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to issue
European Technical
Approvals

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**Agrément
Certificate
No 00/3691**
Second issue*

GUARAFLEX P

Membrane d'étanchéité
Wasserdichtung

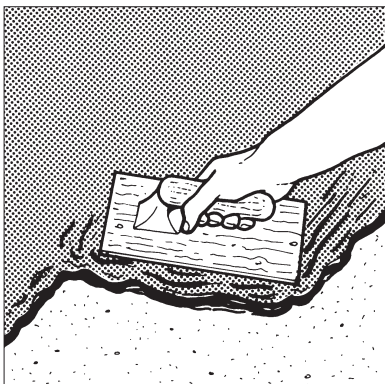
Product

• THIS CERTIFICATE RELATES TO GUARAFLEX P, A POLYMER MODIFIED MASTIC ASPHALT SYSTEM FOR USE AS A WATERPROOFING AND PAVING SYSTEM FOR CONCRETE CAR PARK DECKS AND HEAVY GOODS VEHICLE (HGV) SERVICE DECKS.

• The system is laid using the techniques for mastic asphalt described in the relevant clauses of BS 8218 : 1998, and the Certificate holder's current product literature.

• Advantages over traditional mastic asphalt include improved high-temperature stability and low-temperature flexibility.

• The product is manufactured and marketed by Guaranteed Asphalt Ltd, and may be delivered to site in either hot charge or block form.



Regulations

1 The Building Regulations 2000 (as amended) (England and Wales)

The Secretary of State has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of waterproofing with the Building Regulations. In the opinion of the BBA, Guaraflex P, if used in accordance with the provisions of this Certificate, will meet or contribute to meeting, the relevant requirements.

Requirement:	B4(2)	External fire spread
Comment:		The system meets this Requirement. See sections 11.1 to 11.3 of this Certificate.
Requirement:	C4	Resistance to weather and ground moisture
Comment:		The system can enable a structure to meet this Requirement. See sections 9.1 and 9.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The system is acceptable. See sections 14.1 and 14.2 of this Certificate.

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

In the opinion of the BBA, Guaraflex P, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Regulations and related Technical Standards as listed below.

Regulation:	10	Fitness of materials and workmanship
Standards:	B2.1 and B2.2	Selection and use of materials, fittings, and components, and workmanship
Comment:		The system complies with these Standards. See sections 14.1 and 14.2 of this Certificate.
Regulation:	12	Structural fire precautions
Standard:	D9.1	Fire spread from adjoining buildings
Comment:		The system is unrestricted by this Standard. See sections 11.1 and 11.3 of this Certificate.
Regulation:	17	Resistance to moisture
Standard:	G3.1	Resistance to precipitation
Comment:		The system can enable a structure to satisfy the requirements of this Standard. See sections 9.1 and 9.2 of this Certificate.

3 The Building Regulations (Northern Ireland) 2000

In the opinion of the BBA, Guaraflex P, if used in accordance with the provisions of this Certificate, will satisfy or contribute to satisfying the various Building Regulations as listed below.

Regulation:	B2	Fitness of materials and workmanship
Comment:		The system is acceptable. See sections 14.1 and 14.2 of this Certificate.
Regulation:	C4	Resistance to ground moisture and weather
Comment:		The system can enable a structure to meet this Regulation. See sections 9.1 and 9.2 of this Certificate.
Regulation:	E5	External fire spread
Comment:		The system has an AA classification and is unrestricted under this Regulation. See sections 11.1 to 11.3 of this Certificate.

4 Construction (Design and Management) Regulations 1994 (as amended) Construction (Design and Management) Regulations (Northern Ireland) 1995 (as amended)

Information in this Certificate may assist the client, planning supervisor, designer and contractors to address their obligations under these Regulations.

See sections: 5 Description (5.4) and 7 Delivery and site handling (7.1 and 7.2).

Technical Specification

5 Description

5.1 Guaraflex P is a polymer modified asphalt waterproofing and paving system for elevated decks and car parks for cars, light commercial and heavy vehicles. It may comprise a waterproofing layer of asphaltic cement with graded limestone aggregate and a paving layer, incorporating 6 mm or 10 mm coarse aggregate.

5.2 The waterproofing layer may be omitted from internal specifications where not subjected to hosing.

5.3 Materials used with the system include:

Guaraflex PR — polymer-modified mastic asphalt waterproofing layer

Guaraflex PP — polymer-modified mastic asphalt paving (standard grade)

Guaraflex PPH — polymer-modified mastic asphalt paving (hard grade) for use in uninsulated, heated internal areas and heavy vehicle applications

Guaraflex U — 4 mm thick, polymer-modified bitumen torch-on felt used as flashing at abutments

Guaraflex T — 4 mm thick, polymer-modified bitumen torch-on felt (mineral finished) used as flashing at abutments

Guarafelt CP — 2 mm thick, polymer-modified bitumen membrane

Guarafelt CP Super — 2 mm thick, aluminium-faced, polymer-modified bitumen membrane

Guaralath — 1 to 2 mm thick, expanded metal sheet for use in heavy duty applications

Guaraglas — bitumen-coated woven glass-fibre scrim

High-density extruded polystyrene insulation — for use in insulated specifications. (Grade and thickness to suit required U value)

Lytag/sand concrete or similar — used with A142 steel mesh reinforcement for protection to the insulation in insulated specifications.

5.4 The standard specifications, descriptions and uses are given in Figure 1.

Figure 1 Standard specifications

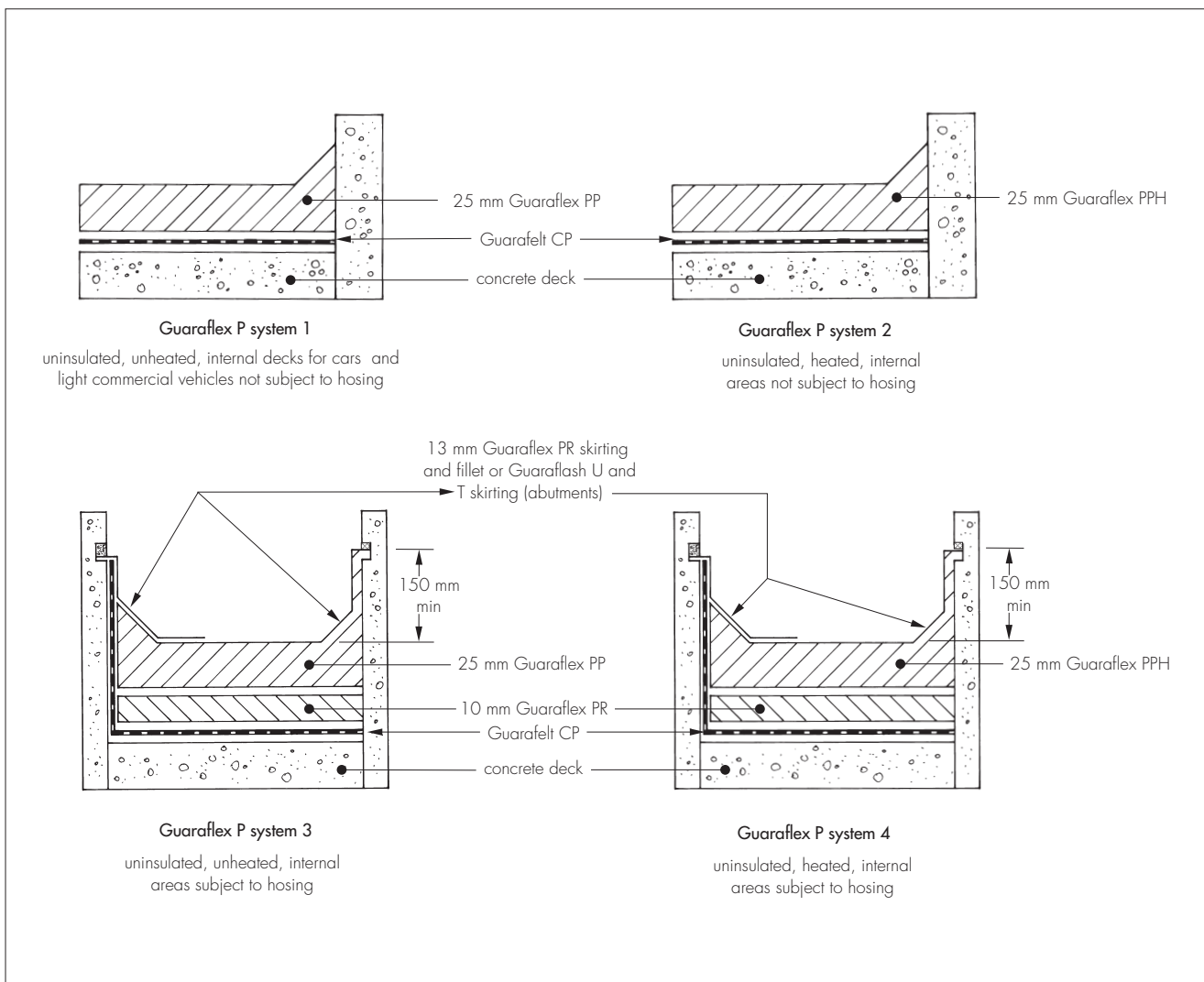
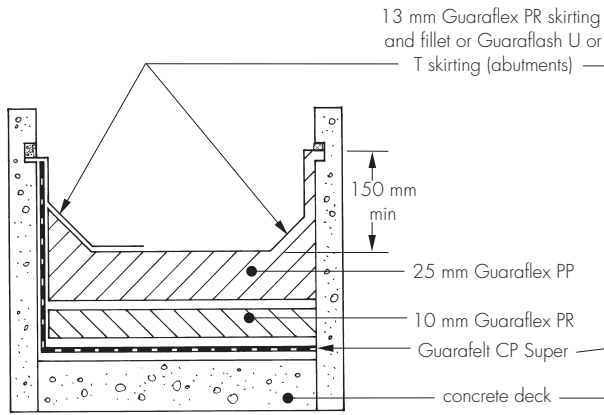
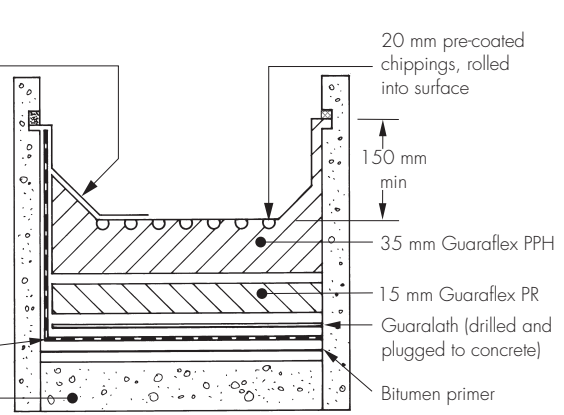


Figure 1 Standard specifications (continued)



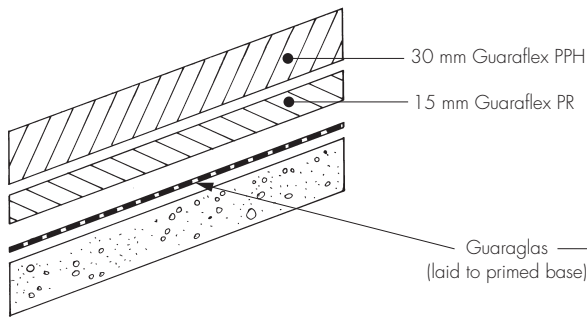
Guaraflex P system 5

uninsulated, external decks for multi-storey roof top car parks for cars and light commercial vehicles



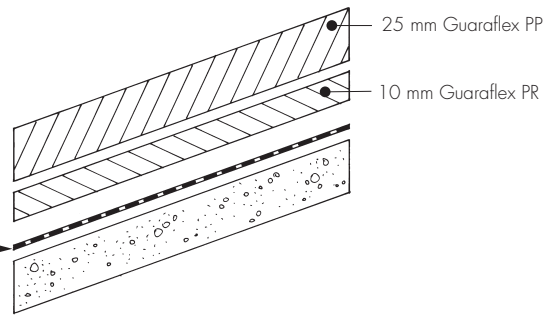
Guaraflex P system 6

uninsulated, external elevated decks for heavy commercial vehicles



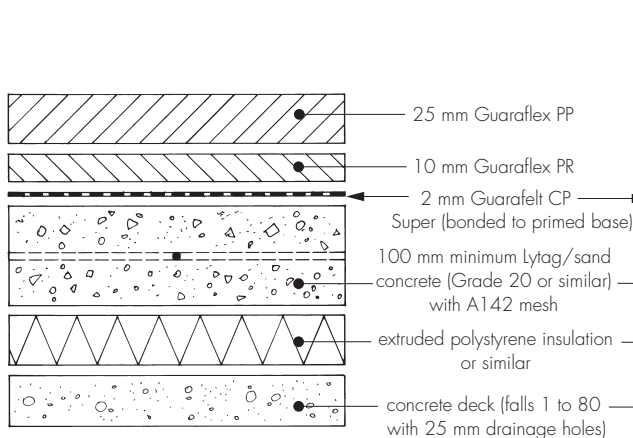
Guaraflex P system 7⁽¹⁾

external ramps (not exceeding 1 to 10 gradient) for heavy commercial vehicles



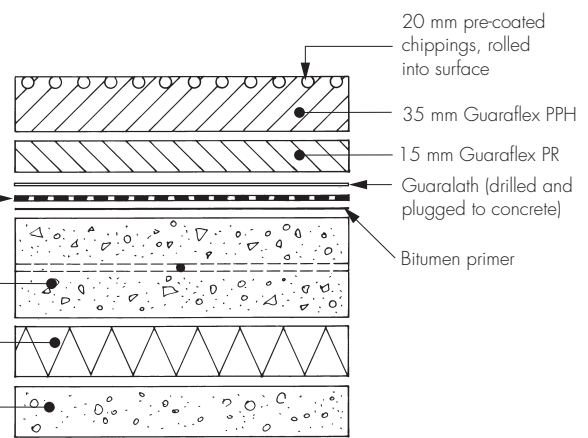
Guaraflex P system 8⁽¹⁾

external ramps (not exceeding 1 to 10 gradient) for cars and light commercial vehicles



Guaraflex P system 9⁽¹⁾

insulated decks for cars and light commercial vehicles (max wheel load 2 tonne per axle)



Guaraflex P system 10⁽¹⁾

insulated decks for heavy commercial vehicles (max wheel load 10.5 tonne per axle)

(1) 13 mm Guaraflex PR skirting and fillet or Guaraflex U or T at all abutments (not shown)

6 Manufacture and quality control

6.1 Guaraflex P waterproofing and paving layers are manufactured by blending the appropriate bitumen, polymer, limestone filler and aggregates using conventional mixing techniques.

6.2 Quality control checks are performed on the incoming raw material and on the final product. Quality control checks on the final product include checks on hardness (base mastic only).

7 Delivery and site handling

7.1 The product is supplied in hot charge (molten) form, delivered to site in purpose-built transporters. The product information is supplied on the relevant delivery notes with each consignment.

7.2 Alternatively, the product may be supplied in block form (similar to traditional mastic asphalt) with labels bearing the product type and name. Each block weighs approximately 16 kg.

7.3 Guaraflex PR, PP and PPH mastic asphalt blocks should be stored in the same manner as traditional mastic asphalt.

Design Data

8 General

8.1 Guaraflex P applied to a float-finished in-situ or precast screeded concrete deck, laid in accordance with BS 8110-1 : 1997, is satisfactory for use as a combined waterproof/wearing surface for rooftop car park decks and HGV service decks. The appropriate design specification (see Figure 1) should be selected for the appropriate trafficking situation, ie foot traffic, cars and light commercial vehicles or heavy goods vehicles.

8.2 The concrete structure must be designed to support all static and imposed loads without undue deflection (the Certificate holder should be consulted for the weights imposed by specific design specification). A fall of 1:60 is recommended to ensure good drainage to outlets and gutters.

8.3 Temporary drainage holes should be provided through the structural base to allow the downward drying of residual construction moisture or entrapped rainwater.

8.4 The product can accept, without damage, the foot and vehicular traffic defined in this Certificate, but some indentation should be expected from continuous heavy point loading.

9 Weathertightness



9.1 Test data confirm that the system will adequately resist the passage of moisture to the inside of the building and so meet or

comply with the relevant requirements of the national Building Regulations.

England and Wales

Approved Document C4, Section 5.1

Scotland

Regulation 17, Standard G3.1

Northern Ireland

Regulation C4.

9.2 The system is impervious to water, is flexible and can accommodate the movement due to cracking permitted by BS 8110-1 : 1997 without leakage.

10 Ability to accommodate movement

Guaraflex P can be detailed to accommodate the movement of designed expansion joints. The Certificate holder should be consulted for their approved designs.

11 Properties in relation to fire



11.1 In the opinion of the BBA, the systems will have similar properties in relation to fire as the traditional grades of mastic asphalt described in BS 8218 : 1998.



11.2 When used on non-combustible concrete substrates the system is deemed or considered to be of designation AA:

England and Wales

Approved Document B, Appendix A, Table A5, Part IV.

Northern Ireland

Technical Booklet E, Table 4.6, Part III.



11.3 The designation of other specifications (eg on combustible substrates) should be confirmed by:

England and Wales

test or assessment in accordance with Approved Document B, Appendix A, Clause A1

Scotland

test to conform with Standard D9.1

Northern Ireland

test or assessment by a UKAS accredited fire testing laboratory, or an independent consultant with appropriate experience.

12 Chemical resistance

12.1 The product has good chemical resistance to hydraulic fluids and aqueous solutions of acids, alkalis and de-icing salts, and is unaffected by contact with an alkaline substrate.

12.2 The product has good short-term chemical resistance to minor spillages of oil, petrol and grease contamination, but prolonged exposure may cause localised softening of the binder. In


high-risk situations the advice of the Certificate holder should be sought, and a proprietary coating system used.

13 Maintenance and repair

13.1 Gullies and drains should be kept free from leaves and debris, and damage resulting from abuse should be reported. Annual inspections should be made to report on the general integrity of the paving, paying particular attention to paving bay joints, expansion joints, mortar pointing, cover flashings, crash barrier supports and upstands.

13.2 Localised repairs should be conducted by a specialist asphalt contractor generally in accordance with the recommendations of BS 8218 : 1998, Section 11 *Maintenance and Repair*.

14 Durability

 14.1 Test data examined by the BBA indicate that the product is stable at high temperatures and is flexible and resistant to impact damage at low temperatures. Accelerated ageing tests indicate a satisfactory retention of properties.

14.2 Available evidence indicates that the product should have a life expectancy in excess of that of conventional grades of mastic asphalt used in car parking and HGV Service Deck situations. With proper maintenance and repair, Guaraflex P should perform satisfactorily for a period in excess of 20 years.

Installation

15 General

15.1 Block material for re-melting on site is available for detail work and small horizontal areas. The amount of coarse aggregate added to the re-melted paving material is dependent on laid thickness (see Table 1).

Table 1 Aggregate additions to block paving material

Paving thickness (mm)	Size of coarse aggregate (mm)	Aggregate content (% per mm thickness)
25	6 or 10 ⁽¹⁾	1
30	6 or 10 ⁽¹⁾	1
40	6 or 10 ⁽¹⁾	1

(1) 6 mm aggregate used in Guaraflex PP, 10 mm aggregate used in Guaraflex PPH.

15.2 Concrete plinths should be cast off the structural slab to accommodate such features as crash barriers and handrail stanchions. The plinths should be at least 150 mm high and weatherproofed with Guaraflex PR waterproofing and a metal flashing where appropriate.

15.3 Where thermal insulation is required above the structural slab (see Figure 1, systems 9 and 10), high-density or extruded polystyrene insulation⁽¹⁾ is loose-laid direct to the float-finished base. Boards are tightly butted together with staggered joints, and accurately trimmed at abutments. An overlay screed of Lytag/sand concrete grade 20 or similar is applied direct to the extruded polystyrene with A142 steel wire mesh reinforcement placed at mid-height throughout.

(1) Alternative insulations may be used with the Certificate holder's consent.

16 Preparation

16.1 Concrete structures should be designed and built in accordance with BS 8110-1 : 1997.

16.2 New concrete should be well compacted and finished, preferably by power floating and power trowelling, without excessive laitance, to a dense, smooth finish free from defects. Concrete toppings/screeds⁽¹⁾ should be properly formulated, applied and compacted. They should be bonded to the substrate and have a wood-floated finish with minimum laitance.

(1) Alternatively, where the product is to be laid over an asphalt screed the advice of the Certificate holder should be sought.

16.3 A minimum curing period of 28 days is normally allowed before installing the product on new concrete substrates.

16.4 The surface must be dry, clean and free from loose particles, paint, grease and oil, or other contaminants which may affect the application of the product.

16.5 Substrates should be free from physical defects such as cracks. Small surface defects can be filled with a proprietary mortar.

16.6 When application is made to an old substrate the advice of the Certificate holder must be sought.

17 Application

17.1 Installation of the waterproofing layer should be carried out using the techniques for laying mastic asphalt described in the relevant clauses of BS 8218 : 1998. Where not controlled by hot charge delivery, advice on the laying temperature of the paving layer should be obtained from the Certificate holder.

17.2 If required, Guaraflex PR waterproofing, can be applied over Guarafelt CP or Guarafelt CP Super felt underlay.

17.3 Guaraflex PP and Guaraflex PPH pavings are applied in single layers and should be rubbed with coarse sharp sand with a wooden float, during the final floating of the hot asphalt. In addition a dimpled surface may be achieved by the use of a crimping roller.

17.4 Steel gauges should be used to ensure the correct thickness of Guaraflex PP or PPH paving

and to provide a bonding edge between adjacent bays of asphalt.

18 Miscellaneous

18.1 Ramps should be cross-tamped. To prevent undue thinning of Guaraflex PR waterproofing, the tamps should not exceed 5 mm in height, and it may be necessary to reduce the bay size to reduce slump during application. The advice of the Certificate holder should be sought regarding the design of service deck ramps for heavy goods vehicles.

18.2 In high stress horizontal areas, 20 mm pre-coated chippings should be rolled into the surface to improve indentation resistance. The paving surface should not be sand rubbed when pre-coated chippings are used.

Technical Investigations

The following is a summary of the technical investigations carried out on Guaraflex P.

19 Tests

19.1 The BBA obtained samples of the asphaltic cement for both Guaraflex P waterproofing and paving, and results of the BBA's tests for the system's general characteristics are summarised in Table 2.

Table 2 General characteristics — asphaltic cement

Test (units)	Method	Mean result
Ash content (%)	BS 2000-223	
Guaraflex PR		0.71
Guaraflex PP		0.54
Ring and ball softening point (°C)	BS 2000-58	
Guaraflex PR		59
Guaraflex PP		72
Needle penetration at 25°C (dmm)	BS 2000-49	
Guaraflex PR		38
Guaraflex PP		25

19.2 Results of the BBA's tests on the product's general physical properties are summarised in Table 3.

Table 3 General physical properties — Guaraflex PR waterproofing and Guaraflex PP and Guaraflex PPH paving

Test (units)	Method	Result
Density (kgm ⁻³):	direct measurement	
10 mm Guaraflex PR		2137
25 mm Guaraflex PP		2177
25 mm Guaraflex PPH		2143
Weight per unit area (kgm ⁻²):	direct measurement	
10 mm Guaraflex PR		22
25 mm Guaraflex PP		54
25 mm Guaraflex PPH		54
Tensile strength (Nmm ⁻²)	BS 2782-3 : Method 320E	
10 mm thick Guaraflex PR:		
unaged		0.62
56 days heat aged at 70°C		0.97
180 days heat aged at 70°C		1.33
Elongation (%)	BS 2782-3 : Method 320E	
10 mm Guaraflex PR:		
unaged		3.6
56 days heat aged at 70°C		1.9
180 days heat aged at 70°C		0.9
Water vapour permeability (gm ⁻² day ⁻¹)	BS 3177 : (75% RH/25°C)	
10 mm Guaraflex PR		0.067

19.3 Results of the BBA's service performance tests on the product are summarised in Table 4.

Table 4 Service performance

Test (units)	Method	Result
Resistance to water pressure (6 m head)	MOAT 27 : Method 5.1.4	no penetration
Resistance to static indentation at 23°C: Guaraflex PP on concrete substrate Guaraflex PPH on concrete substrate	MOAT 27 : Method 5.1.9	I ₄ I ₄
Resistance to impact (4 mm diameter indenter with 9J impact energy): Guaraflex PP on concrete substrate 20°C	MOAT 27 : Method 5.1.10	I ₄ (no cracking)
-10°C		I ₄ (no cracking)
Guaraflex PPH on concrete substrate 20°C		I ₄ (no cracking)
-10°C		I ₄ (no cracking)
Resistance to sliding ⁽¹⁾ (mm): Guaraflex PP on scabbled concrete 7 days at 70°C, included at 45°C ⁽¹⁾	MOAT 27 : Method 5.1.7	≤5
Abrasion resistance (A'Court) Mean weight loss per hour (g m ⁻² hour ⁻¹): granolithic screed control Guaraflex PP Guaraflex PPH	Generally to BS 784	25 142 144
Resistance to chloride ions: 10 mm Guaraflex PR	BD 47/94 ⁽²⁾	no penetration
Resistance to long-term loading (mm): 25 mm Guaraflex PP at 23°C: 10 tonnes m ⁻² for: 1 day 7 days 28 days 34 tonnes m ⁻² for: 1 day 7 days 28 days 25 mm Guaraflex PPH at 23°C: 10 tonnes m ⁻² for: 1 day 7 days 28 days 34 tonnes m ⁻² for: 1 day 7 days 28 days	BBA Test Method ⁽³⁾	1.11 1.65 2.19 1.52 2.47 3.70 0.40 0.54 0.79 0.90 1.11 1.58
Hardness at 23°C (dmm): Guaraflex PP unaged heat aged at 70°C for: 28 days 56 days 112 days 5 cycles ⁽⁴⁾ at 240°C 6 hours at 250°C 6 hours at 270°C	BS 5284	6 7 7 7 3 7 7
after exposure to the following chemicals:		
petrol	1 day	7 day
diesel	19	17
brake fluid	13	24
engine oil	7	5
anti-freeze	7	10
salt solution	8	8
battery acid	7	6
	9	11
Skid resistance (SRV) Guaraflex PPH before abrasion after abrasion	TRL Report 176 Appendix E	75 69

(1) This is a subjective test only, as Guaraflex P is not normally applied to slopes in excess of 10°.

(2) BD 47/94 The Highways Agency *Waterproofing and Surfacing of Concrete Bridge Decks*.

(3) 25 kg and 85 kg loads applied to 50 mm by 50 mm steel plates placed on Guaraflex PP and Guaraflex PPH.

(4) 1 cycle = 6 hours heating at 240°C and 18 hours cooling at ambient temperature.

20 Other investigations

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

20.2 An assessment was made of the system's behaviour in fire, based on the performance of traditional grades of mastic asphalt applied to concrete substrates.

20.3 A user-survey of existing sites in the UK was carried out to assess the system's performance, resistance to rutting and durability in service.

20.4 An assessment was made of the system's resistance to hard body impact.

Additional Information

The management systems of Guaranteed Asphalt Ltd have been assessed and registered as meeting the requirements of BS EN ISO 9002 : 1994 by the British Standards Institution Quality Assurance, Certificate Nos KM 07942 and KM 07350.

Bibliography

BS 784 : 1973 *Methods of test for chemical stoneware*

BS 2000-49 : 1993 *Methods of test for petroleum and its products — Determination of needle penetration of bituminous material*

BS 2000-58 : 1993 *Methods of test for petroleum and its products — Determination of softening point of bitumen — Ring and ball method*

BS 2000-223 : 1993 *Methods of test for petroleum and its products — Determination of ash of petroleum products containing mineral matter*

BS 2782-3 : Methods 320A to 320F : 1976 *Methods of testing plastics — Mechanical properties — Tensile strength, elongation and elastic modulus*

BS 3177 : 1959 *Method for determining the permeability to water vapour of flexible sheet materials used for packaging*

BS 5284 : 1976 *Methods. Sampling and testing mastic asphalt and pitchmastic used in building*

BS 8110-1 : 1997 *Structural use of concrete — Code of practice for design and construction*

BS 8218 : 1998 *Code of practice for mastic asphalt roofing*

BS EN ISO 9002 : 1994 *Quality systems. Model for quality assurance in production, installation and servicing*

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

TRL Report 176 : 1997 *Laboratory tests on high-friction surfaces for highways*

BD 47/94 *Waterproofing and Surfacing of Concrete Bridge Decks, Appendix B Certification Test Requirements for Waterproofing Systems on concrete Bridge Decks*

Conditions of Certification

21 Conditions

21.1 This Certificate:

- (a) relates only to the product that is described, installed, used and maintained as set out in this Certificate;
- (b) is granted only to the company, firm or person identified on the front cover — no other company, firm or person may hold or claim any entitlement to this Certificate;
- (c) has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective;
- (d) is copyright of the BBA.

21.2 References in this Certificate to any Act of Parliament, Regulation made thereunder, Directive or Regulation of the European Union, Statutory Instrument, Code of Practice, British Standard, manufacturers' instructions or similar publication, shall be construed as references to such publication in the form in which it was current at the date of this Certificate.

21.3 This Certificate will remain valid for an unlimited period provided that the product and the manufacture and/or fabricating process(es) thereof:

- (a) are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA;

(b) continue to be checked by the BBA or its agents; and

(c) are reviewed by the BBA as and when it considers appropriate.

21.4 In granting this Certificate, the BBA makes no representation as to:

- (a) the presence or absence of any patent or similar rights subsisting in the product or any other product;
- (b) the right of the Certificate holder to market, supply, install or maintain the product; and
- (c) the nature of individual installations of the product, including methods and workmanship.

21.5 Any recommendations relating to the use or installation of this product which are contained or referred to in this Certificate are the minimum standards required to be met when the product is used. They do not purport in any way to restate the requirements of the Health & Safety at Work etc Act 1974, or of any other statutory, common law or other duty which may exist at the date of this Certificate or in the future; nor is conformity with such recommendations to be taken as satisfying the requirements of the 1974 Act or of any present or future statutory, common law or other duty of care. In granting this Certificate, the BBA does not accept responsibility to any person or body for any loss or damage, including personal injury, arising as a direct or indirect result of the installation and use of this product.



In the opinion of the British Board of Agrément, Guaraflex P is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 00/3691 is accordingly awarded to Guaranteed Asphalt Ltd.

On behalf of the British Board of Agrément

A handwritten signature in black ink, appearing to read 'P. Q. Newson', is written over a light grey background.

Date of Second issue: 11th October 2002

Chief Executive

**Original Certificate issued 10th March 2000. This amended version includes reference to revised Building Regulations, addition of reference to CDM Regulations (Northern Ireland), addition of Guaraglas material, and change of Guarafelt CP Super specification.*