

Designated by Government  
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European Technical  
Approvals

## RHINOPHALT 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; the Scottish Executive; the Welsh Assembly Government; the Department for Regional Development, Northern Ireland), 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



• THIS CERTIFICATE RELATES TO THE RHINOPHALT SYSTEM<sup>(1)</sup> A GILSONITE BASED, COLD SPRAY APPLIED SURFACE TREATMENT FOR BITUMINOUS SURFACE COURSES.

- The system is suitable for use on highways as part of a highways maintenance programme to extend the life of an existing bituminous surface course.
- The system comprises a cold spray applied, Gilsonite based binder, overlaid with a fine graded grit.
- The system is installed by the Certificate holder or their authorised contractors.

(1) Rhinophalt is a registered trademark.

## HAPAS Requirements

### 1 Requirements

1.1 The Highways Technical Advisory Committee has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the Rhinophalt System. In the opinion of the BBA, the system components, when manufactured and installed in accordance with the provisions of this Certificate, are suitable for use as a surface treatment as part of a preventative maintenance programme for a bituminous surface course.

1.2 Additional requirements of the overseeing organisations are given in the *Manual of Contract Documents for Highways Works (MCHW)*, Volumes 1 and 2, 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:

4 *Manufacture and quality control* and 5 *Delivery and site handling* (5.1 and 5.2) of this Certificate.

## Technical Specification

### 3 Description

The Rhinophalt System comprises a solution of Gilsonite, petroleum bitumen, diluents, plasticisers and a fine graded grit.

### 4 Manufacture and quality control

The binder is manufactured by a blending process controlled under the American Association of State Highway and Transportation (AASHTO) quality system recommendations and in accordance with a Quality Plan agreed by the BBA which includes requirements for the following:

- raw material selection
- method of production and process control
- inspection and testing of the finished product.

### 5 Delivery and site handling

5.1 The binder is packaged and delivered to site in 205 litre drums or bulk tanker, and must be stored at temperatures below 93°C, away from any open flame, source of heat or source of ignition. Rhinophalt has a flashpoint of less than 28°C and would be classified as highly flammable under The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (CHIP3). Normal precautions are required when handling the product, ie wear suitable protective clothing and gloves, use in a well-ventilated area.

5.2 Graded fine grit is delivered to site in 25 kg bags. Normal precautions should be adopted when handling, ie avoid contact with eyes.

## Design Data

### 6 General

6.1 The Rhinophalt System is satisfactory for use as a surface maintenance treatment on bituminous mixtures used on highway applications.

6.2 A site survey should be carried out to determine the suitability of the surface course. If pre-existing faults such as fretting, delamination, or ravelling are excessive, then patch repairs may be required prior to application. The Certificate holder can advise on suitable methods of repair which are compatible with the system.

### 7 Texture

7.1 The initial texture of the surface course, when measured immediately after the application of the system (prior to trafficking), was found to be maintained.

7.2 The effect on the retained texture (after trafficking) was found to be variable depending on the type of surface course and expected traffic levels. It is recommended that this is taken into account when considering the application of the system where a minimum retained texture depth is a requirement, eg high-speed roads. The results are detailed within the *Technical Investigations* section of this Certificate.

### 8 Skid resistance

The initial (after the application of the grit) and retained skid resistance (after trafficking) of the surface course was found to be maintained when measured in accordance with the TRRL Road Research Laboratory, Road Note 27 (1969) *Instructions for using a Portable Skid Resistance Tester*. The results are detailed within the *Technical Investigations* section of this Certificate.

### 9 Consolidation of the surface

Bond tests and abrasions tests indicate that an aged asphalt surface treated with the system will be strengthened and will have an improved abrasion resistance. The results are detailed within the *Technical Investigations* section of this Certificate.

### 10 Chemical resistance

A Rhinophalt treated surface course has good resistance to hydraulic fluid and antifreeze but is no more resistant to prolonged contact with petrol, diesel or oils than an existing asphalt surface.

### 11 Resistance to water

The system will reduce the permeability of a surface but will not provide an impermeable barrier.

## 12 Durability

12.1 The durability of a treated surface will depend on the state of the surface course at the time of the treatment, the site specific location and the expected traffic levels.

12.2 The Certificate holder recommends that the initial application should be carried out at least three years after the surface course was installed and before signs of deterioration through exposure to weathering and traffic. The system may be applied to older surfaces although this would be after a satisfactory site survey had been completed in accordance with section 6.2.

12.3 The Certificate holder recommends that the system should be used as part of a surface maintenance programme, with repeat applications every four to five years dependent on the results of repeat site surveys.

## Installation

### 13 General

13.1 Application of the Rhinophalt System must be carried out in accordance with the Certificate holder's instructions, the agreed BBA Method Statement and this Certificate.

13.2 The system can only be applied to a dry surface. Work should not be started if rain is expected before the work can be completed or if the surface is wet.

13.3 Application should only be carried out on substrates with temperatures measured between 5°C and 60°C. The surface must be free of ice, frost or snow.

### 14 Preparation

14.1 Prior to application, the site should be assessed by the Certificate holder or its approved contractors as to its suitability for the system. Any patching necessary should be completed before the treatment is applied.

14.2 The area to be treated shall be thoroughly swept clean by mechanical sweeper and/or using air blowers as required. All vegetation shall be removed or cut back.

14.3 The application equipment must be calibrated in accordance with the Certificate holder's method statement as described in Table 1.

Table 1 Calibrated delivery at 5.5 kmph

Component	Applicator	Amount m <sup>2</sup>
Rhinophalt	Mobile sprayer	0.5 litres ±10%
Fine Grit	Rotary spreader	0.5 kg ±10%

14.4 Areas not to be sprayed must be masked or covered. The system can be sprayed to the edge of road markings not scheduled for relining.

14.5 Kerblines and areas with restricted vehicular access should be treated using a hand-operated applicator with a margin extended at least 100 mm. The rate of application should be 0.5 litres m<sup>-2</sup>.

## 15 Application

15.1 The area to be treated is traversed once by the mobile sprayer travelling at a constant 5.5 kmph (3.4 mph) to give an overall application rate of 0.5 litres m<sup>-2</sup> and the fine grit an application rate of 0.5 kg m<sup>-2</sup>

15.2 The site can be opened to traffic within four hours

## 16 After-care

Visual checks for uniformity and any discernable faults are carried out by the installer and any remedial works carried out as necessary

## Technical Investigations

The following is a summary of the technical investigations carried out on the Rhinophalt System.

### 17 Tests

17.1 A series of laboratory and road tests was carried out before and after the application of the system on an installation trial on the northbound section of the M40 near Banbury. The surfaces treated were stone mastic asphalt and hot-rolled asphalt. The results are detailed below in Tables 2 and 3.

Table 2 Laboratory and road performance tests carried out on the M40 trial on a hot-rolled asphalt surface course

Test	Method	Mean result			
		Before treatment	After treatment <sup>(1)</sup>	After 2 weeks	After 42 weeks
Wheel tracking at 60°C	BS 598-110				
Rate (mm h <sup>-1</sup> )		5.3	5.4	—	—
Rut depth (mm)		5.6	6.0		
Torque bond (kPa)	Guidelines Document, Appendix A.3	>1260 <sup>(2)</sup>	>1122 <sup>(2)</sup>	—	—
Texture depth (mm)	BS 598-105	1.5	1.6 <sup>(3)</sup>	1.2	1.3
Skid resistance	TRRL Road Note 27	66.9	70.8 <sup>(3)</sup>	66.8	68.8
Road hardness	TRL Road Note 39 <sup>(4)</sup>	2.4	—	1.7	1.6

(1) Before trafficking.

(2) No failure at interface.

(3) Initial measurement prior to trafficking.

(4) TRL: Road Note 39 — Design guide for surface dressing.

**Table 3** Laboratory and road performance tests carried out on the M40 trial on a stone mastic asphalt surface course

Test	Method	Mean result			
		Before treatment	After treatment <sup>(1)</sup>	After 2 weeks	After 42 weeks
Wheel tracking at 60°C	BS 598-110				
Rate (mm h <sup>-1</sup> )		0.8	0.3	—	—
Rut depth (mm)		1.4	0.9	—	—
Torque bond (kPa)	Guidelines Document, Appendix A.3	768 <sup>(2)</sup>	771 <sup>(2)</sup>	—	—
Texture depth (mm)	BS 598-105	0.8	0.8 <sup>(3)</sup>	—	1.1
Skid resistance	TRRL Road Note 27	60.8	72.4 <sup>(3)</sup>	63.0	60.9
Road hardness	TRL Road Note 39	3.1	—	3.0	2.2

(1) Before trafficking.

(2) Mode of failure = interface shear.

(3) Initial measurement prior to trafficking investigations.

17.2 A series of laboratory and road tests were carried out as part of the original assessment of Rhinophalt (Certificate No 00/3694) for use on car parks and similar areas only. The results are detailed in Table 4.

## 18 Investigations

18.1 An installation trial was carried out to assess the practicability of the installation and on-site quality control procedures. A visual inspection of the site concluded that it was free from significant abnormalities.

18.2 A user specifier survey relating to existing sites was carried out to assess the system's performance and durability.

18.3 The BBA carried out additional visits to existing sites to confirm the visual performance of the system, including a return to sites inspected as part of the assessment under Certificate No 00/3694.

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

**Table 4** Performance tests

Test	Method	Result	
Drying time over installed temperature range (minutes)	BBA method (touch dry)		
10°C			30
23°C			25
30°C			15
Skid resistance <sup>(1)</sup> (SRV)	TRL Report 176 (Appendix E)		
untreated (20°C)	TRL rubber (car tyres)		69
treated			
1 day (8°C)			78
7 days (8°C)			64
28 days (6°C)			76
42 days (11°C)			78
treated			
1 day (8°C)	4S rubber (shoes)		62
7 days (8°C)			51
28 days (6°C)			58
42 days (11°C)			65
Tensile bond <sup>(1)</sup> (N)	BD 47/94 (100 mm diameter)		
average untreated			2700 <sup>(2)</sup>
average treated			4100 <sup>(3)</sup>
Abrasion — reduction in abrasion over control in first hour (%)	Generally to BS 784 (A'Court)		
BBA site sample <sup>(1)</sup>			44
fresh HRA			66
Effect of solvents <sup>(1)</sup>	BBA ponding tests	1 day	7 days
petrol		surface softening, asphalt loose	surface broken-up
diesel		surface softening, asphalt solid	surface broken-up
hydraulic fluid		no effect	no effect
antifreeze		no effect	no effect
engine oil		Rhinophalt slightly softened	Rhinophalt softened
Artificial weathering (HRA samples)	(2000 hours UV-B/condensation 4+4 hours cycle 60°C)		
uncoated control			faded — surface friable
Rhinophalt coated			light dusting, undamaged
Water vapour flow (gm <sup>-2</sup> day <sup>-1</sup> )	BS 3177 (temperate conditions)		3.4
Water vapour permeability of free film (gmN <sup>-1</sup> s <sup>-1</sup> )			4.0 x 10 <sup>-12</sup>
Water vapour resistance of film (MNsg <sup>-1</sup> )			60
Liquid water penetration (on concrete) (lm <sup>-2</sup> h <sup>-1</sup> )	BD 47/94		
untreated			2200
Rhinophalt coated			0.45

(1) Site samples/site testing.

(2) Failure in basecourse.

(3) Failure at Rhinophalt surface.

## Bibliography

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

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

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 598-110 : 1998 *Sampling and examination of bituminous mixtures for roads and other paved areas — Methods of test for the determination of wheel-tracking rate and depth*

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

TRL Report 176 : 1997 *Laboratory tests on high friction surfaces for highways — Appendix E. Test procedure for determination of skid resistance value.*

Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*, August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works*, August 1998 (as amended)

## Conditions of Certification

### 19 Conditions

19.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is granted only to the company, firm or person named on the front page — no other company, firm or person may hold or claim any entitlement to this Certificate
- 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.

19.2 References in this Certificate to any Act of Parliament, Statutory Instrument, Directive or Regulation of the European Union, British, European or International Standard, Code of Practice, manufacturers' instructions or similar publication, are references to such publication in the form in which it was current at the date of this Certificate.

19.3 This Certificate will remain valid for an unlimited period provided that the product/system and the manufacture and/or fabrication including all related and relevant 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
- remain in accordance with the requirements of Highways Authorities' Product Approval Scheme.

19.4 In granting this Certificate, the BBA is not responsible for:

- 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
- individual installations of the product/system, including the nature, design, methods and workmanship of or related to the installation
- the actual works in which the product/system is installed, used and maintained, including the nature, design, methods and workmanship of such works.

19.5 Any information relating to the manufacture, supply, installation, use and maintenance 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 and maintained. It does 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; 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. 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 manufacture, supply, installation, use and maintenance of this product/system.



In the opinion of the British Board of Agrément, the Rhinophalt System is fit for its intended use, provided it is installed, used and maintained as set out in this Certificate. Certificate No 07/H125 is according awarded to ASI Solutions plc.

On behalf of the British Board of Agrément

Date of issue: 29th March 2007

A handwritten signature in black ink, appearing to read 'G. A. Cooper', is written over a light grey background.

Chief Executive



