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Agrément Certificate
08/4548
Product Sheet 4

TYVEK ROOF LINING SYSTEMS

DUPONT AIRGUARD REFLECTIVE

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to DuPont AirGuard Reflective, for use as a low emissivity vapour control layer/air barrier in roofs.

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

Condensation — the product is a vapour control layer and will reduce the risk of interstitial condensation (see section 5).

Air infiltration — the product is an air barrier and can reduce heat loss by air infiltration (see section 6).

Thermal insulation — the product can contribute to limiting heat loss through roofs (see section 7).

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

Durability — the product will have a service life comparable to other similar elements of construction (see section 11).

The BBA has awarded this Agrément Certificate to the company named above for the product described herein. The 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

Stuart Sadler
Head of Approvals — Materials

Greg Cooper
Chief Executive

Date of First issue: 18 March 2011

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.

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Regulations

In the opinion of the BBA, DuPont AirGuard Reflective, 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 2010 (England and Wales)

Requirement:	C2(c)	Resistance to moisture
Comment:		The product can contribute to limiting the risk of interstitial condensation. See section 5.2 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		See sections 6 and 7 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)	Fitness and durability of materials and workmanship
Comment:		The product satisfies the requirements of this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
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 5.2 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		See sections 6 and 7 of this Certificate, with reference to clauses 6.1.6 ⁽¹⁾ , 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ and 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⁾ .
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:	C5	Condensation
Comment:		The product can contribute to limiting the risk of interstitial condensation. See section 5.2 of this Certificate.
Regulation:	F2(a)(i)	Conservation measures
Regulation:	F3(2)	Target carbon dioxide Emission Rate
Comment:		See sections 6 and 7 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* (1.3) of this Certificate.

Non-regulatory Information

NHBC Standards 2011

NHBC accepts the use of DuPont AirGuard Reflective, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs* and 8.2 *Wall and ceiling finishes*.

General

AirGuard Reflective and TYVEK are registered trademarks of DuPont de Nemours (Luxembourg) S.à r.l.

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 or to the exterior of the building into the air space if used as a radiant barrier.

1.2 DuPont AirGuard Reflective consists of a 50 g·m⁻² spunbonded polypropylene, coated with a 50 g·m⁻² layer of extruded polyethylene with a 27 g·m⁻² polypropylene grid and a 7 µm aluminium foil.

1.3 The finished rolls are available with nominal characteristics of:

Roll width (m)	1.50
Roll length (m)	50
Thickness (mm)	0.43
Mass per unit area (g·m ⁻²)	149

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

- TYVEK Metallised Tape — to close laps between the membrane
- TYVEK Double-sided Tape — an acrylic tape for sealing overlaps and bonding membrane to smooth surfaces
- TYVEK Butyl Tape — a double-sided tape used for; sealing membrane joints, between the membrane and common building materials at detailing and at nail penetrations.

1.5 Quality controls carried out on the raw materials, during production and on the final product include visual inspection, measurement of emissivity, water vapour transmission, watertightness, thickness and mass per unit area.

2 Delivery and site handling

2.1 Rolls are delivered to site in paper wrappings. Each package carries a label bearing the BBA identification mark incorporating the number of this Certificate.

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

Assessment and Technical Investigations

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

Design Considerations

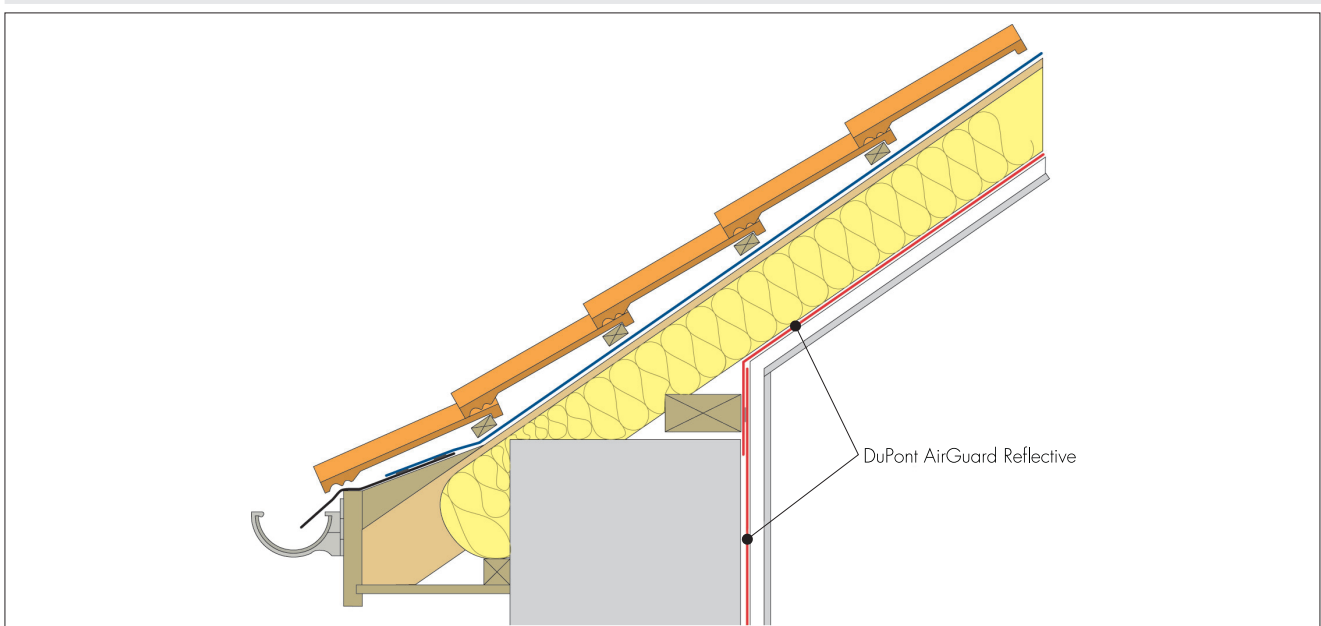
3 General

3.1 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 Enercor Roof.

3.2 The product is satisfactory for use as a radiant barrier when the foil surface is facing into an air space.

Figure 1 Wall/pitched warm roof detail



3.3 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.

3.4 Further information is given in BRE report (BR 262 : 2002) *Thermal insulation : avoiding the risks*.

3.5 Where constructions need to comply with *NHBC Standards 2011*, specifiers should observe the requirements of this document.

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

3.7 The product is effective in reducing the U value (thermal transmittance) of roofs, see section 7.

3.8 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.

3.9 Slated and tiled pitched roofs should be designed and constructed in accordance with BS 5534 : 2003.

4 Practicability of installation

The product can be installed readily by operatives experienced with this type of product.

5 Condensation

5.1 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.



5.2 The product can contribute to meeting the relevant requirements of the national Building Regulations:

England and Wales — Requirement C2(c)

Scotland — Mandatory Standard 3.15, clauses 3.15.1 and 3.15.5

Northern Ireland — Regulation C5.

5.3 Consideration must be given in the overall installation to minimising penetrations by services. Joints at ceiling/wall 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.

5.4 Constructions should be in accordance with the recommendations of BS 5250 : 2002 and favourably assessed in accordance with Appendix D using a minimum air layer equivalent value (S_d) of not less than 500 m (equivalent to a water vapour resistance of $2500 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$) for the product.

6 Air infiltration



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:

England and Wales — Accredited Construction Details (version 1.0)

Scotland — Accredited Construction Details (Scotland).

Northern Ireland — Accredited Construction Details (version 1.0).

7 Thermal insulation



Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE⁽¹⁾ report (BR 443 : 2006) *Conventions for U-value calculations*, 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 $0.45 \text{ m}^2\cdot\text{K}\cdot\text{W}^{-1}$.

(1) Building Research Establishment.

8 Strength

The product can resist the normal stresses associated with installation.

9 Properties in relation to fire

The product has properties in relation to fire similar to those of other polyolefin sheets tending to melt and shrink away from a heat source but will burn in the presence of an ignition source. Therefore the product is unclassifiable in terms of the national Building Regulations and Standards. This should be considered when assessing the overall fire risk.

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 is resistant to internal conditions, does not tear easily and will have a life equal to that of the building in which it is installed.

Installation

12 General

Installation of DuPont AirGuard Reflective should be in accordance with Certificate holder's instructions and good building practice.

13 Procedure

13.1 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 either TYVEK Butyl Tape or TYVEK Metallised Tape.

13.2 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 Butyl Tape and TYVEK Metallised Tape. Penetrations must be kept to a minimum.

13.3 The product should be made vapour and convection tight at detailing. The membrane should be sealed tight against the frame with TYVEK Butyl Tape or TYVEK Metallised Tape or tucked in and compressed by the frame.

13.4 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.

14 Repair

Damage to the vapour control layer can be made good by overlaying the damaged area with a new sheet sealed in place with either TYVEK Butyl Tape or TYVEK Metallised Tape.

Technical Investigations

15 Tests

15.1 Samples of DuPont AirGuard Reflective were obtained from the Certificate holder for testing. The results of the tests carried out by, or on behalf of, the BBA show typical results for the materials and are summarised in Tables 1 and 2.

Table 1 Physical properties — directional

Test (units)	Mean results		Method
	Longitudinal	Transverse	
Nail tear (N)	247	223	BS EN 12310-1 ⁽¹⁾
Dimensional stability (%)	-1.3	-0.5	BS EN 1107-2

(1) Tested in accordance with BS EN 13859-2, Annex B.

Table 2 Physical properties — general

Test (units)	Mean results	Method
Water vapour transmission ($\text{g}\cdot\text{m}^{-2}\cdot\text{day}^{-1}$)	0.01	BS 3177 (23°C/75% RH)
Water vapour resistance ($\text{MN}\cdot\text{s}\cdot\text{g}^{-1}$)	20520	BS 3177 (23°C/75% RH)

15.2 The following properties were also measured on the product:

- thickness
- mass per unit area
- tensile strength
- elongation
- 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.

16 Investigations

16.1 The methods of quality control were examined and details obtained of the quality and composition of the materials used.

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

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

16.4 An examination of independent data for initial type testing for CE Marking, including joint tests was carried out.

16.5 An examination of the assessment leading to Prototype Product Assessment O8/P002 for DuPont Climate System was carried out.

Bibliography

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 EN 1107-2 : 2001 *Flexible sheets for waterproofing — Determination of dimension stability — Plastic and rubber sheets for roof waterproofing*

BS EN 12310-1 : 2000 *Flexible sheets for waterproofing — Determination of resistance to tearing (nail shank)— Bitumen sheets for roof waterproofing*

BS EN 13859-2 : 2004 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for walls*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

Conditions of Certification

17 Conditions

17.1 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.

17.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

17.3 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.

17.4 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.

17.5 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.