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Agrément Certificate

99/3622

Product Sheet 1

PERMO ROOF TILE UNDERLAYS

PERMO FORTE NG AND PERMO FORTE NG SK²

FOR USE IN COLD VENTILATED AND WARM NON-VENTILATED PITCHED ROOF SYSTEMS

This Agrément Certificate Product Sheet⁽¹⁾ relates to Permo Forte NG and Permo Forte NG SK², flexible, vapour permeable reinforced polyolefin and low-density polyethylene (LDPE) laminated membranes for use in cold ventilated and warm 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 products will resist the passage of water and wind-blown snow and dust into the interior of the building (see section 6).

Risk of condensation — the products are low water vapour resistance (Type LR) underlays and can be used as part of warm non-ventilated and cold ventilated roof systems (see section 7).

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

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

Durability — under the normal conditions found in a roof space, the products will have a service life comparable to traditional roof tile underlays (see section 12).



BBA has awarded this Certificate to the company named above for the products described herein. These products have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Claire Curtis-Thomas

Date of Seventh issue: 20 September 2018

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

Originally certificated on 15 May 2000

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 Forte NG and Permo Forte NG SK² for use in cold ventilated and warm non-ventilated roofs, 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 products will contribute to a roof satisfying this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable materials. 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 products 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 products 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:	7.1(a)	Statement of sustainability
Comment:		The products 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 products 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 products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The products will contribute to a roof satisfying this Regulation. See section 6.1 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 section: 1 *Description* (1.2) of this Certificate.

Additional Information

NHBC Standards 2018

In the opinion of the BBA, Permo Forte NG and Permo Forte NG SK² for use in cold ventilated and warm non-ventilated pitched roof systems, if installed, used and maintained in accordance with this Certificate can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*.

CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European Standard 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 Forte NG and Permo Forte NG SK² for use in cold ventilated and warm non-ventilated pitched roof systems are flexible, vapour permeable polyolefin laminated membranes comprising four layers of spunbond polypropylene, reinforcing netting and a LDPE film. Permo Forte NG SK² has a double integral tape on the selvedge edges for sealing overlaps, or Permo TR Plus Tape can be used where there is no integrated tape.

1.2 The membranes have the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Permo Forte NG and Permo Forte NG SK ²
Thickness (mm)	0.95
Mass per unit area (g·m ⁻²)	145
Roll length (m)	50
Roll width (m)	1.1, 1.5
Colour	
upper	light grey
lower	white
Tensile strength* (N·50 mm ⁻¹)	
longitudinal	430
transverse	370
Elongation* (%)	
longitudinal	20
transverse	15
Tear resistance* (N)	
longitudinal	320
transverse	340
Watertightness*	
unaged	W1
aged ⁽¹⁾	W1
Equivalent air layer thickness* (s _d)(m)	0.03

(1) Aged in accordance with EN 13859-1 : 2014

1.3 Ancillary items for use with the products include:

- Tacto — double-sided adhesive tape for sealing lap joints
- Permo TR Plus Tape — single-sided adhesive tape for sealing edges of lap joints.

1.4 Ancillary items for use with the products, but outside the scope of this Certificate, are:

- Butylon — butyl adhesive tape for sealing lap joints

- Klober Underlay Support Tray — a PVC-U detail used to protect the edge of the underlay from the effect of ultraviolet light ageing, and as a run-off into gutters
- Klober Eaves Closer — a mesh-reinforced PVC-U unit acting as a barrier against destructive pests while allowing natural air movements and moisture run-off from the batten space.

2 Manufacture

2.1 Permo Forte NG and Permo Forte NG SK² for use in cold ventilated and warm non-ventilated pitched roof systems are manufactured by heat-laminating an anthracite-coloured spunbond polypropylene (50 g·m⁻²), a white spunbond polypropylene membrane (20 g·m⁻²), reinforcing netting and a linear polyethylene film.

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.

2.3 The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by TÜV Hessen (Certificate 73100176).

3 Delivery and site handling

3.1 The membranes are delivered to site in rolls wrapped in polythene with a red label bearing the company name and product name. A label bearing the BBA logo incorporating the number of this Certificate is applied to the outer polythene wrapper.

3.2 Rolls should be stored on their side, on a smooth, clean 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 Forte NG and Permo Forte NG SK² for use in cold ventilated and warm non-ventilated pitched roof systems.

Design Considerations

4 Use

The products are satisfactory for use as fully supported or unsupported underlays in tiled and slated cold ventilated and warm non-ventilated pitched roof systems constructed in accordance with the relevant clauses of BS 5534 : 2014.

5 Practicability of installation

The products are designed to be installed by competent slaters/tilers experienced with these types of products.

6 Weathertightness



6.1 The products are Class W1* in accordance with BS EN 13859-1 : 2014 and 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 products resist 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. Further information is given in BBA Information Bulletin 2 *Permeable Roof Tile Underlay – Guide to Good Site Practice*.

7 Risk of condensation

7.1 For design purposes, the products' water vapour resistance may be taken as not more than $0.25 \text{ MN}\cdot\text{s}\cdot\text{g}^{-1}$, and for roofs designed in accordance with BS 5534 : 2014 or BS 5250 : 2011 Annex H, they may be regarded as Type LR membranes.

7.2 In common with all roofs, care must be taken in the overall design and installation to minimise the risk of water vapour coming into contact with cold parts of the construction. Factors to be considered and minimised include moisture diffusion through the ceiling, infiltration through unsealed openings/penetrations in the ceiling, and services evaporating or venting moisture into cold spaces.

7.3 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 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*.

Horizontal ceiling and insulation (cold roof)

7.4 Roofs designed and constructed in accordance with BS 5250 : 2011 will adequately limit the risk of interstitial condensation.

7.5 Alternatively, ridge or high level ventilation⁽¹⁾ equivalent to a continuous opening of 5 mm may be used (see section 19.3). If this approach is adopted, users should refer to Product Sheet 1 of BBA Certificate 00/3749, in particular the additional guidance relating to limiting the risk of interstitial condensation.

(1) The provision of high level ventilation, when using an LR underlay in cold pitched roofs is a requirement under *NHBC Standards 2018*, Chapter 7.2.

Inclined ceiling and insulation (warm roof)

7.6 For roofs with an insulated inclined ceiling, ventilation above or below the underlay will not be required provided that the passage of moisture by diffusion and by convection is controlled, eg by a vapour control layer or a continuous envelope of insulation with a high vapour resistance. Ventilation may be required if specified by the tile manufacturer or where the roof covering is airtight, as described in BS 5250 : 2011.

Partially inclined ceiling and insulation (warm and cold roof)

7.7 Where an insulated ceiling spans only part of the roofline, resulting cold roof spaces should be ventilated in accordance with BS 5250 : 2011 Annex H, or the insulation should be executed in accordance with BBA Certificate 00/3749, Product Sheet 3.

8 Wind loading

8.1 Project design wind speeds for roofs in which the products are to be 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 products are satisfactory for use in unsupported systems, in the geographical Wind Zones given in Table 2, where a well-sealed ceiling, as defined in Clause 3.7 of BS 9250 : 2007 is present and the roof has a ridge height of $\leq 15 \text{ m}$, a pitch of between 12.5° and 75° , and a site altitude of $\leq 100 \text{ m}$, 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.

Table 2 Zones of applicability of Permo Forte and Permo Forte NG SK² according to BS 5534 : 2014 clause A.8 with battened laps

Product	345 mm batten gauge with battened lap	250 mm batten gauge with battened lap
Permo Forte NG	Zone 1 to 4	Zones 1 to 5
Permo Forte NG SK ²	Zones 1 to 5 (with integrated tape) Zones 1 to 5 (with Permo TR Plus Tape)	

Table 3 Declared wind uplift resistance (Pa)

Product	345 mm batten gauge ⁽¹⁾	250 mm batten gauge ⁽¹⁾⁽²⁾
Permo Forte NG	1507	2901
Permo Forte NG SK ²	3729 (with integrated tape) 2234 (with Permo TR Plus Tape)	

(1) Mean of test results.

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

Supported

8.3 The products, when fully supported, have adequate resistance to wind uplift forces.

8.4 The products may be used at any batten gauge in all Wind Zones when laid over nominally airtight sheet sarking, for example OSB, plywood, chipboard and insulation for warm-roof design. They may also be used in applications where slates are nailed directly onto sarking boards.

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

9 Strength

The products will resist the normal loads associated with installation of the roof.

10 Properties in relation to fire

10.1 The products are classified as Class E materials in accordance with BS EN 13501-1 : 2007.

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

10.3 When the products are 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 material being ignited.

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

11 Maintenance

As the products are confined within the roof system and have suitable durability (see section 12), maintenance is not required. However, any damage occurring before enclosure must be repaired (see section 16).

12 Durability



The products will be virtually unaffected by normal conditions found in a roof space and will have a life comparable to that of traditional roof tile underlays, provided they are 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 products contain polypropylene, which can be recycled.

14 General

14.1 Permo Forte NG and Permo Forte NG SK² for use in cold ventilated and warm non-ventilated pitched roof systems 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, BS 8000-0 : 2014 and BS 8000-6 : 2013. Installation can be carried out under all conditions normal to roofing work.

14.2 The products are installed with the light grey 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. Vertical laps must be staggered a minimum of 300 mm and detailed to occur along the rafter lines. All horizontal laps can be taped and sealed using a double-sided tape, if required.

Table 4 Minimum overlaps

Roof pitch (°)	Horizontal laps (mm)		Vertical laps (mm)
	Not fully supported	Fully supported	
12.5 <15	225	150 ⁽¹⁾	300
>15	150	100	300

(1) Overlap for fully supported Permo Forte NG SK² is 100 mm.

14.4 Where possible, eaves guards should be used to protect the products from sunlight and to direct water into the gutter. Klobber Underlay Support Tray may be used for this purpose.

15 Procedure

Unsupported

15.1 The products, when installed as an unsupported system, are fixed in the traditional method for roof tile underlays, nominally 10 mm draped between the rafters to allow drainage of liquid water under the tiling battens.

Fully supported

15.2 The products must be used over sarking boards of softwood or other sarking materials as defined in BS 5534 : 2014, and installed in accordance with BS 5250 : 2011, and with either continuous insulation or insulation placed between the rafters.

15.3 The products are secured to the support with counter battens at least 25 mm thick, to create drainage and vapour dispersal space⁽¹⁾ between the products and the tiles.

(1) This space should be ventilated in accordance with BS 5250 : 2011 when using tight-fitting roof coverings.

15.4 The counterbattens are fixed with corrosion-resistant staples at a maximum of 300 mm centres coinciding with the rafters. Tiling battens are secured to the counter battens and rafters with appropriate fixings.

15.5 Care must be taken to minimise the risk of interstitial condensation as described in section 7.5, particularly for timber sarking which may be below the dew-point for extended periods during winter months.

15.6 For Permo Forte NG SK², the overlap is 150 mm wide, with the tape on the upper and lower membranes, and the joint is consolidated.

16 Repair

Damage to the products can be repaired easily prior to the installation of slates or tiles by replacing the damaged areas by patching and sealing correctly in accordance with the Certificate holder's instructions. 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 Tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2014, BS 8000-0 : 2014 and BS 8000-6 : 2013 and the tile/slate manufacturer's instructions, especially when using tightly jointed slates or tiles.

Technical Investigations

18 Tests

18.1 An assessment was made of data to BS EN 13859-1 : 2014 in relation to:

- tensile strength and elongation
- resistance to tear (nail shank)
- straightness
- resistance to water penetration
- resistance to artificial ageing
- water vapour transmission
- low temperature flexibility.

18.2 Tests were carried out to determine:

- resistance to streaming water
- burst strength
- slip resistance
- resistance to wind loads

in order to assess:

- safety of installers
- ability of the underlay to resist the passage of running water/rain
- properties when installed, intended to simulate the effects of wind suction on flexible underlay.

19 Investigations

19.1 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.

19.2 The condensation risk in warm roof constructions, and specifically those containing sarking boards, incorporating the products was assessed.

19.3 Using computer modelling, cold non-ventilated roofs were analysed for risk of condensation. This assessment was used as a basis of acceptance for use of the products in cold roofs with ridge or high-level ventilation.

Bibliography

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 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*

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

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

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1: Actions on structures — General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 *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*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

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.