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Agrément Certificate

17/5452

Product Sheet 1

SHIELD MEMBRANES PARKING DECK SYSTEMS

SHIELDFLEX P

This Agrément Certificate Product Sheet⁽¹⁾ relates to Shieldflex P, for use as a waterproofing and paving system for concrete car park decks and heavy goods vehicle (HGV) service decks.

(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 a building (see section 6).

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

Resistance to wind uplift — the system will resist the effects of any likely wind suction acting on the roof (see section 8).

Resistance to mechanical damage — the system can accept the traffic loads and the effects of thermal or other minor movement likely to occur in service without damage (see section 9).

Durability — under normal service conditions, the system will provide a durable waterproof surfacing with a service life of at least 20 years (see section 11).



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 First issue: 15 November 2017

John Albon – Head of Approvals
Construction Products

Claire Curtis-Thomas
Chief Executive

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, Shieldflex P, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



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

Requirement:	B4(2)	External fire spread
Comment:		The use of the system on concrete substrates can enable a roof to be unrestricted under this Requirement. See sections 7.1 to 7.3 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system will enable a structure to satisfy this Requirement. See section 6.1 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The use of the system satisfies the requirements of this Regulation. See sections 10 and 11 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	2.8	Spread from neighbouring buildings
Comment:		In the opinion of the BBA, a roof incorporating the system applied to a concrete substrate can be regarded as having low vulnerability under clause 2.8.1 ⁽¹⁾⁽²⁾ of this Standard. See sections 7.1 and 7.4 of this Certificate.
Standard:	3.10	Precipitation
Comment:		The system 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 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.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for the system under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ .

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2012 (as amended)

Regulation:	23(a)(b)(i)	Fitness of materials and workmanship
Comment:		The system is acceptable. See section 11 and the <i>Installation</i> part of this Certificate.
Regulation:	28(b)	Resistance to moisture and weather
Comment:		The system will enable a roof to satisfy the requirements of this Regulation. See section 6.1 of this Certificate.
Regulation:	36(b)	External fire spread
Comment:		The use of the system on concrete substrates can enable a roof to be unrestricted under 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 sections: 3 *Delivery and site handling* and 13 *Procedure* (13.1) of this Certificate.

Technical Specification

1 Description

1.1 Shieldflex 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 or 10 mm coarse aggregate.

1.2 The waterproofing layer can be omitted from internal specifications where the system will not be subject to hosing.

1.3 Materials used with the system include:

- Shieldflex PR — polymer-modified waterproofing grade mastic asphalt manufactured by blending bitumen, graded aggregates, filler and polymer using conventional techniques
- Shieldflex PP — polymer-modified mastic asphalt paving (standard grade)
- Shieldflex PPH — polymer-modified mastic asphalt paving (hard grade) for use in uninsulated, heated internal areas and heavy vehicle applications
- Shieldflex Standard Waterproofing — polymer-modified mastic asphalt waterproofing layer for use in economy specifications
- Shieldflex Standard Paving — polymer-modified mastic asphalt paving for use in economy specifications
- Shieldflash U — 4 mm thick, polymer-modified bitumen torch-on membrane used as flashing at abutments
- Shieldflash T — 4 mm thick, polymer-modified bitumen torch-on membrane (mineral finished) used as flashing at abutments
- Shield CP — 2 mm thick, polymer-modified glassfibre mat reinforced bitumen membrane
- Shield CP Super — 4 mm thick, glassfibre mat reinforced polymer-modified bitumen membrane
- Shieldglas — bitumen-coated woven glassfibre scrim
- glassfibre tissue — for use as an asphalt underlay
- 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
- ShieldTec — a hot-applied reinforced polymer modified bitumen waterproofing for use at upstands (subject of BBA Certificate, Product Sheet 3).

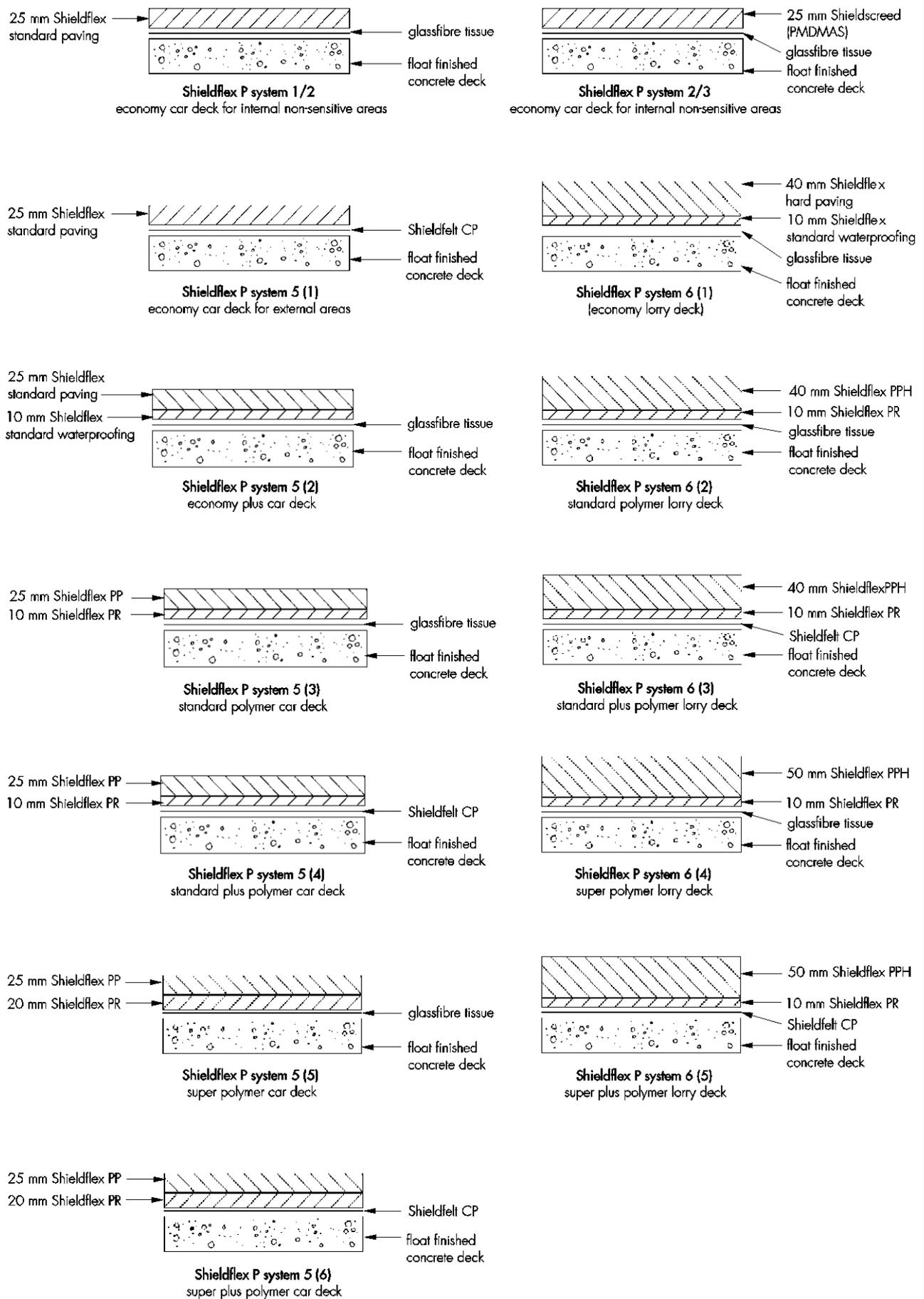
1.4 Ancillary items for use with the system, but outside of the scope of this Certificate, include:

- Shieldscreed — polymer-modified design mix asphalt screed (PMDMAC)⁽¹⁾ for use as a supporting layer under Shieldflex PR in roof specifications or as a protection layer over Shieldflex PR
- Flexible Fillet Strip — 15 mm thick by 45 mm wide torch-on flexible, preformed strip used as an alternative to an in-situ formed asphalt fillet
- Foamglas Type S3 — cellular glass insulation with a nominal compressive strength of 900 kN·m⁻², for use in insulated specifications
- Foamglas Type F — cellular glass insulation with a compressive strength of 1700 kN·m⁻², for use in insulated specifications
- Procoat — a liquid-applied polyurethane spray- or float-applied rubber compound used for forming skirting details.

(1) Available in a terrazzo finish for internal application.

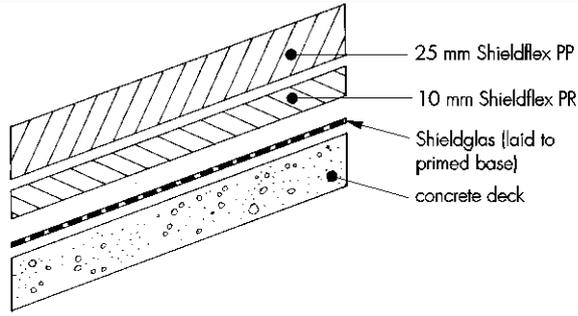
1.5 Standard specifications, descriptions and uses are detailed in Figure 1.

Figure 1 Standard specifications

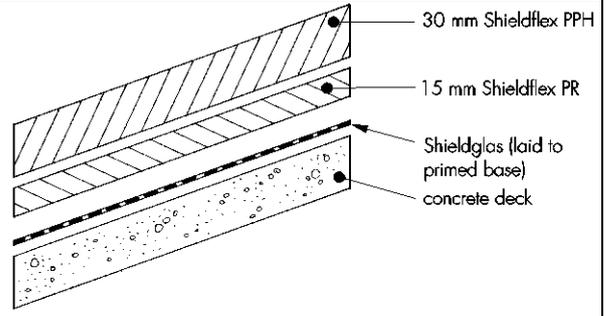


Abutments not shown - the Certificate holder should be consulted for details

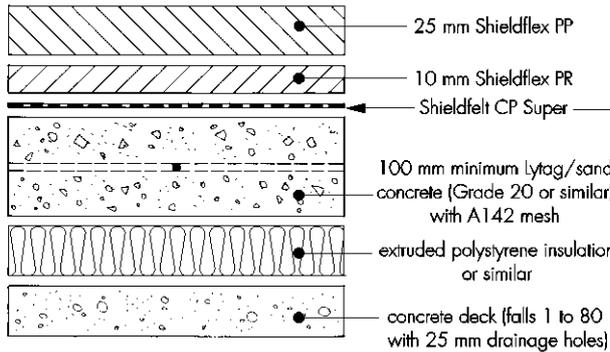
Figure 1 Standard specifications — Continued



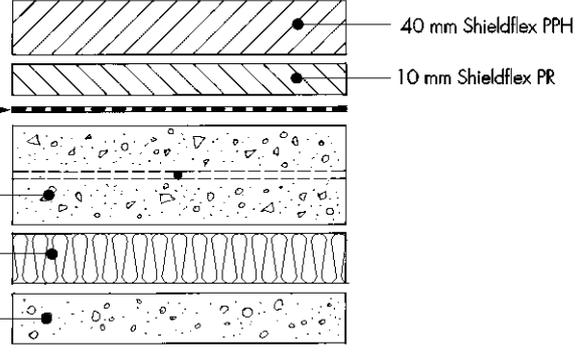
Shieldflex P system 7⁽¹⁾
external ramps (not exceeding 1 to 10 gradient)
for cars and light commercial vehicles



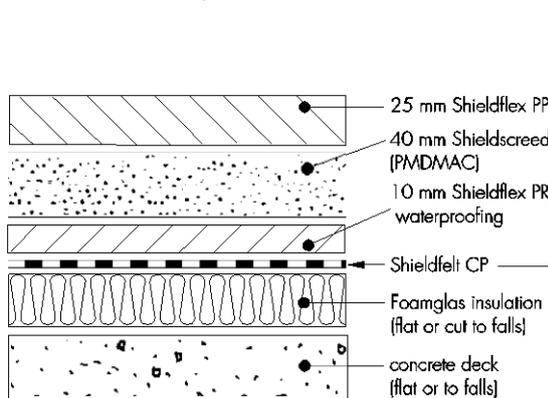
Shieldflex P system 8⁽¹⁾
external ramps (not exceeding 1 to 10 gradient)
for heavy commercial vehicles



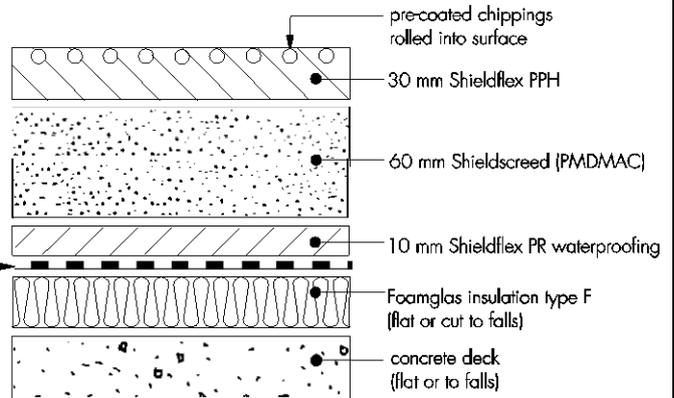
Shieldflex P system 9⁽¹⁾
insulated decks for cars and light
commercial vehicles (max wheel
load 2 tonnes per axle)



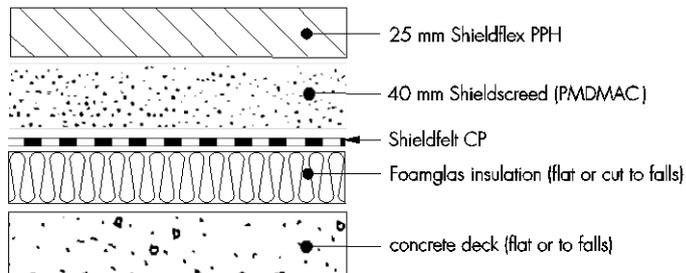
Shieldflex P system 10⁽¹⁾
insulated decks for heavy commercial vehicles
(max wheel load 10.5 tonnes per axle)



Shieldflex P system 11⁽¹⁾
insulated decks, 'fast-track' system for cars and light
commercial vehicles (max wheel load 2 tonnes per axle)



Shieldflex P system 12⁽¹⁾
insulated decks, 'fast-track' system for heavy goods
vehicles (max wheel load 10.5 tonnes per axle)



Shieldflex P system 13⁽¹⁾
covered insulated deck, 'fast-track' system for cars and light
commercial vehicles (max wheel load 2 tonnes per axle)

(1) Details at abutments not shown

2 Manufacture

2.1 Shieldflex P waterproofing and paving asphalts are manufactured by mixing bitumen, polymer, fillers and aggregates using conventional mixing techniques.

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 system components are 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. The manufacturer's material safety data sheet should be consulted prior to discharging and handling the molten product.

3.2 Shieldflash and Shield membranes are supplied in rolls and should be stored on end on a clean, level surface away from heat and protected from inclement weather.

3.3 The bitumen primer is supplied in 5 litre cans or 25 litre drums.

3.4 The Certificate holder has 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

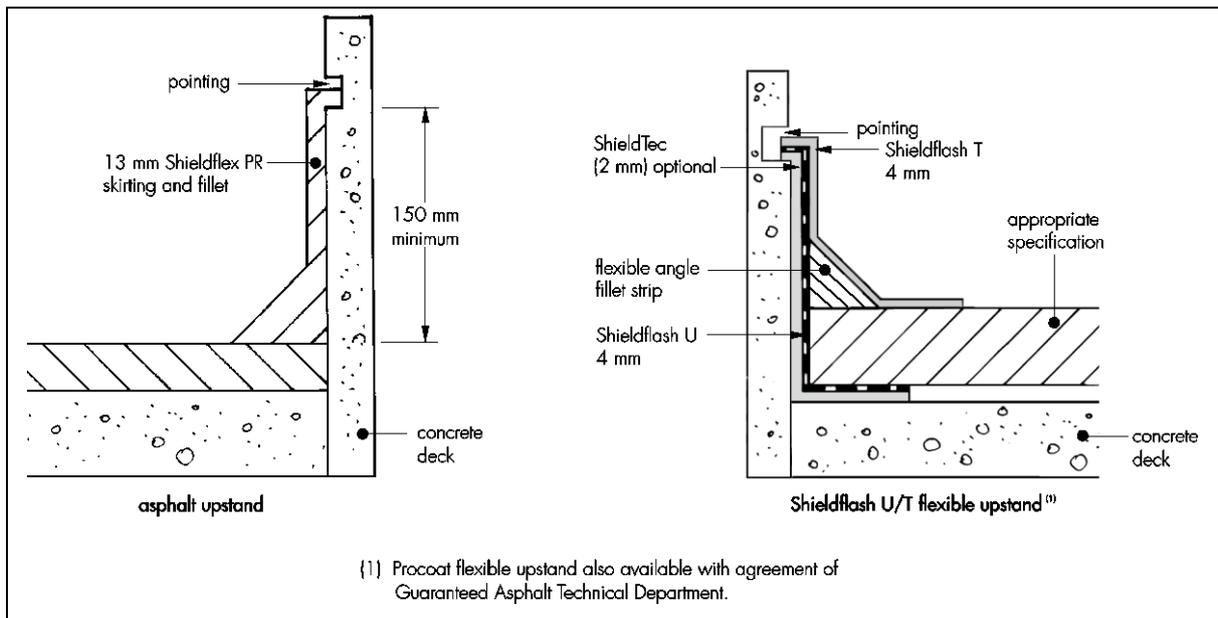
The following is a summary of the assessment and technical investigations carried out on Shieldflex P.

Design Considerations

4 Use

4.1 Shieldflex P is satisfactory for use as a combined waterproof/wearing surface for rooftop car park decks and HGV service decks when applied to a float-finished, in-situ or precast and screeded concrete deck, laid in accordance with BS EN 1992-1-1 : 2004 and its UK National Annex. The 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. Typical installation details are shown in Figure 2.

Figure 2 Typical installation details



4.2 Details and the general principles to be followed at skirtings, upstands, abutments, gutters and expansion joints should be as described in BS 8218 : 1998 and the Certificate holder's instructions.

4.3 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 minimum fall of 1:60 is recommended to ensure good drainage to outlets and gutters.

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

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

4.6 In specifications incorporating Shieldscreed (PMDMAC) and Foamglas insulation, ie Shieldflex P systems 11 to 13 in Figure 1, designers must ensure that imposed loads, especially heavy point loading, will be adequately resisted without undue deflection. In these cases, the advice of the Certificate holder must be sought.

5 Practicability of installation

The system is designed to be installed by competent contractors, experienced with this type of system.

6 Weathertightness



6.1 The system will adequately resist the passage of moisture into the structure and enable a structure to comply with the requirements of the national Building Regulations.

6.2 The system is impervious to water, is flexible and can accommodate, without leakage, the movement due to cracking permitted by BS EN 1992-1-1 : 2004 and its UK National Annex.

7 Properties in relation to fire



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



7.2 When fully supported on concrete substrates, exposed mastic asphalt has a 'notional' B_{ROOF} (t4) classification to BS EN 13501-5 : 2005 with reference to:

England and Wales — Approved Document B, Table A5, Part (iv)

Northern Ireland — Technical Booklet E, Table 5.6 Part (iii).

7.3 The designation of other specifications should be evaluated in accordance with the guidance given in:

England and Wales — Approved Document B, Volumes 1 and 2, paragraphs 10.4 and 14.4 respectively

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



7.4 All specifications should be evaluated in accordance with Mandatory Standard 2.8, Annex 2.C⁽¹⁾ and Annex 2.F⁽²⁾.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).

8 Resistance to wind uplift

When applied to an air-impermeable deck, the system will resist the effects of wind suction likely to occur in service.

9 Resistance to mechanical damage

9.1 The system can accept the foot and vehicular traffic defined in this Certificate. Some indentation should be expected and reasonable care is required to avoid prolonged loading by sharp objects.

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

10 Maintenance



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

10.2 Deep cracks, blisters and deep indentations should be repaired as soon as possible to ensure that the waterproofing integrity of the system is maintained.

11 Durability



11.1 The system will 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, Shieldflex P will perform satisfactorily for a period in excess of 20 years.

11.2 The system has good chemical resistance to hydraulic fluids and aqueous solutions of acids, alkalis and de-icing salts, and is unaffected by contact with alkaline substrates. Prolonged exposure to petrol and diesel 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.

12 General

12.1 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 Shieldflex PR and a metal flashing, where appropriate.

12.2 Where thermal insulation is required above the structural slab (see Figure 1, systems 9 and 10)⁽¹⁾, high-density or extruded polystyrene insulation is loose-laid directly onto 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.

12.3 Concrete structures should be designed and built in accordance with BS EN 1992-1-1: 2004 and its UK national annex.

12.4 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 system is to be laid over an asphalt screed the advice of the Certificate holder should be sought.

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

12.6 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 system.

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

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

13 Procedure

13.1 Installation of the Shieldflex PR 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.

13.2 If required, Shieldflex PR, can be applied over Shield CP or Shield CP Super felt underlay.

13.3 Shieldflex PP, Shieldflex PPH pavings and Shieldscreed 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.

13.4 Steel or timber gauges should be used to ensure the correct thickness of Shieldflex PP or PPH paving and to provide a bonding edge between adjacent bays of asphalt.

13.5 Ramps should be cross-tamped. To prevent undue thinning of Shieldflex 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.

13.6 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.

14 Repair

Localised repairs should be conducted by a specialist asphalt contractor, generally in accordance with the recommendations of BS 8218 : 1998, clause 11.3 *Repair procedures* and/or the Certificate holder's instructions.

Technical Investigations

15 Tests

Tests were carried out on Shieldflex P waterproofing and paving asphalts and on the asphaltic cement to establish:

asphaltic cement

- ash content
- ring and ball softening point
- penetration

Shieldflex P waterproofing and/or paving asphalts

- density
- mass per unit area
- tensile strength and elongation on unaged and heat aged samples
- dimensional stability
- water vapour permeability
- hardness on unaged and heat aged samples
- resistance to water pressure
- resistance to sliding
- static indentation on soft and hard substrates
- hard body impact at -10°C and at $+20^{\circ}\text{C}$
- abrasion resistance
- resistance to chloride ion penetration
- resistance to long-term loading
- effect of exposure to fuels and common chemicals
- skid resistance.

16 Investigations

16.1 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.

16.2 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.

16.3 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.

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

Bibliography

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

BS EN 1992-1-1 : 2004 + A1 : 2014 *Eurocode 2 — Design of concrete structures — General rule and rules for buildings*
NA to BS EN 1992-1-1 : 2004 + A1 : 2014 *UK National Annex to Eurocode 2 — Design of concrete structures — General rule and rules for buildings*

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

17 Conditions

17.1 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.

17.2 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.

17.3 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.

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

17.5 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.

17.6 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.