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HAPAS

Roads and Bridges Agrément Certificate No 01/H058

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BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

Designated by Government to issue European Technical Approvals

KEYGRIP TYPE 1 THERMOPLASTIC HIGH-FRICTION SURFACING SYSTEM

This Certificate is issued under the Highway Authorities Product Approval Scheme (HAPAS) by the BBA in conjunction with the Highways Agency (acting on behalf of the overseeing organisations of the Department for Transport, Local Government and the Regions; the Scottish Executive Development Department; the National Assembly of Wales; the Department for Regional Development, Government Department in Northern Ireland), the CSS (formerly the County Surveyors' Society), the Local Government Technical Advisers Group, and industry bodies. HAPAS Agrément Certificates are normally each subject to a review every five years.

Product

Typical application of Trustseal Ltd's Keygrip Type 1 Thermoplastic High-Friction Surfacing System.

- *THIS CERTIFICATE RELATES TO THE KEYGRIP TYPE 1 THERMOPLASTIC HIGH-FRICTION SURFACING SYSTEM, COMPRISING A THERMOPLASTIC ROSIN ESTER BINDER INCORPORATING A GRADED (1 mm to 3 mm) CHINESE OR GUYANAN CALCINED BAUXITE AGGREGATE.*
- *The system is for use as a high-friction surfacing on highways with bituminous and concrete surfaces and is classified as Type 1 in accordance with the* Guidelines Document for the Assessment and Certification of High-Friction Surfaces for Highways.
- *The system is installed only by BBA Approved Installers.*

HAPAS Requirements

1 Requirements

1.1 The Highways Technical Advisory Committee (HiTAC) and HAPAS Specialist Group 1 (High-Friction Surfacing) have agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the compliance of high-friction surfacing systems with the Guidelines Document. In the opinion of the BBA, the Keygrip Type 1 Thermoplastic High-Friction Surfacing System, when applied to suitable bituminous and concrete surfaces, in accordance with the provisions of this Certificate, will meet the relevant requirements and is deemed to be of Type 1.

1.2 Additional requirements of the overseeing organisations are given in the Manual of Contract Documents for Highway Works, Volume 1 (MCHW 1) *Specification for Highway Works*, Series 900.

Regulations

2 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 Delivery and site handling*, (5.1 and 5.2); *7 Precautions during installation*.

Technical Specification

3 Description

3.1 Keygrip Type 1 Thermoplastic High-Friction Surfacing System comprises a thermoplastic rosin ester binder incorporating a graded (1 mm to 3 mm) Chinese or Guyanan calcined bauxite aggregate.

3.2 The system is suitable for application when road surface temperatures are between 0°C and 35°C.

4 Manufacture and quality control

The product is manufactured by a batch-blending process. A series of quality control checks is conducted on each batch. The packaged product is identified by unique batch numbers which are recorded on a Certificate of Conformity prior to delivery to site.

5 Delivery and site handling

5.1 The product is delivered to site in granular form in 25 kg polyethylene bags. Each bag may also include a pre-weighed sachet of pigment, if a coloured system is required.

5.2 The product is classified as harmful by inhalation under The Chemicals (Hazard Information and Packaging for Supply) Regulations 1994 (CHIP 2) and the packaging bears the appropriate hazard warning label.

5.3 When stored in accordance with the Certificate holder's instructions the unopened product has a shelf-life of at least 12 months.

Design Data

6 General

6.1 Keygrip Type 1 Thermoplastic High-Friction Surfacing System is satisfactory for use as a high-friction surfacing on highways with surface texture depths of between 0.5 mm and 2 mm, measured using the sand patch test as defined in BS 598-105 : 1990.

6.2 The system is classified as Type 1, in accordance with the results of the performance tests as defined in Table 1 of the Guidelines Document for the Assessment and Certification of High-Friction Surfaces for Highways and detailed in Table 3 of this Certificate.

6.3 Installation of the system should be carried out only when the road surface temperature is between 0°C and 35°C.

6.4 The in-service colour retention of the system has not been assessed and is outside the scope of this Certificate.

7 Precautions during installation

Health and Safety Data Sheets and COSHH risk assessments for the works should be deposited with the purchaser and be maintained on site.

8 Maintenance and repair

Should the system be damaged or become debonded from the substrate it may be repaired by cutting the damaged area back to firmly bonded material, cleaning the prepared area using hot compressed air or a propane torch, masking the perimeter and reinstating to the original specification. A 25 mm overlap onto the existing material should be allowed.

9 Durability

9.1 The results of the performance tests and the performance of the system in use indicate that Keygrip Type 1 Thermoplastic High-Friction Surfacing System, when used in an appropriate location as defined in the Guidelines Document for the Assessment and Certification of High-Friction Surfaces for Highways, should have a service life of between 5 and 10 years (see Table 1).

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

Table 1 Area[1] of application by type classification

Site category (as defined in HD 28/94)	Site definition	Maximum traffic levels (number of commercial vehicles per lane per day)		
		Type		
		1	2	3
F	Approaches to and across major junctions (all limbs)	3500	1000	250
G1	Gradient — from 5% to 10%, longer than 50 m			
H1	Bend — not subject to 40 mph or lower speed limit, radius from 100 m to 250 m			
L	Roundabout			
G2	Gradient — >10%, longer than 50 m	2500	750	175
H2	Bend — not subject to 40 mph or lower speed limit, radius <100 m			
J/K	Approach to hazard, such as roundabout, traffic signals, pedestrian crossing, railway level crossing	2500	500	100

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

Installation

10 General

10.1 Installation of the Keygrip Type 1 Thermoplastic High-Friction Surfacing System is carried out only by BBA Approved Installers[1] with trained operatives under competent supervision.

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

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

11 Preparation

11.1 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.

11.2 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.

11.3 Surface contamination can be removed by lancing with hot compressed air.

11.4 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 0°C to 35°C.

11.5 The product is melted and mixed in a suitable boiler, fitted with a horizontally-mounted agitator. The required amount of the product is loaded into the boiler and the temperature of the material raised to the application temperature range of between 200°C and 250°C, and mixed until fully homogeneous. The temperature of the mixed material is checked using a long-handled, digital temperature probe accurate to ±0.5°C.

11.6 The molten material can be maintained between the application temperature range for up to four hours without serious degradation or discolouration.

11.7 The maximum safe heating temperature range is between 265°C and 275°C. Materials should not be heated to above 275°C as this will lead to degradation of the binder.

12 Application

12.1 The mixed material is discharged from the boiler into buckets and transferred to the screed box.

12.2 The product is applied to the prepared surface using a screed box with a suitably designed trailing edge to give an applied finish of between 3 mm and 5 mm by combing transversely across the road surface. The aggregate should be evenly distributed to provide a well-textured finish, free from lumps and similar surface blemishes.

12.3 On a surface with an average texture depth of 1.5 mm the coverage rate should be between 9 kgm^{-2} and 11 kgm^{-2}. This coverage rate may be increased on a more highly-textured surface.

13 Aftercare

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

Technical Investigations

The following is a summary of the technical investigations carried out on the Keygrip Type 1 Thermoplastic High-Friction Surfacing System.

14 Tests

Laboratory performance tests were carried out on the system (see Tables 2 and 3).

15 Other 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 examined, including the methods adopted for quality control, and details were obtained of the quality and composition of materials used.

Table 3 Additional tests

Test	Parameter	Method in TRL Report 176[1]	Result
Resistance to freeze/thaw	Texture depth Erosion index	Appendix L	satisfactory
Resistance to diesel	Texture depth Erosion index	Appendix M	[2]
Thermal movement	Thermal expansion coefficient	Appendix N	satisfactory
Installation temperature test at 0°C	Texture depth Erosion index	Appendix P	satisfactory
Concrete substrate test	Texture depth Erosion index Tensile adhesion at 20 ± 2°C	Appendix P	satisfactory

(1) Including any agreed amendments detailed in Appendix D of the *Guidelines Document for the Assessment and Certification of High-Friction Surfaces for Highways*.

(2) The diesel penetrated the thermoplastic coating and dissolved the binder in the asphalt substrate. Considerable deformation of the asphalt substrate was apparent after the scuffing.

Table 2 Laboratory performance tests on asphalt substrates

Test		Parameter	Method in TRL Report 176[1]	Type 1 requirement
Scuffing at 45°C	Initially	Texture depth (mm)	Appendix G	≥1.4
	After 500 wheel-passes	Texture depth (mm) Erosion index	Appendix G	≥1.2 ≤3
	After heat ageing for 112 days at 70±3°C and 500 wheel-passes	Texture depth (mm) Erosion index	Appendix G	≥1.2 ≤5
Wear	Initially	Texture depth (mm) SRV	Appendix H	≥1.4 ≥65
	After 100 000 wheel-passes	Texture depth (mm) Erosion index SRV	Appendix H	≥1.1 ≤3 ≥70
Tensile adhesion		Stress at −10±2°C (Nmm^{-2})	Appendix J	≥1.0
		Stress at 20±2°C (Nmm^{-2})	Appendix J	≥0.5

(1) Including any agreed amendments detailed in Appendix D of the *Guidelines Document for the Assessment and Certification of High-Friction Surfaces for Highways*.

Bibliography

BS 598 *Sampling and examination of bituminous mixtures for roads and other paved areas*
BS 598-105 : 1990 *Methods of test for the determination of texture depth*

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

HD 28/94 *Design Manual for Roads and Bridges : Volume 7, Pavement Design and Maintenance : Skid Resistance*

Manual of Contract Documents for Highway Works, Volume 1, May 2001 edition (MCHW1)

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

Conditions of Certification

16 Conditions

16.1 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.

16.2 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.

16.3 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;

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

(d) remain in accordance with the requirements of the Highway Authorities Product Approval Scheme.

16.4 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.

16.5 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.

BBA BRITISH BOARD OF AGRÉMENT
TECHNICAL APPROVALS FOR CONSTRUCTION

In the opinion of the British Board of Agrément, the Keygrip Type 1 Thermoplastic High-Friction Surfacing System is fit for its intended use provided it is installed, used and maintained as set out in this Certificate. Certificate No 01/H058 is accordingly awarded to Trustseal Ltd.

On behalf of the British Board of Agrément

Date of issue: 7th February 2002

Chief Executive

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