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Agrément Certificate
10/4807
Product Sheet 1

LANGLEY'S ROOF WATERPROOFING MEMBRANES

PARADIENE/PARAFOR ROOF WATERPROOFING SYSTEMS

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Paradiene/Parafor Roof Waterproofing Systems, for use as a fully or partially bonded, two layer, built-up roof waterproofing system on flat and pitched roofs or a loose-laid and ballasted, two layer, roof waterproofing system on flat roofs.

AGRÉMENT 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

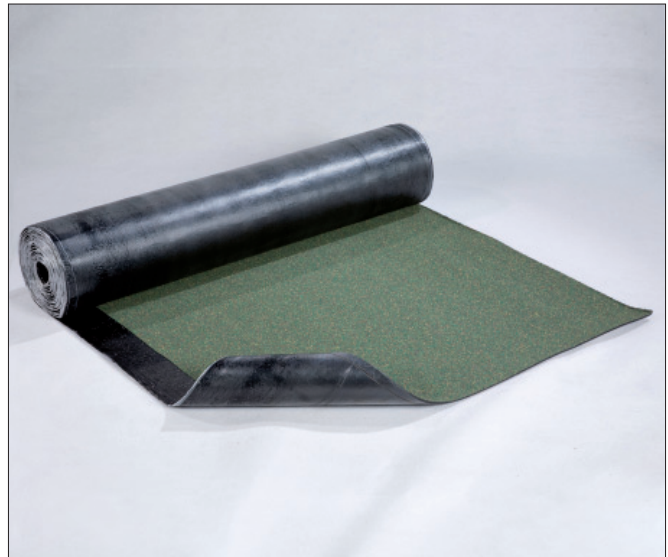
Weathertightness — the systems will resist the passage of moisture into the building (see section 5).

Properties in relation to fire — tests indicate that the systems will enable a roof to be unrestricted under the Building Regulations (see section 6).

Resistance to wind uplift — the systems will resist the effects of any likely wind suction acting on the roof (see section 7).

Resistance to foot traffic — the systems will accept the limited foot traffic and loads associated with installation and maintenance (see section 8).

Durability — under normal service conditions the systems will provide a durable waterproofing with a service life in excess of 20 years (see section 10).



The BBA has awarded this Agrément Certificate to the company named above for the systems described herein. These systems 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

Stuart Sadler
Head of Approvals — Materials

Greg Cooper
Chief Executive

Date of First issue: 24 December 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

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, Paradiene/Parafor Roof Waterproofing Systems, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations:



The Building Regulations 2010 (England and Wales)

Requirement:	B4(2)	External fire spread
Comment:		Tests to BS 476-3 : 1958 indicate that on suitable substructures, the use of the systems will enable a roof to be unrestricted under this Requirement. See sections 6.1 to 6.3 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		Tests for water resistance, indicate that the systems, including joints, meet this Requirement. See section 5.1 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The systems are acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The use of the systems satisfies the requirements of this Regulation. See sections 9, 10.1 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards – construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		Tests to BS 476-3 : 1958 indicate that the systems when applied to suitable substructures, are regarded as having a low vulnerability under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 6.1 and 6.3 of this Certificate.
Standard:	3.10	Precipitation
Comment:		Tests for water resistance indicate that use of the systems, including joints, will enable a roof to satisfy the requirements of this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.7 ⁽¹⁾⁽²⁾ . See section 5.1 of this Certificate.
Regulation:	12	Building standards – conversions
Comment:		All comments given for the membranes under Regulation 9 also apply to this Regulation, with reference to clause 0.12 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The systems are acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The systems are acceptable. See section 9 of this Certificate.
Regulation:	C4(b)	Resistance to ground moisture and weather
Comment:		Tests for water resistance, indicate that the systems, including joints, meet the requirements of this Regulation. See section 5.1 of this Certificate.
Regulation:	E5(b)	External fire spread
Comment:		Tests to BS 476-3 : 1958 indicates that on suitable substructures, the use of the systems will enable a roof to be unrestricted under the requirements of this Regulation. See sections 6.1 to 6.3 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* (1.3) of this Certificate.

Non-regulatory Information

NHBC Standards 2010

NHBC accepts the use of Paradiene/Parafor Roof Waterproofing Membranes, when installed and used in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 7.1 *Flat roofs and balconies* and Chapter 7.2 *Pitched roofs*.

General

This Certificate is a Confirmation of French Avis Technique 5/03-1735 issued by Centre Scientifique et Technique du Bâtiment (CSTB) to Icopal SAS, 12 Rue de la Renaissance, 92184 Anthony Cedex, France.

The products are manufactured in France by Icopal SAS.

Technical Specification

1 Description

1.1 Paradiene/Parafor Roof Waterproofing Systems comprise the following membranes:

- Paradiene VV — a non-woven, glass fibre ($55 \text{ g}\cdot\text{m}^{-2}$) reinforced, polymer-modified bitumen sheet finished on both surfaces with sand, for use as a base or cap sheet with additional protection
- Paradiene R3 — a non-woven, polyester ($120 \text{ g}\cdot\text{m}^{-2}$), or glass-grid/non-woven polyester ($140 \text{ g}\cdot\text{m}^{-2}$) reinforced, polymer-modified bitumen sheet finished on both surfaces with sand, for use as a base or cap sheet with additional protection
- Paradiene R4 — a non-woven, polyester-fibre ($180 \text{ g}\cdot\text{m}^{-2}$) reinforced, polymer-modified bitumen sheet finished on both surfaces with sand, for use as a base sheet or cap sheet with additional protection
- Paradiene 30.1G — a non-woven, glass fibre ($55 \text{ g}\cdot\text{m}^{-2}$) reinforced, polymer-modified bitumen sheet with mineral granule or slate-finished upper surface and a sand-finished under surface, for use as a cap sheet
- Parafor 30 G — a non-woven, polyester-fibre ($180 \text{ g}\cdot\text{m}^{-2}$) reinforced, polymer-modified bitumen sheet with a mineral granule-finished upper surface and a sand-finished under surface, for use as a cap sheet.

1.2 The membranes are manufactured by saturating and coating the reinforcement with SBS (styrene-butadiene-styrene) modified bitumen, then calendered to the correct thickness. The surfaces are finished by the application of sand and/or mineral granules or slate flakes. The sheets are cooled, trimmed and rolled for packaging.

1.3 The membranes are manufactured to the nominal dimensions given in Table 1.

Table 1 Nominal dimensions

Characteristics (units)	Paradiene				Parafor 30 G (granule)
	VV	R3	R4	30.1G	
Thickness (mm)	2.6	2.1	2.1	2.6	3.0
Roll width (m)	1	1	1	1	1
Roll length (m)	10	15	15	10	10
Roll weight (kg)	34	38	38	43/47 ⁽¹⁾	46
Mass per unit area ($\text{kg}\cdot\text{m}^{-2}$)	3.4	2.5	2.5	43/4.7 ⁽¹⁾	4.6

(1) Higher weight corresponds to the mineral granules and the lower to the slate flakes.

1.4 Other products used with Paradiene/Parafor roof covering include:

- Perfover perforated bitumen underlay — used as a semi-bonding layer
- Verecran 100 — a glass fibre ($100 \text{ g}\cdot\text{m}^{-2}$) mat separating layer
- Paradiene R3 — used as a nailed base sheet for wooden deck
- Parafor Solo GS — flashing membranes
- Parevapo — metal-lined, bitumen vapour barrier
- Parevapo SBS — double-reinforced, metal-lined, bitumen vapour barrier
- Neodyl — expansion joint membrane
- Gravifilter — a polypropylene ($200 \text{ g}\cdot\text{m}^{-2}$) separating layer for use beneath heavy protection
- bitumen — oxidised bitumen type 110/30 used for hot bonding applications.

1.5 Quality control checks are carried out on the incoming materials, during manufacture and on the final product.

2 Delivery and site handling

2.1 The membranes are delivered to site in wrapped rolls and on pallets. Roll labels are colour coded and bear the product name, marketing company name and the BBA identification mark including the number of this Certificate.

2.2 The rolls must be stored 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 Paradiene/Parafor Roof Waterproofing Systems.

3 General

3.1 Paradiene/Parafor Roof Waterproofing Systems are satisfactory for use as:

- a fully or partially-bonded waterproofing system, as part of a built-up specification, and
- a loose-laid, two layer, roof waterproofing system, ballasted with aggregate, on flat roofs with limited access, or under heavy protection (eg concrete tiles) on flat roofs with pedestrian traffic.

3.2 Limited access roofs are defined for the purpose of this Certificate as those roofs subjected only to pedestrian traffic for maintenance of the roof covering and cleaning of gutters, etc. Where traffic in excess of this is envisaged, additional protection to the membrane must be provided (see section 8).

3.3 Flat roofs are defined for the purpose of this Certificate as those roofs having a minimum finished fall of 1:80. For design purposes 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. Pitched roofs are defined as those having a fall greater than 1:6.

3.4 Decks to which the membranes are to be applied must comply with the relevant requirements of either BS 6229 : 2003 or BS 8217 : 2005 and, where appropriate *NHBC Standards* 2010, Chapter 7.1.

3.5 Insulation materials to be used in conjunction with the membranes must be in accordance with the Certificate holder's instructions and be either:

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

4 Practicability of installation

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

5 Weathertightness



5.1 Data confirm that the membranes, 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:

England and Wales — Approved Document C, Requirement C2(b), Section 6

Scotland — Mandatory Standard 3.10, clauses 3.10.1 and 3.10.7

Northern Ireland — Regulation C4(b).

5.2 The membranes are impervious to water and will achieve a weathertight roof capable of accepting minor structural movement.

6 Properties in relation to fire



6.1 When tested in accordance with BS 476-3 : 1958, a system comprising 20 mm thick chipboard deck, 40 mm thick mineral wool ($138 \text{ kg}\cdot\text{m}^{-3}$), one layer of Paradiene 20 (bitumen bonded) and one layer of Paradiene 30.1G (bitumen bonded) achieved an EXT.F.AB rating.



6.2 When used on flat roofs with the surface finishes defined in Part iii of Table 5 of Appendix A of Approved Document B of the Building Regulations (England and Wales), or Technical Booklet E, Table 4.6 of Part IV of the Building Regulations (Northern Ireland) (listed below), the roof is deemed to be of designation AA.

Surface finishes

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



6.3 The designation of other specifications should be confirmed by:

England and Wales — test or assessment to Approved Document B, Appendix A, Clause A1

Scotland — tests 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 Resistance to wind uplift

7.1 Data indicate that the adhesion of the bonded systems is sufficient to resist the effects of wind suction, thermal cycling or other minor structural movements likely to occur in service.

7.2 The ballast requirement for loose-laid systems should be calculated in accordance with the relevant parts of BS EN 1991-1-4 : 2005 and the UK National Annex. The membrane should always be ballasted with a minimum depth of 50 mm of aggregate. In areas of high-wind exposure, the Certificate holder's advice should be sought. Alternatively, concrete slabs on suitable supports can be used.

8 Resistance to foot traffic

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

9 Maintenance



Roofs covered with the systems must be the subject of annual inspections to ensure continued performance.

10 Durability



10.1 Accelerated weathering tests confirm that satisfactory retention of physical properties is achieved. Available evidence indicates that the systems will have a service life in excess of 20 years.

10.2 When using the mineral finished membrane, it is possible that some localised loss of the mineral surfacing may occur after some years, in areas where complex detailing of the roof design is incorporated.

Installation

11 General

11.1 Installation of Paradiene/Parafor Roof Waterproofing Systems must be carried out by installers trained and approved by the Certificate holder in accordance with the relevant Clauses of BS 8000-4 : 1989 and BS 8217 : 2005, the Certificate holder's instructions and this Certificate.

11.2 Substrates to which the roof waterproofing membranes are applied must be sound, dry and clean, and free from sharp projections such as nail heads and concrete nibs.

11.3 Installation should not be carried out during inclement weather (eg rain, fog, snow). Nor when the temperature is below 5°C, unless suitable precautions against surface condensation are taken.

11.4 If the roof is likely to be subject to uncontrolled pedestrian access, the substructure must meet the requirements of BS 8217 : 2005, and to prevent damage to the roof covering one of the appropriate surface finishes referred to in Clauses 8.19 and 9.2 of the Code must be used.

11.5 At falls in excess of 1:11, the provision for mechanical fixings as required by BS 8217 : 2005 should be observed.

11.6 On completion of the roof, the sanded finished membrane, when used as a top layer, may have a surface finish applied in accordance with BS 8217 : 2005, Clauses 8.19 and 9.2. Surface finishes in the Code of Practice include:

- stone aggregate in dressing compound
- precast concrete paving slabs
- proprietary tiles on bonding compound.

11.7 When using the mineral surface finished membrane, further surface protection is not required when it is used on roofs with limited access.

12 Application

Loose-laid applications — flat roof

12.1 A separating layer of Verecran 100 is loose-laid over the substructure, with 100 mm loose overlapping joints, and terminating around the perimeter and upstands for a minimum distance of 500 mm.

12.2 A layer of Paradiene VV base sheet is laid with 50 mm side laps and 75 mm head laps. The laps must be bonded with the bitumen adhesive.

12.3 A layer of Paradiene R3 or Paradiene R4 is fully bonded directly to the base sheet using hot bitumen. Side laps should be 50 mm, end laps 75 mm, and should be offset a minimum 300 mm with respect to those of the base sheet.

12.4 A minimum 50 mm depth of aggregate is loaded onto the roof covering. Where roofs are likely to be subjected to uncontrolled pedestrian traffic a concrete tile finish should be used.

12.5 Where concrete tiles are required, the waterproof system is first covered with either a layer of sand or two layers of Gravifilter. Only Paradiene R3 or Paradiene R4 cap sheets, in conjunction with a layer of Gravifilter, are suitable for use under permanent heavy protection such as paving slabs.

Partially-bonded applications — flat and pitched roofs

12.6 A layer of Perfover perforated bitumen underlay with 50 mm laps is loose-laid over the substrate and is fully bonded with hot bitumen to a width of 500 mm at perimeters and around all penetrations.

12.7 A layer of Paradiene VV, Paradiene R3 or Paradiene R4 is fully bonded in hot bitumen onto the surface of Perfover. Bonding should occur regularly through the perforations to ensure even bonding of the membrane onto the substrate. Edge laps a minimum of 50 mm and end laps a minimum of 75 mm are required.

12.8 A layer of Paradiene 30.1G or Parafor 30 G is fully bonded directly to the base sheet using the hot bitumen. Side laps are determined by the exposed selvedge, end laps to be 100 mm and be offset a minimum 300 mm, with those of the base sheet below.

12.9 On nailable substructures a layer of Paradiene R3 is fastened in accordance with the relevant Clauses of BS 8217 : 2005, then an underlay of either Paradiene VV, Paradiene R3 or Paradiene R4 is fully bonded to the base sheets using the appropriate hot bitumen adhesive. A cap sheet of either Paradiene 30.1G or Parafor 30 G is fully bonded to the underlay using hot bitumen.

Fully-bonded applications — flat and pitched roofs

12.10 A layer of Paradiene VV, Paradiene R3 or Paradiene R4 is fully bonded to the substrate using hot bitumen. Overlaps should be a minimum 75 mm.

12.11 A top layer of Paradiene 30.1G or Parafor 30 G is fully bonded to the first layer using the appropriate grade hot bitumen (see section 12.10). Side laps are determined by the exposed selvedge, end laps to be a minimum 100 mm. Joints should be offset 300 mm with those of the base sheet below.

13 Repair

In the event of damage, the membranes can be effectively repaired after cleaning, by applying a patch of the same membrane bitumen, bonded to the damaged area with suitable overlap.

Technical Investigations

14 Tests

Technical data from tests carried out by CSTB leading to the issue of the Avis Technique were evaluated in the context of UK roofing practice and building regulations. The tests carried out by or on behalf of CSTB included:

- low temperature flexibility of coating mass
- elastic recovery of coating mass
- ring and ball of coating mass
- low temperature flexibility unaged and heat aged 90 days at 80°C
- heat resistance unaged and heat aged 90 days at 80°C
- dimensional stability
- static indentation
- dynamic indentation
- resistance to sliding
- fatigue resistance unaged and heat aged 28 days at 80°C
- peel from support unaged and heat aged 28 days at 80°C.

15 Investigations

15.1 Data provided by CSTB were evaluated in the context of UK roofing practice and building regulations.

15.2 UK data on the fire performance of the product were examined.

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

Bibliography

BS 476-3 : 1958 *Fire tests on building materials and structures — External fire exposure roof test*

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 1991-1-4 : 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*

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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.

16.2 Publications and documents referred to in this Certificate are those that the BBA deems to be relevant at the date of issue or re-issue of this Certificate and include any: Act of Parliament; Statutory Instrument; Directive; Regulation; British, European or International Standard; Code of Practice; manufacturers' instructions; or any other publication or document similar or related to the aforementioned.

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

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- remain covered by a valid French Agrément; and
- are reviewed by the BBA as and when it considers appropriate.

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

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

16.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does 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; 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. 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 manufacture, supply, installation, use and maintenance of this product/system.