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Agrément Certificate
07/4435
Product Sheet 2

PERMO AIR LR AIR OPEN ROOFING MEMBRANE

FOR USE IN COLD NON-VENTILATED PITCHED ROOF SYSTEMS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Permo Air LR Air Open Roofing Membrane, a polyolefin laminate composite for use in cold non-ventilated pitched roof systems.

(1) 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

Weathertightness — as part of a complete roof, the product will resist the passage of water, wind-blown snow and dust into the interior of the building (see section 6).

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 non-ventilated cold roof system (see section 7).

Wind loading — when installed on appropriately spaced battens the product's physical properties are adequate to resist the wind loads imposed on the underlay. The product will reduce the wind uplift forces acting on the roof covering (see section 8).

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

Durability — under the normal conditions found in a roof space the product will have a service life comparable with a traditional roof tile underlay (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

John Albon — Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Date of Fourth issue: 28 June 2016

Originally certificated on 12 July 2007

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, Permo Air LR Air Open Roofing Membrane for use in cold non-ventilated pitched roof systems, 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:	C2(b)	Resistance to moisture
Comment:		The product will contribute to a roof meeting this Requirement. See section 6.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product can enable a roof to meet this Requirement with respect to interstitial condensation. See section 7 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is acceptable. See section 12 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 12 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.10	Precipitation
Comment:		The product will contribute to a roof satisfying clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.8 ⁽¹⁾⁽²⁾ of this Standard. See section 6.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The product can enable a roof to satisfy this Standard with respect to interstitial condensation. See section 7 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.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for 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 an acceptable material. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The product will contribute to a roof satisfying this Regulation. See section 6.1 of this Certificate.
Regulation:	29	Condensation
Comment:		The product can enable a roof to satisfy this Regulation. See section 7 of this Certificate.

Construction (Design and Management) Regulations 2015

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

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

See section: 1 *Description* (1.1) of this Certificate.

Additional Information

NHBC Standards 2016

NHBC accepts the use of Permo Air LR Air Open Roofing Membrane for use in cold non-ventilated pitched roof systems (ie ridge or high-level ventilation is not required), provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*.

CE marking

The Certificate holder has taken the responsibility of CE marking the product in accordance with harmonised European Standard BS EN 13859-1 : 2014. An asterisk (*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 Permo Air LR Air Open Roofing Membrane is a thermally-bonded film laminate composite made of polyolefins, with the nominal characteristics given in Table 1.

Characteristic (unit)	Value
Mass per unit area (g·m ⁻²)	160
Roll length (m)	50
Roll width (m)	1.0 and 1.5
Resistance to water penetration* control	Class W1
aged	Class W1
Tensile strength* (N·50 mm ⁻¹) control	
longitudinal direction	280 ± 40
transverse direction	200 ± 40
aged	
longitudinal direction	200 ± 40
transverse direction	150 ± 40
Resistance to tearing – nail tear* (N) longitudinal direction	140 ± 30
transverse direction	130 ± 30
Low temperature flexibility* (°C)	≤ -20°C
Colour	dark blue

1.2 An ancillary item for use with the product is Permo TR Tape, a single-sided adhesive tape for use in sealing the edge of lap joints.

2 Manufacture

2.1 The membrane is manufactured by lamination by thermal bonding of an air and water vapour permeable membrane between two layers of non-woven polyolefin spunbond to form a flexible sheet.

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.

3 Delivery and site handling

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

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Permo Air LR Air Open Roofing Membrane for use in cold non-ventilated pitched roof systems.

Design Considerations

4 General

4.1 Permo Air LR Air Open Roofing Membrane is satisfactory for use in dwellings with non-ventilated tiled or slated roofs of any conventional plan and of any size. Features⁽¹⁾ successfully assessed include:

- duo pitched
- gable ends
- room-in-roof
- mono-pitched
- verges
- dormers
- hipped
- abutments
- timber sarking⁽²⁾
- 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) As in Scottish practice, where slates are nailed through the underlay directly onto timber planks (nominally 150 mm wide with a 2 mm gap) without battens.

4.2 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.

4.3 The product is installed by draping over the rafters in the traditional manner, parallel to the eaves, and securing with tiling battens. The insulation, laid horizontally at ceiling level, is pressed tightly into the eaves against the underlay to ensure no gaps are present.

4.4 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 heat loss.

4.5 In non-ventilated roof systems, the risk of condensation is equivalent to, or less than, that for conventionally-ventilated cold roof systems (see section 7).

5 Practicability of installation

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

6 Weathertightness



6.1 The product is classified as Class W1* in accordance with BS EN 13859 : 2014. 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 : 2014.

6.2 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 BBA Information Bulletin No. 2 *Permeable Roof Tile Underlay — Guide to Good Site Practice*.

7 Risk of condensation



7.1 For design purposes, the product's water vapour resistance may be taken as not more than $0.1 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$ and for roofs designed in accordance with BS 5534 : 2014 or BS 5250 : 2011, Annex H, it may be regarded as a Type LR membrane.

7.2 The product is also air permeable, allowing a significant additional mechanism for water vapour egress by convection.

7.3 The complete roof construction, ceiling boards to roof tiles, must be considered as a complete 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.

7.4 The risk of condensation is highest in new-build construction during the first heating period, where there is high moisture loading owing to wet trades, such as in-situ cast concrete slabs or plaster. The air permeability of the product will reduce this risk (see section 7.2). 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*.

7.5 All penetrations into and out of the roof space must be properly sealed in accordance with the Certificate holder's instructions which include 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.

7.6 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 using loft hatches with an effective 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.

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

8 Wind loading

8.1 Project design wind speeds for the roof in which the product is installed should be determined, and wind uplift forces calculated, in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex.

Unsupported

8.2 The product is satisfactory for use in unsupported systems, in the Geographical Wind Zones given in Table 2, where a well-sealed ceiling is present and the roof has a ridge height $\leq 15\text{m}$, a pitch between 12.5° and 75° , and a site altitude $\leq 100\text{m}$, and where topography is not significant. For all other cases, the required uplift resistance should be determined using BS 5534 : 2014 and the Certificate holder's declared wind uplift resistances in Table 3.

Product	≤345 mm batten gauge with battened laps	≤250 mm batten gauge with battened laps	≤345 mm batten gauge with lap taped with TR Plus Tape
Permo Air LR	Zones 1 to 3	Zones 1 to 5	Zones 1 to 5

Product	≤345 mm batten gauge with battened laps ⁽²⁾	≤250 mm batten gauge with battened laps ⁽¹⁾⁽²⁾	≤345 mm batten gauge with lap taped with TR Plus Tape ⁽²⁾
Permo Air LR	1190	2064	2080

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

(2) Mean of test results.

Supported

8.3 The product, when fully supported, has adequate resistance to wind uplift forces.

8.4 The product may be used at any batten gauge in all wind zones when laid over nominally airtight timber sheathing, for example OSB, plywood, chipboard and insulation for warm-roof design. It may also be used in applications where slates are nailed directly onto timber sarking.

8.5 Timber sarking, such as square-edged butt jointed planks, are not considered to be airtight and the underlay is treated as unsupported.

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 classified as Class E* in accordance with BS EN 13501-1 : 2007.

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

10.3 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 ignition.

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

11 Maintenance

As the product is confined within a roof structure and has suitable durability (see section 12), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 16).

12 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 it is not exposed to sunlight for long periods (see section 14.4). Advice regarding exposure can be obtained from the Certificate holder.

13 Reuse and recyclability

The product contains polyolefins, which can be recycled.

Installation

14 General

14.1 The Permo Air LR Air Open Roofing Membrane must be installed and fixed in accordance with the Certificate holder's instructions, the provisions of this Certificate and the relevant recommendations of BS 5534 : 2014 and BS 8000-6 : 2013. Installation can be carried out under all conditions normal to roofing work.

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

14.3 Overlaps must be provided with the minimum dimensions given in Table 4.

Roof pitch (°)	Horizontal lap (mm)		Vertical laps (mm)
	Not fully supported	Fully supported	
12.5 to 14	225	150	150
15 to 34	150	100	150
35+	100	75	150

14.4 In closed eaves constructions, eaves guards should be used to protect the product from sunlight and to direct water into the gutter.

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

15 Procedure

Draped and loose laps

15.1 The product should be installed as an unsupported system, and fixed in the traditional method for roof tile underlays, ie with a nominal 10 mm drape between the rafters, with the coloured printed side uppermost.

Timber plank sarking

15.2 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.

16 Repair

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

17 Finishing

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

17.2 To minimise the risk of condensation, it is important that the following details are maintained (see also sections 7.2, 7.3 and 7.6):

- all penetrations, eg pipework and electrical fittings to the loft space, must be sealed
- the loft hatch must be securely sealed with an effective compressible draught seal
- the insulation must be pushed into the eaves and against the underlay to avoid gaps.

17.3 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2014, BS 8000-6 : 2013 and the Certificate holder's instructions, especially when using tightly-jointed slates or tiles.

Technical Investigations

18 Tests

Tests were carried out on Permo Air LR Air Open Roofing Membrane and the results assessed to determine:

- thickness
- width
- mass per unit area
- straightness
- tensile strength and elongation – control, aged in accordance with BS EN 13859-1 : 2014 and tested wet
- tear resistance (nail)
- Mullen burst strength
- dimensional stability
- resistance to water penetration – control and aged in accordance with BS EN 13859-1 : 2014
- water vapour transmission
- hydrostatic head
- resistance to streaming water
- air permeability
- resistance to wind loads
- coefficient of friction.

19 Investigations

19.1 Using computer modelling, cold non-ventilated roofs were analysed for risk of condensation.

19.2 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.

Bibliography

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

BS 5534 : 2014 + A1 : 2015 *Code of practice for slating and tiling (including shingles)*

BS 8000-6 : 2013 *Workmanship on building sites — Code of practice for slating and tiling of roofs and claddings*

BS EN 1991-1-4 : 2005 *Eurocode 1: Actions on structures — General actions — wind actions*

NA to BS EN 1991-1-4 : 2008 UK National Annex to *Eurocode 1: Actions on structures — General actions — wind actions*

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

BS EN 13859-1 : 2014 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for discontinuous roofing*

Conditions of Certification

20 Conditions

20.1 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.

20.2 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.

20.3 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.

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

20.5 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.

20.6 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.