Klober Ltd
Unit 6F, East Midlands Distribution Centre
Short Lane
Castle Donington
Derbyshire DE74 2HA
Tel: 01332 813050 Fax: 01332 814033
e-mail: info@klober.co.uk
website: www.klober.co.uk

BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

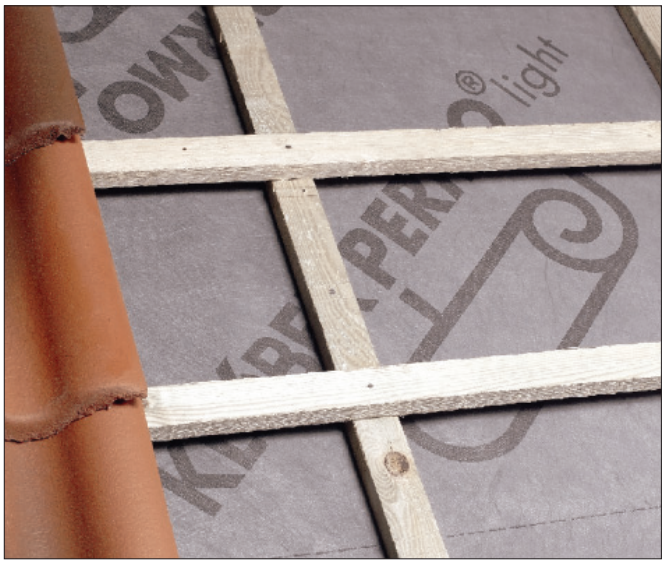
Agrément Certificate
99/3622
Product Sheet 2

PERMO ROOF TILE UNDERLAYS

PERMO LIGHT AND PERMO LIGHT SK² FOR USE IN COLD VENTILATED AND NON-VENTILATED WARM PITCHED ROOF SYSTEMS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Permo Light and Permo Light SK² for use in cold ventilated and non-ventilated warm 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 be used as part of a non-ventilated warm roof system (see section 6).

Wind loading — when installed on appropriately spaced battens the products will 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

Date of Third issue: 17 March 2011
Originally certificated on 15 May 2000

Stuart Sadler
Head of Approvals — Materials

Greg Cooper
Chief Executive

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

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA
tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk

Regulations

In the opinion of the BBA, Permo Light and Permo Light SK² 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:	Regulation 7	Materials and workmanship
Comment:		The products are acceptable. See section 11 and the *Installation* 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 *Installation* 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][2] and 3.10.7[1][2]. See section 5.1 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. See section 11 and the *Installation* 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.

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

NHBC accepts the use Permo Light and Permo Light SK², when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.2 *Pitched roofs*.

General

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

Technical Specification

1 Description

1.1 Permo Light and Permo Light SK^2 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 Light SK^2 has a double integral tape on the selvedge edges for sealing overlaps.

1.2 The product has the nominal characteristics of:

Mass per unit area (g·m^{-2})	140–145
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 Klober Tacto is a double-sided adhesive tape used for sealing lap joints in the underlay.

1.4 Other ancillary items for use with the products include:

- Klober Underlay Support Tray — a PVC-U detail used to provide a run-off for water into gutters and to protect the edge of the underlay from the effect of ultraviolet light
- Klober Eaves Closer — a mesh-faced PVC-U unit acting as a barrier against intrusive pests while allowing natural air movements and moisture run-off from the batten space
- Butylon — butyl adhesive tape for use in sealing lap joints
- Permo TR Tape — a single-sided adhesive tape for use in sealing the edge of lap joints.

1.5 Quality control checks are carried out during production and on the finished product.

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 Light and Permo Light SK^2.

Design Considerations

3 Use

Permo Light is satisfactory for use as fully supported or unsupported underlays and Permo Light SK^2 as a fully supported underlay in tiled and slated cold ventilated and warm non-ventilated pitched roofs constructed in accordance with the relevant Clauses of BS 5534 : 2003.

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 and wind-blown snow and dust into the interior of a building, under the normal 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 MN·s·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 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 ceilings and services evaporating or venting moisture into cold spaces.

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*.

Ceiling and insulation horizontal (cold ventilated roof)

6.4 Roofs designed and constructed in accordance with BS 5250 : 2002 will adequately limit the risk of condensation.

6.5 If this approach is adopted, users should refer to Product Sheet 2 of Certificate 00/3749, in particular the additional guidance relating to limiting the risk of interstitial condensation. Alternatively, ridge or high level ventilation equivalent to a continuous opening of 5 mm may be used (see section 17.2).

Ceiling and insulation inclined (warm roof)

6.6 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.

Ceiling and insulation partially inclined (warm roof and cold non-ventilated roof)

6.7 Where an insulated ceiling only spans part of the roofline, resulting in cold roof spaces, the installation should be executed in accordance with Product Sheet 2 of Certificate 00/3749.

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 The products, when fully supported or draped over counter battens, have adequate resistance to wind uplift forces.

7.3 For a cold ventilated 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 it is 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 Light and Permo Light SK^2 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 printed 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]	300
15 to 34	150	100	300
35+	100	75[1]	300

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

12.4 Where possible, eaves guards should be used to protect the products from sunlight and to direct water into the gutter. Klober Underlay Support Tray is recommended for this purpose.

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

13 Procedure

Fully supported

13.1 The products may be used over sarking boards of softwood or other sarking materials as defined in BS 5534 : 2003 and installed in accordance with BS 5250 : 2002, and either with continuous insulation or insulation placed between the rafters.

13.2 The product is secured to the support with counter battens at least 25 mm thick to create drainage and vapour dispersal space[1] between the product and the tiles.

(1) This space should be ventilated in accordance with BS 5250 : 2002 when using tight-fitting roof coverings.

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

13.4 Care must be taken to minimise the risk of interstitial condensation as described in section 6.5 particularly for timber sarking which may be below the dew-point for extended periods during winter months.

13.5 For Permo Light 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 the joint consolidated.

Unsupported

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

14 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. 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 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.

Technical Investigations

16 Tests

16.1 Samples of Permo Light and Permo Light SK² 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	
Tensile strength (N per 50 mm)	264	210	BS 2782-3.320A (100 mm min^{-1})
Percentage change in tensile (%)			BS 2782-3.320A (100 mm min^{-1})
heat aged[1]	–11.5	–9.6	
UV aged[2]	–25.0	–199.2	
Elongation at break (%)	15	16	BS 2782-3.320A (100 mm min^{-1})
Percentage change in elongation (%)			BS 2782-3.320A (100 mm min^{-1})
heat aged[1]	–22.5	–29.9	
UV aged[2]	–38.0	–43.7	
Tear resistance — nail (N)	116	96	MOAT 27 : 5.4.1 (100 mm min^{-1})
Percentage change in nail tear (%)			MOAT 27 : 5.4.1 (100 mm min^{-1})
heat aged[1]	0	2.4	
water soaked[3]			
tested dry	–40.1	–38.1	
tested wet	–31.4	–34.5	
Low temperature flexibility (°C)[4]	<–25	<–25	MOAT 27 : 5.4.2

(1) Heat aged for 56 days at 70°C.

(2) UV aged for 500 light hours using UVB 313 lamps with a cycle of four hours UV at 50°C and four hours condensation at 50°C.

(3) Water soak for 56 days at 23°C.

(4) Lowest temperature tested –25°C.

Table 3 Physical properties — general

Test (units)	Mean result	Method
Water vapour transmission at 25°C/75% RH ($g \cdot m^{-2} \cdot day^{-1}$)	1149	BS 3177
Vapour resistance ($MN \cdot s \cdot g^{-1}$)	0.18	BS 3177
Hydrostatic pressure (mm)	> 2000	BS EN 20811
Burst strength ($kN \cdot m^{-2}$)	451	BS 3137
Slip resistance (coefficient of friction)		T1/10[1]
dry	0.91	
wet	0.71	
Resistance to wind loads (kPa)[2]		BBA T1/03[3]
batten spacing 350 mm	0.5[4]	
batten spacing 300 mm	1.0[4]	
batten spacing 250 mm	1.0[4]	
batten spacing 200 mm	2.5[4]	

(1) BBA Test Method.

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

(3) BBA Test Method T1/03 now converted to MOAT 69, test 4.2.1.

(4) Maximum pressure achieved.

16.2 An examination was also made of test data on the following properties:

- thickness
- width
- mass per unit area.

17 Investigations

17.1 The condensation risk in warm roof constructions incorporating the products was examined.

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

17.3 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.

Bibliography

BS 2782-3.320A to 320F : 1976 *Methods of testing plastics — Mechanical properties — Tensile strength, elongation and elastic modulus*

BS 3137 : 1972 *Methods for determining the bursting strength of paper and board*

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 20811 : 1992 *Textiles — Determination of resistance to water penetration — Hydrostatic pressure test*

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.

British Board of Agrément
Bucknalls Lane
Garston, Watford
Herts WD25 9BA

tel: 01923 665300
fax: 01923 665301
e-mail: mail@bba.star.co.uk
website: www.bbacerts.co.uk