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Agrément Certificate  
**15/5188**  
Product Sheet 1

## MASTERMAX 3 BREATHABLE MEMBRANES

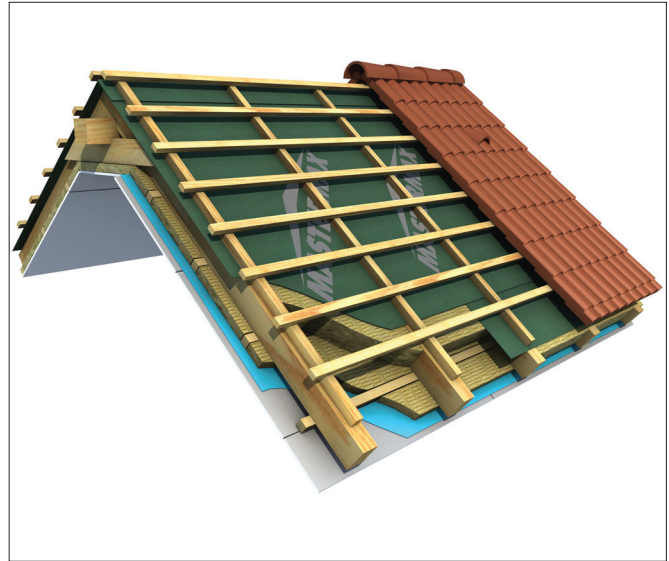
### FOR USE IN WARM NON-VENTILATED AND COLD VENTILATED ROOFS

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Mastermax 3 Breathable Membranes, flexible three-layer polypropylene sheet materials for use as roof tile underlays in warm non-ventilated and cold ventilated pitched roof systems.

(1) Hereinafter referred to as 'Certificate'.

#### CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



#### KEY FACTORS ASSESSED

**Weathertightness** — as part of a complete roof, the products will resist the passage of water and wind-blown snow and dust into the interior of the building (see section 6).

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

**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 8).

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

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

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

On behalf of the British Board of Agrément

John Albon — Head of Approvals  
Construction Products

Claire Curtis-Thomas  
Chief Executive

Date of First issue: 27 January 2015

*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](http://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, Mastermax 3 Breathable Membranes for use in Warm Non-ventilated and Cold Ventilated Roofs, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



## The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	C2(b)	Resistance to moisture
Comment:		The products will contribute to a roof meeting this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.



## The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Durability, workmanship and fitness of materials
Comment:		The products can contribute to a construction satisfying this Regulation. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	3.10	Precipitation
Comment:		The products will contribute to a roof satisfying clauses 3.10.1 <sup>(1)(2)</sup> and 3.10.8 <sup>(1)(2)</sup> of this Standard. See section 6.1 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The products can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for these products under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12.1 <sup>(1)(2)</sup> and Schedule 6 <sup>(1)(2)</sup> . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



## The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(i)(iii)(b)(i)	Fitness of materials and workmanship
Comment:		The products are acceptable. See section 12 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The products will contribute to a roof satisfying this Regulation. See section 6.1 of this Certificate.

## Construction (Design and Management) Regulations 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* and 14 *General* (14.2) of this Certificate.

# Additional Information

## NHBC Standards 2014

NHBC accepts the use of Mastermax 3 Breathable Membranes for use in Warm Non-ventilated and Cold Ventilated Roofs, provided they are installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards, Chapter 7.2 Pitched roofs*.

## CE marking

The Certificate holder has taken the responsibility of CE marking the products, in accordance with harmonised European Standard BS EN 13859-1 : 2014. An asterisk (\*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

# Technical Specification

## 1 Description

Mastermax 3 Breathable Membranes for use in Warm Non-ventilated and Cold Ventilated Roofs are three-layer polypropylene laminate composites with the nominal characteristics given in Table 1.

Table 1 Nominal characteristics

Characteristic (unit)	Mastermax 3 Breathable Membranes			
	Eco	Classic	Top	Extra
Thickness (mm)	0.35	0.43	0.48	0.5
Mass per unit area* (g·m <sup>-2</sup> )	100	120	140	160
Roll length* (m) <sup>(1)</sup>	50	50	50	50
Roll width* (m) <sup>(1)</sup>	1.0, 1.5	1.0, 1.5	1.0, 1.5	1.0, 1.5
Colour				
upper	various	various	various	various
lower	various	various	various	various
Tensile strength* [N(50 mm) <sup>-1</sup> ]				
longitudinal	180	200	240	260
transverse	90	110	150	200
Elongation* (%)				
longitudinal	60	60	60	60
transverse	60	60	60	60
Tear resistance* (N)				
longitudinal	70	80	100	100
transverse	60	70	80	90
Resistance to air penetration* (m <sup>3</sup> /m <sup>2</sup> ·h·50 Pa)	0.093	–	–	0.072
Watertightness*				
unaged	W1	W1	W1	W1
aged <sup>(2)</sup>	W1	W1	W1	W1
Water vapour transmission* (S <sub>d</sub> )(m)	0.02	0.05	0.04	0.01

(1) Other lengths, widths and colours are available.

(2) Aged in accordance with BS EN 13859-1 : 2014, Annex C.

## 2 Manufacture

2.1 The membranes are manufactured by a thermal-bonding process in which a polyethylene breathable film is bonded together with polypropylene non-woven membranes to form a flexible sheet.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by Moody International Certification Ltd TIA Intertek (Certificate 0107126-1).

## 3 Delivery and site handling

3.1 Rolls are delivered to site, individually wrapped in polythene foil bearing the BBA logo incorporating the number of this Certificate.

3.2 The rolls should be stored flat or on end on a clean, level surface and kept under cover.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Mastermax 3 Breathable Membranes for use in Warm Non-ventilated and Cold Ventilated Roofs.

## 4 Use

Mastermax 3 Breathable Membranes for use in Warm Non-ventilated and Cold Ventilated Roofs are satisfactory for use as fully-supported or unsupported underlays in tiled and slated warm non-ventilated and cold ventilated pitched roof systems constructed in accordance with the relevant clauses of BS 5534 : 2014.

## 5 Practicability of installation

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

## 6 Weathertightness



6.1 The products are Class W1\* in accordance with BS EN 13859-1 : 2014. The products will resist the passage of water, wind-blown rain and dust into the interior of a building, under all conditions to be found in a roof constructed in accordance with the relevant clauses of BS 5534 : 2014.

6.2 The products resist penetration of liquid water and consequently may be used as a temporary waterproofing prior to the installation of the slates or tiles. The period of use should, however, be kept to a minimum. Further information is given in BBA Information Bulletin 2 *Permeable Roof Tile Underlay — Guide to Good Site Practice*.

## 7 Risk of condensation

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

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

7.3 The risk of condensation is highest in new-build construction during the first heating period, where there is high moisture loading owing to wet trades, such as in-situ cast concrete slabs or plaster. The risk of condensation diminishes as the building naturally dries out. Further information is given in BBA Information Bulletin No 1 *Roof Tile Underlays in Cold Roofs during the Drying-out Period*.

### Horizontal ceiling and insulation (cold roof)

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

7.5 Alternatively, ridge or high-level ventilation equivalent to a continuous opening of 5 mm may be used. If this approach is adopted, users should refer to Product Sheet 2, in particular the additional guidance relating to limiting the risk of interstitial condensation.

### Inclined ceiling and insulation (warm roof)

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

### Partially inclined ceiling and insulation (warm roof and cold roof)

7.7 Where an insulated ceiling spans only part of the roofline, resulting cold roof spaces should be ventilated in accordance with BS 5250 : 2011, Annex H.

## 8 Wind loading

8.1 Project design wind speeds for the roof in which the products are installed should be determined and wind uplift forces calculated, in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex.

### Unsupported

8.2 The products are satisfactory for use in unsupported systems, in the Geographical Wind Zones given in Table 2, where a well-sealed ceiling is present and the roof has a ridge height  $\leq 15\text{m}$ , a pitch between  $12.5^\circ$  and  $75^\circ$ , and a site altitude  $\leq 100\text{m}$ , and where topography is not significant.

For all other cases, the required uplift resistance should be determined using BS 5534 : 2014 and the Certificate holder's declared wind uplift resistances in Table 3.

*Table 2 Zones of applicability of the Mastermax 3 underlays according to BS 5534 : 2014, clause A.8 with battened laps*

Product	≤345 mm batten gauge with battened laps	≤250 mm batten gauge with battened laps
Mastermax 3 ECO	unclassified	Zones 1 to 3
Mastermax 3 Classic	unclassified	Zones 1 to 4
Mastermax 3 Top	Zone 1	Zones 1 to 5
Mastermax 3 Extra	Zones 1 to 2	Zones 1 to 5

*Table 3 Declared wind uplift resistance Pa*

Product	≤345 mm batten gauge with battened lap <sup>(2)</sup>	≤250 mm batten gauge with battened lap <sup>(1)(2)</sup>
Mastermax 3 ECO	690	1240
Mastermax 3 Classic	750	1510
Mastermax 3 Top	870	1710
Mastermax 3 Extra	1070	2030

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

(2) Mean of test results.

### Supported

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

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

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

## 9 Strength

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

## 10 Properties in relation to fire

10.1 The products are Class E\* in accordance with BS EN 13501-1 : 2007.

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

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

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

## 11 Maintenance

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

## 12 Durability



The products will be virtually unaffected by 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 14.5). Advice regarding exposure can be obtained from the Certificate holder.

## 13 Reuse and recyclability

The products contain polypropylene, which can be recycled.

# Installation

## 14 General

14.1 Mastermax 3 Breathable Membranes must be installed and fixed in accordance with the Certificate holder's instructions, the provisions of this Certificate and the relevant recommendations of BS 5534 : 2014 and BS 8000-6 : 2013. Installation can be carried out under all conditions normal to roofing work.

14.2 The products have a high coefficient of friction, either wet or dry, giving a slip-resistant surface for increased safety during the installation of the tiles and slates.

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

14.4 Overlaps must be provided with the minimum dimensions given in Table 4.

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

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

## 15 Procedure

### Unsupported

15.1 The products, when installed as an unsupported system, are fixed in the traditional method for roof tile underlays, ie draped between the rafters.

### Fully supported

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

15.3 The products are secured to the support with counter battens at least 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 rafters with appropriate fixings.

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

## 16 Repair

Damage to the products can be repaired prior to the installation of slates or tiles by replacing the damaged areas, by patching and sealing correctly. Care must be taken to ensure that the watertightness of the roof is maintained.

## 17 Finishing

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

17.2 The tiling and slating must be carried out in accordance with the relevant clauses of BS 5534 : 2014, BS 8000-6 : 2013 and the Certificate holder's instructions, especially when using tightly-jointed slates or tiles.

## Technical Investigations

## 18 Tests

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

- dimensions\*
- mass per unit area\*
- tensile strength and elongation\*
- resistance to tear\*
- dimensional stability\*
- resistance to penetration of air\*
- resistance to water penetration\*
- resistance to artificial ageing\*
- water vapour transmission\*
- water-tightness of seams\*
- reaction to fire\* .

18.2 Tests were carried out to determine:

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

to assess:

- safety during installation
- performance under typical service conditions
- robustness during installation
- properties when installed.

## 19 Investigations

19.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and compositions of materials used.

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

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

## Bibliography

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS 5534 : 2014 *Slating and tiling for pitched roofs and vertical cladding — Code of practice*

BS 8000-6 : 2013 *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 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN 13859-1 : 2014 *Flexible sheets for waterproofing — Definitions and characteristics of underlays — Underlays for discontinuous roofing*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

## 20 Conditions

20.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

20.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

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

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

20.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

20.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

20.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.