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### Agreement Certificate

09/4653

Product Sheet 1

## PARAFLEX ROOF WATERPROOFING SYSTEMS

### PARAFLEX FD ROOF WATERPROOFING SYSTEM

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to the Paraflex FD Roof Waterproofing System, a flexible, unsaturated polyester reinforced roof waterproofing system, for use in pitched and flat roof specifications, in blue, green and brown roofs, long term storage roofs for rainwater harvesting and on podium decks, balconies and walkways.

(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 system will resist the passage of moisture into the building (see section 6).

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

**Adhesion** — the adhesion of the system is sufficient to resist the effects of any likely wind suction and the effects of thermal or other minor movement likely to occur in practice (see section 8).

**Slip resistance** — the system, when wet or dry, has a satisfactory coefficient of friction to enable its use in pedestrian areas (see section 9).

**Resistance to foot traffic** — the system will accept the limited foot traffic and loads associated with installation and maintenance of the system without damage (see section 10).

**Resistance to penetration of roots** — the system is resistant to plant root penetration (see section 11).

**Durability** — under normal service conditions, the unprotected system will provide a durable waterproof covering with a service life of at least 35 years (see section 13).



The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

*Claire Curtis-Thomas*

Date of Third issue: 31 July 2017

John Albon – Head of Approvals  
Construction Products

Claire Curtis-Thomas  
Chief Executive

Originally certificated on 20 April 2009

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, the Paraflex FD Roof Waterproofing System, 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 suitable substructures, the use of the system can enable a roof to be unrestricted under this Requirement. See sections 7.1 to 7.3 of this Certificate.
<b>Requirement:</b>	<b>C2(b)</b>	<b>Resistance to moisture</b>
Comment:		The system 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</b>
Comment:		The system is acceptable. See sections 13.1 and 13.2 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 system satisfies the requirements of this Regulation. See sections 12.1, 13.1 and 13.2 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>9</b>	<b>Building standards applicable to construction</b>
Standard:	2.8	Spread from neighbouring buildings
Comment:		The system, when applied to a non-combustible substrate, can be regarded as having low vulnerability under clause 2.8.1 <sup>(1)(2)</sup> of this Standard. See sections 7.1 to 7.3 of this Certificate.
Standard:	3.10	Precipitation
Comment:		Use of the system 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:	7.1(a)(b)	Statement of sustainability
Comment:		The system 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 system 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 (as amended)

<b>Regulation:</b>	<b>23(a)</b>	<b>Fitness of materials and workmanship</b>
Comment:	<b>(b)(i)</b>	The system is acceptable. See sections 13.1 and 13.2 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>28(b)</b>	<b>Resistance to moisture and weather</b>
Comment:		The water resistance of the system indicates that its use 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 system can enable a roof to be unrestricted under the requirements of this Regulation. See sections 7.1 to 7.3 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 section: 3 *Delivery and site handling* of this Certificate.

### Additional Information

#### NHBC Standards 2017

NHBC accepts the use of the Paraflex FD Roof Waterproofing System, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies*.

### Technical Specification

#### 1 Description

1.1 The Paraflex FD Roof Waterproofing System is a three-part unsaturated polyester resin reinforced with polyester fleece.

1.2 Paraflex FD resin has the nominal characteristics of:

Specific gravity ( $\text{g}\cdot\text{cm}^{-3}$ )	1.013
Curing with accelerator (mins)	
time to rain-resistant	20
time to foot traffic accessibility	30
Flashpoint ( $^{\circ}\text{C}$ )	34
Colour	anthracite and light grey.

1.3 Other materials used with the system include:

- reinforcement — a non-woven polyester fleece for use in reinforcing the membrane
- Paraflex Hardener — for use in curing
- Paraflex Accelerator — for use in curing
- Paraflex Primer — a polyurethane used for preparing substrates prior to the application of the main system
- kiln-dried sand (for primer) — grain size 0.3–0.8 mm, for broadcasting into the wet surface of the applied primer
- kiln-dried sand (for wearing coat) — grain size 0.8–1.1 mm, for addition to the wearing course as an anti-slip finish
- decorative coloured quartz sand can be used as an alternative.

#### 2 Manufacture

2.1 The system is manufactured by mixing and blending together raw materials.

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 being operated by the manufacturer are being maintained.

### 3 Delivery and site handling

3.1 The Paraflex FD Roof Waterproofing System is delivered to site in 10 kg and 20 kg cans bearing the product's name, health and safety data, the manufacturer's name and the BBA logo incorporating the number of this Certificate.

3.2 The resin components, accelerator and primer must be kept tightly sealed and should be stored in a cool, ventilated place away from ignition sources and other chemicals. Storage temperatures of between 0°C and 25°C will give the product a shelf-life of six months, at higher temperatures the shelf-life will reduce progressively.

3.3 The Certificate holder has taken the responsibility of classifying and labelling the system components under the *CLP Regulation (EC) No 1272/2008 on the 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 the Paraflex FD Roof Waterproofing System.

## Design Considerations

### 4 General

4.1 The Paraflex FD Roof Waterproofing System is satisfactory for use as a waterproofing layer in:

- warm or cold exposed roofs on flat, zero fall roofs and pitched roofs with limited access
- inverted roof specifications using aggregate ballast on flat roofs, including zero fall roofs with limited access
- protected inverted roof specifications using pavers or other suitable protection on flat roofs, including zero fall roofs with limited or pedestrian access
- green roof (extensive) specifications on flat roofs, including zero fall roofs with limited or pedestrian access, or pitched roofs with limited access
- roof garden (intensive) specifications on flat roofs, including zero fall roofs with limited or pedestrian access
- brown roof specifications
- blue roof specifications
- long term storage roofs for rainwater harvesting
- podium decks
- balconies with pedestrian access
- walkways.

4.2 The system is suitable for use on the following substrates:

- concrete
- plastic
- wood
- metal
- asphalt
- reinforced bitumen membranes (including mineral-surfaced)
- PUR or PIR insulation boards
- mineral wool insulation batts.

4.3 Limited access roofs are defined for the purposes 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, special precautions, such as additional protection to the membrane, must be taken: for example, carborundum grit anti-slip finish incorporated into the final coat.

4.4 Flat roofs are defined for the purpose of this Certificate as those having a minimum finished fall of 1:80. Pitched roofs are defined as those having falls in excess of 1:6.

4.5 Zero fall roofs are defined for the purpose of this Certificate as those having a finished fall which can vary between 0° and 0.7°. Reference should also be made to the appropriate clauses in *Liquid Waterproofing Roofing Alliance (LWRA) Note 7 – Specifier Guidance for Flat Roof Falls*.

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

- roof garden (intensive) — a roof with a substantial layer of growing medium with planting that can include shrubs and trees, and generally accessible to pedestrians
- green roof (extensive) — a roof with a shallow layer of growing medium planted with low-maintenance plants such as mosses, sedums, grasses and some wild flower species
- brown roof — a roof with a growing medium selected to allow indigenous plant species to inhabit the roof over time; no deliberate planting is undertaken
- blue roof — a flat roof designed to allow controlled attenuation of rain fall during storm events as part of a SUDS good practice policy.

4.7 When designing flat roofs, twice the minimum finished fall should be assumed unless a detailed analysis of the roof is available, including overall and local deflection, direction of falls, etc.

4.8 Decks to which the system is to be applied must comply with the relevant requirements of BS 6229 : 2003, BS 8217 : 2005 and, where appropriate, *NHBC Standards 2017, Chapter 7.1*.

4.9 Insulation systems or materials used in conjunction with the system must be suitable for the specification and either be:

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

4.10 Dead loads, wind loading and imposed loads are calculated in accordance with BS EN 1991-1-1 : 2002, BS EN 1991-1-3 : 2003, BS EN 1991-1-4 : 2005 and their UK National Annexes.

4.11 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*.

4.12 Structural decks for green roofs, brown roofs, roof gardens and blue roofs to which the system is to be applied must be suitable to transmit the dead and imposed loads experienced in service.

4.13 The drainage system for completely flat green roofs, brown roofs or roof gardens must be correctly designed, and provision made for access for maintenance purposes. Dead loads for green roofs and roof gardens can increase if the drains become partially or completely blocked causing waterlogging of the drainage layer.

4.14 In inverted roof specifications the ballast requirements should be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and its UK National Annex. Additional guidance for inverted roof specifications is given in BBA Information Bulletin No 4 *Inverted roofs — Drainage and U value corrections*.

## 5 Practicability of installation

The system should only be installed by contractors who have been trained and approved by the Certificate holder.

## 6 Weathertightness



6.1 The system 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 system is impervious to water and, when used as described, will give a weathertight roofing capable of accepting minor movement without damage.

6.3 To achieve a weathertight coating it is essential that the application rate is as quoted in the Certificate holder's literature for the relevant system.

## 7 Properties in relation to fire



7.1 When tested and classified in accordance with BS EN 13501-5 : 2005, a system comprising a plywood deck (approximately 18 mm thick) primed with Paraflex Primer and the Paraflex FD system applied in two coats reinforced with a non-woven polyester, achieved a classification of B<sub>ROOF</sub>(t4).

7.2 In the opinion of the BBA, when used in irrigated roof gardens, brown roofs or green roofs, the use of the membranes will be unrestricted under the national Building Regulations.

7.3 The designation of other specifications, eg when used on combustible substrates, 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.

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

## 8 Adhesion

The adhesion of the system to concrete, asphalt, bitumen felts timber, plastic and metal is sufficient to resist the effects of any wind suction, elevated temperatures, thermal shock or minor movement likely to occur in practice.

## 9 Slip resistance

The system, with a sand finish, has satisfactory slip resistance in both dry and wet conditions and may be used in pedestrian access areas.

## 10 Resistance to foot traffic

10.1 The system can accept, without damage, the limited foot traffic and light concentrated loads associated with installation and maintenance operations. However, reasonable care should be taken to avoid puncture by sharp objects or concentrated loads.

10.2 For areas of pedestrian access such as balconies and walkways, an anti-slip finish is applied.

## 11 Resistance to penetration of roots

When used in green roofs, brown roofs and roof gardens, the waterproofing will adequately resist penetration by plant roots.

## 12 Maintenance



12.1 Maintenance must include checks and operations, where applicable, to ensure that:

- adequate ballast is in place and is evenly distributed over the membrane
- protection layers are in good condition
- exposed membrane is free from the build-up of silt and other debris, and unwanted vegetation is cleared.

12.2 Green roofs, brown roofs and roof gardens must be the subject of regular inspections, particularly in autumn after leaf fall and in spring, to ensure unwanted vegetation and other debris are cleared from the roof and drainage outlets (see section 4.11). Guidance is available within the latest edition of *The GRO Green Roof Code, Green Roof Code of Best Practice for the UK*.

12.3 Where damage has occurred it should be repaired in accordance with section 18 and the Certificate holder's instructions.

## 13 Durability



13.1 The system will achieve an initial life expectancy of at least 35 years.

13.2 When fully protected and subject to normal service conditions in an inverted roof specification with an open covering (eg aggregate pavers), the system can provide an effective barrier to the transmission of liquid water and water vapour for the design life of the roof in which it is incorporated.

13.3 However, in situations where maintenance or repair of any of the components in the roof structure are necessary (eg protection layer, insulation), the durability of the membrane may be reduced.

13.4 An estimation cannot be given for the life of green roof, brown roof and roof garden specifications owing to the nature of use; however, under normal circumstances, it should be significantly greater than for open coverings.

## Installation

### 14 General

14.1 Installation of the Paraflex FD Roof Waterproofing System must be carried out only by specialist roofing contractors trained and approved by the Certificate holder and UK marketing company.

14.2 The system must be applied when the air and substrate temperatures are greater than  $-5^{\circ}\text{C}$ . Special precautions may be necessary when temperatures exceed  $35^{\circ}\text{C}$ , as shown in the Certificate holder's Technical Data sheets.

14.3 Detailing (eg upstands), must be carried out in accordance with the Certificate holder's instructions.

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

### 15 Site and surface preparation

15.1 Substrates to which the system is to be applied must be properly prepared in accordance with the Certificate holder's instructions.

15.2 Adhesion to substrates will depend on the condition and cleanliness of the substrate. Substrates must be visibly dry, sound and free from loose materials or contamination (eg moss, algae).

15.3 High pressure sand-blasting or water-jetting may be used to remove loose or flaking materials, but the substrate must be visibly dry before application of the system.

15.4 Damaged areas of the substrate (eg blistered bitumen roofing membrane) must be removed, replaced or repaired.

15.5 Deck surfaces should be free from sharp projections, such as protruding fixing bolts and concrete nibs.

15.6 Gutters and outlets should be checked to ensure that they are, and remain, clear of all debris.

15.7 The substrate should be primed with Paraflex Primer prior to application of the system at a coverage rate of  $300\text{ g}\cdot\text{m}^{-2}$  to  $500\text{ g}\cdot\text{m}^{-2}$ .

15.8 Kiln-dried quartz sand, with a grain size of 0.3–0.8 mm, is broadcast into the wet primer.



## 16 Application

16.1 The system is mixed on site by adding the hardener to the resin in the correct proportion, and the accelerator in the proportions given in Table 1 in respect of the surface/air temperature, and stirred in accordance with the mixing instructions.

Table 1 Accelerator proportion

Surface and/or air temperature (°C)	Approximate amount of Paraflex Accelerator per kg of Paraflex FD (g)	Pot life (mins)
-5 – 0	30	30 – 40
1 – 5	25	25 – 35
6 – 10	20	20 – 30
11 – 15	15	20 – 25
16 – 20	10	15 – 20
21 – 35	5	10 – 20

16.2 The first coat of Paraflex FD is applied using a lambswool roller, and spread evenly. The polyester reinforcement is rolled into the wet resin and pressed free of trapped air using the roller. The reinforcement should have an overlap of at least 50 mm and sufficient resin should be beneath the reinforcement to maintain the system's bond.

16.3 A second layer of Paraflex FD is applied and evenly spread.

16.4 The total coverage of the system is between  $2.4 \text{ kg}\cdot\text{m}^{-2}$  and  $3.0 \text{ kg}\cdot\text{m}^{-2}$  giving a finished cured thickness of 2.3 mm.

16.5 An anti-slip finish is applied, where necessary, for use on balconies, walkways or other areas of pedestrian access, in accordance with the Certificate holder's instructions.

## 17 Repair

The repair of minor damage to the system can be achieved effectively by cleaning back to the unweathered material and recoating the damaged area with the membrane at the total application rate stated in section 16.

## Technical Investigations

## 18 Tests

Tests were conducted on samples of the Paraflex FD Roof Waterproofing System and the results were assessed to determine:

- water vapour diffusion resistance coefficient ( $\mu$ )
- tensile strength and elongation at break
- watertightness at a six metre head
- tensile bond strength on concrete, steel, bitumen felt, softwood and plastic
- dynamic indentation at  $-20^\circ\text{C}$  on mineral wool and concrete
- static indentation on mineral wool and concrete
- fatigue cycling
- root resistance
- coefficient of friction
- UV ageing ( $1000 \text{ MJ}\cdot\text{m}^{-2}$  at  $60^\circ\text{C}$ ) (severe conditions)
- heat ageing (200 days at  $80^\circ\text{C}$ )
- water exposure (180 days at  $60^\circ\text{C}$ )
- the effect of application temperatures
- the effect of day joints
- reaction to fire.



## 19 Investigations

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

19.2 Data on fire performance were assessed.

19.3 Visits to existing sites of over 30 years old were carried out to assess the durability of the system.

### Bibliography

BS 6229 : 2003 *Flat roofs with continuously supported coverings — Code of practice*

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 + A1 : 15 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 13501-5 : 2005 + A1 : 2009 *Fire classification of construction products and building elements — Classification using data from external fire exposure to roof tests*

### 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 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.