HAPAS
Roads and Bridges

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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
08/H140
Product Sheet 1

NU-PHALT REPAIR SYSTEM FOR HIGHWAYS

NU-PHALT INFRA-RED PERMANENT ROAD REPAIR SYSTEM

This Certificate is issued under the Highway Authorities' Product Approval Scheme (HAPAS) by the British Board of Agrément (BBA) in conjunction with the Highways Agency (HA) (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 SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to Nu-phalt Infra-Red Permanent Road Repair System, an in-situ permanent road repair for hot-rolled asphalt and surface dressing.

AGRÉMENT 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 five-yearly review.

KEY FACTORS ASSESSED

Surface characteristics — a repaired surface will have a satisfactory surface texture and skid resistance (see section 5).

Mechanical resistance — a repaired surface will have a satisfactory resistance to expected trafficking and loadings (see section 6).

Durability — the system has been used in the UK since 2005 and available evidence indicates that use of the system will result in a repair that will have an equivalent life to that of the adjacent surface (see section 8).

The BBA has awarded this Agrément 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

Date of First issue: 8 December 2008

Simon Wroe
Head of Approvals — Materials

Greg Cooper
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 of this Agrément Certificate by either referring to the BBA's website (www.bbacerts.co.uk) or contacting the BBA direct.

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HAPAS Requirements

Requirements

The Highways Technical Advisory Committee (HiTAC) has agreed with the British Board of Agrément the aspects of performance to be used by the BBA in assessing the Nu-phalt system. In the opinion of the BBA, the Nu-phalt Infra-Red Permanent Road Repair System, when manufactured and installed in accordance with the provisions of this Certificate, will provide a satisfactory repair to the road surface.

Additional requirements of the overseeing organisations are given in the Manual of Contract Documents for Highways Works (MCHW)[1], Volumes 1 and 2, Series 900.

(1) The MCHW is operated by the Overseeing Organisations: The Highways Agency (HA), Transport Scotland, the Welsh Assembly Government and The Department for Regional Development (Northern Ireland).

Regulations

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 2 *Delivery and site handling* (2.1, 2.2 and 2.3).

General

This Certificate relates to the Nu-phalt Infra-Red Permanent Road Repair System for asphalt surfaces for the permanent repair of defects such as pot-holes, chipping loss, joint failures and surface cracks on hot-rolled asphalt and surface dressed highways.

Technical Specification

1 Description

1.1 The Nu-phalt Infra-Red Permanent Road Repair System is a permanent road repair system that re-heats and recycles the existing in-situ material using an infra-red heating process.

1.2 Additional materials are added when necessary to facilitate the repair of the road surface. The products used are:

- Nu-phalt anionic bitumen emulsion — a proprietary bitumen emulsion, mixed into the re-heated surface before compaction
- Nu-phalt 0/6 mm or 0/10mm asphalt — two proprietary bitumen emulsion asphalts, mixed into the surface before compaction to ensure finished surface levels are restored
- pre-coated chippings — the types and sizes of pre-coated chippings is determined by the site-specific requirements, including location and contractual requirements for polished stone value (PSV); texture depth and/or other properties of the existing surface course.

2 Delivery and site handling

The component products packaging, weight and classification under *The Chemicals (Hazard Information and Packaging for Supply) Regulations 2002* (CHIP3) are given in Table 1. Normal precautions are required when handling these types of products, ie wear suitable protective clothing and gloves.

Table 1 Component weight, packaging and CHIP3 classification

Component	Weight/ package type	Storage temperature (°C)	CHIP3 classification
Nu-phalt anionic bitumen emulsion	25 litre drums	>2<90	Irritant
Nu-phalt 0/6 mm and 0/10mm	25 kg bags	>0	Irritant
Pre-coated chippings	25 kg bags	>0	–

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Nu-phalt Infra-Red Permanent Road Repair System.

Design Considerations

3 Use

3.1 The Nu-phalt Infra-Red Permanent Road Repair System is satisfactory for use as a permanent road repair of highway defects such as pot-holes, chipping loss, joint failures and surface cracks on the following generic asphalt surfaces:

- hot-rolled asphalt
- surface dressing
- micro surfacing.

3.2 The system has been used on DBM and SMA type surface courses, but these have not been assessed by the BBA and are outside the scope of this Certificate.

4 Practicability of installation

The system is installed solely by contractors approved by the Certificate holder using specialised equipment in accordance with Certificate holder's laying procedure.

5 Surface characteristics

Initial texture depth

5.1 Texture depth measurements taken from both hot-rolled asphalt and surface dressed roads repaired using the Nu-phalt system indicate that a satisfactory texture depth can be maintained (see Tables 4 and 5 in the *Technical Investigations* part of this Certificate).

Initial skid resistance

5.2 Skid resistance measurements taken from both hot-rolled asphalt and surface dressed roads repaired using the Nu-phalt system indicate that a satisfactory skid resistance can be maintained (see Tables 4 and 5 in the *Technical Investigations* part of this Certificate).

6 Mechanical resistance

Resistance to permanent deformation

6.1 The wheel tracking rut rate and rut depth was measured on cores taken from repairs on both hot-rolled asphalt and surface dressed roads. The results indicate that a satisfactory rut rate and rut depth can be achieved (see Tables 2 and 3 in the *Technical Investigations* part of this Certificate).

Indirect stiffness modulus (ITSM)

6.2 The ITSM was measured on samples taken from repairs on both the hot-rolled asphalt and surface dressed roads. The results indicate that a satisfactory ITSM can be achieved (see Tables 2 and 3 in the *Technical Investigations* part of this Certificate).

Torque bond

6.3 The torque bond strength and mode of failure was measured on cores removed from a repaired hot-rolled asphalt road. The results indicate that a satisfactory torque bond strength can be achieved (see Table 2 in the *Technical Investigations* part of this Certificate).

7 Maintenance

This system is not subject to any routine maintenance requirements but any damage should be repaired using the procedures given in the *Installation* part of this Certificate (see sections 9 to 13).

8 Durability

8.1 The durability of the system will depend on the nature and general state of repair of the surrounding surface, the exact location of the repair and the expected traffic levels.

8.2 The system is for surface repairs, therefore, the structural layers of the pavement must be adequate to support the traffic without undue cracking or deformation during the expected life of the system. Where defects have penetrated substantially through the depth of the pavement, no expectation of life can be predicted.

8.3 The system has been used in the UK since 2005 and available evidence indicates that provided the structural integrity of the road (see sections 8.1 and 8.2) is taken into account, the system will provide a repaired surface that will have at least the life of the adjacent surface.

Installation

9 General

9.1 The Nu-phalt Infra-Red Permanent Road Repair System should only be installed by installers who have been trained and appointed by the Certificate holder.

9.2 Traffic Management should be in accordance with Department of Transport Traffic Safety at Street Works and Road Works Code of Practice and the following regulations:

- The Health and Safety (Safety, Signs and Signals) Regulations 1996
- The New Roads and Streetworks Act 1991.

9.3 Use of Nu-phalt should be suspended during periods of continuous or heavy rain. Any free-standing water should be brushed away from the area prior to repair. The system should not be used when the air temperature falls below 0°C in anything other than calm, dry conditions. Use of the system should cease in all conditions when the air temperature falls below –3°C.

10 Preparation

10.1 The defective road surface is heated to a temperature of 200°C±30°C using Nu-phalt infra-red heating equipment.

10.2 When the surface has been heated to the required temperature a joint 100 mm inside the perimeter of the heated area is cut into the surface.

10.3 The surface is raked thoroughly to expose the maximum surface area within the material.

11 Addition of Nu-phalt bitumen emulsion and asphalt

Nu-phalt anionic bitumen emulsion

11.1 When necessary, a uniform application of Nu-phalt anionic bitumen emulsion is applied to the heated surface and raked in, prior to compaction. The emulsion is hand-applied using a specialised applicator which controls the flow of the emulsion.

11.2 The addition of the emulsion is dependent upon the visual condition of the asphalt at the time of the repair. The Nu-phalt installer completes a visual inspection of the asphalt at the time of repair and uses the results of this inspection to determine if additional emulsion is needed to be applied to the surface.

Nu-phalt asphalt

11.3 Nu-phalt asphalt is added when necessary to ensure satisfactory finished levels.

11.4 When required, pre-coated chippings are applied to the surface taking care to ensure the finished texture level is achieved.

12 Compaction

Repairs are fully compacted immediately using conventional compaction equipment.

13 After-care

13.1 Visual checks for uniform surface texture, blemishes and any discernible faults are conducted by the installer and any remedial works carried out as necessary.

13.2 During the cooling period no disturbance or trafficking of the system is permitted.

Technical Investigations

14 Tests

A series of laboratory and road tests were carried out on the system. The results of the tests are detailed in Tables 2 to 5.

Table 2 Results from laboratory tests carried out on cores taken from a witnessed installation trial of Nu-phalt at West Drive, Cambridgeshire[1]

Test	Mean result		Method
	Before	After	
Wheel tracking at 60°C[2]			Appendix A.1 Guidelines document
rate (mm h^{-1})	0.4	0.5	
rut depth (mm)	0.6	2.0	
Torque bond strength at 20±2°C (kPa)	1757[3]	1074[4]	Appendix A.3 Guidelines document
ITSM (MPa)	4743	2287	BS DD 213

(1) Hot-rolled asphalt (HRA).

(2) Mean core thickness = 33 mm.

(3) Mode of failure = No failure recorded. Maximum torque reached within calibrated parameters. The age of the surface at the time of test was not known.

(4) Mode of failure = material rupture. Cores tested at 43 days.

Table 3 Results from laboratory tests carried out on cores taken from a witnessed installation trial of Nu-phalt at Cromwell Drive, Cleethorpes[1]

Test	Mean result		Method
	Before	After	
Wheel tracking at 60°C[2]			Appendix A.1 Guidelines document
rate (mm h^{-1})	0.3	0.6	
rut depth (mm)	0.7	1.6	
ITSM (MPa)	2015	991	BS DD 213

(1) Surface dressed (SD).

(2) Mean core thickness = 9 mm.

Table 4 Results from road tests carried out on the witnessed installation trial of Nu-phalt at West Drive, Cambridgeshire[1]

Test	Mean result[2]		Method
	Before	After	
Texture depth			BS 598-105
initial[3]	1.0	1.2	
Skid resistance			TRL Road Note 27[4]
initial[3]	71.3	63.2	

(1) Hot-rolled asphalt.

(2) The test area was 3 m by 1 m. Therefore, the number of measurements was reduced to 3.

(3) Initial measured – prior to trafficking.

(4) Road Research Laboratory Note 27: 1960 *Instructions for Using the Portable Skid Resistance Tester*.

Table 5 Results from road tests carried out on the witnessed installation trial of Nu-phalt at Cromwell Drive, Cleethorpes[1]

Test	Mean result[2]		Method
	Before	After	
Texture depth			BS 598-105
initial[3]	0.7	0.8	
Skid resistance			TRL Road Note 27[4]
initial[3]	74.3	80.3	

(1) Hot-rolled asphalt.

(2) The test area was 3 m by 1 m. Therefore, the number of measurements was reduced to 3.

(3) Initial measured — prior to trafficking.

(4) Road Research Laboratory Note 27: 1960 *Instructions for Using the Portable Skid Resistance Tester*.

15 Investigations

15.1 A trial was carried out to assess the practicability of the installation and on-site quality control procedures. A visual inspection of the finished works concluded that the Nu-phalt surface was free from any significant abnormalities.

15.2 A user/specifier survey relating to the performance in use was carried out. This confirmed the system's performance and durability in applications were representative of those quoted within this Certificate.

15.3 The manufacturing process for the Nu-phalt bitumen emulsion was examined by inspection of the production plant and the methods adopted for quality control, and the quality and composition of the materials used. The inspection confirmed that the plant operated in accordance with requirements of the Quality Plan and Management System agreed with the BBA.

15.4 The BBA carried out additional visits to existing sites to confirm the visual performance of the system.

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 DD 213 : 1993 *Method for determination of the indirect tensile stiffness modulus of bituminous mixtures*

Guidelines Document for the Assessment and Certification of Thin Surfacing Systems for Highways, July 2004

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)

16 Conditions

16.1 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.

16.2 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.

16.3 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.

16.4 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.

16.5 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.

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