

TRUSTSEAL HIGH-FRICTION SURFACING SYSTEM

KEYGRIP EPOXY 924

This HAPAS Certificate Product Sheet⁽¹⁾ is issued by the British Board of Agrément (BBA), supported by Highways England (HE) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Government and the Department for Infrastructure, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers Group and industry bodies. HAPAS Certificates are normally each subject to a review every three years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to Keygrip Epoxy 924, a high-friction surfacing system for use on bituminous highways.

CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations 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

Performance — the system complies with the requirements for a Type 1 system in accordance with the *Guidelines Document for the Assessment and Certification of High-Friction Surfacing for Highways* (see Table 1).

Durability — the system, when used in an appropriate location as defined in the *Guidelines Document for the Assessment and Certification of High-Friction Surfacing for Highways*, should have a service life of between 5 and 10 years (see section 7).



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



Paul Valentine
Technical Excellence Director



Claire Curtis-Thomas
Chief Executive

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Originally certificated on 2 October 2000

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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Requirements

In the opinion of the BBA, Keygrip Epoxy 924, when assessed in accordance with the BBA HAPAS *Guidelines Document for the Assessment and Certification of High-Friction Surfacing for Highways* and used in accordance with the provisions of this Certificate, will meet or contribute to meeting the following requirements of the *Manual of Contract Documents for Highways Works (MCHW)*⁽¹⁾, Volume 1, *Specification for Highways Works (SHW)*, Series 900, Clause 924.

(1) The MCHW is operated by the Overseeing Organisations: Highways England (HE), Transport Scotland, the Welsh Government and the Department for Infrastructure (Northern Ireland).

Regulations

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 9 *Procedure* of this Certificate.

Technical Specification

1 Description

Keygrip Epoxy 924 comprises a two-component, modified epoxy binder and a graded nominal 1 to 3 mm calcined bauxite aggregate.

2 Manufacture

2.1 The binder components are manufactured by a batch-blending process.

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.

2.3 The management system of Trustseal Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by the BBA (Certificate 12/Q026).

3 Delivery and site handling

3.1 Keygrip Epoxy 924 binder components are delivered to site in dedicated heated tanks, located on the installation vehicle or in 22 kg pre-weighed combination packs.

3.2 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 Keygrip Epoxy 924.

4 General

4.1 Keygrip Epoxy 924 is satisfactory for use as a high-friction surfacing system on highways with surface texture depths of between 0.5 and 2.0 mm, measured using the sand patch test as defined in BS 598-105 : 2000 or BS EN 13036-1 : 2010.

4.2 The system is classified as Type 1, in accordance with the requirements defined in the Guidelines Document, Table 1.

4.3 The suitability of the system for use on highways with concrete surfaces, and the in-service colour retention of the system, have not been assessed and are outside the scope of this Certificate.

5 Practicability of installation

The system must be installed by a BBA Approved Installer⁽¹⁾. Operatives must be trained and approved by the Certificate holder.

(1) See also the *Assessment and Surveillance Scheme for Installers of High-Friction Surfacing for Highways*.

6 Maintenance

The system is not subject to any routine maintenance requirements but any damage must be repaired (see section 13).

7 Durability

7.1 The results of performance tests and the performance of the system in use indicate that Keygrip Epoxy 924, when used in an appropriate location as defined in the Guidelines Document, should have a service life of between 5 and 10 years (see Table 1).

Table 1 Area⁽¹⁾ of application by type classification

Site category (as defined in HD 28/15)	Site definition	Maximum traffic levels ⁽²⁾ Type 1
Q	Approaches to and across major junctions and approaches to roundabouts	3500
G1	Gradient from 5 to 10%, longer than 50 m	3500
S1	Bend radius <500 m — carriageway with one-way traffic	3500
R	Roundabout	3500
G2	Gradient >10%, longer than 50 m	2500
S2	Bend radius <500 m — carriageway with two-way traffic	2500
K	Approach to pedestrian crossing and other high-risk situations	2500

(1) Suitable areas for use of systems classified in accordance with the Guidelines Document, Table 1, to give an expected service life of 5 to 10 years.

(2) Commercial vehicles per lane per day.

7.2 If the system is used in other locations or at different traffic levels, the expected life will be increased or decreased in relation to the severity of the site.

Installation

8 General

8.1 The ambient and road surface temperatures should be recorded. Installation should not be carried out if the road surface temperature is outside the range of 5 to 35°C.

8.2 The Certificate holder is responsible for training and monitoring the BBA Approved Installers to ensure that the system is installed in accordance with the BBA agreed Method Statement and this Certificate.

9 Procedure

Health and Safety Data Sheets and the Control of Substances Hazardous to Health Regulations 2002 (COSHH) risk assessments for the works must be deposited with the purchaser and be maintained on site by the approved installer.

10 Preparation

10.1 All imperfections in the road surface not acceptable to the installer should be reinstated with a material approved by the purchaser in consultation with the installer.

10.2 The road surface must be clean, dry, and free from ice, frost, loose aggregate, oil, grease, road salt and other loose matter likely to impair adhesion of the system to the road surfacing.

10.3 Surface contamination may be removed using any suitable method agreed between the installer and purchaser including grit blasting, high-pressure water jetting, scabbling and hot compressed air. Oil contamination is removed by washing with a suitable detergent, followed by flushing with clean water, and drying.

10.4 Existing road markings, iron works and studs must be masked.

11 Application

Material from dedicated heated tanks

11.1 The two components are batched from the tanks into calibrated containers ensuring a mix ratio of 50:50 ± 2% by volume at a temperature between 20 and 50°C.

11.2 The components (up to 20 kg of each) are mixed for at least two minutes, or until homogeneous, using a high-torque drill fitted with a helical mixing blade.

Material from pre-weighed combination packs

11.3 The pre-weighed components, Parts A and B, are heated to a temperature of between 20 and 50°C, and mixed individually for at least one minute. Part B is added to Part A and the two parts mixed for at least two minutes, or until homogeneous, using a high-torque drill fitted with a helical mixing blade.

Application of the binder and calcined bauxite aggregate

11.4 The mixed binder can be applied by squeegee onto the prepared surface at a minimum coverage rate, which will vary according to the texture and porosity of the surface but must not be less than 1.35 kg·m⁻².

11.5 After the binder is applied, an excess of calcined bauxite aggregate is broadcast over the binder and evenly spread out using a broom or squeegee.

11.6 Once the binder is sufficiently cured, the excess aggregate is removed by vacuum sweeper or other suitable means.

11.7 Rolling of the aggregate is not permitted.

11.8 All masking is removed and the system is allowed to set. During the setting period, no disturbance or trafficking the system is allowed.

12 After-care

The installer must conduct a visual check on the installation for uniform surface texture, surface blemishes and any discernible faults. Any remedial work must be conducted as necessary.

13 Repair

Should the system be damaged or become debonded from the substrate, it is repaired by cutting the damaged area back to firmly bonded material, cleaning the prepared area, masking the perimeter and reinstating to the original specification.

Technical Investigations

14 Tests

Laboratory performance tests were carried out on Keygrip 924 HW, for a Type 1 system, as shown in Tables 2 and 3.

Table 2 Laboratory performance tests and requirements

			Appendix G ⁽¹⁾
Scuffing at 45°C			
Initial	Texture depth (mm)	≥1.4	
after 500 wheel-passes	Texture depth (mm)	≥1.2	
	Erosion index	≤3	
after heat ageing for 112 days at 70±3°C and 500 wheel-passes	Texture depth (mm)	≥1.2	
	Erosion index	≤5	
Scuffing at 45°C			Appendix G
Wear			
initial	Texture depth (mm)	≥1.4	Appendix H
	SRV	≥65	
after 100 000 wheel-passes	Texture depth (mm)	≥1.1	
	Erosion index	≤3	
	SRV	≥70	
Tensile adhesion			
at (-10±2)°C	Stress at failure (N·mm ⁻²)	≥1.0	
at (20±2)°C	Stress at failure (N·mm ⁻²)	≥0.5	Appendix J

(1) Including any agreed amendments detailed in the Guidelines Document, Appendix D.

Table 3 Additional tests

Test	Parameter measured	Result	Method in TRL Report 176 ⁽¹⁾
Resistance to freeze/thaw	Texture depth/erosion index	Satisfactory	Appendix L
Resistance to diesel	Texture depth/erosion index	Satisfactory	Appendix M
Thermal movement	Thermal expansion coefficient	Satisfactory	Appendix N

(1) Including any agreed amendments detailed in the Guidelines Document, Appendix D.

15 Investigations

15.1 An installation trial was carried out to assess the practicability of the installation and quality control/assurance procedures.

15.2 A user/specifier survey relating to existing sites at least two years old was carried out to assess the system's performance and durability.

15.3 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.

Bibliography

BS 598-105 : 2000 *Sampling and examination of bituminous mixtures for roads and other paved areas — Methods of test for the determination of texture depth*

BS EN ISO 9001 : 2015 *Quality management systems — Requirements*

BS EN 13036-1 : 2010 *Road and airfield surface characteristics — Test methods — Measurement of pavement surface macrotexture depth using a volumetric patch technique*

Guidelines Document for the Assessment and Certification of High-Friction Surfacing for Highways

HD 28/15 Design Manual for Roads and Bridges, Volume 7, Section 3, Part 1, *Pavement design and maintenance — Pavement maintenance assessment. Skidding resistance*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works, Series 900 Road pavements — bituminous bound materials*

TRL Report 176 : 1997 *Laboratory Test on High-Friction surfaces for Highways*

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

16.2 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.

16.3 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.

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

16.5 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.

16.6 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.