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**Agrément
Certificate
No 03/4062**

Designated by Government
to issue
European Technical
Approvals

MONARPERM 700 BREATHABLE UNDERLAY FOR NON-VENTILATED COLD PITCHED ROOFS

Système de revêtement
Dachbelagsystem

Product

• THIS CERTIFICATE RELATES TO MONARPERM 700 BREATHABLE UNDERLAY FOR NON-VENTILATED COLD PITCHED ROOFS, FOR USE AS A ROOF TILE UNDERLAY IN TILED OR SLATED PITCHED ROOFS.

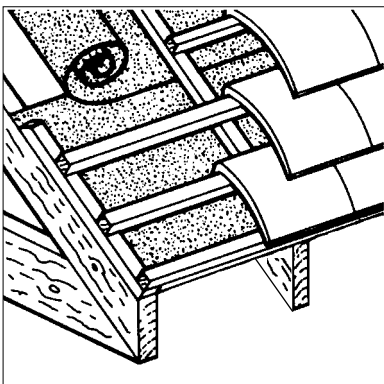
• The product is one part of a non-ventilated, cold-pitched roof system and it is important that designers, planners, contractors and/or installers ensure that the roof and ceiling are constructed in accordance with the Certificate holder's instructions and this Certificate.

• Advice on the use of the product in this application can be sought from the Certificate holder.

• The product prevents the ingress of wind-blown rain or snow.


• Advantages during installation include resistance to tearing and its flexibility at low ambient temperatures.

• The product is permeable to water vapour, but will not allow liquid water to pass through.




Regulations

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, Monarperm 700 Breathable Underlay for Non-ventilated Cold Pitched Roofs, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements.


Requirement:	C4	Resistance to weather and ground moisture
Comment:		The product will contribute to a roof meeting this Requirement. See sections 9.1 and 9.2 of this Certificate.
Requirement:	F2	Condensation in roofs
Comment:		The product can enable a roof to meet this Requirement. See sections 10.1 to 10.6 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is an acceptable material. See section 13 of this Certificate.

2 The Building Standards (Scotland) Regulations 1990 (as amended)

 In the opinion of the BBA, Monarperm 700 Breathable Underlay for Non-ventilated Cold Pitched Roofs, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	10	Fitness of materials and workmanship
Standard:	B2.1	Selection and use of materials, fittings, and components, and workmanship
Comment:		The product can contribute to a construction meeting this Standard. See the <i>Installation</i> part of this Certificate.
Standard:	B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The product is an acceptable material. See section 13 of this Certificate.
Regulation:	17	Resistance to moisture
Standard:	G3.1	Resistance to precipitation — Resistance to precipitation
Comment:		The product will contribute to a roof satisfying this Standard. See sections 9.1 and 9.2 of this Certificate.
Regulation:	18	Resistance to condensation
Standard:	G4.1	Condensation — Interstitial condensation
Comment:		The product can enable a roof to satisfy this Standard. See sections 10.1 to 10.6 of this Certificate.

3 The Building Regulations (Northern Ireland) 2000

 In the opinion of the BBA, Monarperm 700 Breathable Underlay for Non-ventilated Cold Pitched Roofs, 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 product is an acceptable material. See section 13 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The product will contribute to a roof satisfying this Regulation. See sections 9.1 and 9.2 of this Certificate.

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Regulation: C5

Condensation

Comment:

The product can enable a roof to satisfy this Regulation. See sections 10.1 to 10.6 of this Certificate.

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 sections: 5 *Description* (5.2), 8 *Strength* (8.2), and 14 *Installation – General* (14).

Technical Specification

5 Description

5.1 Monarperm 700 Breathable Roof Underlay is a flexible, vapour permeable membrane manufactured from non-woven, micro-porous polypropylene with a polypropylene layer on both sides for use in unsupported specifications.

5.2 The product has the nominal characteristics of:

thickness (mm)	0.6
roll length (m)	50
roll width (m)	1.5
roll weight (kg)	10.5
surface weight (gm ⁻²)	140
coverage per roll (m ²)	75
colour	blue top side (with white logo) grey underside.

5.3 Ancillary items available are:

- butyl adhesive tape (eg Monobond LT Tape)
- Monarflex Eavesguard — a PVC-U detail used to protect the edge of the underlay from the effects of ultraviolet light ageing and as a run-off into the gutter.

6 Delivery and site handling

6.1 Rolls are delivered to site in packages. Each package carries a label bearing the product name, company name, fixing instructions and the BBA identification mark incorporating the number of this Certificate.

6.2 Rolls should be stored on their sides on a smooth, clean, dry surface, under cover and protected from sunlight.

7 General

7.1 Monarperm 700 Breathable Underlay for Non-ventilated Cold Pitched Roofs is satisfactory for use as unsupported, vapour permeable roof tile underlay in tiled or slated cold-pitched roof systems without ventilation. The product is laid parallel to the eaves and is fixed in the traditional method in accordance with BS 5534 : 2003 to the supporting elements or rafters. The insulation, laid horizontally at ceiling level, is pressed tightly into the eaves against the underlay to ensure no gaps are present. Tiling and slating of pitched roofs should be in accordance with the relevant clauses of BS 5534 : 2003.

7.2 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
- gabled 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, further assessment may be required.

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

7.3 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.

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

8 Strength


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

8.2 The product has adequate resistance to wind uplift forces likely to be experienced in most locations in the United Kingdom and, for design

purposes, may be considered at least equal in strength to types 1F and 5U reinforced bitumen underlay as defined in BS 747 : 2000. Tests carried out on the product fixed over rafters at 600 mm centres, with batten centres at 250 mm and 350 mm have shown that the product does not extend unduly or tear around nail holes when subjected to a range of negative pressures up to 2.5 kNm⁻² and 0.5 kNm⁻² respectively.

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

9 Weathertightness

 9.1 Tests indicate that the product 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.

9.2 The product resists penetration of liquid water when subjected to a hydrostatic head in excess of six metres and consequently may be used as temporary waterproofing prior to the installation of slates or tiles. However, the period of such use should be kept to a minimum.

10 Risk of condensation


 10.1 Typical values for water vapour resistance are given in Table 1.

Table 1 Water vapour resistance

Material	Water vapour resistance (MNsg ⁻¹)
Monarperm 700	0.17
Traditional felt underlay	570 ⁽¹⁾
Polyethylene sheet (0.15 mm)	450

(1) Maximum.

10.2 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 manufacturer's instructions and this Certificate to prevent excessive condensation as defined in the national Building Regulations and Standards thus:

England and Wales

Approved Document F

Scotland

Technical Standards, Part G of the *Provisions deemed to satisfy the standards*

Northern Ireland

Technical Booklet C.

10.3 All penetrations into and out of the roof space must be properly sealed in accordance with the Certificate holder's instructions. Vent stacks, boiler flues, for example, passing through the roof space must additionally be sealed along their length.

10.4 Subsequent penetrations into the roof space must be properly sealed to ensure the integrity of the unventilated, cold-pitched roof system is maintained.

10.5 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
- for 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
- ceiling penetrations must be sealed and loft hatches made convection tight by using a compressible draught seal.

10.6 To avoid any potential condensation it is advisable that a vapour control layer (eg Monofilament 250) be used in conjunction with the breather membrane as part of the cold-pitched roof system.

11 Properties in relation to fire

11.1 The product has similar properties in relation to those of traditional polyethylene roof tile underlay, which are acceptable under BS 5534 : 2003.

11.2 When the product is 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.

12 Maintenance

Damage to the underlay can be repaired easily prior to the installation of slates or tiles by the 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.

13 Durability



The product 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 15.3 of this Certificate). Advice regarding exposure can be obtained from the Certificate holder.

Installation

14 General

Monarperm 700 Breathable Underlay for Non-ventilated Cold Pitched Roofs must be installed and fixed in accordance with the Certificate holder's instructions, 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.

15 Procedure

15.1 The underlay is laid parallel to the eaves and is fixed in the traditional method for unsupported roof tile underlays, ie draped between the rafters. The drape should be sufficient to allow water drainage but not greater than a nominal 10 mm to limit the risk of transferring wind loads to the tiles and slates.

15.2 Laps should be installed to shed water out and down the slope.

15.3 For open eaves construction the Monarflex Eavesguard should be used to conduct water into the gutter and protect the underlay from UV light.

15.4 Overlaps must be provided with the minimum dimensions given in Table 2.

Table 2 Overlap dimensions

Roof pitch (°)	Horizontal lap (mm)	Vertical lap (m)
12.5 to 14	225	100
15 to 34	150	100
35+	100	100

16 Finishing

16.1 Detailing of abutments, verges and hips must be in accordance with the Certificate holder's instructions. When detailing hips and valleys, laps must be a minimum of 300 mm.

16.2 It is important that the following details are maintained to achieve a convection-tight loft space (see also section 10.5 of this Certificate):

- all penetrations of the loft space (eg pipework and electrical fittings) must be sealed
- the loft hatch must be securely sealed to ensure a draught-free fit
- the insulation must be pushed into the eaves and against the underlay to avoid gaps.

16.3 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2003 and BS 8000-6 : 1990, especially when using tightly-jointed slates or tiles.

Technical Investigations

The following is a summary of the technical investigations carried out on Monarperm 700 Breathable Underlay for Non-ventilated Cold Pitched Roofs.

17 Tests

17.1 Samples of Monarperm 700 were obtained from the company for testing. The results of the tests carried out by, or on behalf of, the BBA, which show typical results for the material, are summarised in Tables 3 and 4.

Table 3 Physical properties

Test (unit)	Method ⁽¹⁾	Mean result	
		long ⁽²⁾	trans ⁽³⁾
Tensile strength (N 50 mm ⁻¹) unaged (control)	BS 2782-3 : 320A (100 mm min ⁻¹)	233	162
Minimum elongation at break (%) unaged (control)	BS 2782-3 : 320A (100 mm min ⁻¹)	17	48
Resistance to tear (nail) (N) unaged (control)	MOAT 27 : 5.4.1	87	83

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

(2) Longitudinal direction.

(3) Transverse direction.

Table 4 Service performance

Test (unit)	Method ⁽¹⁾	Mean result
Low temperature flexibility (°C)	MOAT 27 : 5.4.2	-25
Resistance to water penetration (Eosin test)	BS 4016	pass — no staining/wetness
Puncture resistance	BBA T1/O1 ⁽²⁾	satisfactory
Resistance to wind loads (kPa)	BBA T1/O3 ⁽²⁾	
350 mm batten spacing		0.5
250 mm batten spacing		2.5
Mullen burst strength (kNm ⁻²)	BS 3137	603
1 metre head of water for 24 hours	BBA ⁽³⁾	no penetration
Water vapour resistance at (gm ⁻² day ⁻¹)	BS 3177 (25°C/75% RH)	1196
Water vapour resistance (MNsg ⁻¹)	BS 3177 (25°C/75% RH)	0.17
Resistance to water spray	BBA T1/15 ⁽²⁾	pass — no wetness
Hydrostatic pressure head of water (m)	BS EN 20811	
mean		7.31
minimum		6.80
Coefficient of dynamic friction	BBA T1/10 ⁽²⁾	
dry		0.85
wet		0.73

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

(2) BBA test methods.

(3) Based on MOAT No 27, Method 5.1.4.

17.2 Data from tests on similar specification roof lining systems were used to assess the following properties of Monarperm 700:

- change in properties after UV ageing at 50°C
- change in properties after heat ageing at 70°C
- change in properties after water immersion at 23°C
- wet strength at 23°C.

18 Investigations

18.1 Using computer modelling, roofs described in section 7.2 of this Certificate were analysed for the risk of condensation.

18.2 An assessment of practicability of installation was made from site visits of Monarperm systems.

18.3 An examination was made of quality control data relating to:

- thickness
- roll weight
- weight per unit area
- tensile strength
- nail tear
- dimensional stability
- head of water.

Bibliography

BS 747 : 2000 *Reinforced bitumen sheets for roofing — Specification*

BS 2782-3 : Methods 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 4016 : 1997 *Specification for flexible building membranes (breather type)*

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

MOAT No 27 : 1983 *General Directive for the Assessment of Roof Waterproofing Systems*

Conditions of Certification

19 Conditions

19.1 This Certificate:

- (a) relates only to the product that is 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.

19.2 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.

19.3 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.

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

- (a) the presence or absence of any patent 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 nature or standard of individual installations of the product or any maintenance thereto, including methods and workmanship.

19.5 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, Monarperm 700 Breathable Underlay for Non-ventilated Cold Pitched Roofs is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 03/4062 is accordingly awarded to Icopal Ltd.

On behalf of the British Board of Agrément

Date of issue: 11th December 2003


Chief Executive

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British Board of Agrément

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