

# HAPAS

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HAPAS Certificate

23/H6948

Product Sheet 1 Issue 1

## LEESON POLYURETHANES HIGH FRICTION SURFACING SYSTEM

### D3149 HFS TYPE 1

This Product Sheet<sup>(1)</sup> is issued by the British Board of Agrément (BBA). The Highways Authorities Product Approval Scheme (HAPAS) is supported by National Highways (NH) (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.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to D3149 HFS Type 1, a polyurethane-based high-friction surfacing system for use on bituminous and concrete highways, in accordance with the *Manual of Contract Documents for Highway Works* (MCHW), Volume 1 Specification for Highways (SHW), Series 900, Clause 924.



The BBA has awarded this Certificate to the company named above for the system described herein. This system has been assessed as complying with the requirements of the BBA HAPAS Certification Scheme according to the assessments set out in this Certificate.

On behalf of the British Board of Agrément

Date of issue: 6 July 2023

A handwritten signature in black ink, appearing to read 'Hardy Giesler'.

Hardy Giesler  
Chief Executive Officer

*This BBA HAPAS Certificate is issued under the BBA's accreditation to ISO/IEC 17065 (UKAS accredited Certification Body Number 0113).*

*Clauses marked † are additional information outside the scope of accreditation.*

*Readers MUST check the validity and latest issue number of this BBA HAPAS Certificate by referring to the BBA website or contacting the BBA directly.*

*The Certificate should be read in full as it may be misleading to read clauses in isolation.*

*Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.*

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## 1 Product Description

1.1 The Certificate holder specifies the system under assessment, D3149 HFS Type 1, as a polyurethane-based high-friction surfacing system for use on bituminous and concrete highways, in accordance with the *Manual of Contract Documents for Highway Works* (MCHW)<sup>(1)</sup>, Volume 1 Specification for Highways (SHW), Series 900, Clause 924.

(1) The MCHW is operated by National Highways (NH) (acting on behalf of the overseeing organisations of the Department for Transport; Transport Scotland; the Welsh Government; and the Department for Infrastructure, Northern Ireland).

1.2 D3149 HFS Type 1 comprises a two-component, cold-applied polyurethane binder and a catalyst if required, incorporating 1 to 3 mm graded calcined bauxite aggregates.

1.3 D3149 HFS Type 1 can be supplied in either a kit size of 17 kg pails or 1000 litre IBC totes.

1.4 The system has the following characteristics:

Characteristic (unit)	Value
Viscosity (spindle 6 @ 20 rpm) (mPa·s <sup>-1</sup> )	6500
Specific gravity (g·cm <sup>-3</sup> )	1.131
Pot life (at 23°C & 50% RH)	>7 minutes
Ash content (%)	4.58%

## 2 Requirements

Requirements for the system are outlined in the BBA HAPAS Certification Scheme and Technical Specifications Documents, and have been established from the following specification documents.

- the MCHW, Volume 1, Series 900, Clause 924
- the Design Manual for Roads and Bridges (DMRB)<sup>(1)</sup>
- CS 228 – Skidding Resistance
- the BBA HAPAS Guidelines Document for the Assessment and Certification of High Friction Surfacing for Highways (hereinafter referred to as ‘the Guideline Document’)
- the BBA document Assessment and Surveillance Scheme for Installers of High-Friction Surfacing for Highways.

(1) The DMRB is operated by the overseeing organisations: National Highways (NH), Transport Scotland, the Welsh Government and the Department for Infrastructure (Northern Ireland).

## 3 Summary of Product Assessment

The system was assessed on the basis of the following characteristics in accordance with HAPAS requirements.

### 3.1 Skid resistance value

Product assessed	Assessment method	Requirement	Outcome
D3149 HFS Type 1	Initial skid resistance to TRL Report 176 : 1997, Appendix E	≥65	Pass
	Retained skid resistance after 100,000 wheel-passes to TRL Report 176 : 1997, Appendix E	≥70	Pass

The assessment showed that the system complies with HAPAS requirements for this characteristic.

### 3.2 Texture depth

*Table 3 Texture depth*

Product assessed	Assessment method	Requirement	Outcome
D3149 HFS Type 1	Initial texture depth to BS 598-105 : 2000 or BS EN 13036-1 : 2010	≥ 1.4 mm	Pass
	Retained texture depth after 500 wheel-passes to BS 598-105 : 2000 or BS EN 13036-1 : 2010	≥ 1.2 mm	Pass
	After heat ageing and 500 wheel-passes to BS 598-105 : 2000 or BS EN 13036-1 : 2010	≥ 1.2 mm	Pass
	Retained texture depth after 100,000 wheel-passes to BS 598-105 : 2000 or BS EN 13036-1 : 2010	≥ 1.1 mm	Pass

The assessment showed that the system complies with HAPAS requirements for this characteristic.

### 3.3 Erosion index

*Table 4 Erosion index*

Product assessed	Assessment method	Requirement	Outcome
D3149 HFS Type 1	After 500 wheel-passes to BBA Guidelines, Appendix D	≤3	Pass
	After heat ageing and 500 wheel-passes to BBA Guidelines, Appendix D	≤5	Pass
	After 100,000 wheel-passes to BBA Guidelines SG1, Appendix D	≤3	Pass

The assessment showed that the system complies with HAPAS requirements for this characteristic.

### 3.4 Tensile adhesion

*Table 5 Tensile adhesion*

Product assessed	Assessment method	Requirement	Outcome
D3149 HFS Type 1	Stress at -10°C to TRL Report 176 : 1997, Appendix J	≥1.0 N/mm <sup>2</sup>	Pass
	Stress at 20°C to TRL Report 176 : 1997, Appendix J	≥0.5 N/mm <sup>2</sup>	Pass

The assessment showed that the system complies with HAPAS requirements for this characteristic.

### 3.5 Additional tests

**Table 6 Additional tests**

Product assessed	Assessment method	Requirement	Outcome
D3149 HFS Type 1	Texture depth and erosion index after resistance to freeze/thaw to TRL Report 176 : Appendix L	$\geq 1.2 \text{ mm} \leq 5$	Pass
	Texture depth and erosion Index after resistance to diesel to TRL Report 176 : 1997, Appendix M	$\geq 1.2 \text{ mm} \leq 5$	Pass
	Thermal expansion coefficient to TRL Report 176 : 1997, Appendix N	Value achieved	0.01(%/°C)
	Installation temperature test at 0°C to TRL Report 176 : 1997, Appendix P (texture depth / erosion index)	Initial texture depth $\geq 1.4 \text{ mm}$ , retained texture depth $\geq 1.2\text{mm} / \leq 3$	Pass
	Installation temperature test at 20°C to TRL Report 176 : 1997, Appendix P (texture depth / erosion index)	Initial texture depth $\geq 1.4$ , retained texture depth $\geq 1.2\text{mm} / \leq 3$	Pass

The assessment showed that the system complies with HAPAS requirements for this characteristic.

### 3.6 Durability

3.6.1 When installed in accordance with this Certificate, the system will have a service life of between 5 and 10 years (see Table 7 of this Certificate).

**Table 7 Area<sup>(1)</sup> of application by type classification**

Site category <sup>(2)</sup>	Site definition	Maximum traffic levels – Type 1 <sup>(3)</sup>
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 – dual carriageway	3500
R	Roundabouts	3500
G2	Gradient from >10%, longer than 50 m	2500
S2	Bend radius <500 m – single carriageway	2500
K	Approaches to pedestrian crossing and other high-risk situations	2500

(1) Suitable areas for use of systems classified in accordance with the Guidelines Document, Table 7, to give an expected life of 5 to 10 years.

(2) Site category as defined in CS 228.

(3) Commercial vehicles per lane per day.

3.6.2 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.

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

## 4 Summary of Process Assessment

Manufacturing process and quality control	Complies with HAPAS requirements
Delivery and site handling	Complies with HAPAS requirements
Installation	Complies with HAPAS requirements

### 4.1 Manufacture

4.1.1 The BBA has undertaken the following tasks for the assessment of product manufacture and has established that the manufacture complies with the BBA HAPAS Certification Scheme requirements:

- the BBA has recorded and evaluated the manufacturer's documentation of the methods adopted for quality control procedures and product testing against HAPAS requirements
- the BBA has assessed the quality control operated over batches of incoming materials and formulations against HAPAS Requirements
- the BBA has evaluated the process for management of non-conforming work
- the BBA has audited the production process and verified that it is in accordance with the documented process
- the BBA has checked that equipment has been properly tested and calibrated.

4.1.2 The BBA has undertaken to review 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.

† 4.1.3 The management system of the manufacturer has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by BBA (Certificate 10/Q018).

### 4.2 Delivery and site handling

† 4.2.1 The Certificate holder states that D3149 HFS Type 1 is delivered to sites in the following pack sizes:

D3149 HFS Type 1 Part A:

- 11.6 kg of material packed into 25 litre pre-labelled ring latch metal pails, maximum 36 pails per pallet or,
- 1045 kg of material packed into 1000 litre Industrial Bulk Containers (IBCs)

D3149 HFS Type 1 Part B:

- 5.4 kg of material packed into 5 litre pre-labelled plastic jerry cans or,
- 1250 kg of material packed into 1000 litre Industrial Bulk Containers (IBCs).

### 4.3 Design

4.3.1 D3149 HFS Type 1 is satisfactory for use as a high-friction surfacing system on bituminous and concrete highways with surface texture depths of between 0.5 and 2.0 mm, measured using the patch test as defined in BS 598-105 : 2000 or BS EN 13036-1 : 2010.

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

### 4.4 Installation

4.4.1 The Certificate holder's instructions for installation of the system were confirmed as meeting the BBA HAPAS Certification Scheme requirements.

4.4.2 To achieve the performance described in this Certificate, the system must be installed in accordance with the BBA Agreed Method Statement and this Certificate.

4.4.3 To achieve the performance described in this Certificate, the system must be used on bituminous and concrete highways, in accordance with the *Manual of Contract Documents for Highway Works (MCHW)*, Volume 1, Series 900, Clause 924.

4.4.4 The ambient and road surface temperatures must be recorded, and the installation must not be carried out if the road surface temperature is outside the range of 5 to 35°C.

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

4.4.6 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.

4.3.7 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.

4.4.8 The binder components and catalyst are supplied in pre-weighed packs. Part B is decanted into Part A and thoroughly mixed using a slow-speed, high-torque drill fitted with a helical mixing blade for a minimum of 45 seconds, until a homogeneous mix is achieved.

4.4.9 If a catalyst is required, due to weather conditions, it must be decanted into Part A prior to adding Part B. The Certificate holder details appropriate quantities relative to temperature in their installation procedures.

4.4.10 The mixed resin is then poured onto the surface and spread using a serrated squeegee to give an even coverage of 1.5 to 2.5 kg·m<sup>-2</sup> depending on the substrate properties (such as surface texture and porosity).

4.4.11 Immediately after the binder is applied, aggregate is broadcast over its surface and the system is allowed to cure.

4.4.12 After the binder has fully cured, the excess aggregate is removed by vacuum sweeper or other suitable means. The site can be re-opened to traffic after a minimum of four hours depending on the ambient temperature.

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

4.4.14 To achieve the performance described in this Certificate, installation of the system must be carried out by operatives approved by the BBA Approved Installer scheme<sup>(1)</sup>.

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

#### **4.5 Maintenance**

4.5.1 The system is not subject to any routine maintenance requirements, but any damage must be repaired.

4.5.2 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.

## **5 Fulfilment of Requirements**

5.1 The conclusion of this BBA assessment is that D3149 HFS Type 1, when used in accordance with the provisions of this Certificate, complies with the BBA HAPAS Certification Scheme requirements.

5.2 In order for the system to continue to meet Scheme requirements, it must be installed, used and maintained as per the manufacturer's instructions and as detailed in the Certificate.

## **6 Validity of Certificate**

Continuing validity of this Certificate is dependent on the following factors:

- continuing compliance with product or process requirements, as described in the HAPAS Scheme document, and the specification documents referred to therein
- ongoing BBA surveillance of factory production control, to verify that the specifications and quality control being operated by the manufacturer are being maintained
- formal triennial Review of the Certificate, and if required, Reissue for required technical or non-technical updates
- compliance with ongoing Certificate obligations by the Certificate holder and manufacturer(s).

## † 7 Additional 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.

### **CLP Regulations**

The Certificate holder has taken the responsibility for classifying and labelling the systems components under the *GB CLP Regulations* and the *CLP Regulation (EC) No 1272/2008 - Classification and Labelling and Packaging of Substances and Mixtures*. Users must refer to the relevant Safety Data Sheet(s).

## 8 Bibliography

BBA HAPAS Guidelines Document for the Assessment and Certification of High-Friction Surfaces for Highways (2017)

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

BS EN ISO 9001 : 2015 *Quality Management Systems - Requirements*

Design Manual for Roads and Bridges (DMRB), CS 228 – *Skidding Resistance*

Manual of Contract Documents for Highway Works, *Volume 1 Specification for Highway Works, Series 900, Clause 924 (05/18)*

Specialist Group 1 – *BBA Guidelines Document for the Assessment and Certification of High Friction Surfacing*



## 9 Conditions of Certification

9.1 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.

9.2 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.

9.3 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.

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

9.5 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 UKCA marking and CE marking.

9.6 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.

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