed to a naked flame or other ignition source.

## 2.4 INSTALLATION

### 2.4.1 General

Tyvek® SUPRO roof underlays must be installed and fixed in accordance with this Certificate, the Certificate holder's instructions, and the relevant recommendations of I.C.P. 2:2002 and BS 5534:2014.

### 2.4.2 Installation Procedure

Installation of Tyvek® SUPRO roof underlays can be carried out in all conditions normal to pitched roofing work. In roof construction it is important to remember that the Tyvek® SUPRO roof underlays are the second line of defence in excluding water penetrating the roof. For this reason the following list of criteria must be met to comply with the requirements of this Certificate.

### 2.4.3 General installation criteria in all design considerations

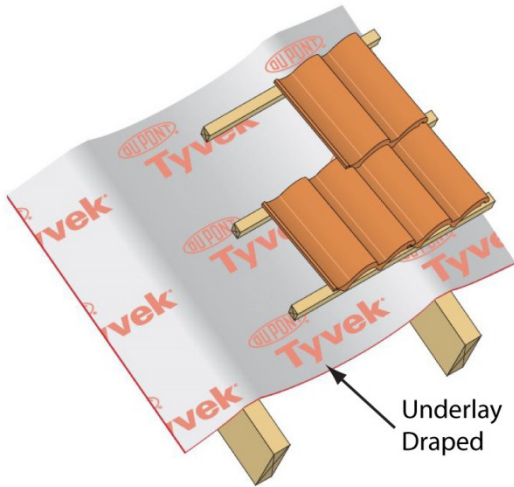
**2.4.3.1** Tyvek® SUPRO roof underlays shall be correctly installed and not damaged.

**2.4.3.2** Both products should always be laid horizontally, parallel to the eaves with the grey non-woven PP and product name uppermost.

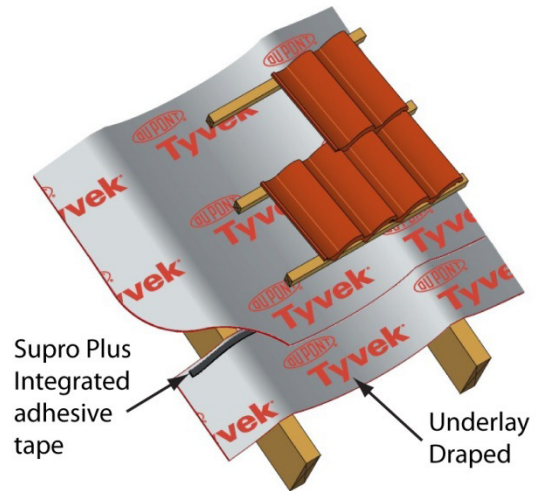
**2.4.3.3** Where Tyvek® SUPRO roof underlays become damaged for whatever reason, it is imperative that they are suitably repaired with a new piece of matching material, or with Tyvek® Acrylic Tape if the damage is only minor. Any penetrations such as vent pipes and chimneys should also be sealed to ensure complete protection of the interior.

**2.4.3.4** Tyvek® SUPRO roof underlays can be installed touching insulation products used in normal construction.

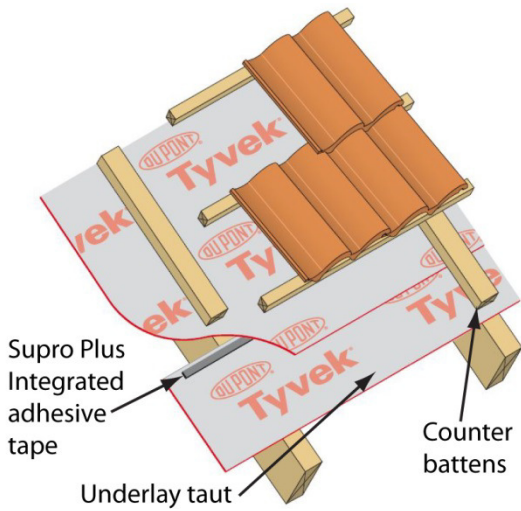
**Unsupported applications**



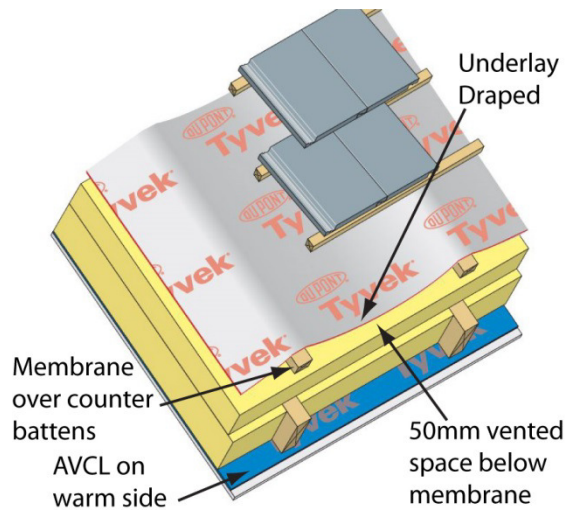
**Figure 1**  
**Cold roof - Ventilated or non-ventilated**



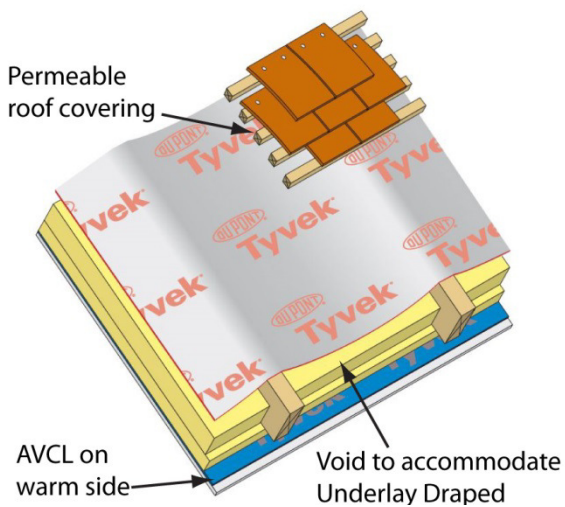
**Figure 2**  
**Cold roof - Non-ventilated & sealed draped**



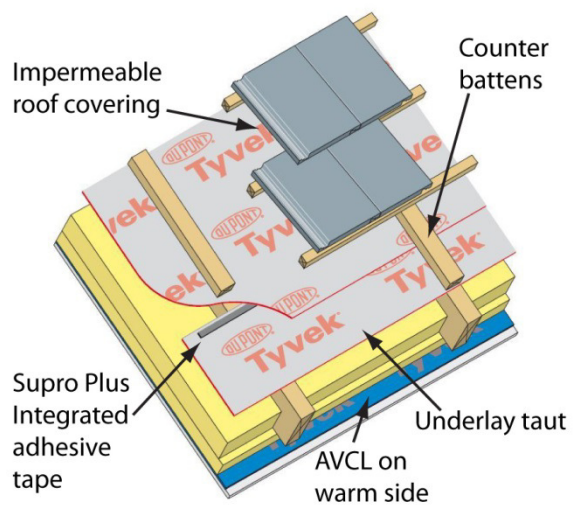
**Figure 3**  
**Cold roof - Non-ventilated & sealed taut**



**Figure 4**  
**Warm roof - Ventilated or non-ventilated (vapour impermeable roof covering)**

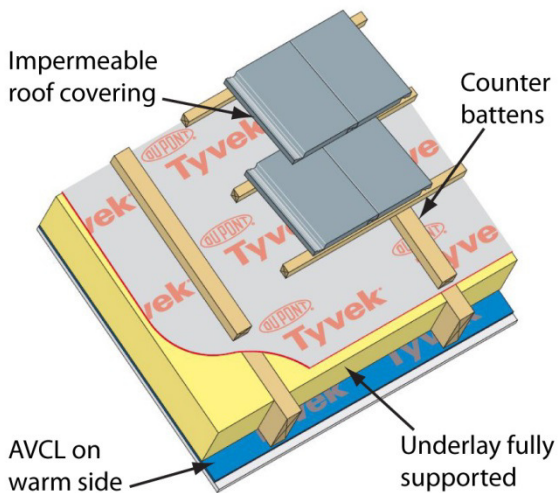


**Figure 5**  
**Warm roof - Non-ventilated (vapour permeable covering) draped**

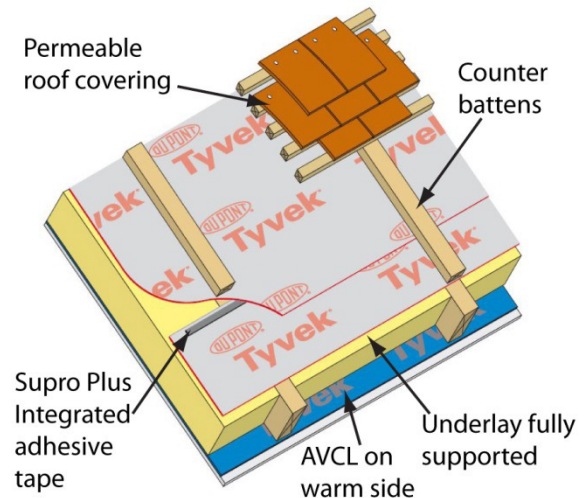


**Figure 6**  
**Warm roof - Non-ventilated & sealed (vapour impermeable covering) taut with counter batten**

### Supported applications



**Figure 7**  
**Warm roof - Non-ventilated**  
**(vapour impermeable covering)**



**Figure 8**  
**Warm roof - Non-ventilated & sealed**  
**(vapour permeable covering)**

**2.4.3.5** During operations of installing the roofing slating it is imperative that persons working on the roof do not use the underlay for supporting themselves or the slates/tiles independently of the roof.

**2.4.3.6** Overlaps of the underlays should be in accordance with that given in Table 1. In all cases the minimum pitch for the slate or tile being used should be considered.

Roof Pitch	Horizontal lap		Vertical lap
	Partially Supported	Fully Supported	
	Tyvek® SUPRO		
Pitch < 22.5°	225 mm	150 mm	300 mm
22.5° < Pitch < 35°	150 mm	150 mm	300 mm
Pitch > 35°	150 mm	150 mm	300 mm
	Tyvek® SUPRO PLUS		
All Pitches	100 mm		

**Table 1: Minimum Overlaps**

**2.4.3.7** Overlaps in a Tyvek® SUPRO PLUS underlay should be in accordance with the roll markings. To seal the overlap the protective cover backing tape must first be removed and the Tyvek® pressed down along the lap to allow the formation of a sealed lap.

**2.4.3.8** Batten gauges should not exceed that recommended by the tile/slate manufacturer for the particular tile/slate being used. In areas where the wind speed is greater than 48 m/s I.C.P. 2:2002 should be followed. (See Section 3 of this certificate for further information on batten gauges).

**2.4.3.9** Where underlay overlaps do not coincide with a batten, consideration should be given to either including an extra batten at the overlap or increasing the underlay overlap to coincide with the next batten. (Reference Table 2 and Table 3 of this certificate).

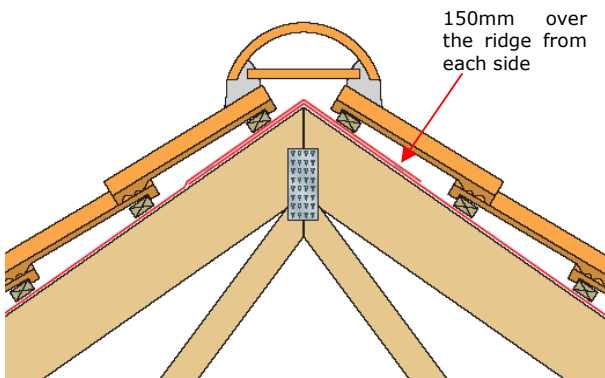
**2.4.3.10** Moisture content of battens at time of fixing should not exceed 22%.

**2.4.3.11** Where timbers on roofs have been treated with wood preservative due to high moisture content of timbers, it is essential that manufacturer's guidance be sought in relation to chemical attack from preservative on roofing underlay.

**2.4.3.12** When tacking the Tyvek® SUPRO roof underlays to the rafters it is recommended that 3mm diameter x 20mm long extra-large head felt nails of copper, aluminium alloy or galvanised steel be used.

**2.4.3.13** The underlays should be tacked at the head of the sheet only, at centres not exceeding 1200mm. It is important that all tacking nails should be covered by the overlap of the next underlay course of Tyvek® so that the minimal headlap is maintained between the tacks and the lower edge of the overlapping underlay.

**2.4.3.14** Where hips and valleys occur on roofs, they should be covered with an additional layer of Tyvek® SUPRO roof underlay overlapped to 300mm on each side. This additional layer of underlay should run continuously from eaves to ridge.



**Figure 9 - Sealed cold roof ridge detail**

**2.4.3.15** At ridge level Tyvek® SUPRO roof underlays should be carried over the ridge with a minimum overlap of 150mm either side to create a 300mm wide double strip (Figure 9).

**2.4.3.16** Where Tyvek® SUPRO roof underlays are fully supported on decking, counter battens should be used to provide an unobstructed drainage path to allow water run into the gutter.

**2.4.3.17** Tyvek® SUPRO roof underlays are not suitable for use in flat roof construction.

**2.4.3.18** Where the length of the rafter slope measured on plan exceeds 6m, Tyvek® SUPRO roof underlays should only be used if manufacturer's guidance is sought on detailing.

**2.4.3.19** Tyvek® SUPRO roof underlays should be draped with a deflection of 5 – 10mm between rafters to permit free drainage of liquid water into the gutter. In roofs where Tyvek® SUPRO roof underlays are not supported on decking the deflection must not be so great as to permit contact with the underside of the slating or tiling when the underlay is subject to wind uplift. (See Section 3 and tables 2 & 3 of this certificate).

**2.4.3.20** Where Tyvek® SUPRO roof underlays are used in dormer roof construction, i.e. where insulation is along the line of the rafters, it is necessary to install a AVCL on the warm side of the insulation (See Figure 4-8)

**2.4.3.21** Tyvek® SUPRO roof underlays if exposed to UV light on a continuous basis will degrade. Therefore at eaves it is necessary to install an eaves carrier onto which the underlay can be lapped and sealed with a Tyvek® Butyl tape. Alternatively a Type 5U felt can be used. This felt should be dressed 50mm into the gutter and be provided with a tilting fillet.

**2.4.3.22** Once the Tyvek® SUPRO roof underlays are installed, they should not be exposed to UV light for more than 4 months.

## **2.4.4 Installation criteria for non-ventilated and sealed roof designs in relation to condensation risk**

Due to the high water vapour permeability of Tyvek® SUPRO roof underlays when installed in a non-ventilated and sealed roof design, it is not necessary to rely on air movement beneath the underlay to minimise the risk of condensation. When using Tyvek® SUPRO in non-ventilated and sealed roof designs, the following measure shall be adopted in order to limit the migration of water vapour generated in the dwelling below, from entering into the attic void through either diffusion or convection.

**2.4.4.1** A continuous air and vapour control layer (AVCL) must be installed on the warm side of the insulation in both cold and warm roof designs.

**2.4.4.2** All penetrations into the roof space must be properly sealed and loft hatches made convection tight by means of a compressible draught seal. Subsequent penetrations can be sealed using Tyvek® Acrylic tape.

**2.4.4.3** The dwelling below the roof must be ventilated in accordance with Section F1 of TGD to Part F of the Building Regulations 1997 to 2017 for the dispersal and rapid dilution of water vapour.

**2.4.4.4** All water tanks in the loft space must be covered and all pipe work lagged.

**2.4.4.5** Extractor fans must be used in rooms that may experience high humidity, such as kitchens, utility rooms and bathrooms. The ventilation rates of the fans should be in accordance with the Building Regulations 1997 to 2017.

**2.4.4.6** All penetrations, e.g. pipe work, electrical fittings, recessed lights to the loft space must be sealed.

## **2.4.5 Ventilated sealed cold roof system**

In this system the roof underlay is laid taut or draped across the rafters with all laps sealed and the underlay sealed to walls and penetrations, with tiling/slating battens held clear of the underlay on counter battens. Eaves ventilation equivalent to a continuous strip 10mm wide are then provided as described in diagram 11 of TGD Part F ventilation.

## **2.4.6 Installation criteria for non-ventilated sealed cold roof system using Tyvek® SUPRO PLUS**

**2.4.6.1** A continuous air and vapour control layer (AVCL) must be installed on the warm side

of the insulation at ceiling level in a cold roof design.

**2.4.6.2** To achieve a sealed roof all laps in the Tyvek® SUPRO roof underlay must be sealed. The self-adhesive strip on the Tyvek® SUPRO PLUS provides a robust seal and makes it ideal for sealed roof applications.

**2.4.6.3** Tyvek® SUPRO or SUPRO PLUS should be installed parallel to the eaves taut fixed by counter battens (min thickness 25 mm). Tyvek® SUPRO or SUPRO PLUS can also be installed draped between rafters.

**2.4.6.4** All edge laps should be sealed using the self-adhesive strip.

**2.4.6.5** To support the sealed laps, cross noggins may be added for extra security.

**2.4.6.6** To achieve an airtight seal at eaves, the underlay should be sealed to the eaves carrier tray with two strips of Tyvek® Butyl tape. Pointing is used to seal fascia and soffit in closed eaves.

**2.4.6.7** An airtight seal at verges must also be maintained. This is achieved by lapping the underlay 50mm onto the gable wall or rafter and sealing with Tyvek® Butyl tape.

**2.4.6.8** Sealing at abutments is achieved by extending the underlay 50mm up the wall face and sealing with Tyvek® Butyl tape.

**2.4.6.9** At ridge, lap the Tyvek® SUPRO roof underlay 150mm over the ridge from each side and seal with Tyvek® tape, as shown in Figure 9.

**2.4.6.10** At valleys and other water collecting areas lap the Tyvek® SUPRO roof underlay 300mm over the centre line each side and seal with Tyvek® Double-Sided Tape.

**2.4.6.11** Where a penetration in the underlay occurs it must be sealed using Tyvek® tape.

**2.4.6.12** The roof insulation must be pushed into the eaves and against the underlay to avoid gaps to ensure a wind tight loft space.

**2.4.6.13** To allow water to disperse above the taut underlay, counter battens and tiling battens, minimum thickness 25mm each, must be used in the sealed cold pitched roof system with impermeable roof coverings to ensure a minimum unobstructed air space of 50mm is maintained. Where permeable roof coverings are provided in a sealed cold pitched roof system with a 10mm drape, the provision of a 25mm tiling battens above the membrane will allow water above the underlay to drain to the gutter.

## **2.4.7 Installation of non-ventilated cold roof**

**2.4.7.1** Both Tyvek® SUPRO and Tyvek® SUPRO PLUS can be used for this system.

**2.4.7.2** There is no requirement for eaves or ridge ventilation with this system, as both roof underlays do not require air movement to avoid damage by condensation.

**2.4.7.3** The insulation is laid horizontal on a vapour barrier at ceiling level and must be pushed into the eaves and against the underlay to ensure that there are no gaps present. Care must be taken to ensure that the barrier to vapour movement at ceiling level is prevented.



### 3.1 GENERAL

Tyvek® SUPRO roof underlays provide a satisfactory underlay in tiled and slated pitched roofs constructed in accordance with I.C.P. 2:2002, BS 5534:2014, BS 5250:2016 and BS 8000-6:2013 *Code of practice for slating and tiling of roofs and walls*.

### 3.2 WIND LOADING

Tyvek® SUPRO roof underlays will resist the loads associated with the installation phase of the roof.

Project design wind speeds for the roof in which the products are installed should be determined, and wind uplift forces calculated, in accordance with Eurocode 1, Action on Structures and I.S. EN 1991-1-4:2005 *General actions - wind actions* and its National Annex 2013.

Tyvek® SUPRO roof underlays have adequate resistance to withstand typical uplift values for various rafter/batten centres.

Tests on Tyvek® SUPRO roof underlays indicate adequate nail tear resistance and resistance to nail tear propagation under design wind speeds (ref. Table 5).

#### 3.2.1 Unsupported

Tyvek® SUPRO and SUPRO Plus are satisfactory for use in conventional unsupported rafter and batten roof systems as described in Table 2 of this Certificate (see also Figure 10). The classifications show in Table 2 are based on the simplified approach for obtaining design wind

pressure and required uplift resistance as defined in BS 5534:2014 Appendix A Cl. A7. These details are valid where a well-sealed ceiling is present and the roof has a ridge height ≤15m, a pitch between 12.5° and 75°, and a site altitude ≤100m where the topography is not significant.

When building and site conditions are outside these limitations, the design wind pressure ( $p_u$ ) should be calculated in accordance with equation H.13 of BS 5534:2014 in order to determine the required wind uplift resistance. Calculated values can then be compared to the declared wind uplift resistances in Table 3 below in order to select a suitable roof underlay and batten spacing.

The design wind pressure ( $p_u$ ) is given by

$$p_u = f_u \times q_p \quad (H.13)$$

where:

$f_u = 0.75$  when a well-sealed ceiling is present;

$f_u = 0.90$  when no ceiling or no well-sealed ceiling is present;

$f_u = 1.10$  when no ceiling or no well-sealed ceiling is present and a permanent dominant opening is present on an external face of the building;

$q_p$  = peak velocity pressure from I.S. EN 1991-1-4:2005

See BS 5534:2014 for all other considerations. When battens and counter battens are provided above the roof membrane, the limitations of Table 2 and Table 3 no longer apply.

Product	≤345 mm batten gauge with battened lap	≤250 mm batten gauge with battened lap	≤345 mm batten gauge with taped laps <sup>(1)</sup>	≤345 mm batten gauge with 3060B tape
Tyvek Supro	Zones 1 to 5	Zones 1 to 5	-	Zones 1 to 5
Tyvek Supro Plus <sup>(1)</sup>	Zones 1 to 5	Zones 1 to 5	Zones 1 to 5	-

<sup>(1)</sup> The laps were taped using the integrated tape.

**Table 2 - Zones of applicability of Tyvek® SUPRO & SUPRO Plus according to BS 5534:2014, clause A.8 with battened laps and taped laps**

Product	≤345 mm batten gauge with battened lap <sup>(3)</sup>	≤250 mm batten gauge with battened lap <sup>(2)(3)</sup>	≤345 mm batten gauge with taped laps <sup>(3)</sup>	≤345 mm batten gauge with 3060B tape <sup>(3)</sup>
Tyvek Supro	1643 Pa	2332 Pa	-	3371 Pa
Tyvek Supro Plus <sup>(1)</sup>	1750 Pa	-	3204 Pa	-

<sup>(1)</sup> The laps were taped using the integrated tape.

<sup>(2)</sup> Underlays with a wind uplift resistance at a 250 mm batten gauge that meet the minimum design wind pressure of 820 Pa for Zone 1 are considered to satisfy the requirements for use at a 100 mm batten gauge in all wind zones.

<sup>(3)</sup> Mean of test results.

**Table 3 - Declared wind uplift resistance (Pa)**

### 3.2.2 Fully supported membrane

Tyvek® SUPRO and SUPRO Plus, when fully supported, have adequate resistance to withstand typical uplift forces.

The products may be used at any batten gauge in all wind zones when laid over nominally air-tight sheet sarking, for example OSB board, plywood and insulation for warm-roof designs. Counter battens are required to provide a drainage channel for wind driven rain and a ventilation void if required.

Poorly fitted sarking boards such as square-edged butt-joints planks are not considered to be airtight and the underlay should be treated as unsupported.

### 3.3 WEATHERTIGHTNESS

Tests confirm that Tyvek® SUPRO roof underlays will resist the passage of water, wind-blown snow and dust into the interior of a building under all conditions to be found in a roof constructed to I.C.P. 2:2002, BS 5534:2014 and BS 8000-6:2013.

The underlays may be used to provide temporary waterproofing to the structure of the building prior to the installation of slates or tiles. It is however recommended that this period of time be kept to a minimum in accordance with the manufacturer's guidance.

For effective water management of a roof subject to severe driving rain conditions all underlay must be installed so that any water leaking through the roof tiles/slates is carried by the draped deflection of the underlay to the gutters. When the underlay is installed taut, counter battens are provided under tiling battens to provide a clear channel to allow water drain to the gutter.

### 3.4 VENTILATION

In the Tyvek® non-ventilated roof systems, the risk of condensation is equivalent to, or less than, that for current conventionally ventilated cold roof systems meeting the criteria of BS 5250:2016.

In conventional ventilated warm roof construction attention should be given to ensuring that there is adequate ventilation to the roof space at eaves level in accordance with the Building Regulations 1997 to 2017. There is no need for high level ventilation when using Tyvek® SUPRO roof underlays as the underlays have a water vapour permeability of 950 g/m<sup>2</sup>/day which is far in excess of that quoted as a minimum for roof tile underlay in I.C.P. 2:2002.

It is essential that roofs be constructed so as to prevent moisture penetration and the formation

of condensation. In accordance with good building construction practice, all openings for services and trap doors should be draught sealed, and trap doors should not be located in bathrooms, shower rooms or kitchens.

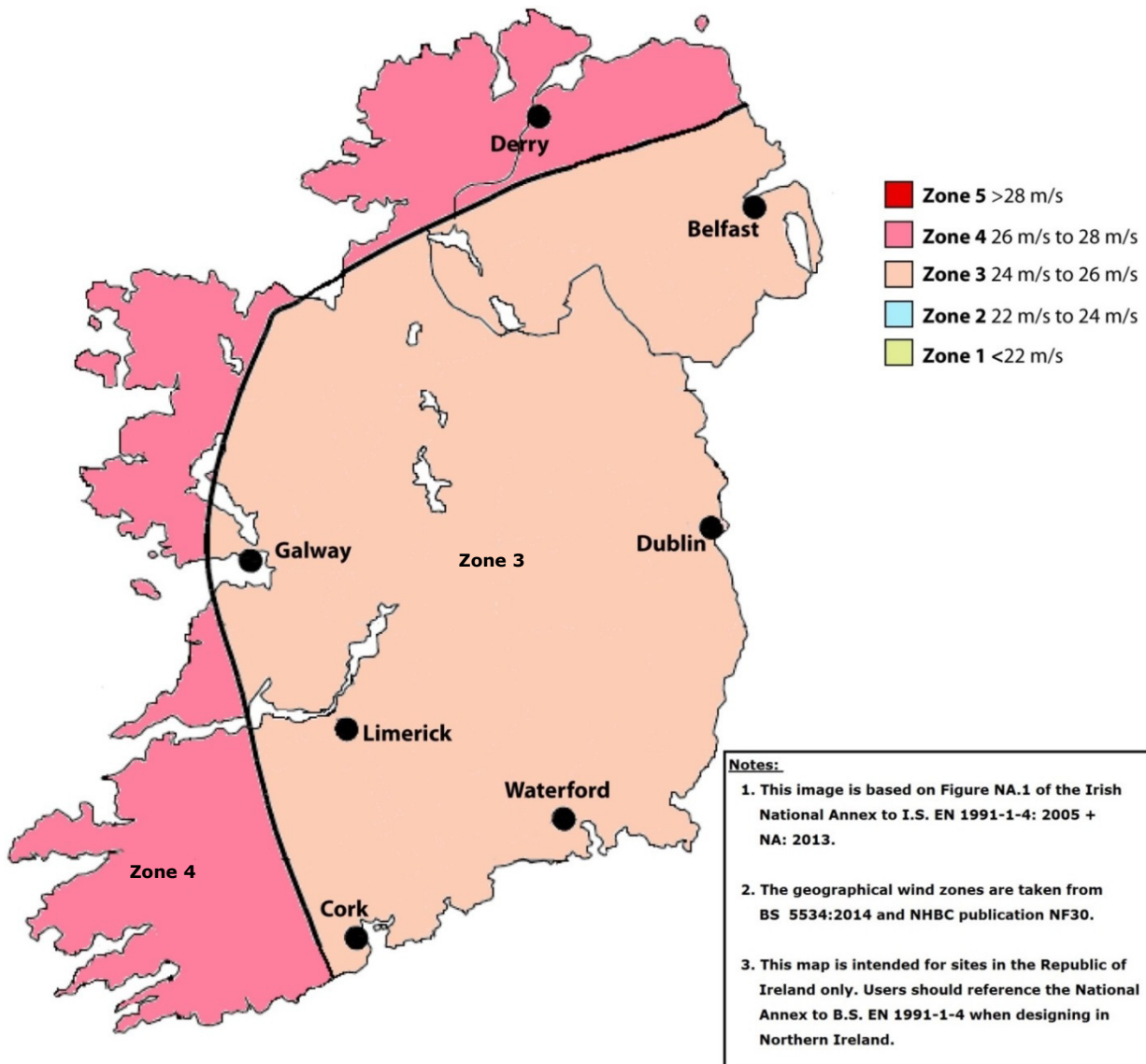
An air and vapour control layer (AVCL) should be used on the warm side of the insulation.

### 3.5 CONSERVATION OF FUEL AND ENERGY

In conventionally ventilated roof constructions, energy loss by ventilation can account for a significant portion of the total heat loss through the roof. The Tyvek® non-ventilated roof system and particularly the sealed roof system will reduce the mechanism of heat loss through the roof.

### 3.6 CE MARKING

The Certificate holder has taken responsibility of CE marking the product in accordance with harmonised European Standard I.S. EN 13859-1:2014 and I.S. EN EN13859-2:2014. An asterisk (\*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance (DoP). Designers should refer to the latest version of the manufacturer's DoP for all essential characteristics.



**Figure 10 - Design wind speeds for geographical wind zones in Ireland**

#### 4.1 BEHAVIOUR IN FIRE

Tyvek® SUPRO roof underlays have similar properties in relation to fire to polythene sheets and so will present no additional fire hazard to a roof structure in which they are incorporated.

Tyvek® SUPRO roof underlays have the risk of fire spread when used unsupported, should the material be accidentally ignited during maintenance works etc. (e.g. by a roofer or plumbers torch). As with all types of sarking material, care must be taken during building and maintenance to avoid the material becoming ignited.

When the product is used in a fully supported situation, the reaction to fire will be determined by the supporting deck.

Tyvek® SUPRO roof underlays being combustible materials must be separated from chimneys and flues as indicated in cl. 2.5.6 of TGD to Part J of the Building Regulations 1997 to 2017.

Toxicity is negligible when used in a roof situation.

#### 4.2 WATER PENETRATION

Tyvek® SUPRO roof underlays, when used in accordance with this Certificate, present no significant risk of water penetration.

#### 4.3 WATER VAPOUR PENETRATION AND CONDENSATION RISK

Tyvek® SUPRO roof underlays have a significantly higher water vapour permeability than that quoted as a minimum for conventional roof tile underlays in BS 5534:2014, and hence movement of moisture vapour can take place through the underlay. The water vapour resistance of Tyvek® SUPRO is 0.22 MNs/g. The water vapour resistance of traditional roof felt underlay or polythene sheeting would be in the range of 450-570 MNs/g. The water vapour transmission or  $S_d$  value is given in Table 4. The  $S_d$  value is the water vapour diffusion-equivalent air layer thickness which is a unit less number representing the thickness of motionless air layer which has the same water vapour resistance as the underlay.

#### 4.4 DURABILITY AND MAINTENANCE

Tyvek® SUPRO roof underlays when installed in accordance with this Certificate, manufacturer's instructions and relevant codes of practice, are virtually unaffected by conditions normally found in a roof space and will have a design life

comparable with that of the roof and in accordance with BS 7543:2015 *Guide to durability of buildings and building elements, products and components*. The durability of the membrane will be dependent on the performance of the roof covering (slates/tiles) and this could be compromised if the roof is not routinely maintained or is subjected to inappropriate traffic. Such maintenance would involve building owners having their roofs inspected annually, preferably in late autumn. Inspection should include checking for missing, damaged or loose slates/tiles and their accessories or flashings. Clogged gutters or downpipes should be unblocked and cleaned.

#### 4.5 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE THE FOLLOWING:

Table 4 to Table 7 give a summary of the technical investigations carried out on Tyvek® SUPRO roof underlays.

#### 4.6 OTHER INVESTIGATIONS

- (i) Existing data on product properties in relation to fire, toxicity, environmental impact and the effect on mechanical strength/stability and durability were assessed.
- (ii) The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.
- (iii) Site visits were conducted to assess the practicability of installation and the history of performance in use of the product.
- (iv) Driving rain resistance was assessed.
- (v) A condensation risk analysis was performed.

Functionality: Water Vapour Transmission, Water Tightness, Weather Durability, Fire Class					
Characteristic	Test Standard	Units	Results	Min.	Max.
Water vapour transmission* (S <sub>d</sub> )	EN ISO 12572 (C) <sup>1</sup>	m	0.025	0.005	0.045
Water vapour permeability	EN ISO 12572	g/m <sup>2</sup> /day	950		
Water vapour resistance	EN ISO 12572	MNs/g	0.22		
Coefficient of dynamic friction Dry Wet	Slip resistance of flooring (modified RAPRA test)		0.65 0.54		
Spray test	Resistance to water spray of a roof tile underlay		No leakage		
Resistance to water penetration (Eosin test)	BS 4016		Pass		
Temperature resistance*	-	°C	-	-40	+100
Flexibility at low temperature*	EN 1109	°C	-	-	-40
UV exposure*	-	months	-	-	4
Product- / Functional layer thickness*		µm	450 / 175	-	-
Water tightness*	EN 1928 (A)	class	W1	-	-
Water column*	EN 20811	m	2	-	-
Reaction to fire*	EN ISO 11925-2	class	E	-	-

**Table 4: Underlay Functionality**

Physical and Mechanical Properties					
Characteristic	Test Standard	Units	Results	Min.	Max.
Mass per unit area*	EN 1849-2	g/m <sup>2</sup>	145	136	154
Maximum tensile force*(MD) <sup>2</sup>	EN 12311-1	N/50mm	300	250	350
Elongation at max. tensile force* (MD) <sup>2</sup>	EN 12311-1	%	14	9	19
Maximum tensile force* (XD) <sup>2</sup>	EN 12311-1	N/50mm	245	200	290
Elongation at max. tensile force* (XD) <sup>2</sup>	EN 12311-1	%	23	16	30
Resistance to tearing* MD <sup>2</sup> (nail shank)	EN 12310-1	N	190	135	245
Resistance to tearing* XD <sup>2</sup> (nail shank)	EN 12310-1	N	205	150	260
Mullen burst strength	BS 3137	kN/m <sup>2</sup>	1190		
Head of water leak test	EN 20811		No penetration		

**Table 5: Physical Properties**

Properties after Ageing					
Characteristic	Test Standard	Units	Results	Min.	Max.
Artificial ageing by UV and heat*	EN 1297 & EN 1296	residual value			
Water tightness*	EN 1928 (A)	class	W1	-	-
Maximum tensile force* (MD) <sup>2</sup>	EN 12311-1	%	90	-	-
MD <sup>2</sup> elongation at max. tensile force*	EN 12311-1	%	80	-	-
Maximum tensile force* (XD) <sup>2</sup>	EN 12311-1	%	90	-	-
XD <sup>2</sup> elongation at max. tensile force*	EN 12311-1	%	80	-	-

**Table 6: Physical Properties after Ageing**

Additional Properties					
Characteristic	Test Standard	Units	Results	Min.	Max.
Length (customer related, expressed in m)	EN 1848-2	deviation in %	0	0	-
Length		m	50		
Width (customer related, expressed in mm)	EN 1848-2	deviation in %	0	-0.5	+1.5
Width		m	1.0, 1.5		
Thickness		mm	0.49		
Roll Weight		Kg	9.4-10.9		
Straightness	EN 1848-2	mm/10m	-	-	30
Dimensional stability (MD <sup>2</sup> & XD <sup>2</sup> )	EN 1107-2	%	-	-	1
Resistance to penetration of air	EN 12114	m <sup>3</sup> /(m <sup>2</sup> h50Pa)	-	-	0.25

\*Refer to Clause 3.6 of this certificate

<sup>1</sup> relates to the water vapour transmissions properties in accordance with EN ISO 12572 using set of conditions C.

<sup>2</sup> MD/XD – longitudinal direction/transverse direction

**Table 7: Additional Properties**

**5.1** National Standards Authority of Ireland ("NSAI") following consultation with NSAI Agrément has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this Certificate and in accordance with the manufacturer's instructions and usual trade practice. This Certificate shall remain valid for five years from date of issue or revision date so long as:

- (a) the specification of the product is unchanged.
- (b) the Building Regulations 1997 to 2017 and any other regulation or standard applicable to the product/process, its use or installation remains unchanged.
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI.
- (d) no new information becomes available which in the opinion of the NSAI, would preclude the granting of the Certificate.
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.
- (f) the registration and/or surveillance fees due to NSAI Agrément are paid.

**5.2** The NSAI Agrément mark and certification number may only be used on or in relation to product/processes in respect of which a valid Certificate exists. If the Certificate becomes invalid the Certificate holder must not use the NSAI Agrément mark and certification number and must remove them from the products already marked.

**5.3** In granting Certification, the NSAI makes no representation as to;

- (a) the absence or presence of patent rights subsisting in the product/process; or
- (b) the legal right of the Certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the Certificate holder in accordance with the descriptions and specifications set out in this Certificate.

**5.4** This Certificate does not comprise installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

**5.5** Any recommendations contained in this Certificate relating to the safe use of the certified product/process are preconditions to the validity of the Certificate. However, the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this Certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act 2005, or of any other current or future common law duty of care owed by the manufacturer or by the Certificate holder.

**5.6** The NSAI is not responsible to any person or body for loss or damage including personal injury arising as a direct or indirect result of the use of this product or process.

**5.7** Where reference is made in this Certificate to any Act of the Oireachtas, Regulation made thereunder, Statutory Instrument, Code of Practice, National Standards, manufacturer's instructions, or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this Certification.

## NSAI Agrément

This Certificate No. **04/0157** is accordingly granted by the NSAI to **DuPont de Nemours (Luxembourg) S.à r.l.** on behalf of NSAI Agrément.

Date of Issue: **November 2004**

Signed



**Seán Balfé**  
**Director of NSAI Agrément**

Readers may check that the status of this Certificate has not changed by contacting NSAI Agrément, NSAI, 1 Swift Square, Northwood, Santry, Dublin 9, Ireland. Telephone: (01) 807 3800. Fax: (01) 807 3842. [www.nσαι.ie](http://www.nσαι.ie)

**Revisions: May 2017**

Product specification updated to reflect manufactures Declaration of Performance.