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**Agrément
Certificate
No 06/4311**

Designated by Government
to issue
European Technical
Approvals

PERMAVENT MEMBRANES IN ENERGY-EFFICIENT NON-VENTILATED COLD PITCHED ROOF SYSTEMS

Sous-toiture
Dachunterspannbahn

Product



• THIS CERTIFICATE RELATES TO PERMAVENT MEMBRANES IN ENERGY-EFFICIENT NON-VENTILATED COLD PITCHED ROOF SYSTEMS AS A ROOF TILE UNDERLAY FOR TILED OR SLATED PITCHED ROOFS.

• The products are one part of a non-ventilated cold pitched roof system and it is important that designers, planners, contractors and/or installers ensure that the roof and ceiling are constructed in accordance with the Certificate holder's instructions and this Certificate.


• The products prevent the ingress of wind-blown rain or snow.

• The products is resistant to tearing during installation and is flexible at low ambient temperatures.

continued

Regulations — Detail Sheet 1

1 The Building Regulations 2000 (as amended) (England and Wales)

 The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of roof tile underlay with the Building Regulations. In the opinion of the BBA, Permavent Membranes in Energy-Efficient Non-ventilated Cold Pitched Roof Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.

Requirement: C2(b)	Resistance to moisture
Comment:	The products will contribute to meeting this Requirement. See the tinted areas in the <i>Weather-tightness</i> section of these Front Sheets.
Requirement: C2(c)	Resistance to moisture
Comment:	The products can enable a roof to meet this Requirement. See the tinted areas in the <i>Risk of condensation</i> section of the relevant accompanying Detail Sheets.
Requirement: Regulation 7	Materials and workmanship
Comment:	The products are acceptable materials. See the tinted area in the <i>Durability</i> section of these Front Sheets.

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continued

- The products are permeable to water vapour, but will not allow liquid water to pass through.

These Front Sheets must be read in conjunction with the accompanying Detail Sheets, which provide information on specific membrane types.

2 The Building (Scotland) Regulations 2004



In the opinion of the BBA, Permavent Membranes in Energy-Efficient Non-ventilated Cold Pitched Roof Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Mandatory Standards as listed below.

Regulation:	8	Fitness and durability of materials and workmanship
Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The products can contribute to a construction satisfying this Regulation. See the tinted area in the <i>Durability</i> section of these Front Sheets and the <i>Installation</i> part of the accompanying Detail Sheets.
Regulation:	9	Building standards — construction
Standard:	3.10	Precipitation
Comment:		The products will contribute to a roof satisfying this Standard with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ . See the tinted areas in the <i>Weathertightness</i> section of these Front Sheets.
Standard:	3.15	Condensation
Comment:		The products can enable a roof to satisfy this Standard. See the tinted area in the <i>Risk of condensation</i> section of the relevant accompanying Detail Sheet.
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).

3 The Building Regulations (Northern Ireland) 2000



In the opinion of the BBA, Permavent Membranes in Energy-Efficient Non-ventilated Cold Pitched Roof Systems, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The products are acceptable materials. See the tinted area in the <i>Durability</i> section of these Front Sheets.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The products will contribute to a roof satisfying this Regulation. See the tinted areas in the <i>Weathertightness</i> section of these Front Sheets.
Regulation:	C5	Condensation
Comment:		These products can enable a roof to satisfy this Regulation. See the tinted areas in the <i>Risk of condensation</i> section of the accompanying Detail Sheets.

4 Construction (Design and Management) Regulations 1994 (as amended)

Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See section: 1 *Description* (1.2) of the accompanying Detail Sheets.

Technical Specification


5 Delivery and site handling

5.1 Rolls of Permavent membranes are delivered to site individually wrapped in polythene sleeves bearing the BBA identification mark incorporating the number of this Certificate. Labels bearing the manufacturer's name, product name and product code are attached to the inside of each roll core.

5.2 Rolls should be stored flat or on end on a clean, level surface and kept under cover.

Design Data

6 Weathertightness

 6.1 Tests indicate that the Permavent membranes will resist the passage of water and 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 : 2003.

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, however, should be kept to a minimum.

7 Properties in relation to fire

7.1 The products have similar properties in relation to those of traditional roof tile underlays.


7.2 When the products are used unsupported, there is a risk that fire can spread if the material is accidentally ignited during maintenance works, eg by a roofer's or plumber's torch. As with all types of sarking material, care should be taken during building and maintenance to avoid the material becoming ignited.

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

8 Maintenance

Damage to the underlay can be repaired easily prior to the installation of slates or tiles by replacement of the damaged sheet, or for limited areas, by patching and sealing correctly. Care should be taken to ensure that the weathertightness of the roof is maintained.

9 Durability

 The products will be virtually unaffected by the normal conditions found in a roof space and will have a life comparable to that of traditional roof tile underlays, provided it is not exposed to sunlight for long periods (see section 6.5 of the relevant Detail Sheet). Advice regarding exposure can be obtained from the Certificate holder.

Bibliography

BS 5534 : 2003 *Code of practice for slating and tiling (including shingles)*

Conditions of Certification

10 Conditions

10.1 This Certificate:

- (a) relates only to the product that is named, described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) is valid only within the UK;
- (d) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (e) is copyright of the BBA;
- (f) is subject to English law.

10.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

10.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabrication including all related and relevant processes thereof:

- (a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine; and

(c) are reviewed by the BBA as and when it considers appropriate.

10.4 In granting this Certificate, the BBA is not responsible for:

- (a) the presence or absence of any patent, intellectual property or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the actual works in which the product is installed, used and maintained, including the nature, design, methods and workmanship of such works.

10.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do 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 or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future 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 installation and use of this product.



In the opinion of the British Board of Agrément, Permavent Membranes in Energy-Efficient Non-ventilated Cold Pitched Roof Systems are fit for their intended use provided they are installed, used and maintained as set out in this Certificate. Certificate No 06/4311 is accordingly awarded to Permavent Ltd.

On behalf of the British Board of Agrément

Date of issue: 21st February 2006

A handwritten signature in black ink, appearing to read 'G. A. Cooper'.

Chief Executive



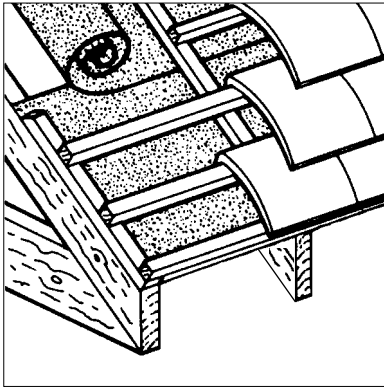
Permavent Ltd

Certificate No 06/4311

DETAIL SHEET 2

PERMAVENT BREATHER MEMBRANE

Product



• THIS DETAIL SHEET RELATES TO PERMAVENT BREATHER MEMBRANE, FOR USE IN THE NON-VENTILATED COLD PITCHED ROOF SYSTEM.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding the Building Regulations and general information relating to the product, and Conditions of Certification.

Technical Specification

1 Description

1.1 Permavent Breather Membrane is a three-layered polypropylene with outer layers of non-woven polypropylene and a breathable film in the centre.

1.2 The product has the nominal characteristics of:

thickness (mm)	0.5
weight (gm ²)	115
roll length (m)	50
roll width (m)	1.00, 1.50
roll weight	5.75, 8.62
colour	blue

1.3 Quality control checks are carried out on the incoming materials, during production and on the finished product. Quality control checks on the finished product include:

- weight
- tensile strength and elongation
- tear
- water penetration.

Design Data

2 General

2.1 Permavent Breather Membrane is satisfactory for use as an unsupported, vapour permeable roof tile underlay in cold-pitched roofs without conventional ventilation. The product is laid in the traditional manner, parallel to the eaves, and fixed in

accordance with BS 5534 : 2003 to the rafters. The insulation, laid horizontally at ceiling level, is pressed tightly into the eaves against the underlay to ensure no gaps are present. The tiling and slating of the pitched roofs should be constructed in accordance with the relevant clauses of BS 5534 : 2003.

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

2.3 The product 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
- mono-pitched
- hipped
- mansard
- gable ends
- verges
- abutments
- valleys
- room in roof
- dormers
- timber sarking⁽²⁾.

(1) For roofs incorporating other features or non-conventional roof geometries or construction materials, the advice of the distributor should be sought.

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

2.4 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 substantially reduce this mechanism of heat loss.

2.5 In non-ventilated roof systems, the risk of condensation is equivalent to, or less than, that attending conventionally-ventilated cold roof systems.

3 Strength

The product will resist the loads associated with installation.

4 Wind loading

4.1 Project design wind speeds should be determined and wind uplift forces calculated, in accordance with BS 6399-2 : 1997.

4.2 Wind loading on the underlay should be calculated in accordance with BS 5534 : 2003, Section 5.5.2.7 (see the *Tests* section of this Detail Sheet for acceptable wind loads with specific batten spacings for the draped product using a 25 mm deep tiling batten).

5 Risk of condensation



5.1 For design purposes, the underlay's resistance to water vapour transmission may be taken as not more than 0.2 MNsg^1 . This value can be used in roof designs shown in Section 8.4 of BS 5250 : 2002. For roofs designed in accordance with BS 5534 : 2003, it may be regarded as a type LR' membrane.

5.2 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 product is laid in accordance with the Certificate holder's instructions and this Certificate to prevent excessive condensation as defined in the national Building Regulations and Standards thus:

England and Wales

Approved Document C

Scotland

Mandatory Standard 3.15

Northern Ireland

Regulation C5.

5.3 All penetrations into the roof space must be properly sealed and loft hatches made convection tight by, for example, using a compressible draught seal. Vent stacks, boiler flues for example passing through the roof space must additionally be sealed along their length.

5.4 Subsequent penetrations into the roof space must be properly sealed to ensure the integrity of the non-ventilated, cold-pitched roof system is maintained. This can be achieved by the use of tape, for example Permatape.

5.5 It is essential to limit the rate of water vapour transfer into the loft space from the dwelling below. Appropriate measures include:

- the dwelling below the roof must be ventilated in accordance with national Building Regulations and Standards for the dispersal and rapid dilution of water vapour
- extractor fans should be used in rooms that may experience high humidity such as kitchens, utility rooms and bathrooms. The ventilation rates should be in accordance with the guidance documents supporting current national Building Regulations and Standards
- all water tanks in the loft space should be covered and all pipework lagged
- penetrations into the loft space from inside and outside must be sealed. Sealing should also be in accordance with the Certificate holder's instructions
- to allow water vapour to disperse above the product, tiling battens (minimum thickness 25 mm) must be used to ensure an air space between the roof covering and the product (see section 8.2).

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

Installation

6 General

6.1 Permavent Breather Membrane must be installed and fixed in accordance with the Certificate holder's instructions, 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.

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

6.3 Overlaps must be provided with the minimum dimensions given in Table 1.

Table 1 Minimum overlaps

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

6.4 Hips should be covered with a 600 mm wide strip of Permavent Breather Membrane.

6.5 In closed eaves construction, the use of eaves guards is recommended.

7 Procedure

Fully supported (cold roofs)

7.1 The product may be laid over timber plank sarking as described in section 2.3, footnote 2.

Fully supported (warm room-in-roofs)

7.2 The product may be used over sarking boards of softwood, C4 grade chipboard or water-resistant grade plywood, and either continuous insulation or insulation placed between the rafters.

7.3 The product is secured to the support with counter battens at least 12 mm thick to create an air space between the product and the tiles for drainage and vapour dispersal. The counter battens are fixed with corrosion-resistant staples or galvanized clout nails as appropriate. Tiling battens are secured to the counter battens and support with appropriate fixings.

7.4 Care must be taken to minimise the risk of interstitial condensation as described in section 5.5, particularly for timber sarking which may be below the dew-point for extended periods during winter months.

Unsupported

7.5 The membrane, when installed as an unsupported system, is fixed in the traditional method for roof tile underlays, ie draped between the rafters.

8 Finishing

8.1 It is important that the following details are maintained to achieve a convection-tight loft space (see also section 5.5).

- all pipework, electrical fittings, that penetrate the loft space must be sealed
- the loft hatch must be securely sealed to ensure draught-free fit
- the insulation must be pushed into the eaves and against the underlay to avoid gaps.

8.2 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2003 and the manufacturer's instructions, especially when using tightly jointed slates or tiles.

Technical Investigations

The following is a summary of the technical investigations carried out on the Permavent Breather Membrane.

9 Tests

Samples of Permavent Breather Membrane were obtained for testing. The result of the tests carried out by, or on behalf of, the BBA, which show typical results for the material, are summarised in Tables 2 to 4.

Table 2 Physical properties

Test (units)	Method ⁽¹⁾	Mean result
Mullen burst strength (kNm ²)	BS 3137	427
Head of water (mm)	BS EN 20811	424

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

Table 3 Physical properties — directional

Test (units)	Method ⁽¹⁾	Mean result	
		long ⁽²⁾	trans ⁽³⁾
Tensile strength (N 50 mm ²) unaged	EN 12311-1	258	158
		201	127
		276	166
Elongation at break (%) unaged	EN 12311-1	93	130
		50	75
		95	121
Tear resistance (nail) (N) unaged	BS EN 12310-1	136	187

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Longitudinal direction.

(3) Transverse direction.

(4) UV/heat aged at 50°C UVA/heat ageing for 90 days at 70°C ±2.

(5) Water soak at 23°C for 24 hours tested surface wet.

Table 4 Service performance

Test (units)	Method ⁽¹⁾	Mean result
Water vapour permeability at 25°C/75% RH (gm ² day ⁻¹)	BS 3177	1373
Vapour resistance (MNsg ⁻¹)	BS 3177	0.15
Dimensional stability long ⁽²⁾ trans ⁽³⁾	BS EN 1107-2	0.5
		+0.3
Slip resistance (coefficient of friction) dry wet	T1/10 ⁽⁴⁾	0.9
		0.7
Resistance to water penetration unaged UV/heat aged ⁽⁵⁾	EN 1928	pass
		pass
Spray test	MOAT 69 : 4.2.2	no leakage
Resistance to wind loads (kPa) batten spacing 350 mm batten spacing 330 mm batten spacing 300 mm batten spacing 250 mm batten spacing 200 mm	T1/03 ⁽⁴⁾	0.5 ⁽⁶⁾
		0.5 ⁽⁶⁾
		0.5 ⁽⁶⁾
		1.5 ⁽⁶⁾
		2.5 ⁽⁶⁾

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Longitudinal direction.

(3) Transverse direction.

(4) BBA test method.

(5) UV/heat aged at 50°C UVA/heat ageing for 90 days at 70°C ±2.

(6) Maximum pressure achieved.

10 Investigations

10.1 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.

10.2 Using computer modelling, roofs described in section 2.3 were analysed for the risk of condensation.

Bibliography

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 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8000-6 : 1990 *Workmanship on building sites — Code of practice for slating and tiling of roofs and claddings*

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

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

BS EN 20811 : 1992 *Textiles. Determination of resistance to water penetration. Hydrostatic pressure test*

EN 1928 : 2000 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of watertightness*

EN 12311-1 : 2000 *Flexible sheets for waterproofing — Determination of tensile properties — Part 1 — Bitumen sheets for roof waterproofing*

MOAT No 69 : 2004 *UEAtc Technical Report for the Assessment of Discontinuous Roofing Underlay Systems*



On behalf of the British Board of Agrément

Date of issue: 21st February 2006

Chief Executive



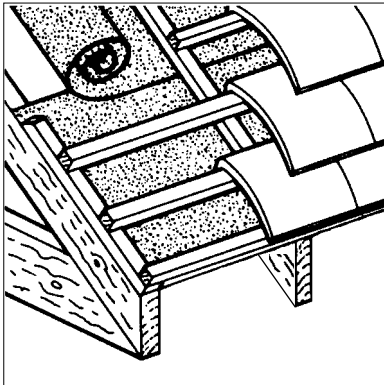
Permavent Ltd

Certificate No 06/4311

DETAIL SHEET 3

PERMAVENT-MAX BREATHER MEMBRANE

Product



• THIS DETAIL SHEET RELATES TO PERMAVENT-MAX BREATHER MEMBRANE, FOR USE IN NON-VENTILATED COLD PITCHED ROOF SYSTEMS.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 Permavent-Max Breather Membrane is a three-layer composite with outer layers of non-woven polypropylene and a breathable film in the centre.

1.2 The product has the nominal characteristics of:

thickness (mm)	0.7
weight per unit area (gm ²)	140
roll length (m)	50
roll width (m)	1.00, 1.50
roll weight (kg)	7, 10.5
colour	beige

1.3 Quality control checks are carried out on the incoming materials, during production and on the finished product. Quality control checks on the finished product include:

- weight
- tensile strength and elongation
- tear
- water penetration.

fixed in accordance with BS 5534 : 2003 to the rafters. The insulation, laid horizontally at ceiling level, is pressed tightly into the eaves against the underlay to ensure no gaps are present. The tiling and slating of the pitched roofs should be constructed in accordance with the relevant clauses of BS 5534 : 2003.

2.2 The product can be installed by draping over to and securing with tiling battens, or installed taut over rafters and secured with counter battens and tiling battens.

2.3 The product 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
- mono-pitched
- hipped
- mansard
- gable ends
- verges
- abutments
- valleys
- room in roof
- dormers
- timber sarking⁽²⁾.

(1) For roofs incorporating other features or non-conventional roof geometries or construction materials, the advice of the distributor should be sought.

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

Design Data

2 General

2.1 Permavent-Max Breather Membrane is satisfactory for use as an unsupported, vapour permeable roof tile underlay in cold-pitched roofs without conventional ventilation. The product is laid in the traditional manner, parallel to the eaves, and

2.4 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 substantially reduce this mechanism of heat loss.

2.5 In non-ventilated roof systems, the risk of condensation is equivalent to, or less than, that attending conventionally-ventilated cold roof systems.

3 Strength

The product will resist the loads associated with the installation of the roof.

4 Wind loading

4.1 Project design wind speeds should be determined and wind uplift forces calculated, in accordance with BS 6399-2 : 1997.

4.2 Wind loading on the underlay should be calculated in accordance with BS 5534 : 2003, Section 5.5.2.7 (see the *Tests* section of this Detail Sheet for acceptable wind loads with specific batten spacings for the draped product using a 25 mm deep tiling batten).

5 Risk of condensation



5.1 For design purposes, the underlay's resistance to water vapour transmission may be taken as not more than 0.2 MNsg^1 . This value can be used in roof designs shown in Section 8.4 of BS 5250 : 2002. For roofs designed in accordance with BS 5534 : 2003 it may be regarded as a type LR' membrane.

5.2 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 product is laid in accordance with the Certificate holder's instructions and this Certificate to prevent excessive condensation as defined in the national Building Regulations and Standards thus:

England and Wales

Approved Document C

Scotland

Mandatory Standard 3.15

Northern Ireland

Regulation C5.

5.3 All penetrations into the roof space must be properly sealed and loft hatches made convection tight by, for example, using a compressible draught seal. Vent stacks, boiler flues for example passing through the roof space must additionally be sealed along their length.

5.4 Subsequent penetrations into the roof space must be properly sealed to ensure the integrity of the non-ventilated, cold-pitched roof system is maintained. This can be achieved by the use of tape, for example Permatape.

5.5 It is essential to limit the rate of water vapour transfer into the loft space from the dwelling below. Appropriate measures include:

- the dwelling below the roof must be ventilated in accordance with national Building Regulations and Standards for the dispersal and rapid dilution of water vapour
- extractor fans should be used in rooms that may experience high humidity such as kitchens, utility rooms and bathrooms. The ventilation rates should be in accordance with the guidance documents supporting current national Building Regulations and Standards
- all water tanks in the loft space should be covered and all pipework lagged
- penetrations into the loft space from inside and outside must be sealed. Sealing should also be in accordance with the Certificate holder's instructions
- to allow water vapour to disperse above the product, tiling battens (minimum thickness 25 mm) must be used to ensure an air space between the roof covering and the product (see section 8.2).

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

Installation

6 General

6.1 Permavent-Max Breather Membrane must be installed and fixed in accordance with the Certificate holder's instructions, 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.

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

6.3 Overlaps must be provided with the minimum dimensions given in Table 1.

Table 1 Minimum overlaps

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

6.4 Hips should be covered with a 600 mm wide strip of Permavent-Max Membrane.

6.5 In closed eaves construction, the use of eaves guards is recommended.

7 Procedure

Fully supported (cold roofs)

7.1 The product may be laid over timber plank sarking as described in section 2.3, footnote 2.

Fully supported (warm room-in-roofs)

7.2 The product may be used over sarking boards of softwood, C4 grade chipboard or water-resistant grade plywood, and either continuous insulation or insulation placed between the rafters.

7.3 The product is secured to the support with counter battens at least 12 mm thick to create an air space between the product and the tiles for drainage and vapour dispersal. The counter battens are fixed with corrosion-resistant staples or galvanized clout nails as appropriate. Tiling battens are secured to the counter battens and support with appropriate fixings.

7.4 Care must be taken to minimise the risk of interstitial condensation as described in section 5.5, particularly for timber sarking which may be below the dew-point for extended periods during winter months.

Unsupported

7.5 The membrane, when installed as an unsupported system, is fixed in the traditional method for roof tile underlays, ie draped between the rafters.

8 Finishing

8.1 It is important that the following details are maintained to achieve a convection-tight loft space (see also section 5.5).

- all pipework, electrical fittings, that penetrate the loft space must be sealed
- the loft hatch must be securely sealed to ensure draught-free fit
- the insulation must be pushed into the eaves and against the underlay to avoid gaps.

8.2 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2003 and the manufacturer's instructions, especially when using tightly jointed slates or tiles.

Technical Investigations

The following is a summary of the technical investigations carried out on Permavent-Max Breather Membrane.

9 Tests

9.1 Samples of Permavent-Max Breather Membrane were obtained for testing. The result of the tests carried out by, or on behalf of, the BBA,

which show typical results for the material, are summarised in Tables 2 and 3.

Table 2 Physical properties — directional

Test (units)	Method ⁽¹⁾	Mean result	
		long ⁽²⁾	trans ⁽³⁾
Tensile strength (N per 50 mm) unaged	EN 12311-1	310	199
Elongation at break (%) unaged	EN 12311-1	78	108
Tear resistance (nail) (N) unaged	BS EN 12310-1	167	193

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Longitudinal direction.

(3) Transverse direction.

Table 3 Service performance

Test (units)	Method ⁽¹⁾	Mean result
Water vapour permeability at 25°C/75% RH (gm ⁻² day ⁻¹)	BS 3177	1343
Vapour resistance (MNsg ⁻¹)	BS 3177	0.15
Resistance to wind loads (kPa)	T1/03 ⁽²⁾	
batten spacing 350 mm		0.5 ⁽³⁾
batten spacing 330 mm		0.5 ⁽³⁾
batten spacing 300 mm		1.0 ⁽³⁾
batten spacing 250 mm		2.0 ⁽³⁾
batten spacing 200 mm		2.5 ⁽³⁾

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) BBA test method.

(3) Maximum pressure achieved.

9.2 Test data relating to Permavent Breather Membrane (covered by Detail Sheet 2 of this Certificate) was assessed:

- effect of UV and heat ageing
- wet strength
- dimensional stability
- slip resistance
- resistance to water penetration
- spray test
- head of water
- mullen burst strength.

10 Investigations

10.1 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.

10.2 Using computer modelling, roofs described in section 2.3 were analysed for the risk of condensation.

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 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8000-6 : 1990 *Workmanship on building sites — Code of practice for slating and tiling of roofs and claddings*

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

EN 12311-1 : 2000 *Flexible sheets for waterproofing — Determination of tensile properties — Part 1 — Bitumen sheets for roof waterproofing*



On behalf of the British Board of Agrément

Date of issue: 21st February 2006

Chief Executive



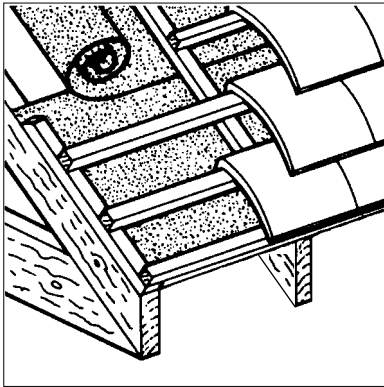
Permavent Ltd

Certificate No 06/4311

DETAIL SHEET 4

PERMAVENT-ECO BREATHER MEMBRANE

Product



• THIS DETAIL SHEET RELATES TO PERMAVENT-ECO BREATHER MEMBRANE, FOR USE IN NON-VENTILATED COLD PITCHED ROOF SYSTEMS.

This Detail Sheet must be read in conjunction with the Front Sheets, which give the product's position regarding Building Regulations, general information relating to the product, and the Conditions of Certification.

Technical Specification

1 Description

1.1 Permavent-ECO Breather Membrane is a three-layer composite with outer layers of non-woven polypropylene and a breathable film in the centre.

1.2 The product has the nominal characteristics of:

thickness (mm)	0.6
weight per unit area (gm ²)	90
roll length (m)	50
roll width (m)	1.00, 1.50
roll weight (kg)	6.7
colour	grey

1.3 Quality control checks are carried out on the incoming materials, during production and on the finished product. Quality control checks on the finished product include:

- weight
- tensile strength and elongation
- tear
- water penetration.

Design Data

2 General

2.1 Permavent-ECO Breather Membrane is satisfactory for use as an unsupported, vapour permeable roof tile underlay in cold-pitched roofs without conventional ventilation. The product is laid

in the traditional manner, parallel to the eaves, and fixed in accordance with BS 5534 : 2003 to the rafters. The insulation, laid horizontally at ceiling level, is pressed tightly into the eaves against the underlay to ensure no gaps are present. The tiling and slating of the pitched roofs should be constructed in accordance with the relevant clauses of BS 5534 : 2003.

2.2 The product can be installed by draping over to and securing with tiling battens, or installed taut over rafters and secured with counter battens and tiling battens.

2.3 The product 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
- mono-pitched
- hipped
- mansard
- gable ends
- verges
- abutments
- valleys
- room in roof
- dormers
- timber sarking⁽²⁾.

(1) For roofs incorporating other features or non-conventional roof geometries or construction materials, the advice of the distributor should be sought.

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

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2.4 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 substantially reduce this mechanism of heat loss.

2.5 In non-ventilated roof systems, the risk of condensation is equivalent to, or less than, that attending conventionally-ventilated cold roof systems.

3 Strength

The product will resist the loads associated with the installation of the roof.

4 Wind loading

4.1 Project design wind speeds should be determined and wind uplift forces calculated, in accordance with BS 6399-2 : 1997.

4.2 Wind loading on the underlay should be calculated in accordance with BS 5534 : 2003, Section 5.5.2.7 (see the *Tests* section of this Detail Sheet for acceptable wind loads with specific batten spacings for the draped product using a 25 mm deep tiling batten).

5 Risk of condensation



5.1 For design purposes, the underlay's resistance to water vapour transmission may be taken as not more than 0.15 MNsg¹.

This value can be used in roof designs shown in Section 8.4 of BS 5250 : 2002. For roofs designed in accordance with BS 5534 : 2003 it may be regarded as a type 'LR' membrane.

5.2 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 product is laid in accordance with the Certificate holder's instructions and this Certificate to prevent excessive condensation as defined in the national Building Regulations and Standards thus:

England and Wales

Approved Document C

Scotland

Mandatory Standard 3.15

Northern Ireland

Regulation C5.

5.3 All penetrations into the roof space must be properly sealed and loft hatches made convection tight by, for example, using a compressible draught seal. Vent stacks, boiler flues for example passing through the roof space must additionally be sealed along their length.

5.4 Subsequent penetrations into the roof space must be properly sealed to ensure the integrity of the non-ventilated, cold-pitched roof system is maintained. This can be achieved by the use of tape, for example Permatape.

5.5 It is essential to limit the rate of water vapour transfer into the loft space from the dwelling below. Appropriate measures include:

- the dwelling below the roof must be ventilated in accordance with national Building Regulations and Standards for the dispersal and rapid dilution of water vapour
- extractor fans should be used in rooms that may experience high humidity such as kitchens, utility rooms and bathrooms. The ventilation rates should be in accordance with the guidance documents supporting current national Building Regulations and Standards
- all water tanks in the loft space should be covered and all pipework lagged
- penetrations into the loft space from inside and outside must be sealed. Sealing should also be in accordance with the Certificate holder's instructions
- to allow water vapour to disperse above the product, tiling battens (minimum thickness 25 mm) must be used to ensure an air space between the roof covering and the product (see section 8.2)

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

Installation

6 General

6.1 Permavent-ECO Breather Membrane must be installed and fixed in accordance with the Certificate holder's instructions, 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.

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

6.3 Overlaps must be provided with the minimum dimensions given in Table 1.

Table 1 Minimum overlaps

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

6.4 Hips should be covered with a 600 mm wide strip of Permavent-ECO Breather Membrane.

6.5 In closed eaves construction, the use of eaves guards is recommended.

7 Procedure

Fully supported (cold roofs)

7.1 The product may be laid over timber plank sarking as described in section 2.3, footnote 2.

Fully supported (warm room-in-roofs)

7.2 The product may be used over sarking boards of softwood, C4 grade chipboard or water-resistant grade plywood, and either continuous insulation or insulation placed between the rafters.

7.3 The product is secured to the support with counter battens at least 12 mm thick to create an air space between the product and the tiles for drainage and vapour dispersal. The counter battens are fixed with corrosion-resistant staples or galvanized clout nails as appropriate. Tiling battens are secured to the counter battens and support with appropriate fixings.

7.4 Care must be taken to minimise the risk of interstitial condensation as described in section 5.5, particularly for timber sarking which may be below the dew-point for extended periods during winter months.

Unsupported

7.5 The membrane, when installed as an unsupported system, is fixed in the traditional method for roof tile underlays, ie draped between the rafters.

8 Finishing

8.1 It is important that the following details are maintained to achieve a convection-tight loft space (see also section 5.5).

- all pipework, electrical fittings, that penetrate the loft space must be sealed
- the loft hatch must be securely sealed to ensure draught-free fit
- the insulation must be pushed into the eaves and against the underlay to avoid gaps.

8.2 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2003 and the manufacturer's instructions, especially when using tightly jointed slates or tiles.

Technical Investigations

The following is a summary of the technical investigations carried out on Permavent-ECO Breather Membrane.

9 Tests

9.1 Samples of Permavent-ECO Breather Membrane were obtained for testing. The result of the tests carried out by, or on behalf of, the BBA, which show typical results for the material, are summarised in Tables 2 to 4

Table 2 Physical properties

Test (units)	Method ⁽¹⁾	Mean result
Mullen burst strength (kNm ⁻²)	BS 3137	379
Head of water (cm)	BS EN 20811	527

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

Table 3 Physical properties — directional

Test (units)	Method ⁽¹⁾	Mean result	
		long ⁽²⁾	trans ⁽³⁾
Tensile strength (N per 50 mm) unaged UVA/heat ageing ⁽⁴⁾	EN 12311-1	109	134
		150	88
Elongation at break (%) unaged UVA/heat ageing ⁽⁴⁾	EN 12311-1	85	56
		45	35
Tear resistance (nail) (N) unaged	BS EN 12310-1	131	188

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) Longitudinal direction.

(3) Transverse direction.

(4) UV/heat aged at 50C UVA/heat ageing for 90 days at 70C ±2.

Table 4 Service performance

Test (units)	Method ⁽¹⁾	Mean result
Water vapour permeability at 25C/75% RH (gm ⁻² day ⁻¹)	BS 3177	1960
Vapour resistance (MNsg ⁻¹)	BS 3177	0.11
Resistance to water penetration aged UV/heat aged ⁽²⁾	EN 1928	pass pass
Spray test	MOAT 69 : 4.2.2	no leakage
Resistance to wind loads (kPa) batten spacing 330 mm batten spacing 300 mm batten spacing 250 mm batten spacing 200 mm	MOAT 69 : 4.2.1	0.5 ⁽³⁾
		0.5 ⁽³⁾
		1.5 ⁽³⁾
		2.5 ⁽³⁾

(1) The test documents are detailed in the *Bibliography*. Numbers in the table refer to sections/parts of the various documents.

(2) UV/heat aged at 50C UVA/heat ageing for 90 days at 70C ±2.

(3) Maximum pressure achieved.

9.2 Test data relating to Permavent-ECO Breather Membrane (covered by Detail Sheet 2 of this Certificate) was assessed:

- wet strength
- dimensional stability
- slip resistance.

10 Investigations

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

10.2 Using computer modelling, roofs described in section 2.3 were analysed for the risk of condensation.

Bibliography

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 6399-2 : 1997 *Loading for buildings — Code of practice for wind loads*

BS 8000-6 : 1990 *Workmanship on building sites — Code of practice for slating and tiling of roofs and claddings*

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

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

EN 1928 : 2000 *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of watertightness*

EN 12311-1 : 2000 *Flexible sheets for waterproofing — Determination of tensile properties — Part 1 — Bitumen sheets for roof waterproofing*

MOAT No 69 : 2004 *UEAtc Technical Report for the Assessment of Discontinuous Roofing Underlay Systems*



On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'G. A. Cooper'.

Date of issue: 21st February 2006

Chief Executive