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Agrément Certificate

21/5964

Product Sheet 1

DUPONT AIR VAPOUR CONTROL LAYERS

DUPONT TYVEK AIRGUARD SMART

This Agrément Certificate Product Sheet⁽¹⁾ relates to DuPont TYVEK AirGuard⁽²⁾ Smart, for use as a humidity-variable air and vapour control layer (AVCL) in roofs, walls and suspended floors, in domestic and non-domestic buildings up to and including humidity class 3.

(1) Hereinafter referred to as 'Certificate'.

(2) TYVEK and AirGuard are registered trademarks of E.I. du Pont de Nemours & Co. or its affiliates.

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

Condensation — the product will reduce the risk of interstitial condensation (see section 6).

Airtightness — the product is an air barrier and can reduce heat loss by air infiltration (see section 7).

Strength — the product has adequate strength to resist damage during installation (see section 8).

Properties in relation to fire — the membrane is classified as E in accordance with EN 13501-1 : 2007 and its use is restricted in some cases by the national Building Regulations (see section 9).

Durability — the product will have a lifetime equal to that of the building element in which it is installed (see section 11).

The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 17 November 2021

Hardy Giesler
Chief Executive Officer

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 MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.*

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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Regulations

In the opinion of the BBA, DuPont TYVEK AirGuard Smart, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	B3(4)	Internal fire spread
Comment:		The product can contribute to satisfying this Requirement. See section 9.1 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The product is restricted by this Requirement. See section 9.2 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to limiting the risk of interstitial condensation. See section 6.4 of this Certificate.
Requirement:	L1(a)(1)	Conservation of fuel and power
Comment:		The product can contribute to satisfying this Requirement. See section 7 this Certificate.
Regulation:	26	CO₂ emission rates for new buildings
Regulation:	26(A)	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26(A)	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26(B)	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The product can contribute to satisfying these Regulations. See section 7 this Certificate.
Regulation:	7(1)	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)	Durability, workmanship and fitness of materials
Comment:		The product can contribute to a construction satisfying this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.4	Cavities
Comment:		The product can contribute to satisfying this Standard with respect to clause 2.4.2 ⁽¹⁾⁽²⁾ . See section 9.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can contribute to limiting the risk of interstitial condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ of this Standard. See section 6.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying these Standards, with reference to clauses 6.1.1 ⁽¹⁾ , 6.1.2 ⁽²⁾ , 6.1.6 ⁽¹⁾ , 6.2.4 ⁽¹⁾ , 6.2.6 ⁽²⁾ , 6.2.10 ⁽¹⁾ and 6.2.12 ⁽²⁾ . See section 7 of this Certificate.

Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to satisfying the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard. In addition, the products can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾] and 7.1.7 ⁽¹⁾⁽²⁾ [Aspect 1 ⁽¹⁾⁽²⁾]. See section 7 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments in relation to the product under Regulation 9, Standards 1 to 6, 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) 2012 (as amended)

Regulation:	23(a)(i)	Fitness of materials and workmanship
Comment:	(iii)(b)(i)	The product is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	29	Condensation
Comment:		The product can contribute to limiting the risk of interstitial condensation. See section 6.4 of this Certificate.
Regulation:	35(4)	Internal fire spread - structure
Comment:		The product can contribute to satisfying this Regulation. See section 9.1 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to satisfying these Regulations. See section 7 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 1 *Description* (1.2) of this Certificate.

Additional Information

NHBC Standards 2021

In the opinion of the BBA, DuPont TYVEK AirGuard Smart, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to NHBC Standards, Chapters 6.2 *External timber framed walls*, 6.9 *Curtain walling and cladding*, 6.10 *Light steel framed walls and floors*, 7.1 *Flat roofs, terraces and balconies*, 7.2 *Pitched roofs* and 9.2 *Wall and ceiling finishes*.

In NHBC projects where the product is used in conjunction with a vapour-closed insulation, a diffusion-open membrane must be used on the cold side of the insulation.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard EN 13984 : 2013.

Technical Specification

1 Description

1.1 DuPont TYVEK AirGuard Smart (Style 2009B) is an AVCL with a resistance to vapour diffusion that depends on the moisture content of the air adjacent to the membrane. In summer conditions, where solar radiation is incident on the element, the vapour resistance reduces and facilitates the inward diffusion/escape of accumulated moisture.

1.2 The product consists of a spun-bond polyethylene coated with polyethylene copolymer. The product has the nominal characteristics of:

Thickness (mm)	0.2
Mass per unit area ($\text{g}\cdot\text{m}^{-2}$)	92
Roll length (m)	50
Roll width (m)	1.5
Equivalent air layer thickness over range of humidities — s_d (m)	0.2 to 35 ⁽¹⁾
Equivalent air layer thickness — s_d (m) at 23°C/75% relative humidity	13 ⁽¹⁾
Water vapour resistance over range of humidities ($\text{MN}\cdot\text{s}\cdot\text{g}^{-1}$)	1 to 175 ⁽¹⁾
Water vapour resistance ($\text{MN}\cdot\text{s}\cdot\text{g}^{-1}$) at 23°C/75% relative humidity	65 ⁽¹⁾
Watertightness	pass
Hydrostatic head (m)	3
Tensile strength (N per 50 mm)	
longitudinal	390
transverse	380
Elongation at maximum tensile force (%)	
longitudinal	16
transverse	19
Nail tear (N)	
longitudinal	75
transverse	65
Reaction to fire	Class E.

(1) Values at different levels of relative humidity are given in Section 6.1 Table 1 of this Certificate.

1.3 The following products are used in conjunction with TYVEK AirGuard Smart to minimise air infiltration:

- TYVEK Butyl Tape – a double-sided tape with a paper liner, for sealing the membrane to membrane at laps, adjacent walls, floors and the ceiling/roof, and for sealing around windows and doors
- TYVEK Acrylic Tape – a single-sided tape based on a Tyvek membrane coated with a water-based acrylic adhesive, for sealing joint laps in the membrane
- TYVEK Double-sided Tape – for sealing the membrane to membrane at adjacent walls, floors and the ceiling/roof
- TYVEK FlexWrap – a single-sided tape based on a Tyvek membrane coated with a butyl adhesive, for sealing at penetrations for pipework, wiring and electrical sockets, and sealing at corners of window and door frames.

2 Manufacture

2.1 The product is manufactured by spinning strands of high density polyethylene and bonding them together with heat and pressure to form a flexible sheet, which is then coated with a polyethylene copolymer.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities

- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management systems of DuPont de Nemours (Luxembourg) S.à r.l. have been assessed and registered as meeting the requirements of EN ISO 9001 : 2015 by DQS GmbH (Certificate 000093 QM15).

3 Delivery and site handling

3.1 The product is delivered to site in rolls with polythene wrappings with an insert sheet bearing the Certificate holder's name, the grade identification, the technical specifications, installation instructions and the BBA logo incorporating the number of this Certificate, and a label inside the core giving batch number and roll number.

3.2 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 AirGuard Smart.

Design Considerations

4 Use

4.1 TYVEK AirGuard Smart is satisfactory for use as an AVCL for the building envelope in new-build and refurbishments in domestic and non-domestic buildings up to and including humidity class 3, in the following specifications:

- at the rafter line in slated or tiled pitched timber warm roof constructions in conjunction with an HR or LR underlay
- at ceiling level in warm pitched roof constructions
- at ceiling level in slated or tiled pitched ventilated cold roof constructions
- in walls in timber, masonry and steel-frame constructions
- ground bearing floors (insulation above floor slab, damp proof membrane below)
- suspended floors
- conventional flat roofs.

4.2 Further information is given in BRE Report BR 262 : 2002.

4.3 Where constructions need to comply with *NHBC Standards 2021*, specifiers should observe the requirements given in chapters 6.2, 6.10, 7.1, 7.2 and 9.2 of that document.

4.4 It is essential that proper care and attention is given to maintaining the product's integrity and continuity.

4.5 New elements should incorporate the product on the warm side of the insulation, and the overall construction must be designed and constructed in accordance with the relevant good practice, Regulations and Standards.

4.6 Existing elements must either be in a good state of repair without evidence of rain penetration, damp or frost damage or repaired and any rain penetration, damp or frost damage rectified and the product should be incorporated on the warm side of the insulation.

4.7 NHBC will only accept the use of the product as a variable resistance AVCL when used in conjunction with vapour-open insulation. When used in conjunction with a vapour-closed insulation, a diffusion-open materials must be used on the cold side of the insulation.

5 Practicability of installation

The product is designed to be installed by competent installers experienced with this type of product.

6 Condensation

6.1 The product is a variable AVCL that alters its vapour resistance according to the direction of heat flow and the relative humidity between the two sides of the membrane, examples of test results for equivalent air layer thickness values at different humidity conditions are given in Table 1. In summer, the membrane's vapour resistance decreases, allowing moisture vapour to diffuse through the membrane back into the room. In winter, the membrane's vapour resistance increases to minimise vapour diffusion into the construction.

Table 1 Equivalent air layer thickness S_d test results at different humidity conditions

Test conditions	Equivalent air layer thickness S_d (m)	Water vapour resistance ($MN \cdot s \cdot g^{-1}$)
0% relative humidity/50% relative humidity at 23°C	36.11	180.55
0% relative humidity/75% relative humidity at 23°C	10.99	54.95
25% relative humidity/93% relative humidity at 23°C	1.76	8.80
50% relative humidity/94% relative humidity at 23°C	0.52	2.60
75% relative humidity/93% relative humidity at 23°C	0.38	1.90
85% relative humidity/94% relative humidity at 23°C	0.37	1.85

6.2 The risk of interstitial condensation occurring will depend upon the properties and vapour resistance of other materials used in the construction, the internal and external conditions, and the effectiveness of the product's installation.

6.3 Consideration must be given in the overall installation to minimise penetrations by services. Joints at ceilings/walls must be sealed to offer significant resistance to water vapour transmission. Sealing must be carried out in accordance with the Certificate holder's instructions.



6.4 When the product is installed on the warm side of the construction with a diffusion-tight layer on the outer face (eg waterproofing membranes, green roofs, HR underlay as defined in BS 5250 : 2011), a dynamic condensation assessment in accordance with BS EN 15026 : 2007 should be carried out by a suitably experienced and competent person for each individual situation, using an appropriate dynamic modelling package and considering parameters of:

- vapour diffusion resistance values as given in section 6.1
- hygrothermal properties of all other materials in the construction, in particular vapour resistances in the cold side
- type of insulation
- element location, orientation and pitch
- rainfall and water absorption coefficient of the outermost external layer
- shading and solar absorptivity
- internal humidity conditions
- degree of airtightness of the construction.

6.5 Where incidence of solar radiation is low, such as in the Highlands of Scotland or north of Inverness, the potential for back drying is reduced and the advice of the Certificate holder should be sought.

7 Airtightness



The product is an air barrier and, when lapped, fixed and taped correctly, can contribute to elements and junctions minimising heat loss by unplanned air infiltration. Guidance in this respect can be found in the relevant supporting documents to the National Building Regulations.

8 Strength

The product has adequate strength to resist damage during installation and subsequent works.

9 Properties in relation to fire



9.1 The product is classified as Class E in accordance with EN 13501-1 : 2007⁽¹⁾. Where the product forms the face of a cavity, the spacing of cavity barriers is restricted by the documents supporting the national Building Regulations.

(1) Test and classification reports FIRES-RF-011-19-AUNE and FIRES-CR-040-19-AUPE respectively, issued by FIRES s.r.o. Copies of the reports are available from the Certificate holder.



9.2 In England and Wales, the product should not be used on buildings that have a storey at least 18 m above ground level and which contain one or more dwellings, an institution, a room for residential purposes (excluding any room in a hostel, hotel or boarding house), student accommodation, care homes, sheltered housing, hospitals or dormitories in boarding schools.

10 Maintenance

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

11 Durability



The product is rot-proof, does not tear easily and will have a life equal to that of the element in which it is installed.

Installation

12 General

12.1 Installation of TYVEK AirGuard Smart should be in accordance with the Certificate holder's instructions, conventional good building practice and this Certificate.

12.2 The product is installed with the printed side facing the installer on the warm side of the insulation.

12.3 It is recommended internal lining should be set on spacer battens, leaving a minimum gap of 25 mm behind the lining to accommodate wiring and other services and reduce the need for penetrations of the AVCL.

12.4 The product, when used in floors, is either installed above or beneath the floor boarding and beneath the internal floor finishes.

13 Procedure

13.1 The product is held in place as follows:

- For timber – initial/temporary fixing by stainless steel staples at approximately 500 mm centres, positioned within the overlap, to the substructure. The product should be permanently fixed using timber battens, metal channels or the internal lining.
- For concrete – the surface must be clean and dry before installation commences. The membrane is bonded to the substrate using a suitable tape, such as TYVEK Butyl Tape.
- For steelwork – temporary fixing is achieved using either TYVEK Double-sided Tape or TYVEK Butyl Tape. The product should be permanently fixed using timber battens, metal channels or the internal lining.

13.2 Joints between adjacent sheets of the material should be lapped 100 mm over a support and be sealed with a strip of TYVEK Butyl Tape, TYVEK Double-sided Tape or TYVEK Acrylic Tape in accordance with the Certificate holder's instructions.

13.3 For vertical installations, it is best practice for the overlaps to be placed in line with studs.

Sealing and detailing

13.4 At all penetrations and abutments, the product is cut neatly to fit as closely as possible, and joints are sealed with TYVEK FlexWrap. Penetrations must be kept to a minimum (see section 12.3).

13.5 The product is made convection-tight at all window and door openings and at other detailing. The membrane is sealed tight against the frame with TYVEK FlexWrap.

13.6 Detailing/overlapping of the product at ceiling/wall and floor/wall junctions must be carried out in accordance with the Certificate holder's instructions to ensure airtightness of the building envelope.

13.7 Sealing at terminations to other construction material is carried out in accordance with the Certificate holder's installation instructions, using TYVEK Butyl Tape at floors and TYVEK Double-sided Tape at ceilings. The substrate must be clean and dry; in the case of concrete substrates, a primer may be required to promote adhesion. In cases of doubt, the advice of the Certificate holder or their UK representative should be sought.

14 Repair

Damage to TYVEK AirGuard Smart can be repaired by first covering the area of damage with TYVEK Acrylic Tape and then overlaying the affected area with an extra piece of TYVEK AirGuard Smart with an overlap of at least 100 mm in all directions from the damage. The repair should then be sealed in accordance with section 13.7 of this Certificate.

Technical Investigations

15 Tests

15.1 Tests were carried out and the results assessed to determine:

- thickness
- mass per unit area
- tensile strength and elongation
- nail tear
- water vapour transmission properties at different relative humidities, control and heat aged 168 days at 80°C
- peel of tapes from concrete and PVC-U substrates, control and heat aged 168 days at 70°C
- Joint peel strength of membrane, control and heat aged 168 days at 70°C
- resistance to air penetration of membrane joint
- resistance to air penetration of membrane/window assembly.

15.2 An assessment was made of test data in relation to:

- thickness
- water vapour transmission properties at different relative humidities
- reaction to fire.

16 Investigations

16.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

16.2 Calculations were carried out to establish the risks of interstitial condensation occurring in various constructions, temperatures and humidity conditions.

Bibliography

BRE Report BR 262 : 2002 *Thermal insulation : avoiding risks*

BS 5250 : 2011 + A1 : 2016 *Code of practice for control of condensation in buildings*

BS EN 15026 : 2007 *Hygrothermal performance of building components and building elements — Assessment of moisture transfer by numerical simulation*

EN 13501-1 : 2007 + A1 : 2009 *Fire classification of construction products and building elements — Classification using data from reaction to fire tests*

EN 13984 : 2013 *Flexible sheets for waterproofing — Plastic and rubber vapour control layers — Definitions and characteristics*

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- 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.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and 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.

17.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- 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
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal 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, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue 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.