

## Icopal SAS

12 rue de la Renaissance  
92184 Antony Cedex  
France

Tel: 00 33 1 40 96 35 00 Fax: 00 33 1 40 96 35 07

e-mail: [contactinternational@icopal.com](mailto:contactinternational@icopal.com)

website: [www.siplast-international.com](http://www.siplast-international.com)



### Agrément Certificate

10/4762

Product Sheet 1

## SIPLAST MEMBRANES

### PREFLEX AND GRAVIFLEX MEMBRANES

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Preflex and Graviflex Membranes, modified bitumen membranes for use in roof garden (including zero fall) applications.

(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** — the products, including joints, will resist the passage of moisture into a building (see section 6).

**Properties in relation to fire** — the products can enable a roof to be unrestricted under the national Building Regulations (see section 7).

**Resistance to wind uplift** — resistance to wind uplift is dependent on the top layers of the roof garden and green roof specification (see section 8).

**Resistance to mechanical damage** — the products will accept, without damage, the limited foot traffic and loads associated with installation and maintenance (see section 9).

**Resistance to root penetration** — the products will adequately resist plant root penetration (see section 10).

**Durability** — under normal service conditions, the products will provide a durable waterproof covering with a service life in excess of 30 years (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

Date of Third issue: 15 August 2019

John Albon  
Chief Scientific Officer

Claire Curtis-Thomas  
Chief Executive

Originally certificated on 8 July 2010

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.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

#### British Board of Agrément

Bucknalls Lane  
Watford  
Herts WD25 9BA

©2019

tel: 01923 665300  
[clientservices@bbacerts.co.uk](mailto:clientservices@bbacerts.co.uk)  
[www.bbacerts.co.uk](http://www.bbacerts.co.uk)

## Regulations

In the opinion of the BBA, Preflex and Graviflex Membranes, 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)

<b>Requirement:</b>	<b>B4(2)</b>	<b>External fire spread</b>
Comment:	On a suitable substructure, the use of the products can enable a roof to be unrestricted under this Requirement. See sections 7.1 to 7.4 of this Certificate.	
<b>Requirement:</b>	<b>C2(b)</b>	<b>Resistance to moisture</b>
Comment:	The products, including joints, will enable a roof to satisfy this Requirement. See section 6.1 of this Certificate.	
<b>Regulation:</b>	<b>7</b>	<b>Materials and workmanship (applicable to Wales only)</b>
<b>Regulation:</b>	<b>7(1)</b>	<b>Materials and workmanship (applicable to England only)</b>
Comment:	The products are acceptable. See section 12.1 and the <i>Installation</i> part of this Certificate.	



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

<b>Regulation:</b>	<b>8(1)(2)</b>	<b>Durability, workmanship and fitness of materials</b>
Comment:	The use of the products satisfies the requirements of this Regulation. See sections 11.1 and 12.1 and the <i>Installation</i> part of this Certificate.	
<b>Regulation:</b>	<b>9</b>	<b>Building standards applicable to construction</b>
Standard:	<b>2.8</b>	<b>Spread from neighbouring buildings</b>
Comment:	The products, when applied to suitable substrates, can be regarded as having low vulnerability and can enable a roof to be unrestricted under this Standard, with reference to clauses 2.8.1 <sup>(1)(2)</sup> and 2.8.2 <sup>(1)(2)</sup> . See sections 7.1, 7.2 and 7.4 of this Certificate.	
Standard:	<b>3.10</b>	<b>Precipitation</b>
Comment:	The use of the products will enable a roof to satisfy the requirements of this Standard, with reference to clauses 3.10.1 <sup>(1)(2)</sup> and 3.10.7 <sup>(1)(2)</sup> . See section 6.1 of this Certificate.	
Standard:	<b>7.1(a)</b>	<b>Statement of sustainability</b>
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.	
<b>Regulation:</b>	<b>12</b>	<b>Building standards applicable to conversions</b>
Comment:	Comments in relation to the product under Regulation 9, Standards 1 to 6, also apply to this Regulation, with reference to clause 0.12 <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 (as amended)

<b>Regulation:</b>	<b>23(a)(i)(iii)(b)(i)</b>	<b>Fitness of materials and workmanship</b>
Comment:	The products are acceptable. See section 12.1 and the <i>Installation</i> part of this Certificate.	

<b>Regulation:</b>	<b>28(b)</b>	<b>Resistance to moisture and weather</b>
<b>Comment:</b>		The products, including joints, will enable a roof to satisfy the requirements of this Regulation. See section 6.1 of this Certificate.
<b>Regulation:</b>	<b>36(b)</b>	<b>External fire spread</b>
<b>Comment:</b>		On suitable substructures, the use of the products can enable a roof to be unrestricted under the requirements of this Regulation. See sections 7.1 to 7.4 of this Certificate.

## Construction (Design and Management) Regulations 2015

## Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See sections: 1 *Description* (1.2) of this Certificate and 3 *Delivery and site handling* (3.3) of this Certificate.

### Additional Information

#### NHBC Standards 2019

In the opinion of the BBA, Preflex and Graviflex Membranes, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

#### CE marking

The Certificate holder has taken the responsibility of CE marking the products in accordance with harmonised European standard BS EN 13707 : 2013. An asterisk (\*) appearing in this Certificate indicates that data shown are given in the manufacturer's Declaration of Performance.

### Technical Specification

#### 1 Description

1.1 Preflex and Graviflex Membranes comprise Preflex Underlay and Graviflex Capsheet, are torch-on, styrene-butadiene-styrene (SBS)-modified bitumen sheets with non-woven polyester reinforcement. Graviflex Capsheet is treated with Preventol 'B' Root Inhibitor.

1.2 The membranes are manufactured to the nominal characteristics given in Table 1.

**Table 1 Access categories**

Characteristic (unit)	Preflex Underlay	Graviflex Capsheet
Thickness* (mm)	2.6	3.2
Thickness including mineral finish (mm)	—	4
Roll width (m)	1	1
Roll length (m)	10	8
Mass per unit area ( $\text{kg}\cdot\text{m}^{-2}$ )	3.85	5
Tensile strength* (N per 50 mm)		
longitudinal	700	740
transverse	400	540
Elongation at break* (%)		
longitudinal	20	40
transverse	25	49
Low temperature flexibility* ( $^{\circ}\text{C}$ )	$\leq -10$	$\leq -15$
Flow resistance* ( $^{\circ}\text{C}$ )	$\geq 105$	$\geq 100$
Dimensional stability* (%)	—	$\leq -0.5$
Impact* (mm) (soft substrate B)	—	$\geq 1500$
Static loading * (kg) (soft substrate A)	—	20
Mass per unit area of polyester reinforcement ( $\text{g}\cdot\text{m}^{-2}$ )	145	180
Surface finish		
lower	thermofusible film	thermofusible film
upper	thermofusible film	slate flakes

1.3 An ancillary item for use with products is Xtra-Seal QD Bitumen Primer, a bitumen primer designed to dry in approximately one hour after application.

## 2 Manufacture

2.1 The membranes are manufactured by saturating and coating the reinforcement with SBS-modified bitumen and calendaring to the correct thickness. The surfaces are finished by the application of sand/thermofusible film to the lower surface and sand, mineral granules or slate flakes to the upper surface. The sheets are cooled, trimmed and rolled for packaging.

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.

## 3 Delivery and site handling

3.1 The membranes are delivered to site in rolls with paper wrappings bearing the product name, manufacturing data, factory name and the BBA logo incorporating the number of this Certificate. The rolls are packed on pallets and shrunk wrapped in polythene.

3.2 Rolls should be stored upright on a clean, level surface, away from excessive heat and kept under cover.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the products under the *CLP Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures*. Users must refer to the relevant Safety Data Sheet(s).

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Preflex and Graviflex Membranes.

### Design Considerations

#### 4 Use

4.1 Preflex and Graviflex Membranes are satisfactory for use as fully or partially bonded waterproofing in warm roof systems on:

- pitched, flat and zero fall roofs in green roofs (extensive planting) with limited access
- flat and zero fall roofs in roof gardens (intensive planting).

4.2 Decks to which the products are to be applied must comply with the relevant requirements of either BS 6229 : 2018 or BS 8217 : 2005 and, where appropriate, *NHBC Standards* 2019, Chapter 7.1.

4.3 The following terms are defined for the purpose of this Certificate as:

- green roof (extensive) — a roof with a substantial layer of growing medium with planting that can include shrubs and trees, and generally accessible to pedestrians
- roof garden (intensive) — a roof with a shallow layer of growing medium planted with low-maintenance plants such as mosses, sedums, grasses and some wild flower species.

4.4 Limited access roofs are defined for the purpose of this Certificate as those subjected only to pedestrian traffic for maintenance of the roof covering, cleaning of gutters etc. Where traffic in excess of this is envisaged, additional protection to the membranes must be provided (see section 9).

4.5 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80<sup>(1)</sup>. For design purposes, twice the minimum finished fall should be assumed, unless a detailed analysis of the roof is available, including such features as overall and local deflection, direction of falls.

(1) *NHBC Standards* 2019 requires a minimum fall of 1:60 for green roofs and roof gardens.

4.6 Pitched roofs are defined as those having a fall greater than 1:6.

4.7 Zero fall roofs are defined for the purpose of this Certificate as those having a finished fall which can vary between 0 and 1:80.

4.8 The structural decks to which the membranes are to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.9 Imposed loads, dead loading and wind load specifications are calculated in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003 and BS EN 1991-1-4 : 2005, and their UK National Annexes.

4.10 Recommendations for the design of green roofs and roof garden specifications are available within the latest edition of *The GRO Green Roof Code — Green Roof Code of Best Practice for the UK 2011*.

4.11 The drainage systems for zero fall roofs, green roofs or roof gardens must be correctly designed, and the following points should be addressed:

- provision made for access for maintenance purposes
- for zero falls roofs, it is particularly important to identify the correct drainage points, to ensure that drainage is sufficient and effective
- dead loads for green roofs and roof gardens can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer.

4.12 Insulation systems or materials used in conjunction with the membranes must be either:

- as described in BS 8217 : 2005, or
- the subject of a current BBA Certificate and be used in accordance with, and within the limitations of, that Certificate.

## 5 Practicability of installation

The products are designed to be installed by a competent roofing contractor, experienced with these types of products.

## 6 Weathertightness



6.1 The products, including joints, when completely sealed and consolidated, will adequately resist the passage of moisture into the building and enable a roof to comply with the requirements of the national Building Regulations.

6.2 The membranes are impervious to water and, when used as described in this Certificate, will achieve a weathertight roof capable of accepting minor structural movements without damage.

## 7 Properties in relation to fire



7.1 In the opinion of the BBA, a roof incorporating the products will be unrestricted under the national Building Regulations in the following circumstances:

- a roof garden covered with a drainage layer of gravel 100 mm thick and a soil layer 300 mm thick
- when protected by an inorganic covering (eg gravel or paving slabs) listed in the Annex of Commission Decision 2000/553/EC.

7.2 In the opinion of the BBA, the use of the products in irrigated roof gardens or green roofs will also be unrestricted under the national Building Regulations.



7.3 Exposed areas of the capsheet, when used with one of the surface finishes detailed in Approved Document B, Appendix A, Table A5, part iii (England and Wales) and Technical Booklet E, Table 4.6, part iv (Northern Ireland) (listed below), would also be deemed to be unrestricted:

- bitumen-bedded stone chippings covering the whole surface to a depth of not less than 12.5 mm
- bitumen-bedded tiles of non-combustible materials
- sand and cement screed, or
- macadam.



7.4 The designation of exposed areas of the capsheet installed to other specifications should be confirmed by:

**England and Wales** — Test or assessment in accordance with Approved Document B, Appendix A, Clause 1

**Scotland** — Test to conform to Mandatory Standard 2.8, clause 2.8.1

**Northern Ireland** — Test or assessment by a UKAS accredited laboratory, or an independent consultant with appropriate experience.

7.5 If allowed to dry, the plants used may allow flame spread across the roof. This situation should be taken into consideration when selecting the plants for the garden. Appropriate planting irrigation and/or protection should be applied to ensure the overall fire-rating of the roof is not compromised by its use.

## 8 Resistance to wind uplift

8.1 The membranes, when used with a suitable roof garden or green roof specification, will adequately resist the effects of wind uplift likely to occur in practice.

8.2 The soil used in intensive plantings should not be of a type that will be removed, or become localised, owing to wind scour experienced on site.

8.3 It should be recognised that the type of plants used could significantly affect the expected wind loads experienced in service.

## 9 Resistance to mechanical damage

9.1 The products can accept the limited foot traffic and light concentrated loads associated with installation and maintenance operations. Reasonable care should be taken to avoid puncture of the membranes by sharp objects or concentrated loads. Where traffic in excess of this is envisaged, such as for maintenance of lift equipment, a walkway should be provided (for example, using concrete slabs supported on bearing pads).

9.2 Once the green roof or roof garden is installed, it can be regarded as a suitable protection for the membrane in use.

## 10 Resistance to root penetration

The products and their joints are resistant to root penetration and can be used in a roof waterproofing system for roof gardens and green roofs.

## 11 Maintenance



11.1 The products must be the subject of biannual inspections and maintenance in accordance with BS 6229 : 2018, Chapter 7, to ensure continued performance

11.2 Guidance for the maintenance of roof gardens and green roofs is available within the latest edition of *The GRO Green Roof Code — Green Roof Code of Best Practice for the UK*.

## 12 Durability



12.1 Under normal conditions, the products will have a service life in excess of 30 years.

12.2 The mineral surfaced product, when exposed, will suffer some localised loss of mineral surfacing in areas where complex detailing of the roof design is incorporated.

## Installation

## 13 General

13.1 Deck surfaces must be dry, clean and free from sharp projections such as nail heads and concrete nibs.

13.2 Installation of the membranes is carried out in accordance with the manufacturer's instructions and the relevant clauses of BS 8000-0 : 2014, BS 8000-4 : 1989 and BS 8217 : 2005.

13.3 The membranes may be laid in conditions normal to roofing work and must not be laid in rain, snow or heavy fog, nor if the temperature falls below 5°C, unless precautions against condensation have been taken.

13.4 Graviflex Capsheet has a mineral surface finish, and when used exposed on areas with limited access, does not require further surface protection.

13.5 The roofing layers must always be installed with staggered overlaps and in such a manner that no counter-seams in the direction of outlets are made.

13.6 Soil or other bulk material should not be stored on one area of the roof prior to installation, to ensure that localised overloading does not occur.

## **14 Procedures**

14.1 Preflex Underlay is fully bonded to the substrate by torching with laps of 60 mm and end laps of 60 mm.

14.2 Graviflex Capsheet is fully bonded to Preflex Underlay by torching with the same width of laps as the underlay.

14.3 Laps between the underlay and capsheet should be offset by a minimum of 100 mm.

## **15 Repair**

Should damage occur, the capsheet can be effectively repaired, after cleaning, by torch-bonding a patch to the damaged area, with recommended overlaps.

## **Technical Investigations**

## **16 Tests**

Tests were conducted on the membranes and the results assessed to determine:

- roll weight
- thickness
- length
- low temperature flexibility
- heat resistance
- dimensional stability
- tensile strength and elongation
- nail tear resistance
- root resistance
- resistance to leakage at joints
- tensile shear of joints
- adhesion
- peel resistance of joints
- water exposure for 180 days at 60°C
- chemical resistance.

## **17 Investigations**

17.1 The manufacturing processes were evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

17.2 Test data were evaluated in the context of UK roofing practice and the national Building Regulations.



## Bibliography

BS 6229 : 2018 *Flat roofs with continuously supported flexible waterproof coverings — Code of practice*

BS 8000-0 : 2014 *Workmanship on construction sites — Introduction and general principles*

BS 8000-4 : 1989 *Workmanship on building sites — Code of practice for waterproofing*

BS 8217 : 2005 *Reinforced bitumen membranes for roofing — Code of practice*

BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures — General actions— Densities, self-weight, imposed loads for buildings*

NA to BS EN 1991-1-1 : 2002 *UK National Annex to Eurocode 1 : Actions on structures — General actions— Densities, self-weight, imposed loads for buildings*

BS EN 1991-1-3 : 2003 + A1 : 2015 *Eurocode 1 — Actions on structures — General actions — Snow loads*

NA + A2 : 18 to BS EN 1991-1-3 : 2003 + A1 : 2015 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Snow loads*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 13707 : 2013 *Flexible sheets for waterproofing — Reinforced bitumen sheets for roof waterproofing — Definitions and characteristics*

### 18 Conditions

#### 18.1 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.

18.2 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.

18.3 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.

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

18.5 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.

18.6 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.