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Agrément Certificate
00/3749
Product Sheet 1

KLOBER ROOF TILE UNDERLAY IN NON-VENTILATED COLD PITCHED ROOF SYSTEMS

PERMO FORTE AND PERMO FORTE SK² ROOF TILE UNDERLAYS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Permo Forte and Permo Forte SK² Roof Tile Underlays for use in cold non-ventilated pitched roof systems.

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

Weathertightness — as part of a complete roof, the products will resist the passage of water, wind-blown snow and dust into the interior of the building (see section 5).

Risk of condensation — the products are regarded as low water vapour resistance (Type LR) underlays and can therefore be used as part of a non-ventilated cold roof system (see section 6).

Wind loading — when installed on appropriately spaced battens the products' physical properties are deemed 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 7).

Strength — the products have adequate strength to resist the loads associated with the installation of the roof (see section 8).

Durability — under the normal conditions found in a roof space the products will have a service life comparable to a traditional roof tile underlay (see section 11).

The BBA has awarded this Agrément 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

Stuart Sadler
Head of Approvals — Materials

Greg Cooper
Chief Executive

Date of Third issue: 14 March 2011

Originally certificated on 6 September 2005

Certificate amended on 9 June 2011 with a change of Certificate holder details.

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 and Permo Forte SK² Roof Tile Underlays, 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(b)	Resistance to moisture
Comment:		The products will contribute to a roof meeting this Requirement. See section 5.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The product will contribute to a roof meeting this Requirement with respect to interstitial condensation. See sections 6.1 to 6.6 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The products are 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 use of the products satisfies the requirements of this Regulation. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	3.10	Precipitation
Comment:		The products will contribute to a roof satisfying the requirements of this Standard, with reference to clauses 3.10.1 ⁽¹⁾ and 3.10.7 ⁽¹⁾ . See section 5.1 of this Certificate.
Standard:	3.15	Condensation
Comment:		The products can enable a roof to satisfy this Standard with respect to interstitial condensation. See sections 6.1 to 6.6 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for these products 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 products are acceptable materials. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		The products will contribute to a roof satisfying the requirements of this Regulation. See section 5.1 of this Certificate.
Regulation:	C5	Condensation
Comment:		The products can enable a roof to satisfy the requirements of this Regulation. See sections 6.1 to 6.6 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* (1.2) of this Certificate.

Non-regulatory Information

NHBC Standards 2011

The use of Permo Forte and Permo Forte SK² Roof Tile Underlays in cold non-ventilated roofs is not permitted by these Standards.

General

The products are manufactured in Germany by Klöber GmbH & Co KG.

Technical Specification

1 Description

1.1 Permo Forte and Permo Forte SK² are manufactured by heat laminating an anthracite coloured spunbond polypropylene (80 g·m⁻²), a white spunbond polypropylene (20 g·m⁻²), a reinforcing netting and a linear low-density polyethylene film. Permo Forte SK² has a double integral tape on the selvedge edges for sealing overlaps.

1.2 The products have the nominal characteristics of:

Mass per unit area (g·m ⁻²)	150
Roll length (m)	25 ⁽¹⁾ , 50
Roll width (m)	1.1, 1.5
Colour — top surface	light grey with dark grey logos
— bottom surface	white.

(1) Only available in 1.5 m width.

1.3 Other ancillary items for use with the products include:

- Butylon — butyl adhesive tape for use in sealing lap joints in the underlay
- Tacto — a double-sided adhesive tape for use in sealing lap joints in the underlay
- Permo TR Tape — a single-sided adhesive tape for use in sealing the edge of 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.

1.4 Quality control checks on the finished product include:

- mass per unit area
- head of water
- hydrostatic head
- water vapour transmission
- tensile strength
- nail tear.

2 Delivery and site handling

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

2.2 The rolls should be stored on their sides, 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 and Permo Forte SK² Roof Tile Underlays.

Design Considerations

3 General

3.1 Permo Forte and Permo Forte SK² Roof Tile Underlays are satisfactory for use in dwellings with cold non-ventilated tiled or slated roofs of any conventional plan and size. Features⁽¹⁾ successfully assessed include:

- duo pitched
- gable ends
- room-in-roof⁽²⁾
- mono-pitched
- verges
- dormers
- hipped
- abutments
- timber sarking⁽³⁾⁽⁴⁾
- 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) Where a room-in-roof results in part of a roof pitch being insulated (ie a warm roof), design and detailing of that part of the roof should comply with relevant guidance given in Certificate No 99/3622, Product Sheet 1.

(3) As in Scottish practice, where slates are nailed through the breather membrane directly onto timber planks (nominally 150 mm wide with a 2 mm gap) without battens.

(4) Sheet sarking materials must not be used.

3.2 Permo Forte SK² should be used only in supported specifications.

3.3 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.

3.4 The products can be installed by draping over rafters and securing with tiling battens, or installed taut over rafters and secured with counter battens.

3.5 In conventionally-ventilated roof constructions, energy loss by ventilation can account for up to 25% of the total heat loss through the roof. The non-ventilated system will significantly reduce this mechanism of heat loss.

3.6 In non-ventilated roof systems, the risk of condensation is equivalent to, or less than, that for conventionally-ventilated cold roof systems (see section 6).

4 Practicability of installation

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

5 Weathertightness



5.1 Tests indicate that the products will resist the passage of water, wind-blown snow and dust into the interior of a building, under the conditions to be found in a roof constructed in accordance with the relevant Clauses of BS 5534 : 2003.

5.2 The products resist penetration of liquid water and consequently may be used as a 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 section 16, Table for *Physical properties — general*).

6 Risk of condensation



6.1 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 : 2003 or BS 5250 : 2002, Section 8.4, it may be regarded as a Type LR membrane.

6.2 The complete roof construction, ceiling boards to roof tiles, must be considered as a total system with regard to condensation risk. It is important that the products are laid in accordance with the Certificate holder's instructions and this Certificate to minimise the risk of condensation.

6.3 The risk of condensation is highest in new-build construction during the first heating period, where there is high moisture loading due 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*.

6.4 All penetrations into and out of the roof space must be properly sealed in accordance with the Certificate holder's instructions. In addition, such features as vent stacks and boiler flues, passing through the roof space, must be sealed.

6.5 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 making loft hatches convection-tight by using a 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.

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

7 Wind loading

7.1 Project design wind speeds should be determined and wind uplift forces calculated, in accordance with BS EN 1991-1-4 : 2005 and the UK National Annex.

7.2 For an unsupported system, wind loading on the underlay should be calculated in accordance with BS 5534 : 2003, Section 5.5.2.7. For acceptable wind loads with specific batten spacings for the draped product, using a 25 mm deep tiling batten, see section 16 (Table for *Physical properties — general*).

8 Strength

The products will resist the loads associated with installation of the roof (see section 16, Table for *Physical properties — directional*).

9 Properties in relation to fire

9.1 The products will melt and shrink away from heat, but will burn in the presence of a naked flame. The products are classified in accordance with EN 13501-1 : 2007 as a Class E material.

9.2 When the products are used unsupported, there is a risk that fire can spread if they 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 the material becoming ignited.

10 Maintenance

As the products are confined to a roof space, and have suitable durability (see section 11) there are no maintenance requirements. However, it must be ensured that damage occurring before enclosure is repaired (see section 14).

11 Durability



The products 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 they are not exposed to sunlight for long periods (see section 12.4). Advice regarding exposure can be obtained from the Certificate holder.

Installation

12.1 Permo Forte and Permo Forte SK² Roof Tile Underlays must be installed and fixed in accordance with the Certificate holder's instructions, provisions of this Certificate and the relevant recommendations of BS 5534 : 2003 and BS 8000-6 : 1990. Installation can be carried out under all conditions normal to roofing work.

12.2 The products are installed with the coloured side uppermost and lapped to shed water out and down the slope.

12.3 Overlaps must be provided with the minimum dimensions given in Table 1. Vertical laps should 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 1 Minimum overlaps

Roof pitch (°)	Horizontal lap (mm)		Vertical laps (mm)
	Not fully supported	Fully supported	
12.5 to 14	225	150 ⁽¹⁾	100
15 to 34	150	100	100
35+	100	75 ⁽¹⁾	100

(1) Overlap for fully supported Permo Forte SK² to be 100 mm.

12.4 Where possible, eaves guards should be used to protect the products from sunlight and to direct water into the gutter.

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

13 Procedure

Draped and loose laps

13.1 The product should be installed as an unsupported system, and fixed in the traditional method for roof tile underlays, ie laid parallel to the eaves, draped between the rafters, with the light grey printed side uppermost.

Taut

13.2 When laid horizontally, the product must be pulled taut and stapled or nailed to hold securely in position. Counter battens (minimum thickness 25 mm) are then fixed to the rafter.

Timber plank sarking

13.3 For fully supported roofs (traditional Scottish), the slates can be nailed through the underlay into the timber plank sarking, normally 150 mm wide with a 2 mm gap.

13.4 For Permo Forte SK² the overlap is 100 mm wide with the tape on the upper and lower membranes aligned. The release paper is removed simultaneously from the upper and lower membranes and joint consolidated.

14 Repair

Damage to the underlay 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.

15 Finishing

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

15.2 To achieve a convection-tight loft space, it is important that the following details are maintained (see also section 6.5).

- all penetrations, eg pipework, electrical fittings to the loft space, must be sealed
- the loft hatch must be securely sealed to ensure a draught-free fit
- the eaves must be constructed to minimise air penetration into the loft space
- the insulation must be pushed into the eaves and against the underlay to avoid gaps, taking care to avoid pushing the underlay against the tiling battens and blocking the drainage path.

15.3 The tiling and slating must be carried out in accordance with the relevant Clauses of BS 5534 : 2003, BS 8000-6 : 1990 and the tile/slate manufacturer's instructions, especially when using tightly-jointed slates or tiles.

16 Tests

16.1 Samples of Permo Forte and Permo Forte SK² Roof Tile Underlays were obtained from the Certificate holder for testing. The results of the tests carried out by, or on behalf of, the BBA are summarised in Tables 2 and 3.

Table 2 Physical properties — directional

Test (units)	Mean result		Method
	Longitudinal	Transverse	
Tear resistance — nail (N)	364	392	BS EN 13859-1, Annex B
Low temperature flexibility (°C) ⁽¹⁾	<-25	<-25	MOAT 27 : 5.4.2

(1) Lowest temperature tested -25°C.

Table 3 Physical properties — general

Test (units)	Mean result	Method
Water vapour transmission at 25°C/75% RH (g·m ⁻² ·day ⁻¹)	1.342	BS 3177
Vapour resistance (MN·s·g ⁻¹)	0.15	BS 3177
Slip resistance (coefficient of friction)		T1/10 ⁽¹⁾
dry	0.91	
wet	0.71	
Resistance to wind loads (kPa) ⁽²⁾		MOAT 69 : 4.2.1
batten spacing 350 mm	1.5 ⁽³⁾	
batten spacing 330 mm	1.5 ⁽³⁾	
batten spacing 300 mm	2.5 ⁽⁴⁾	

(1) BBA Test Method.

(2) Test carried out using 25 mm thick battens and a 600 mm rafter spacing.

(3) Maximum pressure achieved

(4) Maximum pressure tested.

16.2 An examination was also made of test data on an earlier specification of the product on the following properties:

- thickness
- width
- straightness
- mass per unit area
- tensile strength and elongation
- hydrostatic pressure.

17 Investigations

17.1 Using computer modelling, cold non-ventilated roofs (as described in section 3.1) were analysed for risk of condensation.

17.2 The manufacturing process was assessed, including the method adopted for quality control, and details were obtained of the quality and composition of the materials used.

17.3 An assessment of ageing characteristics was carried out based on test data for Permo Light (see Product Sheet 2 of this Certificate).

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 8000-6 : 1990 *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 : 2005 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Wind actions*
- BS EN 13859-1 : 2010 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for discontinuous roofing*
- EN 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*
- MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*
- MOAT No 69 : 2004 *UEAtc Technical Report for the Assessment of Discontinuous Roofing Underlay Systems*

18 Conditions

18.1 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.

18.2 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.

18.3 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.

18.4 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.

18.5 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.