

DuPont de Nemours (Luxembourg) S.à r.l.

Rue General Patton
L-2984
Luxembourg

Tel: 01275 879770 Fax: 01275 879773
e-mail: tyvek.construction@lux.dupont.com
website: www.tyvekhome.com



Agrément Certificate
No 08/4548

TYVEK ROOF LINING SYSTEMS

PRODUCT SHEET 2 — TYVEK SUPRO ROOF TILE UNDERLAY FOR USE IN ENERGY EFFICIENT COLD NON-VENTILATED ROOFS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate replaces Certificate No 04/4101 and relates to TYVEK Supro Roof Tile Underlay for use in energy efficient cold non-ventilated pitched roof systems.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

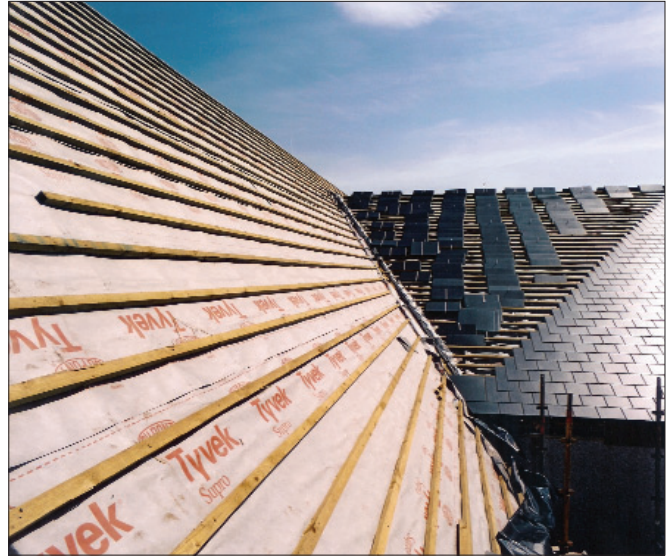
Weathertightness — as part of a complete roof, the product will resist the passage of water and wind-blown snow and dust into the interior of the building (see section 5).

Risk of condensation — the product can be regarded as a low water vapour resistance (Type LR) underlay and can be used as part of a cold roof system without specific provisions for ventilation (see section 6).

Wind loading — when installed on appropriately spaced battens and/or rafters the product's physical properties are deemed adequate to resist the wind loads imposed on the underlay. The product's will reduce the wind uplift forces acting on the roof covering (see section 7).

Strength — the product has adequate strength to resist the loads associated with the installation of the roof (see section 8).

Durability — under the normal conditions found in a roof space the product will have a service life comparable to a traditional roof tile underlay (see section 11).



The BBA has awarded this Agrément Certificate for TYVEK Supro Roof Tile Underlay for use in energy efficient cold non-ventilated roofs to DuPont de Nemours (Luxembourg) S.à r.l. as fit for its intended use provided it is are installed, used and maintained as set out in this Agrément Certificate.

On behalf of the British Board of Agrément

Head of Approvals
— Materials

Chief Executive

Date of First issue: 8 April 2008

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

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tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

Regulations

In the opinion of the BBA, TYVEK Supro Roof Tile Underlay for use in energy efficient cold non-ventilated roofs, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2000 (as amended) (England and Wales)

Requirement:	C2(b)	Resistance to moisture
Comment:		The product will contribute to a roof meeting this Requirement. See section 5.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product will enable a roof to meet this Requirement with respect to interstitial condensation. See sections 6.1 to 6.6 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See sections 10 and 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	3.10	Precipitation
Comment:		The product will contribute to a roof satisfying clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ of this Standard. See section 5.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can enable a roof to satisfy this Standard with respect to interstitial condensation. See sections 6.1 to 6.6 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for this product under Regulation 9, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The product is acceptable. See section 10 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		The product will contribute to a roof satisfying this Regulation. See section 5.1 of this Certificate.
Regulation:	C5	Condensation
Comment:		The product can enable a roof to satisfy this Regulation. See sections 6.1 to 6.6 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 1 *Description* (1.2).

Non-regulatory Information

NHBC Standards 2007

NHBC accepts the use of TYVEK Supro Roof Tile Underlay for use in energy efficient cold non-ventilated roofs, when installed and used in accordance with this Certificate, as meeting Technical Requirement R3 in relation to *NHBC Standards, Chapter 7.2 Pitched roofs*.

Zurich Building Guarantee Technical Manual 2007

In the opinion of the BBA, TYVEK Supro Roof Tile Underlay for use in energy efficient cold non-ventilated roofs, when installed and used in accordance with this Certificate, satisfies the requirements of the *Zurich Building Guarantee Technical Manual, Section 4 Superstructure, Sub-section Pitched roofs*.

General

This Certificate relates to TYVEK Supro Roof Tile Underlay for use as a vapour permeable roof tile underlay in energy efficient cold non-ventilated pitched roof systems.

The product will also prevent the ingress of wind-blown rain or snow.

It is important that the designers, planners, contractors and/or installers ensure that the roof and ceiling are constructed in accordance with the Certificate holder's instructions and the information given in this Certificate.

Tyvek is a registered trademark of DuPont de Nemours (Luxembourg) S.à r.l.

Technical Specification

1 Description

1.1 TYVEK Supro is manufactured by spinning strands of high-density polyethylene (PE-HD) and bonding them together with heat and pressure to form a flexible sheet. TYVEK Supro is available with or without an integral adhesive tape known as TYVEK Supro Plus.

1.2 The product has the nominal characteristics of:

Thickness (mm)	0.45
Mass per unit area (gm ⁻²)	145
Roll length (m)	50
Roll width (m)	1.0, 1.5
Tensile strength (N per 50 mm)	
longitudinal	>400
transverse	>400
Elongation at break (%) ⁽¹⁾	
longitudinal	17
transverse	17
Colour	white underside/ grey top side and red logo

1.3 TYVEK SD2 Air Leakage Barrier/Vapour Control Layer can be used in conjunction with TYVEK Supro as a vapour control layer in a warm roof specification. See Product Sheet 3 of this Certificate.

1.4 TYVEK Eaves Carrier is an eaves guard used to protect the exposed underlay edge.

1.5 Quality control checks are carried out on the incoming materials, during production and on the finished product. Quality control checks on the finished product include:

- visual inspection
- physical properties
- thickness
- roll weight.

2 Delivery and site handling

2.1 Rolls are delivered to site in packages that carry a label bearing the marketing company's name, the grade identification and the BBA identification mark including the number of this Certificate.

2.2 The rolls should be stored flat on their sides, on a smooth, clean, dry surface, under cover and protected from sunlight.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on TYVEK Supro Roof Tile Underlay.

Design Considerations

3 General

3.1 TYVEK Supro Roof Tile Underlay is satisfactory for use in dwellings with fully supported or draped over rafter or counter batten specifications, non-ventilated tiled or slated roofs of any conventional plan and of any size. Features⁽¹⁾ successfully assessed include:

- duo pitched
- mono-pitched
- hipped
- gable ends
- verges
- abutments
- room-in-roof⁽²⁾
- dormers
- timber sarking⁽³⁾⁽⁴⁾⁽⁵⁾

- mansard
 - valleys.
- (1) For roofs incorporating other features, non-conventional roof geometries or construction materials, the advice of the Certificate holder should be sought.
 - (2) Where a room-in-roof results in part of a pitch being insulated (ie a warm roof), design and detailing of that part of the roof should comply with the relevant guidance given in Product Sheet 1 of this Certificate.
 - (3) Timber sarking, Scottish practice; the membrane is laid over open jointed timber planks (nominally 150 mm wide with 2 mm gap) and fixed with galvanized clout nails. Slates are nailed through the membrane on the sarking without battens.
 - (4) Timber sarking, tiled roofs; counter battens of 12 mm minimum thickness should be used to provide a drainage path beneath the tiling battens. The membrane may be laid directly over the timber sarking, or draped over the counter battens.
 - (5) Sheet sarking materials should not be used.

3.2 The product can be installed by draping over rafters and securing with tiling battens, or installed taut over rafters and secured with counter battens and tiling battens.

3.3 In conventionally-ventilated roof constructions, energy loss by ventilation can account for up to 25% of the total heat lost through the roof. The non-ventilated system will significantly reduce this mechanism of heat loss.

4 Practicability of installation

Installation can be carried out easily by slaters/tilers experienced with this type of product.

5 Weathertightness



5.1 Tests indicate that the product 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 in accordance with the relevant clauses of BS 5534 : 2003.

5.2 The product resists penetration of liquid water and consequently may be used as temporary waterproofing prior to the installation of slates or tiles. The period of such use should, however, be kept to a minimum. Advice should be sought from the Certificate holder (see section 16, Table for *Physical properties — general*).

6 Risk of condensation



6.1 For design purposes, the product's water vapour resistance may be taken as not more than 0.25 MNsg^{-1} , and for roofs designed in accordance with BS 5534: 2003 or BS 5250: 2002, Section 8.4, it may be regarded as a Type LR membrane.

6.2 The complete roof construction, ceiling boards to roof tiles, must be considered as a total system with regard to condensation risk. It is important that the product is laid in accordance with the Certificate holder's instructions and this Certificate to minimise the risk of condensation.

6.3 The risk of condensation is highest in new-build construction during the first heating period, where there is high moisture loading due to wet trades, such as in-situ cast concrete slabs or plaster. The risk of condensation diminishes as the building naturally dries out. See *BBA Information Bulletin No 1 — Roof Tile Underlays in Cold Roofs during the Drying-out Period*.

6.4 All penetrations into and out of the roof space must be properly sealed in accordance with the Certificate holder's instructions which includes the use of the Certificate holder's recommended sealing tape. In addition, such features as vent stacks and boiler flues, passing through the roof space must be sealed.

6.5 It is essential to minimise water vapour transfer into the loft space from the dwelling below. Appropriate measures include:

- ventilating the dwelling below in accordance with national Building Regulations and Standards for the dispersal and rapid dilution of water vapour, particularly from rooms that may experience high humidity (such as kitchens, utility rooms and bathrooms)
- covering all water tanks in the loft space and lagging pipework
- sealing penetrations in the ceiling and making loft hatches convection-tight by using a compressible draught seal
- ensuring that there is continuity of jointing with walls (and behind wall linings) at ceiling perimeters
- ensuring that masonry wall cavities do not interconnect with roof cavities.

6.6 For additional protection, the use of a vapour control layer/vapour check plasterboard can be considered.

6.7 Convective water transfer into the roof construction can be reduced by installing a continuous airtight sheet such as TYVEK SD2 behind the internal lining. This may also contribute to a successful pressure test by achieving the required design air permeability of $10 \text{ m}^3\text{h}^{-1}\text{m}^{-2}$ in accordance with Approved Document L (see section 13.2).

7 Wind loading

7.1 Project design wind speeds should be determined and wind uplift forces calculated, in accordance with BS 6399-2 : 1997.

7.2 When unsupported, wind loading on the underlay should be calculated in accordance with BS 5534 : 2003, Section 5.5.2.7. For acceptable wind loads with specific batten spacings for the draped product, using a 25 mm deep tiling batten (see section 16, Table for *Physical properties – general*).

8 Strength

The product will resist the loads associated with installation of the roof (see section 16, Table for *Physical properties – directional*).

9 Properties in relation to fire

9.1 The product will melt and shrink away from heat, but will burn in the presence of a naked flame. The product is classified in accordance with BS EN 13501-1 : 2007 as a Class E material.

9.2 When the product is used unsupported, there is a risk that fire can spread if the materials are accidentally ignited during maintenance works, eg by a roofer's or plumber's torch. As with all types of underlay, care should be taken during building and maintenance to avoid the material becoming ignited.

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

10 Maintenance



As the product is confined within a roof structure and has suitable durability (see section 11), maintenance is not required.

11 Durability



The product will be virtually unaffected by the normal conditions found in a roof space and will have a life comparable with that of traditional roof tile underlays, provided they are not exposed to sunlight for long periods (see section 12.4). Advice regarding exposure can be obtained from the Certificate holder.

Installation

12 General

12.1 TYVEK Supro Roof Tile Underlay must be installed and fixed in accordance with the Certificate holder's instructions, provisions of this Certificate and the relevant recommendations of BS 5534 : 2003 and BS 8000-6 : 1990. Installation can be carried out under all conditions normal to roofing work.

12.2 The product is installed with the printed side uppermost and lapped to shed water out and down the slope.

12.3 Overlaps must be provided with the minimum dimensions given in Table 1.

Table 1 Minimum overlaps

Roof pitch (°)	Horizontal lap (mm)	Vertical laps (mm)
	Not fully supported	
12.5 to 14	225	300
15 to 34	150	300
35+	150	300

12.4 In closed eaves constructions, eaves guards should be used to protect the product from sunlight, and to direct water into the gutter. TYVEK Eaves Carrier is recommended for this purpose.

12.5 Hips should be covered with a 600 mm wide strip of the product.

13 Procedure

Draped and loose laps

13.1 The product should be installed as an unsupported system, and fixed in the traditional method for roof tile underlays, ie draped between the rafters, with the coloured printed side uppermost. The underlay should not drape more than 10 mm.

Taut

13.2 The product should be laid horizontally and must be pulled taut and not allowed to drape. Each sheet should be fixed to hold it in position prior to the counter battens being fixed. Counter battens (minimum thickness 25 mm) are then fixed to the rafter. To assist in achieving the design air permeability, the lap joints and penetrations through the underlay can be sealed with TYVEK Acrylic Tape.

Timber plank sarking

13.3 For fully supported roofs (traditional Scottish), the slates can be nailed through the product into the timber plank sarking, normally 150 mm wide with a 2 mm gap. The underlay must be fixed to the sarking board using galvanized clout nails.

13.4 For fully supported roofs (where battens are used) counter battens of minimum thickness 12 mm should be installed either above or beneath the underlay for drainage purposes.

14 Repair

Damage to the product can be repaired easily prior to the installation of slates or tiles by replacement of the damaged areas, by patching and sealing correctly using TYVEK Acrylic Tape. Care should be taken to ensure that the watertightness of the roof is maintained.

15 Finishing

15.1 Detailing of abutments, verges and hips must be in accordance with the Certificate holder's instructions.

15.2 To achieve a convection-tight loft space, it is important that the following details are maintained (see also section 6.5).

- all penetrations, eg pipework, electrical fittings to the loft space, must be sealed
- the loft hatch must be securely sealed to ensure a draught-free fit
- the eaves must be constructed to minimise air penetration into the loft space
- the insulation must be pushed into the eaves and against the underlay, taking care to avoid pushing the underlay against the tiling battens and blocking the drainage path.

15.3 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2003, BS 8000-6 : 1990 and the tile/slate manufacturer's instructions, especially when using tightly-jointed slates or tiles.

Technical Investigations

16 Tests

16.1 Samples of TYVEK Supro Roof Tile Underlay was obtained from the Certificate holder for testing. The results of the tests carried out by, or on behalf of, the BBA are summarised in Tables 2 and 3.

16.2 Data from previous tests on TYVEK membrane assessments were used to assess the properties of:

- wet strength
- low temperature flexibility
- heat ageing
- water immersion
- UV ageing.

Table 2 Physical properties — directional

Test (units)	Mean result		Method ⁽¹⁾
	Long ⁽²⁾	Trans ⁽³⁾	
Tensile strength (N per 50 mm)	310	241	BS EN 12311-1 ⁽⁴⁾
Elongation at break (%)	16	26	BS EN 12311-1 ⁽⁴⁾
Resistance to tear (N)	129	121	MOAT 27 : 5.4.1

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Longitudinal direction.

(3) Transverse direction.

(4) Sample modified in accordance with BS EN 13859-1.

Table 3 Physical properties — general

Test (units)	Mean result	Method ⁽¹⁾
Water vapour transmission at 25°C/75% RH (gm ⁻² day ⁻¹)	935	BS 3177
Vapour resistance (MNsg ⁻¹)	0.22	BS 3177
Slip resistance (coefficient of friction)		T1/10 ⁽²⁾
dry	0.45	
wet	0.19	
1 metre head of water for 24 hours	pass	BBA method ⁽³⁾
Mullen burst strength (kNm ⁻²)	724	BS 3137
Head of water (cm)		BS EN 20811
mean	237	
minimum	189	
Resistance to wind loads (kPa) ⁽⁴⁾		MOAT 69 : 4.2.1
batten spacing 350 mm	1.0	
batten spacing 330 mm	1.5	
batten spacing 300 mm	2.0	
batten spacing 250 mm	2.5	

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) BBA Test Method.

(3) Modification of the MOAT 27 water resistance test.

(4) Test carried out using 25 mm thick battens and a 600 mm rafter spacing.

17 Investigations

17.1 Using computer modelling, cold non-ventilated roofs were analysed for the risk on condensation.

17.2 The manufacturing process was assessed, including the method adopted for quality control, and details were obtained of the quality and composition of the materials used.

17.3 An assessment of practicability of installation was made from data gathered during previous assessments of TYVEK Roof Lining Systems.

17.4 An evaluation was made of monitored data covering internal loft space temperature and relative humidity, plus moisture content of the rafters. The data were collected over winter and summer periods.

17.5 An evaluation was also made of data relating to reduction in unwanted energy loss from roofs incorporating the TYVEK non-ventilated system.

Bibliography

BS 3137 : 1972 *Methods for determining the bursting strength of paper and board*

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

BS 5250 : 2002 *Code of practice for control of condensation in buildings*

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

BS 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8000-6 : 1990 *Workmanship on building sites — Code of practice for slating and tiling of roofs and claddings*

BS EN 12311-1 : 2000 *Flexible sheets for waterproofing — Determination of tensile properties — Bitumen sheets for roof waterproofing*

BS EN 13501-1 : 2007 *Fire classification of construction products and building elements. Classification using test data from reaction to fire tests*

BS EN 13859-1 : 2005 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for discontinuous roofing*

BS EN 20811 : 1992 *Textiles — Determination of resistance to water penetration — Hydrostatic pressure test*

MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*

MOAT No 69 : 2004 *UEAtc Technical Report for the Assessment of Discontinuous Roofing Underlay Systems*

18 Conditions

18.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English law.

18.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

18.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

18.4 In granting this Certificate, the BBA is not responsible for:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

18.5 Any information relating to the manufacture, supply, installation, use and maintenance of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used and maintained. It does not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the manufacture, supply, installation, use and maintenance of this product/system.