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Agrément Certificate
08/4548
Product Sheet 4

TYVEK(1) ROOF LINING SYSTEMS

DUPONT AIRGUARD REFLECTIVE

This Agrément Certificate Product Sheet(2) relates to DuPont AirGuard(1) Reflective, an air barrier and vapour control layer for use in roofs and ceilings.

(1) TYVEK and DuPont AirGuard are registered trademarks of E.I DuPont de Nemours & Co or its affiliates.
(2) Hereinafter referred to as 'Certificate'.

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

Risk of condensation — the product is a vapour control layer and will reduce the risk of interstitial condensation (see section 6).

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

Thermal insulation — the product can contribute to limiting heat loss through roofs (see section 8).

Strength — the product has adequate strength to resist the loads associated with the construction of the roof (see section 9).

Properties in relation to fire — the product is classified as Class E in accordance with EN 13501-1 : 2007 and its use is restricted in some cases by the national Building Regulations (see section 10).

Durability — the product will have a service life equal to that of the building in which it is installed (see section 12).

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 Fourth issue: 2 October 2020

Originally certificated on 18 March 2011

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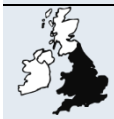
Regulations

In the opinion of the BBA, DuPont AirGuard Reflective, 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:	**B4(1)**	**External fire spread**
Comment:		The product, in some circumstances, is restricted by this Requirement. See sections 10.1 and 10.2 of this Certificate.
Requirement:	**C2(c)**	**Resistance to moisture**
Comment:		The product can contribute to a roof satisfying this Requirement, with respect to interstitial condensation. See section 6.3 of this Certificate.
Requirement:	**L1(a)(i)**	**Conservation of fuel and power**
Comment:		The product can contribute to satisfying this Requirement. See sections 7 and 8 of this Certificate.
Regulation:	**7(1)**	**Materials and workmanship**
Comment:		The product is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**26**	**CO_2 emission rates for new buildings**
Regulation:	**26A**	**Fabric energy efficiency rates for new dwellings (applicable to England only)**
Regulation:	**26A**	**Primary energy consumption rates for new buildings (applicable to Wales only)**
Regulation:	**26B**	**Fabric performance values for new dwellings (applicable to Wales only)**
Comment:		The product can contribute to satisfying these Regulations. See section 7 and 8 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 12 and the *Installation* part of this Certificate.
Regulation:	**9**	**Building standards applicable to construction**
Standard:	3.15	Condensation
Comment:		The product can enable a roof to satisfy clauses 3.15.1(1)(2) and 3.15.5(1)(2) of this Standard, with respect to interstitial condensation. See section 6.3 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to satisfying the requirements of this Standard, with reference to clauses 6.1.6(1), 6.2.1(1)(2), 6.2.3(1), 6.2.4(1)(2), 6.2.5(2), 6.2.6(1)(2), 6.2.7(1), 6.2.8(1)(2), 6.2.9(1)(2), 6.2.10(1)(2), 6.2.11(1)(2), 6.2.12(2) and 6.2.13(1)(2). See sections 7 and 8 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The product can contribute to meeting 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 product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4(1) [Aspects 1(1) and 2(1)], 7.1.6(1)(2) [Aspects 1(1)(2) and 2(1)(2)] and 7.1.7(1) [Aspect 1(1)], 7.1.9(2) [Aspect 1(2) and Aspect 2(2)] and 7.1.10(2) [Aspect 1(2)]. See section 8 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) (iii)(b)(i)**	**Fitness of materials and workmanship**
Comment:		The product is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	**29**	**Condensation**
Comment:		The product can contribute to a roof satisfying this Regulation. See section 6.3 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 sections 7 and 8 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* (1.3) and 3 *Delivery and site handling* (3.3) of this Certificate.

Additional Information

NHBC Standards 2020

In the opinion of the BBA, DuPont AirGuard Reflective, 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 7.2 *Pitched roofs* and 9.2 *Wall and ceiling finishes*.

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 AirGuard Reflective is an air barrier and vapour control layer with a low emissivity aluminium foil face on one side. It is placed on the warm side of the insulation with the foil surface facing the interior of the building.

1.2 DuPont AirGuard Reflective consists of a spunbond polypropylene substrate, coated with a layer of low density polyethylene (LDPE) with a polypropylene grid and a layer of aluminium foil.

1.3 The finished rolls are available with the following nominal characteristics:

Thickness (mm)	0.43
Roll width (m)	1.5

Roll length (m)	50
Mass per unit area ($g \cdot m^{-2}$)	149
Equivalent air layer thickness – s_d (m)	
minimum	500
nominal	2000
Water vapour resistance ($MN \cdot s \cdot g^{-1}$)	
minimum	2500
nominal	10000
Watertightness	pass
Tensile strength (N per 50 mm)	
longitudinal	440
transverse	210
Nail tear (N)	
longitudinal	230
transverse	250
Reaction to fire	Class E.

1.4 The following products are used in conjunction with DuPont AirGuard Reflective to minimise air infiltration:

- TYVEK Metallised Tape (2060M) — to close laps between the membrane and for repairs/making good where cuts are made
- Tyvek FLEXWRAP EZ (2064FW) is a flexible sealing tape for use in building penetrations
- AirGuard Tape (1310V) is a flexible airtight sealing tape for internal use in detailing.

2 Manufacture

2.1 The product is manufactured by spinning strands of polypropylene and bonding them together with heat and pressure. The polypropylene is laminated to the aluminium foil and polypropylene grid extrusion using the LDPE by extrusion.

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 being operated by the manufacturer are being maintained.

3 Delivery and site handling

3.1 Rolls of membrane are delivered to site in packages that carry a label bearing the Certificate holder's name, the grade identification and the BBA logo incorporating the number of this Certificate.

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

3.3 The Certificate holder has taken the responsibility of classifying and labelling the product under the *CLP Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures.* Users must refer to the relevant Safety Data Sheet(s).

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on DuPont AirGuard Reflective.

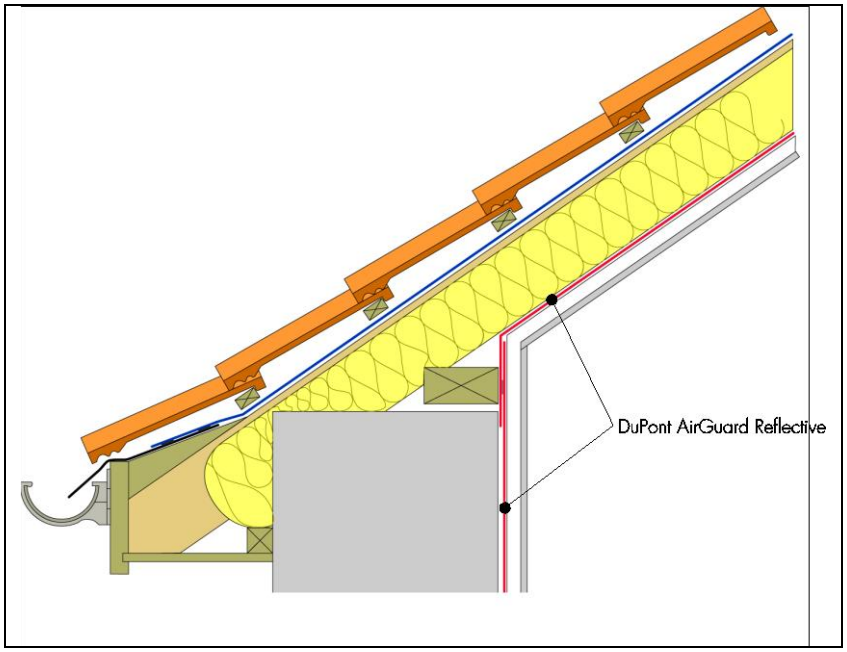
Design Considerations

4 Use

4.1 DuPont AirGuard Reflective is satisfactory for use as a vapour control layer/air barrier in the following roof specifications:

- at ceiling level in slated or tiled pitched cold roof constructions
- at the rafter line in slated or tiled pitched warm roof constructions (see Figure 1)
- in conjunction with TYVEK Supro (see Product Sheets 1 and 2 of this Certificate).

Figure 1 Wall/pitched warm roof detail



4.2 The product is satisfactory for use as a radiant barrier and is effective in reducing the thermal transmittance of the roof when the foil surface is facing into an air space (see section 8).

4.3 When used without a service void the product acts as a vapour control layer and air barrier but does not contribute to the thermal value of the construction.

4.4 Further information is given in BRE report BR 262 : 2002.

4.5 Where constructions need to comply with *NHBC Standards* 2020, specifiers should observe the requirements of this document.

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

4.7 In ceilings, the product is placed to cover the insulation on the warm side as an integrated vapour control layer/air barrier within the service void formed by the fixing battens and the ceiling lining.

4.8 Slated and tiled pitched roofs should be designed and constructed in accordance with BS 5534 : 2014.

5 Practicability of installation

The product is designed to be installed by competent slaters/tilers experienced with this type of product.

6 Risk of condensation

6.1 The risk of 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.

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

6.3 The roof should comply with BS 5250 : 2011, Annex H, and favourably assessed in accordance with Annex D, using an equivalent air layer thickness (s_d) of not less than 500 m (equivalent to a water vapour resistance of 2500 MN·s·g^{-1}) for the product.

6.4 Constructions should be in accordance with the recommendations of BS 5250 : 2011, Annex H, and favourably assessed in accordance with Annex D, using a minimum air layer equivalent value (s_d) of not less than 500 m (equivalent to a water vapour resistance of 2500 MN·s·g^{-1}) for the product.

7 Air permeability

When lapped, fixed and taped correctly, the product acts as an air barrier and can contribute to elements and junctions minimising heat loss by unplanned air infiltration and exfiltration. Guidance in this respect can be found in the documents supporting the national Building Regulations.

8 Thermal insulation

Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using an emissivity value of 0.05 for the foil surface of the product. Where this faces into a sloping or horizontal unventilated cavity (>13 mm thick) this corresponds to a cavity thermal resistance value of 0.45 m^2·K·W^{-1}.

9 Strength

The product will resist the loads associated with installation of the roof.

10 Properties in relation to fire

10.1 The product is Class E in accordance with EN 13501-1 : 2007(1).

(1) Report reference FIRES-CR-109-18-AUPE issued by FIRES. Report is available from the Certificate holder upon request.

10.2 The product, when used in pitches of greater that 70°, should not be used on buildings in England and Wales that have a storey at least 18 m above ground level and 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.

10.3 The product will have similar properties in relation to fire to those of traditional polyethylene roof tile underlays.

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

11 Maintenance

As the product is confined within a roof structure and has suitable durability (see section 12), maintenance is not required.

12 Durability

The product will have a service life equal to that of the building in which it is installed.

Installation

13 General

Installation of DuPont AirGuard Reflective should be in accordance with Certificate holder's instructions, the provisions of this Certificate, BS 9250 : 2007 and good building practice.

14 Procedure

14.1 The product should be positioned on the warm side of the thermal insulation and held in place by staples at approximately 500 mm centres to the background structure. Joints between adjacent sheets of the material should be lapped 100 mm over a support and be sealed with a strip of TYVEK Metallised Tape(2060M).

14.2 At all penetrations and abutments, the product should be cut neatly to fit as closely as possible and the joint sealed with a strip of Tyvek FLEXWRAP EZ (2064FW). Penetrations must be kept to a minimum.

14.3 The product should be made vapour and convection tight at detailing. The membrane should be sealed tight against the frame with AirGuard Tape (1310V), or tucked in and compressed by the frame.

14.4 Internal lining must be set on spacer battens, leaving a minimum gap of 25 mm behind the lining which can reduce the need for penetrations of the vapour control layer/air barrier. When used without a void, the product does not contribute to the thermal value of the construction but continues to act as a vapour control layer/air barrier.

15 Repair

Damage to DuPont AirGuard Reflective can be repaired with TYVEK Metallised Tape (2060M). Extensively damaged areas should be made good by overlaying the damaged area with a new sheet, sealed into place with TYVEK Metallised Tape (2060M).

Technical Investigations

16 Tests

16.1 An assessment was made on data to EN 13984 : 2013 in relation to:

- thickness
- mass per unit area
- tensile strength and elongation
- resistance to nail tear
- tensile shear strength of joint
- watertightness
- water vapour transmission properties
- effect of heat ageing
- resistance to alkali
- reaction to fire.

16.2 Tests were carried out to determine:

- dimensional stability
- emissivity
- emissivity after heat ageing for 90 days at 70°C
- emissivity after combined heat and humidity ageing for 90 days at 70°C and 500 hours at 90%
- relative humidity at 45°C

in order to assess:

- mechanical stability in service
- thermal performance in service
- durability.

17 Investigations

17.1 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.

17.2 The risk of interstitial condensation in a range of typical constructions was evaluated.

17.3 An evaluation of the thermal performance of the product in typical constructions was made.

17.4 An examination of the assessment leading to Prototype Product Assessment 08/P002 for the DuPont Climate System was carried out.

Bibliography

BRE report BR 262 : 2002 *Thermal insulation : avoiding the risks*

BRE report BR 443 : 2006 *Conventions for U-value calculations*

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

BS 5534 : 2014 + A2 : 2018 *Slating and tiling for pitched roofs and vertical cladding — Code of practice*

BS 9250 : 2007 *Code of practice for design of the airtightness of ceilings in pitched roofs*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

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

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

18 Conditions

18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.